Office for National Statistics

Statistical bulletin

Coronavirus (COVID-19) related deaths by occupation, before and during lockdown, England and Wales: deaths registered between 9 March and 30 June 2020

Provisional analysis of deaths involving the coronavirus (COVID-19) by occupation where the infection may have been acquired either before or during the period of lockdown.

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1 . Main points

- Building on previous releases that looked at rates of death involving the coronavirus (COVID-19) by occupation, this bulletin aims to understand the impact of lockdown on these rates.
- Between 9 March and 30 June 2020, prior to the widespread easing of lockdown restrictions, 5,330 deaths involving COVID-19 in the working age population (those aged 20 to 64 years) of England and Wales were registered.
- 72.0% of the total number (3,839 deaths) were likely to be the result of an infection acquired before lockdown.
- For both sexes, age-standardised rates of death involving COVID-19 by occupation were statistically significantly lower during lockdown than before lockdown.
- Across the entire time period, some groups of occupations continued to have high rates of death involving COVID-19, when compared with rates among those of the same age and sex in the population.
- Among men, four of the nine major occupation groups (elementary; caring, leisure and personal services; process, plant and machine operatives; and skilled trades) had statistically significantly higher rates of death involving COVID-19 both before and during lockdown, when compared with rates among those of same age and sex in the population.
- Caring, leisure and other services was the only major occupation group to have a statistically significantly higher rate of death involving COVID-19 among women before and during lockdown, when compared with rates among those of the same age and sex in the population.
- Among health and social care professionals, rates of death involving COVID-19 in men were around three times higher when the virus was more likely acquired before lockdown than during lockdown; in women, rates were around two times higher.
- Reasons for these findings are complex, but factors like the level of exposure to others before and during lockdown, the ability to work from home, whether an occupation was furloughed, and where someone lives could all be playing a role.

2 . Overview of coronavirus-related deaths by occupation: before and during lockdown

Previously published analysis showed the wide range of occupations with elevated rates of death involving the coronavirus (COVID-19), including elementary male workers such as security guards, men and women working in social care occupations such as care workers and home carers, and men working in healthcare professions such as nurses. Reasons for such findings are not yet fully understood, however, it is likely that jobs involving close proximity with others, and those where there is regular exposure to disease, are most likely to be exposed to COVID-19. Our previous release discusses a range of other factors that may be associated with COVID-19 related deaths by occupation.

Occupation was defined using the Standard Occupation Classification 2010 (SOC 2010) – see Glossary for further information.

The lockdown that came into place in England and Wales on 23 March 2020, may have changed the likelihood of people in certain occupations becoming exposed to COVID-19. This bulletin presents analysis of deaths involving COVID-19 in different occupation groups among those aged 20 to 64 years in England and Wales.Using the data on deaths involving COVID-19 by occupation registered up to 30 June 2020 – deaths that were registered prior to widespread easing of lockdown restrictions – we compare deaths where the time of COVID-19 infection is likely to be either before or during the period of lockdown.

In the analysis, we have made assumptions on the timeline of COVID-19, based on the evidence that is currently available. Government guidelines show the maximum time from infection to symptom onset is 14 days, and a number of research studies have shown there to be around 20 days on average from symptom onset to death, in the worst cases of the disease (for further information, see Measuring the data). Therefore, in this bulletin we assume a period of 34 days from infection with COVID-19 to the date of death. As such, the data described in this bulletin are split into two groups, based on the date of death:

- infection likely to be acquired before the period of lockdown: all deaths that occurred on or before 25 April 2020
- infection likely to be acquired during the period of lockdown: all deaths that occurred on or after 26 April 2020, that is 34 days from the date of lockdown on 23 March 2020

The analysis is based on assumptions and the findings should be interpreted bearing in mind the warnings in the Strengths and limitations section.

The analysis is based on assumptions, and therefore has its limitations. For example, the incubation period for COVID-19 for some people will be shorter than 14 days, and the time between onset of symptoms and death will vary. However, given that the length of illness is not consistently recorded on death certificates, and that our death registrations data are not currently linked to another data source to obtain this information, the findings described in this bulletin presently represent our best estimates. The findings should be interpreted bearing in mind the warnings in the Strengths and limitations section.

For deaths registered between 9 March and 30 June 2020, there were 5,330 deaths involving COVID-19 in the working age population (aged 20 to 64 years) of England and Wales. Of these, 3,839 deaths (or 72.0% of the total) occurred on or before 25 April 2020 –these are the deaths we assume to be a result of an infection acquired before lockdown – with annualised age standardised rates of 117.0 deaths per 100,000 men (or 2,513 deaths) and 59.8 deaths per 100,000 women (or 1,326 deaths).

We have adjusted the rates in this release so it is possible to compare rates in the "before" and "during" lockdown periods; for this reason it is not possible to compare these rates with those published previously. See Measuring the data for more information.

The remaining 1,491 deaths we assume to be the result of an infection acquired during lockdown with rates of 32.5 deaths per 100,000 men (or 961 deaths) and 17.5 deaths per 100,000 women (or 530 deaths).

The following analyses include data where information on the occupation of the deceased was available on the death certificate. Of the deaths recorded among the working age population in this period, 75.3% (or 4,013 out of 5,330 deaths) included information on occupation. Further information on the data, including the main reasons for missing occupation, can be found in Measuring the data.

3 . Deaths involving COVID-19 in men, by occupation, infection acquired before and during the lockdown

Previously published analysis showed that men working in elementary occupations (jobs that perform mainly routine tasks, such as construction workers and cleaners) and men working in caring, leisure and other service occupations (such as nursing assistants, care workers, and ambulance drivers) had the highest rates of death involving COVID-19, when compared with the rate among all men of the same age and sex in England and Wales. Elevated rates of death involving COVID-19 were also found among men working in process, plant and machine operative occupations (such as operating machinery in factories in addition to transport drivers such as taxi or bus drivers); administrative and secretarial occupations (such as book-keepers); skilled trade occupations (such as farmers, welders, electricians, and roofers) and sales and customer service occupations (such as sales and retail assistants).

For all groups of occupations, mortality rates among men were statistically significantly lower during lockdown

Overall, rates of death involving COVID-19 were statistically significantly lower in all occupation groups during lockdown (Figure 2), when compared with the rates where the infection is likely to have been acquired before lockdown (Figure 1). Lockdown resulted in fewer people being infected with COVID-19, resulting in lower mortality rates.

When comparing rates between the two groups, we found four main patterns of findings.

Raised rates before and during lockdown

Four of the six major group occupations with raised rates in our previously published analysis were found to have raised rates of death involving COVID-19 in the before and during lockdown groups (Figures 2 and 3), when compared with the corresponding rate of death involving COVID-19 among men of the same age in the general population. These were: elementary occupations; caring, leisure and personal service occupations; process, plant, and machine operative occupations; skilled trades occupations. Of the specific occupations included in these groups, previous analysis shows that security guards, care workers and home carers, taxi and bus drivers, vehicle technicians and mechanics, had some of the highest rates of death involving COVID-19. Many of the occupations in these groups will have continued working during the pandemic and would be unable to work from home, possibly increasing their chances of catching the virus.

Low rates before and during lockdown

Men working in professional occupations and professional associate occupations had statistically significantly lower rates in both the before and during lockdown groups (Figures 1 and 2).

Low rates during lockdown only

Men working as managers, directors, and senior officials had a statistically significantly lower rate in the during lockdown group (Figure 2). In the before lockdown group the rate in this occupation was like that seen in the general population among men of the same age (Figure 1).

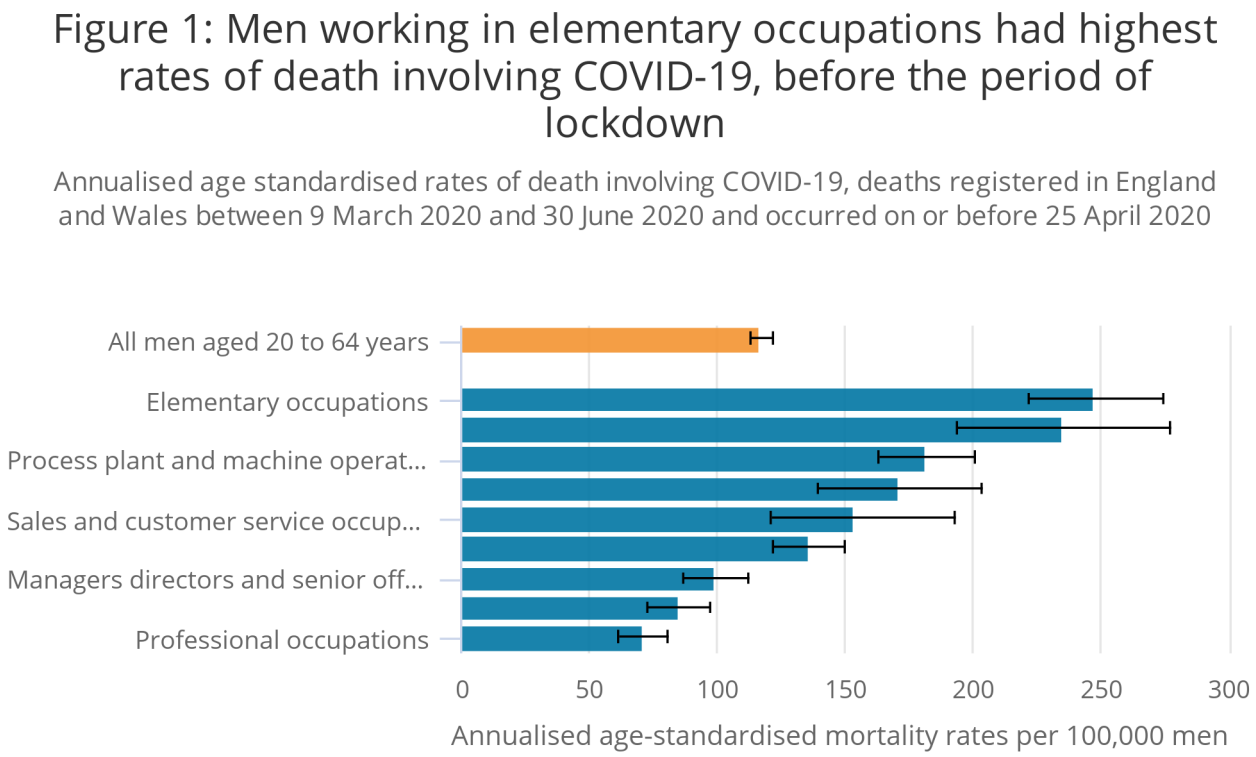
High rates before lockdown only

Men working in administrative and secretarial occupations had a statistically significantly higher rate in the before lockdown group (Figure 1). In the during lockdown group, the rate in this occupation was like that seen in the population among men of the same age (Figure 2).

We did not find any occupation groups with raised rates in the lockdown group only. Possible explanations for occupations having statistically significantly lower rates during lockdown include their ability to work from home or being furloughed (see Section 6: Factors that may be associated with COVID-19 related deaths by occupation for further information).

Figure 1: Men working in elementary occupations had highest rates of death involving COVID-19, before the period of lockdown

Annualised age standardised rates of death involving COVID-19, deaths registered in England and Wales between 9 March 2020 and 30 June 2020 and occurred on or before 25 April 2020



Source: Office for National Statistics

Notes:

1. Deaths involving the coronavirus (COVID-19) include those with an underlying cause, or any mention, of U07.1 (COVID-19, virus identified) or U07.2 (COVID-19, virus not identified).

2. Figures are for residents of England and Wales aged 20 to 64 years.

3. Occupations defined using the Standard Occupation Classification 2010 (SOC 2010).

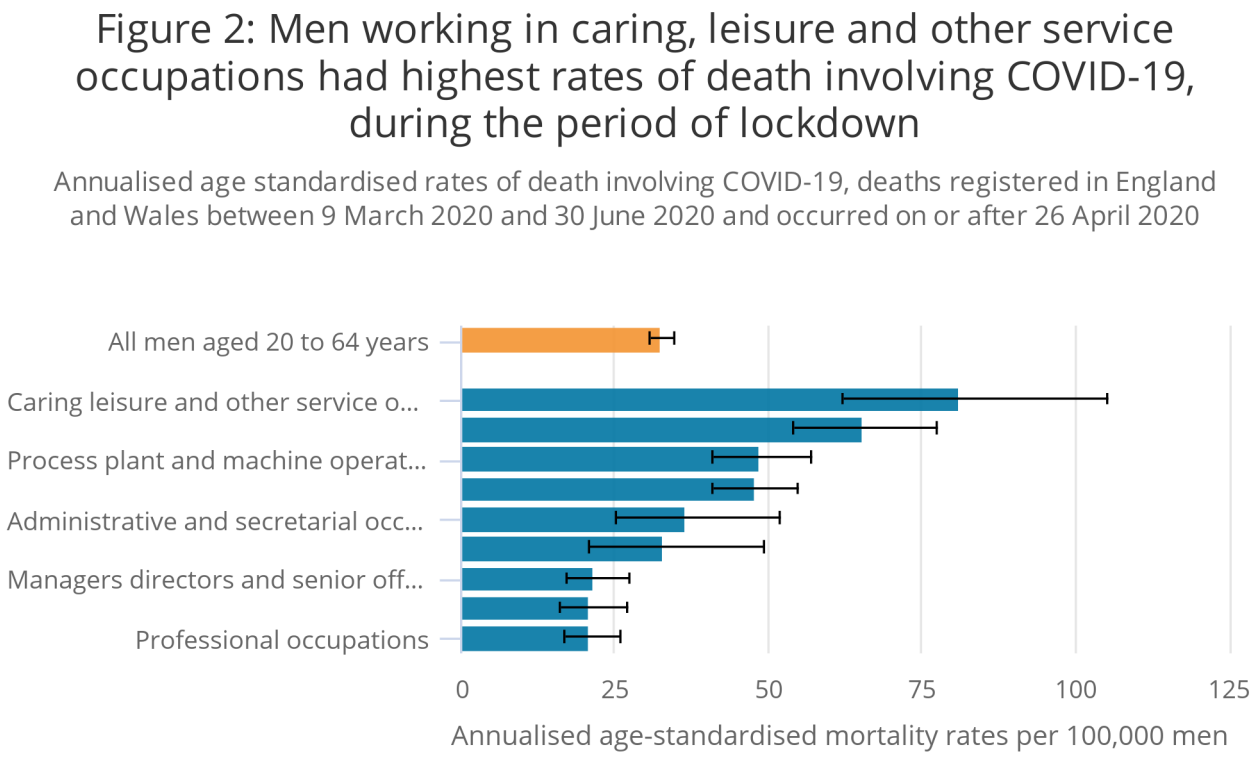
4. Figures are for deaths that occurred on or before 25th April 2020 – these are the deaths we assume to be a result of COVID-19 infection before the date of lockdown on 23rd March 2020.

5. Figures are based on deaths registered between 9th March and 30th June 2020.

6. Annualised age-standardised mortality rates are only presented for occupations with 20 or more deaths.

Figure 2: Men working in caring, leisure and other service occupations had highest rates of death involving COVID-19, during the period of lockdown

Annualised age standardised rates of death involving COVID-19, deaths registered in England and Wales between 9 March 2020 and 30 June 2020 and occurred on or after 26 April 2020



Source: Office for National Statistics

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2. Figures are for residents of England and Wales aged 20 to 64 years.

3. Occupations defined using the Standard Occupation Classification 2010 (SOC 2010)

4. Figures are for deaths that occurred between 26 April 2020 and 30 June 2020 (inclusive) these are the deaths we assume to be a result of COVID-19 infection during the period of lockdown that began on 23 March 2020.

5. Figures are based on deaths registered between 9 March and 30 June 2020.

6. Annualised age-standardised mortality rates are only presented for occupations with 20 or more deaths.

4 . Deaths involving COVID-19 in women, by occupation, before and during the lockdown

Women had far fewer numbers of deaths involving COVID-19 compared with men of the same age (20 to 64 years), for deaths registered up to 30 June 2020. Consequently, our previous analysis showed the caring, leisure and other service occupations was the only group with a raised rate of death involving COVID-19 compared with the rate among women of the same age in the general population. This finding was largely due to the high rate among care workers and home carers.

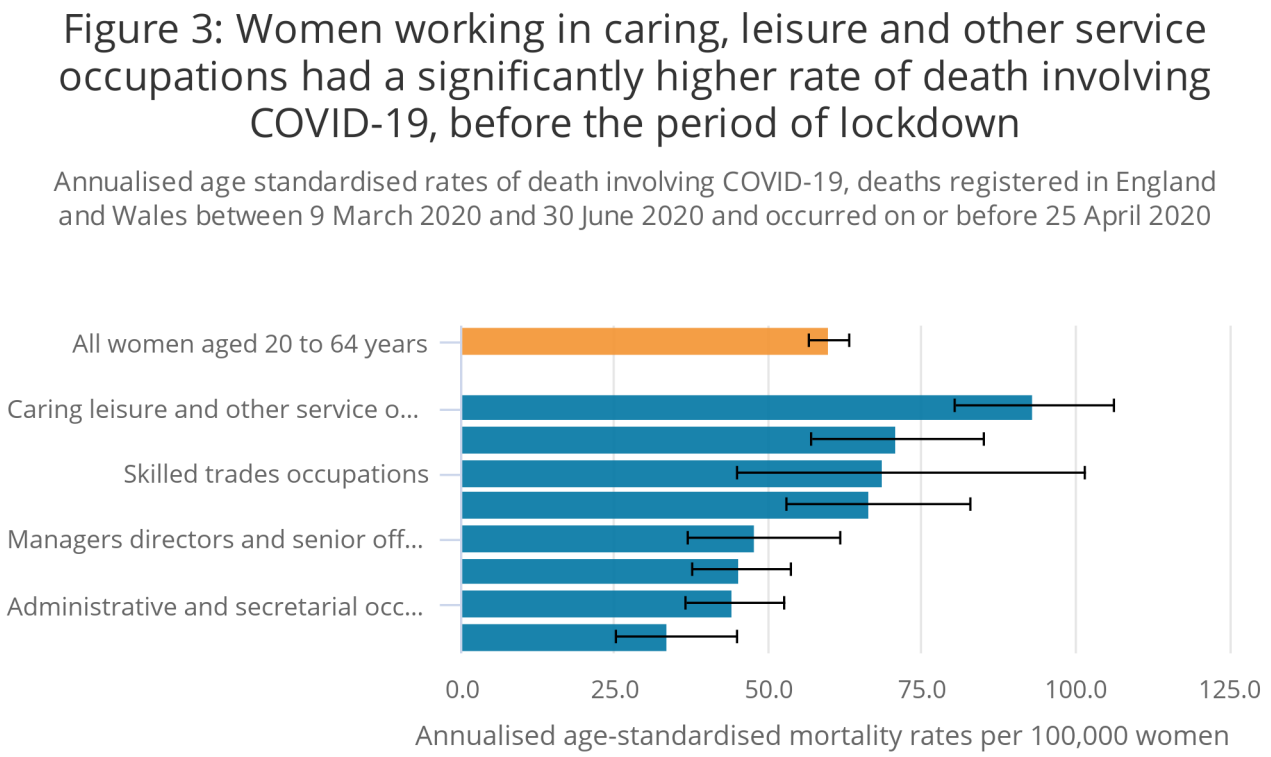
As with men, rates of death involving COVID-19 were statistically significantly lower in all occupation groups during lockdown (Figure 4), when compared with the rates where the infection is assumed to have been acquired before lockdown (Figure 3).

Women working in caring, leisure, and other service occupations had elevated rates in both the “before” and “during” lockdown groups

When looking at these deaths where the time of COVID-19 infection is assumed to be either before or during the period of lockdown, only women working in caring, leisure and other service occupations were found to have statistically elevated rates. This was found to be the case in the before and during lockdown groups (Figures 3 and 4), when compared with the corresponding rate of death involving COVID-19 among women of the same age in the general population. In our previous releases, the higher rate in the caring, leisure and other service occupations group was found to be largely explained by carers and home carers. Such occupations have likely continued to work during the pandemic and are unable to work from home, possibly increasing the likelihood of being infected.

Figure 3: Women working in caring, leisure and other service occupations had a significantly higher rate of death involving COVID-19, before the period of lockdown

Annualised age standardised rates of death involving COVID-19, deaths registered in England and Wales between 9 March 2020 and 30 June 2020 and occurred on or before 25 April 2020



Source: Office for National Statistics

Notes:

1. Deaths involving the coronavirus (COVID-19) include those with an underlying cause, or any mention, of U07.1 (COVID-19, virus identified) or U07.2 (COVID-19, virus not identified).

2. Figures are for residents of England and Wales aged 20 to 64 years.

3. Occupations defined using the Standard Occupation Classification 2010 (SOC 2010)

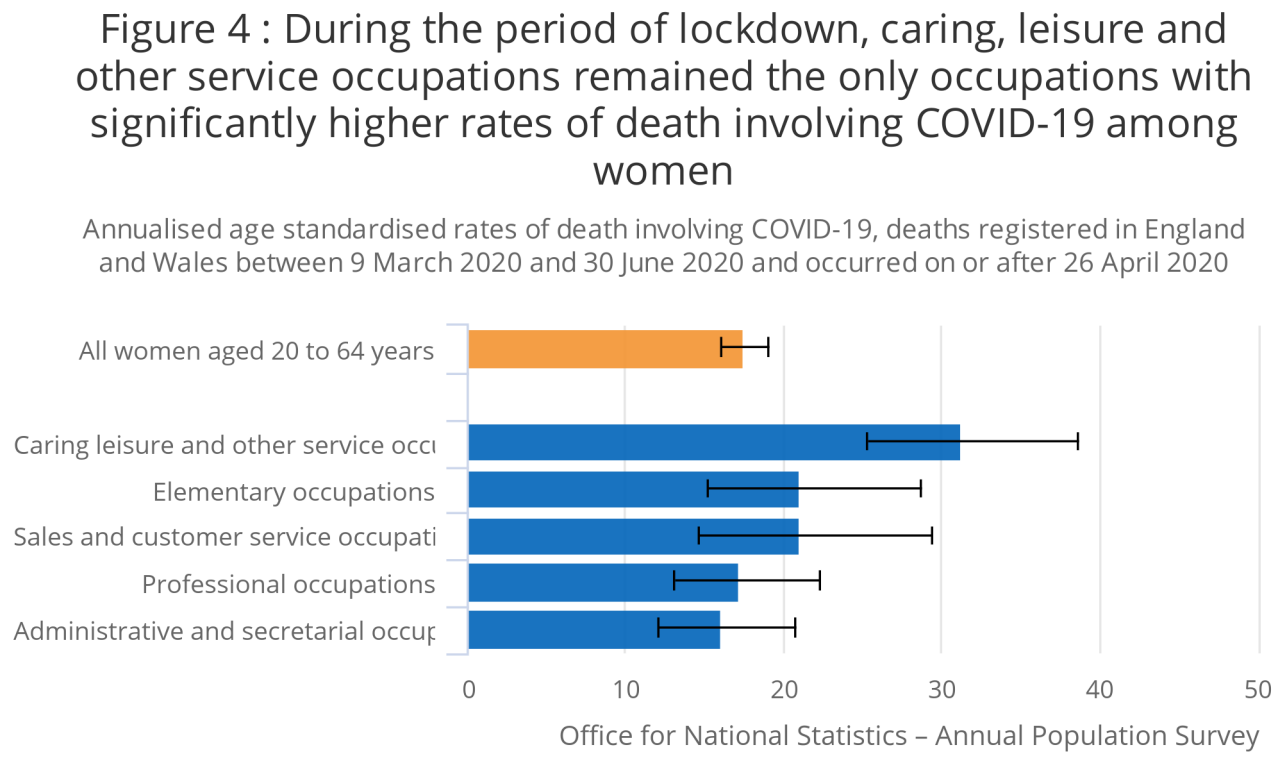
4. Figures are for deaths that occurred on or before 25 April 2020 – these are the deaths we assume to be a result of COVID-19 infection before the date of lockdown on 23 March 2020.

5. Figures are based on deaths registered between 9 March and 30 June 2020.

6. Annualised age-standardised mortality rates are only presented for occupations with 20 or more deaths.

Figure 4 : During the period of lockdown, caring, leisure and other service occupations remained the only occupations with significantly higher rates of death involving COVID-19 among women

Annualised age standardised rates of death involving COVID-19, deaths registered in England and Wales between 9 March 2020 and 30 June 2020 and occurred on or after 26 April 2020



Source: Office for National Statistics

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2. Figures are for residents of England and Wales aged 20 to 64 years.

3. Occupations defined using the Standard Occupation Classification 2010 (SOC 2010)

4. Figures are for deaths that occurred between 26 April 2020 and 30 June 2020 (inclusive) – these are the deaths we assume to be a result of COVID-19 infection during the period of lockdown that began on 23 March 2020.

5. Figures are based on deaths registered between 9 March and 30 June 2020.

6. Annualised age-standardised mortality rates are only presented for occupations with 20 or more deaths.

5 . Deaths involving COVID-19 among male and female health and social care workers, before and during lockdown

Deaths among health and social care workers are recorded in a wide range of occupational groups. In this section we present analysis that grouped specific occupations into these two categories for men and women.

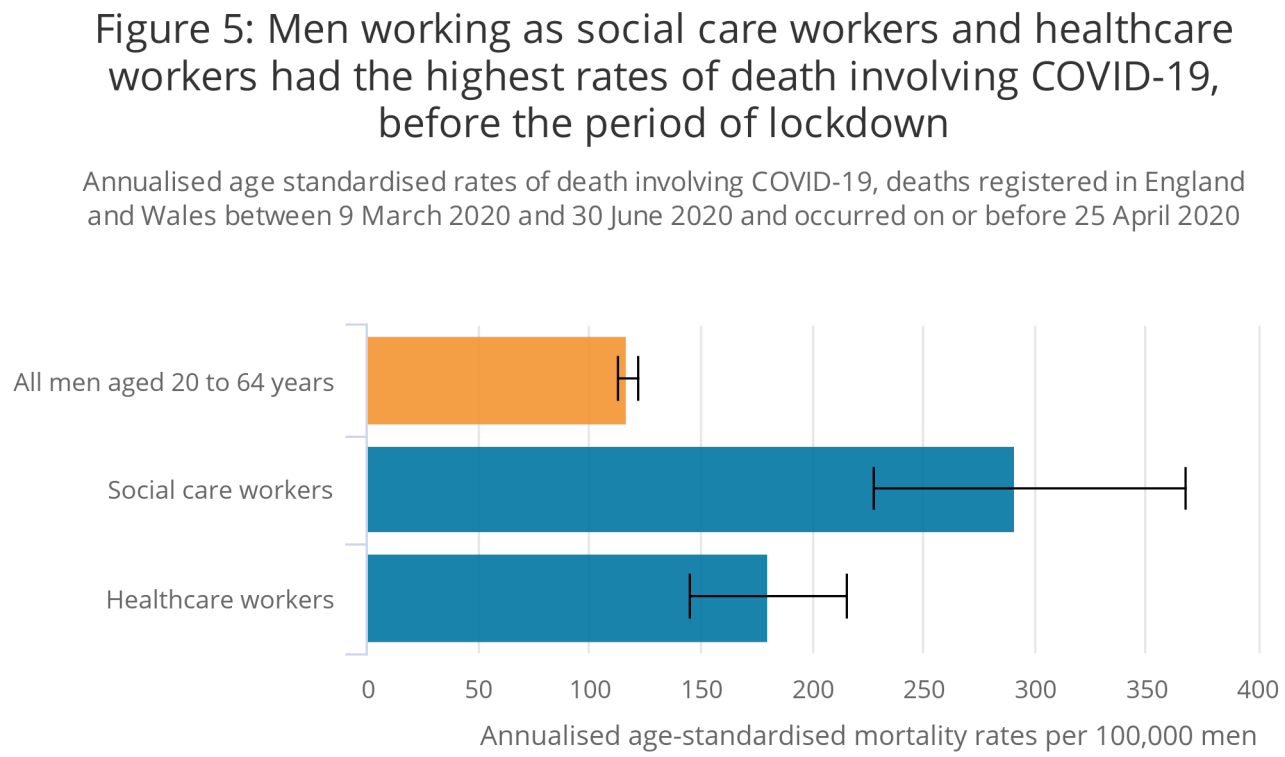
Previous analysis showed that men and women working in social care occupations (such as care workers and home carers, social workers, managers of residential care institutions, and care escorts) had raised rates of death involving COVID-19 when compared with the rate of COVID-19 among those of the same age and sex in the population. Among health care workers (such as doctors, nurses and midwives, nurse assistants, paramedics, ambulance staff, and hospital porters) only men were found to have raised rates of death involving COVID-19, a finding largely explained by the rate among male nurses. Interestingly, at the most granular level of occupation, female nurses were also found to have raised rates.

For men working in health and social care, rates of death involving COVID-19 were at least three times higher in the “before” than the “during” lockdown groups

Among men working in healthcare professions, the rate of death involving COVID-19 was around 3.2 times higher in those who likely acquired the virus before lockdown (180.3 deaths per 100,000 men; Figure 5) than those who likely acquired the virus during lockdown (55.5 deaths per 100,000 men; Figure 6). For social care workers, the rate before lockdown rate was around 2.9 times higher than the during lockdown rate (291.3 deaths per 100,000 men compared with 99.8 per 100,000, respectively).

Figure 5: Men working as social care workers and healthcare workers had the highest rates of death involving COVID-19, before the period of lockdown

Annualised age standardised rates of death involving COVID-19, deaths registered in England and Wales between 9 March 2020 and 30 June 2020 and occurred on or before 25 April 2020



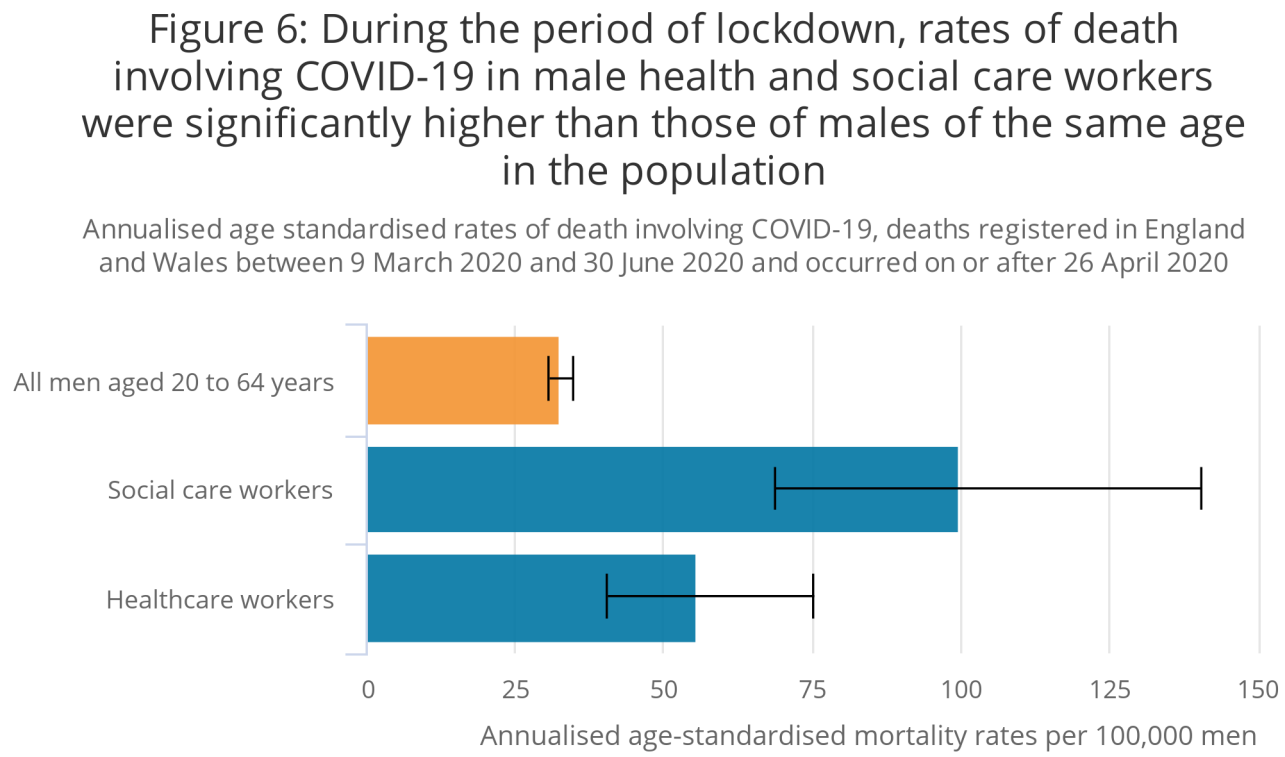
Source: Office for National Statistics

Notes:

1. Deaths involving the coronavirus (COVID-19) include those with an underlying cause, or any mention, of U07.1 (COVID-19, virus identified) or U07.2 (COVID-19, virus not identified).
2. Figures are for residents of England and Wales aged 20 to 64 years.
3. Occupations defined using the Standard Occupation Classification 2010 (SOC 2010)
4. Figures are for deaths that occurred on or before 25 April 2020 – these are the deaths we assume to be a result of COVID-19 infection before the date of lockdown on 23 March 2020.
5. Figures are based on deaths registered between 9 March and 30 June 2020.
6. Age-standardised mortality rates are only presented for occupations with 20 or more deaths.

Figure 6: During the period of lockdown, rates of death involving COVID-19 in male health and social care workers were significantly higher than those of males of the same age in the population

Annualised age standardised rates of death involving COVID-19, deaths registered in England and Wales between 9 March 2020 and 30 June 2020 and occurred on or after 26 April 2020



Source: Office for National Statistics

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5. Figures are based on deaths registered between 9 March and 30 June 2020.
6. Age-standardised mortality rates are only presented for occupations with 20 or more deaths.

Among women, only social care workers had a higher rate of death in both the “before” and “during” lockdown groups compared with women of the same age in the population

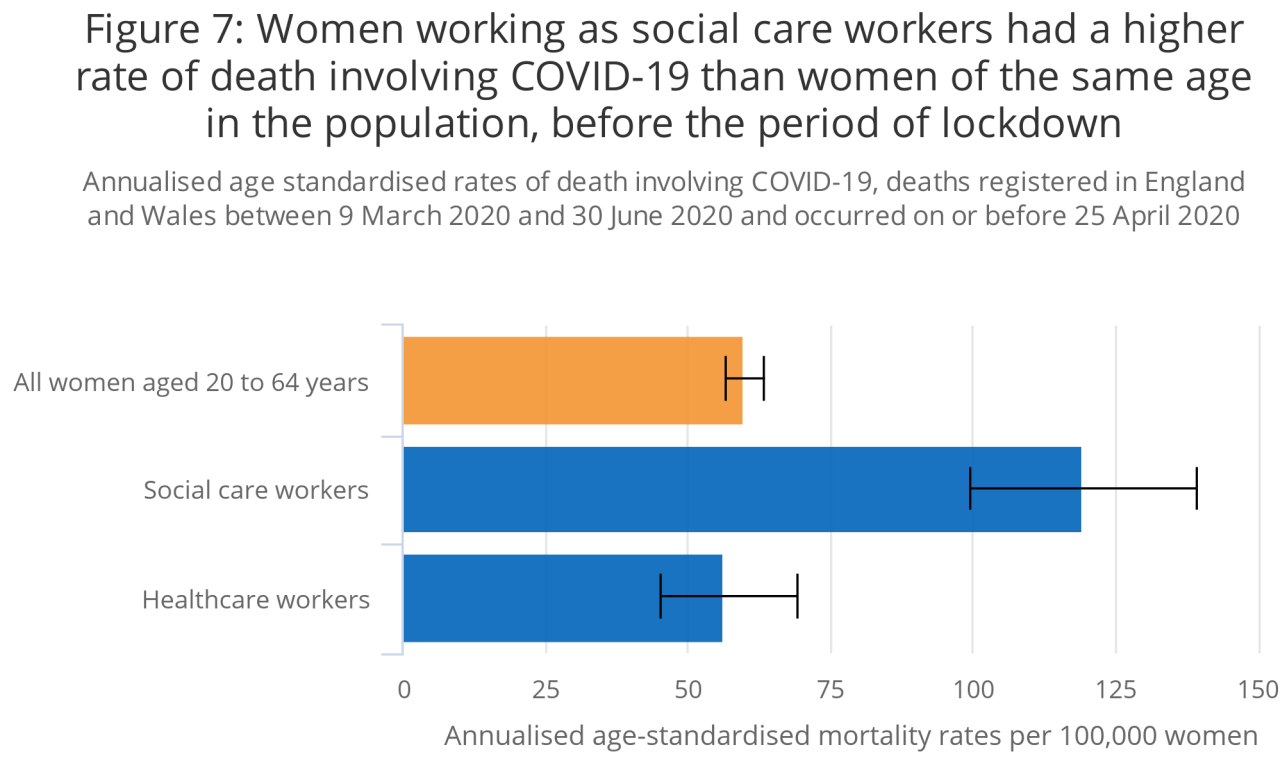
For women working in health and social care professions, rates of death involving COVID-19 were around double in those who likely acquired the virus before lockdown (Figure 7) than those who likely acquired the virus during lockdown (Figure 8). Only social care workers were found to have an elevated rate of death involving COVID-19 in both those who likely acquired the virus before or during lockdown, when compared with women of the same age in the population.

Women working in healthcare professions had a higher rate in the “during” lockdown group – in the “before” lockdown group, their rate was no different to that seen in women of the same age in the population

Among women working in healthcare professions, the rate of death involving COVID-19 was statistically significantly higher in those who likely acquired the virus during lockdown, when compared with the rate among women of the same age in the population. For female healthcare professionals who likely acquired the virus before lockdown, the rate of death involving COVID-19 was no different when compared with women of the same age in the population.

Figure 7: Women working as social care workers had a higher rate of death involving COVID-19 than women of the same age in the population, before the period of lockdown

Annualised age standardised rates of death involving COVID-19, deaths registered in England and Wales between 9 March 2020 and 30 June 2020 and occurred on or before 25 April 2020



Source: Office for National Statistics

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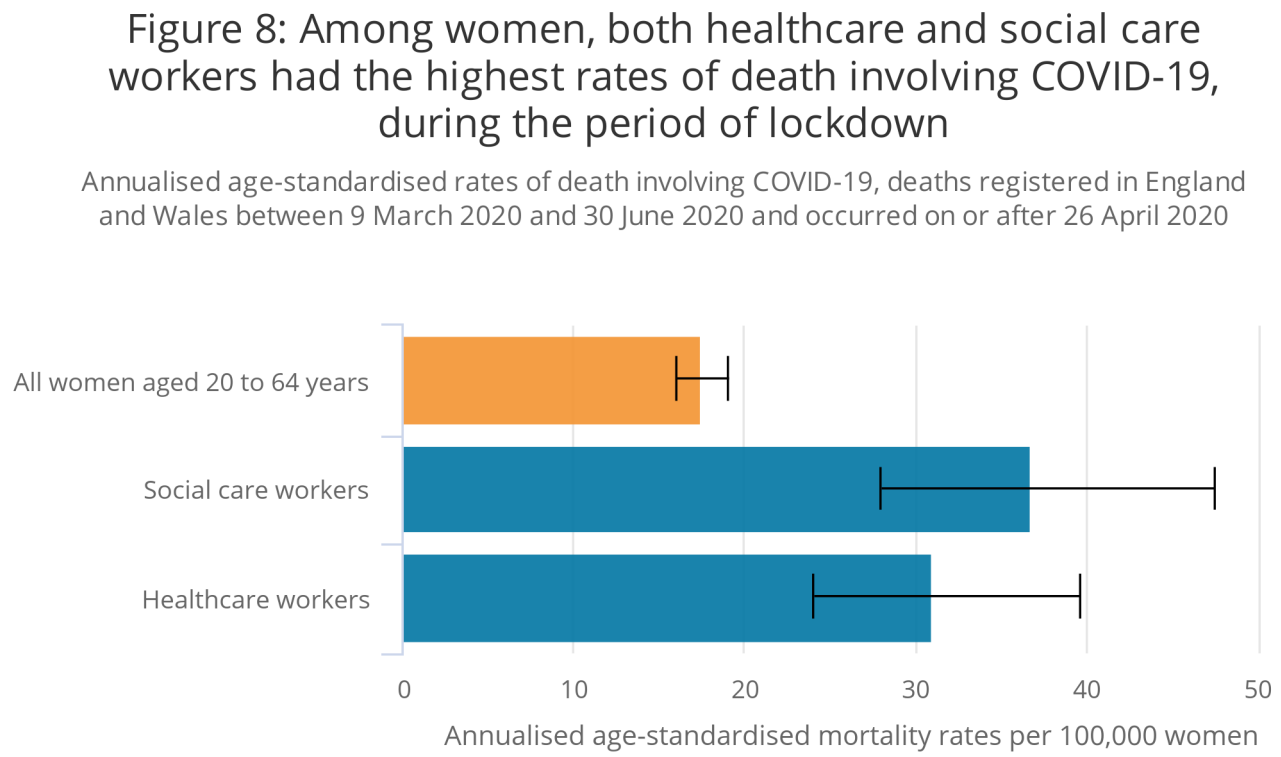
2. Figures are for residents of England and Wales aged 20 to 64 years.
3. Occupations defined using the Standard Occupation Classification 2010 (SOC 2010)
4. Figures are for deaths that occurred on or before 25 April 2020 – these are the deaths we assume to be a result of COVID-19 infection before the date of lockdown on 23 March 2020.
5. Figures are based on deaths registered between 9 March and 30 June 2020.
6. Age-standardised mortality rates are only presented for occupations with 20 or more.

Figure 8: Among women, both healthcare and social care workers had the highest rates of death involving COVID-19, during the period of lockdown

Annualised age-standardised rates of death involving COVID-19, deaths registered in England and Wales between 9 March 2020 and 30 June 2020 and occurred on or after 26 April 2020



Source: Office for National Statistics

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5. Figures are based on deaths registered between 9 March and 30 June 2020.
6. Age-standardised mortality rates are only presented for occupations with 20 or more deaths.

6 . Factors that may be associated with COVID-19 related deaths by occupation

Possible explanations for the findings reported in this bulletin will be many and complex. However, finding that lockdown was associated with statistically significantly lower rates of death involving the coronavirus (COVID-19) in all occupation groups, when compared with the rates seen before lockdown, could be because lockdown resulted in fewer people being infected with COVID-19, resulting in lower mortality rates.

Previous analysis showed that certain occupations are more likely to be exposed to disease, based on how closely they interact with others in their day-to-day work. During the pandemic, some occupations, such as health and social care professions, have continued to work in proximity to others; this is a factor that may explain the generally higher rates seen among such occupations. Other occupations, such as elementary and manual workers, are less likely to have homeworking opportunities, another possible factor. On the other hand, the lowest rates during lockdown may be because of certain occupations being able to work from home or because they have been furloughed. Our previous statistical bulletin provided information on a range of factors that may be associated with deaths involving COVID-19 by occupation more generally. These include the likelihood of certain occupations being more exposed to COVID-19 than other occupations, where somebody lives and ethnic group.

7 . Glossary

Occupation

Occupation was defined using the Standard Occupational Classification 2010 (SOC 2010). Full lists of occupations used in the analysis are reported in the accompanying datasets, and descriptions of these can be found in the Office for National Statistics (ONS) SOC Hierarchy. Deaths and the population at risk (see Measuring the data) were both coded using this classification system.

8 . Measuring the data

Deaths data

The figures described in this bulletin include deaths registered in England and Wales between 9 March and 30 June 2020. Deaths were only included in the analyses if the country of usual residence was also England and Wales.

Deaths were defined using the International Classification of Diseases, 10th Revision (ICD-10). Deaths involving the coronavirus (COVID-19) include those with an underlying cause, or any mention, of ICD-10 codes U07.1 (COVID-19, virus identified) or U07.2 (COVID-19, virus not identified). We applied an age restriction, selecting deaths among those aged 20 to 64 years, because of limitations of occupational mortality data for those below the age of 20 years and those above the age of 64 years.

Occupation is reported on the death certificate at the time of death registration by the informant. This information was then coded using the Standard Occupational Classification 2010 (SOC 2010) (see the Glossary).

During the period of analysis, a total of 3,474 deaths and 1,856 deaths involving COVID-19 were registered among men and women aged 20 to 64 years, respectively. Among men, 82.1% of the deaths (or 2,852 deaths) had information on occupation recorded on the death certificate. For women, this figure was 1,161 deaths (or 62.6%). For the 622 deaths with no recorded information on occupation among men, the majority of these were because the occupation was not stated on the death certificate (88.6% of these deaths, or 551 deaths). Among women, the majority of the 695 records with no information on occupation were recorded as: full-time carers of the home and/or dependent relatives or that they were working voluntarily (50.8% of these deaths, or 353 deaths) or the occupation was not stated (45.3% of these deaths, or 315 deaths). Of the records included in the analysis of COVID-19 deaths by occupation, the mean age at death for men was 55.7 years and for women it was 55.0 years.

Further information on death registrations data can be found in the Mortality statistics in England and Wales QMI.

Timeline of the coronavirus (COVID-19) disease

Due to the required information not being available on death certificates, in the analysis we made assumptions on the timeline of COVID-19, based on the evidence that is currently available.

The first assumption is the amount of time between infection with COVID-19 and the onset of the first symptoms (incubation period). Government guidelines show the incubation period to have a maximum of 14 days.

The second assumption is the amount of time between initial symptom onset and death, in the worst cases of the disease. Evidence on this is still emerging, however, several studies have shown this to be around 20 days on average (Wu et al., 2020; Zhou et al., 2020). However, these studies have small sample sizes and were conducted abroad, and we do not know whether the findings can be generalised to England and Wales.

Based on the available evidence we assume a timeline of 34 days (see Table 1) from infection to death in the worst cases of the disease. Despite the limitations, the data described in this bulletin are generally consistent with the assumptions made - when looking at the daily number of deaths involving COVID-19 among 20- to 64-year-olds, you see a reduction in the number of deaths around 32 to 34 days after the date of lockdown on the 23 March 2020.

Table 1. Assumptions on the timeline of COVID-19 used in this bulletin

Maximum incubation period	Time from symptom onset to death	Total number of days
14 days	20 days	34 days

Source: Office for National Statistics

Population data

Population counts for occupations were obtained from the Annual Population Survey (APS), using data collected in 2019. The APS is the largest ongoing household survey in the UK, based on interviews with members of randomly selected households. The survey covers a range of diverse topics, including information on occupation, which is then coded using the SOC 2010. The population counts were also restricted to those aged 20 to 64 years and were weighted to be representative of those living in England and Wales. Further information on the APS can be found in the APS quality and methodology information (QMI).

Mortality rates for the broader population of all usual residents in England and Wales were based on the mid-year population estimates for 2018.

Analysis

Figures in the commentary are based on age-standardised mortality rates (ASMR). These refer to a weighted average of deaths per 100,000 people of a particular age group that is standardised to the 2013 European Standard Population. They allow for differences in age structure of populations and therefore allow valid comparisons to be made between the sexes and different occupations.

The ASMRs in this release have been adjusted so that it is possible to compare rates in those who likely acquired the before lockdown with rate for those who likely acquired the virus during lockdown. For each occupation, we did this by calculating the ASMR involving COVID-19 for each period, and we then adjusted for the number of days in each period:

$$\text{Adjusted ASMR} = \text{Period ASMR}\, x \left(\frac{M}{N}\right)$$

Where:

- "Period ASMR" is the calculated rate for each period, in other words the rate for before lockdown or during lockdown
- *M* is the number of days in 2020
- *N* is the number of days in each period - based on the data included in this release, this was 48 days for the before lockdown group, and 66 days for the during lockdown group

With the adjustment, the magnitude of the rates reported in this release are higher than those published previously , and comparisons cannot be made.

The commentary reports findings for occupations with rates that are statistically significantly higher than the rate among those of the same age and sex in England and Wales. Significance has been determined using 95% confidence intervals, which provide the range of values within which we are 95% confident that the true value lies. Instances of non-overlapping confidence intervals between figures indicate the difference is unlikely to have arisen from random fluctuation. The 95% confidence intervals for the estimates are available in the accompanying datasets.

9 . Strengths and limitations

Strengths

In this bulletin, we only refer to occupations that have at least 20 deaths. For these, reliable age-standardised rates can be calculated, reducing the likelihood of the findings being a result of chance. In our accompanying datasets, rates have been marked as unreliable where there are fewer than 20 deaths, and we have not produced rates for occupations with fewer than 10 deaths. A robust method is used for the analysis: age-standardised rates allow for differences in age structure of populations and therefore allow valid comparisons to be made between the sexes and different occupations.

Quality assurance procedures have been undertaken throughout all stages of the analysis to minimise the risk of error. We also conducted sensitivity analyses that varied the timeline of the coronavirus; these analyses showed similar findings compared to those reported in this bulletin.

Limitations

The analysis is based on assumptions on the timeline of COVID-19, including the length of time between acquiring the virus and symptom onset, and between symptom onset and death in the worst cases of the disease. For some people, the incubation period for COVID-19 will be shorter than 14 days, and the time between onset of symptoms and death will vary.

This analysis does not prove conclusively that the observed rates of death involving the coronavirus (COVID-19) are necessarily caused by differences in occupational exposure. In the analysis we adjusted for age, but not for other factors such as ethnic group, place of residence or deprivation. We have also published an article that explores possible differences in occupation exposure to COVID-19. Additionally, the analysis only considers the occupation of the deceased. We have not taken account of the occupations of others in the household, which could increase exposure to other members of the same household.

The results could change as more deaths are registered over the coming weeks and months. In particular, there may be deaths in some occupations that cannot yet be registered because a coroner's inquest is required. For the deaths involving COVID-19 described in this release, the median delay between the date of death and the date of death registration was four days.

The data were taken from two separate sources: death certificates and the Annual Population Survey (APS). The findings could be impacted by a degree of bias because of the misalignment of occupation data between the two sources.

The occupation recorded on the death certificate is reported by the informant and likely reflects the deceased's main lifetime occupation or the occupation at the time of death. It is also possible that, when they died, the deceased was retired, unemployed or in a different job altogether. Despite this, the occupations found to have higher rates of death involving COVID-19 are generally consistent with recent literature on the occupations that are more likely to be exposed to the coronavirus.

With the data recorded on death certificates on occupation, we are unable to tell whether the deceased was furloughed at the time of death.

At the time of analysis, we used the most recently available occupation populations, based on data collected in 2019. The analysis may be affected if there has been a rapid increase or decrease in the number of workers in a specific occupation since then.