Witness Name: Professor Sir Ian Diamond
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UK COVID-19 INQUIRY
MODULE 4

WITNESS STATEMENT OF PROFESSOR SIR IAN DIAMOND

I, Professor Sir Ian Diamond, Chief Executive of the UK Statistics Authority and National Statistician, will say as follows:

Contents

The UK Statistics Authority's role, function, and responsibilities

1. The UK Statistics Authority (the Authority) is an independent statutory body established under the Statistics and Registration Service Act 2007 ('the 2007 Act'). It operates at arm's length from government as a non-ministerial department and reports directly to the UK Parliament, the Scottish Parliament, the Welsh Parliament and the Northern Ireland Assembly.
2. The 2007 Act established the Statistics Board as a body corporate (see section 1(1)). The 2007 Act also provided that there should be a National Statistician appointed by the Crown as an officer of the Board (see section 5). The National Statistician is the Chief Executive of the Board (see section 31).
3. The Board has adopted standing orders ('the standing orders'). The standing orders explain (at ¶1) that:

   > The Act created a 'Statistics Board' but by resolution at its first meeting on 2 February 2008 the Board agreed that it would operate under the name of the 'UK Statistics Authority'.

4. The 2007 Act sets out the Authority's objective as promoting and safeguarding the production and publication of official statistics that serve the public good (see section 7 (1)).
5. The Authority has a number of responsibilities. These are described as follows (at ¶3 of the standing orders):

   > The Authority provides professional oversight of the Government Statistical Service (GSS) and has exclusive responsibility for the Office for National Statistics, and for independent regulation.

6. In practice, the Office for National Statistics (ONS) operates as the Authority's statistical production function and is part of the GSS. The ONS is the UK's internationally recognised National Statistical Institute and largest producer of official statistics in the UK. The ONS is responsible for collecting and publishing statistics related to the economy, population and society at national, regional and local levels. It is the work of the ONS that I will, unless stated otherwise, be referring to in this statement.
7. The Office for Statistics Regulation (OSR) is the regulatory arm of the Authority and provides independent regulation of all official statistics produced in the UK.
8. The GSS is a network of all those involved in the production of official statistics in the UK. Official statistics are defined as those produced by organisations named

in the 2007 Act or in the Official Statistics Order (SI 878 of 2023). Every public body with a significant GSS presence, such as those involved in the production or use of official statistics, has its own designated Head of Profession for Statistics. The GSS is part of the cross-government Analysis Function, which is a community of analysts across government. I lead both the GSS and Analysis Function.

9. Official statistics are produced by statisticians operating under the umbrella of the GSS, working in either the ONS, UK government departments and agencies, or one of the three devolved administrations in Northern Ireland, Scotland and Wales. Each of the devolved administrations has its own Chief Statistician. The Concordat on Statistics [ID4/1-INQ000252611] sets out an agreed framework for statistical collaboration between the Authority, UK Government, and the Northern Ireland, Scottish and Welsh Governments.
10. An organisation chart of the Authority outlining how the ONS, OSR and the GSS relate to each other has been exhibited to the inquiry [ID4/2 – INQ000515022].

The role and responsibilities of the National Statistician

11. I, as the National Statistician (October 2019 – present (November 2024 at the time of writing)), am Chief Executive of the Authority, Head of the GSS and Analysis Function. I provide overall leadership for the ONS and the statistics profession across government. I advise ministers, the Cabinet Secretary and senior officials on the production, dissemination and use of statistics across government. I am responsible for the work of our department and provide direction to ensure we deliver on our strategy 'Statistics for the Public Good'.

<u>The ONS's role in providing data and statistics during the Covid-19 pandemic</u>

12. As the UK's National Statistical Institute, the ONS's role during the pandemic was to inform decision-makers and the public with regular data and analytical insights. This was across the economic, social and health themes. We increased the level of insight that we provided within releases, such as mortality, to reflect the needs of our users (such as the public, media and decision-makers). For example, we linked these data to produce new insights on Covid-19 deaths for different characteristics such as ethnic group, disability and occupation.

13. Where further insight was required, we introduced and adapted surveys at pace to rapidly inform policy decisions about the pandemic. For example, we introduced the Business Insights and Conditions Survey (BICS), the Covid-19 Infection Survey (CIS), the Schools Infection Survey (SIS) and made changes to the Opinions and Lifestyle Survey (OPN). We also safely procured and used new data sources such as financial transactions to provide novel insights for decision-makers. The ONS worked closely with government departments and the devolved administrations. We provided expertise and support to facilitate effective surveillance of the virus.
14. During the pandemic period the ONS published statistics and analysis relating to vaccines, including in relation to mortality, infections and public sentiment. This work is detailed further in this statement.

Mortality data

Sources on death data

15. The ONS and its predecessor organisations have been and remain responsible for publishing statistics on cause of death as recorded on death certificates. The process of death registration, which involves transcribing the causes of death on the Medical Certificate of Cause of Death (MCCD) into the official register, is carried out by local registration officials acting under the authority of the Registrar General.
16. The information that the ONS gathers on cause of death comes from the MCCD (except for coroner cases) via the death registration. The MCCD is normally completed by a doctor who was in contact with the patient during their final illness. The informant was (until the Covid-19 pandemic) provided with a physical copy of the MCCD to take to the local registration office. The local registrar, after making certain checks, exactly transcribes the cause of death information from the MCCD to the official death register. The registrar also collects some information directly from the registration informant (usually the next of kin) for example the deceased's full name, age, sex and last known address to record in the register. The combined information is sent to the ONS for statistical purposes. The document often referred to as the 'death certificate' is a certified extract of the death register.

17. The datasets used for the Covid-19 deaths by vaccination status publications were:
    - ONS death registrations
    - ONS Census 2011, and later Census 2021
    - Vaccination records from the National Immunisation Management Service (NIMS) received from NHS England.
    - An extract of people who died soon after vaccination and did not have a record in NIMS from NHS England.
18. Census records were linked to death registrations in the Public Health Data Asset (PHDA). We received data on vaccinations from NIMS (which is the System of Record for the NHS Covid-19 vaccination programme in England) and the additional extract from NHS England (the ONS did not collect the vaccinations data itself). We applied data cleaning and processing to the NIMS vaccinations data to obtain vaccination records for each dose for each person. We linked the vaccinations dataset to the PHDA using NHS number. We also linked on the extra extract of vaccinations data to update records where the vaccination had not been recorded. We then applied further data processing to obtain the vaccination status of individuals over time from which we calculated age-standardised mortality rates[1] (ASMR).

Excess deaths

19. During the pandemic, the ONS compared the number of deaths and ASMR to the average of the previous 5 years. For example, 2020 would be compared with the 2015 to 2019 average.
20. Because of the Covid-19 pandemic, 2020 saw the second highest number of deaths since 1838. If this year was used to calculate the five-year average, then the number of deaths in the five-year average would be abnormally high and would not be comparable with a "normal" (non-coronavirus pandemic) year. Therefore, we continued to use the 2015 to 2019 average for 2021.

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[1] As age is a key factor in Covid-19 mortality, ASMRs allow comparisons to be made between groups that have differing age structures. Interpreting differences in mortality rates between different groups without accounting for the differing age profiles or population sizes can lead to misleading conclusions.

21. The further we moved away from 2019, the less robust the 2015 to 2019 five-year average becomes. For 2022 we moved to an average of the following five years: 2016, 2017, 2018, 2019 and 2021. This moves our five-year average along by a year but does not include the exceptionally high number of deaths seen in 2020. It allows deaths in 2022 to be compared with a five-year average that is as up to date as possible, while still being close to representing a "normal" year. However, this does include some Covid-19 deaths, especially at the start of 2021 when there was a Covid-19 wave.
22. As set out in Table 1 [ID4/44-INQ000515059], between March 2020 and June 2022, there were 137,477 deaths in England and Wales above the five-year average. When removing deaths where the underlying cause of death was Covid-19, the number of deaths becomes 7,360 below average. However, this differs by sex with males still showing above average mortality. Excluding deaths where Covid-19 was mentioned anywhere on the death certificate, as an underlying cause or contributory cause, the number of deaths was 31,397 deaths below average.

Table 1: Number of deaths and excess deaths by sex, registered March 2020 to June 2022, England and Wales[2,3,4]

	Number of deaths		
	All cause	**Excluding deaths due to Covid-19**	**Excluding deaths involving Covid-19**
Persons	1,381,235	1,226,132	1,200,573
Males	702,206	616,757	
Female	679,029	609,375	

	Number of excess deaths		
	All cause	**Excluding deaths due to Covid-19**	**Excluding deaths involving Covid-19**
Persons	137,447	-7,360	-31,397
Males	87,358	7,406	
Female	50,089	-14,766	

[2] Based on date of registration rather than occurrence
[3] Includes deaths of non-residents
[4] The publication used 2022 provisional data, figures may differ to other publications

23. Causes of death differ between sex and age, therefore the sex and age group with the highest excess deaths will influence which causes had the highest number of excess deaths. As Covid-19 was not a cause of death prior to 2020, excess deaths is not calculated for this cause.
24. Table 2 [ID4/45-INQ000515060] shows how over the period March 2020 to June 2022, the cause of death "Symptoms, signs and ill-defined conditions" (indicating old age and frailty) had the highest number of deaths above the five-year average, with 9,094 deaths or 30.3% above average. This was the leading cause of excess deaths for both males and females and was mainly driven by the 80 years and over age group, as shown in Figure 1 [ID4/46-INQ000515061].

Table 2: Number of deaths registered, excess deaths and percentage of excess deaths by leading cause, England and Wales, March 2020 to June 2022[5,6,7]
Deaths due to Covid-19 are included for comparison. No figure for excess deaths due to Covid-19 is available as there are no deaths in the preceding period.

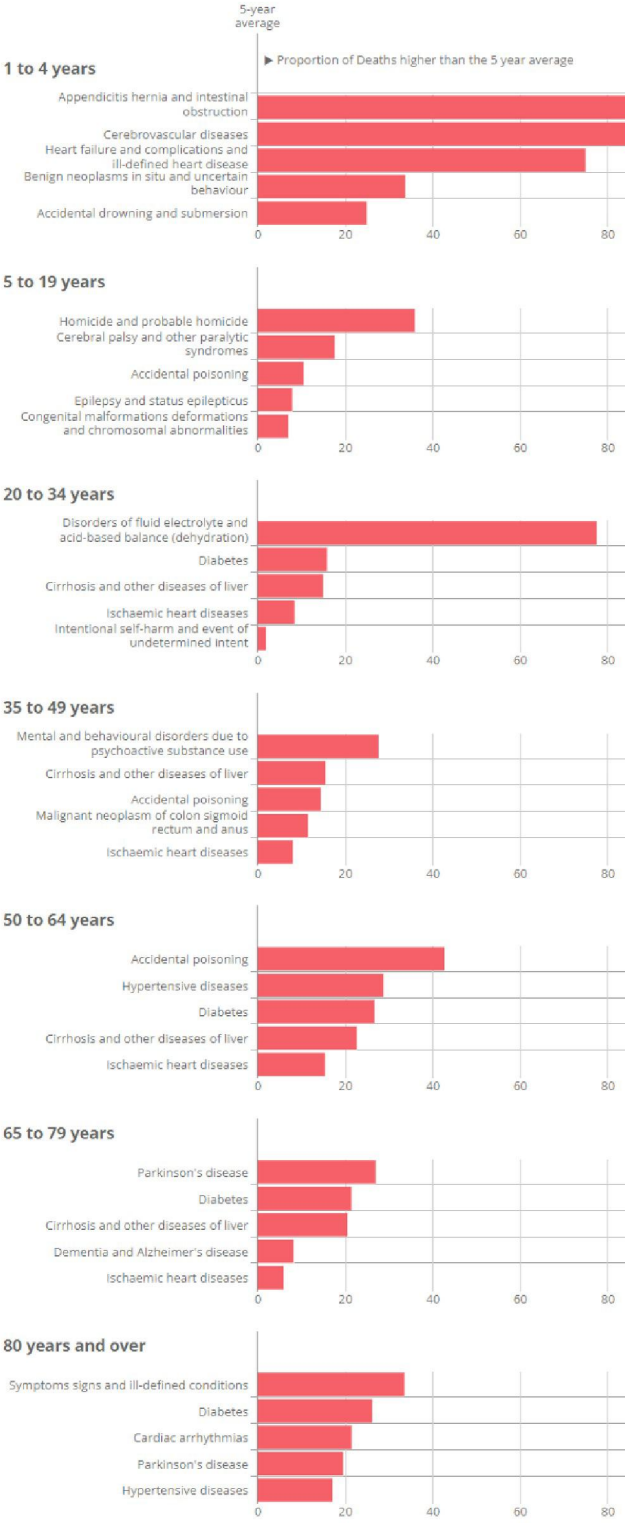
	Leading cause	Total deaths	Total excess deaths	Percentage excess deaths (%)
Persons	Covid-19	155,103	n/a	
Persons	Symptoms signs and ill-defined conditions	39,142	9,094	30.3
Persons	Cirrhosis and other diseases of liver	23,276	3,834	19.7
Persons	Diabetes	17,648	3,466	24.4
Persons	Cardiac arrhythmias	19,273	3,389	21.3
Persons	Parkinson's disease	16,967	3,037	21.8
Males	Covid-19	85,449	n/a	
Males	Symptoms signs and ill-defined conditions	11,674	3,039	35.2
Males	Ischaemic heart diseases	86,115	2,975	3.6
Males	Cirrhosis and other diseases of liver	14,122	2,159	18.0
Males	Diabetes	9,162	1,975	27.5
Males	Parkinson's disease	10,367	1,870	22.0
Females	Covid-19	69,654	n/a	
Females	Symptoms signs and ill-defined conditions	27,468	6,055	28.3
Females	Cirrhosis and other diseases of liver	9,154	1,676	22.4
Females	Cardiac arrhythmias	11,693	1,610	16.0
Females	Hypertensive diseases	10,793	1,574	17.1
Females	Diabetes	8,486	1,490	21.3

[5] Based on date of registration rather than occurrence
[6] Includes deaths of non-residents
[7] The publication used 2022 provisional data, figures may differ to other publications

25. For the overall period, deaths were below average for the youngest 6 age groups (Under 1 through to 20 to 24) and above average in the remaining age groups. When excluding deaths due to Covid-19, those aged 25 to 29, 45 to 49, 65 to 69, 80 to 84, 85 to 89 and 90+ no longer showed deaths above average.
26. Leading causes of excess deaths differed across age groups. When grouping the age groups to avoid low counts, we see that Diabetes, Cirrhosis and other diseases of liver, and Ischemic Heart Diseases appears in 4 of the 7 aggregated age groups.
27. The ONS also produced monthly and year-to-date excess mortality as part of the monthly mortality analysis (MMA) [ID4/3 – INQ000515043]. This included every cause of death, whereas the excess mortality release focused on the top five causes. The data across the two releases are comparable.

Figure 1: Proportion of deaths registered by age group and top five leading causes of death for each age group, ordered by number of excess deaths, England and Wales, March 2020 to June 2022

Based on date of registration rather than occurrence. Includes deaths of non-residents. This publication used 2022 provisional data; figures may differ to other publications.



	Five-year average (2015-2019)	Total deaths
1 to 4 years		
Appendicitis hernia and intestinal obstruction	5.2	10
Cerebrovascular diseases	10.8	20
Heart failure and complications and ill-defined heart disease	4.0	7
Benign neoplasms in situ and uncertain behaviour	14.2	19
Accidental drowning and submersion	12.0	15
5 to 19 years		
Homicide and probable homicide	150.0	204
Cerebral palsy and other paralytic syndromes	81.6	96
Accidental poisoning	117.6	130
Epilepsy and status epilepticus	88.0	95
Congenital malformations deformations and chromosomal abnormalities	161.6	173
20 to 34 years		
Disorders of fluid electrolyte and acid-based balance (dehydration)	27.6	49
Diabetes	168.2	195
Cirrhosis and other diseases of liver	394.8	454
Ischaemic heart diseases	235.0	255
Intentional self-harm and event of undetermined intent	2,883.6	2,939
35 to 49 years		
Mental and behavioural disorders due to psychoactive substance use	482.4	616
Cirrhosis and other diseases of liver	3,642.8	4,208
Accidental poisoning	3,824.0	4,376
Malignant neoplasm of colon sigmoid rectum and anus	1,220.2	1,361
Ischaemic heart diseases	3,258.4	3,522
50 to 64 years		
Accidental poisoning	1,895.4	2,705
Hypertensive diseases	1,254.4	1,616
Diabetes	1,388.4	1,760
Cirrhosis and other diseases of liver	7,613.4	9,342
Ischaemic heart diseases	16,767.8	19,352
65 to 79 years		
Parkinson's disease	4,099.6	5,207
Diabetes	3,679.4	4,469
Cirrhosis and other diseases of liver	5,857.2	7,059
Dementia and Alzheimer's disease	18,360.4	19,882
Ischaemic heart diseases	43,496.6	46,084
80 years and over		
Symptoms signs and ill-defined conditions	26,982.0	36,044
Diabetes	8,437.0	10,651
Cardiac arrhythmias	13,199.6	16,039
Parkinson's disease	9,663.2	11,554
Hypertensive diseases	11,027.2	12,917

Methodological revisions

28. In our previous approach to estimating excess deaths in England and Wales, as described above, the expected (baseline) number of deaths was estimated as the average number of deaths registered (or the expected ASMR estimated as the average ASMR) in a recent five-year period. In contrast, our new methodology [ID4/4 – INQ000515054] (detailed in further detail in two online blogs [ID4/5 – INQ000515062], [ID4/6 – INQ000515063] is based on age-specific mortality rates rather than death counts, so trends in population size and age structure are accounted for (all else being equal, more people means more deaths, particularly if a greater share of the population are elderly). Furthermore, the five-year average mortality rate is adjusted for a trend, so historical changes in population mortality rates are also accounted for (population mortality rates were generally falling until 2011 before levelling off until the onset of the pandemic).
29. Before the pandemic, the five-year period used in the previous methodology was the five years preceding the current year. For example, the expected number of deaths in 2019 was estimated as the average number of deaths registered from 2014 to 2018 (inclusive).
30. Weekly and monthly expected deaths were estimated as the average number of deaths registered in the same week or month over the past five years. For example, the expected number of deaths in Week 1 of 2019 was estimated as the average number of deaths registered in Week 1 from 2014 to 2018 (inclusive). The expected number of deaths in 2021 was estimated as the average of deaths registered from 2015 to 2019 rather than 2016 to 2020, to avoid the pandemic distorting the excess deaths calculation. The expected number of deaths in 2022 was estimated as the average of deaths registered in 2016, 2017, 2018, 2019 and 2021.
31. In contrast, under the new methodology, which harmonises the methodology for estimating excess mortality across UK government agencies and countries, individual weeks and months, rather than whole years, that were substantially affected by the immediate mortality impact of the pandemic are removed from the expected deaths calculation.
32. Other changes brought about by the change in methodology include:

- Use of a statistical model means that multiple demographic, trend, seasonal and calendar effects can be included simultaneously in the estimation of expected deaths, and confidence intervals can readily be obtained
- A "bottom-up" approach to aggregation (whereby estimates of excess deaths are produced for individual age-sex-geography combinations before being summed upwards) means that estimates are additive across age groups, sexes, and high-level geographies, and between months and years
- Having a common methodology for all four UK countries means that estimates of excess deaths are consistent and comparable across all parts of the UK, and the new methodology is largely coherent (though not identical) to that used by the Office for Health Improvement and Disparities (OHID) to estimate excess deaths in English local authorities.

33. Our new methodology has not yet been adapted to produce cause-specific estimates of excess mortality, hence it is not possible to say what impact the change in methodology would have on the cause-specific estimates summarised in the previous section.

Deaths by vaccination status

34. Between 1 November 2021 and 25 August 2023, the ONS published eight datasets and accompanying commentary in bulletins [ID4/7 – INQ000515064], which included ASMRs for Covid-19 and non-Covid-19 deaths by vaccination status.
35. Our definition of a Covid-19 death for these analyses was a death where either of the ICD-10 codes relating to Covid-19 was mentioned on the death certificate (U.07.1, Covid-19 virus identified or U07.2, Covid-19, virus not identified).
36. The purpose of these publications was to provide rapid indications of the impact of vaccination on mortality that could be updated regularly to provide an indication of the changing picture. This would help inform vaccine policy and the public.
37. The ASMRs are not measures of vaccine effectiveness. This is because, although they account for differences in age between people with different vaccination statuses, they do not account for other factors such as clinical

vulnerability, occupation and ethnicity. These characteristics can vary between vaccination groups due to differences in when people with these characteristics became eligible for vaccination and differences in uptake and these factors can also impact on mortality rates (both for Covid-19 deaths and non-Covid-19 deaths). Background changes in mortality rates such as the Covid-19 infection rate and winter mortality will also impact on the mortality rates by vaccination status.

38. Including non-Covid-19 deaths in our publications can help to interpret changes seen in the Covid-19 mortality rates due to sociodemographic or background factors. They can also be used to indicate changes in death rates that may be due to adverse reactions from the vaccine, if the number of deaths is large enough to produce a detectable effect.
39. As well as the "Deaths involving Covid-19 by vaccination status, England: deaths occurring between 1 April 2021 and 31 May 2023" release introduced at paragraph 34, the ONS provided tables as part of MMA [ID4/3-INQ000515043] which looked at the ICD-10 code relating to 'Covid-19 vaccines causing adverse effects in therapeutic use, unspecified' by age group. Figures usually consist of first registrations only, however after further investigation, a death can be re-registered as a different cause of death. For transparency of our statistics, this table included re-registrations as well as initial registrations. This table showed how many deaths had 'Covid-19 vaccines causing adverse effects in therapeutic use, unspecified' on the death certificate, a cause is only listed on a death certificate if it contributed to the death.
40. The analysis on deaths by vaccination status was last published in August 2023. It was particularly important to monitor the impacts of the vaccine and provide up to date insights at the start of the vaccination campaign as this was the first use of it in the population. The impact of the vaccine in clinical trials may be different to the impacts from use of the vaccine in the population due to for example wider populations being vaccinated and different background conditions. It was also important to monitor over time due to eligibility of the vaccination for different groups occurring later and different doses being administered. This would aid with policy making around future vaccination doses and help monitor the effects of the vaccine in each group as they were vaccinated.

41. Following a review of the statistical outputs produced by ONS, it was decided to stop publishing the deaths by vaccination status releases after August 2023. At this point, most of the population had been vaccinated with the first two doses and booster and Covid-19 mortality rates were lower so there were no longer rapid changes in mortality rates.
42. ONS no longer receives vaccinations data from NIMS and NHS England. ONS death registrations are still collected as this is a routine dataset held by ONS. No analysis is currently carried out by ONS using the vaccinations data. NIMS data received by ONS, linked to death registrations, are available to approved researchers via the Secure Research Service, should researchers outside ONS wish to access these data and perform their own analyses.

Impact of vaccines on mortality

43. The ONS published regular datasets and commentary of mortality rates by vaccination status in England [ID4/7 – INQ000515064], covering the period ranging from 1 September 2021 to 31 May 2023. These provided early indications of the potential impact of vaccinations on mortality. We published ASMRs as the main metric to take into account differences in the ages of people who had received the vaccinations at different times due to the age-based eligibility criteria for the vaccine roll out. We also provided age-specific rates.
44. As the vaccines were also administered according to priority groups by clinical vulnerability and occupation, we provided commentary on how these factors can affect the mortality rates in the releases and in blogs. We also provided commentary on the limitations of these rapid statistics, mainly that the estimates do not take into account all sources of confounding (factors which are associated with both the likelihood of vaccination and risk of mortality and therefore can be a cause of differences in mortality rates of people with different vaccination statuses, other than the effects of the vaccination), and thus these estimates could not be used as a definitive measure of vaccine effectiveness. In this regular publication, we provided links to our more comprehensive, but less up to date, analyses on these topics. Key findings from our regular publications included:
    - Initially lower mortality rates for people who received two vaccinations compared to one or no vaccinations, indicating that the second dose was

likely to provide increased protection over one dose only and over being unvaccinated.

- Once the third dose or booster had been introduced, lower mortality rates for people who had a third dose or booster compared with no vaccinations or a first or second dose, indicating that the third dose or booster was likely to provide additional protection over the first two doses and over being unvaccinated.
- Higher mortality rates among people who had a second dose more than six-months ago compared to less than six months ago indicating waning protection over time.
- Initially higher non-Covid-19 mortality rates among young people for the third dose or booster, which reduced as more young people were vaccinated, indicative of more clinically vulnerable young people being vaccinated earlier.

Vaccine safety and mortality

45. In response to concerns that some deaths, particularly cardiac-related deaths, could be linked to Covid-19 vaccination, particularly among young people, we conducted an analysis to look at deaths in young people after vaccination. This was a rapid analysis [ID4/8 – INQ000515065] that was followed up later by a more in-depth analysis published in a scientific journal [ID4/9 – INQ000515066] and a further ONS bulletin [ID4/10 - INQ000515023]. The rapid analysis also included analysis by OHID on causes of deaths among young people.
46. In the rapid analysis, we compared the incidence of death and cardiac-related death over the first six weeks after vaccination among young people who had received a vaccination, and found no evidence of a change in the number of cardiac-related deaths or death occurring from any cause after vaccination. The more in-depth and up-to-date analysis [ID4/9 – INQ000515066 and ID4/10-INQ000515023] found no evidence that the risk of cardiac or all cause death was increased in the weeks following vaccination with mRNA vaccines. However, receiving a first dose of a non-mRNA vaccine was associated with an increased risk of cardiac death in young women (equivalent to six additional cardiac-related deaths per 100,000 females aged 12 to 29). Most of the young people who received the main non-mRNA vaccine used in the UK received it because they

were prioritised for vaccination due to clinical vulnerability or being a healthcare worker. (The ChAdOx1 Oxford Astra-Zeneca vaccine was withdrawn for people aged under 30 on 7 April 2021.) Therefore, these results cannot be generalised to the population as a whole. In particular, people who were clinically extremely vulnerable may be at greater risk of adverse events following vaccination than the general population. These limitations are discussed in detail in [ID4/9 – INQ000515066].

47. While vaccination carries some risks, these need to be assessed in comparison with the risks of Covid-19 infection. The analysis in [ID4/9 – INQ000515066] and [ID4/10-INQ000515023] shows that the risk of death is greatly increased following a positive test for Covid-19 even in young people, especially in people who were unvaccinated. In people aged 12 to 29, the increased risk of all-cause registered death in the 12 weeks following a positive Covid-19 test corresponded to eight additional deaths in every 100,000 unvaccinated individuals, and two additional deaths in every 100,000 vaccinated individuals [ID4/9-INQ000515066]. Studies discussed elsewhere in this statement show that vaccines are highly effective at preventing hospitalisation or death following Covid-19 infection.

Risk of death for different variants

48. The ONS produced an analysis of the risk of Covid-19 related deaths for the Omicron variant compared with the Delta variant across the same time period in December 2021, published as an ONS bulletin [ID4/11 – INQ000515024] and an academic paper [ID4/12 – INQ000515025]. This analysis included people who tested positive for Covid-19 under the Test and Trace national surveillance programme, where the infection could be identified as omicron BA.1 or delta compatible.
49. The risk of Covid-19 death was found to be 66% lower for Omicron compared with Delta, adjusting for a wide range of potential confounders. The relative risk of an Omicron death compared to Delta was more pronounced in people aged 18-59 years than those 70 and above. No evidence was found of a difference in mortality risk between variants for different numbers of health comorbidities. This work expanded the existing knowledge that infection with Omicron was

associated with reduced hospital admission compared with the Delta, to demonstrate that risk of mortality was also reduced.

Demographic characteristics associated with risk of death among people receiving a booster vaccination in England

50. We conducted an analysis modelling the risk of death in adults who had received three coronavirus vaccinations at least 14 days prior to 31 December 2021 [ID4/13 – INQ000515026]. Age was the characteristic most associated with the risk of death involving Covid-19 in triple vaccinated individuals during the Omicron period, with the risk being over 30 times greater in those aged 80 years, compared with those aged 50 years.
51. In triple vaccinated individuals, there was no independent association between the risk of death involving Covid-19 and ethnicity, except for those of Indian background, who were at a slightly elevated risk compared with the White group. The risk of death involving Covid-19 was also elevated in people with several health conditions, including severe combined immunodeficiency, cancer of the blood or bone marrow, and dementia.

Mortality and Ethnicity

52. The Covid-19 vaccination greatly reduced the burden of Covid-19. However, there were large differences in vaccination uptake by ethnic groups, with people from Black ethnic backgrounds being much less likely to have been vaccinated than people from the White British groups These ethnic differences in Covid-19 vaccination uptake persisted during the pandemic. Analysis ONS conducted showed that the differences in vaccination uptake explained a large proportion of the higher risk of Covid-19 death among people from Black and South Asian backgrounds [ID4/19G - INQ000474601].
53. However, since the start of the Omicron period, people from ethnic minority groups have no longer been at higher risk of death from Covid-19 compared to the White British group [ID4/19- INQ000515032]. This is despite people from Black and South Asian background remaining less likely to be vaccinated. This may be due to Omicron being less lethal, or to people from these groups being more likely to have developed immunity via infection.

Death Registration

54. Currently, the ONS is only aware of a death once it is registered by the informant. On average (Median), deaths are registered within 7 days, however, this increases to 26 days when certified by a coroner and 223 days when certified by a coroner with an inquest and post-mortem. If the ONS had access to the number of deaths being referred to the coroner, we would be able to produce more timely, robust estimates on the number of deaths by date of occurrence allowing greater information on current mortality patterns in England and Wales.
55. Ideally, this would be achieved through access to individual-level identifiable data that included both fact of death and suspected or provisional cause. This would enable more timely statistics on causes of death that tend to be referred to the coroner, such as suicides and infant deaths.
56. However, individual level data without any cause information, or even aggregate data on number of deaths per week or month (broken down by characteristics like age, sex and geography) would still be useful. Although this aggregate data would not improve reporting on causes such as suicides, it would at least enable more timely and accurate statistics on excess deaths. These have become increasingly high profile since the pandemic.
57. I note that the Royal Statistical Society has long advocated for this change, including in evidence to this Inquiry [INQ000183421].

Infections data in relation to vaccination

58. Working with partners including the University of Oxford, the Coronavirus Infection Survey (CIS) was the largest regular survey of coronavirus infections and antibodies. It provided vital information to help the UK's pandemic response.
59. The CIS pilot took place in England and the survey then expanded to the devolved administrations. Fieldwork began in Wales in June 2020 (first published August 2020), Northern Ireland in July 2020 (first published September 2020) and Scotland in September 2020 (first published October 2020).
60. CIS continued to run until March 2023 and at its peak collected data from some 400,000 participants who were surveyed monthly. The CIS used a random sample of private households where all residents aged over two years were

invited to join the study. Whether or not they had symptoms, participants were regularly asked to:

- Provide nose and throat swab samples
- Answer a questionnaire; and
- For some participants, provide a blood sample.

61. The people included in the survey were only those living in private households. Those in hospitals, care homes or other communal establishments were not included in the sample and were therefore not accounted for in its estimates.
62. Swab samples were tested for SARS-CoV-2 using reverse transcriptase polymerase chain reaction (RT-PCR). These samples were collected to enable the ONS to estimate the number of people infected, including asymptomatic infections.
63. Blood samples were collected from a randomly selected subsample of CIS participants, initially those aged 16 and over. From 29 November 2021, we also collected blood samples from children aged 8 to 15 years. Participants gave 0.5 millilitres of blood using a self-administered capillary finger prick method. The blood samples were taken at enrolment and then every month. Blood samples were tested for antibodies, which are produced to fight the virus. We used blood test results to identify individuals who had different levels of antibodies against SARS-CoV-2.
64. CIS questionnaires were expanded over time to meet user need; questions on Covid-19 vaccines were first included from February 2021. Participants were asked only whether or not they had received a Covid-19 vaccination, and the date on which this occurred. From April 2021, the questionnaire also included questions on the type/s of vaccination received (e.g. Pfizer, Moderna, AstraZeneca) and the number of doses received. From May 2021, the questionnaire also asked participants who said they had not been vaccinated against Covid-19, whether or not they had been offered a vaccine. In later versions of the questionnaire the range of vaccination types, and the option to select different types of vaccine for different doses was included.
65. Working with academic partners including the University of Oxford, the data from swab samples, questionnaires and blood samples were modelled to provide representative estimates across the general population for:
    - Vaccination uptake among private households

- Antibody levels and change over time by age group and UK country
- Risk of infection by vaccination status
- Risk of reinfection by vaccination status

66. During 2021, the ONS published National Statistical blogs on the topic of vaccines as follows:
    - What the ONS can tell you about the Covid-19 Vaccine programme [ID4/14 – INQ000515027]
    - Antibodies and Immunity – how do they relate to one another? [ID4/15 – INQ000515028]
    - Delta Variant and vaccine effectiveness; what can the CIS tell us? [ID4/16 – INQ000515029]
    - Vaccine effectiveness against Covid-19 – What can the Covid-19 Infection Survey tell us? [ID4/17 – INQ000515030]

Vaccination uptake

67. During the period up to 23 February 2022 (including data up to 30 January 2022) when the vaccination programmes were progressing, the ONS Coronavirus Insights Tool presented estimates of vaccine uptake within private households using CIS participant responses to provide context for our antibody estimates.
68. After this date, the national vaccination programmes were well established and official administrative figures on vaccinations were published by the government. From that point, the ONS Coronavirus Insights Tool provided updates sourced from the Gov.UK coronavirus dashboard and the UK Health Security Agency [ID4/18 – INQ000515031].
69. While the daily official government figures provided the recorded actual numbers of vaccines against SARS-CoV-2 issued, ONS vaccination estimates were likely to be different from the official figures. This is because they were estimates based on a sample survey of reported vaccine status and were provided for context alongside antibodies estimates. Importantly, the survey collected information from the population living in private households only, and did not include people living in communal establishments such as care homes, hospitals or prisons. The ONS estimates of vaccines were therefore primarily intended for use alongside estimates of people testing positive for antibodies to illustrate the relationship between the two.

70. The CIS vaccinations model for Great Britain was run at a subregional level and included ethnicity, vaccination priority age groups, and sex. The vaccination model for Northern Ireland was also run at a subregional level because of a higher number of participants with information about vaccination uptake. The model controlled for the effect of ethnicity by post-stratifying[8] our analysis by the ethnic groupings of White and ethnic minorities (excluding White minorities), rather than individual ethnicities, because of sample size. The model accounted for sex and age in wider groups.
71. We validated our self-reported vaccination data in England with data from the NIMS. The equivalent of NIMS was not included for other countries, so vaccination estimates for Wales, Northern Ireland, and Scotland were produced only from CIS self-reported records of vaccination.
72. From March 2021 to March 2023, ONS produced data on vaccination coverage in England at the national level and by demographic, socio-economic and geographic factors. These data included estimates for the proportion and age-standardised proportion of people who had, and had not, received Covid-19 vaccinations. ONS also produced modelled estimates on the likelihood of having received vaccinations by demographic, socio-economic and geographic factors, while controlling for other characteristics. These data were published in bulletins and datasets on the ONS website [ID4/19A - INQ000474600], [ID4/19B - INQ000474599], [ID4/19C - INQ000474607]. ONS also published three articles in academic journals using these data [ID4/19D - INQ000474603], [ID4/19H - INQ000474604], [ID4/19I - INQ000474602]
73. To derive these estimates, ONS linked administrative vaccination data from the National Immunisation Management System (NIMS) to the ONS Public Health Data Asset (PHDA), itself made up from 2011 Census, the General Practice Extraction Service (GPES) data for pandemic planning and research (GDPPR), and the Hospital Episode Statistics (HES). This linked dataset covered a subset of the population, (around 79% of people who had received at least one vaccination).

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[8] Post-stratification is a method to ensure the sample is representative of the population that can be used with modelled estimates to achieve the same objective as weighting.

74. The linked NIMS and ONS PHDA dataset allowed ONS to produce estimates for vaccination coverage by a wider number of individual characteristics, sourced from the 2011 Census, including self-reported ethnicity, religion, self-reported disability status, socio-economic status and others.
75. From July 2021 to March 2023, ONS collaborated with the Office for Health Improvements and Disparities (OHID) to present the estimates in OHID's interactive Covid-19 Health Inequalities Monitoring for England (CHIME) tool, to provide a greater user experience to explore the data.
76. In January 2022, ONS extended the linked NIMS and ONS PHDA dataset to include occupation information from Census 2021. ONS produced vaccination coverage estimates by occupation using this more timely information [ID4/19E - INQ000474606]. This work was developed further to later produce estimates by various other demographic, socio-economic and geographic factors using information from Census 2021 [ID4/19F - INQ000474605].

Antibody levels and change over time

77. Both Covid-19 infection and vaccination can trigger an immune response in the body which produces Covid-19 antibodies. It takes between two and three weeks after infection or vaccination for the body to make enough antibodies to fight the infection. Once infected or vaccinated, antibodies remain in the blood at low levels and can decline over time. The length of time antibodies remain at detectable levels in the blood is not fully known. Using data from the CIS blood samples, we presented estimates of antibody positivity at different levels measured by antibodies to the spike (S) protein.
78. The ONS reported antibody data for all four nations of the UK:
    - From 3 February 2021 to 13 May 2021 via a fortnightly article series [ID4/20 – INQ000515033] (covering data for the period 7 December 2020 to 22 April 2021)
79. From 26 May 2021 to 27 July 2023 via a fortnightly statistical bulletin [ID4/20 – INQ000515033] These data could not be used to separate population antibody changes as a result of vaccination versus those resulting from natural infection. Nevertheless, they provided insight into the changing levels of antibodies among different age groups and how these correlated with vaccination roll out. They also

indicated when antibody levels were dropping below protective levels amongst key populations, e.g. older age groups.

80. By the end of April 2021 in England, we found that:
    - The percentage of adults aged 16 to 49 years testing positive for antibodies ranged from 46.2% to 53.4%;
    - in those aged 50 to 64 years, from 82.9% to 86.2%;
    - in those aged 65 years and over, from 81.8% to 92.3%; and
    - the highest percentage of people testing positive for antibodies was in those aged 80 years and over at 92.3% (95% credible interval: 87.4% to 95.1%)
81. At that time, based on our estimates, more than 99% of people aged 70 years and over in private households had received at least one dose of a Covid-19 vaccine across the UK. Of those who had been fully vaccinated, the highest percentages were found in the oldest age groups and lowest among the younger age groups.
82. In March 2021, antibody positivity decreased among people aged over 80 and subsequently increased as a result of second doses. A similar decrease is seen in those in their 70s at the end of March and can be seen in late April among those in their 60s [ID4/21 – INQ000515034].
83. By the same date at the end of April 2021 in Wales, we found that:
    - the percentage of adults aged 16 to 49 years testing positive for antibodies ranged from 38.1% to 47.5%;
    - in those aged 50 to 64 years, from 81.4% to 81.7%;
    - in those aged 65 years and over, from 81.0% to 90.4%; and
    - the highest percentage of people testing positive for antibodies was in those aged 80 years and over at 90.4% (95% credible interval: 84.3% to 93.9%)
84. At the end of October 2021, we estimated that in England, 93.1% of the adult population (95% credible interval: 91.9% to 94.1%) would have tested positive for antibodies against SARS-CoV-2, the specific virus that causes Covid-19, suggesting they had the infection in the past or have been vaccinated.
85. In Wales, 91.7% of the adult population (95% credible interval: 90.1% to 93.1%) would have tested positive for antibodies against SARS-CoV-2 on a blood test in

the week beginning 18 October 2021, suggesting they had the infection in the past or have been vaccinated.

86. Many of the participants who tested negative for antibodies in the later weeks would have received their vaccinations in the early stages of the vaccination programme. Along with age, the early stages of the vaccination programme prioritised individuals on a range of factors (such as long-term health conditions and type of employment) which may help to explain the declining trend appearing in different age groups.
87. By the June 2022 we estimated that in England, the percentage of people estimated to have antibodies against SARS-CoV-2 was 97.7% of adults (95% credible interval: 97.4% to 97.9%), and in Wales, the percentage of people estimated to have antibodies against SARS-CoV-2 was 97.6% of adults (95% credible interval: 97.1% to 98.1%)
88. We published information on the methodology of our antibodies estimates on the ONS website [ID4/22 – INQ000515035].

Impact of vaccination on testing positive

89. We used data from the CIS and pillars 1 and 2 of NHS Test and Trace to estimate the reduction in risk of testing positive for Covid-19 associated with vaccination overall and by different vaccine types. Two time periods were analysed: when the Alpha variant was dominant in the UK (1 December 2020 to 16 May 2021), and when the Delta variant was dominant (17 May to 14 August 2021). This allowed the study to assess vaccine effectiveness against these different strains.
90. This analysis built on academic research [ID4/23 – INQ000515036] conducted by our survey partners from Oxford University led by Professor Sarah Walker. In this updated analysis, Poisson regression was used rather than logistic regression. This allowed the inclusion of additional positive tests from the NHS Test and Trace programme for participants from England, improving the accuracy of the date of the first positive test in new infection episodes and including extra positive tests which are not present in CIS. This increased statistical power to detect effects of vaccination. This updated analysis also included an additional two weeks of data from the Delta-dominant period, increasing statistical power. The

full methodology for this work can be found in our technical article [ID4/24 – INQ000515037].

91. We found that:
    a) Vaccination significantly reduced the risk of people testing positive during both the Alpha-dominant period and the Delta-dominant period.
    b) Vaccine effectiveness was reduced in the Delta-dominant period compared with the Alpha-dominant period, particularly in preventing infections with symptoms.
    c) Two doses of either Pfizer-BioNTech or Oxford-AstraZeneca vaccines provided a similar level of protection to prior natural infection when the Delta variant was dominant.
    d) Two doses of either vaccine provided significantly greater protection than one dose across all analyses.

Risk of infection by vaccination status

92. We incorporated risk of testing positive by vaccination status into our regular bulletin series on the characteristics of people testing positive for Covid-19 [ID4/25 – INQ000515038].
93. These models were mixed-effect multivariable logistic regression models, which simultaneously estimate the effect of different factors that impact on the odds of testing positive for Covid-19. The models were used to identify the risk associated with different individual characteristics such as vaccination status while controlling for the effects of other characteristics including sex, ethnicity, age, geographical region, urban or rural classification of address, deprivation percentile, household size, and whether the household was multigenerational.
94. The odds of testing positive for Covid-19 associated with each characteristic are compared with the odds for testing positive in a base category (that is, as an odds ratio). When a characteristic has an odds ratio of one, this means that there is neither an increase nor a decrease in the likelihood of infection compared with the base category. An odds ratio of higher than one means that there is an increased likelihood of infection compared with the base category; while an odds ratio of lower than one means that there is a reduced likelihood of infection compared with the base category.

95. In the first such analysis, using data from 29 August to 11 September 2021, we showed that people who had received one or two doses of a coronavirus vaccine (Astra Zeneca, Pfizer or Moderna) were less likely to test positive for Covid-19 than those not vaccinated. This was also true for people who had had Covid-19 previously (had a positive swab in the survey or the England Test and Trace programme more than 120 days ago).
96. These odds ratios were presented as a regular series. The effect sizes varied over time, reflecting:
    - Progression through the time categories used for analysis – for example, given sufficient time after a vaccination campaign, the distribution of participants within a category of '15 to 90 day post vaccination' will be biased towards the later (90 day) boundary of that category rather than the earlier (15 day) boundary
    - Changes in the population group within any vaccination category – for example after a second or third vaccination campaign there would be relatively fewer individuals remaining who had received only a single vaccination, and who might have other characteristics not controlled for in our model which differed from the general population
    - Increasing rates of natural infection resulting in a higher level of antibody protection in the general population, including those who had not received a recent vaccine (or any vaccine)

Risk of reinfection by vaccination status

97. In our bulletin published 19 January 2022, [ID4/26 – INQ000515039] we presented analysis of the risk factors associated with a first Covid-19 reinfection (that is, second infection) among participants between 2 July 2020 and 9 January 2022.
98. The risk of reinfection by characteristic is measured in terms of hazard ratios as used above in our analysis of the risk factors of infection. The model explores multiple factors including age, sex, ethnicity, Cycle threshold (Ct) value observed in the initial infection, deprivation, household size, work in patient-facing healthcare, long-term health conditions, vaccination status and the period during which an individual was at risk. The methodology underlying this work is presented in our technical article dated June 2021 [ID4/43 – INQ000515058],

with improvements presented in our bulletin published 6 October 2021 [ID4/27 – INQ000515040]. All estimates of Covid-19 reinfections in this analysis were unweighted.

99. In this analysis, the criteria for a 'reinfection' were that a new positive test was recorded in the survey and:
    - 120 days had elapsed since an individual's first positive test in the survey, and their most recent previous test result was negative prior to this positive test; or
    - if 120 days had not passed since their first positive test in the survey, the individual's last positive test had been followed by four consecutive negative tests prior to this positive test

100. The median time between positive episodes in those with reinfections was 302 days or almost 10 months.

101. We found that people who were unvaccinated were approximately twice as likely to be reinfected than our reference category, people who had their second vaccine 14 to 89 days ago (95% confidence interval: 1.5 to 2.7 times higher). People who had their second vaccine over 90 days ago were also more likely to be reinfected than people who had their second vaccine more recently from 14 to 89 days ago.

102. We continued to update this series monthly reflecting newly collected CIS data. By the end of June 2022, based on data covering the two years from 2 July 2020 to 1 July 2022, we found that those who were unvaccinated were more likely to be reinfected than people who had their second vaccine 14 to 89 days ago (95% confidence interval: 1.5 to 2.0 times higher). Those who had their latest vaccine more than 90 days ago were also more likely to be reinfected than people who had their second vaccine 14 to 89 days ago (95% confidence interval for those 90 days or more after second vaccine: 1.2 to 1.5 times higher; 95% confidence interval for those 90 days or more after third vaccine: 1.3 to 1.8 times higher).

Impact of vaccination on Long Covid

Vaccination before first infection

103. Using data from the CIS, we compared the risk of developing self-reported Long Covid (symptoms continuing for more than four weeks after the

first confirmed or suspected coronavirus (Covid-19) infection that were not explained by something else) among respondents who had received two doses of a Covid-19 vaccine before and among those who were unvaccinated [ID4/28 – INQ000515041].

104. We found that receiving two doses of a Covid-19 vaccine at least two weeks before a first test-confirmed SARS-CoV-2 infection was associated with a 41.1% decrease in the odds of self-reported Long Covid at least 12 weeks later, relative to matched study participants who were not vaccinated when infected and controlling for any remaining differences in socio-demographic profiles.

105. Long Covid symptoms of any severity were reported by 9.5% of double-vaccinated study participants, compared with 14.6% of socio-demographically matched participants who were unvaccinated when infected; the corresponding estimates for Long Covid symptoms severe enough to result in limitation to day-to-day activities were 5.5% and 8.7% respectively.

106. There was no statistical evidence that the relationship between vaccination status at the time of infection and the likelihood of subsequently reporting Long Covid symptoms differed by whether participants received adenovirus vector (Oxford/AstraZeneca) or mRNA (Pfizer/BioNTech or Moderna) vaccines.

107. This analysis was based on data to 30 November 2021, and therefore it did not consider the impact of booster doses and the Omicron variant on the effectiveness of vaccines. Furthermore, the observational nature of the analysis means that we cannot say for certain whether Covid-19 vaccination caused subsequent changes in the likelihood of self-reported Long Covid.

108. A limitation of this study was that nearly all unvaccinated study participants were first infected during the Alpha wave of the pandemic, while nearly all double-vaccinated study participants were first infected during the Delta wave. Therefore, differences in the likelihood of developing Long Covid symptoms between unvaccinated and double-vaccinated participants may partly reflect differences in the dominant Covid-19 variant at the time of infection or other temporal effects, in addition to any effects of vaccination.

Vaccination after first infection

109. We also investigated the effect of vaccination after infection on the risk of reporting Long Covid, among 28,356 CIS study participants aged 18 to 69 years in the UK who had test-confirmed SARS-CoV-2 prior to vaccination, using data to 5 September 2021 [ID4/29 – INQ000515042].

110. Receiving a first Covid-19 vaccination was associated with an initial 13% decrease in the likelihood of self-reported Long Covid at least 12 weeks after infection. However, it is unclear from the data whether the improvement in self-reported Long Covid symptoms after receiving the first vaccination was sustained over time until receiving the second vaccination.

111. Receiving a second Covid-19 vaccination was associated with 9% decrease in the likelihood of self-reported Long Covid, relative to having received the first vaccination, and there was statistical evidence of a sustained improvement after this.

112. There was no statistical evidence of differences in post-vaccination trends of self-reported Long Covid between participants who received an adenovirus vector (Oxford/AstraZeneca) vaccine and those who received an mRNA (Pfizer/BioNTech or Moderna) vaccine. There was also no statistical evidence of differences in trends according to socio-demographic characteristics (age, sex, ethnic group and area deprivation) or health-related factors (self-reported health status not related to Covid-19, and whether ever hospitalised with acute Covid-19).

113. The observational nature of the study means that we cannot say whether Covid-19 vaccination caused subsequent changes in the likelihood of self-reported Long Covid. In addition, study follow-up after receiving the second vaccination was limited, so long-term associations between Covid-19 vaccination and self-reported Long Covid cannot be inferred.

Vaccine sentiment

114. The ONS collected data on attitudes towards vaccination as part of the Opinions and Lifestyle Survey (OPN) [ID4/41- INQ000515056], the Over 80s Vaccine Insights Study [ID4/34 – INQ000515048], the Vaccine Opinions Study [ID4/35 – INQ000515049], and the Schools Infection Survey (SIS) [ID4/42-INQ000515057].

Opinions and Lifestyle Survey

115. Before March 2020, the OPN was an ONS survey which ran for 2 months in each quarter. From late March 2020, with new restrictions in place, this was adapted to become a weekly survey collecting data on the impact of Covid-19 on day-to-day life (the frequency of the publication of the survey results changed during the pandemic period). The ONS was open to feedback on the survey and, given the frequency of data collection, was able to adapt survey questions to reflect data needs incredibly quickly.

116. A new question was added to the survey in December 2020 (10 to 13 December data collection) which was published on 18 December in the ONS "Coronavirus and the social impacts on Great Britain" publication [ID4/30 – INQ000515044]. This question asked adults "If a vaccine for the coronavirus (Covid-19) was offered to you, how likely or unlikely would you be to have the vaccine?", with the question phrased in a hypothetical manner given the first Covid-19 vaccines had yet to be administered. This found 78% of adults in Great Britain said they would be very or fairly likely to have the Covid-19 vaccine if offered, with rates increasing with age. Adults who said they were very unlikely or fairly unlikely to have the vaccine were asked "For what reasons would you be unlikely to have a vaccine for the coronavirus (Covid-19) if it was offered to you?". The most commonly reported reasons included "I am worried about the side effects" (52% of those who were unlikely to have the vaccine), "I would wait to see how well the vaccine works (52%) and "I am worried about the long term effects on my health" (46%).

117. Estimates from these questions continued to be collected and published from the OPN on a weekly basis through to September 2021, and then fortnightly to April 2022 (following the survey moving to a fortnightly data collection frequency), with revisions made to reflect the roll out of the vaccine. This was to account for some groups of the adults having received / turned down the vaccine, and others who were waiting for the vaccine to be offered. A measure of "Vaccine Hesitancy" was created from the survey, based on adults who reported they:

- had been offered the vaccine and decided not to be vaccinated
- reported being very or fairly unlikely to have the vaccine if offered

- responded "neither likely nor unlikely", "don't know" or "prefer not to say" to the question "if a vaccine for the coronavirus (Covid-19) was offered to you, how likely or unlikely would you be to have the vaccine?"

118. A measure of "Positive Sentiment" towards vaccine was also created, based on adults who reported they:

- had received the vaccine
- had been offered the vaccine and waiting to be vaccinated
- reported being very or fairly likely to have the vaccine if offered

119. On the 8 March 2021, the ONS additionally published "Coronavirus and vaccine hesitancy, Great Britain" [ID4/31 – INQ000515045], to examine the characteristics of the "vaccine hesitant" in more detail. Covering data collected from the OPN between 13 January to 7 February 2021, this found:

- 91% of adults reported positive sentiment towards the vaccine, while 9% of adults reported vaccine hesitancy
- 17% of adults aged 16 to 29 years reported vaccine hesitancy; this was the highest of all age groups
- 44% of Black or Black British adults reported vaccine hesitancy; this was the highest of all ethnic groups
- 16% of parents living with a dependent child aged 0 to 4 years reported vaccine hesitancy, compared with 8% of non-parents or parents not living with a dependent child
- 16% of adults in the most deprived areas of England (based on Index of Multiple Deprivation) reported vaccine hesitancy, compared with 7% of adults in the least deprived areas of England
- "Side effects", "long term effects on health" and "how well the vaccine works" were the top three reasons for reporting negative sentiment towards the vaccine; this was consistent across all population groups.

120. This output continued to be published throughout 2021, with the last publication of this series published on 9 August 2021.

121. Data on vaccine attitudes were regularly published from the OPN until 1 April 2022 [ID4/32 – INQ000515046], by which time the OPN questions tracked likely uptake of a booster vaccination. 54% of adults who had already received 2 doses of a Covid-19 vaccine reported they would be very or fairly likely to have a booster jab if it was offered to them, while 28% said they would be very or fairly

unlikely. When asking those who had reported being "very or fairly unlikely" to want a booster jab, the main reasons they did not want a booster jab included "I do not think a vaccine booster will offer me any extra protection" (46%) and "I am worried about the long-term effects on my health" (39%).

Over 80s Vaccine Insights Study

122. In addition to the above, the ONS also published a piece looking at "Coronavirus and vaccine attitudes and behaviours in England: over 80s population" in March 2021[ID4/33 – INQ000515047], based on results from a "Over 80s vaccine insights study" [ID4/34 – INQ000515048] aiming to collect views and experiences of coronavirus (Covid-19) guidance and the vaccine rollout being administered to those aged 80 years and over in England. This one-off study was conducted in collaboration with the Department of Health and Social Care. Key findings included [ID4/33 – INQ000515047]:

- An estimated two out of five (41%) over 80s who had received the first dose of a vaccine less than three weeks ago reported they had met someone other than a household member, care worker or member of their support bubble, indoors; this appears to contradict lockdown regulations.
- A quarter (25%) of over 80s who had only received one dose of a Covid-19 vaccination reported that they would be much or somewhat more likely to attend a hospital for medical reasons since being vaccinated; this increased to one-third (33%) for those who had received both doses.
- Almost half (49%) of over 80s perceived the coronavirus to be a major or significant risk to them personally without vaccination; this decreased to 5% if they were to receive both doses of the vaccine.
- Of over 80s who had received at least one dose of a Covid-19 vaccine, 41% had experienced side effects.
- Of those who had experienced side effects and were still awaiting their second dose of a vaccine, 63% said the side effects would not affect their decision to get the second dose, and 35% were more likely to get the second dose.
- Around 19 out of 20 over 80s (96%) would be very or somewhat likely to encourage others to get a Covid-19 vaccination.

Vaccine Opinions Survey

123. During September 2021, the ONS set up a separate "Vaccine Opinions Survey" [ID4/35 – INQ000515049] on behalf of the Department for Health and Social Care (DHSC), and with input from the Cabinet Office and NHS England, which ran between 7 to 16 September 2021. This aimed to track changes in uptake and attitudes towards the Covid-19 vaccines, amongst adults who previously reported vaccine hesitancy (based on a sample of adults who took part in the OPN between January and August 2021). The key findings from this study found that among previously Covid-19 vaccine-hesitant adults [ID4/36 – INQ000515050]:

- Over 4 in 10 (44%) were now vaccinated, while 55% remained unvaccinated.
- A higher percentage (46%) of previously vaccine hesitant younger adults (18 to 29 years) reported vaccine uptake compared with those aged 70 years and older (19%)
- There was similar vaccine uptake of previously vaccine hesitant between Black and Black British (47%) and White (42%) adults,
- Around two-thirds (65%) of those now vaccinated said that wanting restrictions to ease and life to return to normal had motivated them to get a vaccine.
- Of those who remained unvaccinated, 58% said that worry about side effects had stopped them from getting a vaccine.

124. In early 2022, additional one-off qualitative analysis from this study was conducted, looking at the motivations and barriers to vaccination among adults who previously declined, were unlikely to have or unsure about having a Covid-19 vaccine. This was based analysis of written reasons respondents provided, beyond those presented in response to multiple-selection lists, about what had encouraged them, stopped them or would encourage them to get a Covid-19 vaccine. The results, published in the report "Coronavirus and changing perceptions towards vaccination, England: 7 to 16 September 2021" [ID4/36 – INQ000515050] found:

- Primary motivations among adults who decided to get vaccinated included "protecting others or oneself", "regaining freedoms and rights" and "being influenced by others".

- The main reasons for those who remained unvaccinated included "feeling that the risks of a Covid-19 vaccine were too high or the benefits were too low", "distrusting or feeling discontent towards vaccine stakeholders" such as the government and vaccine manufacturers, and "lacking sufficient, trustworthy or favourable evidence on vaccine side effects, safety or effectiveness".
- Unvaccinated adults reported "having sufficient or trustworthy evidence on vaccine side effects, safety or effectiveness" and "feeling that the risks of a Covid-19 vaccine were lower or the benefits were higher" as the main factors that would encourage them to have a vaccine in the future.
- Responses often included more than one theme, particularly those reporting barriers to vaccination, which suggests that the decision of whether to have a Covid-19 vaccine is complex.
- Some interventions to reduce the spread of Covid-19, such as lockdowns and vaccine passports, encouraged some respondents to vaccinate but were a barrier to others.
- For some respondents, the barriers to vaccination were practical ones, such as having a disability or difficulty accessing a vaccination site.

Schools Infection Survey

125. DHSC commissioned the ONS in late 2020 to investigate the prevalence of infections and presence of antibodies to Covid-19 among pupils and staff in sampled primary and secondary schools in England. The survey was led by a partnership between PHE (later moved to the UKHSA in 2021), London School of Hygiene and Tropical Medicine (LSHTM) and the ONS [ID4/42-INQ000515057]. The first round of testing took place between 3 November and 20 November 2020.

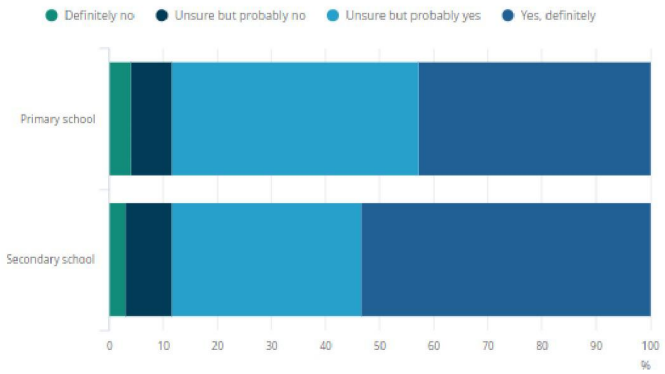
126. As part of the Survey a study team visited each school to collect biological samples for testing from the staff and pupils who had enrolled in the study. In addition, questionnaire data were also collected from pupils and their parents, including questions on vaccine sentiment.

Parental views on child vaccination

127. Between 12 April and 21 May 2021, parents were asked to complete a short questionnaire about their views towards their children receiving a Covid-19 vaccination. Analysis was carried out on 4,439 responses received from parents with children under the age of 16 years (a response rate of 28%) and has been weighted to be representative of all children under 16 years in the Covid-19 Schools Infection Survey (SIS) local authorities. SIS oversamples local authorities in the North West of England and therefore these findings are not necessarily generalisable to England as a whole.

128. In response to the question "If a Covid-19 vaccine was offered to your child, would you want them to have the vaccine", 43% of primary school parents and 53% of secondary school parents responded that they "Yes, definitely" would want their child to have a Covid-19 vaccine. Some 4% of primary school parents and 3% of secondary school parents said they would "Definitely not" want their child to have a vaccine, as seen below [ID4/37 – INQ000515051].

Figure 2: Parental views on child Covid-19 vaccination, England, 12 April to 21 May 2021



129. The most common reasons given by parents who said that they would definitely not want their child to have a vaccine were:

- not enough research has been carried out
- wanting more information on the long-term side effects
- concerns about vaccine safety and side effects

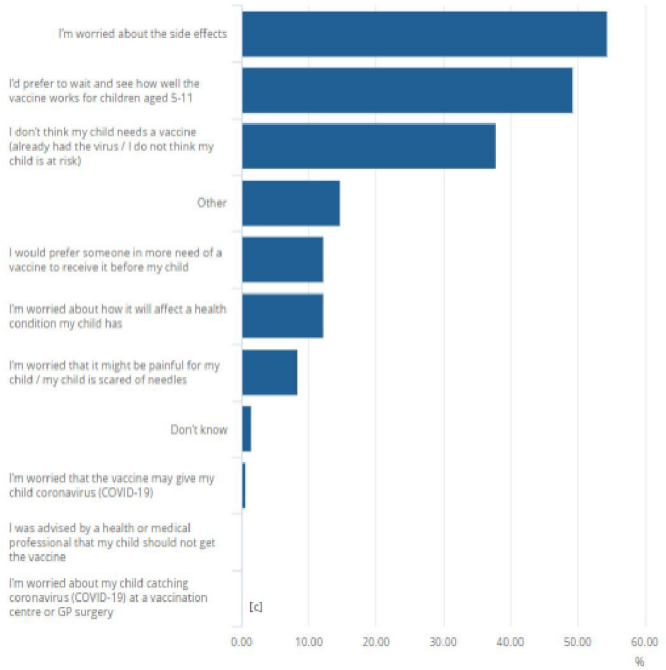
130. A second round of parental questionnaires on views towards their children receiving a Covid-19 vaccination was carried out between 21 May and 22 June 2021. No significant change in opinion was found since the previous

questionnaire, with 40% of primary school parents and 54% of secondary school parents responded that they "Yes, definitely" would want their child to have a Covid-19 vaccine. Some 3% of primary school parents and 6% of secondary school parents said they would "Definitely not" want their child to have a vaccine [ID4/38 – INQ000515052].

131. Between 11 November and 15 December 2021, parents of children aged 5 to 11 years were asked how likely they were to agree to their child having a Covid-19 vaccine if it was offered to them. For 62% of pupils, parents said they were "fairly" or "very likely" to agree to their child having a Covid-19 vaccine. For 24% of pupils, parents said they were "fairly" or "very unlikely" to agree to their child having a Covid-19 vaccine [ID4/39 – INQ000515053]. The remaining responses indicated that parents were undecided whether their child should have a Covid-19 vaccine, or that their child already has received a Covid-19 vaccine.

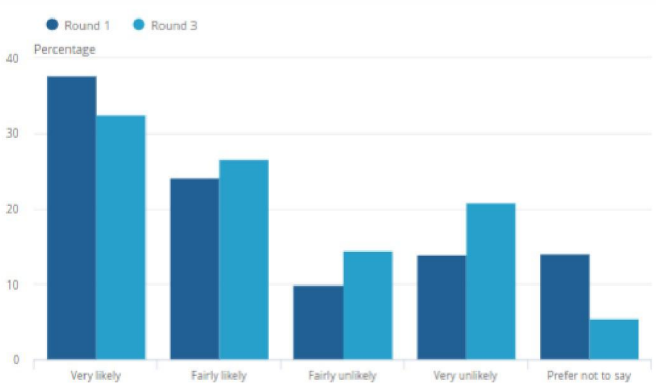
132. Of those who said they were unlikely to vaccinate their child if offered, the main reasons for not agreeing to get a Covid-19 vaccine were being worried about the side effects (54%) or waiting to see how well the Covid-19 vaccines work (49%).

Figure 3: Reasons for parents of children aged 5-11 years not wanting their children to get a Covid-19 vaccine, England, December 2021



133. Subsequent analysis of vaccine sentiment among primary school aged children found that, by March 2022, over half of pupils' parents (59.1%) said they were "very" or "fairly likely" to agree to their child having a Covid-19 vaccine. This was a significant increase in pupils' parents who said they were "very likely" to get a Covid-19 vaccine when comparing the findings from November/December 2021 and March 2022 (13.9% and 20.9%, respectively). For 35.4% of pupils, parents said they were "very" or "fairly unlikely" to agree to their child having a Covid-19 vaccine [ID4/40 – INQ000515055].

Figure 4: Attitudes of parents of primary school pupils who had not had the coronavirus (Covid-19) vaccination towards getting the Covid-19 vaccination for their child if offered to them, England, December 2021 and March 2022



Secondary school-aged pupils' attitudes to vaccination

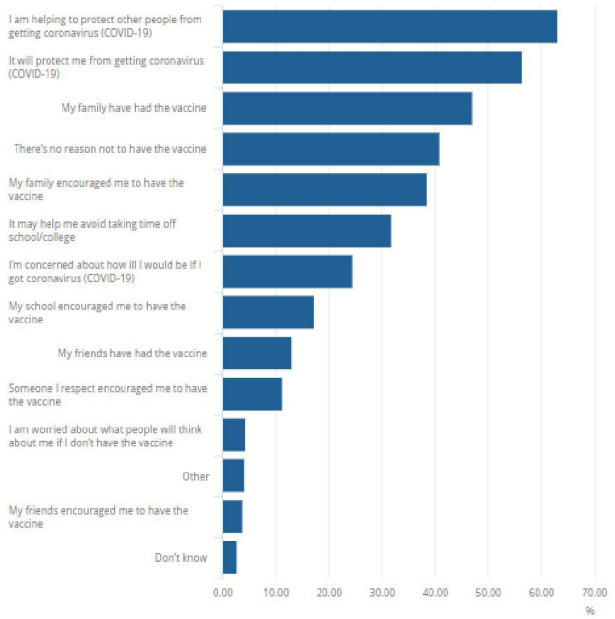
134. Analysis of the pupil surveys collected between 11 November and 15 December 2021 found that 70% of pupils in school year 7 to school year 13 (aged 12 to 18 years) said they have been vaccinated [ID4/39 – INQ000515053]. This was higher than the official published figures of the time for that age group, which suggested that 45.9% of 12- to 15-year-olds and 61.5% of 16-to 17-year-olds had received a Covid-19 vaccine. This was likely because of the selection bias of participating students.

135. In our study, Covid-19 vaccine take-up was similar by gender (69% of boys and 71% of girls) but showed differences by age (84% for those aged 16 years and over and 67% for those aged 12 to 15 years). This matches the trend

in the official data where Covid-19 vaccine take-up increases with age but is very similar across gender.

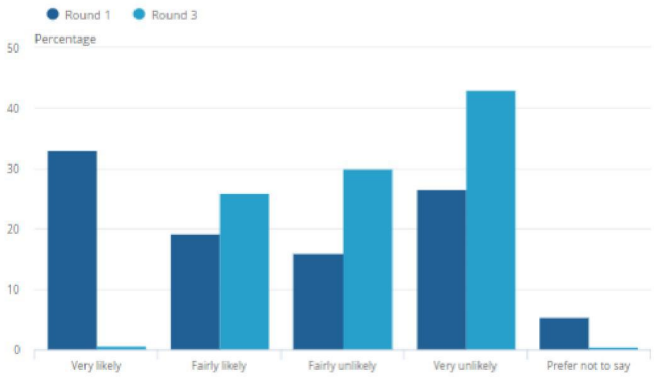
136. When asked for all the reasons why they decided to have a Covid-19 vaccine, "I am helping to protect other people from getting coronavirus" was a motivation for 63% of pupils [ID4/39 – INQ000515053]. Other motivations included "it will protect me from getting coronavirus" (56%) and "my family have had the vaccine" (47%). Around 1 in 10 (11%) pupils said someone they respect encouraged them to get the vaccine. When asked to write who this respected person was, the majority of pupils wrote parents, with some stating their family member being vulnerable as the reason.

Figure 5: The most common motivations for secondary school pupils getting a Covid-19 vaccine were protecting themselves and protecting others, England, December 2021



137. In March 2022, of those who had not received a Covid-19 vaccine, a quarter (26.6%) of pupils said they were "very" or "fairly likely" to get a Covid-19 vaccine if it was offered to them [ID4/40 – INQ000515055]. This finding was lower than the 52.2% found in the previous November/December 2022 survey. This is likely because of the majority of those unvaccinated but willing in November/December 2021 had been vaccinated by March 2022.

Figure 6: Attitudes of unvaccinated secondary school pupils towards getting the Covid-19 vaccine if offered to them. England, December 2021 to March 2022.



Statement of Truth

I believe that the facts stated in this witness statement are true. I understand that proceedings may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief of its truth.

Signed: NR

Dated: 14 November 2024