Analysis of ONS Dataset "Deaths by vaccination status, England" release 1/11/21

The dataset was obtained from web site,
https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/datasets/deathsbyvaccinationstatusengland
and relates to death data between 2 January 2021 and 24 September 2021.

Analysis is confined to data from Tables 3 and 4. (Tables 1 and 2 could also be addressed but rates given in those Tables are age-standardized. Rates herein are not age-standardised).

All data are given disaggregated into,

- Four age ranges: 10-59, 60-69, 70-79 and 80+, and,
- Four vaccination statuses: unvaccinated, one dose within 21 days, one dose 21 days or more previously, or double-vaccinated, and,
- 38 weeks, and,
- Deaths attributed to Covid-19 (Table 3) or all-cause deaths (Table 4).

For any week, age range and vaccination status, I calculate the non-Covid number of deaths by subtracting the numbers of deaths in Table 3 from that in Table 4.

Death rates are per 100,000 of the population of the same age and same vaccination status in the same week.

Covid Death Rates are plotted against week for the four vaccination statuses in Fig.1 for age range 10-59. Figures 2-4 are the corresponding graphs for the other age ranges. The "one dose (<21 days)" data (blue) is noisy so I've smoothed it in some places by replacing with an average.

There's nothing very surprising in Figs.1-4. All vaccination statuses show either reduced death rates cf unvaccinated or, for one dose cases in some weeks, little difference. The older age groups have far higher death rates, as is well known.

Fig.1

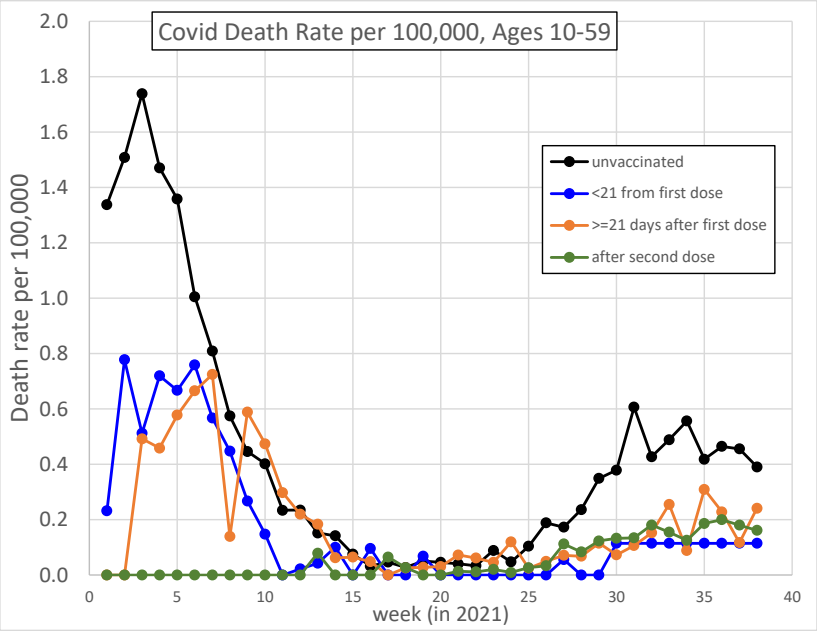


Fig.2

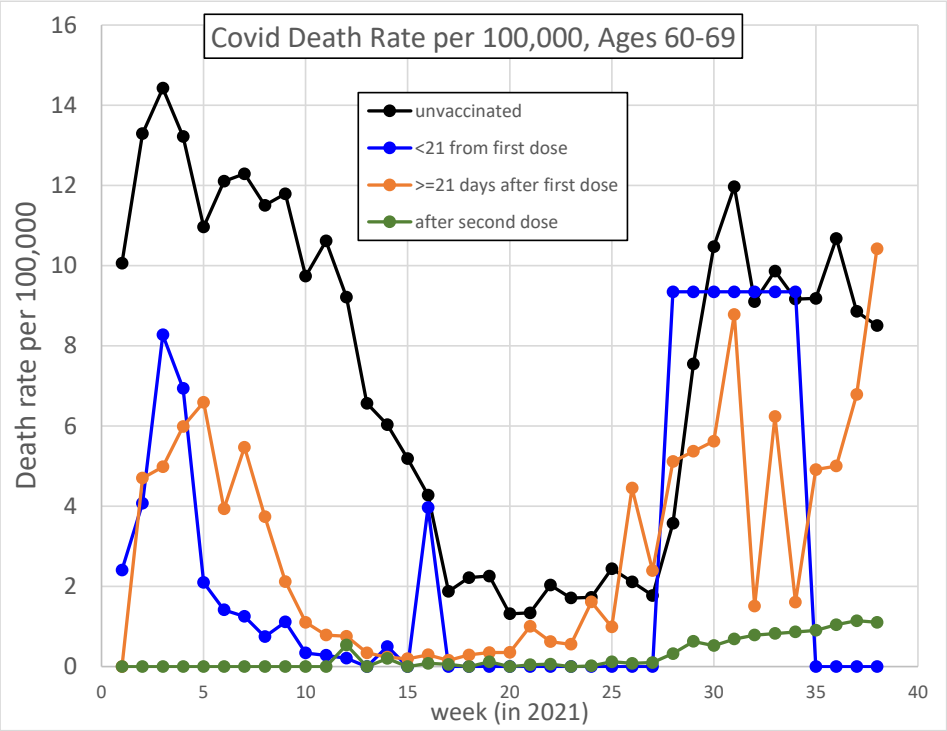

Covid Death Rate per 100,000, Ages 60-69
unvaccinated
<21 from first dose
>=21 days after first dose
after second dose
Death rate per 100,000
week (in 2021)
0
2
4
6
8
10
12
14
16
0
5
10
15
20
25
30
35
40

Fig.3

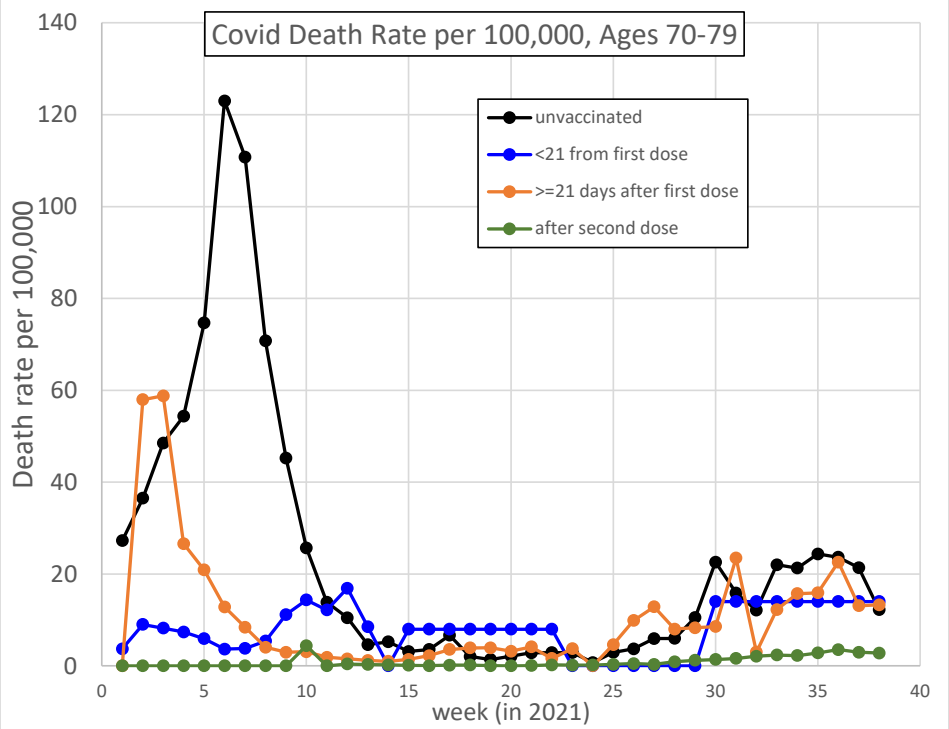
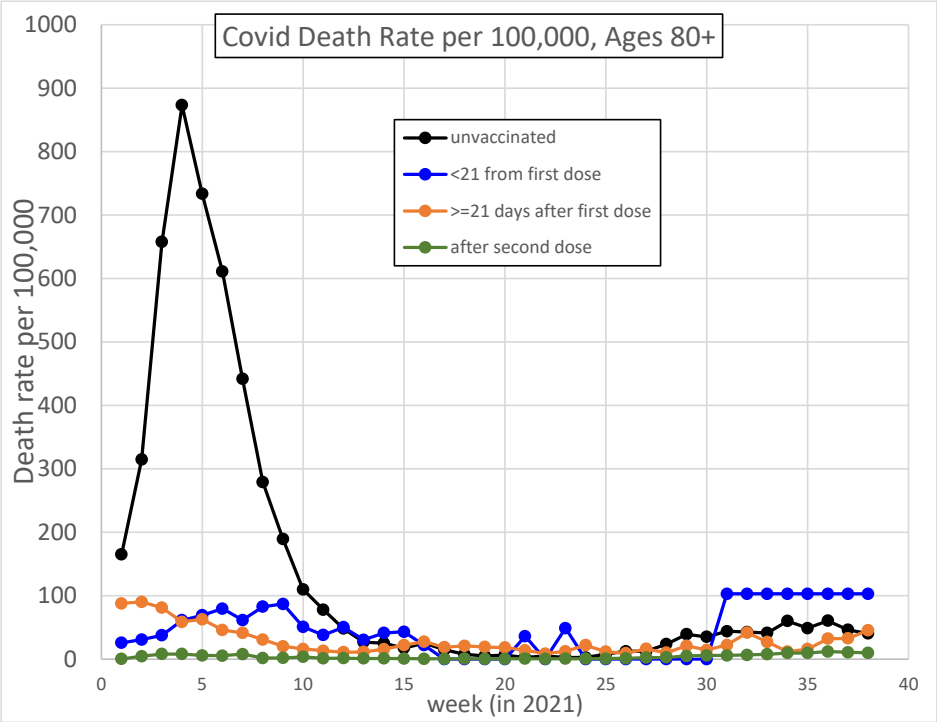

Covid Death Rate per 100,000, Ages 70-79
unvaccinated
<21 from first dose
>=21 days after first dose
after second dose
Death rate per 100,000
week (in 2021)
0
20
40
60
80
100
120
140
0
5
10
15
20
25
30
35
40

Fig.4



Non-Covid Death Rates are plotted against week for the four vaccination statuses in Fig.5 for age range 10-59. Figures 6-8 are the corresponding graphs for the other age ranges. I have not smoothed any data in these graphs but I suggest you mentally smooth the noisy parts of the blue data.

Fig.5

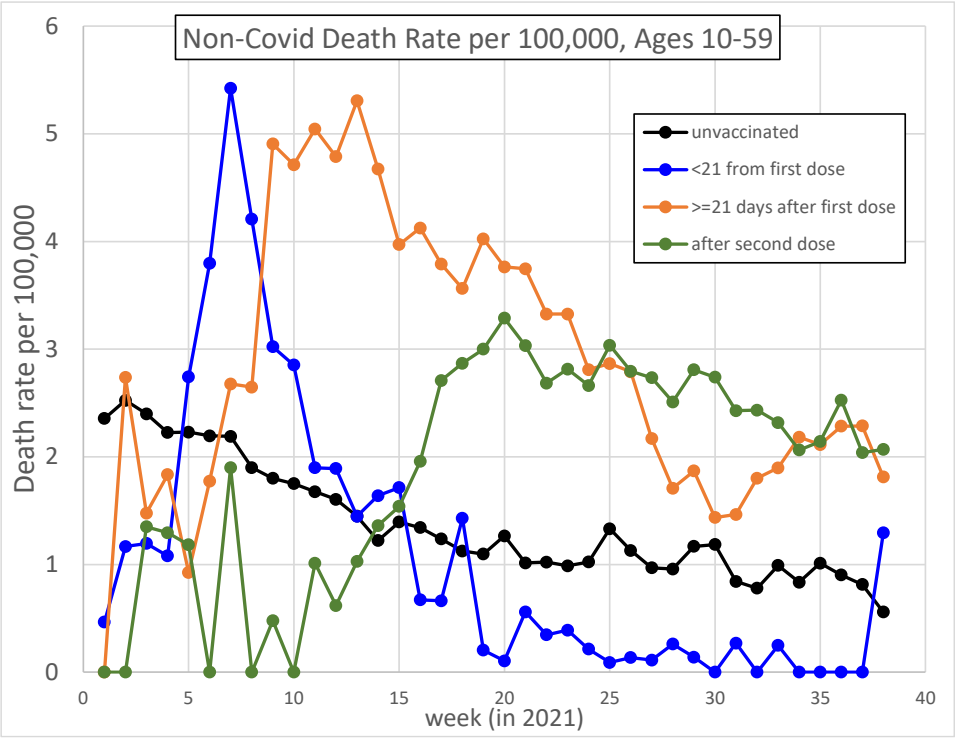


Fig.6

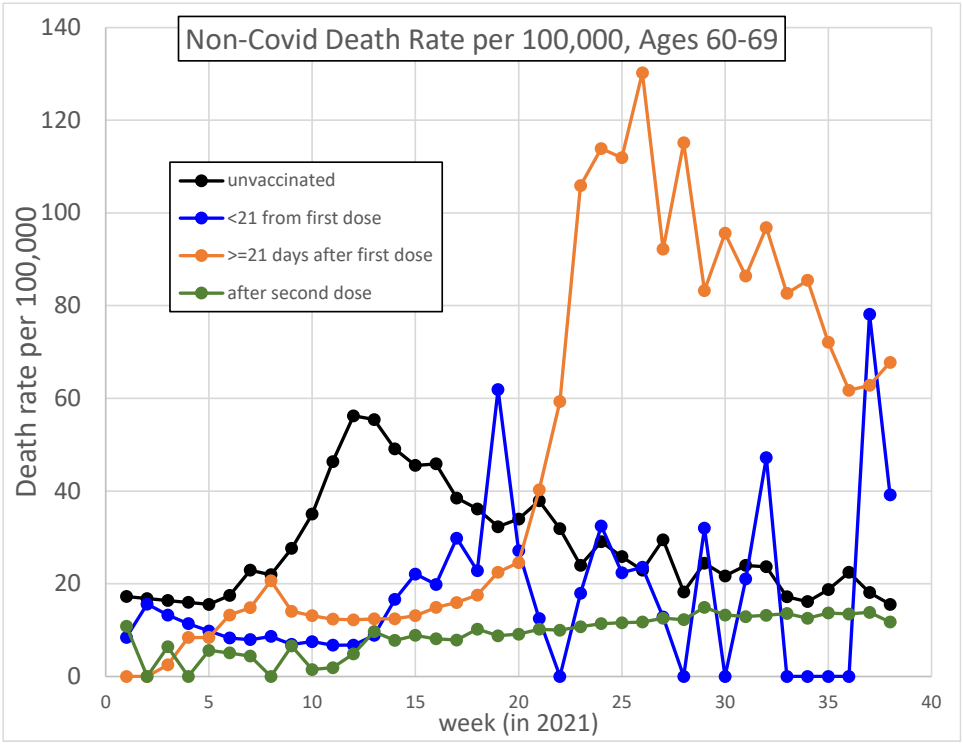

Non-Covid Death Rate per 100,000, Ages 60-69
unvaccinated
<21 from first dose
>=21 days after first dose
after second dose
Death rate per 100,000
week (in 2021)
0
20
40
60
80
100
120
140
0
5
10
15
20
25
30
35
40

Fig.7

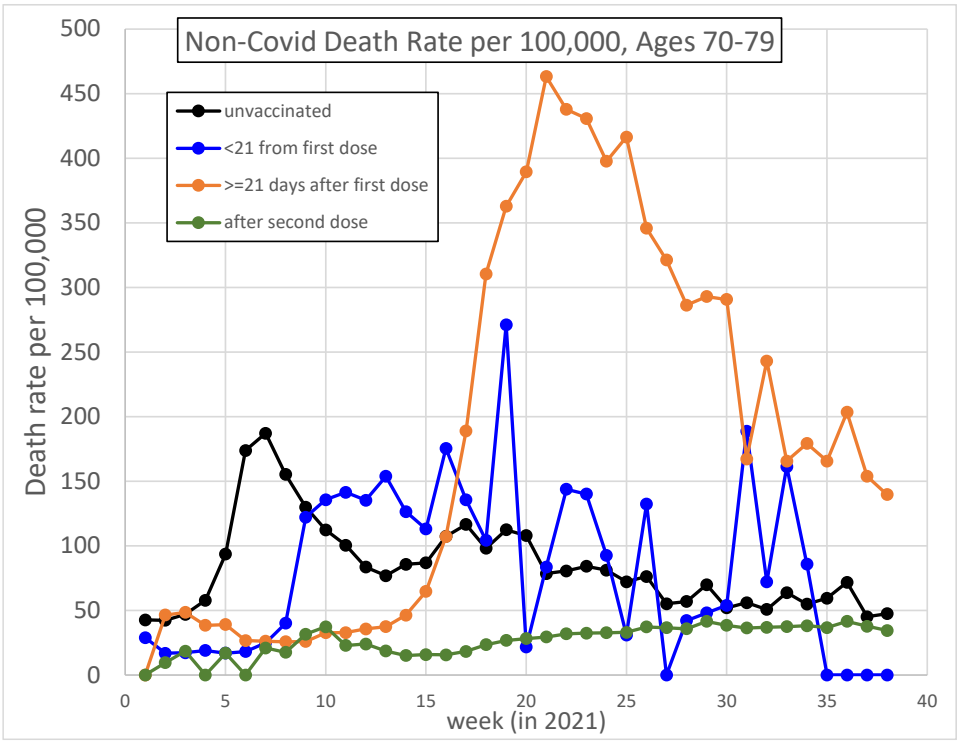
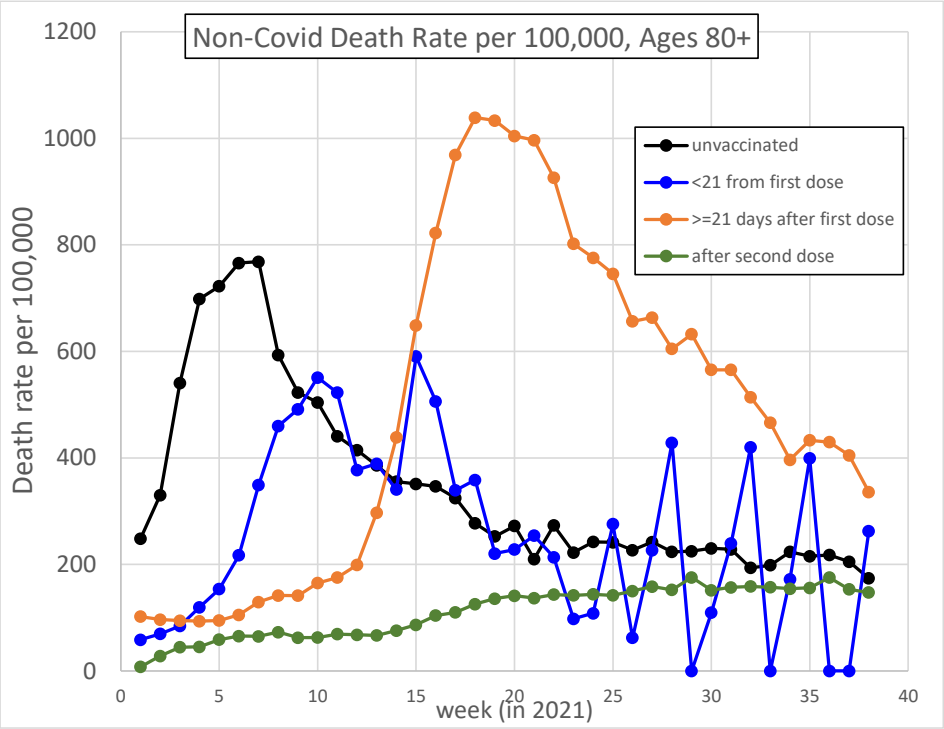

Non-Covid Death Rate per 100,000, Ages 70-79
unvaccinated
<21 from first dose
>=21 days after first dose
after second dose
Death rate per 100,000
week (in 2021)
0
50
100
150
200
250
300
350
400
450
500
0
5
10
15
20
25
30
35
40

Fig.8



People with one vaccination dose 21 days or more previously (brown lines) would seem, for all age ranges, to have substantially higher death rates than the unvaccinated (black lines) excepting the earliest months. For those aged 10-59 the same is true for the double-vaccinated.

At first sight this looks very concerning as regards vaccine safety – however it is not what it seems.

Data Analysis

Statistical Significance & Data Vetos

Before proceeding further it is important to check if apparent differences in death rates are statistically significant. I have adopted an approach of using standard checks for significance separately for each week, and then rejecting data which does not meet significance checks, retaining only data that does. The procedure is,

- The ONS give lower and upper bounds for death rates in Tables 3 and 4. I interpret half the range from lower to upper bound as the standard deviation (s). Where bounds are not given by ONS I have assumed a Coefficient of Variation of unity (i.e., the standard deviation equals the quoted best estimate, so the lower and upper bounds are zero and double the stated value respectively).
- The standard deviation of Non-Covid death rates is assumed to be the root-sum-of-squares of the standard deviations from Tables 3 and 4. If Covid death rates and All Cause death rates were uncorrelated this would be accurate. As they will certainly be positively correlated, it is a conservative over-estimate.

- We are interested in the significance of any apparent difference between unvaccinated Non-Covid death rates and Non-Covid death rates for the various vaccination statuses. The Independent Samples t-test is used and a p value calculated from the t-statistic using the Student t-distribution. (Algebra given in the Appendix).
- A veto is also deployed if the vaccinated/unvaccinated difference in death rates fails to meet an effect size criterion based on Cohen's d. (Algebra also given in the Appendix).
- Data for any given week, and any vaccination status, is retained only if $p < 0.05$ and $d > 0.8$. The former corresponds to 95% confidence of significance whilst the latter is the conventional criterion for large effect size.

The Impact of Figs.5-8: How Many Deaths Are Attributable to Vaccination?

I am concerned here with Non-Covid deaths only, and this can be assumed in all the data that follows.

It is convenient to consider ages 60 and above first as the age range 10-59 turns out to be quite different.

Suppose a vaccinated population has a larger death rate than the unvaccinated population of the same age at the same time. Taking the difference between these rates and multiplying by the population of vaccinated individuals gives a number of excess deaths within the vaccinated population compared to if they had not been vaccinated, other things being equal. But we cannot assume that the vaccine was the cause of these excess deaths, because other things might not be equal. However, it's the place to start to see if there is a case to be answered.

For ages 60-69, Fig.9 plots this "vaccinated excess number of deaths" against week for each of the three vaccination statuses. It is negative everywhere where it is large in magnitude.

Fig.9

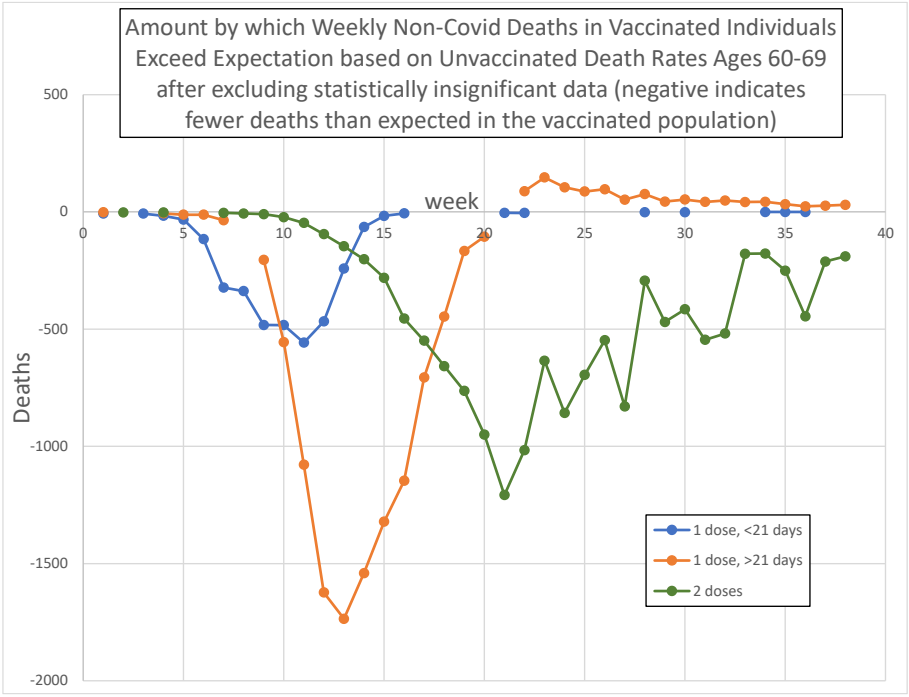
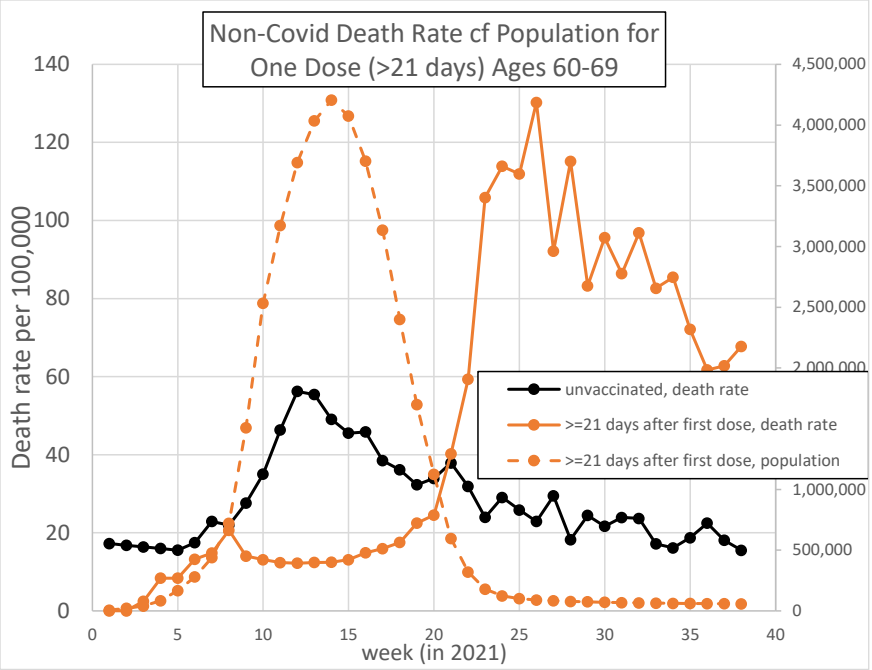


Fig.9 tells us that vaccinated individuals have a ***smaller*** number of **Non-Covid** deaths than would have been expected based on the observed unvaccinated death rates. But how is this consistent with Fig.6 which shows that for people with one dose (>21 days) the (Non-Covid) death rate is far higher than for the unvaccinated after around week 22? Well, there is indeed a positive "vaccine signal" in the brown line after week 22 in Fig.9, but its magnitude is small. The resolution of this conundrum lies in how the population of single-vaccinated people changes over time. Fig.10 plots both the death rate and the weekly population for people aged 60-69 with one dose (>21 days), the unvaccinated death rate is also shown for comparison.

Fig.10



This shows very clearly that the high death rates for "one dose (>21 days)" people applies only when the corresponding population has dropped to extremely low levels. Consequently, these high death rates correspond to only quite small number of deaths, thus explaining Fig.9.

It is extremely improbable that the Covid vaccines would be beneficial to anything other than Covid-19, so the smaller numbers of deaths in the vaccinated populations (compared to what the unvaccinated population would suggest) shown in Fig.9 can only be a sampling effect.

The high death rates associated with very small remnant population sizes shown in Fig.10 will also be a sampling effect.

The same pattern of behaviour is seen in the data for ages 70-79 and 80+, as shown by Figs.11-14 below.

Fig.11

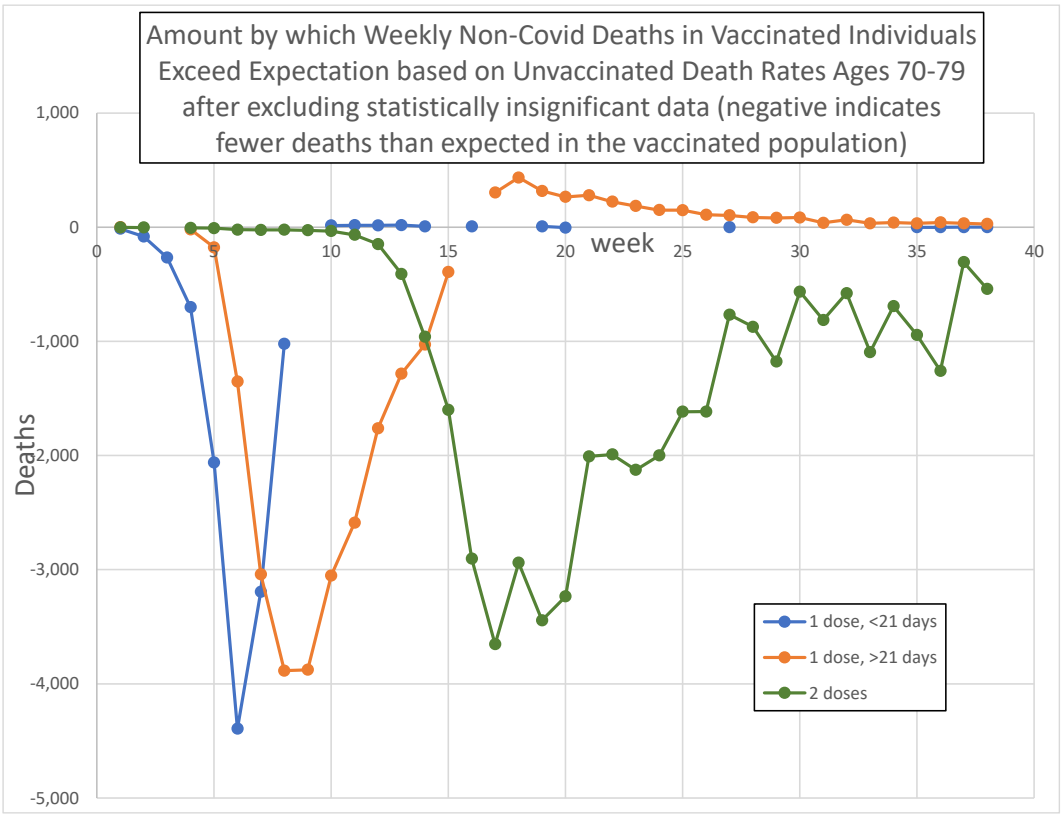


Fig.12

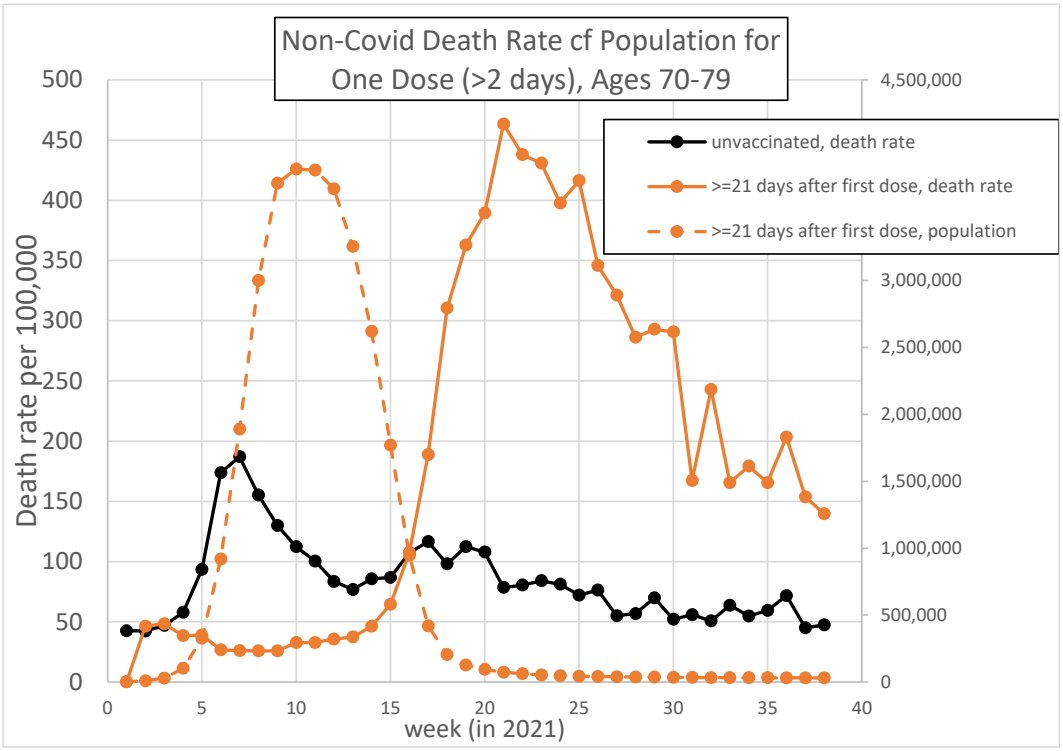


Fig.13

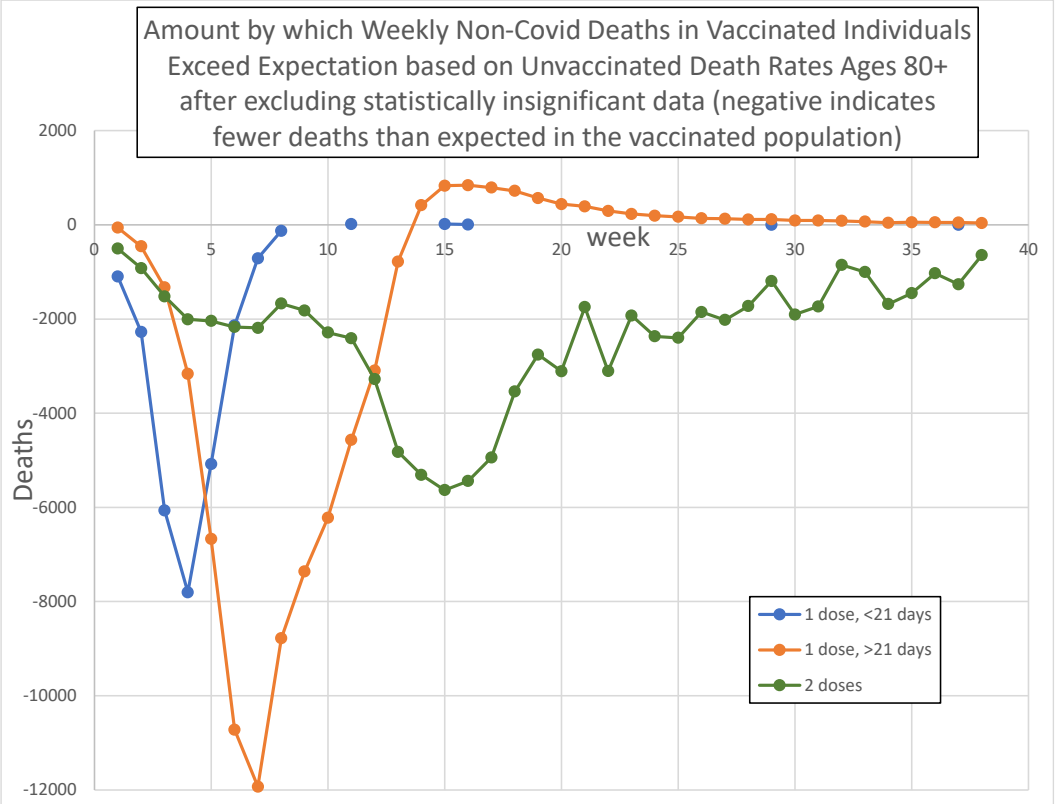
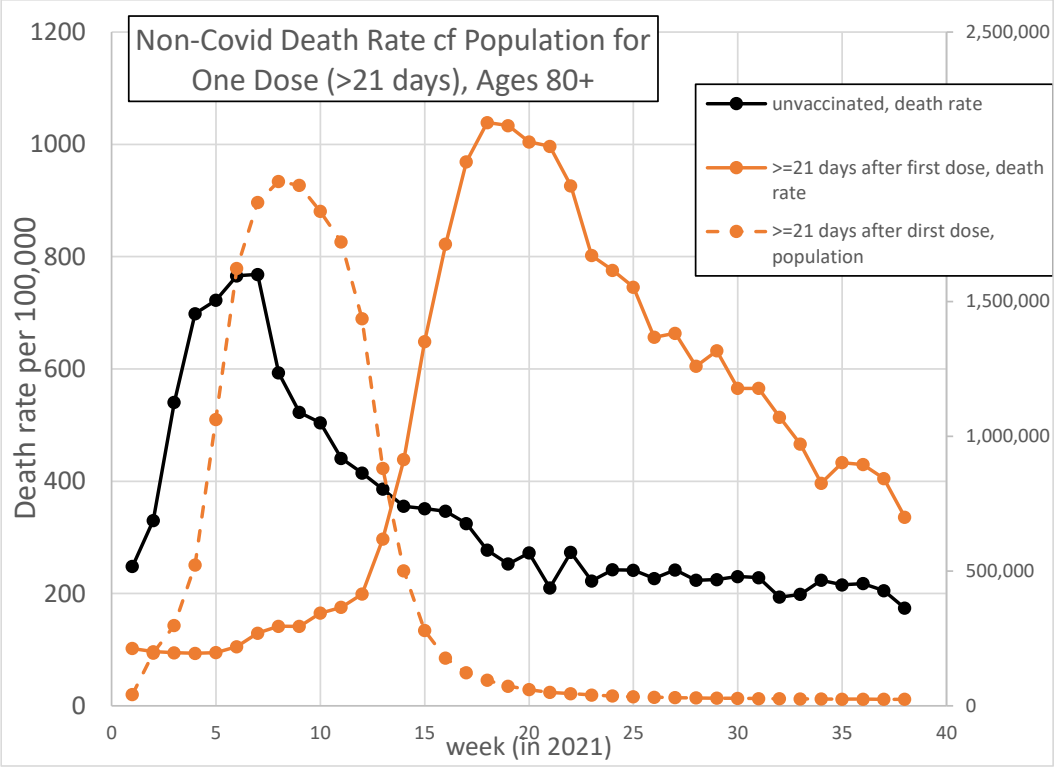


Fig.14

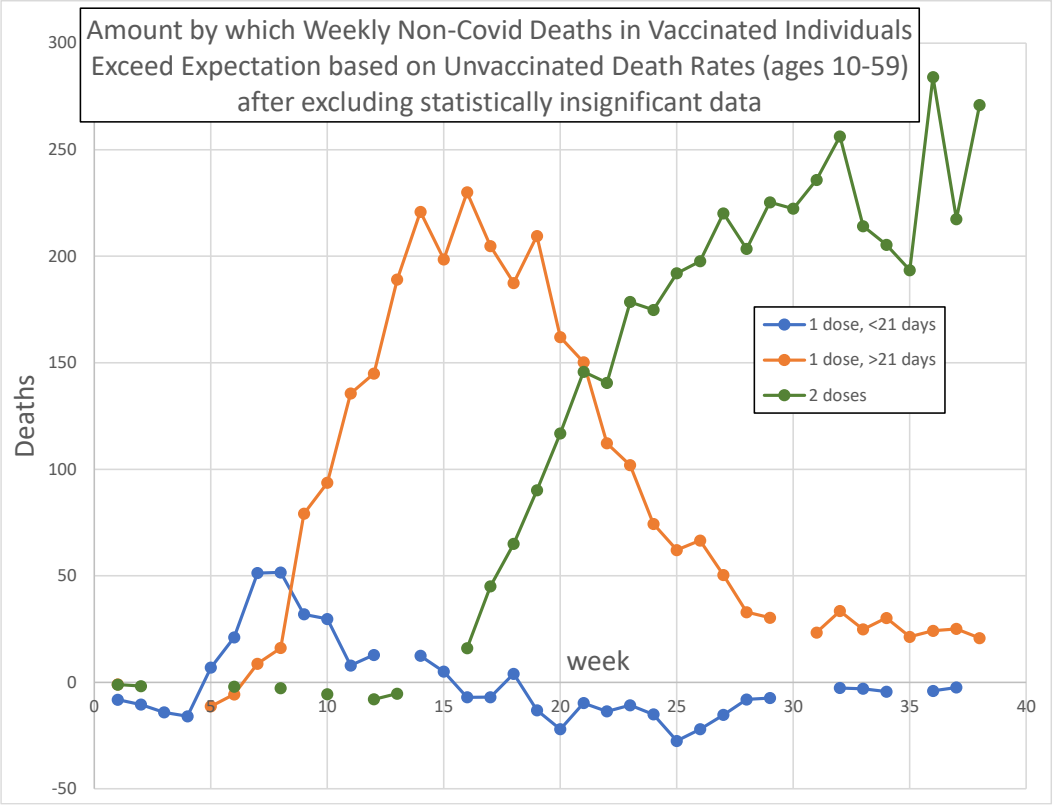


In conclusion, for ages 60 and over I find no evidence of a vaccine death signal in this dataset (i.e., Figs.9,11,13 are dominated by a “negative vaccine death signal”, which will actually be a sampling effect).

However…the plot thickens for ages 10-59. For this youngest age range, Fig.15 plots the "vaccine death signal", i.e., the equivalent of Figs.9,11,13. This signal is positive everywhere it isn't small.

The smoking gun at last? I think not, but possibly a whiff of cordite.

Fig.15



The reason why Fig.15 has a positive signal is that, in contrast to Figs.10,12,14, the high death rates occur at the same time that the corresponding populations are large, not small. This is shown in Figs.16 and 17.

So, it really is the smoking gun, then? Nope.

Consider, Fig.18, which shows how the unvaccinated population varies over time, and in comparison with the unvaccinated death rate. One could hardly wish for a better correlation.

I confess I was stumped for a while: why should the death rate vary with the population size?

Of course, it's embarrassingly obvious. It's because the population of the unvaccinated decreases from the oldest downwards – as people were vaccinated in reverse order of age. Consequently, when the unvaccinated population is large, it contains a large proportion of the oldest people – and hence will obviously have a larger death rate (Non-Covid and Covid).

Similarly, the "one dose (>21 days)" deaths per week reach a peak around weeks 14 to 19 in Fig.15 because initially it is old people in this category. The brown curve in Fig.15 then falls as more and more younger people enter this category. The double-dosed green curve is only just reaching its peak by week 38 as, at that time, half of people under 35 had not yet been vaccinated twice.

Fig.16

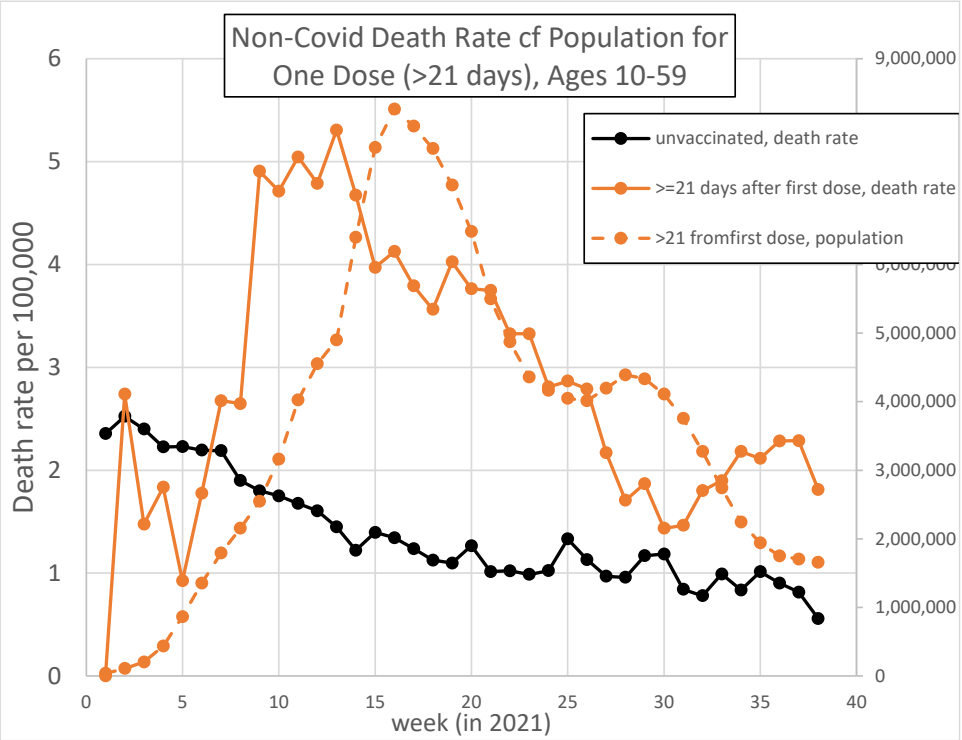

Non-Covid Death Rate cf Population for One Dose (>21 days), Ages 10-59
unvaccinated, death rate
>=21 days after first dose, death rate
>21 fromfirst dose, population
Death rate per 100,000
week (in 2021)
0
1
2
3
4
5
6
0
1,000,000
2,000,000
3,000,000
4,000,000
5,000,000
9,000,000
0
5
10
15
20
25
30
35
40

Fig.17

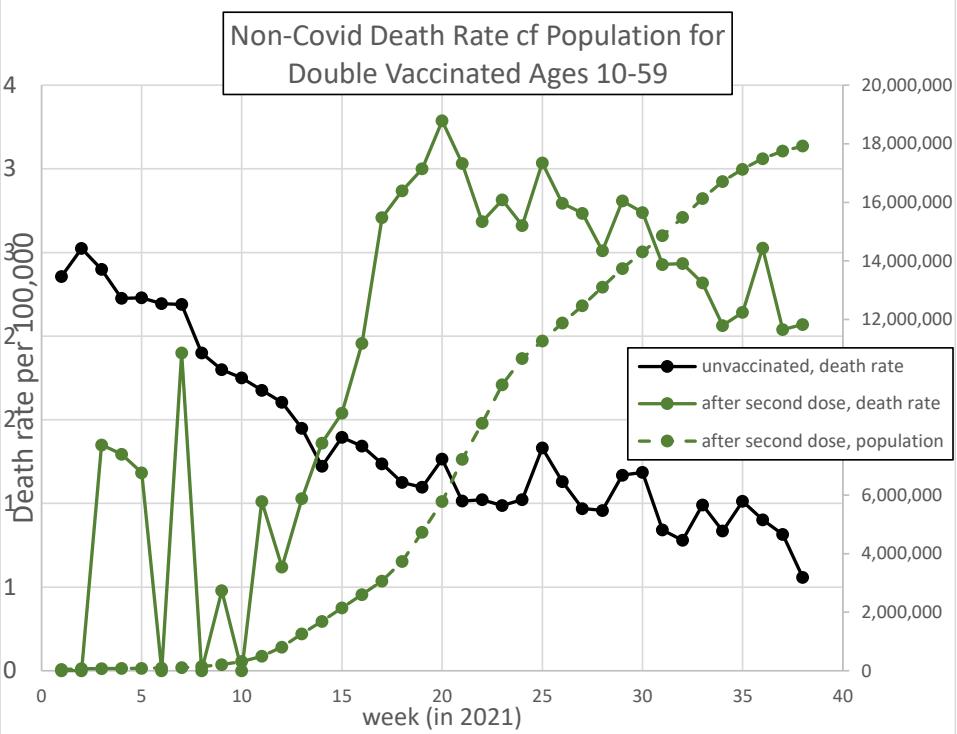
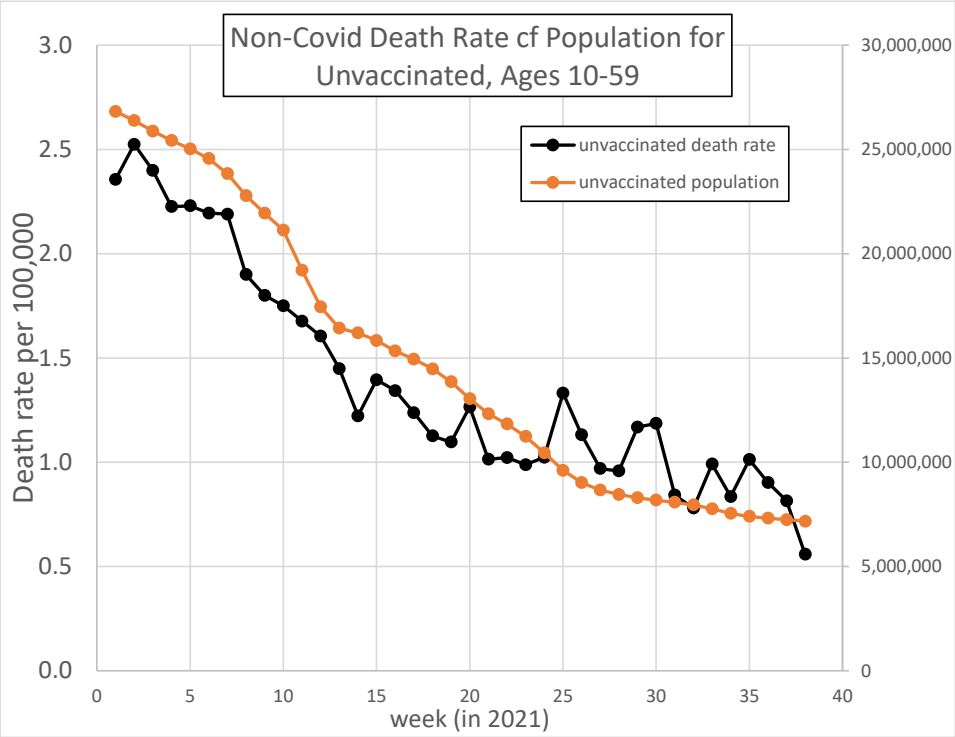

Non-Covid Death Rate cf Population for Double Vaccinated Ages 10-59
unvaccinated, death rate
after second dose, death rate
after second dose, population
Death rate per 100,000
week (in 2021)
0
1
2
3
4
0
2,000,000
4,000,000
6,000,000
12,000,000
14,000,000
16,000,000
18,000,000
20,000,000
0
5
10
15
20
25
30
35
40

Fig.18



In conclusion, there is no definite vaccine death signal discernible in this dataset. For people over 60 this is unambiguous. For people under 60 the data which naively shows such a signal has a natural explanation.

However, a genuine vaccine death signal could indeed be hiding within Fig.15 but it is not easy to see how the effect of the varying age distribution in the 10-59 populations could be quantified to examine this.

However, it is unlikely that such a vaccine death signal would result anyway – because, if there were such a signal in the 10-59 age range one would expect one also in the over-60 data, but no such thing is found.