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Comparing age adjusted all-cause mortality rates in England between vaccinated and unvaccinated

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The UK Government's own data does not support the claims made for vaccine effectiveness/safety.

In a previous post we argued that the most reliable long-term measure of Covid-19 vaccine effectiveness/safety is the age adjusted all-cause mortality rate. If, over a reasonably prolonged period, fewer vaccinated people die, from whatever cause, including Covid-19, than unvaccinated people then we could conclude that the benefits of the vaccine outweigh the risks. We also

vaccine outweigh the risks. We also pointed out that, to avoid the confounding effect of age, it is critical that data for each age category is available, rather than the aggregated data because, clearly, aggregated data might exaggerate vaccine mortality rates if more older people, with shorter expected mortality, are included. The UK roll out of the vaccine was executed in descending age order, from older to younger, except very early on in the vaccination programme when the vulnerable young were vaccinated along with the very elderly. As the programme progressed those vaccinated were, on average, older than those who remained unvaccinated and as the roll out proceeded a progressively higher proportion of the residual unvaccinated population are younger.

The latest Office for National Statistics report on mortality rates by Covid vaccination status provides data on all deaths – Covid related and non-Covid related for the period Jan-July 2021 for the unvaccinated and the different categories of vaccinated ('within 21 days of first dose', '21 days or more after first dose', 'second dose'). The ONS data for Covid-19 mortality, is given in Table 4 of the ONS spreadsheet and the ONS data for all-cause mortality excluding Covid-19, is given in Table 5 of the same spreadsheet. Both tables are reproduced

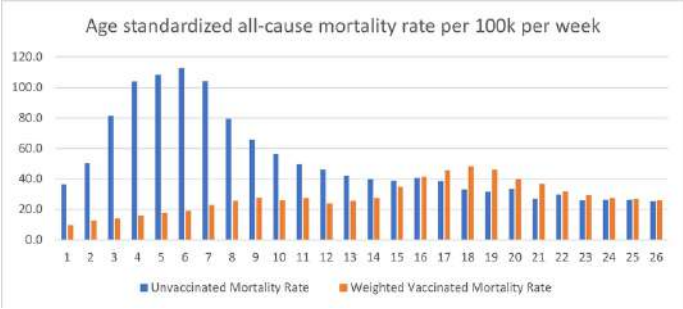
at the bottom of this post.

We believe there are severe weaknesses and possible errors in the ONS data (see foonote**). But importantly, while it does not provide the raw age categorized data, it ***does*** provide age standardized mortality rates. This means the ONS have calculated the overall mortality rate in a way which (they believe) adjusts for the confounding effect of age, and this is 'baked into' the mortality rates they have published. However, while they report this age adjusted mortality rate for each of the three separate categories of vaccinated people they do not report it for the combined set of vaccinated people. In our analysis, and in the absence of the actual age stratified data, we compute a population weighted age adjusted all-cause mortality rate by using the ONS's published population sizes for each of the three categories of vaccinated. This is not ideal because the ONS age adjusted rates are so opaque and are not 'abolute numbers'. However, in the absence of detailed data this should provide a reasonable estimate of what the ONS age adjusted all-cause mortality rate would be for all unvaccinated if they had bothered to report it. We will call this the 'weighted vaccinated mortality rate'. The data

table derived from the ONS data and used to compute this rate is given at the end of this post.

It turns out that, even using this age adjusted mortality rate, the death rate is currently higher among the vaccinated than the unvaccinated.

The age adjusted mortality rates for vaccinated against unvaccinated for weeks 1 to 26 of 2021 are charted below. Overall, the chart shows that, over time, the weighted mortality rate for the vaccinated has steadily increased and by week 16 (23 April 2021), surpassed that for the unvaccinated.

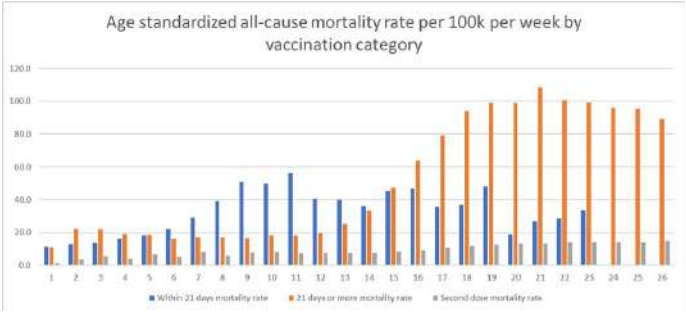


Week 1 ends 6 Jan 2021, Week 26 ends 2 July 2021

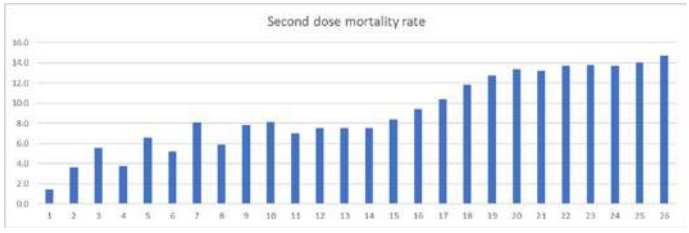
The chart suggests a normal seasonal mortality trend for the unvaccinated, with a winter peak on week 6, 12 February 2021, and a steady decline toward summer. In contrast, the

pattern for the vaccinated is completely different. From week 24 onwards the mortality rates for the vaccinated and unvaccinated appear to be converging as summer begins.

As the ONS data breaks down the data over time for the three categories of vaccinated (those within 21 days of first dose, those 21 days after first dose, and those after two doses), we can also plot mortality charts for each of these categories. The mortality rate, for week 26, up to 2 July, for the unvaccinated is around 25 deaths per 100,000. But there are big differences between the mortality rates for the different categories of vaccinated deaths. For example, for those after 21 days of first dose, the comparable mortality is around 89 deaths per 100,000 people (a number which has drastically increased since January), while for those vaccinated with two doses there were approximately 15 deaths per 100,000 in the same July period.



The trends for the different vaccination categories are also concerning. In contrast to the unvaccinated, the mortality rates for the vaccinated have initially increased from very low initial values, but then have increased, whilst that for the unvaccinated has decreased. The charts below show these patterns.



Since 19 March the double dose vaccination mortality rate has increased

week-on-week more or less consistently. The mortality rate for those more than 21 days after first dose increased drastically in the spring (at week 14) and remained high thereafter. Mortality within 21 days of vaccination initially increased but looks to have stabilised, albeit with some noise. We will leave it to clinical colleagues to explain why there are such different patterns.

Because of the limitations and possible errors in the ONS data**, there are many caveats that need to be applied to our crude analysis (including some which are covered in the previous post). **But we can conclude that the ONS's own data does not support the claims made for vaccine effectiveness/safety.**

It is also important to note that the population of vaccinated people is becoming sufficiently large and representative that the criticality of age adjustment becomes much diminished. We will be doing a follow-up analysis that takes account of this.

**Potential limitations and errors in the ONS data (with thanks to Clare Craig for identifying some of these)

- Does not provide the raw age

categorized data.

- The age standardized score used by ONS relies on the 2011 census data to determine the population proportions in each age category. These proportions have changed since 2011 and, as we noted in this article, these differences can significantly change the results.
- There are inconsistencies in vaccination numbers between the ONS data and the National Immunisation Management Service (NIMS) data. For example, by week 26 NIMS has 28.1 million people over 18 who have had second does, but ONS has only 23.3 million.
- The ONS total population is 16.6 million short of the whole population. Only 12.6 million are under 18 so the remaining 4 million are omitted for some other reason.
- The rates in the unvaccinated on 8th Jan are lower than the double vaccinated in summer. Also, on 8th January only 12% of over 65 year olds had been vaccinated, so the unvaccinated population should have had a death rate very similar to background levels.

- The wildly increasing weekly age adjusted mortality rates (for non-Covid related deaths) for the 38 million unvaccinated population in January are totally inconsistent with weekly changes in previous years. Although this population excludes the under 18s and the 1.2 million (mainly over 65s) who had by then recieved their first dose, we would not expect the mortality rate for this population to be drastically different to the mortality rate for England seen in recent years as reported in a different ONS report.
- Ultimately we need to exclude unnatual deaths such as murders, accidents and suicides since these may introduce bias between the cohorts, especially in the young age categories where the overall death numbers are small.

Here is Table 4 data the raw data, for Covid-19 deaths, as provided by the ONS:

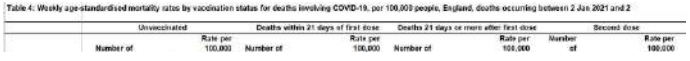
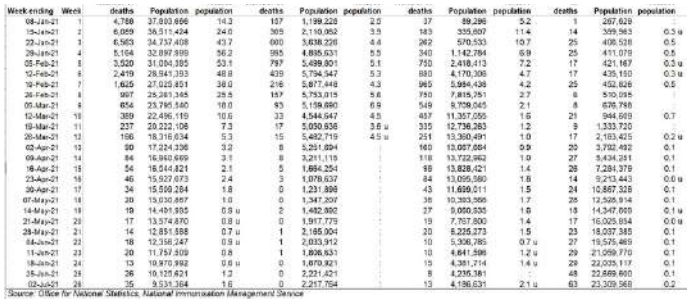
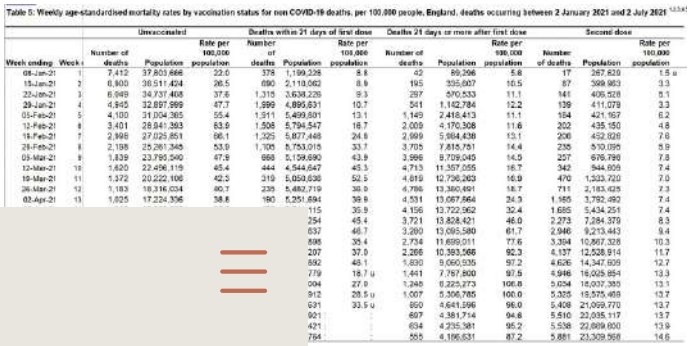


Table 4: Weekly age-standardised mortality rates by vaccination status for deaths involving COVID-19, per 100,000 people, England, deaths occurring between 2 Jan 2021 and 2

	Unvaccinated		Deaths within 21 days of first dose		Deaths 21 days or more after first dose		Second dose	
	Number of	Rate per 100,000	Number of	Rate per 100,000	Number of	Rate per 100,000	Number of	Rate per 100,000



Here is Table 5 data the raw data, for all-cause deaths except for Covid-19, as provided by the ONS:



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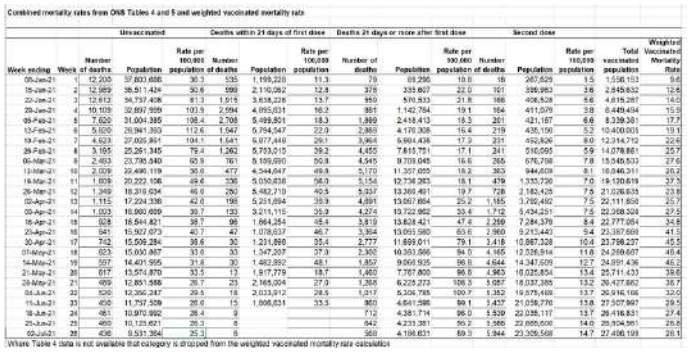
Finally, here is the data we used to calculate combined all-cause age adjusted mortality rates and the weighted vaccinated mortality rate.



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4. Age-standardised mortality rates

Age-standardised mortality rates (ASMRs) are used to allow for comparisons to be made between populations that may contain different overall population sizes and proportions of people of different ages. The 2013 European Standard Population is used to standardise age-specific rates to a consistent population. The formula used to calculate the weekly age-standardised mortality rates per 100,000 for week w is:

$$ASMR_w = \frac{1}{\sum_i ESP_i} \sum_i \frac{D_{i,w}}{P_{i,w}} \bullet 100,000 \bullet ESP_i$$

where:

- w is the week number for which we calculate the ASMR
- i is the age group
- ESP_i is the standard population for age group i
- $D_{i,w}$ is the number of deaths for age group i occurring in week w
- $P_{i,w}$ is the population for age group i alive at the beginning of the week w

To calculate the ASMRs by vaccination status, those aged under 10 years were not used, as the associated dataset includes only those aged nine years and over because it is linked to the 2011 census.

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