Post

Norman Fenton \searrow 7 days ago \cdot 5 min

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

Norman Fenton and Martin Neil 23 Sept 2021

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



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vaccine outweigh the nors, 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 allcause 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.

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 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:

Week ending	Week	deaths	Population	population	deaths	Population	population	deaths	Population	pepulation	deaths	Population	population
08-Jan-21	.1	4,788	37,803,666	14.3	107	1,199.228	2.5	37	89,296	5.2	1.1	267,628	
15-Jah-21	2	6,059	38,511,424	24.0	30.9	2,110,052	3.9	189	335,607	11.4	.14	399,963	0.5 (
22-110-21	1	6,563	34,737,408	43.7	000	3,638,220	4.4	245	570,533	10.7	25	400.528	0.5
29-Jan-21	4	5,164	32,897,999	56.2	995	4.835.631	5.5	340	1.142.784	6.9	25	411.078	0.5
05-Feb-21		3,520	31,004,385	53.1	797	5,439,801	5.1	750	2,418,413	7.2	17	421,167	0.3
12-Feb-01		2,419	28,941,393	48.8	439	5,794,547	53	BBD	4,170,306	4.7	17	435,150	0.31
19-Peb-21	1	1,625	27,025,851	38.0	216	5,877,448	4.3	965	5,954,438	4.2	25	452,826	0.5
26-Feb-21	1 A.	997	25,261,345	25.5	157	5,753,015	5.6	Yen	7,815,751	27		510,015	
05.Mar.21		654	23,795,540	18.0	93	5,159,690	6.9	549	8,709,045	21		676,798	
12-Mar-21	-10	389	22,496,119	10.6	33	4,544,647	45	457	11.357,055	1.5	21	944,619	0.7
19-Mar-21		237	20.222,108	73	17	5,050,636	3.6 u	335	12,736,263	1.2	. 9	1.333.720	
28-Mar-21	12	196	18,316,034	5.3	15	5,482,719	45 u	251	13,360,491	1.0	17	2,183,425	0.21
02-Apr-21	93	50	17,224,336	3.2		5,251,694		160	13,057,664	0.9	20	3,792,492	0.1
09.Apr.21	34	84	16.060,669	3.1	8	3,211,115		1.18	13,722,962	1.0	27	5,434,251	0.1
16-Apr-21	15	54	16.544.821	2.1	5	1.654.254		98	13.828.421	1.4	25	7.284.379	0.1
23-Apr-21	18	46	15,927,073	2.4	3	1,078,637		84	13,095,580	1.8	14	9,213,443	0.0
30-Apr-21	12	34	15 509 284	1.8	0	1,231,898		43	11,699,011	1.5	24	10,867,328	0.1
07-Max-21	18	20	15.030.667	1.0	0	1,347,207		36	10,303,566	1.7	28	12,525.914	0.1
14-Map-21	11	19	14,401,985	0.9 u	\$	1,482,892		27	9,050,535	10	18	14,347,009	0.11
21-May-21	21	17	13.574.870	0.8 u	0	1,917,779		15	7,757,800	1.4	17	16.025.854	0.01
28-May-21	21	14	12.851.588	07 u	1	2,165,004		20	8.225.273	1.5	23	18,037,385	0.1
64-Jun-21	22	18	12,358,247	0.9 1	1	2.033.912		10	5.306.785	074	27	19.575.469	0.1
11-Jun-21	23	20	T1,757,500	0.8	1	1,806,631		10	4,641,598	1.2 u	29	21,059,770	0.1
18-Jab-21	24	13	10,970,992	0.6 11	0	1,870,921		15	4,381,714	1.4 u	28	22,035,117	0.1
25-Jun-21	25	26	10.120.621	12	0	2,221,421		8	4,236,381		48	22,669,600	0.1
02-Jul-21	28	35	9.531.364	16	0	2,217,754		13	4,186,631	214	63	23.309.568	0.2

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

			Unvaccinated		Deatity v	within 21 days	s of first dose	Deaths 21 d	lays or more al	fter first dose		Second dos	
tech coulous	Weeks	Number of	Posselation	Rate per 100,000	Number	Portalistica	Rate per 103,000	Number of	Providen	Rate per 930,000	Number	Providence	Rate per
68-Jan-21	1	7.412	37 801 666	22.0	378	1.109.228	8.8	42	89,296	5.8	17	267,629	1.4
13-Jan 21	2	0.000	36 511 424	26.5	090	2,110,062	8.9	195	395.607	10.5	87	599.953	3.3
22-jan-21	- 10	6.949	34 737 408	37.6	1.315	3,638,226	9.3	297	570 533	81.1	141	405 528	8.1
29-Jan 21	4	4,945	12 897 999	47.7	1.999	4,895,631	10.7	541	1.142.784	12.2	139	411.079	3
05-Feb-21	5	4,100	31.004.385	55.4	1.911	5.499.801	13.1	5,149	2,418,413	11.1	184	421.167	6.2
12-Feb-21		3,401	28.941.393	63.9	1.508	5,794,547	16.7	2.009	4,170,308	11.6	202	435,150	41
11.Feb.21	7	2,998	27.025,851	66.1	1,325	5,877,448	24.8	2,599	5,984,438	13.1	206	452,828	. 7.1
28-Feb-21	- 1	2,198	25 261 345	53.9	1,705	5,753,015	33.7	3,705	7,815,751	14.4	235	\$10,098	8.
05-Mar-21		1,839	23,795,540	47.9	668	5,159,690	43.9	3,996	8,709,045	14.5	257	676.790	7.
12-hter-21	18	1,620	22,496,119	45.4	444	4.544,647	45.3	4.713	11.357.055	16.7	342	944,609	7
19-Mar-21	21	1,372	20,222,108	42.5	219	5,050,638	52.5	4,819	12,738,263	16.9	470	1,533,720	7
35-Mar-21	12	1,183	18,316,034	80,7	235	5,482,719	36.0	6,785	13,380,491	18.7	711	2,183,425	7
02-Apr-21	13	1,025	17,224,336	38.6	190	5,251,694	39.9	4,531	13.067,564	24.3	1.155	3,792,492	7
						115	35.9	4 156	13.722,962	32.4	1,685	5,434,251	7
						254	45.4	3,721	13.828.421	46.0	2.273	7,284.379	8
						637	48.7	3,290	13,095,580	61.7	2.946	9,213,443	
						895	35.4	2.734	11,699,011	77.6	3,394	10,867,328	10
				_	_	207	37.0	2.266	10.383.565	92.3	4.137	12,528,914	11
						892	48.1	1,890	9,060,935	97.2	4,626	14,347,609	- 13
				_		779	18.7 0	1,441	7,787,800	97,5	4,946	16,025,854	13
						004	27.0	1,245	0.225,273	106.8	5,034	18,037,385	13
						912	28.5 0	5.007	5.306,785	100.0	5,325	19,575,458	12
						631	33.5 U	860	4,641,596	96.0	5,408	21,059.770	12
						921		697	4,381,714	94.6	5,510	22,035, 117	13
						421		634	4,235,381	95.2	5.538	22,689,650	13
						764		565	4,156,631	87.2	5.881	23,309,558	14

Norman Fenton



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

			threaccinated		Deaths we	min 24 days o	f first dase	Deaths 21 day	s or more after	first does		Second does			
Week and ing	Week	Narder of daptra	Population	Rate per teo,ees pepulation	Number of deaths	Papelation	Rate per toc,000 population	Manber of deaths	Popublies	Rate per 190,000 population	Number of dealths	Pepulation	Rate per 100,000 population	Total vaccinated population	Weights Vaccinate Mortale Rul
05-Jwn-21	1 1	12,200	37,803,688	38.3	-535	1,199,228	11,3	79	01,205	10.8	. 18	267,629	15	1,558,153	9.
15-Jan-21	2	12,989	38,511,424	30.6	590	2,110,082	12.8	378	335,607	22.0	701	326,963	38	2.845,632	124
27-Jpn-21	(2	12,612	34,737.408	81.3	1.915	3,638,228	15.7	950	570,833	21.8	168	406,528	5.6	4,815,287	14
29-Jun-21	6 d	10,109	32,897,999	103.9	2,594	4,895,831	16.2	361	1,142,784	19.1	164	411,079	38	6,449,494	15
05-Feb-21	6 2	7,620	31.004.385	108.4	2,708	5,499,801	18.3	1,889	2,418,413	18.3	201	421,167	6.6	8,339,381	17.
12-Feb-21	5 8	5,820	28,941,393	112.6	1.947	5,794,547	22.0	2,889	4.170.308	16.4	219	435,150	52	10,400,005	19
19-Fab-21	2 2	4,623	27,025,851	104.1	1.641	6,877,448	29,1	3,964	5,991,438	17.3	231	452,826	8.0	12,314,712	22
29 Pap-21	6 1	3,195	25,261,345	79.4	1,262	5,753,015	39.2	4,455	7.615,751	17.1	241	510,095	5.9	14,078,861	20
05-Nar-21	5 8	2.453	23,795.540	65.8	161	5.159,990	59.8	4,545	9,703.045	16.6	265	676,788	7.8	15,545,533	27.
12-Marv21	14	2.009	22,495,119	95.0	477	4,544,647	49.8	-5,170	11.357.055	18.2	303	944,609		10,040,311	30
19-Mail-21	1 11	1.009	20,222,106	49.6	- 356	5.050,638	56.0	5,154	12,734,283	18.1	479	1,335,720	7.0	19,120,619	37
25-Mar-21	1 12	1.349	18.316.034	46.0	250	5.482,719	49.5	5,937	13,260,491	19.7	728	2,183,425	75	21,026,635	23
02-Apr-21	1 13	1.115	17.224,338	42.0	198	5,251,894	38.9	4,651	13,067,664	25.2	1,185	3,792,492	75	22,111,650	25
00-Apr-21	5 34	1.003	16.960,669	32.7	133	3.211,115	35,9	4,274	13,722,962	53.4	1,712	5,434,251	75	22,368,528	- 27.
15-Apr-21	1.15	828	18,544,821	38.7	96	1.864,254	45,4	3,819	13.828.421	47.4	2,250	7,284,379	8.4	22.777.064	. 34
23-Apr-21	5 15	841	15,927,073	40.7	47	1.078,637	46.7	3,964	13.095.580	63 E	2,960	9,213,443	94	23,387,691	41
30-Apr-21	17	742	15,509,284	38.6	30	1.231,890	35,4	2,777	11,699,011	79.1	3,418	10,867.328	10.4	23.758.237	45.
07-Mey-21	5 . 18	-623	15.033.867	33.0	33.	1.347,207	37.0	2,302	10.393.595	B4.0	4,165	12.526,914	11.8	24,259,607	48.
54-May-21	5 59	597	14.401.995	31.8	00	1,482,892	48.1	1,857	9.060.935	96.8	4,644	14,347,609	12.7	24,991,436	45
21-May-21	21	617	13,574,870	33.5	12	1,917,779	18.7	1,460	7,707,800	90.0	4,965	10,025,854	13.4	25,711,433	39/
26 May 21	21	.689	12,851,558	26.7	23	2,165,004	27,0	1,298	6,225,273	108.3	3,007	18,037,385	13.2	20.427.062	36
04.A.m.21	. 22	520	12,356,247	29.5	18	2,013,912	28.5	1,217	5,306,785	100.7	1,352	19,575,469	13.7	26,916,105	32
15-Am-21	. 35	400	11,757,500	20.0	15	1,806,631	33.5	036	4,641,595	99.1	3,437	21,059,770	13.8	27,907,997	29
10-3.0-21	24	481	10.970.982	28.4	9			712	4,381,714	\$6.0	5,539	22,035,117	13.7	25,416,831	29.
25-hm-21	25	460	10,125,621	26.3	8			642	4,235,381	20.7	1,385	22,065,600	14.0	25,904,561	28.
02-Jul-21	28	436	9.531.384	25.1	8			568	4 198.631	89.3	5.944	23,309,568	14.7	27 456 199	28.

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 <u>2013 European Standard Population</u> 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
- / is the age group
- ESP_i is the standard population for age group *i*
- D_{l,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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	Cases Deaths	%	
vaccinated	19693 2	0.010	D
unvaccinated	52846 6	0.011	
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	Cases Deaths	%	
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