

What the ONS Mortality Covid-19 Surveillance Data can tell us about Vaccine Safety and Efficacy

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Abstract

The latest ONS vaccine mortality surveillance report for England (for the period 1 Jan 2021 to 31 May 2022) fails to take account various confounding factors in the 'headline' results and can thus be easily misinterpreted. Those seeking evidence that the vaccines are unsafe might point to the overall all-cause mortality rate in the vaccinated (1,367 deaths per 100k person years) being much higher than in the unvaccinated (671 deaths per 100k person years). But this fails to take account of age confounding. Those seeking evidence that the vaccines are safe might point to the overall age-standardized mortality rate over the whole period being much higher in the unvaccinated (2,338 deaths per 100k person years) than the vaccinated (957 deaths per 100k person years). But this fails to take account of major anomalies in the mis-categorization of deaths by vaccination status (especially in the first part of 2021), evidence for which can clearly be seen in the implausible differences in non-covid mortality rates between different vaccination status categories. There is also now strong evidence that the ONS underestimates the proportion of unvaccinated, which leads to inflated mortality rates for the unvaccinated relative to the vaccinated. This underestimation is a major issue: the ONS claimed in May 2022 that 8% of adults are unvaccinated whereas the UKHSA estimated approximately 20% and an extensive and representative ICM survey estimated 26%. Because the ONS data are based on a subset of England residents that excludes all those not registered with a GP and not registered in the 2011 census, it is missing some 8 million adults who are not at all representative of those in the ONS sample. Hence, whilst it is conceivable that both the ONS 8% figure is correct for its sample, and the proportion of all adults in England unvaccinated is at least 20% as per the other sources, this means that at least 69% of adults missing from the ONS sample are unvaccinated. Hence, either the ONS is underestimating the proportion of unvaccinated in its sample or the sample is so unrepresentative of the whole population that any inferences made using the ONS data are worthless. Either way, the ONS estimate of the proportion unvaccinated must not be used for any comparisons of vaccine efficacy or safety of the whole England population. We also provide further evidence that the ONS are grossly underestimating mortality in their dataset, with their 18-39, 40-49 age groups showing approximately half the mortality rates published by the ONS in 2016, for both unvaccinated and vaccinated. Finally, we show that there are many missing deaths from their dataset with the 8 million people suffering 30% of deaths despite comprising only 19% of the population, hence further compromising the accuracy and relevance of their data.

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1 Introduction

The Office for National Statistics (ONS) vaccine mortality surveillance reports (the latest being (1)) are based on a subset of 39 million of the approximately 56 million population of England and are supposedly an authoritative source of data used by Covid-19 vaccine advocates and detractors alike. The ONS dataset can be easily misinterpreted in many ways by failing to take account of various confounding factors in the 'headline' results. Those seeking evidence that the vaccines are:

- unsafe might point to the overall mortality being much higher in the vaccinated than the unvaccinated. But this fails to take account of age confounding.
- safe might point to the age-standardized mortality rate over the whole period being much higher in the unvaccinated than the vaccinated. But this fails to take account of major anomalies in both the mis-categorization of deaths in the first part of 2021 and underestimates of the proportion of unvaccinated.

The latest report covers the period Jan 2021 -May 2022 and claims that, over this full period, the age-standardised all-cause mortality of people vaccinated against Covid-19 is significantly lower than that of their unvaccinated counterparts (957 deaths per 100k person years compared to 2338). Figure 1 shows a plot of the overall age-standardised mortality rates by vaccination status for the period of the latest report. However, the ONS dataset has numerous anomalies which might bias its results toward underestimation of mortality rates of the vaccinated and overestimation of mortality rates of the unvaccinated. This includes miscategorising many vaccinated deaths as unvaccinated (2), and the potential omission of many vaccinated deaths from the data (3).

Another potential major anomaly in the ONS data that biases the results, the implications of which have not previously been thoroughly investigated, is an underestimation of the proportion of unvaccinated.

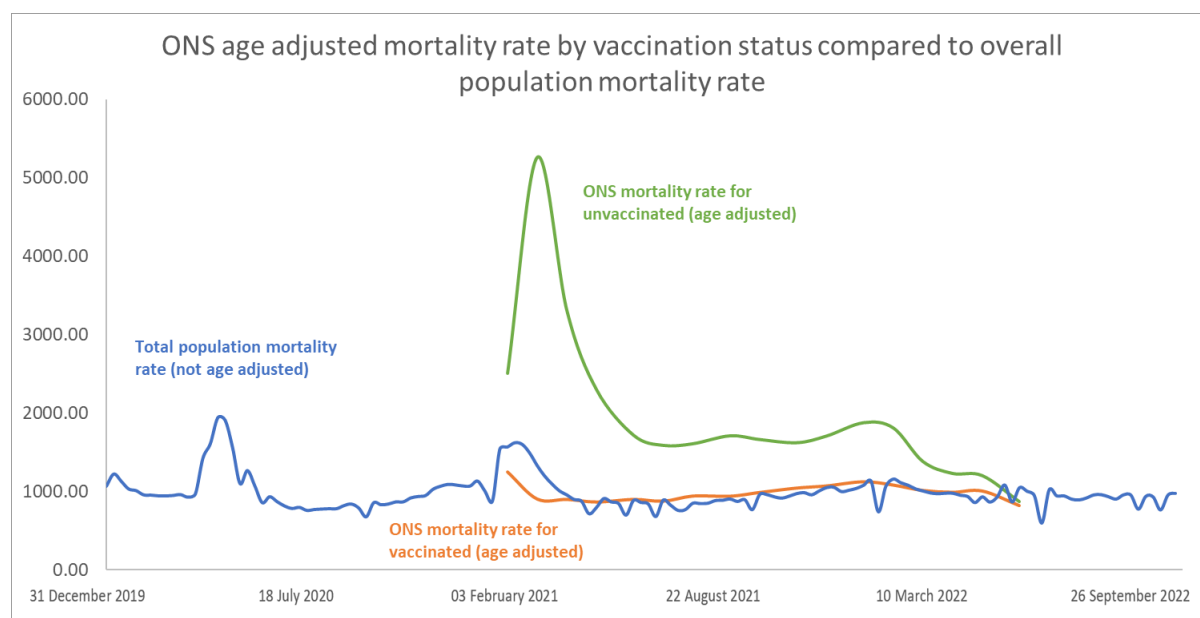


Figure 1 ONS age standardised mortality rate by vaccination status

There are competing claims about the percentage of adults who remain unvaccinated which at first glance appear difficult to reconcile. The ONS claimed in May 2022 that 8% of adults were unvaccinated and indeed this was the headline figure on which the controversial BBC2 television programme

“Unvaccinated” was based (4). However, the problem with this 8% estimate is that it was completely at odds with other independent estimates. The UKHSA report at that time (5) was estimating 20% of those aged at least 18 as unvaccinated. More significantly, in an extensive and highly representative survey undertaken by ICM in May 2022 (6) that was used by the BBC for their documentary programme, 26% of those aged at least 18 (664 out of 2570) were never vaccinated. The detailed survey spreadsheet, which can be downloaded from the link at (5), actually compares the survey results with the ONS estimates for all the population data (age, ethnicity, region, socio-economic class); the only attribute where there is any significant variation is the proportion of unvaccinated where it clearly states the ONS estimate as 8% compared to the 26% found⁴. Moreover, when the NHS uses ONS denominators to estimate vaccine coverage they report more than 100% of many older age groups have been vaccinated (7).

This paper analyses the impact of these biases on the latest ONS data. In Section 2 we explain the limitations of the ONS dataset and how they arrived at the 8% adult unvaccinated in May 2022. We show that, it is conceivable that both the ONS 8% figure is correct for its sample, while the proportion of all adults in England unvaccinated is at least 20% as per the other sources. But we show in Section 3 that this would mean that at least 69% of adults missing from the ONS sample are unvaccinated. Hence, either the ONS is underestimating the proportion of unvaccinated in its sample or the sample is so unrepresentative of the whole population that any inferences made using the ONS data are worthless. Either way, the ONS estimate of proportion unvaccinated must not be used for any comparisons of vaccine efficacy or safety of the whole England population.

In Section 4, we review the raw mortality data in the ONS report and highlight some obvious problems with it. The raw mortality rates (which the ONS do not report) are higher in the vaccinated than the unvaccinated, but overall, these results are age confounded. Instead of reporting separate comparative mortality rates for each different age category to avoid age confounding, the ONS use overall age-standardised mortality rates (ASMR).

In Section 5 we identify the limitations and anomalies in the ASMR. We show that, even without adjusting for the previously observed anomalies and biases in (2) and (3), the most recent monthly data (in contrast to the especially flawed data in 2021) provides no evidence that the vaccines reduce all-cause mortality once we make even minor adjustments for the possibility that the ONS has underestimated the proportion of unvaccinated. This is demonstrated in detail in Section 6 where we analyse the recent months’ mortality data Feb-May 2022 for each of the different age categories.

Since all our analyses point toward errors in the claims made in support of vaccine safety and efficacy, it is unsurprising that vaccine advocates have sought alternative possible explanations for the anomalies in the ONS data beyond those already discussed and we address these in Section 7. The most common alternative explanations are directly contradictory, with some claiming a ‘healthy vaccinee effect’ and others claiming an ‘unhealthy vaccinee effect’. Neither of these alternative explanations is supported either empirically or theoretically.

Our conclusions are presented in Section 8. We recommend that the ONS adds full caveats to its future surveillance reports explaining the limitations and biases of its sample population. Also, any studies of vaccine efficacy or safety comparing vaccinated and unvaccinated which use whole population data of covid cases, hospitalisations, and deaths, but which rely on the ONS estimate of proportion unvaccinated must be retracted.

⁴ A detailed analysis of this can be found in <https://www.normanfenton.com/post/more-updates-on-bbc2-documentary-unvaccinated> and the linked video.

2 The ONS population sample: its limitations and estimates of number unvaccinated

The ONS vaccine mortality surveillance reports (the latest being (1)) relate to the population of England (it contains no data at all on Wales, Scotland or Northern Ireland). However, contrary to what many people assume, the data do not represent the whole population of England, but rather a biased subset of it. Specifically, a person is in the database only if they were:

- a) registered in England in the 2011 census, and
- b) registered with a GP in England in 2019

In addition to all people not registered with a GP, this ONS dataset also excludes all people who arrived in the country after 2011 (believed to be around 4 million) and all children under the age of 10. The total number in the sample is about 39 million. We refer to Table 3 of the latest report (1) to source these numbers and to help understand how the ONS estimate the proportion unvaccinated. The report covers the 17 months from 1 Jan 2021 – 31 May 2022 and records the following:

- Total unvaccinated: 16,375,484 person-years
- Total Ever vaccinated: 38,860,947 person-years

That is a total of 55,236,431 person-years. Since there are 516 days in the period 1 Jan 2021 – 31 May 2022, to calculate the number of people in the dataset we must multiply by 365/516 since every person corresponds to 516/365 person-years. Hence, the number of people in the dataset is 39,072,282.

The current estimated England population is approximately 56 million of whom circa 49 million are aged at least 10. So, the sample excludes roughly 10 million people aged over 10. This missing 10 million are intrinsically different to those in the ONS dataset since they are either people who are new immigrants and/or have refused, failed or are sufficiently healthy to have not needed to register with a GP. This means they are likely to be a much younger sub-population with a much higher proportion of people unvaccinated. In other words, the ONS dataset is not a representative sample of the population of England, aged at least 10. Indeed, we find very strong evidence of this underrepresentation when we look at the ONS estimates of the proportion unvaccinated.

First note that the reason the ONS uses person-years rather than number of people in their breakdown of vaccinated versus unvaccinated is because many people will only have been vaccinated for part of the previous 17-month period. By using the person-years data above, and by dividing the total unvaccinated by the total unvaccinated and ever vaccinated, we can calculate that 29.6% of the total person years were unvaccinated over the 17-month period. This does not mean that 29.6% of people remain unvaccinated at the end of the period, but rather that over the whole period, 29.6% of that time (for all people together) was spent unvaccinated. This includes people who spent the entire period unvaccinated as well as people who spent just a few days unvaccinated.

However, if we focus only on the latest available month, namely May 2022, from report (1), we can see how the ONS could arrive at their highly disputed estimate of 8% adult unvaccinated at this time (8):

For any month the report provides (in its Table 1) the number of person years for the 'unvaccinated' and 'ever vaccinated'. If we multiply the person years 'unvaccinated' by 365 and divide by the number of days in the month we get the ONS estimate of the total number

of people unvaccinated at that point⁵. Similarly, for the ‘ever vaccinated’. So, for May 2022, there are:

- 448,434 unvaccinated person years, which corresponds to 5,279,949 people (we multiply by 365/31 as there are 31 days in May)
- 2,846,174 ever vaccinated years, which corresponds to 33,511,404 people.

Note that, as a consistency check, this totals just under 39 million people still alive in May 2022 from the original 39,072,282 in the ONS dataset in January 2021.

This means that, in the ONS dataset, 13.6% of the people were unvaccinated up to the end of May 2022. However, (as we explain in detail in the next section) if we remove those aged under 18 and account for the fact that a higher proportion of that age category are unvaccinated, we can see how that would result in a number close to the 8% adult unvaccinated claimed by the ONS (see below).

In a recent response to an FOI request, the ONS concede that “it is difficult to identify exactly how many people in the population are unvaccinated” (9). A plausible explanation for (at least part of) the difference in unvaccinated rates is that, compared to the others, the ONS sample is (as we have suspected all along) significantly biased. It does indeed seem reasonable that the England population who were not registered in the 2011 census and who were not registered with a GP will be a set of people much less likely to get vaccinated than those in the ONS sample.

While there is no dispute about the number of people (the 39 million) in the ONS dataset, the number ‘ever vaccinated’ is based on GP records which may not be accurate for reasons explained in (2). There is also strong anecdotal evidence that many unvaccinated people are erroneously recorded as vaccinated with records that contain explicit dates and batch numbers (10). However, such errors, should they be random, are assumed here not to make a major difference.

3 Estimating the proportion of unvaccinated in those missing from the ONS sample.

As explained above we know that in May 2022, in their sample of England residents (all aged 10+), the ONS estimate that there were:

- 5,279,949 unvaccinated
- 33,511,404 vaccinated

meaning that 13.6% were unvaccinated in May 2022. If we remove those aged 10-17 and account for the fact that a higher proportion of that age category are unvaccinated, we can get to the 8% figure estimated by ONS, if we assume 50% of the unvaccinated were aged less than 18 and that 10% of the vaccinated were aged less than 18, i.e.:

$$u_1 : \text{number of unvaccinated adults in ONS sample} = 2,639,975$$

$$v_1 : \text{number of vaccinated adults in ONS sample} = 30,160,264$$

This gets us to the 8% adult unvaccinated proportion claimed by the ONS for their sample.

⁵ Strictly speaking it is only an approximation of the number of people unvaccinated up to the end of the month because the person years contains a small number who were first vaccinated during that month

But we also know that there are approximately 8,000,000 England residents aged 18+ who are missing from the ONS sample (specifically, the total number of England residents aged 10+ missing from the ONS sample is approximately 10,000,000 and approximately 80% of these are aged 18+).

Let

u_2 : number of unvaccinated adults missing from ONS sample

v_2 : number of vaccinated adults missing from ONS sample

Then $u_2 + v_2 = 8,000,000$ and the total number of adults overall is:

$$u_1 + u_2 + v_1 + v_2 = 8,000,000 + 2,639,975 + 30,160,264 = 42,800,239$$

The proportion z of unvaccinated in the whole population is

$$z = \frac{u_1 + u_2}{u_1 + u_2 + v_1 + v_2} = \frac{u_1 + u_2}{42,800,239} \quad (1)$$

But we know that, in May 2022, z was at least 20% based on the UKHSA (20%) and ICM (26%) estimates. Given such a value for z we are interested in knowing the proportion of unvaccinated in those missing from the ONS sample. Let α be the proportion of unvaccinated in those missing from the ONS sample. Then we know

$$u_2 = \alpha \times 8,000,000 \quad (2)$$

Hence, by equations (1) and (2) we have:

$$z = \frac{2,639,975 + \alpha \times 8,000,000}{40,800,239}$$

So, if $z = 0.2$ we get:

$$0.2 \times 40,800,239 = 2,639,975 + \alpha \times 8,000,000$$

So

$$\alpha = \frac{8,160,048 - 2,639,975}{8,000,000} = 0.69$$

Hence, if the ONS estimate of 8% adult unvaccinated in their sample is correct and if there are at least 20% adult unvaccinated in the whole of England, it follows that at least 69% of the adults missing from the ONS sample are unvaccinated.

But what if the 26% adult unvaccinated reported in the ICM survey for the BBC documentary was the true proportion for adult unvaccinated? Then substituting $z = 0.26$ above we get:

$$\alpha = \frac{10,608,062 - 2,639,975}{8,000,000} = 0.996$$

In other words, this would mean 99.6% of the adults missing from the ONS sample are unvaccinated.

So, if the ONS estimate of 8% adult unvaccinated for their sample is correct then, based on other independent estimates of the adult unvaccinated in the whole population, this would mean that between 69% and 99.6% of the 8,000,000 adults missing from the ONS sample were unvaccinated.

Is this feasible? It would mean the ONS sample is not at all representative of the whole England population. It is much more likely that the ONS population estimate and therefore their estimate of

the size of the unvaccinated population is too low (the fact that NHS data show vaccination rates of greater than 100% using ONS denominators also confirms this). Yet the ONS are now claiming (11) that, as of end of August 2022 the number of unvaccinated has dropped even further despite extremely weak vaccine take-up during that period. Their latest report states: “of those aged 12 years and over 93.6% had received a first dose of a COVID-19 vaccine”. Hence their latest estimate is that just 6.4% of those aged 12 and over are unvaccinated and this would mean even less (about 5%) of those aged 18+ are unvaccinated. It is highly unlikely that many of the 8,000,000 aged 18+ missing from the ONS sample have had the vaccine since May 2022. This means the ONS sample is even more unrepresentative of the England population than originally thought.

If correct, then it means the ONS sample is such a highly biased subset of the England adult population that it should not be used to make any inferences about the entire population. Furthermore, any mortality analysis reliant on ONS estimates for proportion unvaccinated, will significantly overestimate mortality rates for the unvaccinated and underestimate mortality rates for the vaccinated. This problem extends to the use of whole population estimates of covid case, hospitalisation, and mortality rates for vaccinated and unvaccinated. In other words, using the ONS estimate of 8% adult unvaccinated will likely result in a significant exaggeration of the efficacy and safety of the vaccines.

So, while the vaccine might appear to support claims of safety and effectiveness for the ONS population dataset (and we will show in Section 6 that this is not the case of the ONS most recent data), this would certainly not mean any claims for safety and efficacy can be extended to the whole population. In fact, due to misclassification (2) and missing vaccine deaths (3), as well as delays caused by post-mortems, there is even less support for any claims that the vaccine is safe and effective using the ONS’s special population subset.

4 Understanding the ONS mortality dataset and its limitations

The following detailed analysis of the ONS dataset reveals evidence of further problems with it⁶. Table 3 in the ONS report (1) includes the aggregated mortality data for England over the 17-month period 1 Jan 2021 to 31 May 2022 shown in the left-hand side of Table 1. Note that the total number of deaths for the 17-month period is 641,009 which equates to an approximate annual mortality rate for the period of 1,163 deaths per 100k people (based on the sample size of 39 million and the 17 months equal to 516/365 years).

Note that there is a lower mortality rate for covid related deaths in the ever vaccinated, but a higher non-covid mortality rate in the vaccinated, and overall, the all-cause mortality is significantly higher in the vaccinated.

⁶ This twitter thread also addresses these concerns about the ONS data
<https://twitter.com/os51388957/status/1576204422857703424>

**Table 1 Age-confounded aggregated mortality rates
(with lowest death rates in each category italicised)**

Vaccination status	Person years	Deaths			Death rate per 100k person years		
		Involving covid	Non-covid	All cause	Involving covid	Non-covid	All cause
Unvaccinated	16,375,484	38,285	71,606	109,891	234	437	671
Ever vaccinated	38,860,947	36,175	494,943	531,118	93	1,274	1,367

Superficially this seems to suggest that, over this 17-month period, the risks of the vaccine outweigh the benefits overall. But this is not necessarily the case because this aggregated mortality data is age confounded, whereby a much higher proportion of young people in this population are unvaccinated and most deaths, of course, occur in the older population which has the highest proportion of vaccinated. Indeed, the ONS do not include the death rates shown on the right-hand side in Table 1 to avoid people drawing this inappropriate conclusion.

To determine the actual risk-benefit of vaccination (which may radically differ between age-groups), we need to look at the all-cause mortality rates within each age category. Helpfully, the ONS provide an age breakdown in Tables 5 and 6 in their reports. For example, for the 15-19 age category we can compute the mortality rates shown in Table 2.

**Table 2 Age category 15-19 mortality rates
(with lowest death rates in each category italicised
and 95% confidence intervals in brackets)**

15-19 age category	Person years	Deaths			Death rate per 100k person years		
		Involving covid	Non-covid	All cause	Involving covid	Non-covid	All cause
Unvaccinated	1,991,761	24	265	289	1.2 (0.81, 0.79)	13.3 (11.7, 15.0)	14.5 (12.9, 16.2)
Ever vaccinated	1,458,465	7	225	232	0.5 (0.23, 0.99)	15.4 (13.5, 17.6)	15.9 (14.0, 18.1)

So, in the 15-19 age category, where there are few deaths overall, there is a higher mortality rate for covid related deaths in the unvaccinated but a lower non-covid mortality rate in the unvaccinated. Overall, the all-cause mortality is lower in the unvaccinated because there are very few covid related deaths in this age category⁷ meaning that, for this age-group the risks of the vaccine might outweigh

⁷ Moreover, we know that almost all the 31 deaths ‘with covid’ reported here were not due to covid. Based on an FOI request we know that only 1 person in this age category died up until 31 Dec 2021 with covid as the only cause:
<https://www.ons.gov.uk/aboutus/transparencyandgovernance/freedomofinformationfoi/covid19deathsandautopsiesfeb2020todec2021>

the benefits based on the whole 17-month period⁸. However, there may be a bias whereby the sickest 15–19 age group with the highest mortality rate might have been more likely to have been vaccinated.

However, things are very different for example in the 70-74 age category as shown in Table 3.

**Table 3 Age category 70-74 mortality rates
(with lowest death rates in each category italicised
and 95% confidence intervals in brackets)**

70-74 age category		Deaths			Death rate per 100k person years		
Vaccination status	Person years	Involving covid	Non-covid	All cause	Involving covid	Non-covid	All cause
Unvaccinated	322,630	4,194	8,090	12,284	1,300 (1261,1340)	2,508 (2453, 2562)	3,807 (3741, 3875)
Ever vaccinated	1,966,066	2,085	33,697	35,782	106 (101, 110)	1,714 (1695,1732)	1,820 (1801, 1839)

In the 70-74 age category, where there are many deaths overall, the all-cause mortality is much lower in the vaccinated meaning that, for this age-group, the benefits of the vaccine outweigh the risks based on the whole 17-month period.

However, Table 3 also reveals a major anomaly in the ONS dataset. While we would expect a lower covid mortality rate in the vaccinated if the vaccine is effective, even if there were no serious adverse reactions from vaccination, we should not expect the non-covid mortality rate in the vaccinated to be less than the unvaccinated. At best, if the vaccine was perfectly safe, these rates should be approximately equal. Yet the unvaccinated non-covid mortality rate is 46% higher than the vaccinated. This is simply not credible.

As this is over the whole 17-month period it is instructive to look at the mortality rates for this age category in the latest month only, May 2022. Unfortunately, this is where we hit another inconsistency in the ONS dataset because, in contrast to their Tables 5 and 6, they only provide the monthly age categorised data (ONS Table 1) on a less granular level; we have the age category 70-79 and not 70-74 or 75-79. This May 2022 mortality data is shown in Table 4, which also distinguishes the different vaccination categories.

⁸ Because of the low numbers of deaths in this age category the difference is not highly significant with a 95% confidence Bayesian risk ratio of 0.77 to 1.08 and an 86% probability the rate is higher in the vaccinated.

Table 4 Age category 70-79 mortality rates for May 2022

70-79 age category	Person years	Deaths			Death rate per 100k person years		
		Involving covid	Non-covid	All cause	Involving covid	Non-covid	All cause
Unvaccinated	10,216	20	216	236	196	2,114	2,310
First dose, less than 21 days ago	11	<3	<3	<3			
First dose, at least 21 days ago	1,163	<3	47	49		4,041	4,213
Second dose, less than 21 days ago	23	<3	<3	<3			
Second dose, at least 21 days ago	8,790	23	422	445	262	4,801	5,063
Third dose or booster, less than 21 days ago	273	<3	25	25		9,158	9,158
Third dose or booster, at least 21 days ago	349,100	250	6,130	6,380	72	1,756	1,828
Ever vaccinated	359,360	279	6,624	6,903	78	1,843	1,921

Note the following:

- The non-covid mortality rate is still significantly higher in the unvaccinated compared to the ever vaccinated (2114 compared to 1843), meaning there is likely an ongoing mis-categorisation problem, but the difference has dropped dramatically – from 46% higher down to 15% higher.
- In each of the vaccination categories other than ‘Third dose or booster, at least 21 days ago’ the non-covid mortality of the vaccinated is much higher than that of the unvaccinated, with wildly different values of 4041, 4801 and 9158. Even with only 273 person years for the ‘Third dose or booster, less than 21 days ago’ the non-covid mortality rate is statistically significantly different from the other rates.

But, as mentioned above, assuming no significant adverse reactions, the non-covid mortality rate for each of the different categories of vaccination status should be approximately equal, so the fact that they are so wildly different is evidential support for misclassification in the data, as discussed in (2), namely that many of those who die shortly after their first dose are wrongly classified as unvaccinated and those who die shortly after their second dose are wrongly classified as single dose only etc.

5 Anomalies in the ONS age-standardised mortality rate

For risk benefit analysis we would prefer to consider the separate all-cause mortality for each of the different age categories. As we already saw, in the 15-19 age category the all-cause mortality of the vaccinated was higher than that of the unvaccinated but in the older age categories the all-cause

mortality of the unvaccinated was higher than that of the vaccinated. However, it is possible to provide an approximate whole population mortality rate that avoids the age confounding problem. This is called the age-standardised metric (12) and it is the only mortality metric used by the ONS. The ONS dataset Table 3 provides this metric, and we summarise the results in Table 5 here:

Table 5 Whole period mortality rates with age-standardised metric

Vaccination status	Person years	Deaths			Age standardised mortality rate per 100k person years		
		Involving covid	Non-covid	All cause	Involving covid	Non-covid	All cause
Unvaccinated	16,375,484	38,285	71,606	109,891	863	1,474	2,338
First dose, less than 21 days ago	1,925,587	4,037	13,662	17,699	190	637	827
First dose, at least 21 days ago	5,536,696	7,270	69,930	77,200	122	1,167	1,289
Second dose, less than 21 days ago	1,878,686	200	11,786	11,986	8	504	513
Second dose, between 21 days and 6 months ago	13,454,401	5,462	151,075	156,537	30	838	868
Second dose, at least 6 months ago	2,664,983	6,664	65,126	71,790	198	1,909	2,107
Third dose or booster, less than 21 days ago	1,529,103	494	12,374	12,868	22	548	569
Third dose or booster, at least 21 days ago	11,871,491	12,048	170,990	183,038	59	825	883
Ever vaccinated	38,860,947	36,175	494,943	531,118	65	893	957

The whole point of the ASMR is that it is intended to take full account of the number of people and deaths in each age category so that age categories with proportionally more deaths get a heavier weighting. This explains why, despite the deaths per person years being higher overall in the vaccinated, it is perfectly feasible for the ASMR to be higher in the unvaccinated. Also, because most deaths occur in the older age categories the ASMR is much 'closer' to the mortality rate of the older age-groups (such as those shown in Table 3) than the younger age-groups (such as those shown in Table 2).

The age-standardized metric is already adjusted to take account of the length of the reporting period, so although the time period in Table 5 is 17 months, the ASMR shown is an estimate of the number of people who die in a year (not 17 months). Hence, according to the estimate in the table, 1474 out of every 100k unvaccinated people would die per year from non-covid causes, compared to just 893 out of every 100k ever vaccinated people.

But this means that the ASMR exhibit even stranger anomalies than seen in the mortality rates of the older age-groups for the whole period. In Table 5, the non-covid mortality rate of the unvaccinated is 65% higher than the vaccinated. It suggests that such a gross anomaly might be disproportionately

due to misclassification errors that occurred early in the 17-month period, because the latest month's figures (May 2022) shown in Table 6 are very different from those in Table 5.

**Table 6 Latest month May 2022 age age-standardised mortality
(x indicates number too low to reasonably estimate)**

Vaccination status	Person years	Deaths			Age standardised mortality rate per 100k person years		
		Involving covid	Non-covid	All cause	Involving covid	Non-covid	All cause
Unvaccinated	448,434	82	935	1017	78	795	873
First dose, less than 21 days ago	2,291	0	1	1	x	x	x
First dose, at least 21 days ago	107,764	18	283	301	122	1,751	1,873
Second dose, less than 21 days ago	8,424	0	9	9	x	x	x
Second dose, between 21 days and 6 months ago	159,940	6	127	133	x	1,746	1,816
Second dose, at least 6 months ago	328,732	103	1,683	1,786	106	1,597	1,704
Third dose or booster, less than 21 days ago	13,292	0	96	96	x	2,056	2,056
Third dose or booster, at least 21 days ago	2,225,731	1,155	25,987	27,142	33	764	797
Ever vaccinated	2,846,174	1,282	28,186	29,468	36	787	823

So, in the May 2022 data there is no longer much difference between the age-standardised non-covid mortality rate of the vaccinated, 787 per 100k people, and the unvaccinated, 795 per 100k people. The all-cause ASMR are also not too far apart (823 versus 873). Moreover, except for the category 'third dose or booster at least 21 days ago' the all-cause ASMR of the unvaccinated is much lower than that of each category of vaccinated. In other words, even with all the potential biases and misclassifications in the ONS data, in the latest available month's data there is no real evidence to support the hypothesis that the vaccine reduced all-cause mortality in May 2022.

To understand the extent of the anomaly with the full period data Table 5 we can compare them to the historical annual non-covid mortality rates. The ONS provide age-standardised rates dating back to 1938 but for England & Wales combined (13) as shown in Table 7, whereas Table 5 is for England only. However, we can estimate the England figures as shown.

Table 7 Age-standardised mortality rate (per 100k population)

Year	England & Wales*
2020	1044
2019	925
2018	965
2017	965
2016	967
2015	993
2014	953
2013	986
2012	987
2011	979

* We are assuming the ASMR for the population of England is similar to that for England & Wales)

As already discussed, there is no logical reason for the ASMR for non-covid deaths to be higher in the unvaccinated since the vaccine cannot reduce non-covid deaths. So, prior to the Covid year of 2020 the England ASMR is stable at around 974 deaths per 100k people. This means we should be seeing a similar yearly figure for both the latest unvaccinated and vaccinated non-covid mortality rate. Yet, based on the whole 17-month period of the ONS dataset we have:

- Vaccinated rate is 893 (an 8% drop from what is expected)
- unvaccinated rate is 1473 (a 51% increase from what is expected)

If we compare historical all-cause mortality, 974 ASMR, with the ONS dataset values, 2338 ASMR for the unvaccinated and 957 ASMR for the vaccinated, then we would conclude that in a period after the peak of the pandemic while the vaccinated now have a similar mortality rate to historical rates the unvaccinated are dying at an enormous rate 240% higher than before. Hence, whether we focus on non-covid deaths or all-cause deaths the ONS dataset cannot be correct. It is also important to compare the recent vaccinated and unvaccinated data, 823 and 873 respectively from Table 6, with historical rates and this shows missing mortality and confirms that the ONS dataset is incorrect.

What was shown in (2) was that, in 2021 when the vaccine rollout began, the ONS data were showing peaks in non-covid mortality among the unvaccinated at the very time the vaccine rollouts reached their peak in each different age category. Figure 2 shows this for the 60-69 age category. Later smaller peaks in non-covid mortality were also seen in the unvaccinated when the second dose was rolled out.

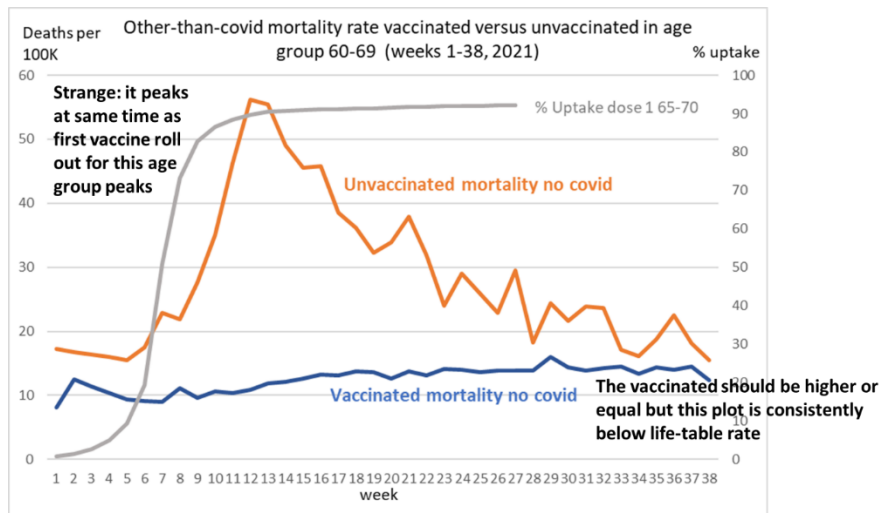


Figure 2 Non-covid mortality rate in age category 60-69

That paper concluded that a possible plausible explanation for such an obvious anomaly was that people dying shortly after vaccination were being wrongly classified as unvaccinated. Whether through policy or error this certainly happens (indeed in Sweden a reply to an FOI⁹ request confirms that those dying within 14 days of vaccination are routinely counted as unvaccinated). Once the ONS data were adjusted for these anomalies there was no evidence that the vaccines reduced all-cause mortality.

Using the data in the latest ONS report (1) Figure 3 shows the weekly non-covid mortality rate in the unvaccinated and vaccinated over the whole period from 1 Jan 2021 to 31 May 2022. Note, how the anomalies seen in the first half of 2021, when the major vaccine rollouts occurred, subside and the rates for both vaccinated and unvaccinated converge on the historical non-covid mortality rates as they always should have done.

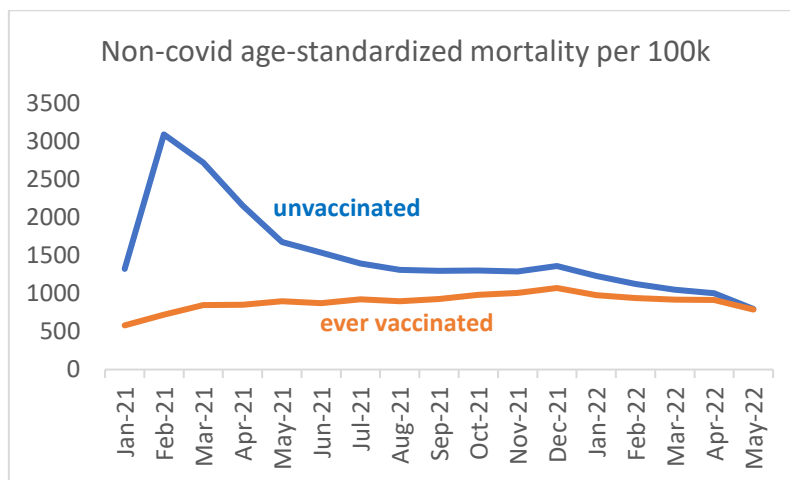


Figure 3 Non-covid mortality rate Jan 2021 – May 2022

The fact that the vaccinated and unvaccinated non-covid mortality rates have now converged, however, does not necessarily mean that claims of vaccine safety and efficacy can be supported. On

⁹ <https://lakaruppropet.se/public-health-agency-reporting-has-distorted-mortality-rates-for-the-unvaccinated-and-vaccinated/>

the contrary, there are several reasons to believe that the non-covid mortality in the vaccinated is being underestimated even in the ONS dataset:

- There are a large number of vaccinated deaths missing from the ONS dataset as explained in (3)
- It is likely that there is continued misclassification of those dying shortly after vaccination doses
- Even within the highly unrepresentative ONS sample of the England population the proportion of unvaccinated in the dataset is likely underestimated

Since we have argued that a much larger proportion of the whole England population is unvaccinated compared to the proportion in the ONS sample, it follows that if the whole population proportion is used as the denominator with the ONS mortality figures, the current non-covid mortality rate (based on May 2022) would be significantly higher in the vaccinated.

6 Analysis of recent mortality data: “Dead presumed missing”

To best understand the current mortality rate of vaccinated and unvaccinated and to consider the impact of possible underestimation of proportion unvaccinated in the ONS data we focus on the four most recent months (Feb to May 2022) and the mortality data in each separate age category. The most recent months should provide the most stable current estimate of differences in all-cause mortality between vaccinated and unvaccinated especially as there were no major waves of covid mortality or vaccination during this period.

The relevant data for this comes from Table 2 of the ONS dataset. There are, however, some curious omissions in this table that need to be noted that slightly compromise the analysis. Specifically:

- Whereas elsewhere in the dataset the ONS provide age categories (10-14, 15-19, 20-24, ..., 85-89, 90+) the ONS only provide data for the age categories 18-39, 40-49, 50-59, 60-69, 70-79, 80-89, 90+ in Table 2.
- Whereas elsewhere in the dataset the ONS provide the aggregated ‘ever vaccinated’ data in addition to all the individual vaccination status categories’ data, this is omitted in Table 2. Of course, we can and do simply calculate the ‘ever vaccinated’ data by aggregating the data for all the individual vaccination status categories. However, while this enables us to calculate the mortality rate, it does not allow us to calculate the ASMR that ONS itself uses. Fortunately, because the data is already age-categorised (albeit quite coarsely) there is minimal age confounding, and these rates are close to the age-standardised rates.

Table 8 shows the aggregated mortality data and mortality rates (expressed as deaths per 100k person years) for the four most recent months of the ONS data. The last two columns show the reported percentages of unvaccinated by both ONS (which in each age category is simply the number of unvaccinated person years divided by the total person years in the age category) and the NIMS estimate for that period and age group.

Note that:

- For each of the younger age categories (18-39 and 40-49), as well as (curiously) the oldest age category 90+, the all-cause mortality rate of the unvaccinated is lower than that of the ever vaccinated.

- In each of the other age categories the all-cause mortality rate of the unvaccinated is higher than that of the ever vaccinated.
- In every age category the proportion of unvaccinated is significantly underestimated compared to the NIMS estimate. If we were to assume that the fatalities were accurately categorised but that the overall proportion was that of the NIMS estimate and not the ONS estimate, then the all-cause mortality would be significantly higher in the vaccinated in every age-group. In each of the age groups where the unvaccinated mortality rate is higher than the vaccinated mortality rate, the NIMS estimate is at least 71% higher than the ONS estimate. A relative increase of between 20% and 40% over the reported unvaccinated mortality rate will result in a lower all-cause mortality rate for the unvaccinated category. However, these kinds of adjustments are questionable given that the unvaccinated, uncounted by the ONS, have no mortality represented within the ONS dataset.

Table 8 Feb-May 2022 Mortality Rate by Age Category

Age Category	Total deaths	Person years	Mortality rate deaths per 100k person years	Reported unvaccinated %	
				ONS	NIMS
18-39				19.3%	28.7%
Unvaccinated	151	706,779	21		
Ever vaccinated	730	2,952,830	25		
40-49				12.2%	19.6%
Unvaccinated	204	218,387	93		
Ever vaccinated	1,610	1,571,717	102		
50-59				6.9%	11.8%
Unvaccinated	560	144,459	388		
Ever vaccinated	5,712	1,960,002	291		
60-69				4.7%	8.2%
Unvaccinated	876	82,600	1,061		
Ever vaccinated	13,132	1,674,394	784		
70-79				2.8%	4.8%
Unvaccinated	1,178	39,319	2,996		
Ever vaccinated	31,064	1,388,370	2,237		
80-89				2.2%	4.4%
Unvaccinated	1,375	15,246	9,019		
Ever vaccinated	48,346	662,379	7,299		
90+				2.9%	4.4%
Unvaccinated	910	4,386	20,748		
Ever vaccinated	31,638	146,737	21,561		

However, these latest data provide some of the strongest evidence yet of how inaccurate the ONS dataset is when we compare the mortality rates with the historical rates up to 2016 (14) as shown in Figure 4 reproduced from (14).

What we find is that the ONS mortality rates are much lower for both the vaccinated and unvaccinated in each age category (while a very small drop might be expected to account for Feb-May having slightly lower annual rates than a full year including January and December this should be more than compensated for the known increase in deaths in 2022 from the various impacts of Covid-19 and lockdowns). For example, from Table 9, in the 18-39 age group the ONS data shows mortality rates of 21 for the unvaccinated and 25 for the vaccinated, whereas historical rates are around 50. For the 40-49 age group the ONS rates of 93 for the unvaccinated and 102 for the vaccinated, whereas historical rates are around 180. As the age categories increase the reported mortality rates for the unvaccinated and ever vaccinated converge.

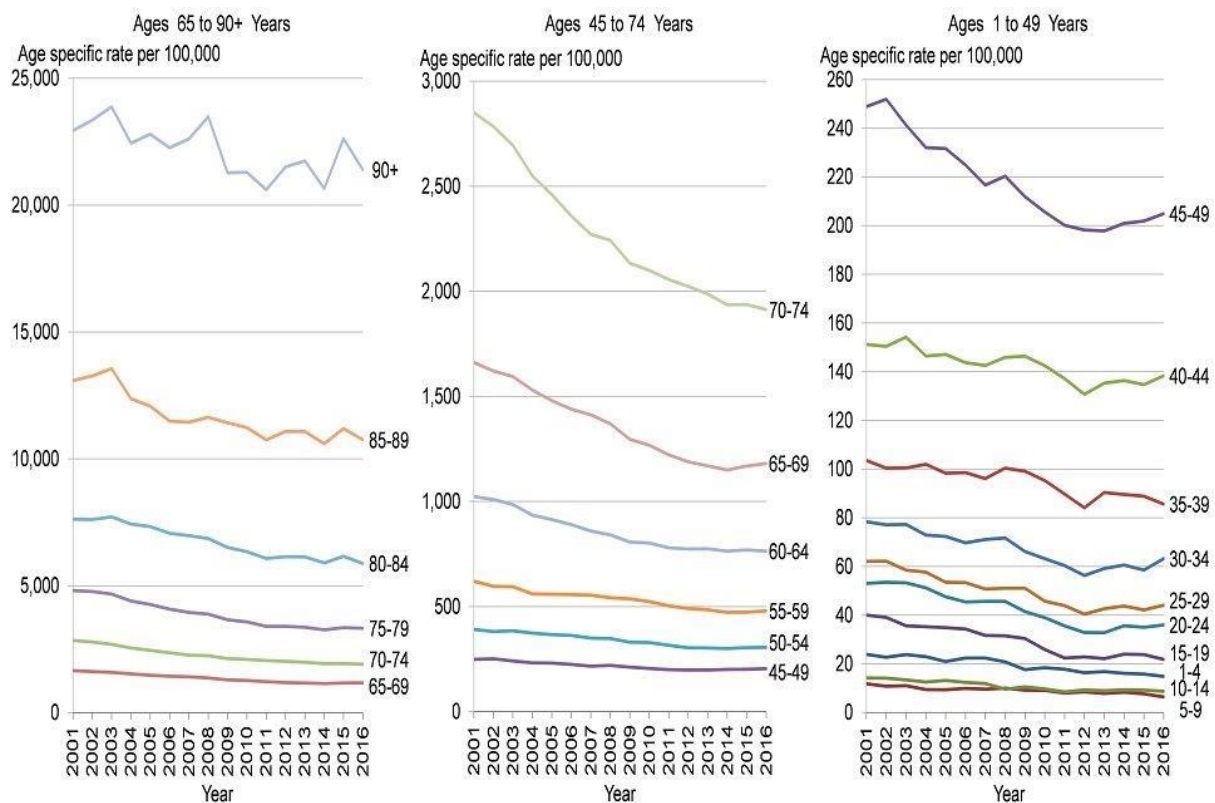


Figure 4 Historical mortality rates for England by age group

Where are these missing deaths? It might be that deaths reported by the ONS are only those registered with the authorities but deaths that require a coroner's investigation will not be included in the ONS death totals until the investigation is complete and the death is registered thereafter. Given coroner's investigations can take weeks or, in exceptional cases, months a larger proportion of deaths will be missing in the most recent data from the ONS [19]. This creates a lag effect where actual mortality lags that reported and, over time, this lag effect self-corrects as deaths are registered and are then retrospectively added into the ONS data with the correct date of occurrence. Clearly this lag effect would be more pronounced for younger age groups as the proportion of deaths that require investigation is higher in the young. However, given that the data is from Feb-May 2022 any backlog of deaths being investigated by the coroner should have cleared by the time of writing.

It would be possible to estimate the historical lag effect and, assuming it is representative of current processes, then estimate the total numbers of deaths missing for which self-correction is expected. However, the ONS have chosen not to do that and instead reported a misleading low mortality rate

which will rise over time as the death data corrects itself. Whereas the ONS had published updates to the data every two months or so, there has not been an update since July 2022 with no explanation as to why or when the next update is to be expected.

Table 9 Feb-May 2022 Age-standardized Mortality Rate compared with approximate Historical Mortality Rate (deaths per 100k person years)

Age Category	Mortality rate	Historical Mortality rate in 2016 (approximate)
18-39		
Unvaccinated	21	50
Ever vaccinated	25	
40-49		
Unvaccinated	93	180
Ever vaccinated	102	
50-59		
Unvaccinated	388	400
Ever vaccinated	291	
60-69		
Unvaccinated	1,061	1,000
Ever vaccinated	784	
70-79		
Unvaccinated	2,996	3,000
Ever vaccinated	2,237	
80-89		
Unvaccinated	9,019	8,500
Ever vaccinated	7,299	
90+		
Unvaccinated	20,748	21,000
Ever vaccinated	21,561	

We have previously encountered this ‘dead presumed missing’ problem in ONS mortality data. In (3) we found that they had omitted 13,593 deaths from their dataset and as a result the mortality in the vaccinated was disproportionately low when compared to historical norms and those omitted from their dataset (but which appear in other government statistics). The ONS have only acknowledged 1,436 deaths post vaccination whose vaccination record was not entered into the NIMS data system, thus originally categorising them as unvaccinated deaths, whilst stating that 71,318 people with inconsistent vaccination records were simply removed from the analysis [20].

The ONS dataset continues to show grossly unrealistic discrepancies between the mortality rate of people within the ONS sample and the implied mortality rate of the remaining population. If we take the claimed ONS mortality rates for vaccinated and unvaccinated for the sample and extrapolate to the population, outside of their sample, we find there would have been over 150,000 deaths in the population that was not sampled (see below). That would mean those 8 million people, while only

19% of the population of England and likely to be younger overall than those in the sample, accounted for 30% of all deaths in England and Wales.

In Section 3 we inferred that 69% of the 10+ population not in the ONS dataset are unvaccinated, and this gives us 5,520,000 unvaccinated people and 2,480,000 vaccinated people (a total of 8 million not in the ONS dataset). Using the ONS unvaccinated and ever vaccinated all-cause mortality estimates for the whole period, 2337.5 and 957.4 (from Table 3 in [20]) and applying them to these ever vaccinated and unvaccinated populations results in 129,000 unvaccinated deaths and 23,700 vaccinated deaths (a grand total of 150,000 deaths in a year).

In England there are 42.8 million people aged 10+ and the 8 million not in sample is approximately 19% of this population total. However, the total deaths recorded in England by ONS for 2021 is 496,309 and 150,000 deaths would be approximately 30% of that figure. Therefore, we can conclude that 19% of the aged 10+ population of England have generated 30% of the deaths. Rather than 69% if we assumed the upper limit of 99.6%, were unvaccinated then the total would be 187,000 deaths in the population that was not sampled, which would be 37% of the total deaths in whole population. How is this discrepancy explained? The obvious explanation is that the ONS dataset not only misrepresents the true proportion of the unvaccinated but also is selective in which deaths appear in the dataset and which do not.

7 Alternative explanations for the anomalous ONS data

Our analysis demonstrates that, even without any adjustments to take account of underestimates in the proportion of unvaccinated, the recent months of ONS data suggests that in the young (less than 50) and very old (90+) the all-cause mortality is higher among the vaccinated than the unvaccinated. Only very modest and realistic adjustments to the unvaccinated proportion indicate the same may be true of all the other age groups. There is growing evidence elsewhere that the vaccines may lead to an increase in all-cause mortality across all age groups (15).

Because of the potentially devastating impact of these conclusions on the vaccination programme, and because it confirms the extent of the anomalies in the ONS data in the first half of 2021, there has been a concerted effort to invent alternative explanations for the anomalies in the ONS dataset. One persistent argument has been that the anomalies were the result of especially ill people being denied the vaccine; so, there was, they claimed, a 'healthy vaccinee effect' (or equivalently a 'moribund unvaccinated effect'). Indeed, as shown in (16) one of the harshest critics of the report (2) repeated that explanation while attacking the recent paper by Malhotra exposing problems with the covid vaccines (15).

The ONS even stated the 'healthy vaccinee effect' as an explanation in a subsequent report (17) after the anomalies in their data were identified. But the notion of the 'healthy vaccinee' was contradicted by the NHS guidelines (18) (which required the most critically ill people be prioritised for the vaccine, not denied it) and we know that even terminally ill patients in hospices and care homes were given the vaccine as a priority. Moreover, in (2) it was shown that the ONS data could not be explained by a 'healthy vaccinee' effect. From the mortality pattern across age categories in Table 9 there is no healthy vaccinee effect in evidence. Only the ever vaccinated in the middle to older age groups (50-59, 60-69, 70-79, 80-89) show lower mortality, than the unvaccinated. Yet we see the opposite result in the very youngest (18-39, 40-49) and very oldest (90+) age groups, where the unvaccinated show lower mortality than the ever vaccinated. And in any case as we have already observed there is little

evidence of any of these age groups containing substantial sub-populations of terminally ill or moribund people given the mortality rates are less than or equal to historical figures across the board.

The most striking feature of Table 9 is that the mortality rates for the younger age groups in the ONS dataset are significantly less than we would reasonably expect given historical mortality rates. Given that ONS reported mortality rates are adjusted to ensure that differences in population sizes are accounted for, by age-standardization, differences in population numbers cannot explain this. Neither can any hypothesis that unhealthy younger people, possibly more likely to die, are less likely to be in the ONS dataset because, if anything, such terminally ill young people would almost certainly be registered with a GP and thus be included in the ONS dataset.

Another alternative explanation for this observed reduced mortality effect is that there are fewer deaths in the ONS dataset than should be reported for these younger age categories.

With the UKHSA data showing increasingly poor efficacy of the vaccines (5) this brings us to a very interesting comment by another covid commentator 'Health Nerd' (@GidMK on twitter) who was also critical of the report(2). He has also been outspoken in trying to delegitimise the recent paper by Malhotra. In a long twitter thread about that paper¹⁰ he wrote:

In the UK, people who were most at risk were vaccinated first meaning that “vaccinated” is a good proxy for extremely high-risk individuals. You have to correct for this difference in observational analyses, but the author does not

So, in contrast to the previously claimed 'healthy vaccinee' effect used to explain the non-covid mortality spikes, the same people are now claiming an 'unhealthy vaccinee' effect to explain the higher mortality rates of the vaccinated. For us to know how to defend our work against these counter arguments, it would be good if our detractors could make up their minds as to whether vaccinees are *especially healthy or especially unhealthy*.

8 Conclusions

Previously discussed explanations for the anomalous differences between non-covid mortality rates in the vaccinated and unvaccinated include miscategorising deaths shortly after vaccination as unvaccinated and omitting completely many vaccinated deaths. This paper considered an additional major source of bias that has not previously been widely discussed: possible underestimation of the proportion of unvaccinated people. The ONS estimate of 8% of adults unvaccinated in May 2022 contrasts starkly with two other independent sources which estimate the figure to be 20% and 26% respectively. Because the ONS data are based on a subset of England residents that excludes all those not registered with a GP and not registered in the 2011 census, it is missing some 8 million adults who are not at all representative of those in the ONS sample. Hence, it is conceivable that both the ONS 8% figure is correct for its sample, while the proportion of all adults in England unvaccinated is at least 20% as per the other sources. But we showed this would necessarily imply that between 69% to 99.6% of adults missing from the ONS sample are unvaccinated. Hence, either the ONS is underestimating the proportion of unvaccinated in its sample or the sample is so unrepresentative of the whole population that any inferences made using the ONS data are worthless. Either way, the ONS estimate of proportion unvaccinated must not be used for any comparisons of vaccine efficacy or safety of the whole England population. We also showed that even with these anomalies and biases the most recent monthly data (in contrast to the especially flawed data in 2021) provides no evidence that the

¹⁰ <https://twitter.com/GidMK/status/1574643817600647168>

vaccines reduce all-cause mortality. In fact, for each of the younger age categories (18-39 and 40-49), as well as (curiously) the oldest age category 90+, the all-cause mortality rate of the unvaccinated is lower than that of the ever vaccinated.

The ONS vaccine mortality surveillance reports for England have numerous anomalies which bias its results strongly toward underestimating mortality rates for the vaccinated and overestimating mortality rates for the unvaccinated. Clear evidence of the anomalies can be seen in the latest report by comparing the ONS reported age standardised mortality rates for non-covid deaths in the vaccinated and unvaccinated. Assuming the vaccines do not cause many deaths from serious adverse reactions, there is no reason why these mortality rates for both vaccinated and unvaccinated should be significantly different from the pre-covid era steady state figure of approximately 974 deaths per 100k person years. Yet, based on the whole period of vaccination from Jan 2021 to May 2022, the ONS data shows a completely implausible non-covid mortality rate of 1474 per 100k person years for unvaccinated people, compared to just 893 for vaccinated people. Moreover, when we analyse the recent months' data by age categories, we find that in both the vaccinated and unvaccinated the all-cause mortality rates are much lower than the historical rates. Likewise, the mortality rate outside of the ONS dataset is significantly higher than that within the ONS dataset. The ONS data therefore suffers from deaths selection bias.

Overall, the ONS dataset is so compromised with inaccuracies, anomalies, and biases that it cannot be used to reliably determine vaccine efficacy and safety. We recommend that the ONS adds full caveats to its future surveillance reports explaining the limitations and biases of its sample population. Also, any studies of vaccine efficacy or safety comparing vaccinated and unvaccinated which use whole population data of covid cases, hospitalisations, and deaths, but which rely on the ONS estimate of proportion unvaccinated must be retracted.

Acknowledgments

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