

Excess mortality among essential workers in England and Wales during the COVID-19 pandemic: an updated analysis

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What is already known on this topic

During 2020, excess mortality during the COVID-19 pandemic varied over time and by occupation. Essential workers, particularly those in healthcare, had higher excess mortality than non-essential workers throughout 2020 in England and Wales.

What this study adds

We have updated our previous analysis for 2020 to include 2021 given the continuing impact of COVID-19 on mortality. The pattern of excess mortality has changed, with social care workers having the highest excess mortality compared to other essential workers.

How this study might affect research, practice or policy

Our results show that for non-essential workers, the lockdowns, encouragement to work from home and to maintain social distancing are likely to have prevented a number of deaths from COVID-19 and from other causes even during the second year of the pandemic.

Abstract

Background

Excess mortality from all causes combined during the COVID-19 pandemic in England and Wales in 2020 was predominantly higher for essential workers. In 2021, the vaccination programme had begun, new SARS-CoV-2 variants were identified, and different policy approaches were used. We have updated our previous analyses of excess mortality in England and Wales to include trends in excess mortality by occupation for 2021.

Methods

We estimated excess mortality for working age adults living in England and Wales by occupational group, for each month in 2021 and for the year as a whole.

Results

During 2021, excess mortality remained higher for most groups of essential workers than for non-essential workers. It peaked in January 2021, when all-cause mortality was 44.6% higher than expected for all occupational groups combined. Excess mortality was highest for adults working in social care (86.9% higher than expected).

Conclusion

Previously, we reported on excess mortality in 2020, with this paper providing an update to include 2021 data. Excess mortality was predominantly higher for essential workers during 2021. However, unlike the first year of the pandemic, when healthcare workers experienced the highest mortality, the highest excess mortality during 2021 was experienced by social care workers.

Introduction

In England and Wales, there have been over 21.3 million confirmed cases of COVID-19 and over 195,200 deaths due to COVID-19, according to the death certificate, from the start of the pandemic to 13 January 2023.¹⁻⁴

Essential workers in England and Wales have been shown to have higher infection rates, a higher risk of developing severe COVID-19 and a higher risk of death than non-essential workers, though level of impact on essential workers varied throughout the pandemic.⁵⁻¹⁶

In previous analyses, we reported that during 2020, excess mortality from COVID-19 was consistently higher for essential workers than for non-essential workers.¹⁷ For all adults of working age, all-cause mortality was 54% higher in April 2020 than the 2015-2019 average for the same month. However, excess mortality varied widely throughout the year and between occupational groups. Healthcare workers had the highest excess mortality during 2020, with mortality 90% higher than expected in April 2020.

The first national lockdown was followed by a decline in excess mortality, and by July 2020 mortality was at or below that expected for non-essential workers.¹⁷

For 2021, notable features include the roll-out of vaccinations, and the rise of new SARS-CoV-2 variants, as well as differing policy approaches. During 2021, there were over 9.9 million new cases and 66,000 deaths in England and Wales due to COVID-19.¹⁻⁴ We have therefore updated our previous analyses of excess mortality in England and Wales to include trends in excess mortality by occupation for 2021.

Methods

We obtained provisional counts of all deaths from any cause that occurred in England and Wales between 1 January 2020 and 31 December 2021 from the Office of National Statistics (ONS). We used the final official death counts for all deaths from 1 January 2015 to 31 December 2019. We used the date when the death occurred, rather than the date when it was registered, to avoid any effects of delays in the reporting of deaths.

We used the same restrictions as in our previous analyses¹⁷: adults living in England and Wales aged 20-64 years at the time of death whose full date (day, month and year) of death was known.

We have followed the same methods as in our previous analyses¹⁷. We calculated excess mortality for six broad occupational groups (healthcare, social care, education, other essential occupations, non-essential workers and unknown occupation or unemployed), categorized using the four-digit Standard Occupational Classification (SOC) 2010 unit group reported on the death certificate¹⁷. Other essential occupations included adults working in the police, protective services, food industry and transport.

Excess mortality compares the number of deaths from any cause that occurred each month during the pandemic for a given occupation with the average number of deaths during that same month in the previous 5-year pre-pandemic period from 2015 to 2019 for that same occupation. We have expressed excess mortality both in absolute terms (the excess death count) and in relative terms (the percentage of the average number of deaths during 2015-2019).

Results

Total excess mortality: 1 January – 31 December 2021

During 2021, there were 78,212 deaths among working age (20-64 years) adults living in England and Wales (Supplementary Table 1). The total number of deaths was slightly higher than the average during 2015-2019 (1,471 or 1.9%), though mortality differed between the occupational groups (Table 1). Excess mortality was highest for adults working in social care, with 20.0% higher mortality than expected. Adults working in other essential occupations also experienced higher than expected mortality during 2021, with 1,359 more deaths (11.0%).

Second national lockdown: 5 November – 2 December 2020

During the second national lockdown, mortality was 17.5% higher than expected (Supplementary Table 1). Excess mortality increased for all occupational groups except healthcare workers (Figure 1). By the end of November 2020, excess mortality was highest for social care workers (39.4%) and lowest for non-essential workers (12.7%).

Tier-system: 3 December 2020 – 5 January 2021

For the majority of occupational groups, excess mortality plateaued during December 2020, when the geographic tier-system was introduced, with varying levels of restrictions based on current levels of infection in that specific area (Figure 1). For all occupational groups combined, mortality was 16.4% higher than expected (Supplementary Table 1). Adults working in social care had the highest excess mortality (37.9%), followed by those working in other essential occupations (28.1%). Excess mortality continued to decline for healthcare workers (8.7%), and adults working in education experienced the lowest excess mortality (2.8%) among the six groups we examined during December 2020.

Third national lockdown: 6 January – 28 March 2021

The peak mortality in 2021 occurred during January, when mortality was 44.6% higher than expected for all occupational groups combined (Table 1, Figure 1). Excess mortality increased for all occupation groups during January, with social care having the highest excess mortality (86.9%).

In February, excess mortality decreased for all occupation groups, but was still 56.7% higher than expected for social care workers (Table 1, Figure 1). By the end of the third national lockdown, mortality was similar to or below what would have been expected from mortality in pre-pandemic years for all occupational groups except social care workers, whose excess mortality was 15.1%.

Government roadmap: 29 March – 18 July 2021

As restrictions were eased gradually from late March to mid-July 2021, mortality was similar to or below that of 2015-2019 for all occupational groups except social care workers (Figure 1). From late March to mid-May, excess mortality was highest for social care workers (12.5% higher than expected in April) and lowest for education workers (13.1% lower than expected in April) (Table 1).

During mid-May to mid-July 2021, excess mortality increased for all occupation groups (Figure 1). While the increase was small and all-cause mortality was similar to or below that expected for most occupations, mortality was still 18.1% higher than expected for social care and 12.5% higher for adults working in other essential occupations by the end of July 2021 (Table 1).

All restrictions lifted: 19 July – 31 December 2021

After all restrictions were lifted in mid-July, excess mortality was relatively stable until decreasing for most occupational groups during the latter part of the year (Figure 1). For social care and other essential workers, mortality remained higher than expected until December

2021 (16.0% and 11.0% higher than expected in August, respectively) (Table 1). For healthcare, education and non-essential workers, mortality was similar to that during 2015-2019, while for those who were unemployed or whose occupation was unknown, mortality was lower than expected.

Discussion

We have previously reported on monthly trends in excess mortality by occupation during the first year of the COVID-19 pandemic in England and Wales.¹⁷ This updated analysis extends our analyses of trends in excess mortality to include 2021, the second year of the pandemic. Additionally, we have updated the trends for the latter part of 2020, to include deaths that had been previously missed.

We used all-cause observed mortality to estimate excess mortality during the COVID-19 pandemic, by comparison with average numbers of deaths during 2015-2019. Excess mortality does not require information on the cause of death, or confirmation of a positive COVID-19 test. As a result, it is not affected by eligibility for testing, the availability of testing or changes in the definition of death from COVID-19.

We used the final official death counts from 1 January 2020 – 31 December 2020 in our original analyses. However, for this update we used the provisional death counts, because this allowed for the inclusion of trends in excess mortality up to and including December 2021. The excess death count and excess mortality percentages for 2020 in this report are, therefore, different from what was previously reported. The pattern of the trends in excess mortality, however, is the same in terms of differences between occupational groups and changes over time except for the latter part of 2020.

We reported previously that excess mortality during 2020 was lowest in December, but cautioned that this could be due to delays in death registration despite using the final official death counts for 2020.¹⁷ As can be seen in the updated analysis, excess mortality during 2020 was lowest during the summer and began increasing again in the autumn, confirming that some deaths occurring at the end of 2020 had been missed, potentially due to delays in death registration. The decline in excess mortality during the latter part of 2021 is probably due, at least in part, to delays in death registration.

During the first year of the pandemic, healthcare workers experienced the highest excess mortality. However, during the second year, adults working in social care had the highest excess mortality. It is possible that this shift in the burden of excess mortality to social care workers may be explained by potential confounders (e.g., socioeconomic stats, ethnicity) for which we were unable to account. Non-essential workers continued to generally have the lowest excess mortality of the occupational groups, perhaps benefitting from working at home during the third national lockdown.

The short second national lockdown during November 2020 and the implementation of the tier system in December 2020 did not coincide with a decrease in excess mortality due to COVID-19, with mortality remaining relatively stable and above that expected during the last two months of the year.

Peak mortality during 2021 occurred in January. Despite Tier 4 restrictions in place in much of England at the end of December, excess mortality reached 44.6% in January, with mortality declining steeply during February and March 2021 after the third national lockdown.

Despite experiencing a decrease in excess mortality, adults working in social care still had 15.1% higher mortality than expected during March 2021. By June and July 2021, when many

adults had at least one course of the vaccination, adults working in social care had similar mortality to that in previous years (3.1%).

By July 2021, most adults had received at least one dose of a vaccine against COVID-19. This may explain the lower excess mortality seen during the summer and the decline during the autumn. Vaccination uptake, however, varies by occupation. Healthcare and education workers have the highest vaccination coverage (80% or higher have received three doses by February 2022), while those working in elementary trades and related occupations have the lowest coverage (around 56%)¹⁸. Though healthcare and social care workers were offered the vaccination at the same time, the difference in vaccination uptake may explain the higher excess mortality in social care workers during the second year of the pandemic. By February 2022, only 73% of social care workers on average had received three doses of the vaccination¹⁸.

We did not control for socioeconomic status or ethnicity, both of which have been shown to be related to COVID-19 death. However, any bias from this exclusion is likely to be small as we have compared deaths in 2021 with that of the same occupation in 2015-2019.

Mortality continued to be higher than expected during the first half of 2021, particularly for social care workers. The third national lockdown and vaccination against COVID-19 are likely to have prevented a number of deaths from COVID-19 during the second year of the pandemic.

Research Ethics Approval

Following assessment using the NSDEC's tool, we engaged with the UK Statistics Authority Data Ethics team and it was decided that ethical approval was not required.

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Table 1. Number of deaths from all causes in 2021, and number (%) of excess deaths^a, adults aged 20-64 years, by broad essential worker occupational group, January - December 2021

	All occupations	Healthcare workers	Social care	Education	Other essential workers	Non-essential workers	Unknown/Unemployed
	Excess deaths	Excess deaths	Excess deaths	Excess deaths	Excess deaths	Excess deaths	Excess deaths
2021							
January	44.6	32.8	86.9	30.6	60.8	30.3	56.8
February	23.0	23.4	56.7	1.1	35.9	15.9	23.3
March	1.2	-1.4	15.1	4.3	5.8	-4.1	6.0
April	-4.9	1.4	12.5	-13.1	1.4	-9.1	-4.6
May	-3.1	2.4	7.6	-9.7	-1.3	-6.3	-0.5
June	-2.4	-6.0	3.1	-4.8	1.3	-4.0	-2.3
July	4.2	4.6	18.1	1.6	12.5	0.7	2.9
August	0.1	2.6	16.0	-5.1	11.0	-2.7	-5.4
September	1.5	1.1	15.7	4.8	7.8	2.1	-7.7
October	-3.1	7.7	10.6	-6.0	6.5	-3.2	-14.2
November	-7.6	-13.7	16.2	-0.8	10.0	-10.1	-19.3
December	-33.3	-32.2	-21.6	-26.2	-25.1	-33.1	-42.3
Total	1.9	1.9	20.0	-1.8	11.0	-1.9	-0.2

^a The total number of deaths in each month of 2021 compared to the average number of deaths occurring in the same month during 2015-2019. The percentage of excess deaths is the total number of excess deaths expressed as a percentage of the five-year average.