Witness Name: Professor Sir Christopher Whitty

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UK COVID-19 INQUIRY

MODULE 7

EIGHTH WITNESS STATEMENT OF PROFESSOR SIR CHRISTOPHER WHITTY

I, PROFESSOR SIR CHRISTOPHER JOHN MACRAE WHITTY, will say as follows:

Section 1: Introduction

Overview

1.1 I am the current Chief Medical Officer ("CMO") for England. This is the eighth witness statement that I have submitted to the UK COVID-19 Inquiry ("the Inquiry") and is made in response to a draft Rule 9 request dated 1 October 2024.

1.2 Many of the requests from the Inquiry are to reproduce sections of my previous seven witness statements which have been prepared for prior Modules. Those sections are included within an Annex to this witness statement: (1) in order to ensure that the focus of this statement is properly on matters of central relevance to the present Module and (2) to avoid repeating matters of which the Chair is familiar. For the avoidance of doubt, the content of the Annex remains accurate and true to the best of my knowledge and belief. I understand that its status as evidence in the Inquiry is the same as that set out in the main body of this statement.

1.3 I am a Fellow of the Royal Society, the Academy of Medical Sciences, the Royal College of Physicians, the Faculty of Public Health and honorary Fellow of the Faculty of Pharmaceutical Medicine, the Royal College of Paediatrics and Child Health, the Royal College of Pathologists and the Royal College of General Practitioners among other learned bodies. I remain a National Health Service ("NHS") consultant physician in infectious diseases at University College London Hospitals ("UCLH") and have practical experience of research in the NHS.

1.4 I was appointed CMO on 1 October 2019 and remain in post. Three full-time Deputy Chief Medical Officers ("DCMOs") were in post during the pandemic period relevant to this Module. Professor Sir Jonathan Van-Tam took on the role of DCMO for health protection in 2017 and relinquished it upon taking up a senior position in academia in March 2022. Professor Dame Jenny Harries became DCMO for health improvement in 2019 and continued in that role until taking up the position of CEO of the UK Health Security Agency ("UKHSA") in April 2021. Professor Thomas Waite was appointed as an interim DCMO covering COVID-19 in July 2021. He subsequently succeeded Professor Van-Tam as DCMO for health protection and remains in post. In addition, Dr Aidan Fowler, whose main role is as the National Director of Patient Safety in NHS England ("NHSE"), has the title of DCMO.

1.5 The CMO is a professionally independent position at Permanent Secretary level. Since the position was first established in 1855, the CMO has always had an advisory role in Government, part of the collective leadership of the public health and medical professions, a public facing role to inform the public of health issues and a scientific role. I sit on the Executive Committee and the Board of the Department of Health and Social Care. The CMO reports to the DHSC Permanent Secretary.

1.6 An important source which describes many of the technical aspects of the COVID-19 response is the Technical Report produced for our successors **(CJMW8/01 - INQ000203933)**. I co-edited this document (as lead editor) alongside the Government Chief Scientific Adviser ("GCSA"), and the other UK CMOs, lead DCMOs, the National Medical Director of NHS England and the Chief Executive of the UKHSA. The report also drew upon the contributions of many other distinguished authors. Chapters 1, 6 and 7 are especially relevant to this Module, although other chapters contain relevant information.

Section 2: Background relevant to the Test Trace Isolate system

2.1 Public Health England ("PHE") and subsequently NHS Test and Trace ("NHS TT") then UKHSA had and currently have responsibility for the Test Trace Isolate ("TTI") system. Although I was involved in some technical discussions, including through SAGE which I co-chaired, I was not involved in the procurement or operational delivery of TTI. As part of the collective leadership of the medical profession in Government, I was aware and involved in discussion at a high level on the strategic direction, though not the finer operational details which were correctly left to experts in this area. In view of my limited direct involvement in TTI therefore, I have limited my comments in this witness statement to high level strategic advice and reflections. Others are better placed to speak to the development, operation and delivery of TTI.

Section 3: Scientific Advice in Government

3.1 I reproduce Section 2 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 1 of the Annex to this statement.

Advice relevant to TTI system

Domestic Position

3.2 As noted above, PHE/UKHSA had responsibility for the TTI system, therefore my advice was primarily to relay the view of SAGE and occasionally provide professional technical advice but this was limited to high level advice such as the move from contain to delay and the tiering system rather than operational advice.

3.3 I chaired the Joint Biosecurity Centre's "Silver" meetings which made recommendations to "Gold" meetings chaired by the Health and Social Care Secretary of State and COVID-O on the tiering system in place across England. This involved reviewing detailed epidemiological data with regional and local public health experts across the country and inputting technical views on which areas enter which tiers in order to reduce the rate of transmission. UKHSA will have all minutes from the Silver meetings.

3.4 The Inquiry has asked for my view on the make-up of SAGE's expertise. SAGE had the benefit of PHE/NHS TT/UKHSA experts as well as the Association of Directors of Public Health and the CSA for the Department for Levelling Up, Housing and Communities to inform them of local levels. There is a balance between saturating discussions with too many attendees meaning there is insufficient time for members to challenge and test the ideas of others and having the right expertise at the table. On reflection, I do not think the composition of SAGE represented a gap in its expertise in the context of matters relating to TTI.

3.5 The Inquiry has asked about the availability of expertise across the four nations, again presumably in the context of matters relevant to the present module. SAGE was a four nations advisory function. Nationally in England, PHE had experience at successfully managing small outbreaks and spillover cases of high consequence infectious diseases (HCIDs) as did their counterpart organisations in the other UK nations. The challenge came when there was widespread community transmission with extremely limited testing resources. There was experience and expertise at TTI at local levels as well as regionally such as PHE's regional teams, local health protection teams and Directors of Public Health.

International Collaboration

In general

3.6 Throughout the pandemic, I had extensive interactions with international partners both directly and indirectly. The information provided by international colleagues was essential, particularly at the points where a foreign country had a major COVID-19 outbreak that was potentially a threat to the UK. Without these international insights, it would have been much harder to formulate a rational response. My own views and those of SAGE were heavily influenced by these interactions and they fed into the technical advice given to decision-makers. Information exchanged included our mutual understandings of the virus and its behaviours, as well as the state of the epidemic and the epidemiology both in our countries and abroad. I was and am very grateful for their insights.

3.7 In general, there was a practical difficulty that whilst we were particularly interested in the experiences of countries that were at the leading edge of any given wave, the scientists and doctors from those countries were usually working flat out and did not have time to interact on a bilateral basis with every other nation. Medicine, and of course science more widely, are international endeavours with a strong tradition of rapid publication. Accordingly, much of our learning from abroad came from publications and online data. We also gained information from important bilateral discussions, and multilateral meetings such as those with the WHO or G7.

3.8 Early in the pandemic, I had very useful bilateral interactions with colleagues from Singapore, Japan, South Korea, Hong Kong and Italy, and indirectly from China, who provided the earliest sources of information with which to inform our own risk assessments. These were augmented by multilateral meetings to exchange information set up by WHO at which senior medical leaders from multiple countries contributed. When the Alpha wave was first detected in the UK, we became net givers rather than recipients of information as other nations wished to learn from our experience.

3.9 In most respects, international data allowed us to advise earlier than would have been possible if we were relying only on UK or European data.

3.10 In addition, we developed regular meetings of senior European scientists (chaired by our GCSA) and I had regular bilaterals with US Presidential adviser Dr Anthony Fauci and check-ins with Dr Rochelle Walensky, Director of the US CDC. Later on, we

commenced meetings with the 'five eyes' group of CMO and equivalents from the USA, Canada, Australia, New Zealand and the UK. In parallel, the GCSA and PHE/UKHSA had their own bilateral or multilateral meetings and we shared relevant information between us.

3.11 Throughout the early stages of this pandemic, I was on the Executive Board of the WHO ("WHO EB"). The European members of the WHO also had a separate WHO EURO group. Through these meetings, I gained a lot of indirect and informal information. I was immensely grateful for the amount of time and expertise international colleagues offered on a bilateral and multilateral basis.

3.12 Key decision-makers were very interested in what other nations were doing, and as far as we could understand it, why they were doing it and their associated epidemiology. There were and are however considerable difficulties in proving causation between the public health actions of another nation and their epidemiological situation.

3.13 The International Comparators Joint Unit ("ICJU") was very useful in facilitating an assessment of what other countries were doing. Whilst there were several academic and other groups tracking the pandemic via a variety of means such as Our World in Data, the ICJU provided very helpful information on how other countries were responding. I supplemented this with information provided from colleagues internationally, and occasional use of the Science and Innovation Network ("SIN") of FCO/FCDO **(CJMW8/01a – INQ000575599, CJMW8/01b – INQ000575600)**.

3.14 Whilst we had to maintain the professional confidence requested by international colleagues, wherever possible the GCSA and I would feedback to decision-makers our understanding of the logic behind the decisions of other nations, in particular where these differed from the UK/England. We would also communicate our view of the strength of the scientific opinion internationally.

3.15 When other countries did things differently, it was very useful to work out why this was the case, and to test whether we had considered this approach ourselves. We also examined areas where we thought other nations were doing particularly well, for example the ability of South Korea and Germany to scale up testing in the very early stages of the pandemic. These are examples where emulation, where it was practical, was clearly in the interests of the UK/English response. There were other policies, such as the requirement in some European countries to get official permission even to leave the home, or requiring facemasks to be worn outdoors, where we noted they had

chosen to do something for which we could not see a compelling scientific case. This was communicated to senior decision makers and informed decisions by them as to whether to introduce similar measures in the UK.

In a TTI context

3.16 Different countries took slightly or significantly different operational approaches to TTI, although the underlying principle was the same. Some of this, especially in Southeast Asia, will have been influenced by previous direct experiences e.g. MERS/SARS which resulted in countries increasing their standing capacity for public health including testing and isolation. There were also different approaches based on a country's considerations on the premium placed on individual privacy – these are political decisions.

Four nations collaboration

3.17 PHE/NHS TT and UKHSA were the lead TTI experts in England so the detailed collaboration on this took place between them and their counterparts. Although the UK CMOs discussed TTI at a high level and were aligned on the broad approach I am not aware that any of the CMOs were closely involved on the running of the test, trace and isolate systems of their respective nations.

3.18 More broadly, the four CMOs maintained very regular communication along with the constituent nations' DCMOs. Sometimes this consisted purely of information sharing, for example the first few cases and deaths in each nation. Frequently, it was about testing one another's thinking and aligning our technical advice. We were often asked to attend ministerial meetings including COBR alongside Ministers from our respective nations and so being aware of each other's technical thinking was advantageous. We all took note of, and interpreted the technical output of, SAGE meetings, to our Ministers which tended to shape a common position. The four CMOs and the relevant DCMOs had different professional experiences and disciplines and I considered this an advantage in our discussions. In my view, the CMOs in Scotland (Dr. Calderwood and then Sir Gregor Smith), Wales (Sir Frank Atherton), and Northern Ireland (Sir Michael McBride) were excellent colleagues and public health leaders during this major four nations emergency.

3.19 Inevitably, there were differences of epidemiology and nuance across the four nations, but the scientific and epidemiological underpinnings of advice were transferrable.

3.20 Whilst fully recognising that health is a devolved matter and therefore inevitably some important differences would emerge in the operational or policy responses, our view as the four UK CMOs was that the general public would become confused if different versions of the scientific or clinical evidence were given across the four nations. We therefore tried to stick to the principle that the science and clinical advice both to Ministers and the public would be as similar as possible, whilst acknowledging the policy response might be significantly different for multiple reasons.

Section 4: The World Health Organization

4.1 The WHO is an important body for international health and has played a significant role in many of the health improvements seen since its inception. I am, unsurprisingly given my background, a strong supporter of a well-funded and empowered WHO equipped with significant technical capacity. The WHO can play an important role in responding to pandemics, for instance by declaring a Public Health Emergency of International Concern ("PHEIC"), as they did on 30 January 2020 in respect of COVID-19. The WHO also has a role in providing guidance to countries on how to respond to health threats. WHO outputs informed my advice to key decision-makers, and technical guidance from the WHO was extensively used in the UK by a wide range of professionals.

4.2 Due to the nature of the WHO as a body comprised of its constituent member states (which includes almost all countries globally), it aims to provide guidance that is applicable to all of its members. The individual circumstances of each member state inevitably vary considerably, for instance for reasons of economic prosperity, technical capacity, as well as factors which directly impact on disease susceptibility, such as geography and climate. During the pandemic there were also wide differences in epidemiology, with waves occurring in different countries at different times. WHO guidance will therefore always be both high level and less well targeted to local circumstances than national guidance would be. By way of example, on 4 February 2020, the WHO released guidance on COVID-19 that described the objectives of the response strategy at a high level. **(CJMW8/02 – INQ000087457)**.

4.3 In this sense, the WHO guidance was useful as a guide, but it usually needed considerable additional technical input in order to be usable in any given country.

4.4 This remained the case as more information about COVID-19 became available. The WHO COVID-19 strategy update on 14 April 2020 stated:

"Each country must continue to implement National Action Plans based on a whole of society approach and a realistic appraisal of what is feasible to achieve first in terms of slowing down transmission and reducing mortality, and subsequently in terms of sustaining low level transmission while society and economic activity resumes" **(CJMW8/03 - INQ000228104)**.

4.5 Whilst this was clearly sensible, it makes the point that each country was required to decide how best to implement WHO guidance for themselves.

4.6 There were instances where the UK could not follow WHO guidance due to practical constraints. One example relevant to this Module was the WHO advice on March 16 2020 to "test, test, test" e.g. to test every suspected case. I and others were well aware of this advice. To the extent that testing was available, we agreed with it. Particularly early in the pandemic however, it was not entirely clear to which countries this advice applied. Even in high income countries competition for key materials and limitations in the expansion of capacity were a problem substantially limiting testing capacity; in low-income countries the availability of testing was unfortunately even further delayed. There was therefore no theoretical disagreement with the advice, but practical limitations on the extent to which it could be applied in the UK and indeed most other countries due to the limited availability of tests. Once testing was scaled up this was of course something where the UK put a lot of emphasis. SAGE was clear on the need for testing; at around the same time as the WHO's advice, SAGE minutes said "SAGE highlighted the critical importance of scaling up antibody serology and diagnostic testing to managing the epidemic. A solution is urgently required, with a plan for implementation." **(CJMW8/03a - INQ000075664)**. My advice was the same as SAGE's.

4.7 It follows that on some occasions, the UK took a slightly different approach to that advocated by the WHO. This was the case for instance in its approach to clinical trials, where we were stronger in our view that novel therapies should be trialled. Nevertheless, in my view such occasions happened fairly rarely, and it was much more frequently the case that the UK's approach was consistent with advice emanating from the WHO.

4.8 Accordingly, in my view advice and guidance from the WHO was a helpful resource for local national decision makers to take into account, and for local national advisers to consider when formulating their advice, whilst acknowledging it was high-level and necessarily could not take local epidemiology, demography, clinical and scientific capacity and other factors into account. The UK worked closely with the WHO and

usually was broadly aligned with it. Where there was divergence, this generally was a reflection of the fact that WHO guidance needed to be applicable to all countries.

4.9 It is important to recognise that test, trace and isolate is most effective where case numbers are low and a very high proportion of infected people can be identified. Once case numbers are in the thousands or more a day even the best test, trace and isolate systems will likely be overwhelmed and miss many of the initial cases and be unable to follow up every contact. Countries which had lower numbers of cases tended therefore to have more effective test trace and isolate systems.

4.10 In the early phase of the pandemic (up to mid-2020) several other countries were able to execute a test, trace and isolate system more effectively than the UK. In no case was this, in my view, due to a different scientific understanding, and some of the differences are less marked than sometimes implied, but both at the time and subsequently they were able to do things we were not in the UK. In all relevant cases it was in my view based on prior investment in pre-pandemic capacity in testing and in contact tracing. South Korea and Germany both were able to scale up testing and contact tracing more rapidly than the UK because they had invested in it pre-2020, in South Korea's case after the MERS outbreak in Southeast Asia. I acknowledged that they were doing this better at the time, and that remains my view.

Section 5: Executive Agencies

5.1 I reproduce Section 3 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 3 of the Annex to this statement.

Section 6: Data and Modelling

6.1 I reproduce Section 4 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 4 of the Annex to this statement.

6.2 As set out in the Annex at Part 4, the modelling had to change as the situation evolved such as developing immunity. Modellers are best placed to explain this. I consider the purpose and capacity of modelling was understood by decision-makers, although this required in-depth discussions normally led by the GCSA. I think the modelling teams did an excellent job in very difficult circumstances and the modelling provided

supported the TTI teams by presenting data informed projections, but it was not the principal driver of TTI decisions.

Section 7: Summary of technical advice

7.1 I reproduce Section 5 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 5 of the Annex to this statement. I have nothing further to add specifically in relation to TTI in view of my limited involvement in its delivery and operation, as set out above.

Section 8: Decision Making Structures

8.1 I reproduce Section 6 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 6 of the Annex to this statement.

8.2 I was often present at ministerial meetings on testing including with the Prime Minister and the Secretary of State for Health and Social Care. However, I was usually not a key contributor on operational issues for TTI – the key people were Baroness Harding and her team. These meetings ran in a similar fashion to most of the other ministerial COVID meetings and I cannot recall any specific concerns I had with them.

Section 9: Understanding and response to COVID-19

9.1 I reproduce Section 7 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 7 of the Annex to this statement. The substance of paragraphs 7.118 to 7.127 of my Fourth Witness Statement, which relate to testing, is included in the following text.

Limitations imposed by testing capacity

Consequences of limited testing

9.2 The main limitation in any form of surveillance in the first few months of 2020 was our lack of testing capacity at scale. At the point when we did not have evidence of domestic spread, what little testing capacity we did have was concentrated on surveillance of potential imported cases (those symptomatic individuals who entered the UK from overseas) and contact tracing around those cases. PHE, NHSE and I sent

out a joint Central Alerting System (CAS) alert on 23 January 2020 to the NHS asking for potentially exposed people with symptoms to be tested (**CJMW8/04 – INQ000047537**). At this time, our case definition employed a limited geographical footprint. As the initial epidemic spread to several countries, the geographical footprint on which test eligibility was based similarly expanded.

9.3 Once it became clear we had domestic spread of the disease, it became necessary to move our limited testing to testing based on symptoms without any geographical basis. This clearly was inadequate as a proper surveillance mechanism but for a disease with very non-specific symptoms, where testing was therefore essential to confirm cases, it was the best that was achievable with the limited testing resources we had.

9.4 The lack of testing at scale was a problem for the UK throughout the first few months of the pandemic. It meant that the tests that were available had to be very heavily concentrated on clinical case management. By this I mean they had to be used to identify which of those patients who presented to hospital with symptoms compatible with COVID-19 were in fact suffering from the disease, and which patients had the many other conditions (both infective and non-infective) which could give rise to those same symptoms. This was particularly complex given the non-specific nature of COVID-19's symptoms, during the respiratory virus season (late winter and early spring). It was important to identify cases accurately in hospital for their optimal management, both for their own benefit and for reduction in nosocomial spread, so making hospital patients with relevant symptoms the priority for the limited testing capacity was logical.

9.5 It was strongly my view, and that of virtually everyone involved in the COVID-19 response, that testing capacity in the early stages of the pandemic when the virus was expanding rapidly and exponentially in the UK was insufficient to the need. This forced us to limit testing for surveillance and at points led to us underestimating how far along the upward curve of the epidemic wave we were, and as has been laid out in Module 2 this was relevant to the timing the first lockdown. It made it very difficult to test in hospitals and other care settings. It was not simply that the number of tests available were too few, but that the speed of turnaround was initially slow because a small number of centres were having to handle all the tests, often with travel time for samples. There was therefore a realistic possibility that people would be tested, and then become infected, infectious, or deteriorate clinically in the period between being tested and getting a result.

9.6 The decision by PHE to switch from community testing including surveillance to a focus on clinical testing was a practical necessity. I agreed with the logic at the time because there was no obvious viable alternative. Had we had the testing capacity, we would of course wished to have continued with both clinical testing and surveillance, but PHE and the NHS had to prioritise the limited testing capacity available. It would not have been reasonable to have people who were ill in hospital not being diagnosed with COVID-19 because the limited testing was being used in community testing. It was therefore a public health decision, but only in the narrow sense that given the very limited testing and contact tracing availability and capacity, the health system had to prioritise.

9.7 Once more testing was available, we expanded community testing and surveillance again and introduced testing in a number of other settings whilst continuing with testing in clinical settings. This was where we ended up after a significant scale up effort, but it was not where we were in March 2020. Stopping community testing was a result of the practical need rather than any wish to do so.

9.8 There was a technical concern early in the pandemic, which is addressed further in Part 7, that asymptomatic testing may have yielded unreliable results as it was acknowledged in initial advice to SAGE that testing for asymptomatic disease was likely to be less sensitive (so less reliable) than that for symptomatic disease. Of more practical importance in the first three months however was that the tests available were so limited in number that using them on asymptomatic people, when we were unable to test all the people who were symptomatic, made no practical sense. It was only once we had sufficient testing capacity to allow us to meet the demands of symptomatic people that the possibility of extending testing to those without symptoms arose. It is important therefore to separate out the theoretical considerations from the practical realities. Even if we had been confident that asymptomatic testing was as sensitive as it was for symptomatic people they would have been (and were) low down the list of priorities in this initial period of extremely constrained supply. The spread of COVID-19 during the early period would have been in part due to asymptomatic spread – it is not possible to determine the precise amount, but symptomatic spread would likely have been the main driver at this stage.

Difficulties in scaling up testing

9.9 The reasons for the UK's difficulties in scaling up testing capacity in the early stages of the pandemic response are complex, and I am not the best person to lay them out. In

brief however, unlike some nations we did not have a domestic industry capable of rapid scale up of diagnostic testing. Nor was PHE, which had been very fast to develop a prototype test, equipped to scale up testing to the extent necessary, which would have required prior (pre-pandemic) investment by Government in this capacity. This weakness was exacerbated by global shortages of key materials required for testing since demand went up simultaneously everywhere. It is an area where we have much to learn, in particular from Germany and South Korea, both of which were able to achieve rapid scale up in the early stages of the pandemic relative to the UK. Some of the technical issues in this regard are laid out in the Technical Report at Chapter 6 (**CJMW8/01 - INQ000203933**).

9.10 I, the GCSA and SAGE all made the point about limited testing, which was well known to colleagues in PHE and wider government. I do not consider that the reason PHE were unable to scale up at speed in the first three months of the pandemic was because they did not know, or did not care, that this was a major limitation. Rather they were not set up or resourced to be able to achieve this kind of scale up in advance of the emergence of COVID-19 and this in my view is one of the major learnings from the pandemic; the ability to scale diagnostic testing is essential but requires planning and investment in advance. This diagnostic capability is essential in all epidemics and cannot simply be switched on from a standing start once an emergency has begun. It takes prior investment. As I took up post in October 2019 this was not something I advised on prior to the pandemic.

9.11 I was not closely involved in the practical decisions about how to scale up testing since many other highly qualified people were already engaged on this operational issue. It was clear that a substantially new approach to scaling up was going to be needed for the volume and speed of expansion required. I had very high respect for the scientific capacity within PHE but this was a different, operational issue and there were a variety of ways it could have been achieved. The method to achieve this that was chosen by the Government, which I did not play any meaningful role in, was ultimately successful and given the limitations I think is a great credit to those involved. I was not involved in the setting of daily testing targets.

The establishment and development of the five testing pillars

9.12 On 2 April 2020 I reviewed a Secretary of State for Health and Social Care speech which set out the five testing pillars and a public document (**CJMW8/05 –**

INQ000068636 and **CJMW8/06 – INQ000068637**). The plan had been developed by DHSC colleagues following a commission from the Secretary of State on 1 April 2020. I checked it from a scientific perspective (**CJMW8/07 – INQ000514077**). I was aware and supportive of Professor John Newton being designated as the lead for testing and delivering the target of 100,000 tests a day – he was a very experienced public health leader and did a very good job under difficult circumstances.

Lighthouse Laboratory Network

9.13 I was not closely involved in the development of the Lighthouse Laboratory Network.

Surge testing

9.14 One of the benefits of having substantial community tests available is the ability to surge in tests to areas of particular concern where testing is limited relative to transmission. You can then identify cases and possibly break chains of transmission, with the aim of slowing the rate of transmission in that area or setting. It should not be seen however as the end of the testing for this area or setting, it should continue afterwards and become routine.

9.15 I attended regular meetings on testing with the Prime Minister and Secretary of State for Health and Social Care at which Baroness Harding discussed updates on testing efforts in England. On 14 January 2021, in an update to this group, 'National Surge Testing' was referenced as being in its early stages (**CJMW8/08 – INQ000514090**). On 4 February 2021, proposed surge testing was discussed to align with the easing of roadmap measures. In this meeting, I noted the importance of establishing testing as routine following any potential surge testing and the Secretary of State's office followed up on this meeting on 10 February 2021 with a draft campaign plan (**CJMW8/09 – INQ000514092** and **CJMW8/10 – INQ000514093**). On 18 February 2021, I attended a further meeting on testing where the Prime Minister agreed a plan for surge testing in schools (**CJMW8/11 – INQ000514095**). On 26 February 2021, an update from the Secretary of State for Health to the Prime Minister identified that surge testing for variants of concern had been continuing, with samples of the Beta and Gamma variants (referred to at the time as the 'South African' and 'Brazil' variants respectively) identified (**CJMW8/12 – INQ000514097**).

Prioritisation of testing

9.16 I was aware of and involved in the prioritisation of testing based on clinical need especially early in the pandemic when testing resources were very limited. I was also aware of and involved in the development of policy on prioritisation of key worker testing (**CJMW8/13 – INQ000514073**, **CJMW8/14 – INQ000068717**). On 14 May 2020 I was in a meeting with the Prime Minister, GCSA and Baroness Harding which referenced testing prioritisation (**CJMW8/15 – INQ000252831)**. I saw a draft testing strategy on 14 September 2020 (**CJMW8/16 – INQ000514086**). I reviewed a note to No 10 on 16 September 2020 (**CJMW8/17 – INQ000514087**). On 18 September 2020, the UK CMOs commented on proposed advice for the Secretary of State regarding how prioritisation could be built into the test and trace portal. Broadly, the view of the UK CMOs was that the best outcome would be to avoid any reduction in testing of symptomatic people, and, failing that, that any eligibility criteria for testing should be based on health priorities for which further analysis was needed but would likely include age, occupation, vulnerability and location (**CJMW8/18 – INQ000514088**).

Community testing

9.17 Community testing refers to the centres and processes established throughout the country that people could go to get tested for COVID-19. The advice I and other technical experts gave core decision-makers about community testing for COVID-19 and its significance to the response to the disease varied over the period of the pandemic. This depended on amongst other things the availability of testing, the availability of contact tracing, the known epidemiology and the arrival of rapid diagnostic tests which people can use at home. It was therefore not static advice.

9.18 Targeted community testing had at least five advantages, provided the test identified those who were infectious with a good degree of accuracy. It meant that people with symptoms of COVID-19 could test themselves and if positive self-isolate, thereby reducing chains of transmission. Conversely, if they tested negative it meant they could resume their normal family, social and economic life in line with restrictions in place at the time.

9.19 Testing like this was complementary to community self-testing of asymptomatic people (no known symptoms) undertaking a higher risk activity or entering a higher risk environment to test to reduce risk to vulnerable others. It allowed people who were visiting a vulnerable person, or about to go to a social event, to check they were

probably not infectious based on testing irrespective of symptoms. It allowed high risk venues (e.g. care homes and hospitals) to reduce their risk by getting people to test before they entered and not enter if positive. It also allowed some venues such as theatres to open earlier than they would otherwise have done with testing to reduce the risk of transmission.

9.20 All of this depended on having a large scale testing capacity and was made possible by point-of-care tests which were reasonably accurate at determining if people were, at the time they took their test, infectious.

9.21 I thought the evidence was in favour of such targeted community testing, once widespread point-of-care tests were available. I was in favour of community testing with PCR but accepted that it had significant practical limitations due to the delay in time between a test being taken and a result being returned. This was an inherent consequence of it being based on a system where tests were mailed in to a laboratory and the results then communicated back. There were therefore several circumstances, for instance admissions to sports events, where lateral flow tests were beneficial due to their speed of results but a PCR based system would not have been.

9.22 Overall, I consider the expansion of testing into the community as one of the more effective innovations that occurred during COVID-19 and one which may well be carried forward to some, although not necessarily all, future pandemics. The appropriateness of community testing in future pandemics would be assessed on the route of transmission, severity of disease, prevalence of disease at that point in time and sensitivity, specificity and type of test required. More technical details on testing and the steps that led to the ability to achieve it are laid out in the Technical Report. It did depend on having lateral flow tests for a relatively non-invasive sample (mouth or nasal swabs) where being test positive had a high correlation with infectiousness.

9.23 There was a scientific debate, to which OCMO contributed, in SAGE about the role of population testing and mass testing.

9.24 On 16 April 2020, SAGE noted the importance of getting accurate estimates of R value and community prevalence over the short term to inform decisions on changes to social distancing measures and to fill knowledge gaps (**CJMW8/19 – INQ000075780**). Sufficient testing capacity therefore needed to be reserved for repeated large-scale community testing to get this information. At this time, PHE was unable to deliver a community testing programme due to the limited resources they went into the

pandemic with, and SAGE therefore agreed a repeated ONS-led household survey programme should be conducted to supplement routine data streams.

9.25 On 28 April 2020, SAGE discussed that hospital admissions were at that time likely a better basis for ongoing monitoring than estimates of incidence in the community as testing was deployed most systematically in hospitals given the limited number of tests, but acknowledged they were a lagging factor (**CJMW8/20 – INQ000053212**). Given the paucity of other data, the estimates of community incidence were expected to improve when the ONS community study began to report. Regardless, SAGE viewed the urgent establishment of monitoring and surveillance as a key requirement for managing COVID-19 at a population level.

Mass testing

9.26 Mass testing relates to the widespread non-targeted testing of populations in the community who we had no particular reason to suspect had COVID-19 (i.e. they were not displaying symptoms, or had been in contact with someone who was) and were not going to a high-risk venue.

9.27 SAGE on 27 August 2020 provided a view on mass testing (**CJMW8/21 – INQ000061561**):

2. The effectiveness of mass testing will depend on several factors including the proportion of the population tested; the frequency of testing; the ability of a test to identify true positives and negatives; the speed of results; and adherence to isolation. The testing itself should not be considered in isolation but as part of the total system requirements.

3. Any testing programme should have clear and specific aims, this could include reduction of R or risks of larger outbreaks. Separate testing objectives could relate to economic or social objectives such as re-opening venues or workplaces.

4. Mass testing is most likely to be successful in reducing R if used in well-defined higher-risk populations or settings for example care homes, where it is more feasible to detect and prevent large outbreaks early, and where compliance can be measured, and in groups with higher rates of infection and transmission than the general population.

5. Speed and coverage of NHS Test and Trace needs to be optimised to identify and isolate quickly a high proportion of symptomatic cases, and it will be important to ensure that a general mass testing project does not have any negative impact on this approach. Effective test and trace can have a significant effect on R and this should remain a priority.

…

17. SAGE endorsed the Mass Screening Task and Finish Group paper — subject to amendments following the discussion. The scenarios for use were considered particularly useful.

18. The effectiveness of mass testing will depend on several factors including the proportion of the population tested; the frequency of testing; the ability of a test to identify true positives and negatives; the speed of results; and adherence to isolation. It is important to recognise that testing is one part of a system leading to isolation of infectious individuals and the whole system needs to work in order to achieve the desired aim (which would be to identify as many infectious people as possible and isolate them from contacts during the infectious period).

19. Any testing programme should have clear and specific aims, this could include reduction of R or risks of larger outbreaks. Separate testing objectives could relate to economic or social objectives such as re-opening venues, workplaces (it is important to recognise these as different objectives).

20. A mass testing programme designed to reduce R should be designed to find as many cases as possible and have minimal detection of false positives. It would need to be linked to an effective system for isolation of cases (this will require incentives and intervention to increase both uptake of testing and adherence to isolation). Even if well designed and implemented, it may not be as effective at finding cases as a well-functioning Test and Trace system, especially at low levels of prevalence or if it requires the use of tests with low sensitivity or specificity.

21. SAGE strongly supports increased scale of testing and the associated system. As per previous reports it was noted that multiplex testing would be beneficial in some situations for winter.

22. With mass testing, it will be most efficient and effective initially to concentrate increased testing capacity on high risk groups and settings where transmission is likely

to be greatest. Priority groups for mass testing should be identified according to the risk of individuals being infectious, and the potential consequences if they tested positive. For the system to work social and economic factors will need to be considered, including incentives and interventions to enhance adherence.

23. Mass testing is most likely to be successful in well-defined higher-risk settings (for example care homes, meat processing plants) where it is more feasible to detect and prevent large outbreaks early, and compliance can be measured and moderated.

24. Tests used for mass population testing particularly in low prevalence settings and populations could result in higher false positives than symptomatic testing using lab-based PCR tests, which could reduce public confidence in testing. Double testing may be required to reduce false positives (with PCR as the gold standard).

25. Separately, and with a different objective, it would be possible to use a wider testing approach to detect and stop infectious individuals from entering specific venues (for example theatres, workplaces). This would reduce the chance of contact with an infectious person in such screened environments, but it should be recognised that this is a different objective to reducing R overall.

26. There are several barriers to symptom reporting including a lack of knowledge; concerns about stigmatisation; and financial disincentives such as loss of earnings. There are also barriers to self-isolation. These all need to be considered in any system.

27. SAGE agreed that clear communication and public engagement is needed to improve understanding of testing programmes and prevent stigmatisation of communities. Structured financial support for disadvantaged groups may be particularly important.

28. SAGE did not consider in detail different types of tests. There is an advisory group on testing technologies established within DHSC.

29. In any introduction of a mass testing (and isolation) system it will be important to undertake evaluation and experimentation (for example pilot studies) to determine the effects and adjust the programme accordingly.

9.28 SAGE on 26 November 2020 stated (**CJMW8/22 – INQ000061578**):

5. Repeated rounds of testing for population case detection would have more impact than a single round. The benefit of later rounds is smaller than for the first round, particularly if the same people are more likely to come forward for testing in each round.

6. If used appropriately, lateral flow testing may reduce the risk associated with certain activities but will not eliminate it. It should not be seen as a way on its own of enabling high-risk activities to resume but could reduce the risk of open activities. Test technologies need to be matched carefully with use cases. Behavioural impacts of receiving a negative test result need to be considered in all use cases, as these may be important for the overall impact of testing.

…

32. SAGE has previously advised that a reduction in prevalence of 15% to 20% might be a realistic expectation for a single round of highly effective untargeted mass testing (see SAGE 53 and 56). Use of Lateral Flow Devices (LFDs) to test a large number of people in order to identify potentially infectious people could reduce transmission if it identifies people who wouldn't otherwise have been identified and those people then go on to isolate themselves. Uptake of testing and adherence to isolation are 2 of the critical factors in effectiveness (as well as sensitivity and specificity of tests).

33. Some groups contribute more to the spread of the epidemic than others, due to both high prevalence within the group and high onward transmission. Targeting groups and institutions where prevalence is likely to be higher will have a greater impact on transmission. If, however, these groups are less likely to be tested or less likely to isolate than others (or both), mass testing will have less of an effect. Targeted testing is recommended.

34. Repeated rounds of testing could have more impact than a single round. The benefit of later rounds is smaller than for the first round, particularly if the same people are more likely to come forward for testing in each round. This applies regardless of whether those people are in a high or low prevalence group. Experience from other infectious diseases shows that it is not uncommon for those at highest risk to be least likely to present for single or repeated testing rounds.

35. Emerging evidence from Liverpool is that the lateral flow tests being used are not as sensitive as had been expected from the test validation, but it is still likely that they will pick up the most infectious individuals with the highest viral load. While LFDs may pick up a smaller proportion of cases than PCR testing, the people who they do identify

are more likely to be in the most infectious part of the infection cycle (whereas PCR testing will identify some people who are not yet very infectious or who are no longer very infectious). The value of pilots is clear and it is important that, as testing is rolled out, further assessment and evaluation continues. Parallel LFD and PCR testing is important in gathering more data on test effectiveness.

36. LFDs may also be considered for use cases other than population case detection. If used appropriately, lateral flow testing may reduce the risk associated with certain activities but will not eliminate it. It should not be seen as a way on its own of enabling high-risk activities to resume but could reduce the risk of open activities.

37. Test technologies need to be matched carefully with use cases. Behavioural impacts of receiving a negative test result need to be considered in all use cases, as these may be important for the overall impact of testing.

38. SAGE endorsed 2 important uses for widespread testing:

- *repeated and frequent targeted testing of higher risk or prevalence groups and institutions*
- *to reduce risk when activities are already occurring (for example, to reduce the number of infectious people entering an indoor environment)*

SAGE has previously commented on the short duration for which a negative test provides some reassurance.

9.29 SAGE, on 29 November 2021, stated **(CJMW8/23 – INQ000061605)**:

"18. Lateral flow testing is a valuable way of identifying potentially infectious people and lateral flow devices have identified Omicron cases, indicating that they are still effective for this variant. They are particularly valuable if used as a group diagnostic tool within households or following a common exposure event. If each in the group tests negative, there would be greater confidence that they are all negative. If, however, at least one person tests positive, then there is a higher likelihood that another person in the group is also infected, despite a negative test result. Lateral flow tests are useful to identify infection to avoid attendance at gatherings and pre-testing will be particularly important over the upcoming holiday period (high confidence)."

9.30 Mass testing, which had enthusiastic support from some, posed a separate set of issues from the targeted community testing. It was less clear that it would be useful,

especially in an era when testing was based on PCR, as I outlined in my advice to the Cabinet Office and Permanent Secretary at DHSC on 8 November 2020 **(CJMW8/24 – INQ000071531)**:

"1) The empirical evidence this [mass testing] *will actually have a useful impact is weak. The mathematical theory is fine- but the theory for a lot of things is fine, but is no substitute for empiric data. I am confident a lot of people will want to be tested, and a lot of people will have COVID- the question is to what extent the two circles of the Venn diagram overlap. The reports from medical colleagues in Liverpool and elsewhere is that those most at risk are least enthusiastic to be tested (one gave a disruption* [sic] *of being chased out of a housing estate by a man in his underwear he was so angry). And testing without isolation is pointless- we don't know what it will lead to. Or whether it will lead to people taking risky behaviours if they are negative, cancelling out any positive benefits. Etc.*

2) There are clear and major opportunity costs. My biggest worry is this will lead to diversion of tests from areas we realty [sic] *need them including symptomatic people, healthcare workers, social care workers, those isolating etc. Or lead time to test result extending, which has the same effect; a delayed test result is of minimal use. This would definitely lead to a net loss for public health. We must guard against it at all costs, and the risks here need to be explicit.*

3) I am nervous of the Christmas theme. Many of the highest risk groups (eg British people of Pakistani heritage- the highest incidence group) do not celebrate Christmas, and feel we did everything we could to make celebrating Eid al-Adha difficult. We put lockdown over Diwali (other British south Asians being another major risk group). It will need careful messaging if we are not to lose further support among groups we need to be bought in".

9.31 Some expressed a hope that mass testing alone could serve to control the pandemic in and of itself. Whilst I was open to the view that mass testing could have a role, I considered the idea it could on its own control the pandemic to be very optimistic without clear data to support its effectiveness. Mass testing performed on or around any given point in time would at best identify a portion of those people with COVID-19. It would not identify those who might have been exposed prior to this point who would test negative but then go to develop the disease in the following days. Nor could mass testing feasibly identify everyone with COVID-19 on that date, on the basis that some

sections of the population would not come forward to be tested and of those who did, there would be a portion of false negative results.

9.32 Whilst mass testing would identify cases and, if they then self-isolated, put some temporary downward pressure on the incidence and prevalence of the disease, it would not in my view be so successful as to allow the widespread relaxation of NPIs unless it was repeated frequently over time. Other countries did attempt the approach. In respect of mass testing in Slovakia, which was seen by some as a model to follow, I advised the Cabinet Office on 19 November 2020: "I think it is a bit early to say R has been reduced in Slovakia by mass testing alone– and I would be a bit surprised if it had. Reducing prevalence is more likely, if people adhere, and on the background of a falling R this is useful" (**CJMW8/25 — INQ000071738**). By adhere I meant people following the testing and self-isolation requirements, I have no reason to think this was unclear to people in the context at the time. Reviewing the publicly available data on new confirmed cases in Slovakia which showed a rise in transmission from December 2020, it is not obvious the experiment with mass testing in Slovakia had the prolonged impact on transmission some in the UK hoped it might have.

9.33 These limitations were reflected in our own (UK) experiences in the pilots we undertook. For instance, when we attempted this in Liverpool, I was of the view that mass testing resulted in us identifying more of those who were positive (a good thing). There was however limited evidence that it had in and of itself contributed to a sustained and significant slowing in rates of transmission **(30 November 2020 – CJMW8/26 – INQ000071945)**.

9.34 On 20 November 2020 I emailed Shona Dunn DHSC Second Permanent Secretary and James Bowler at Cabinet Office, with Professor Harries and Sir Patrick Vallance copied concerning mass testing (**CJMW8/27 – INQ000071777**):

"Just to reiterate the basic logic of why we need to be quite careful of some of the incentives being discussed for the mass testing. The goal of mass testing is to reduce prevalence.

The main issues centre on the fact that even with two tests there is a relatively small but still significant false negative rate (say 20-30% under operational conditions- negative predictive value).

1) If a test occurs before people do something they otherwise would have done, and it pulls out 80% of those who were positive who then self isolate there is a major win for public health goals, and it de-risks the environment into which they then go.

If, on the other hand, having a negative test leads to them doing a risky behaviour they otherwise would not have done this increases risk, because some of them would be falsely reassured by the test, will actually be positive, and will pass on the virus. Therefore the concept of 'freedom passes', however named, actually increases risk- this is a certainty. It may lead to increased uptake of testing, but the evidence that the amount this increased uptake would reduce prevalence by more than the certain increase due to false positives is lacking. It may- and it may not. It is especially risky if we say a negative test allows people to do things that are most risky- either interacting closely with individual vulnerable people ('you can hug your grandmother') or in high risk environment for mass spreading events ('you can meet your mates in the pub').

So I think we need to be very careful of these messages. If it means people are feeling more secure about doing things they otherwise would have done- great, win all round. If it increases risk taking, especially over a prolonged period, not good.

2) On the issue of linking to tiers, the key would be to make sure it is due to the outcome indicator (prevalence) not the process indicator (number of people tested)."

Operation Moonshot

9.35 The Inquiry has asked about Operation Moonshot. The idea behind "Operation Moonshot" was to make possible mass population testing. I attended some meetings with the Prime Minister on it (**CJMW8/28 – INQ000062598**) and Professor Van-Tam was a member of the "Moonshot Scientific Advisory Group" co-chaired by Lord Bethell and the eminent clinician-scientist Lord Darzi, which held its first meeting on 25 August 2020 (**CJMW8/29 – INQ000514085**). As noted above, there are practical and epidemiological challenges to mass testing. Operation Moonshot was worth considering in parallel with other activities but not as a high priority for my work given the fundamental challenges I have already laid out and the other work I was undertaking.

Testing and care homes

9.36 My preference from an early stage in the pandemic was that people entering care homes as residents from either hospital or the community should be tested. This was not a controversial stance and I am not aware of anybody who argued against it. The practical reality at the time however was that the availability of testing, and the prioritisation of those tests which were available against the many other potential uses, made this very difficult. My advice that testing should be undertaken as soon as possible was given in advance of testing being available at the scale needed to achieve it for all care home residents **(14 April 2020 – CJMW8/30 – INQ000068798)**.

9.37 As far as I am aware, this lack of available tests was the principal reason testing was not performed prior to people's arrival at care homes. If advice was received that someone who had had a negative test in hospital could subsequently become infectious, that was correct technical advice. The incubation period of COVID-19 means that someone could be discharged negative (with the test having been performed correctly) and subsequently become positive, so a negative test did not exclude subsequent risk. This however was not a reason not to test, whereas the lack of testing was. It would however have been incorrect to imply to care homes that a negative test in someone arriving, whether from hospital or the community, guaranteed they would not subsequently become infectious to fellow residents, staff and visitors in the next few days due to an infection acquired prior to arrival.

9.38 The UK put in place research to track the impact of, and reasons for, COVID-19 in care homes very rapidly by international standards. These included the VIVALDI 1 and VIVALDI 2 study, the Easter 6 (later named the London Care Homes Network) and others. To interpret study outputs and provide science advice informing social care policy decisions, the Social Care Working Group ("SCWG") complemented work conducted by SPI-M-O to understand the impact of COVID-19 on vulnerable populations and in settings such as care homes. Modelling approaches were used to understand the key determinants of ingress and transmission of COVID-19 in high-risk adult social care settings. A key focus was ongoing assessment of effective options for the most appropriate testing and isolation regimens for care home staff and residents to mitigate the risk of transmission of COVID-19. Work was also undertaken to reduce the number of admissions to hospital of care home residents, so as to protect them from nosocomial infection if they were admitted.

9.39 Further details of these measures are laid out in the Technical Report. As we said in that publication, the value of reliable and comprehensive routine population and health data describing the population living and working in residential care to inform policy decisions and evaluate the impact of interventions cannot be overstated.

General points

9.40 I do think relevant decision makers understood the importance of a national efficient TTI system, the issue as previously noted in this statement was that the ability to scale up to a major epidemic was not there. The benefits were rapidly to identify, test and trace contacts – trying to break chains of transmission. This is a very old, established and effective measure for managing some, but not all, infectious diseases. For some diseases, such as Ebola in West Africa, it is the mainstay of control. For others the implementation of a national TTI system is a useful adjunct to other public health measures such as social distancing, and in my view at the time and now this was true for COVID-19 in its first 2 years. The benefits early in the pandemic included slowing the establishment and spread of disease. The benefits later in the pandemic were to help assist easing as many social restrictions as possible without overloading the health system and protect the most vulnerable.

9.41 Once it was clear we did not have in place the capacity to expand TTI at the rate of exponential increase of the disease there was a valid debate about whether this was best done as an expansion of local capacity, as a national capacity, or both. Local test and trace systems had the benefit of local knowledge which the national system would not necessarily pick up. On the other hand local systems were not universally strong across the country, and whilst some local systems would probably have been able to scale up at the speed needed some probably would not, leaving areas of the country with less strong capacity. Each component of TTI - testing, tracing, and encouraging and supporting isolation needs to work if TTI is to have the desired effect and these are technically demanding and labour intensive. There were therefore valid arguments for both national and local scale-up. I was not central to the decisions on this operational question. I am not best placed to advise on the mobilisation of testing capacity and by which routes.

9.42 There was at points in the pandemic a close relationship between the TTI system and the extent of non-pharmaceutical measures – the more effective TTI was the more it helped ease restrictions more swiftly and helped protect the most vulnerable as people could test before visiting them. The relative importance reduced the further into the

vaccination campaign we went; vaccination was substantially more effective than TTI and once the population was fully vaccinated made it largely redundant as a central tool of reducing infection transmission and poor clinical outcomes at a population level although it remained useful in local outbreaks. The TTI system was an important component of contain, delay, research and mitigate in the pre-vaccine era– its aim was to break the chains of transmission and testing supported research.

9.43 SAGE discussed that, at least as of May 2020, the Reasonable Worst Case Scenario (RWCS) model predicted a rise in the R number due to a lack of infection detection, and concluded that early warning signals and an effective TTI programme, "should be designed to prevent R rising to [the predicted] level". See minutes of the SAGE meeting of 21 May 2020 (**CJMW8/31 – INQ000075783**). No RCWS can be perfect and the policy objective is to avoid it becoming a reality. The development of the TTI system by May 2020 was well underway and I don't consider that this RWCS had any major impact on it as the necessity of a high performing and expansive TTI system was clear to all.

9.44 As previously noted a TTI system works most effectively when the cases are limited. On 21 May 2020, SAGE discussed contact tracing and testing capacity in the context of relaxing NPI measures, noting that the risks of TTI failure were greatest in winter and at the start of TTI if the number of cases is still relatively high and the system immature. It further reiterated the view that incidence should be as low as possible before an effective TTI system could work, however the decision as to what level of incidence to choose was an operational one and not for SAGE. SAGE warned that if the TTI system begins operating when there was a relatively high level of incidence and prevalence of COVID-19 in the population, the system could rapidly become overwhelmed and have limited impact (**CJMW8/31 – INQ000075783**).

9.45 Testing also meant that the government could reduce the days that people isolate for; this was testing to help individuals rather than as a tool of infection control at a population level. From 17 January 2022, people with COVID-19 in England could end their self-isolation after 5 full days as long as they tested negative on day 5 and 6. This was down from a national policy default of 10 days self isolation. Ending isolation after receiving negative test results prevented unnecessary further isolation.

The uses, significance and effectiveness of antibody testing

9.46 Antibody testing, a test of a component of the body's immune system response to a disease, is central to the diagnosis and management of many infectious diseases and has no role in others. Antibody testing was for example for many years the mainstay of diagnosing HIV for clinical management. At an individual or population level it can be used to measure past infection, potentially for months or years after exposure, and in particular first infection, as the body may continue to mount an antibody response to the infection for a long time. For many diseases the presence of antibodies can demonstrate that someone is immune to a disease, but this is not true for all diseases. The potential role of antibody testing for COVID-19 early in the pandemic was therefore potentially important but unclear and it was developed in parallel with antigen testing.

9.47 I previously indicated there is hardly ever a case where evidence changes instantly, it evolves over time. This occurred with antibody testing for COVID-19. I provided advice to policy teams that whilst antibodies might well be important their use in routine practice should not move ahead of the evidence as it was still evolving and there were many unknown factors such as its association with severe and less severe disease. As the evidence evolved, antibody testing proved to have an important but relatively niche role in understanding the epidemiology of the disease. It did not have the importance in individual case management or being able to say people who were antibody positive would have no further infections, as occurs in some infections and as we initially thought it might. (**CJMW8/32 – INQ000069305, CJMW8/33 – INQ000069357, CJMW8/34 – INQ000069411, and CJMW8/35 – INQ000069818).**

The uses, significance and effectiveness of genomic testing

9.48 I was not closely involved with establishing genomic testing, most of which involved PHE/NHSTT/UKHSA. Professor Sharon Peacock the director of COVID-19 Genomics UK Consortium (COG-UK) in particular led on this successful part of the UK response, where for much of the pandemic the UK led the world in public data on genomic sequencing, and could assist the Inquiry on its use. I did use the outputs of their work as one important input to clinical and public health advice among other data inputs. In particular it was useful for identifying when new variants were becoming dominant, and for understanding how chains of transmission were occurring in hospitals, care homes and from imported cases.

Other forms of testing which may have been relevant including wastewater testing and the use of AI

9.49 On 30 July 2020 SAGE in a discussion with the Joint Biosecurity Centre on trigger points identified that as part of testing, the proportion of confirmed cases which could and could not be linked to known clusters should be monitored, as it was an important indicator of transmission and of the effectiveness of the test and trace system (**CJMW8/36 – INQ000119955**).

9.50 On 8 April 2021, SAGE discussed wastewater testing, noting that it could help to track the presence of SARS-CoV-2, including new variants of concern in the population. It noted: it was particularly useful to detect outbreaks when prevalence was low (including in areas where community engagement with testing was low) and to detect presence and geographical spread of new variants but that it was less effective, however, for precise quantification of levels of SARS-CoV-2 (or particular variants) in a population (**CJMW8/37 – INQ000119960**).

9.51 Outside of the SAGE context I had little involvement in these matters.

Variants

9.52 I reproduce paragraphs 5.239-5.245 of my First Witness Statement to the Inquiry, dated 15 August 2023 and paragraphs 4.27-4.30 and 4.80-4.96 of my Fifth Witness Statement, dated 1 February 2024 at Part 8 of the Annex to this statement.

9.53 UKHSA handled the details of enhanced contact tracing to support intelligence gathering on variants. I did provide advice to the Cabinet Office on a paper on responding to new variants where I stated "The no-regrets are enhanced contact tracing, further support for isolation and comms." (**7 February 2021 – CJMW8/38 – INQ000072707).** By this I meant that these measures would be appropriate with few downsides given the risk of variants at this time.

Asymptomatic transmission

9.54 I reproduce paragraphs 6.55-6.63 of my First Witness Statement to the Inquiry, dated 15 August 2023 and paragraphs 4.11-4.26 of my Fifth Witness Statement, dated 1 February 2024 at Part 9 of the Annex to this statement. Paragraphs 5.19 to 5.63 of my

Fourth Witness Statement to the Inquiry dated 22 August 2023 are, as set out above, included in Part 4.

9.55 On 28 May 2020, SAGE advised that efforts to limit transmission in the homeless, prison, and immigrant reception centres (as well as other institutions featuring vulnerable populations and communal facilities) must be proactive, and treated differently from settings such as care homes, given trust issues and the particular challenges that exist around test, trace and isolate (**CJMW8/39 – INQ000119951**). SAGE determined research was needed to understand the environmental and human issues in these settings, and thinking required on the seasonal challenges involved, especially winter as COVID-19 has similar symptoms to other respiratory illnesses and testing in a clinical setting is often most useful to differentiate between two or more diseases with similar symptoms.

Tracing

9.56 I reproduce paragraphs 10.22 to 10.28 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 9 of the Annex to this statement.

9.57 I was not closely involved in the operational tracing strategy, that was led by PHE/NHSTT/UKHSA. SAGE, in a meeting of 1 May 2020, set out its view, with strong evidence to support it, that isolation of contacts of individuals who had COVID-19 within 48 hours was desirable (**CJMW8/40 – INQ000120511**). Modelling discussed at the meeting indicated that delay in isolation of contacts beyond 48-72 hours resulted in a significant impact on the R value. SAGE discussed that the aim for contact tracing at this stage was to develop the capability to test index cases in less than 24 hours, where following a positive result contacts would then be required to isolate. This level of testing capability was considered essential to reach before the autumn/winter influenza season to have maximum impact.

9.58 SAGE, in a 4 June 2020 meeting, endorsed the SPI-M paper on clusters and highlighted the importance of cluster tracing to the TTI programme – including location tracing, understanding of environmental factors, and backwards contact tracing, which contributed to a robust TTI programme that would work to reduce the rising incidence of infection (**CJMW8/41 – INQ000120526**). Similarly, at the next SAGE meeting on 11 June 2020, SAGE noted it continued to recommend backwards contract tracing, but determining the period over which contacts should be considered for tracing was important (**CJMW8/42 – INQ000120527**). SAGE discussed that it was difficult to

determine a reasonable period for backward contact tracing for those who tested positive but were asymptomatic, as the time of onset of infection would be unknown. SPI-M was tasked with advising NHS T&T and JBC directly on the optimal time for backward contact tracing and testing, and to share papers with SAGE by 15 June. Conventional, forward, contact tracing identifies the contacts of a case who they might have passed disease on to with the aim of isolating them before they become infectious. Backwards contact tracing aims to identify the people the case might have caught the disease from. The aim of this backward tracing was to identify potential clusters of infection. Determining the backward contract tracing period was further complicated by those who were positive but asymptomatic, as the time of onset of infection was unknown – the rate of asymptomatic carriers remained uncertain at this stage.

9.59 I was aware of but not involved in the decision to adopt a centralised approach to tracing. This was led by experts in PHE/NHSTT/UKHSA.

9.60 I was closely involved in the decision to move from contain to delay, although it had little impact on the decisions around TTI, which were as previously noted driven by the practical limitations imposed by the number of tests available. It was a gradual process which reflected the reality that there was widespread community transmission occurring in the UK and in many other nations, therefore contain was no longer a viable strategy. My advice was that of SAGE's and will have been given to the Secretary of State for Health and the Prime Minister – their offices will hold any minutes of those meetings.

NHS App

9.61 I was briefed on the plan to develop an app and was copied into updates. As this (apps) is not my area of expertise, I did not play a significant role. I believe Professor Van-Tam continued to support the team at a high level for a limited time. I was copied into a finalised version of the submission for the Secretary of State for Health on this topic on 9 March 2020 (**CJMW8/43 – INQ000514070**) and was briefed by NHSx on the app on 2 April 2020 (**CJMW8/44 – INQ000514074**). I was sent further correspondence concerning updates on the development of the app (see for example - **CJMW8/45 – INQ000514078**, **CJMW8/46 – INQ000514079**, and **CJMW8/47 – INQ000514082**). I note the action from a SAGE meeting in early May 2020 for an ethical review of the

proposed NHSx App, following which I was sent details of the review by the Ethics Advisory Board (**CJMW8/48 – INQ000514080**).

9.62 While I was copied into email correspondence concerning the development of the COVID-19 App and its launch, I was not directly involved in its development, nor did I personally provide advice relating to modelling, digital tracing, accessibility issues, or public communication/guidance surrounding the purpose and use of the App.

Isolation

9.63 I reproduce paragraph 6.14 of my First Witness Statement to the Inquiry, dated 15 August 2023, and paragraphs 7.166-7.169 and 8.137-8.139 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 11 of the Annex to this statement.

9.64 I was part of some of the discussions related to financial support to those who needed to self-isolate. I laid out my views in my Module 2 oral evidence session as well as in my Fourth Statement to the Inquiry:

"There was a significant debate in Government about the role of financial support for people who are self-isolating. My opinion was that for workers who are paid if they are off sick, or who could work from home, the financial risk from self-isolation was usually a relatively unimportant factor. For people who had employment which meant that if they did not work they did not get paid however, there was a strong financial incentive not to self-isolate. Compounding this was the fact that in general, these jobs tended to be lower paid or the self-employed, for whom the loss of over a week's wages was highly problematic in terms of their disposable income. The evidence of this was most clear in care homes. Care homes which paid members of staff when off sick or self-isolating had lower rates of transmission than those which did not. There was also clear evidence that COVID-19 transmission was highest in areas of deprivation, where such jobs were more common, although this association might not be causal. The Treasury were generally not convinced by these arguments in favour of payments for working people who were self-isolating and who were not otherwise paid for that time."

9.65 This was an issue discussed at Local Action Committee Gold meetings with the Secretary of State for Health and Social Care as well as across government, for example on 13 September 2020, I replied to the Cabinet Office stating:

"*These are not medical/science matters in the main so I would not put too much weight on my view. As you know I am v supportive of the higher payment to reduce the disincentive for lower paid (esp self employed) people to isolate and get a test. The size of it I have no particular views on as this is not something I have expertise in or data. I agree with Patrick we should be making it unacceptable for employers to pressure people to come in if self isolating with symptoms pre-test, a positive test or a contact of a known case. I remain cautious of the fine for noncompliance because of disincentives to test/declare, and instinctively for that reason would not make it so steep. But there is no data on the right level*" **(CJMW8/48a – INQ000575601)**

as well as on 18 February 2021 to the Cabinet Office:

"On the specific question you ask about financial and non-financial support you will be unsurprised that I consider this very important. If we want to put a lot of reliance on test-and-trace rather than extended NPIs to keep rates low (we do), and accept that the data from care homes makes clear that there was an absolute correlation between those where people were not paid sick pay to stay home and bad COVID outcomes (there was), and accept that COVID is particularly concentrated in the low paid (it is) the case for this is pretty overwhelming. I have not yet heard convincing counter-arguments." **(CJMW8/48b - INQ000072811)**

and on 28 April 2021:

"The one think I would maybe put more visible emphasis on is the isolate part of both test, trace and isolate, and self-isolation for those with symptoms which could actually carry a lot of the residual load once we have high levels of vaccination. This includes, as discussed, financial support for those in employment sectors where sick-pay is not routine. It is there, but only for the keen reader." **(CJMW8/48c – INQ000575603)**.

Isolation period changes

9.66 I was involved in the discussions relating to establishing and all the changes to the self-isolation periods which are summarised below. These conversations were informed by scientific experts involving NERVTAG, SAGE and PHE and reflect the evolving nature of the scientific information and evidence available at the time.

Self-isolation of a positive case started at 14 days

9.67 This was initially for people returning from affected countries, then to anyone in the UK based on symptoms. SAGE and NERVTAG considered this (**CJMW8/49 – INQ000087540**).

Self-isolation of a positive case moved to 7 days

9.68 The advice from SPI-M on 9 March 2020 was that 7 days isolation of cases gave the same benefit as 14: "From a population perspective, the difference between 7 and 14 days is negligible, but you might expect higher compliance from 7 days" (**CJMW8/50 – INQ000048000**).

9.69 10 March 2020 – "SAGE endorsed NERVTAG's advice that individual case isolation should last for 7 days from onset of symptoms." (**CJMW8/51 – INQ000061522**).

Self-isolation of a positive case moved to 10 days

9.70 30 July 2020 - The self-isolation period was extended to 10 days for those in the community who have coronavirus (COVID-19) symptoms or a positive test result. (**CJMW8/52 – INQ000514348**).

Self-isolation of a positive case moved to release following two negative tests

9.71 22 December 2021 – UKHSA announced that people who receive negative LFD results on day 6 and day 7 of their self-isolation period – with tests taken 24 hours apart – will no longer have to self-isolate for the full 10 days. The first test must be taken no earlier than day 6 of the self-isolation period (**CJMW8/53 – INQ000527834**).

Self-isolation for contacts

9.72 Self-isolation for identified contacts was 14 days from the start of 2020 (**CJMW8/54 – INQ000514349**).

9.73 On 16 March 2020 - Isolation of households with a symptomatic case was introduced (**CJMW8/55 – INQ000203947**).

Self-isolation for contacts reduced from 14 to 10 days.

9.74 11 December 2020 – Self-isolation for contacts reduced from 14 to 10 days (**CJMW8/56 – INQ000203967**).

Section 10: Borders

10.1 I reproduce Section 9 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 12 of the Annex to this statement to which I have nothing further to add in respect of TTI.

Section 11: Public Communication and adherence.

11.1 I reproduce Section 14 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, at Part 13 of the Annex to this statement.

11.2 While I am not a communications expert, I often checked media statements of political leaders but limited to scientific or medical accuracy prior to delivery. Communications professionals within government, of which there are many, will be better placed to advise the Inquiry on TTI public communications and the incorporation of behavioural sciences. SAGE noted in an early meeting, on 28 January 2020, that given its understanding of COVID-19 it supported the principle of self-isolation but that behavioural science input on public communication was required (**CJMW8/57 – INQ000057492**). It recognised the importance of public trust in a cross-government approach and would keep under review whether a further behavioural science sub-group would be needed. PHE was actioned with opening lines of communication with SAGE behavioural scientists and to share what data was available.

11.3 In its meeting of 13 August 2020, SAGE recognised that the effectiveness of self-isolation depended on adherence which differed between areas and groups (**CJMW8/58 – INQ000120551**). An understanding of these variations was seen as important in assessing the likely effectiveness of actions, but evidence was needed to determine what the precise impact of adherence was, and what incentives could assist. A later meeting of 17 September 2020 also recognised the importance of adherence to the effectiveness of the measures (**CJMW8/59 – INQ000120558**). It was therefore considered that support to enable and promote this adherence was needed, including simple, clear messaging, removal of disincentives, and an explanation of the underpinning rationale. SAGE recognised that measures which relied on individual decision-making would not have the same levels of adherence than those relying on responses from business or other organisations. Discouraging or preventing certain activities would also have behavioural responses, and could potentially lead to individuals engaging in other, potentially higher-risk, activities instead.

11.4 SAGE noted that adherence was particularly low among younger populations and those from socio-economically disadvantaged communities, but additionally that self-report of adherence is prone to bias as people were less likely to admit a lack of adherence to self-isolation. Partial adherence would also vary in severity.

11.5 SAGE recommended a package of support measures to increase rates of full self-isolation including financial and non-financial support; improved communication and advice; and greater access to social or psychological support. SAGE considered provision of financial support to safeguard incomes could have the most significant impact on improved adherence to self-isolation in all populations. Proactive outreach to households to identify and resolve practical needs would also be beneficial in improving adherence. SAGE recommended that support measures be evaluated to quantify the impact of the interventions, and to identify the most effective, as well as identifying barriers to implementation or uptake of the measures.

11.6 SAGE noted, in their meeting of 1 May 2020, that in terms of test, trace and isolate, behavioural science indicated that isolation based on a positive test was preferable to isolation based on symptoms with a release based on a negative test (**CJMW8/40 – INQ000120511**). Similarly, contacts of symptomatically-positive cases could be given different advice to those contacts of test-positive cases in order to maximise adherence. If further details are required behavioural scientists would be better placed to assist on why they thought this was preferable.

Section 12: Enforcement and adherence

12.1 Although I gave public health advice based on SAGE deliberations, usually in concert with the GCSA, I was not involved in any meaningful way in drawing up legislation and regulations, which is not my core skill set. OCMO was sent drafts of the coronavirus regulations to review and comment on the accuracy and appropriateness of some of the medical/scientific references in the provisions. I was not involved in enforcement. I had no view on whether criminal or civil sanctions were the correct mechanism for enforcement. In my view, this was an issue for elected politicians informed by legal advice.

Section 13: Disparities

13.1 I reproduce Section 11 of my Fourth Witness Statement to the Inquiry, dated 22 August 2023, and paragraphs 4.38 – 4.68 of my Fifth Witness Statement to the Inquiry dated 1 February 2024 at Part 14 of the Annex to this statement.

13.2 The aim of the COVID-19 pandemic strategy was principally to protect the most vulnerable. This was explicit in the advice given. It took some time for every vulnerability to become clear and this changed as science progressed and clinical data emerged. The first high risk group identified, and numerically the largest by some distance, were older citizens. Some of the risk factors other than age for which evidence emerged were largely predictable, for example immunosuppression, whereas some such as obesity were less obvious until the data appeared.

13.3 SAGE minutes are publicly available and were shared within government usually very quickly after the meetings. I would normally brief the Prime Minister and key advisers and decision makers with the GCSA shortly after a SAGE meeting. I often encouraged policy officials to think about all religious holidays, not just Christmas as noted above and in other evidence given to the Inquiry.

13.4 The quality of data was poor at the start of the pandemic and got better as a result of the JBC as noted above. They had in-depth analysis as did the No10 units and would be best placed to assist the Inquiry with more information. A lack of ethnicity on death certificates continued for too long and I covered this in previous evidence.

13.5 With regards to vulnerable groups, shielding has been covered at length in Module 3 so I will not repeat that here as it does not throw any further light on TTI.

13.6 I think disparities were considered by core decision makers at length. It is a complex area, one which Professor Fenton's report makes clear.

Section 14: Lessons learned and recommendations

14.1 I have made a number of observations throughout this document and, with others, in the Technical Report. I would like to repeat a single key learning relating to TTI, for emphasis as I consider it one of the most important things that we need to do better for the next pandemic. Maintaining a scalable TTI system is important to protecting the nation when the next pandemic occurs. There is often a temptation to disinvest in public

health, and in particular TTI capacity, as other non-public health issues occur after an emergency. Maintaining investment in our capacity to diagnose, contact trace and support in isolation can save lives in many future pandemics.

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 or without an honest belief of its truth.

Signed: PD

Dated: 24 March 2025

ANNEX

PART 1

Section 2 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Senior Scientific Offices in Government

The Chief Medical Officer

2.1. The main responsibilities of the Chief Medical Officer for England are: i) to advise Ministers and senior officials in Government on clinical, public health or scientific issues; ii) leadership, but not management, of the public health profession; and iii) to contribute alongside others to the collective leadership of the medical profession. For the purpose of Module 2 of the Inquiry, it is the advisory aspect of my role which is of most importance.

2.2. It is the CMO's role to advise Ministers and other officials when a senior clinical, public health or scientific opinion is needed. This often includes reflecting and summarising technical concepts in language accessible to an able lay person. If the advice does not require a clinical, public health or science qualification in order to give it, then it is usually better given by others - this includes for example economic, legal, diplomatic, operational or non-clinical policy advice. CMOs are independent in that they do not have to agree in public with government policy, but only when the issue is a clinical, public health or scientific one. CMOs have also always been expected to be involved in communicating to the general public during health emergencies.

2.3. There was no change to the formal role of the CMO during the pandemic. There was however inevitably a major shift in the practical application of that role. The CMO is the chief medical adviser to the whole UK Government, rather than to just DHSC; this distinction was important during COVID-19. Under normal circumstances, the CMO works closely with the Secretary of State and Ministers in DHSC (and its predecessors), but has less frequent interactions with other Ministers or Cabinet, and rarely engages with the Prime Minister directly. During the first two years of the pandemic, once its importance and impact had been recognised at the centre of

Government, I worked very closely with the Prime Minister, key Cabinet Ministers, No 10 and the Cabinet Office. The responsibilities of the CMO as compared to those of Public Health England ("PHE"), UKHSA and the NHS had to be tested and defined during this time.

2.4. I also had to learn very rapidly how to communicate to the public in a way that was useful to the average listener as the level of public exposure was well in excess of what not just I, but any living CMO, had experienced. This learning curve in public communication was not without some errors by me, especially early in the pandemic (some of which I highlight below). I was asked by Ministers to brief the general public and give advice via the media, this took different forms including press conferences on background and live to camera as well as live and pre-recorded broadcast and print interviews. At my own discretion, I additionally gave more detailed information through public lectures (e.g. at Gresham College) or professional lectures and outlets (e.g. at the Royal College of Physicians or via the BMJ). I additionally engaged extensively with leaders of the public health, medical and scientific professions.

Chief Scientific Adviser to the Department of Health and Social Care

2.5. During the first two years of the pandemic, I was concurrently both CMO and CSA to DHSC/Head of NIHR. This arrangement had also been the case for my predecessor Professor Dame Sally Davies. It had been my intention to hand the CSA/NIHR role over once a proper open process could be undertaken; this was overtaken by COVID-19.

2.6. There were both advantages and disadvantages for the initial COVID-19 response of holding both roles simultaneously. The scientific advisory part of the CSA role was for COVID-19 the less important one, as there was extensive scientific input and challenge coming into Government from SAGE and several expert scientific committees. The CEO NIHR part of the role was important.

2.7. In respect of the NIHR role, the advantages were that there was a single unified view of the strategy for COVID-19 research, and I was able to integrate the research strategy, tactical and operational elements with public health goals and NHS activities. I happen to have a background in infectious diseases, which was the overriding technical need of NIHR in the pandemic. This was not a given. My successor as CEO of NIHR, Professor Lucy Chappell, has a distinguished background in obstetric medicine. My predecessor, Dame Sally Davies, was an highly respected haematologist. Additionally, anyone coming into Government for the first time has a very steep learning curve even under ideal circumstances and I was by then experienced in this.

2.8. The obvious disadvantage of holding the CMO and CSA/Head of NIHR roles concurrently was that during COVID-19 both were very stretched. Doing both simultaneously meant that some things in NIHR had to be delegated that under normal circumstances I would have done myself. Fortunately, I had a very able and experienced director in Dr. Louise Wood CBE who took much of the load, but it was not ideal. On balance, in my opinion the advantages outweighed the disadvantages in this crisis, but there were some drawbacks and others might reasonably balance the benefits and disadvantages differently. It would however in practice have been extremely difficult to select by open competition and get up to speed a new CSA/Head of NIHR in the first year of the pandemic wherever the theoretical balance of benefit lay. My role as CMO became considerably easier once Professor Chappell took over the CSA/NIHR post.

The relationship between the Chief Medical Officer, Deputy Chief Medical Officers and Government Chief Scientific Adviser

2.9. The division of labour between myself, the DCMOs and the GCSA changed over the course of the first three months of the COVID-19 pandemic. It then became relatively stable. In the first three weeks of 2020, the majority of the day-to-day work on COVID-19 was undertaken by the DCMO for health protection (whose portfolio includes emergencies and infectious diseases) Professor Sir Jonathan Van-Tam. Throughout this time, he remained in close coordination with me.

2.10. As the probability that COVID-19 was going to become a major international threat increased, I progressively took the lead in communicating into the centre of Government; this is laid out in my First Statement at paragraphs 5.57 to 5.153, and so I will not repeat it here. Two key inflection points were when I requested on 20 January 2020 that SAGE first meet on 22 January 2020, and then when I informed the Prime Minister that a major pandemic with 100,000 to 300,000 deaths in the UK was now possible on 4 February. From that point on, my view was this was a major risk to the UK and SAGE advice, properly, became the principal official source of scientific advice to the Prime Minister, Cabinet and wider Government where that was practical.

2.11. Between the two main DCMOs and myself there was a loose division of labour, but all of us were capable of cross-covering as needed and tried to keep one another briefed on developments. Close working relationships between us were essential. I had ultimate responsibility for all areas and the DCMOs would check with me when there was a serious issue.

2.12. Sir Jonathan Van-Tam (often called JVT in communications) had an extensive history in vaccine development and respiratory infections, and he therefore took the lead in the vaccine work including that with the Joint Committee on Vaccination and Immunisation ("JCVI"), and the New and Emerging Respiratory Vaccines Threats Advisory Group ("NERVTAG") (which he had previously chaired). He was later joined in this work by Professor Thomas Waite, who has a background in infectious disease epidemiology, and who was therefore able to take on some of the responsibilities of Sir Jonathan.

2.13. Professor Dame Jenny Harries, although officially DCMO for health improvement (i.e. issues such as preventing heart disease and cancer), also had a long history of work in health emergencies and health protection, including in local authorities. She therefore took the lead in several technical areas such as shielding, schools and local authority work. Dr Aidan Fowler was principally working in NHS England in a senior patient safety role, but also had a DCMO position and took the lead in some of the

work on testing. As an experienced surgeon, he understood surgical issues in a way we did not. Whilst he was less central than the other two as a DCMO (due to his major NHS role), he provided very useful advice which we used collectively.

2.14. Sir Jonathan, and Dame Jenny before she left to head up UKHSA, were however the main DCMOs with responsibility for COVID-19 and did most of the work in checking the technical aspects of regulations, guidance and advice from across Government. Given the speed of decision making, there were frequently time clashes between important meetings which were happening in parallel. In these cases, I usually covered meetings with the Prime Minister or Cabinet and SAGE meetings. For some major meetings with the Prime Minister or Secretary of State for Health and Social Care, I might be accompanied by one, or both, DCMOs.

2.15. The DCMOs covered the remaining meetings, usually with other Government departments beyond the Cabinet Office and No 10. The sheer volume of these departmental decision-making meetings and associated correspondence meant that it was usually not possible to have both myself and a DCMO in attendance. The DCMOs were therefore often in key meetings where I was not and vice versa, including meeting with the Secretary of State for Health and Social Care where there was a clash with a Prime Minister led meeting. This meant we had to ensure we pre-agreed our position on predictable major issues to ensure we did not accidentally give slightly different advice on the same issue in different meetings.

2.16. The DCMOs and I had considerable mutual trust in one another's judgement. This was also important when we were covering different press conferences; the public needed to hear a consistent message, sometimes delivered in different styles, but with the same key technical points. Sir Jonathan and Dame Jenny were fortunately both extremely experienced in both emergencies and infections, strong on the science, good and clear communicators, and exceptionally good to work with. I was very fortunate that both by background, training and temperament the GCSA and DCMOs in post during COVID-19 were excellent at working as a collective as well as individually even under great pressure. We relied on one another very heavily. We also relied on an exceptionally able Private Office.

2.17. As GCSA, Sir Patrick Vallance was the principal chair of SAGE. Given that the focus of this emergency was health however, I was co-chair and we agreed agendas and cleared Minutes together. The GCSA and I tried, as far as we could, to give identical technical advice. For the great majority of meetings with the Prime Minister, Cabinet and its sub-committees, and meetings with senior No 10 or Cabinet Office officials such as the Cabinet Secretary and the Prime Minister's Chief Adviser Dominic Cummings, we were both present. This had the advantage of allowing us to pick up any misunderstandings by those listening, reinforce key points and make clear that ours was a collective scientific view rather than a personal one. The same applied to public statements; when the Prime Minister took a press conference both the GCSA and I were usually present.

2.18. I was, and in my view the UK was, very fortunate that Sir Patrick Vallance was GCSA during this pandemic. As a distinguished clinical pharmacologist and previous Professor of Medicine he had a really strong understanding of the medical as well as the scientific concepts. He was consistently exceptionally level headed and collegiate over the prolonged period of stress of the pandemic. It therefore made the CMO-GCSA interactions extremely easy at a technical and personal level. This was far from a given. As previous President, R&D at GlaxoSmithKline (GSK) he also had a deep understanding of industry that was essential, especially on vaccines. Sir Patrick and I also benefitted greatly from the advice of the CSA network across Government in addition to the scientific committee structure.

Sources of Scientific Advice in Government

Scientific Advisory Group for Emergencies (SAGE)

Rationale for SAGE

2.19. For the great majority of major decisions, SAGE remained the principal conduit by which scientific advice to Government was channelled. In doing so, it integrated research findings and opinions from various scientific advisory committees, including NERVTAG for clinical advice, SPI-M-O for modelling, SPI-B for behavioural science, and input from other bodies such as the ACDP, Royal Society, Academy of Medical Sciences and other Academies, advisory groups and committees. Several subject specific subcommittees were set up as needed including around shielding (the UK Clinical Panel for Shielding Patients) and school risks (Children's Task and Finish Working Group). The work of SAGE and its subgroups was informed by thousands of scientific inputs from many disciplines in the UK and internationally.

2.20. As co-chair of SAGE, I am likely to be biased in its favour. It is not however obvious to me what an alternative better mechanism for the provision of scientific advice would be. We were aware of the scientific advisory structures in other countries but the degree to which they were independent of Government, which confers both strengths and weaknesses, varied internationally.

2.21. The purpose of the SAGE mechanism is to provide a single integrated view of the science provided by multiple disciplines which takes account of the various competing schools of thought. This does not mean it can or should provide a consensus, except when consensus reflects the reality of scientific opinion. Rather, SAGE attempts to provide a central view of scientific understanding at that point in time, and where necessary indicates the spread of opinion or uncertainly around that central view. Without SAGE, or some similar mechanism, Ministers would be provided with multiple competing scientific opinions from which they would have to choose.

2.22. Inevitably, when the science is not yet settled (i.e. there is ongoing and significant movement in the central view) those who hold outlier opinions in either direction tend to be critical of the SAGE mechanism. In my opinion however, the more uncertain the science, the more important it is to have a collective integration of the breadth of

scientific opinion to put before decision-makers. The alternative would be to have decision-makers confronted by widely varying (and often strongly held) scientific opinions, which might represent different ends of the spectrum of scientific views at that time.

SAGE Membership

2.23. The mechanics of SAGE and the process by which members are selected is best described by the SAGE secretariat which was, and is, based in GO-Science. Nevertheless, it is in my opinion uncontroversial to observe that over the course of the pandemic, the relative importance of different sciences to the pandemic response evolved. The balance of scientific input into SAGE therefore changed to reflect these needs.

2.24. The initial selection of participants in the first SAGE meetings was made by GO-Science, using people who had experience of epidemic modelling and other sciences in the context of previous emergencies such as Ebola. Although I did not make the selection, I thought they were a sensible initial group which was then augmented as the range of questions extended. I was more involved in decisions on some of the later additions to SAGE meetings as the pandemic progressed.

2.25. It is important to stress that SAGE does not have a membership other than the chair; the meeting brings together scientists relevant to the questions that are thought most important at that point in time. In the context of COVID-19, SAGE's membership could therefore be adapted to the evolving policy need. This is to my mind an advantage of the SAGE system.

2.26. The right balance of expertise in SAGE in any given emergency is inevitably to some extent subjective. As with many advisory groups, the principal tension was between having a group small enough to have proper expert discussions, with sufficient time to

challenge opinions, and having a large enough body so that it was representative of all the sciences needed to address the key questions at that point in the pandemic.

2.27. That being said, SAGE is not intended to be a wholly representative body; it is an ad hoc expert group of the best scientists who are willing and able to address particular questions, often at very short notice. There are major downsides to very large groups which include every possible representative group in the context of a need to provide highly technical information in a very short timeframe. If every possible scientific discipline, clinical expertise, representative group (including protected characteristics), geographical spread and other legitimate interest had been represented, SAGE would have been impossibly large (potentially running to hundreds of scientists). Political leaders needed to be reassured that not only had the best available scientific opinion fed into the technical advice they were being provided, but as importantly, that those scientists had been afforded the time to challenge each other's opinions and properly interrogate the science and data.

2.28. It is likely that the first SAGE groups were too narrow in their composition but, in my view, this was very quickly rectified by GO-Science. Given that SAGE meetings were usually very time constrained, and especially early in the pandemic often met just before major political decisions were taken, expanding the membership for any given meeting would have inevitably led to less opportunity for those present to challenge and debate the science, which is one of the essential purposes of SAGE. There is a clear tension between a smaller body which can get through the business and provide mutual challenge and a larger body which represents a wider range of expertise.

2.29. For similar reasons, getting the right balance of UK national and regional experience was not always straightforward. Particular areas of scientific excellence can be concentrated in certain geographical areas or even particular universities or departments. The GCSA and I tried to ensure proper involvement from all four nations of the United Kingdom. This became easier with time as it became clear who in the academic community was getting involved in the COVID-19 response and had particular skills to contribute.

2.30. I am not aware of any situation where someone was excluded from SAGE because of concerns they would disagree with the group's output or discussions. Whilst only the SAGE secretariat could confirm that definitively, I would be very surprised if it were the case. The aim of SAGE was to have the best available scientists for any given question and to reflect the central position of the science at any point in time, not to advance a particular position. Legitimate outlier opinions often tended to dominate media discussions, but the job of SAGE was to provide a central view of the current science, alongside an indication of the spread, rather than give equal weight to every opinion, no matter how minor.

2.31. Given the speed of decision-making, SAGE had to be selective in the range of questions and disciplines covered at any given point in time. The aim was to provide focussed scientific advice in order to aid decision-making rather than to express and summarise the full range of interesting and outlier opinions on the subject. Different GCSAs might come to slightly different conclusions on the best balance. In my view, the GCSA and SAGE secretariat did their best to achieve a balance whilst avoiding the committee becoming unwieldy. Over the course of the pandemic the GCSA and I received representations from several disciplines that thought their one was not sufficiently well represented and we took these seriously. Sometimes these concerns were based on a misunderstanding of the skill sets of those around the table, which were in fact very wide. If I were rerunning the SAGE process, I might have increased the amount of anthropological expertise at some points (as distinct from behavioural science), as that was exceptionally useful during the West African Ebola epidemic, but the issues of having too many people round the table would have weighed on that decision.

SAGE subgroups

2.32. SAGE itself took account of multiple scientific inputs from various sources. The formal subgroups were particularly influential but were not the only source of information. These groups included (but were not limited to) SPI-M-O, SPI-B, the COVID-19 Clinical

Information Network (CO-CIN), NERVTAG, the Environmental Modelling Group (EMG) and various ad hoc advisory groups including the Children's Task and Finish Working Group (TFC), the Hospital Onset COVID-19 Working Group (HOCI), the Ethnicity Subgroup and the Social Care Working Group (SCWG). Other sources of information included the WHO, Academies such as the Royal Society and Academy of Medical Sciences, information coming from specialist agencies such as PHE and Porton Down, as well as the large volume of UK generated and international scientific literature.

2.33. The advantage of the subgroup system was that it allowed data and scientific opinion within a single discipline or related disciplines to be integrated before that input was itself fed into the central SAGE system. The disadvantage was principally one of time; this sequence of primary analysis followed by consideration and integration of the various scientific views on a particular topic by a subgroup, which in turn sent a summary to SAGE which SAGE then integrated with other scientific inputs, inevitably added a delay. Usually, this was measured in days, but it could on occasion be a little longer.

2.34. Whether this process was advantageous was a product of the benefits of more informed science versus the risks associated with the delay. If the integration of various scientific viewpoints within a particular field had not happened via the subgroups, then SAGE, which was largely an opportunity for the views of distinct scientific disciplines to be integrated, would have been significantly less expert in its advice to Government. It would however potentially have been slightly quicker in its outputs. In general, it is my view that the expertise provided by the subgroups exceeded the risks introduced by any delay. Therefore, my overall view is that the subgroups were very important to SAGE, providing a solid integrated scientific input to policy-making.

Commissioning of SAGE's work

2.35. SAGE was commissioned via a variety of different routes but two dominated. The Cabinet Office and Civil Contingencies Secretariat ("CCS") had a major role in directly commissioning the work of SAGE and its subgroups. They were however not the only

commissioning bodies and the SAGE secretariat housed in GO-Science commissioned much of SAGE's output. The secretariat, alongside SAGE itself, also had an important role in commissioning work from the various subgroups. The SAGE Secretariat are best placed to explain how this worked in practice; I was not usually involved in commissioning except through SAGE.

2.36. That much of the commissioning was in practice internal (i.e. within GO-Science) reflected the fact that the next important scientific questions were often most obvious to technical experts. The fact that multiple groups commissioned SAGE and its subgroups was not in itself unreasonable given the scale of the issues involved. There were however periods when too many different individuals and bodies were trying to commission SAGE and its subgroups leading to more questions than could reasonably be answered properly given the time and resource available. There was also a risk that commissioning was biased towards those who were most vocal in their requirements rather than those whose questions were most important for policy, or where science had the most to offer.

2.37. Trying to centralise this via secretariats in GO-Science and the Cabinet Office was important to making it manageable. SPI-M-O and SPI-B in particular were frequently commissioned directly rather than via SAGE. In retrospect, my view is that an early central clearinghouse for policy requests to SAGE and its subgroups with senior scientists and policymakers triaging the requests would have improved prioritisation. The question of whether the outputs from SAGE were what policymakers needed is best answered by them.

SAGE's operations during COVID-19

2.38. Arriving at the central scientific view from SAGE was not always straightforward. This was particularly so in the earlier stages of COVID-19 when much about the science

was uncertain and the data were changing very rapidly. For some questions, subgroups such as SPI-M-O would come to a central view of their own which SAGE then endorsed (or not). For matters on which SAGE was asked to opine, the GCSA would sum up the meeting and attempt to summarise the points on which there was consensus, the points where there was a central view but some spread of opinion, and the areas where it was not possible to draw a solid conclusion. In my view, he did this with great skill and balance. On some issues there were strong differing opinions around the table and the aim was to provide an accurate reflection of the central view but also the spread of opinion. The GCSA and I then edited the minute to reflect as best we could our understanding of the central view which had been arrived at, as well as uncertainties. This was available for members to challenge if they felt the group's discussions had not been accurately captured.

2.39. The provision of advice to core decision-makers inevitably took slightly longer because of the SAGE system than if any individual (including me) had simply given our scientific opinion directly to policymakers. In my view however, as one of the scientists in Government who would otherwise have been required to advise based solely on my own opinion of the science, the SAGE mechanism considerably strengthened and broadened the scientific advice and ensured decision-makers or the public received a better opinion. Neither the GCSA, the DCMOs nor I had the full range of expertise that was present in SAGE and its subgroups. Nor am I aware of any external scientist who could combine in one person all the relevant skills and expertise necessary to properly opine on the full breadth of science required by the COVID-19 response.

2.40. Outputs from SAGE and its subgroups were communicated officially to core decision-makers via one or both of two mechanisms: the official Minutes cleared by GCSA and me; or the GCSA and/or me providing a readout of a meeting in advance of formal minutes when there had not been time to clear them (and where necessary expanding on points in the minutes). Additionally, many officials sat in on SAGE, which allowed them to get an early understanding of the direction of travel and the degree of consensus or not in the room. These included officials from the Cabinet Office, No 10, devolved nations, HM Treasury and DHSC amongst others. The GCSA and I were however clear in the SAGE meetings that communication to the Prime Minister,

Cabinet or Cabinet Office Briefing Rooms ("COBR") members should be via the official route, not via observers. This was to avoid partial, or partially misunderstood, versions of SAGE outputs circulating in advance of the formal minutes or advice causing confusion. Especially early on in the COVID-19 pandemic, the advice of SAGE had very considerable weight. Ensuring accuracy of reporting of its conclusions was therefore in our view essential. On some occasions, where in good faith an official sitting in as an observer communicated their own version of events to Ministers in advance of the formal route, it resulted in problems and confusion.

2.41. I have been asked by the Inquiry whether I think the SAGE minutes were sufficiently detailed. Since I signed them off, by definition I did. There was a very strong premium towards speed of turnaround and circulation of Minutes and the longer they are the slower they are to produce. In general, additionally, the longer a document is the less likely it will be read by senior decision-makers who in an emergency have very little time. The aim of SAGE Minutes was not to record the entire conversation, which had in any case been attended by observers from across Government, but to bring out key points which in our view decision-makers wanted or needed to know, and to be accurate. They could then ask follow-up questions where they wanted greater detail. The underlying papers which provided the detail were also published from relatively early on in the pandemic and are available on an open repository.

2.42. The GCSA and I tried to communicate the range of opinion around the central SAGE conclusion, in particular in verbal briefings to the Prime Minister and other Ministers. As I have said above, the aim of SAGE is not to advance a particular argument, but to provide technical input into a complex political or policy decision. It was therefore important that senior decision-makers understood the uncertainties (within the time available). SAGE minutes sometimes gave a formal level of certainty rating (e.g. high confidence, low confidence) where we thought this was important. It was open to SAGE members had they requested it to have a dissenting opinion recorded, but more usually the aim was to record the fact that there was uncertainty.

2.43. In response to a question from the Inquiry, it is not my view that SAGE restricted itself to politically palatable options. At many points during the pandemic the great majority

of SAGE advice was deeply unpalatable to political leaders who were in receipt of it (and they said as much). SAGE did however tend to restrict itself to things which we considered practical. Spending time discussing things which had no chance of being enacted was a poor use of limited time and resource.

2.44. Several policies which, once 'lockdown'[1] had been implemented, appeared practical if difficult and unpleasant, looked incredibly difficult to achieve in advance. In particular, draconian curbs on individual freedoms for prolonged periods and restrictions on large parts of the economy beyond those normally used in epidemics were quite difficult to contemplate as a measured response at a time when there were relatively few cases and deaths in Europe. This includes the period up to March 2020; as of 4 March 2020, the UK had only recorded 85 cases and no deaths **(CJMW8/60 - INQ000203876)**. Whilst this could be considered a failure of imagination by a group of scientists who understood the nature of epidemics and their history, it was not for reasons of political expediency. Non-pharmaceutical interventions ("NPIs"), including ones which involve significant curbs on normal behaviours including quarantine, self-isolation, the closing of high risk professions such as hospitality or hairdressing and school closures have all been used for decades and in many cases centuries. They all have obvious downsides but were considered a normal part of the range of options to be considered in response to an epidemic or pandemic, and were in the early stages of this pandemic. What was new was a complete closure of all non-essential social and economic activity, by law, for prolonged periods.

2.45. SAGE had a responsibility to provide scientific advice relevant to all areas of the UK. SAGE should be seen, and in my view largely was seen, as a UK wide technical resource. It only engaged on issues of national or regional difference where there was a strong technical (e.g. epidemiological) rather than political or operational reason to do so. Where they had technical capacity, the three devolved nations had local advisory scientific committees or groups able to take local conditions and data into account. As I understand it, these were informed by SAGE thinking, and seldom came to significantly different scientific conclusions on the major issues. Throughout the

pandemic, SAGE came under very considerable scrutiny. This came from the press, Parliament, Ministers and individual scientists. Some distinguished scientists such as Professors Sunetra Gupta and Carl Hennegan, along with others who associated themselves with the Great Barrington Declaration, strongly expressed the view that SAGE was providing evidence that implied more action was needed than was necessary **(4 October 2020 - CJMW8/61 – INQ000203988)**. Others equally eminent, particularly concentrated around the zero COVID thesis (many participating in independent SAGE), argued that SAGE should be providing greater evidence in support of more extreme and longer social interventions. It would therefore be misleading to imply that SAGE had no challenge or scrutiny. There is a legitimate question about whether that challenge occurred in real time, in the sense that sometimes the challenge would occur after a policy decision has been made rather than before it but given the necessary speed of decision-making to some extent this was inevitable.

Limitations of, and reflections on, SAGE

2.46. It is always possible to say that anybody providing advice at very high speed could be more transparent and accurate. This applies to SAGE as much as any other advice in an emergency.

2.47. In my view, SAGE's minutes should have been made public earlier than May 2020. This was also the view of the GCSA, as laid out to the Science and Technology Committee of the House of Commons on 25 March 2020 and was in general an expression of the scientific opinion at the time **(CJMW8/62 - INQ000064520)**. There are clear advantages in doing so for both public understanding and reasons of peer review.

2.48. As I understand it, the reason for the official advice that they should not be made public largely stemmed from the fact that SAGE began its life entirely as an input to COBR, where the norm is that Minutes are not published. Save for situations where SAGE

Minutes cannot be published (e.g. on issues of national security), in my opinion publication of scientific advice should be the default.

2.49. SAGE Minutes were however widely circulated in Government from the outset. From relatively early in the pandemic, the deficit in the publication of the underlying papers for people outside Government to read and understand was remedied. I therefore consider the scientific advice as summarised by SAGE that was seen by Ministers to have been at least as transparent, and arguably more so, than for example the economic advice.

2.50. In principle I am in favour of the membership of SAGE being public in most emergencies, but in this case I do have some concerns. Members of SAGE received substantial abuse and hostility from a minority. In my case, I was advised by the Home Office that the threat was sufficiently high that I had to have police close protection for nine months. Others had threats made to their families. If by making names public individual scientists or their families are targeted, or the best available scientists feel unable to take the risk of advising Government, the benefits of transparency may be outweighed by the risks to personal safety (to the scientists involved and their families) and proper advice (to Government and wider society). I therefore think it is a very easy decision on publication of minutes to maximise transparency of advice, and a more complex one on publication of names. Clearly, public figures such as the CMO and GCSA will always be known.

2.51. I am more cautious about policy advice given within Government being published, at least contemporaneously. Ministers have a difficult job in which they need to take often hard decisions. If they can not only be criticised for the decision on its merits (legitimate) but also subject to a running commentary on the advice that has been taken and not taken by them it makes the job of Ministers harder still. Whilst the arguments for transparency have some force, they would in my view create a risk that Ministers would in response either avoid getting advice from people who might give advice that could be used against them, or advisers would hedge their advice so that it would not cause friction in public. Neither would be conducive to good Government decisions. Ministers need to get a clear view where experienced officials disagree with

their first instincts, but also remain able to take the final decision. The general assumption is that policy advice given to Ministers within Government is private. If a future CMO was specifically excluded from this assumption, I think it is entirely possible they would also be excluded from important decisions where their input would help decision making.

2.52. The SAGE mechanism only exists to provide advice on science. It does not consider other fields relevant to the Government's wider considerations including macroeconomic issues. Whilst there was some limited health economic input (microeconomic) into the formulation of advice by SAGE, health economics being a discipline that regularly feeds into public health advice, the major questions for the principal decision-makers were around the fiscal and macroeconomic impacts of the decisions taken and how to balance these against the public health implications.

2.53. SAGE did not have the expertise to consider these important technical areas, and it would have been wholly inappropriate for it to have attempted to do so. The assumption within Government was that this was all done within the Treasury and that external scrutiny of the sort SAGE was subject to was therefore not needed. A legitimate question is whether a SAGE-like mechanism for economic advice would have helped decision-makers. Economic advisers as well as independent scientists regularly challenged the scientific advice (entirely reasonably), but it was impossible to do so the other way round as the economic advice was not available for independent economists to critique in the same way. I do not have a view about what is best for political senior decision makers, but there was a major imbalance between the degree of external or indeed internal scrutiny given to scientific and economic technical inputs.

2.54. The Inquiry has asked whether I agree with the statement by the then Chancellor of the Exchequer, the Rt Hon Rishi Sunak, that scientists were 'inappropriately empowered'. If by this it was meant that there was too much scientific advice, and this was taken seriously by decision-makers, unsurprisingly I would not agree. If however what he meant, which is my understanding, is that he was concerned that the balance between scientific and other disciplines was wrong, I think that is a matter of legitimate judgement.

2.55. I would not wish to have had less scientific advice. I cannot see how this would have served to improve decision-making. It would however have been helpful to have had more, and more open and transparent, input from other disciplines, in particular economics. All the scientific advice was published, and the GCSA and I gave advice openly in Cabinet as well as in private to the Prime Minister. We also laid out our thinking in public including at press conferences. There would in my view have been a strong argument for having a similar degree of transparency about the economic technical (as opposed to policy) advice and its intellectual underpinnings. I certainly never perceived scientific and economic advice as inevitably in conflict (as they were sometimes portrayed), but rather as two important inputs into the decisions made by political leaders, along with their view on social and wider issues.

2.56. There is always a risk of groupthink in any group working under pressure. To that extent, SAGE was at risk of groupthink. The GCSA and I tried to reduce that risk as best we could. This included having people in SAGE and its subgroups who had a range of views and experiences as well as disciplines, whilst keeping the groups small enough they could debate issues. Evidence to the Inquiry, and the reality at the time of scientists from SAGE and its subgroups commenting, occasionally critically, in the media shows there was not unanimity of opinion on SAGE (nor should there have been). The risk however was practically lower than, for example, when national security makes it impossible to discuss the evidence in public. Scientists from the wider scientific community and from all ranges of opinion were debating the issues that SAGE was considering every day and on every channel in the media. None of these eliminate the potential for groupthink, but they provide some mitigation. Groupthink was a phrase that featured heavily in Module 1 of the Inquiry, including arising from the public comments of my distinguished predecessor, Dame Sally Davies, but it is important to note that Dame Sally's comments were (as she has explained) intended to address the groupthink of the entire Western medical and scientific community rather than directed towards any individual committee.

2.57. I am not the right person to comment on resource and funding of SAGE – this should be the SAGE secretariat. I do however think that as a matter of routine all SAGE and

other external scientists advising Government should be indemnified by Government against the risk of civil cases as a result of them giving advice to Government, in much the same way as doctors are covered by Crown indemnity when working for an NHS Trust. It cannot be right that individual scientists, freely giving their expertise to society, are put at personal legal risk if they have behaved in a proper way. It would also remove a potential way by which malign actors could try to pressure them by threat of a civil case.

Office of the Chief Medical Officer and Government Chief Scientific Adviser

2.58. Within Government, I provided advice repeatedly to among others the Prime Minister, the Secretary of State for Health and Social Care, the Cabinet Secretary, the Prime Minister's Chief Adviser Dominic Cummings, and several individual Cabinet Ministers at their request. I also provided advice to COBR, Cabinet, Cabinet sub-committees, official small Ministerial groups and COBR-officials meetings (COBR-O). At the request of Ministers, I briefed the House of Commons, The House of Lords (open meetings), the Leader of the Opposition and other Opposition figures (on Privy Council terms).

2.59. In the initial phases of the response, core decision-makers were understandably often unsure what the right questions were to ask of scientific advisers and found the scale of the issues they were dealing with in very rapid time quite challenging. As the pandemic went on, the relative roles of different individuals and groups became clearer and the understanding of the technical issues and options by the Prime Minister and other Ministers became better. Accordingly, the questions we were asked and the commissioning of scientific advice became more focused.

2.60. The UK COVID-19 Dashboards and the Cabinet Office Dashboard became essential tools which assisted me and others to inform senior decision-makers. Although the data presented were extensive, because they were largely provided in a format repeated from day-to-day, Ministers and others got to know their way around it and were able to see how things were progressing. The fact it was very well visualised made it a very useful tool for explaining issues. Once the routine of daily Dashboards

was introduced the process of providing technical updates and advice became substantially easier. Good data visualisation of course depends on good data, something which was limited in the initial months of the pandemic by a lack of testing capacity. The creation of the excellent data by the Joint Biosecurity Centre ("JBC"), PHE and the Cabinet Office post May 2020 was in my view one of the great successes which aided rational decision-making.

2.61. The majority of my advice to the Prime Minister and other decision-makers over the course of the pandemic was given verbally in minuted decision making meetings or the pre-meetings which preceded them. This was for two reasons: the speed of change of the situation often made it much easier to do verbally; and for both the Prime Minister and the Secretary of State for Health and Social Care this appeared to be the most effective way of ensuring they understood the advice and could ask follow-on questions. Occasionally, I provided written advice, but the principal form of written advice were the minutes of SAGE. Some examples of the written advice I did produce are: 'Coronavirus: summary of strategic and tactical approach to the epidemic' – sent to the Secretary of State for Health and Social Care on 21 March 2020, the Prime Minister's Adviser on 22 March 2020 and the Cabinet Secretary on 23 March 2020 **(CJMW8/63 – INQ000203890)** and 'Three scenarios over winter' – sent to Simon Case (who led on COVID-19 for No 10 and then became Cabinet Secretary) on 3 September 2020 **(CJMW8/64 – INQ000070554)**.

2.62. The Prime Minister, Secretary of State for Health and Social Care and Mr Cummings among others sometimes asked for advice by WhatsApp. My view was that it was a poor means of communicating often quite complicated technical advice and I predominantly used it only when asked. The Prime Minister, Secretary of State for Health and Social Care, and more rarely the Chancellor and other Ministers would also sometimes phone for technical advice. I also found the pre-meetings before press conferences with the Prime Minister to be a very important opportunity to reinforce key technical messages and address misconceptions in a small group and in a relatively private setting. In almost all the most important decision making meetings, the GCSA was also present. As I have said, this allowed us to mutually reinforce key points, and pick up when an issue had been misunderstood or could have been explained better.

2.63. I hope that my advice to senior decision-makers was clear, including what was not known, but they are in a better position to confirm or refute that. Inevitably, I got better at giving advice as the pandemic went on for at least three reasons: i) the data on which the advice was based was much stronger with a more stable scientific foundation; ii) I understood the thought processes and styles of communication of the senior principals much better and was able to tailor my advice to their needs and styles; and iii) they built up a degree of trust in the advice I was giving based on their prior experience.

2.64. The Inquiry has asked about my views of the grasp of scientific, medical and mathematical concepts by the principal decision-makers. All doctors are trained to explain technical and medical concepts as clearly as possible, tailored to the prior knowledge and training of the person receiving the advice. This is one of the fundamentals of medical practice. Although none of the principal decision-makers had a scientific background, all were used to using numerical data in their decision-making.

2.65. Following from this, provided that senior decision-makers were prepared to take the time to listen, which in almost all cases they were, insofar as they did not understand the concepts I or the GCSA were presenting, I saw this as a failure of our ability to present data and concepts rather than their failure to comprehend. Relatively few of the concepts most important to the major decisions were intrinsically complicated, although I was struck by the fact that even some economists who understood compounding sometimes underestimated the power of exponential growth if left unchecked to change the situation over very short periods of time. A difficulty we from time to time had was that non-specialist external commentators, many with very strong prior beliefs influencing their views, sometimes provided counter-narratives based on misunderstood, cherry picked or possibly deliberately distorted science. If these were picked up by political leaders via the media it could cause confusion. The GCSA, DCMOs and I tried both to explain the scientific concepts and to explain the range of uncertainty around them, as well as to correct technical misunderstandings.

2.66. Very early in the pandemic, the GCSA and I agreed that the most important thing in order to support the Prime Minister, senior Ministers and other decision-makers was to ensure we coordinated our views and advice continuously. We thought it would be very confusing for them to receive two different versions of reality from each of us. We therefore took a lot of time and effort to ensure we were aligned, and if we were not that we understood why.

2.67. There were in my view no occasions when the GCSA and I disagreed on the fundamental science or a key point of medical advice. We sometimes expressed it differently, in particular early in the pandemic when we were trying to work out the best way to support senior decision-makers, but this was about presentation not substance. Occasionally, one of us expressed something less well in public (I give an example of my own below) that made it difficult for the other, but this was inevitable during a period in which we were exposed to huge media interest in which we were not experienced, and every sentence was potentially subject to minute public scrutiny. Where there were differences in the way we expressed advice, we attempted to resolve them immediately to avoid confusion setting in.

2.68. In general, my view was that our advice was sought appropriately. There were occasional relatively minor decisions where I felt it had not been, but almost always this was a case of oversight in the context of a very fast paced response rather than a deliberate choice, and none of them stand out that are not covered elsewhere in this Statement. On a few occasions, my view was that it would have been prudent to have sought the advice of myself, the GCSA or DCMOs at an earlier stage- for example we would be asked to comment at speed on a detailed policy document about to be produced when it would have been easier to have discussed key principles at an earlier stage of development. Some of the decisions by individual Departments would have benefited from proper scientific or medical advice, but that is to a fair degree inevitable given the multiple calls on our time. Just as frequently, my question in response to the OCMO receiving an enquiry was 'why are we being asked to comment – this is neither science nor medicine?'.

2.69. In my opinion, the distinction between scientists providing advice and politicians making decisions remained clear throughout the pandemic and where this was not understood by others I tried to point it out. Most of the very difficult decisions required of decision-makers, including those to go into lockdown or variants of it, required multiple inputs in addition to the scientific, clinical and public health ones. These included economic, social, diplomatic and political considerations.

2.70. It was my job, and that of my colleagues, to provide as strong a scientific input to this decision-making as we could. The balancing of the multiple difficult elements which required consideration had to be by elected politicians representing society. Inevitably, there were situations where political leaders wished scientific advisers to state what the policy should be, and in the opposite direction where scientific colleagues outside Government wished to present their views in the media on what policy should be in very complicated areas. There is a very important space for technical advice, but the old cliché that advisers advise and Ministers decide remains current.

Independent Advisory Groups

2.71. As CMO, I was the recipient of advice from independent advisory groups, for which I was very grateful. This would further inform my own advice to Government and included that from advisory groups such as NERVTAG and JCVI, which played significant roles in the pandemic response. I provided an overview of this in my First Statement at paragraphs 5.163 to 5.187, and so do not repeat it again.

2.72. I was not a member of these independent advisory groups, although I could attend as an observer if I wanted to and occasionally did. Sir Jonathan Van-Tam attended both NERVTAG and JCVI, but as an observer rather than a member. I had previously been a member or chair of several independent scientific advisory groups, and so this did allow me to understand their role.

Other sources of advice and expertise

2.73. Throughout the pandemic, I attended regular meetings of advisers to discuss and align advice. These meetings with expert colleagues included:

a. regular meetings with the four UK CMOs to discuss cross-UK issues;

b. Local Action Committee Silver meetings to feed into Gold decision making meetings for England. I describe the system of Local Action Committees in my First Statement at paragraphs 5.201 and 5.202;

c. a Senior Clinicians Group to discuss issues and share information;

d. meetings with the Academy of Medical Royal Colleges, who represent the medical profession, to share information and gain expert views; and

e. the Directors of Public Health from across the country.

2.74. Further detail on these meetings is set out in my First Statement at paragraphs 5.189 to 5.200. On 21 December 2022, the OCMO provided the Inquiry with a chronology of meetings with experts that I attended from January 2020 to February 2022.

4 Nations collaboration

2.75. I am able to comment on the extent to which there was technical collaboration between the four UK nations during the pandemic, and particularly between the four UK CMOs. In my view, there was close interaction between us on a frequent and regular basis. We all learned from one another, challenged one another and often provided joint guidance aimed either at Government **(CJMW8/65 – INQ000203899)**, the medical profession **(CJMW8/66 – INQ000049584, CJMW8/67 – INQ000236434, CJMW8/68 – INQ000068589)** or the general public **(CJMW8/69 – INQ000070464)**. At the end of the acute phase of the pandemic, the other UK CMOs contributed to the joint Technical Report to our successors.

2.76. The four CMOs maintained very regular communication along with the constituent nations' DCMOs. Sometimes this consisted purely of information sharing, for example the first few cases and deaths in each nation. Frequently, it was about testing one another's thinking and aligning our technical advice. We were often asked to attend ministerial meetings including COBR alongside Ministers from our respective nations and so being aware of each other's technical thinking was advantageous. We all took note of, and tried to interpret the output of, SAGE meetings, to our Ministers which tended to shape a common position. The four CMOs and the relevant DCMOs had different professional experiences and disciplines and I considered this an advantage in our discussions. In my view, the CMOs in Scotland (Dr. Calderwood and then Sir Gregor Smith), Wales (Sir Frank Atherton), and Northern Ireland (Sir Michael McBride) were excellent colleagues and public health leaders during this major four nations emergency.

2.77. When I felt that the views of the CMOs of Scotland, Wales or Northern Ireland were important for UK Ministers to hear, I fed these into my advice. This was particularly important for issues where UK Government decisions had implications for the other three nations alongside England. An example of this was border measures, where many international travellers to the other three nations are likely to come through England. Whilst the differences tended to be modest, there were some occasions where the epidemiology was different between the four nations and this needed to be highlighted to the UK Government. In the advice which I provided the UK Government, I do not recall an occasion when I considered, or said to anyone, that the advice was not appropriate in the other UK nations. Inevitably, there were differences of epidemiology and nuance across the four nations, but the scientific and epidemiological underpinnings of advice were transferrable.

2.78. Whilst fully recognising that health is a devolved matter and therefore inevitably some important differences would emerge in the policy responses, our view as the four UK CMOs was that the general public would become confused if different versions of the scientific or clinical evidence were given across the four nations. We therefore tried to stick to the principle that the science and clinical advice both to Ministers and the public

would be as similar as possible, whilst acknowledging the policy response might be significantly different for multiple reasons.

2.79. The extent to which there was political collaboration is not really a question for me. I do however feel confident in observing that the public health agencies of the four nations worked closely together, with many shared policies and documents as well as a shared scientific understanding.

International Collaboration

International collaboration in general

2.80. Throughout the pandemic, I had extensive interactions with international partners both directly and indirectly. The information provided by international colleagues was essential, particularly at the points where a foreign country had a major outbreak that was potentially a threat to the UK. Without these international insights, it would have been much harder to formulate a rational response. My own views and those of SAGE were heavily influenced by these interactions and they fed into the technical advice given to decision-makers. Information exchanged included our mutual understandings of the virus and its behaviours, as well as the state of the epidemic and the epidemiology both in our countries and abroad. I was and am very grateful for their insights.

2.81. In general, there was a practical difficulty that whilst we were particularly interested in the experiences of countries that were at the leading edge of any given wave, the scientists and doctors from those countries were usually working flat out and did not have time to interact on a bilateral basis with every other nation. Medicine, and of course science more widely, are international endeavours with a strong tradition of rapid publication. Accordingly, much of our learning from abroad came from publications and online data. We also gained information from important bilateral discussions, and multilateral meetings such as those with the WHO or G7.

2.82. Early in the pandemic, I had very useful bilateral interactions with colleagues from Singapore, Japan, South Korea, Hong Kong and Italy, and indirectly from China, who provided the earliest sources of information with which to inform our own risk assessments. These were augmented by multilateral meetings to exchange information set up by WHO at which senior medical leaders from multiple countries contributed. When the Alpha wave was first detected in the UK, we became net givers rather than recipients of information as other nations wished to learn from our experience. By way of further examples, over the course of the pandemic I had interactions with:

i. Senior Danish colleagues at the point they had an outbreak of COVID-19 in mink. Their transparency at this time was vital in allowing us to introduce a temporary ban on travel to Denmark, and similarly in removing that ban in due course;

ii. Indian colleagues around the time of the emergence of the Delta variant; and

iii. South African scientists, who were very generous with their time and expertise, in the early stages of the Omicron outbreak. Information from them was essential to our understanding of the risk of Omicron; South Africa has some of the best genomic sequencing capacity and epidemiological capacity globally and we learned a huge amount from them. Again, their transparency with data sharing made it much easier for me to inform decision-makers so that they could make rational decisions.

2.83. In most respects, international data allowed us to advise earlier than would have been possible if we were relying only on UK or European data.

2.84. In addition, we developed regular meetings of senior European scientists (chaired by our GCSA) and I had regular bilaterals with US Presidential adviser Dr Anthony Fauci and check ins with Dr Rochelle Walensky, director of the US CDC. Later on, we commenced meetings with the 'five eyes' group of CMO and equivalents from the USA, Canada, Australia, New Zealand and the UK. In parallel, the GCSA and PHE/UKHSA had their own bilateral or multilateral meetings and we shared relevant information between us.

2.85. Throughout the early stages of this pandemic, I was on the Executive Board of the WHO ("WHO EB"). The European members of the WHO also had a separate WHO EURO group. Through these meetings, I gained a lot of indirect and informal information. I was immensely grateful for the amount of time and expertise international colleagues offered on a bilateral and multilateral basis.

2.86. A fuller account of my engagement with international partners is set out in my First Statement, at paragraphs 5.204 to 5.208, and in the chronology of my meetings provided to the Inquiry by the OCMO on 21 December 2022. As such, I do not repeat this material again here.

International comparisons

2.87. Key decision-makers were very interested in what other nations were doing, and insofar as we could understand it, why they were doing it and their associated epidemiology. There were however considerable difficulties in proving causation between the public health actions of another nation and their epidemiological situation.

2.88. Nevertheless, the International Comparators Joint Unit ("ICJU") was very useful in facilitating an assessment of what other countries were doing. Whilst there were several academic and other groups tracking the pandemic via a variety of means such as Our World in Data, the ICJU provided very helpful information on how other countries were responding. I supplemented this by information provided from colleagues internationally, and occasional use of the Science and Innovation Network ("SIN") of FCO/FCDO.

2.89. Whilst we had to maintain the professional confidence requested by international colleagues, wherever possible the GCSA and I would feedback to decision-makers our understanding of the logic behind the decisions of other nations, in particular where

these differed from the UK/England. We would also communicate our view of the strength of the scientific opinion internationally.

2.90. When other countries did things differently, it was very useful to work out why this was the case, test whether we had considered this approach ourselves, and if we had not, establish why. We also examined areas where we thought other nations were doing particularly well, for example the ability of South Korea and Germany to scale up testing in the very early stages of the pandemic. These are examples where emulation, where it was practical, was clearly in the interests of the UK/English response. There were other policies, such as the requirement in some European countries to get official permission even to leave the home, or requiring facemasks to be worn outdoors, where we noted they had chosen to do something for which we could not see a compelling scientific case. This was communicated to senior decision-makers and informed decisions by them as to whether to introduce similar measures in the UK.

The World Health Organization

2.91. The WHO is an important body for international health and has played a significant role in many of the health improvements seen since its inception. I am, unsurprisingly given my background, a strong supporter of a well-funded and empowered WHO equipped with significant technical capacity. The WHO can play an important role in responding to pandemics, for instance by declaring a Public Health Emergency of International Concern ("PHEIC"), as they did on 30 January 2020 in respect of COVID-19. The WHO also has a role in providing guidance to countries on how to respond to health threats. WHO outputs informed my advice to key decision-makers, and technical guidance from the WHO was extensively used in the UK by a wide range of professionals.

2.92. Due to the nature of the WHO as a body comprised of its constituent member states (which includes almost all countries globally), it aims to provide guidance that is applicable to all of its members. The individual circumstances of each member state inevitably vary considerably, for instance for reasons of economic prosperity, technical

capacity, as well as factors which directly impact on disease susceptibility, such as geography and climate. WHO guidance will therefore always be both high level and less well targeted to local circumstances than national guidance would be. By way of example, on 4 February 2020, the WHO released guidance on COVID-19 that described the objectives of the response strategy as:

- *"Limit human-to-human transmission, including reducing secondary infections among close contacts and healthcare workers, preventing transmission amplification events, and preventing further international spread from China;*
- *Identify, isolate, and care for patients early, including providing optimized care for infected patients;*
- *Identify and reduce transmission from the animal source;*
- *Address crucial unknowns regarding clinical severity, extent of transmission and infection, treatment options, and accelerate the development of diagnostics, therapeutics, and vaccines;*
- *Communicate critical risk and event information to all communities, and counter misinformation;*
- *Minimize social and economic impact through multisectoral partnerships.*

These objectives can be achieved by:

A) Rapidly establishing international coordination to deliver strategic, technical, and operational support through existing mechanisms and partnerships;

B) Scaling up country preparedness and response operations, including strengthening readiness to rapidly identify, diagnose and treat cases; identification and follow-up of contacts when feasible (with priority given to high-risk settings such as healthcare facilities); infection prevention and control in healthcare settings; implementation of health measures for travellers; and awareness raising in the population though risk communication and community engagement.

C) Accelerating priority research and innovation to support a clear and transparent global process to set research and innovation priorities to fast track and scale-up research, development, and the equitable availability of candidate therapeutics, vaccines, and diagnostics. This will build a common platform for standardized

processes, protocols and tools, to facilitate multidisciplinary and collaborative research integrated with the response.

The response strategy is based on several planning assumptions. Owing to the considerable uncertainty surrounding the extent of the outbreak within China, the transmissibility of the virus, and the clinical spectrum of the disease, it will be necessary to regularly update these assumptions as gaps in our knowledge of the disease are filled. The current response plan assumes that human-to-human transmission takes place, and that it may be amplified in specific settings, including healthcare facilities. We also assume that human-to-human transmission is widespread within Hubei, and possibly other population centres in China.

It is expected that cases will continue to be exported to other countries while the outbreak continues in China. While the response emphasis will be to rapidly identify and isolate imported cases, there is a risk of clusters of cases caused by localized community transmission outside China. In some cases, countries may require operational assistance to strengthen their capacity to detect and respond to these imported cases. However, there remain significant uncertainties around the potential for more widespread transmission outside China, and it will therefore be necessary to have contingency plans in place to mitigate the challenges this would present." **(CJMW8/70 – INQ000236432)**.

2.93. Further detail was set out in the rest of the report, but it remained a blueprint for national guidance to work within. In this sense, the WHO guidance was useful as a guide, but it usually needed considerable additional technical input in order to be usable in any given country. As regards the above advice, my view is that the UK's approach was consistent with it.

2.94. This remained the case as more information about COVID-19 became available. The WHO COVID-19 strategy update on 14 April 2020 stated:

"*Each country must continue to implement National Action Plans based on a whole of society approach and a realistic appraisal of what is feasible to achieve first in terms of slowing down transmission and reducing mortality, and subsequently in terms of*

sustaining low level transmission while society and economic activity resumes" **(CJMW8/03 - INQ000228104)**.

2.95. Whilst this was clearly sensible, it makes the point that each country was required to decide how best to implement WHO guidance for themselves.

2.96. There were instances where the UK could not follow WHO guidance due to practical constraints. One example was the WHO advice to "test, test, test" e.g. to test every suspected case. I and others were well aware of this advice. To the extent that testing was available, we agreed with it. Particularly early in the pandemic however, it was not entirely clear to which countries this advice applied. Even in high income countries competition for key materials and limitations in the expansion of capacity were a problem; in low-income countries the availability of testing was unfortunately even further delayed. There was therefore no theoretical disagreement with the advice, but practical limitations on the extent to which it could be applied in the UK and indeed most other countries due to the limited availability of tests. Once testing was scaled up this was of course something where the UK put a lot of emphasis.

2.97. It follows that on some occasions, the UK took a slightly different approach to that advocated by the WHO. This was also the case for instance in its approach to clinical trials, where we were stronger in our view that novel therapies should be trialled. I discuss this specific point in more detail below at paragraphs 16.18 to 16.22. Nevertheless, in my view such occasions happened fairly rarely, and it was much more frequently the case that the UK's approach was consistent with advice emanating from the WHO.

2.98. Accordingly, in my view advice and guidance from the WHO was a helpful resource for local national decision makers to take into account, and for local national advisers to consider when formulating their advice. The UK worked closely with the WHO and usually was broadly aligned with it. Where there was divergence, this generally was a reflection of the fact that WHO guidance needed to be applicable to all countries.

2.99. The Inquiry has made specific requests as to how the WHO guidance dated 9 January 2020, 4 February 2020 and 28 February 2020 applied to the UK. I have explained my approach to the guidance dated 4 February 2020 above. Similarly, I considered that those other pieces of WHO guidance applied to the UK, albeit that their direct applicability should be understood in the context of my comments above and the need to tailor advice designed to be internationally applicable to a national context.

PART 2

Paragraphs 5.201 and 5.202 of the First Witness Statement of Professor Sir Christopher Whitty dated 15 August 2023

5.201. OCMO also played a key role in the internal advice structure for COVID-19 surveillance that the DHSC set up. This structure was called the Local Action Committee (LAC) or Bronze/Silver/Gold- the latter a reference to the different levels of LAC meetings. The Bronze and Silver parts of this structure were technical and expert in nature.

5.202. The OCMO played a key role in the LAC command structure, which was set up by the Joint Biosecurity Centre (part of Test of Trace) at the request of the Secretary of State for Health and Social Care. There were Bronze, Silver and Gold LAC meetings each week. Bronze was a working level meeting with regional teams, I did not attend. I chaired most of the Silver committee meetings which generally happened weekly from 9th June 2020. This was a technical meeting to present, assess and challenge interpretation and consistency of data, analyses and recommendations from Bronze. Silver made technical recommendations to Gold which was chaired by the Secretary of State for Health and Social Care. I attended most Gold meetings. There were exceptional Silver and Gold meetings if a situation required urgent attention. The decisions on localised restrictions, including the Tiers, were made through this process – resulting in recommendations made by the Secretary of State to a COVID-O (central ministerial decision making meetings run by Cabinet Office) meeting. More information relating to the LAC process and its inputs is in the COVID-19 contain framework (**CJMW8/71 – INQ000223952**).

PART 3

Section 3 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Executive Agencies

Public Health England/UK Health Security Agency

3.1. The Inquiry has asked me to comment on the effectiveness of PHE during the early stages of the pandemic and the decision in August 2020 to disband PHE and create the UK Health Security Agency. In January and February 2020, PHE played to its considerable scientific strengths. PHE scientists very rapidly created a PCR diagnostic test after the genetic sequence of SARS-CoV-2 was published. Operationally, PHE was effective at contact tracing when the numbers of cases initially identified were small.

3.2. PHE did however struggle when it came to rapid scale up, in particular of diagnostics and contact tracing. In my opinion, this was the inevitable result of an erosion of the health protection capabilities of PHE over a number of years. This is not a criticism either of the professionalism of PHE staff or of the political decisions to prioritise other areas in budgetary decisions. I make this point however because I consider the ability to scale up rapidly was demonstrated to be weak in the UK and I am concerned that this will remain a weakness for future pandemics and other health emergencies on this scale.

3.3. The decision to disband PHE in the middle of the pandemic and create new entities was principally a political one. It was not based on my technical advice or that of the DCMOs. Unsurprisingly, an emergency on the scale of the COVID-19 pandemic exposed weaknesses. These clearly needed to be rectified. Whether disbanding and reforming the principal health protection agency which had extensive responsibilities in the middle of an infectious disease emergency was the best way of achieving this, is an open question. In my view, key PHE staff responded with professionalism to this change and did their best to minimise the impact it had on their operational response.

Joint Biosecurity Centre

3.4. The Joint Biosecurity Centre ("JBC") was established in May 2020 to bring together expertise and analysis to inform the policy response to the pandemic. In considering the creation and role of the JBC, I would like to separate out the process of its creation and its operational impact.

3.5. Many of those involved in the decision to create JBC had experience in national security matters and viewed things through that prism but JBC had significant public health expertise at its creation in addition to pulling in analytical experts from many other parts of Government. I thought the JBC staff did a remarkably good job of standing up a very strong analytical response from a standing start. They provided reliable data in rapid time, very well presented in a way that was interpretable by policymakers. The sophistication of their data visualisation both geographically (maps) and temporally (charts and graphs) really helped decision-making. It pulled in analytical and data visualisation expertise from across Government including bodies such as the national security agencies, the Bank of England, as well as PHE and wider skills from the public health and epidemiological community.

3.6. The need for the skills brought together in JBC was clear. I was and am agnostic as to whether it needed to be freestanding or could have been placed within PHE. Overall however, I consider the bringing together of JBC skills to be one of the significant steps forward in analytical and data visualisation to inform policy response.

3.7. Outside the intense period of a pandemic, it did not however make sense for JBC to be freestanding. Under normal circumstances, with typical numbers of outbreaks and public health events and smaller scale emergencies, having two organisations providing technical analytical input in parallel ran the risk of duplication of effort and conflicting advice. I was therefore supportive of the merger of JBC with UKHSA once the worst stages of the pandemic were over.

3.8. I noted with interest suggestions that JBC could replace SAGE in the longer term. The suggestions came out of a misunderstanding of the roles of both bodies. JBC was and is a highly effective analytical body with a central emphasis on the tactical analysis of data and data visualisation. SAGE is an emergency mechanism to bring together the

best relevant scientists in the UK to provide advice to policymakers in response to an emergency. These might include issues as diverse as solar flares, flooding, volcanic eruptions closing airspace, national power outages, a major cyberattack, nuclear accidents as well as human, animal and plant infections. SAGE is only stood up in emergencies and designed around the emergency in hand, usually drawing on the wide skillset of the external academic community. The idea that JBC and SAGE could take on one another's roles makes no sense.

PART 4

Section 4 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Data and Modelling

Sources of data

4.1. I, the GCSA and other professional advisers used multiple sources of data to inform our advice to core decision-makers. These included but were not limited to: data from clinical studies and trials; NHS activity data; epidemiological data; genomic data; data from virological studies; qualitative and quantitative social science data; and data from the private sector. Which predominated at any given point depended on the stage of the pandemic, the question to be addressed and which input at that time we considered the most reliable.

4.2. In the first weeks of the pandemic, the data were almost entirely from international studies, firstly from China and then more widely. By the middle of 2020, reliable UK domestic data was rapidly expanding and by summer 2020, the quality of UK domestic data had reached a point where we were able to provide highly geographically detailed data in something approaching near time for the purposes of the No 10 dashboard and the Silver and Gold Local Action Committee meetings. This included data obtained by the ONS household survey.

4.3. Some of the key sources of data used to understand the virus and its spread included:

i. the First Few Hundred study, a largely descriptive clinical study of early cases which followed a protocol previously used for MERS in 2015 and 'swine flu' in 2009 (started in January 2020);

ii. CO-CIN, a study of hospitalised patients with COVID-19, in particular those in the Intensive Care Unit (started March 2020);

iii. SIREN, a study of healthcare workers with serial sampling to understand infection rates, reinfection and in due course vaccine efficacy in working-age adults (started June 2020);

iv. VIVALDI, a study in care homes which looked at how many care home staff and residents had been infected with COVID-19 and the effectiveness of vaccines against infection (started May 2020);

v. the ONS COVID-19 Infection Survey, a study of the proportion of the general population with infection (started April 2020);

vi. COMIX, a survey of a sample of the UK adult population looking at social contact trends (started March 2020);

vii. PITCH, a study to understand T-cell responses in healthcare workers (started March 2020);

viii. the ONS COVID-19 Schools Infection Survey, a study to understand and assess infection and transmission in schools (started October 2020);

ix. Virus Watch, a study of households focusing on transmission, immunity and symptoms (stared June 2020); and

x. ATACCC, a cohort study of healthcare workers studying the secondary attack rate and time between exposure and infection (started September 2020).

4.4. As outlined in the previous section of this statement, the data from the JBC and PHE/UKHSA surveillance was also very valuable in understanding COVID-19. Clearly this is a sub-set of the total data used, but it gives an indication of some of the key surveillance studies. We set out further detail on this in the Technical Report.

4.5. A different but similarly important set of data came from the research into medical countermeasures which led to treatments and vaccines becoming available. I understand that these topics will be the focus of future Inquiry modules. I therefore do not cover the role of research trials in providing data to inform the COVID-19 response in detail here. Again, further detail can be found in the Technical Report if this is of assistance.

Data limitations

4.6. In considering the role of data, and the limitations in data as a barrier to good decision-making, I will divide the pandemic into three stages.

4.7. In the very initial weeks, the data were extremely limited for everyone globally, and were all international in nature; decisions had to be taken based on very sparse data and this was made clear in the advice given.

4.8. In the third stage, from approximately the middle of 2020 onwards, the full apparatus of JBC, analytical flows from NHS Test and Trace, the ONS survey and several observational cohort studies such as SIREN provided very detailed data. From here on, I consider that the data provision to Government was one of the real strengths of the UK response. The publicly available data were also more detailed and reliable than in most other countries.

4.9. The phase between those periods, for practical purposes from mid-February to the middle of 2020, was a time of relative weakness in the UK's data provision. The response to rapidly spreading COVID-19 required a very substantial change in the way data were provided, shared, analysed and the data from the increasing testing capacity fed in. Inevitably, some elements of this could have been faster and this was a source of frustration at the time. This should not however detract from the extraordinary contribution of data scientists, analysts, visualisation experts and others in providing and interpreting data over the pandemic as a whole.

4.10. By way of further detail, as the UK pandemic developed beyond the first few cases in mid-February 2020, there was a period until approximately the middle of that year where the data were incomplete. Limited testing capacity combined with an inability to merge different datasets, including those from the NHS, in order to make best use of the routine data sources available, was undoubtedly a limitation. Resolving these issues was critical to being able to provide professional advice based on reliable data. There were also difficulties with data sharing between various parts of Government, academia and the NHS. Over the first three to five months of the pandemic, these issues were resolved.

4.11. Some of the delay in achieving this was in my view inevitable and occurs in every emergency I have ever worked in. There are a multitude of reasons for this, including cultural norms about sharing data, worries about legal risk and mechanistic difficulties in sharing data in a way and format it can be used by others. It is also clear that there was insufficient capacity in the data and analytical capabilities of PHE and NHS

England, which were simply not equipped for a crisis on the scale of COVID-19. This latter problem was eventually solved, in large part by drafting analysts from other parts of Government, both departments and agencies.

4.12. Whether these early problems in data sharing could have been resolved faster is a question I am not the best person to answer. Those involved in the system of data sharing and analysis, both users and providers, would be in a better position to assist the Inquiry. The difficulties imposed by the limited data available in the early part of the pandemic were undoubtedly real, but so were some of the limitations in sharing data and it was important these were resolved. However, the well-documented limitations in testing meant that for many purposes, reliable data simply did not exist to share, nor was there the contact tracing infrastructure which provided a lot of the information later in the pandemic.

4.13. In any emergency response, it is almost always going to be the case that some useful data could have been shared earlier than it was. Data flows within the UK system early in the pandemic were not optimal but improved considerably over its course. Further detail on this is set out in the Technical Report, in particular Chapter 4, which sets out in some detail data sources and the challenges faced.

4.14. The creation of JBC and the No 10 Data Science and Analytics team went a long way to helping resolve some of the problems of data analytic capacity. There were clear advantages to having this capacity in No 10 itself. These included that they could be very responsive to the particular interests of the Prime Minister and his immediate advisers. It was essential however that it was part of a connected data effort across Government rather than a freestanding unit. Multiple standalone data efforts risk confusion with competing analyses addressing similar but not identical questions. This would have given rise to very confused advice to Ministers and other decision-makers.

4.15. I would also like to make clear the role of professional advisers in the face of uncertainty. Once reliable data were available it made decision-making considerably better informed. It is of course always easier to give reliable professional advice with a full sweep of data in which you have confidence. It is however the job of a technical adviser during an emergency from whatever discipline (this would be as true for military advice as medical advice) to understand the limitations of the data they are presented

with but still to give the best advice they can based on the data they have. A high degree of uncertainty is inevitable in any emergency, especially early on, and advisers and the policymakers they advise simply have to work with that reality. This is no different from many other aspects of medicine and other disciplines. Waiting for perfect data is often likely to be the wrong approach in a fast moving emergency.

Modelling

Modelling in general

4.16. Modelling is one of the important technical skills in an infectious emergency, although the outputs of models have to be interpreted with care and considered alongside the many other inputs from other fields and disciplines. Excellent modelling cannot make up for biased, incorrect or absent source data. Indeed, a model is no stronger than the assumptions on which it is based, and these will in part depend on reliable data sources for their accuracy. The assumptions which inform a model will always mean there is a range of uncertainty around a model's central estimate. The further out in time the model is projecting, the greater that uncertainty will be. This is as true for economic or weather models as it is for epidemiological ones.

4.17. Early in the pandemic, the number of modelling groups which could stand up rapidly, and the availability of data, limited the range of inputs that could be given. At the same time, there were relatively few alternative routes by which we could explore possible future scenarios. It was (and is still) widely accepted internationally that the UK has particular strengths in the field of infectious disease modelling, including but not limited to the modelling groups at Imperial College and the LSHTM.

4.18. Modelling in the early pandemic was in one sense more straightforward than it was later, as population immunity did not need to be taken into account (there was none) and there were no medical countermeasures to factor in. In the absence of immunity or social or medical countermeasures, the first wave of the pandemic will follow an exponential path. Modelling becomes harder once factors intended to retard the spread of the disease or mitigate its severity need to be taken into account, especially when the impact of these effects is itself hard to estimate e.g. the impact of certain NPIs, or the extent of population immunity.

4.19. An epidemic is almost always either doubling or halving; initially it will be doubling and once the doubling time is established the speed of the upswing can be derived. What is not easy to determine is how high the first and subsequent peaks will be. There is a theoretical upper maximum which can be derived but this is seldom reached in the first wave. There were however many unknowns including the degree and duration of immunity and how large the proportion of asymptomatic spread was.

4.20. This uncertainty on the amount of asymptomatic infection posed a particular challenge when trying to estimate the infection fatality rate ("IFR"). The IFR is the proportion of all people who are infected with the disease who then die of it, and is distinct to the case fatality rate ("CFR") which can be derived in the absence of knowledge about asymptomatic disease and relies upon the number of known cases who go on to die of the disease. It follows that in a disease with a significant number of asymptomatic cases, the IFR will be lower than CFR (on the basis that those who are asymptomatic are unlikely to be detected as cases), and if there is a lot of asymptomatic infection, may be much lower. Such unknowns had the potential to impact on the accuracy of the models.

4.21. As the pandemic went on, the array of models and institutions contributing to modelling efforts increased substantially and the reliability of the data on which they were based became stronger. Alongside this, the way in which we were able to achieve a consensus between modelling outputs became more established. In giving advice, we used whatever models were available from the highly competent groups. At first the number of these was very small but over time it expanded. My view was that the modelers largely collaborated very well when judged against realistic expectations. They were transparent within the norms of their own discipline and drew on data from a variety of sources.

4.22. Due to the limitations in models (which I explain further below), wherever possible when presenting data in public I used actual data, or very occasionally very short-term projections. I do not think it is easy to explain the limitations and strengths of models to the general public in the very short time available in broadcast media. Presenting a model without its limitations is usually a mistake. In much longer meetings of decision-makers it was possible to have this more nuanced discussion and present model data, although the GCSA often led on this.

Modelling used during the COVID-19 pandemic

4.23. The details of multiple models are laid out in SPI-M-O minutes, background papers and presentations. We also discuss them in more detail in the Technical Report. Some of the questions asked by the Inquiry are better addressed to the modelling teams and

SPI-M. In my First Statement at paragraphs 5.176 to 5.181, I lay out some of the mechanisms by which SPI-M-O, the SAGE sub-group producing most of the models for SAGE, worked. There was also modelling done outside of SPI-M-O from academics in the four nations of the UK, the NHS (principally for operational reasons) and private companies.

Limitations of Models

4.24. I have already touched upon some of the limitations of models in the paragraphs above. In addition, SPI-M-O produced a useful summary of some of the general limitations of models which I set out in part below:

"*Models are, by their nature, a simplified representation of reality. Models cannot, and do not try to, account for every possible detail of changes in government policy, the nature of the virus and how the population is interacting. Instead, they try to capture the important aspects. They are often limited by the available data and the models' outputs are only as good as the quality of the data that goes into them.*

There can be substantial uncertainty in the models' results because the future is, for the most part, highly uncertain. The models factor in what is known with reasonable certainty about the future, for example, the planned progress of vaccine rollouts. Many things are unknowable however, for example if a new variant will emerge and what characteristics it might have. The further into the future the models consider, the greater this uncertainty is as there will be more of these unknowable possibilities.

Each model output (or combination of model outputs) will have a measure of uncertainty associated with it to capture this. This uncertainty interval shows the range of values within which the observed outcomes are highly likely to lie. This does not mean that the actual outcomes data will not be outside the interval, just that it is less likely under those conditions.

Modelling can never exactly replicate reality and therefore no individual model will give a perfect description of the future. It is precisely because of this that we do not rely on just one model. We consider a wide range of views on the data and intelligence available from several independent groups, who use different approaches to produce a varying set of answers to each question the models are asked. A consensus position

is agreed through a robust discussion comparing and challenging the different models' results. Where these independent approaches give similar answers, it gives greater confidence in those outputs; if they differ then understanding why can itself be very informative" **(CJMW8/72 – INQ000236423)**.

4.25. Many of the criticisms of models during the first two years of the pandemic made in the press, social media and the political sphere were misleading. Firstly, they implied that models were the only or were the principal driver of policy. This was not correct, nor should it be. Models were only one of many inputs into policy decisions, even within the overall scientific advice, and policymakers made their decisions based on much wider issues.

4.26. Secondly, critics sometimes took the most extreme model outputs, generally the upper or lower bounds of the confidence intervals or outlier outputs, implied these were the projection of the modellers, and then attacked the projection as if it was the central projection, and as if it was a prediction of future reality rather than a model. This did not always assist the public in understanding the strengths and weaknesses of models in a balanced way. There was often a conflation of the presentation of actual observed data (i.e. 'things have got worse based on admissions to hospital') and the outputs from models. It was for these reasons that in the great majority of my public appearances, I preferred to present actual recorded data rather than the outputs from models. I have addressed the widely publicised March 2020 modelling report by Imperial College at paragraph 7.101 below.

4.27. Models were used initially to demonstrate to decision-makers that in the context of exponential increases, cases would move from very low numbers to very high numbers in a surprisingly short period of time. They also showed how high in principle the peak of infections could get unless action was taken. They were in my view also helpful to policymakers in seeing the likely impact of a small or larger number of interventions. Certainly, in the advice I gave, I did not think that models crowded out other important scientific inputs. They are one important tool amongst others in the scientific advice which itself is only one strand of advice on which decision-makers took their decision.

4.28. The Inquiry has asked whether the models overestimated the extent of spread of the virus early in the pandemic. The initial models were there to demonstrate what would happen if no action were taken either by Government or by the general public. I do not

believe that in their performance of that task, these models have been shown to be particularly inaccurate, beyond the recognised limitations I have outlined above.

4.29. Had no action been taken and the virus left to take its course, the number of people who would have been infected in the first wave would have been significantly higher than that which occurred. The impact of the models on decision-making prior to the first wave was to demonstrate that had no action been taken, the consequences would have been very significant. It is unsurprising that in a situation where the public made multiple decisions of their own to restrict their social interactions, and the Government then took major action to go further still, the initial wave was smaller than the theoretical maximum predicted by models. A recent report by the Royal Society usefully lays out some of the data on the impacts of NPIs **(CJMW8/73 – INQ000252720)**.

4.30. The total theoretical maximum infection and total mortality under a do-nothing scenario is in fact fairly easy to calculate. It is simply the total number who are likely to get infected multiplied by the infection fatality rate. The fact that we did not reach those numbers of deaths was not an accident, nor was it a failure of the models. It was because action was taken to avoid it. To criticise the models after the event because, having taken steps to avoid it, the theoretical maximum was not reached, is illogical.

4.31. The main thing I would have wished to see more of within modelling was sensitivity analysis, particularly in the early stages of the pandemic. Sensitivity analysis is where the assumptions of the model are varied to see what impact this has on the model's output. It is informative in its own right, and also indicates which of the various inputs to a model have the greatest impact on its outputs. In turn, if this is a variable in which we have very weak confidence, it can modify our interpretation of the model and the reliance we place on its conclusions. I made this point at the time.

4.32. The Inquiry has asked whether in my opinion there was an overreliance on epidemiology or infectious disease modelling in the scientific advice. Epidemiology is a wide discipline with many skills within it. It encapsulates data from science across an epidemic, including in this case virological, clinical and social science data. Modelling is only one component of this. It is hard in my view to see a situation where giving less epidemiological information to core decision-makers in a major epidemic would have improved the decision-making. Generally, the principal epidemiological outputs were

a description of data which if properly collected helped orientate decision-makers in the contemporary reality. Epidemiological concepts such as R were relatively easy to explain and also served to assist policymakers in understanding the implications of different future paths.

PART 5

Section 5 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Summary of technical advice by topic

Introduction

5.1. The Inquiry has asked a number of questions of a technical nature. What follows is a brief summary of some of the fundamental scientific underpinnings of the COVID-19 response and our understanding at particular times. There is considerably more detail on these matters in the Technical Report which also describes the difficulties in estimating many of the statistical and epidemiological values on which we relied. For a chronological view of how these changed over time, the minutes of SAGE and the underpinning papers generally provide the best contemporaneous record.

5.2. It should also be stressed that as with most of the technical judgements in the pandemic, there was seldom a single point in time at which we 'knew' a particular fact (e.g. the value of facemasks) or a particular number (e.g. the reproductive rate or CFR). Rather, our understanding of any given matter usually reflected a probability distribution in which we had a central estimate of the true value, with a wide spread around it in which the true value likely lay. As time went by and data accumulated, the central estimate shifted and the spread of this probability distribution narrowed. Accordingly, over time the confidence we had in our understanding increased.

5.3. Although inevitably the issues which caught the most attention were those where the central view shifted, looking back at the initial estimates a surprisingly high proportion of the early judgements stood the test of time. I say that because the difficulty of calculating them is often underestimated, and the early data available were often sparse.

Person to person transmission

5.4. On 5 January 2020, I laid out a series of triggers which, if met, would provide an indication that an epidemic of global importance was possible from the outbreak that had been described **(CJMW8/74 – INQ000047484)**. These were:

"1. Healthcare workers dying. This is often the early warning that a new infection is both severe and transmissible (eg SARS, MERS, Ebola). This would be the most concerning.

2. Evidence of person-to-person spread eg in families.

3. Geographical spread implying a zoonosis is spreading (in this case we would also want to liaise with DEFRA)"

At this stage, it was unclear whether there was person to person transmission.

5.5. On 6 January 2020, Sir Jonathan Van-Tam asked our CDC colleagues if they had any concerns around person-to-person transmission **(CJMW8/75 – INQ000151291)**.

5.6. On 13 January 2020, NERVTAG met and said:
"Members noted that it has been stated that there has been no 'significant' human to human transmission, which implies there may be some evidence of limited human to human transmission which has not yet been made available. Given that the onset dates are over a period of almost one month, and now the case in Thailand, we should be cautious at this point in making conclusions about the absence human to human transmission" **(CJMW8/76 – INQ000023107)**.

5.7. On 14 January 2020, the WHO announced that:
"Preliminary investigations conducted by the Chinese authorities have found no clear evidence of human-to-human transmission of the novel #coronavirus (2019-nCoV) identified in Wuhan" **(CJMW8/77 – INQ000236435)**.

5.8. On 19 January 2020, I had an email discussion with Sir Jeremy Farrar (then Director of Wellcome), and subsequently Sir Jonathan based on informal information Sir Jeremy had seen from an unpublished manuscript **(CJMW8/78 – INQ000183355)**. This provided evidence, albeit in early form, of person-to-person spread, but not of sustained community transmission. The difference between the two is important when considering a pathogen's epidemic potential. A disease may be transmissible between

individuals who are in close contact, for instance families residing in the same premises or between doctors and patients in medical settings, yet lack the ease of transmission necessary to bring about sustained community spread (e.g. between strangers meeting briefly in shops or on public transport). This is for example the case for the coronavirus MERS.

5.9. On 19 January 2020, WHO tweeted:
"According to the latest information received and @WHO analysis, there is evidence of limited human-to-human transmission of #Ncov.This is in line with experience with other respiratory illnesses and in particular with other coronavirus outbreaks". **(CJMW8/79 – INQ000236436)**.

5.10. On 21 January 2020, WHO tweeted:

"It is now very clear from the latest information that there is at least some human-to-human transmission of #nCoV2019. Infections among health care workers strengthen the evidence for this". **(CJMW8/80 – INQ000236437)**.

5.11. On 22 January 2020, SAGE met and said:

"There is evidence of person-to-person transmission. It is unknown whether transmission is sustainable" **(CJMW8/81 – INQ000087535)**.

5.12. On 22 January, a WHO mission summary said:

"Data collected through detailed epidemiological investigation and through the deployment of the new test kit nationally suggests that human-to-human transmission is taking place in Wuhan. More analysis of the epidemiological data is needed to understand the full extent of human-to-human transmission" **(CJMW8/82 – INQ000236429)**.

This finding was circulated across Government and was referenced in the top story on BBC news.

5.13. On 24 January 2020, a paper was published suggesting there was person-to-person transmission (**CJMW8/83 – INQ000212897)**. That there was extensive person-to-

person transmission thereafter became clear quite quickly, as the rising case numbers over a wide geographic range could not be explained otherwise.

Modes of transmission

5.14. There are broadly five standard routes of transmission by which an epidemic or pandemic can be transmitted and I give an example of each: respiratory (influenza), touch (Ebola), sexual/intravenous (HIV), oral (cholera) and insect/arachnid vector (Zika). Most infections have a dominant route of transmission, which may be the sole route of transmission capable of maintaining an epidemic. COVID-19 was identified as a predominantly respiratory infection very rapidly in the pandemic.

5.15. One area where the central view both in the UK and internationally (e.g. WHO) changed over the course of the pandemic was the relative contribution of droplet spread (usually at quite close quarters of a few meters) and aerosol spread (capable of infecting at a distance, especially indoors in poorly ventilated settings). Both are mainly transmitted by the respiratory route, but the distinction was important as it had implications for potential countermeasures. In brief, if droplet spread is a more important contribution to transmission then maintaining distance of more than 2 metres from an infected person is of greater importance than it is for aerosol spread; ventilation is more important for aerosol spread. The relative contribution of aerosol transmission was understood to be greater as time went on, but this was a result of gradual accumulation of evidence.

5.16. Transmission was explained by the WHO 23 December 2021:

"- *Current evidence suggests that the virus spreads mainly between people who are in close contact with each other, for example at a conversational distance. The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. Another person can then contract the virus when infectious particles that pass through the air are inhaled at short range (this is often called short-range aerosol or short-range airborne transmission) or if infectious particles come into direct contact with the eyes, nose, or mouth (droplet transmission).*

- The virus can also spread in poorly ventilated and/or crowded indoor settings, where people tend to spend longer periods of time. This is because aerosols can

remain suspended in the air or travel farther than conversational distance (this is often called long-range aerosol or long-range airborne transmission).

- People may also become infected when touching their eyes, nose or mouth after touching surfaces or objects that have been contaminated by the virus" **(CJMW8/84 – INQ000203978)**.

5.17. There was and is scientific debate about the relative importance of droplet and aerosol transmission and their exact contribution remains uncertain (and may be different between Omicron and previous variants). It is the case however that the central scientific view shifted over time to consider suspended aerosols as being of greater importance than was originally thought. In turn, this led to an increased emphasis on the role of ventilation as a countermeasure for COVID-19. In the UK, this can be seen in the outputs of the Environmental Modelling Group (a SAGE sub-group who provide advice on the role environmental modelling, data analysis and environmental sampling can play in understanding COVID-19 transmission) and in the communications campaigns which later emphasised the importance of ventilation **(30 September 2020 - CJMW8/85 – INQ000203979, CJMW8/86 – INQ000203993) (18 November 2020 – CJMW8/87 – INQ000203922)**.

5.18. Fuller details can be found in the Technical Report at Chapter 1 **(CJMW8/01 - INQ000203933)**.

Pre-symptomatic and asymptomatic transmission

5.19. The changing understanding of asymptomatic transmission was set out in my First Statement, at paragraphs 6.55 to 6.63. Those paragraphs run to some five pages. In light of their length and the fact the Inquiry has already had that material, I do not repeat it again at length here.

5.20. I was aware of the possibility of asymptomatic spread of COVID-19 (as opposed to there being just asymptomatic cases, without the potential for those cases in turn to then generate further infections) from early January 2020. As an example, I discuss this possibility with Sir Jeremy Farrar by email on 19 January 2020 **(CJMW8/78 – INQ000183355)**.

5.21. There is however a significant difference between the possibility that asymptomatic infection might occasionally occur (likely), and the idea that asymptomatic transmission would be a major part of the force of transmission. Evidence that asymptomatic transmission was a sufficiently important part of the epidemiology that it had a significant impact on the pandemic overall accumulated slowly. There was no single point where I and others in the international scientific community moved from thinking it was improbable to thinking it was a major issue; rather it was a gradual process of accumulation of evidence. The UK was not an outlier in this and WHO also gradually changed its position as the evidence accumulated. Even as late as 9 July 2020, the WHO's position was that the scale of asymptomatic transmission was unknown **(CJMW8/88 – INQ000203997).**

5.22. The exact proportion of asymptomatic transmission has still not been established beyond doubt and has likely changed over time. The current central view is that COVID-19 has a greater proportion of asymptomatic transmission than previously seen with other novel coronaviruses. The proportion is likely to have changed throughout the pandemic as new variants with different infectiousness, and the roll-out of vaccination, meant people benefitted from immunity which tends to make symptoms less severe, or less apparent.

5.23. The midpoint of the scientific view, and therefore my advice to Ministers and other core decision-makers, about the reliability of testing asymptomatic people changed over the first few months of the pandemic. The initial advice in SAGE given by Dr Maria Zambon, who had originally developed the test and is an acknowledged international expert in this area, was that testing for asymptomatic disease was likely to be less sensitive than that for symptomatic disease **(28 January 2020 – CJMW8/57 – INQ000057492)**. Subsequently, studies showed that it was possible to identify asymptomatic people by means of testing, and so the advice changed.

5.24. I would like to make clear the difference between pre-symptomatic and asymptomatic spread as I thought that might have got lost in some evidence in Module 1 and it had and has practical importance. First, it is sensible to repeat a point made in witness statements in Module 1; asymptomatic infection (a person is infected without having symptoms) is different from asymptomatic transmission (a person with no symptoms

can transmit to others). Pre-symptomatic transmission is where a person becomes infectious, and becomes symptomatic, but they are infectious for a period (hours or days) before the symptoms appear. In asymptomatic transmission, the individual can transmit the virus despite having no symptoms at any point.

5.25. There are important differences between pre-symptomatic transmission and asymptomatic transmission from a perspective of disease control. The most important is that in pre-symptomatic transmission the case will be identified and counted, and their contacts can be identified and isolated, relatively easily (albeit later than in symptomatic infection). In asymptomatic transmission, it is much less likely the index case will be identified early enough to institute contact tracing unless they are by chance tested whilst infectious. This makes contact tracing as a method of control less effective, and if a large proportion of the infection is from asymptomatic transmission much less effective.

Incubation period

5.26. On 9 January 2020, Sir Jonathan Van-Tam set out that we did not know the incubation period in an email to PHE describing our ability at the time to identify likely cases:

"*Essentially if we or any other countries get cases we won't be in a position to diagnose by lab test in the next few weeks; more likely it will be resp infection + travel to Wuhan within last 21 days (we don't know incubation period) + no obvious common RVI cause. The caveat will still be that +ve for flu (and lots in China at present) would not in my view assure no co-infection with something novel".* **(CJMW8/89 – INQ000151296)**.

5.27. On 13 January 2020, NERVTAG said:

"The incubation period distribution is likely to be relatively long for this novel coronavirus when taking into account the long incubation period seen in both SARS and MERS." **(CJMW8/76 – INQ000023107)**.

5.28. On 22 January 2020, SAGE said:

"The incubation period is unclear – but appears to be within 5 to 10 days; 14 days after contact is a sensible outer limit to use" **(CJMW8/81 – INQ000087535)**.

5.29. On 3 February 2020, SAGE said:

"Incubation period (time between exposure to infection and symptom onset): consensus of modellers puts this at 5 days, but range is 2 to 14 days" **(CJMW8/90 - INQ000203939)**.

5.30. On 11 February 2020, SAGE said:

"Incubation period: 4-5 days average, with range of 1-14 days" **(CJMW8/91 – INQ000075784)**.

5.31. On 4 March 2020, SAGE agreed with the following assumption in a paper:

"Average: 5 days. Range: 1 to 11 days. (assumed for UK)" **(CJMW8/92 – INQ000074987)**.

Broadly, this remained an accurate view of the incubation period for the original COVID strain, although it likely changed with the variants, being probably shorter for Delta and Omicron.

5.32. The incubation period was important when considering the length of time that contacts of cases should isolate. This started out as 14 days, but was changed in December 2020 at the recommendation of the UK CMOs **(1 December 2020 - CJMW8/93 – INQ000071960)**. Our view was that a 10 day isolation period for contacts represented the appropriate balance of risk given the current data and the stage of the epidemic at that point, rather than the data on incubation having substantially changed. Our view took account of the need to minimise transmission, but against this the considerable inconvenience of people who were contacts of cases self-isolating even when beyond 10 days the chance they were infectious was very low. This was particularly the case in people who had multiple contacts so had to self-isolate multiple times. We considered it was unreasonable that people should be made to isolate for longer than

was necessary, and additionally it was possible (but not proven) that it would increase adherence if isolation was made less onerous.

Duration of infectivity

5.33. The duration of infectivity refers to the time during which a patient who has contracted COVID-19 remains able to transmit the disease on to another individual. It is distinct from the incubation period, which refers to the time it takes for someone who is exposed to the disease to display symptoms. I describe how our understanding of the duration of infectivity changed below.

5.34. On 28 January 2020, SAGE said:

"Duration of infectivity: unknown, but 14 days seems a reasonable estimate" **(CJMW8/57 – INQ000057492)**.

5.35. On 4 February 2020, SAGE said:
"Duration of infectivity: around 2 weeks, but could be longer. Average possibly 7 days. Duration will vary depending on severity of individual cases" (**CJMW8/94 – INQ000051925)**.

5.36. On 11 February 2020, SAGE said:
"Duration of infectivity: 14 days as upper limit (advice to self-isolate for 14 days still stands). Peak infectivity is probably around the start of symptom onset, average 2-6 days" **(CJMW8/91 – INQ000075784)**.

5.37. On 27 February 2020, SAGE set out an assumption for duration of infectivity:
"Duration of infectivity likely to vary depending on severity of individual cases. 14 days as upper limit. Peak infectivity is probably around the start of symptom on set, average 2-6 days, then falling off rapidly" **(CJMW8/95 – INQ000074896)**.

5.38. Further information on the duration of infectivity and when that information became available is set out in the Technical Report at page 60 **(CJMW8/01 – INQ000203933)**.

5.39. The duration of infectivity is an important concept when considering how long the isolation of proven or probable cases should be (as opposed to the isolation of otherwise well case contacts). Here, the balance is between people ending isolation while still infectious and people having to stay isolated once they have become non-infectious.

5.40. The recommendation for people who had tested positive started at self-isolating for 7 days and was increased to 10 days on 30 July 2020 **(CJMW8/96 – INQ000086692)**. This was in response to the evidence which, although still limited, strengthened and showed that people with COVID-19 who remained mildly ill or were recovering retained a low but appreciable possibility of infecting others between seven and nine days after the onset of their illness. Increased testing also meant people were isolating after they tested positive, as opposed to having to isolate only on the basis of their symptoms which may or may not have been caused by COVID-19 (although at the peaks of the pandemic if people had symptoms of COVID-19 it had a high chance of being COVID-19).

R number (in the absence of NPIs)

5.41. The basic reproduction number ("R_0") is the natural reproduction number of the virus. This means the reproduction rate in a population where all are susceptible (there is no pre-existing immunity), and no control measures are in place. Put simply, it describes how many people each case will in turn pass the infection on to, where R of 1 means one person infects one other person (the disease is stable); R=2 means one person will infect 2 people and so on. If R is above 1 an epidemic is expanding, if it is below 1 it is receding.

5.42. On 28 January 2020, SAGE set out:
"Reproductive number: estimated as between 2 and 3, in accordance with estimates from the Chinese authorities, but these figures are uncertain" **(CJMW8/57 – INQ000057492)**.

5.43. On 4 February 2020, SAGE said:

"Reproductive number: previous estimate (2 to 3) still valid, with doubling time still 4 to 5 days" **(CJMW8/94** – INQ000051925**)**.

5.44. On 27 February 2020, SAGE papers again set out an assumption for the R number: *"Estimated 2-3 in Wuhan. Unknown in other Chinese regions and internationally"* **(CJMW8/95 – INQ000074896**).

5.45. On 4 March 2020, SAGE agreed with the following assumption in a paper:

"2.4 (assumed for the UK)" **(CJMW8/92 – INQ000074987)**.

5.46. The basic R_0 number for subsequent variants increased, with Alpha, Delta and Omicron all having a higher natural R number than the original Wuhan variant. The higher the R number, the more action is required to bring it below 1 and so change the epidemic from one that is doubling to one that is halving. The SPI-M-O estimates of the R number are available online and I have provided a copy with this statement **(15 May 2020 – CJMW8/97 - INQ000203987)**.

5.47. As immunity mounts due to vaccination and infection, the pool of susceptible individuals capable of being infected falls so the effective reproduction number R (sometimes written as R_t where 't' is time) diverges from, and is generally smaller than, R_0. The effective reproductive number R is more important for decisions on control as it describes the actual force of transmission with current levels of accumulated immunity, rather than the theoretical maximum rate were that immunity not there. For example if R_t was 2 and R_0 was 3, at this point in time you would need to just over halve the force of transmission to get R below 1 (from R=2) rather than reduce it by over 3 times (from R_0=3). This helps explain why a smaller number of NPIs may be needed to achieve the same effect once some accumulating immunity from vaccination and/or infection in the population have led to a smaller proportion of susceptible individuals.

Doubling time (in the absence of NPIs)

5.48. The doubling time is the time taken for the number of cases of the disease to double, and then double again, continuing this doubling pattern repeatedly (exponential

growth). With short doubling times epidemics can expand from small numbers to very large numbers extremely rapidly.

5.49. On 28 January 2020, SAGE said:

"Doubling rate: estimated at 3 to 4 days" (**CJMW8/57 – INQ000057492**).

5.50. On 3 February 2020, SAGE said:

"The epidemic is still in its early stages. It is a reasonable hypothesis that the epidemic is still growing exponentially – doubling every 4-5 days" **(CJMW8/90 - INQ000203939)**.

5.51. On 27 February 2020, SAGE papers set out an assumption for doubling time for COVID-19:

"4-5 days in China" **(CJMW8/95 - INQ000074896)**.

5.52. On 4 March 2020, SAGE agreed with the following assumption in a paper:

"4.6 days (assumed for the UK)" **(CJMW8/92 - INQ000074987)**.

5.53. On 16 March 2020, SAGE said:

"UK cases may be doubling in number every 5-6 days" **(CJMW8/03a – INQ000075664**)

5.54. The Inquiry has asked for the doubling time absent NPIs. This is less straightforward than it might appear as the broad concept of NPIs incorporates a range of activity that was implemented over time but also peoples' own behaviours absent any action by Government. This would include action taken by the public of their own initiative once they see an epidemic arriving, for instance to avoid crowded spaces or not take their children to school, as well as the more formal initiatives of Government. From mid-March 2020, considerable NPIs were brought in which altered the doubling number. There were however significant changes to behaviour in advance of the Government's actions which almost certainly had an impact on the doubling time prior to the introduction of formal Government policies.

Infection fatality rate for COVID-19

5.55. The infection fatality rate is the proportion of people infected with a pathogen who die. The case fatality rate is the proportion of people diagnosed with a disease who die. In diseases where there is a lot of asymptomatic infection and limited testing, the difference between case fatality rate and infection fatality rate can be substantial.

5.56. The infection fatality rate for COVID-19 was (and is) low compared to the novel coronaviruses SARS or MERS, but is high in comparison to the endemic human coronaviruses 229E, NL63, OC43 and HKU1 that cause cold-like symptoms. It follows that extrapolating an IFR from any of these known viruses would have been hazardous. Perhaps the most notable feature of COVID-19 was how both the IFR and CFR varied significantly by age.

5.57. On 27 February 2020, SAGE agreed with the estimate of a 2-3% CFR, and 1% IFR, for the initial (Wuhan) variant. There was however a wide variation in these values depending on a patient's age and there remained a fair degree of uncertainty. On 28 January 2020, SAGE observed that the CFR was *"currently estimated to be lower than SARS, but many uncertainties remain"* **(CJMW8/90 – INQ000203936)**.

5.58. On 11 February 2020 and then 27 February 2020, SAGE maintained this estimation of a 2-3% CFR for planning assumptions, albeit that this had wide confidence intervals **(CJMW8/91 – INQ000075784, CJMW8/95 – INQ000074896)**. The estimate for IFR on 27 February 2020 was 1% **(CJMW8/98 - INQ000203873, CJMW8/99 - INQ000203874)**.

5.59. On 4 March 2020, SAGE agreed with the following assumptions in a paper **(CJMW8/92 – INQ000074987)**:

Age	Proportion of infected that die
0-9	0.01%
10-19	0.01%
20-29	0.04%
30-39	0.09%

40-49	0.15%
50-59	0.69%
60-69	2.21%
70-79	5.92%
80+	8.76%

5.60. It remained the case that the estimated IFR differed widely by age, with much higher mortality in older ages. As new variants and vaccines altered the relationship between infection and death, the estimated IFR and CFR fell substantially.

5.61. It was not until late spring 2020, when many countries were experiencing high transmission and testing was increased alongside designated surveillance studies, that it was possible to shift from a reliance on the CFR to the IFR. This is because in the absence of a way of accurately assessing the number of asymptomatic cases, it was extremely difficult to identify the IFR reliably. At the same time and for the same reasons, the estimates for IFR converged towards a value of 1%, in which we were able to have increasing confidence compared to our initial impressions from earlier in 2020. Whilst this understanding occurred after the peak of the first wave in the UK, the estimate fell within the values previously arrived at by SAGE and NERVTAG **(27 February 2020 – CJMW8/99 - INQ000203874, CJMW8/95 – INQ000074896)**.

Overall use of these data to inform policy decisions

5.62. In terms of our knowledge of the features of COVID-19 described above, as our knowledge increased or changed I, the GCSA and DCMOs in turn changed our advice to decision makers based on that new knowledge, as summarised by SAGE. The concepts above underpinned essentially all of the advice given on COVID-19, as the response to a pandemic is inevitably predicated on the features and characteristics of the pathogen causing it, with mortality, force of transmission, and route of transmission being particularly important in determining the most effective and proportionate likely policy responses.

5.63. Clearly, in respect of many of these features, the advice alters in terms of its scale and the operational response as the exact estimates change, but the underlying scientific

logic did not change. There was for instance consistency in advising that where the R number is above 1, action is needed if exponential growth is to be stopped and reversed. The aspect of this advice more liable to changes over time concerned the measures needed to bring R back below 1, as the degree to which R exceeds 1 will affect how much action is required.

PART 6

Section 6 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Decision Making

Decision Making Structures

6.1. There were a wide range of decision-making meetings that considered the UK Government's response to COVID-19. These naturally evolved over time as the understanding of the disease and the challenges presented by it changed. It is, rightly, for the relevant government department and Ministers to decide on those structures, and they are best placed to explain their purpose and how they evolved.

6.2. A chronology of decision-making meetings that I attended from January 2020 to February 2022 was provided to the Inquiry on 21 December 2022. This included meetings such as:

- COBR (M) and COBR (O);
- Cabinet as required;
- MICS (Ministerial Implementation Committees) which became MIGS (Ministerial Implementation Groups);
- COVID-S and COVID-O;
- 'Quad' meetings of the Prime Minister, Secretary of State for Health and Social Care, Chancellor of the Exchequer and Chancellor of the Duchy of Lancaster;
- Meetings with the Secretary of State for Health and Social Care;
- Other meetings with the Prime Minister, including daily Dashboard meetings, pre-press conference briefings and *ad hoc* meetings with him and his No 10 advisers; and
- UK CMOs.

6.3. My role in these meeting was to provide clinical/public health and scientific advice as required by Ministers and other decision makers to inform their decision-making. That remained my role in these meetings over the relevant time period.

Cabinet Office Structures

6.4. As a technical adviser, my view is that Cabinet Office and No 10 structures and processes were and are a matter for the Prime Minister and Cabinet. It is the job of technical advisers to provide advice to as high a technical standard as is practical in the timeframe, within whatever formal or informal structure works best for the political leaders and other senior decision-makers at the time. In my experience in Government, the personality, preferences and skills of the political leaders, rather than the formal structures in place, dictate how best to provide advice, and how that advice is used. More formal structures are usually better for recording decisions, but not always for making them.

6.5. That said, the effectiveness of feeding in clinical and scientific advice to decision-making certainly improved substantially over the first 6 months of the pandemic. This was as much to do with the fact that very able people started to be placed in the right roles as it became clearer the COVID-19 response was the central mission of Government, and that we all got used to working together effectively and understood one another's roles and skills, as it was to do with the structures in place. In addition, the amount of reliable data on which to base decisions significantly improved, and the science became much more settled, making technical advice more certain.

DHSC Structures

6.6. The same is true for the Ministerial decision-making structures of DHSC. Different Ministers choose different structures and technical advisers have to work within their preferences. There is always a balance between having a wide enough group in the (virtual) room to ensure relevant expertise is present and challenge is possible and having such a large group that decisions become slow or impossible. Ministers vary widely in their preference on size and formality of decision-making forums.

6.7. The official structures in DHSC worked in the sense that I did not at any point think the structure of decision-making bodies was the main limitation in the quality of the decision being made. Generally, the effectiveness of emergency responses flow from the capabilities of the people involved, their ability to work together and the strength of

the technical information they have to work from, rather than the formal structure within which they work *per se*.

6.8. In practice, there will always be a lead government department for a limited emergency, and this will always be superseded by the No 10 and Cabinet Office machinery once it becomes clear the emergency is either on a major scale, the central mission of Government, or if the response crosses multiple departments. It would not be efficient to have Cabinet Office holding the technical capacity to respond to a moderate flood (DEFRA), rail bridge collapse (DfT) or limited infectious disease outbreak (DHSC).

6.9. Equally, once an event becomes a major emergency requiring multiple government departments to work together, No 10 and Cabinet Office will always have to provide a co-ordination role and lead the overall response. In these circumstances technical advice will need to be fed through them, but with individual departments retaining responsibility for their sector- for example DfE for COVID-19 schools policy. The question is when the crossover from a lead department to the centre should happen as the scale of an emergency escalates. In the case of COVID-19, there is an argument that it should have occurred sooner, but it was not inevitable that COVID-19 would escalate to that extent in, for example, early January 2020.

Formal and informal decision making

6.10. Formal decision-making meetings into which I fed technical advice included, as laid out above, COBR, Cabinet, Cabinet sub-committees, small Ministerial groups, meetings chaired by the Prime Minister, the Chancellor of the Duchy of Lancaster or the Secretary of State for Health and Social Care, meetings chaired by other Cabinet Ministers and Ministers, and officials meetings chaired by the Cabinet Secretary or other Cabinet Office officials.

6.11. Some of the 4-nation CMO meetings, which I generally chaired, also resulted in decision-making on technical clinical advice, including to the general public. Once the Bronze/Silver/Gold Local Action Committee system was set up, I chaired most of the Silver meetings which fed technical advice into the Gold meetings chaired by the Secretary of State for Health and Social Care.

6.12. I have been asked about the extent to which key decisions regarding the UK Government response to COVID-19 were made outside of formal government processes. I can only comment on the decision-making that I witnessed. On that basis, I formed the view that almost all major decisions that needed to be taken by elected political leaders were taken via a formal process. That is however not to say that all of the thought process that led up to the formal decision being made was via a formal process, although in my view this was inevitable given the speed of the pandemic. For example, the Prime Minister might have a pre-meeting with a small group of his advisers, sometimes including a few Ministers and/or me and the GCSA where technical advice was relevant. These pre-meetings allowed him to test his own views and understanding of the issues, and might lead to him coming to a provisional view on the best next steps. The formal decision would subsequently be taken in a formal meeting, often Cabinet, a Cabinet sub-committee or occasionally COBR, in which other senior Ministers could, and in meetings I was in often did, challenge the initial view or interrogate the technical advice underpinning it. The degree of time and space for challenge that I observed was, unsurprisingly, greater in smaller meetings of Ministers than large groups.

6.13. WhatsApp is an informal platform that was used during the pandemic to share information and views among other things. It was used bilaterally and by groups. These included groups of colleagues and mixed groups of advisers and Ministers. In my experience, the groups that included me did not supplant formal decision making on important issues and I certainly saw nothing which made me think that WhatsApp was being used to take on a role or make decisions that would normally be performed or taken by Cabinet or its sub-committees. The use of WhatsApp was akin to the informal conversations that might previously have been had by telephone, or by colleagues working in the same office who now worked remotely. It did however allow real-time conversations between people who were physically separated without the need to set up a group call or meeting, particularly in circumstances where that might not be practical.

6.14. As such, I considered that WhatsApp messaging overall probably provided more benefits than harms given the need to communicate often many times a day on multiple topics at a time physical meeting was minimised. It was least useful for trying to convey more complex technical information. Sometimes it took on a role like that of a pre-

meeting outlined above. That is, it helped inform decisions, but the decisions themselves were subsequently taken through a formal process where issues could be laid out more fully, ideally with data. It was in my view much less good when more technical information needed to be fed into decision making which often needed data from charts, maps, or an iterated conversation where misapprehensions were corrected.

6.15. I think that I should note that WhatsApp was also used for line management and morale reasons, including occasional discussions of the health issues of colleagues and their families (e.g. in the context of compassionate leave). Such correspondence when discussing health would normally be considered as medical-in-confidence. It would be improper for a medical practitioner to disclose such messages under normal GMC guidelines unless under the direction of a Court.

Decision-making in general

6.16. In my firm view, the primary decision-makers for issues around societal interventions against COVID-19 should be, and were, elected political leaders. Issues such as closing schools, workplaces, transport and port measures have very wide-ranging social, economic, political, legal, diplomatic and philosophical ramifications. The balance of these issues against health priorities has to be for elected leaders in a democracy, representing society.

6.17. In a pandemic, the scientific and clinical advice is clearly a major consideration but it is only one of the factors to be taken into account in decision-making. The GCSA and I were from the outset very uncomfortable with the formulation 'following the science' and consider the correct formulation to be that decisions were 'informed by science', in so far as they could be, accepting that science is by its nature often uncertain and changing. The decisions of political leaders were also, correctly, informed by economic and societal data, advice and considerations.

6.18. There were some important technical decisions which were rightly made by technical experts and which did not have wider societal or economic ramifications. Decisions for example about which clinical trials to fund, which vaccines to procure or the correct clinical pathways for doctors to follow were, for practical purposes, made by experts in

those fields, where all or almost all of the considerations were scientific or clinical in nature. I, along with other senior technical and clinical leaders, were involved in such decisions. If however such decisions involved major budgetary implications, they would usually be agreed by an elected leader as it involved public money. For the major decisions, including all the societal decisions, the principal decision-makers were, correctly, elected leaders.

6.19. From early March 2020, I and/or DCMOs or the GCSA were present at most of the main meetings I would have expected one of us to be at. For practical purposes, we were interchangeable when it came to giving scientific advice. Where a meeting took place without one of us, it was almost always for practical reasons. I did not at any point consider there were active decisions made in No 10, Cabinet Office or DHSC to exclude us from key meetings and usually the difficulty was covering all the meetings we were invited to whilst also performing other aspects of our role.

6.20. The Prime Minister, the Secretary of State for Health and Social Care and the Deputy Prime Minister (First Secretary of State) when the Prime Minister was too ill to take the lead all had different approaches to decision-making. I have set out above (see, for example paragraphs 2.63 and 6.4) that different political leaders have different personalities, preferences and skills and I considered my role was to provide advisory support in a way that conformed to the decision-making style of the principal or committee taking the decision.

6.21. The political leaders taking the major decisions were always having to balance multiple competing priorities whist working against a very short timeline dictated by the exponential nature of viral spread. In turn, this meant balancing the gathering of all necessary inputs so that the matter could be considered in the round, with the need frequently to take decisions very fast. I do not think it is possible to say there was a 'right' balance between these competing factors as there were risks in both directions. Moving too slowly risked being behind the exponential curve, moving too fast meant taking decisions in advance of having some of the key data and therefore making an avoidable error.

Role of advisers in decision making

6.22. The aim of the scientific and clinical advisers was to give as clear and balanced a technical input as possible, but without being the rate-limiting step to major decision-making. As with the political decision-making, there was a tension between providing the best possible technical appraisal with proper review and getting data and technical analysis in front of decision-makers rapidly so they could use it to inform their decisions.

6.23. With the benefit of hindsight, there were no doubt some issues where we would have done better to have gone earlier with less complete analysis, and others where the extra time spent to extend analysis would probably have been beneficial at the expense of a later but better informed decision. This was however quite difficult to judge at the time and also remains so subsequently, and for this reason it is difficult to provide examples where I am confident that going ahead of, or delaying until after, some specific piece of analysis would have made a material difference. It was especially difficult in the early stages of the pandemic where the political decisions were substantial but the data available were sparse but improving every day and the virus was spreading exponentially.

6.24. There are of course multiple scientific issues which, had we known them at the time a decision was taken, might well have led to different decisions. These include but are not limited to the relative contribution of airborne as opposed to droplet spread; the size of the asymptomatic infection pool; the proportion of transmission that was asymptomatic; the existence of the chronic and debilitating syndromes known as 'Long COVID'; the size and duration of immune protection; the speed at which the first wave was travelling in the UK; the existence of Alpha variant; how long a vaccine would take to develop; the importance of oxygen, anticoagulation and many others.

6.25. This is different however from important factors which were known contemporaneously and were then ignored by decision-makers. Once we got to mid-March 2020 and beyond, I do not think the principal decision-makers ignored scientific advice, although the degree of weighting they gave it compared to other inputs (e.g. economic and social) varied over time. That is not to say there were not members of Government more peripheral to the major decisions who wanted to cherry-pick their science to fit their world view, but this did not in my experience apply in general to the Prime Minister, Secretary of State for Health and Social Care, Chancellor of the Duchy of Lancaster,

or Chancellor of the Exchequer among others. The Secretary of State for Health and Social Care engaged with scientific advice from the earliest stages of the pandemic (in part reflecting his role in Government). Other senior decision makers generally engaged as they realised the crisis was large enough it was going to affect their own area of responsibility.

6.26. The Inquiry has invited me to comment on any concerns I might have had about the performance of individual members of the Government or the wider system. I considered it was my job to have a view on, and try to support, my direct and indirect reports. I consider the performance of the DCMOs, the Director responsible for NIHR, my Private Office and others in my direct line to have been very good indeed over a prolonged period under considerable strain. I would also like to take this opportunity to say how good I thought members of the Private Offices of the Prime Minister and Secretary of State for Health and Social Care were.

6.27. I did not, and do not, consider it my role to judge the performance of people who I was not responsible for line managing or leading but who the elected Prime Minister had put in post. My role, and that of other technical advisers, is to work with them professionally. Where I had concerns on specific issues, I would take them up with the individual at the time and there was never an occasion they did not listen. I did consider it my role to support all people in post as best I could, mainly technically but also to boost morale of individuals when I thought that was flagging, and stabilise the emotional mood of meetings by helping provide perspective. The one general comment I would make is that, in a protracted emergency, the ability of political and other leaders to maintain a positive and kindly approach to their junior staff and other colleagues is of very great importance and often underrated; these are chronically stressful events in which some mistakes will inevitably be made by excellent people trying their best. I expressed that view to senior leaders, usually as a general point.

6.28. The Inquiry has asked if I ever considered resigning. At no point did I consider resigning or say to anyone that I was considering resigning. From time to time I was rumoured to be threatening to resign in the press but this was always wholly inaccurate. I would not have chosen to have the public exposure that came with being CMO during the pandemic, but I was in post and had a duty to perform. The only circumstances under which I would have considered resigning were if I had lost the capacity to continue; lost

the confidence of the Prime Minister, Cabinet or the majority of my scientific or medical peers; thought there was a better person ready and willing to take over during the crisis; or was being made to do something I thought illegal or morally wrong. None of those in my view occurred.

PART 7

Section 7 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Initial Understanding and response to COVID-19

Introduction

7.1. The section that follows is not intended as a comprehensive account of every thought process, piece of advice given or decision made in respect of COVID-19 by me during the period January 2020 to March 2020. It does however attempt to address at a high level, in response to the questions posed by the Inquiry in the Rule 9 request, some of the key concerns I had at the time and the factors which influenced the UK's COVID-19 response. A more detailed account of my role in the introduction of NPIs is found separately at Section 8 of this witness statement.

1 January 2020 to 31 January 2020

Chronology of events

7.2. I have laid out much of the detailed chronology of this period at paragraphs 5.62 to 5.111 of my First Statement. As such, I will not repeat that material again here except when necessary. To provide context to the events of January 2020, it is worth keeping in mind the number of reported cases and deaths as the month progressed:

- On 15 January, 43 people worldwide were reported as infected. There was 1 reported death. There was 1 case in Thailand announced on 13 January and 1 case confirmed in Japan on 16th January.

- On 19 January, 65 people worldwide were reported as infected, 3 outside of China with 2 deaths.

- On 21 January, 282 people worldwide were reported as infected, 4 outside China. There were 6 reported deaths.

7.3. I first became aware of the infection subsequently known as COVID-19 on 2 January 2020. It had been reported to WHO on 31 December 2019. As laid out in my First

Statement, our understanding of the importance of this particular infection steadily increased through January 2020. Multiple reports are given every month of outbreaks which could turn into a locally, regionally or internationally important infection. Most of these disappear or are controlled. In the case of COVID-19, there was a gradual increase in the probability that this would become an international problem as data accrued and the extent of geographical spread became apparent over the first few weeks.

7.4. Initially, the work of the OCMO was led by the DCMO for health protection, Sir Jonathan Van-Tam, with input from myself. As the international risk became more apparent and the probability this would become a significant pandemic increased, I took over the lead with Sir Jonathan in support.

7.5. As set out in my First Statement, I was made aware of cases of a "pneumonia of unknown aetiology" detected in Wuhan on 2 January 2020. On this date, Sir Jonathan emailed me, DHSC health protection policy and PHE colleagues and highlighted the outbreak **(CJMW8/100 - INQ000183346)**.

7.6. The then Secretary of State for Health and Social Care has stated that he became aware from us of COVID-19 on 3 January 2020. I am not confident about whether this was the exact date but he was aware in the first week of that year that this was an outbreak. The first formal submission on COVID-19 went to Ministers on 9 January 2020. This came from policy officials **(CJMW8/101 – INQ000106041)**.

7.7. Whilst key parts of my advice and that of the wider OCMO in January 2020 have been laid out previously in my First Statement, I outline some specific points below to address the requests made in the Rule 9 request. Some of this material is also covered elsewhere in this statement, but for the Inquiry's ease, I have duplicated it here so as to provide an account of our response in a single place.

7.8. On 2 January 2020, Sir Jonathan emailed international colleagues including WHO and CDC asking for further information (**CJMW8/102 - INQ000183347)**.

7.9. On 3 January 2020, Sir Jonathan emailed Professor Sir Peter Horby (an academic colleague) to ask him to use his contacts in China to provide any intelligence on the outbreak **(CJMW8/103 - INQ000151286)**.

7.10. On 5 January 2020, I laid out a series of triggers which, if met, would provide an indication that an epidemic of global importance was possible from the outbreak that had been described **(CJMW8/74 - INQ000047484)**. These were:

"1. Healthcare workers dying. This is often the early warning that a new infection is both severe and transmissible (eg SARS, MERS, Ebola). This would be the most concerning.

2. Evidence of person-to-person spread eg in families.

3. Geographical spread implying a zoonosis is spreading (in this case we would also want to liaise with DEFRA)"

Much of the next 2 weeks were spent trying to ascertain if the triggers were met.

7.11. On 6 January 2020, Sir Jonathan wrote to a colleague in the WHO to ask for further information on the outbreak (**CJMW8/104 - INQ000151289)**.

7.12. On 7 January 2020, I met with the GCSA. While the outbreak was not the purpose of the meeting, we did discuss it. Whilst I cannot recall the exact details of my discussion at this stage, our view would have been that this was something to keep a close eye on rather than something which was definitely going to turn into a pandemic.

7.13. In the following two days Sir Jonathan made two separate points via email. On 8 January 2020, he passed on information from the CDC that the outbreak might be a novel coronavirus. On 9 January 2020, he set out that based on the limited data we had, the hospitalisation rate was relatively high even though we did not yet have large numbers of deaths **(CJMW8/89 – INQ000151296)**. At this stage, all information on the outbreak was useful and informed our thinking, but it had to be caveated due to the considerable uncertainty.

7.14. On 9 January 2020, I requested NERVTAG meet the following Monday, 13 January, in particular to consider port of entry screening (**CJMW8/105 – INQ000047488)**. On 13 January 2020, Sir Jonathan attended that first meeting of NERVTAG.

7.15. On 17 January 2020, Sir Jonathan attended a WHO meeting on COVID-19 **(CJMW8/106 – INQ000183354, CJMW8/107 - INQ000183352)**. On this date he also set out advice on port health recommendations to DHSC health protection and PHE colleagues (**CJMW8/108 - INQ000151331)**.

7.16. On 19 January 2020, I had an email discussion with Sir Jeremy Farrar and subsequently Sir Jonathan based on informal information Sir Jeremy had seen from an unpublished manuscript. This provided evidence, albeit in early form, of person-to-person spread (but not of sustained community transmission). We discussed whether there was asymptomatic transmission as that had practical implications, including for screening **(CJMW8/78 - INQ000183355)**.

7.17. In the second half of January 2020, Sir Jonathan and I became increasingly concerned about the potential risk that COVID-19 posed to the UK. I did not at this stage think it necessarily would become a significant threat to the UK, but thought the potential was increasing. The tempo of our response therefore increased from 20 January 2020 onwards.

7.18. On 20 January 2020, the first DHSC Permanent Secretary led meeting on COVID-19 was held on the basis of the increased perception of risk. It was also on this date that the OCMO alerted GO-Science of my view that we should hold a pre-SAGE (a SAGE meeting in advance of a formal request from Cabinet Office to activate SAGE) **(CJMW8/109 - INQ000047510)**.

7.19. SAGE first met on 22nd January 2020, and reached the following assessment:

"*7. There is evidence of person-to-person transmission. It is unknown whether transmission is sustainable.*

8. The incubation period is unclear – but appears to be within 5 to 10 days; 14 days after contact is a sensible outer limit to use.

9. It is highly probable that the reproductive number is currently above 1.

10. It is currently estimated that the mortality rate for WN-CoV is lower than for SARS, but it is too early to reliably quantify that rate.

11. There is insufficient information currently on the genetic strain to comment on WN-CoV's origin.

12. There is no evidence yet on whether individuals are infectious prior to showing symptoms.

13. There is no evidence that individuals are more infectious when symptoms are more severe, but that is likely.

14. There appears to be very little genetic diversity in WN-CoV based on sequences available so far.

15. It is reasonable to argue – based on lessons from MERS and SARS, and consistent with exported cases of WN-CoV – that individuals returning from Wuhan are no longer at risk if they show no symptoms after 14 days" **(CJMW8/81 – INQ000087535)**.

7.20. At this stage, DHSC was engaging with the potential threat with meetings as laid out in Sir Christopher Wormald's first corporate statement for Module 2 of the Inquiry (INQ000144792). The output from the first and subsequent SAGE meetings informed my advice to DHSC. It was also communicated to the Cabinet Office. Central Contingencies Secretariat and DHSC were both on the distribution list for SAGE Minutes **(CJMW8/110 – INQ000236378)**.

7.21. In addition, on 22 January 2020 I also wrote to DHSC health protection policy and PHE colleagues to suggest action needed at ports of entry **(CJMW8/111 - INQ000203861)** and briefed the National Security Council (Officials) on COVID-19.

7.22. On 23 January 2020, Professor Sir Stephen Powis (NHS England National Medical Director), Professor Sharon Peacock (PHE National Infection Service Director) and I sent a Central Alert System ("CAS") alert message to clinicians offering advice for clinical staff encountering patients with respiratory infections arriving from overseas **(CJMW8/112 - INQ000047535, CJMW8/04 - INQ000047537)**.

7.23. On 24 January 2020, I attended the first Ministerial COBR meeting on COVID-19. In answer to a question from the Inquiry, I do not have a view on whether COBR should have been held before 24 January 2020. COBR is a coordination mechanism but other

means of coordination across Government exist, in particular the Civil Contingencies Secretariat (CCS) **(CJMW8/113 - INQ000047549)**.

7.24. On 24 January 2020, I had a first meeting on COVID-19 with the other UK CMOs. At the time these were Professor Sir Michael McBride (Northern Ireland), Sir Frank Atherton (Wales) and Dr Catherine Calderwood (Scotland).

7.25. On 27 January 2020, I met with the GCSA and research funders (UKRI, the Medical Research Council ("MRC"), Wellcome and NIHR) to discuss the COVID-19 research likely to be needed in the event a pandemic occurred **(CJMW8/114 - INQ000047580, CJMW8/115 - INQ000203863, CJMW8/116 - INQ000047578, CJMW8/117 - INQ000047579)**. This was also the date on which the regular internal meetings on COVID-19 with the Secretary of State for Health and Social Care began. At this time, there were 2,798 cases confirmed internationally, 2,741 of which were in China, and 80 deaths **(CJMW8/118 – INQ000236438)**. There were no deaths outside China reported at this point and no recorded cases in the UK.

7.26. On 28 January 2020, SAGE met a second time. On this date, I also emailed William Warr, the health Special Adviser ("SpAd") to No 10. This was the first direct communication from the OCMO to No 10 on COVID-19. This email set out the possible scenarios that COVID-19 could take, taking account of SAGE and UK CMOs views **(CJMW8/119 - INQ000047585)**.

7.27. On 29 January 2020, the Secretary of State for Health and Social Care had a call with the Director-General of the WHO. Sir Jonathan and I joined the call. I also briefed the Shadow Health and Social Care Secretary on COVID-19.

7.28. On 30 January 2020, I had a first meeting on COVID-19 with the Presidents and/or Chairs of the Royal Colleges relating to medicine, under the auspices of the Academy of Medical Royal Colleges, at that time chaired by Professor Dame Carrie MacEwan. These are the all the major professional bodies for the medical profession and include the Royal Colleges of Physicians, General Practitioners, Surgeons, the Faculty of Public Health and others.

7.29. On 30 January 2020, WHO declared a PHEIC. This was communicated to core decision makers including No 10 at that time. Also on this date, the UK CMOs advised the public of an increase in the UK risk level from low to moderate **(CJMW8/120 - INQ000203938)**. This increase in the UK risk level seemed a good way of messaging that this risk was one the UK should take seriously as part of the international increase in risk.

7.30. On 31 January it was announced that two patients in the UK, who were members of the same family, had tested positive for COVID-19 both Chinese nationals **(CJMW8/121 – INQ000051857)**.

7.31. On 31 January 2020, I met with one of the Prime Minister's Private Secretaries and William Warr, health SpAd to No 10. We discussed COVID-19. On this date I also led the first press conference on COVID-19, had my first meeting on COVID-19 with the Directors of Public Health, (who work in local authorities as the lead public health official including for health emergencies) and jointly sent an updated CAS alert to the medical profession with Professors Powis and Peacock. **(CJMW8/122 – INQ000068530, CJMW8/123 – INQ000203867)**.

7.32. Given the passage of time, I cannot recall the details of my non-scheduled interactions with the Secretary of State for Health and Social Care regarding COVID-19 in January 2020. I had a call with the Secretary of State on 23 January ahead of his statement to the House and a COBR prebrief on 24 January. Per my diary, 27 January was the first of a series of formal meetings I had with him specifically on the topic of COVID-19. We had non-scheduled interactions before that date however, but I cannot recall the precise details.

Assessment of risk to the UK

7.33. NERVTAG considered COVID-19 on 13 January 2020 at my request. I was not present at this meeting, but consider its assessment that at that point the risk to the UK was very low to have been reasonable. The point of such risk assessments is not to assess the risk at some theoretical future point but rather the risk at that point in time. Given at this time China had reported 44 cases and the first cases outside of China had just

been reported (1 case in Thailand), this was a rational assessment. **(CJMW8/76 – INQ000023107)**.

7.34. I was aware, as was Sir Jonathan, of the path that had been taken by SARS and MERS, both coronaviruses. Both these viruses had caused understandable concern and led to international spread but had not developed into a full pandemic or a large number of cases in the UK. I did however consider that SARS, MERS or a similar virus could be a significant threat if they became more transmissible, as described by the UK Vaccine Network in 2019 **(12 September 2019 - CJMW8/124 - INQ000183378)**.

7.35. For both SARS and MERS, the great majority of transmission, and possibly almost all, was from symptomatic cases. We were however well aware that even apparently similar viruses can take very different paths and that accordingly, asymptomatic transmission was possible.

7.36. Virtually all of our understanding of COVID-19 in January 2020 came from China. I had, and still have, a very high respect for the scientists and clinicians in China and consider they are capable of providing clinical, epidemiological and scientific outputs to the highest international standard. I therefore had no reason to doubt the technical capacity of China to provide good international data.

7.37. There were however two potential reasons why data from China might not be accurate or complete. The first was the biological and practical reality that this was a fast moving new virus to which China was mounting a very major response. There was a high chance that their capacity, in common with any other country faced with this situation, would be overwhelmed. Accordingly, the data they could provide the international community would inevitably lag behind the real situation due to technical reasons and system strain. Had the UK been the first country affected by COVID-19, there would in all probability have been some delay in our reporting of data as the initial system was overwhelmed.

7.38. What was less clear was whether the Government of China would choose to delay or modify the information it made available internationally even if it were available domestically in China. I thought it very unlikely they would exaggerate the risk. Insofar as there was a risk therefore, whether from understandable reasons of the system

being overwhelmed or from deliberate policy, it was that they would reduce or delay the reported risk, and thereby lead to an underestimate of that risk by ourselves. This was my view at the time.

Factors which influenced my response in January 2020

7.39. As of January 2020, I had a good awareness of the UK's capability to respond to a pandemic. I considered that it was capable of responding effectively to small outbreaks, spillover cases from major epidemics elsewhere (e.g. SARS, MERS, Ebola in West Africa) and had very strong science capabilities. I had no illusions that the UK, or for that matter any other Western nation, was well set up to meet the challenges of a major pandemic with significant mortality.

7.40. For reasons I have laid out in previous witness statements, my view is that every pandemic is very different to the last; for example, the last major pandemic affecting the UK was HIV, a sexually and intravenously transmitted infection of predominantly young adults with initially 100% mortality for which the interventions were completely different from those for COVID-19. I was not of the view that investment in health protection had been strong over the previous decade, nor did I think that previous pandemic plans or lessons from previous exercises would necessarily stand up to the challenges of a new pandemic from whatever source.

7.41. I was influenced in my thinking by my personal experience of the major pandemics, epidemics and outbreaks I had seen. The ones which influenced me most outside influenza were HIV, Ebola and malaria. I learned a number of things from the domestic UK response to H1N1 in 2009, which in general I thought was good, although personally I was more engaged on the international side. I certainly did not take from the experience of 2009 that there was merit in delaying any response. I thought the rapid standing up of the response to H1N1 in 2009 was entirely correct, but that arguably we should have stood down elements of it more rapidly once it became clear that mortality was very low by influenza standards.

7.42. I was clear to policymakers that there were risks to overreaction as well as underreaction. An example is my email to the health SpAd in No 10 sent on 28 January

2020 **(CJMW8/119 - INQ000047585)**. On that day there were 4,593 international cases reported and 106 deaths.

7.43. For the first 20 days of January 2020, we were assessing the extent to which we thought an international crisis was likely to occur. From 20 January onwards, we commenced preparations in earnest to be ready for a pandemic were one to occur. In practice, this was similar in structure to the roadmap subsequently laid out: "contain, delay, research and mitigate". These were parallel work streams and should not be seen as strictly sequential.

7.44. Containment was primarily intended to identify any cases in the UK that were spillover cases. It was initially a real possibility that even if this became an international emergency it might not become a pandemic, but rather something similar to the SARS epidemic. This had led to widespread infection in Asia and Canada, especially in the health services as much of the spread was in hospitals, but only spillover cases occurred in the UK, which were contained. My view at the time, expressed in public meetings as well as within Government, was that if this was a containable disease (i.e. one with limited transmission) the UK was capable of containing it, but if it was significantly more transmissible containment was very unlikely to hold for long anywhere, including the UK and wider Europe and it would spread globally. Were that to be the case, we should aim to delay the upswing of any UK pandemic wave.

7.45. There were several benefits to delaying the arrival of the first pandemic wave; to push it away from the winter months where the NHS is under greatest pressure and when influenza would have some syndromic similarities; to maximise the chances that the first scientific understanding would be in place before the wave; and to prepare systems across the whole of Government for what would clearly be a major public health, medical, social and economic shock. There was a further dividend in that any delay to the first wave would allow us to get our research programmes underway in advance, something for which I had both operational and advisory responsibilities due to my role as Head of NIHR.

7.46. The WHO's declaration of a PHEIC on 30 January received wide publicity and was therefore well known in Government. In my view, this was simply a recognition of the realities of the situation unfolding in China and eastern Asia. It was not at that stage

necessarily a prelude to the declaration of a pandemic. Between 2005 and 2020, there were five PHEIC declarations: the 2009 H1N1 influenza pandemic; 2014 polio declaration; 2013–2016 outbreak of Ebola in West Africa; 2015–16 Zika virus epidemic; and the 2018–20 Kivu Ebola epidemic. Only one (influenza H1N1) was a potential significant threat to the UK. Most recently, a PHEIC was declared for Mpox, a disease which whilst certainly having significant international impact, fell well short of a pandemic and caused only limited impact in the UK. Whilst WHO did not declare a COVID-19 pandemic until March, it was helpful to have confirmation from them at this time that COVID-19 should be taken seriously internationally.

COVID-19 as an airborne high consequence infectious disease

7.47. On 13 January 2020, Sir Jonathan suggested COVID-19 should be seen as an airborne high-consequence infectious disease ("HCID"). This was in response to an email from PHE setting out that "*the 4 Nations Public Health HCID List and Definition group who have considered the rationale for Wuhan novel coronavirus (WN-Cov)… made an interim recommendation that this should be considered as an airborne HCID".* The email went on to say: *"In material terms, this does not change our immediate public health response but will influence how the health services in the 4 nations manage patients"* **(CJMW8/125 – INQ000151309)**.

7.48. Sir Jonathan also suggested that PHE should seek NERVTAG's view. NERVTAG met on 13 January 2020. The minute records the following:

"NERVTAG were briefed that the novel coronavirus has been reviewed by the 4 Nations Public Health Agencies who have recommended it is designated as an interim airborne HCID, although this now has to be considered by other bodies. The group had requested that this information was provided to the Chair of NERVTAG. NERVTAG have noted this and has not raised any specific problems around this precautionary measure." **(CJMW8/76 – INQ000023107)**.

7.49. In my Second Statement, I laid out some points about HCIDs, and repeat them below:

"*A novel emerging infectious disease is likely to be treated as an HCID whilst the characteristics of the pathogen are still becoming known. Wuhan novel coronavirus*

was classified as an HCID on 16 January 2020 and declassified on 19 March 2020, following advice from ACDP. These decisions took into account the available information and uncertainty about this novel disease at the beginning of the outbreak and mortality rates among other factors.

There are significant disadvantages to a disease being classified as a HCID when it is not one. At the individual patient level it makes treatment more difficult and alarming as very strict barrier care will be in place, and ill patients may have to be transported around the country to specialist units with attendant risks. At an NHS-wide level each case of a HCID is highly resource-intensive, and the specialist provision of beds is limited. At a population level contacts will be very strictly isolated and monitored. There are therefore few advantages, and several risks, to having a HCID classification in place when it is not needed. De-classifying diseases down to a non-HCID wherever possible should therefore be seen as normal practice once initial risk assessments are in place".

7.50. In my view and at the time and with hindsight, I consider the initial classification of COVID-19 as a HCID as prudent as part of the containment strategy, and the de-escalation sensible once it was clear we had multiple cases and the mortality in younger people was lower than most diseases which are HCIDs such as Ebola.

1 February 2020 to 28 February 2020

7.51. February 2020 saw increasing attention paid to the UK's preparations for COVID-19, as well as aspects of our direct response e.g. the management of travellers abroad. On 31 January it was announced that two patients in the UK, who were members of the same family, had tested positive for COVID-19; both Chinese nationals, which did not lead to onward transmission. On 28 February 2020, the UK recorded the first case of COVID-19 which clearly appeared to have been contracted domestically (i.e. no international links). Time was spent in trying to work out what combination of NPIs could get R below 1 for COVID-19 whilst minimising the impact on society.

Meeting with the Prime Minister on 4 February 2020

7.52. I first briefed the Prime Minister, who was accompanied by the Cabinet Secretary and others, on 4 February 2020 (having already communicated with his health SpAd from

28 January and aware of a significant Cabinet Office briefing to the Prime Minister on 27 January). My briefing was part of a wider NHS briefing including on the potential risks of COVID-19. At that point, I expressed the view that if COVID-19 spread internationally and became a pandemic, there was a reasonable chance we would have between 100,000 and 300,000 deaths from it in the UK.

7.53. This was not intended, nor was it presented as, a formally calculated reasonable worst case scenario ("RWCS"). Rather, these figures were an indication of the seriousness of the situation if a pandemic of this new infection were to emerge. In the same meeting, it was made clear that the RWCS used for planning, based on pandemic influenza, was even higher than this. By then, the total number of reported cases internationally was 29,630. The total number of reported deaths was 425 in China and 1 outside. My principal aim in this meeting was to ensure that the Prime Minister understood that if COVID-19 turned into a pandemic there was likely to be very significant loss of life in the UK. He heard the advice and in my view understood it; I have no way of telling whether he believed it. It was a relatively brief discussion.

7.54. I do not recall in that meeting the Prime Minister asking me whether flights should be banned. This does not mean he did not, simply that I do not recall it. Had I been asked, I would have likely said that banning flights just from China, were there to be a pandemic, might delay but would not prevent ingress of the disease to the UK. This was consistent with the widely held international views at the time. I cover our advice on borders and travel separately in greater detail below in Section 9.

Our understanding of COVID-19 in early February 2020

7.55. By late January 2020, SAGE had only just started to be operational. We did not in early February have a reliable RWCS for COVID-19 specifically. There was a pre-existing unmitigated RWCS for pandemic influenza with an upper bound of 820,000 excess deaths **(CJMW8/126 - INQ000236439)**. In the absence of specific data for COVID-19, this was used for planning purposes whilst COVID-19 specific data emerged. It was of course wholly improbable that no mitigations would be undertaken.

7.56. Subsequently, SAGE would formally agree RWCS numbers specifically for COVID-19 which were thereafter used by myself and the GCSA in our advice and disseminated

more widely across Government via the SAGE minutes **(27 February 2020 – CJMW8/99 - INQ000203874).** Influenza pandemic planning assumptions were actually more alarming in terms of the RWCS than the COVID-19 specific data, and so using these was not a brake on the potential seriousness of the situation. As always, it is better to plan for a higher RWCS and then de-escalate once better data becomes available, than to be surprised by the severity and to under-plan.

7.57. Various commentators have frequently made comparisons between COVID-19 and influenza. For my part, I certainly did not consider COVID-19 to be like seasonal influenza. Whilst we had adopted the RWCS for pandemic influenza, in my opinion quite reasonably in the absence of specific COVID-19 data, my view was that although it had some similarities to pandemic influenza, it also had a number of important differences.

7.58. The most important similarity was that it was by this stage apparent it is a highly transmissible infection passed on by the respiratory route (unlike for example MERS- much less transmissible). The route has very significant implications for potential methods of control as compared to pandemics or outbreaks passed on by sexual (HIV), touch (Ebola), vector (Zika, malaria) or oral (cholera, nvCJD) routes. Respiratory pandemics will generally be faster in their transmission and most of the countermeasures available for other routes do not work. On the other hand, there were some important differences between COVID-19 and pandemic influenza that emerged relatively early on in the pandemic, in particular the fact that in contrast to influenza children were relatively unaffected in terms of severe disease (although severe and fatal cases did occur in children). It also had a longer generation time and a number of other important technical differences.

7.59. The Inquiry stated in their ask of me that the SAGE meeting on 3 February 2020 considered that "*China was likely significantly underestimating its case number and fatality figures*". This appears to be a subtle but important difference from what SAGE actually said. The minutes of the SAGE meeting dated 4 February 2020 state that "*SAGE was updated on latest case numbers and fatalities: there was agreement that figures for China likely a significant underestimate*." **(CJMW8/94 - INQ000051925)**. For reasons I have covered above, we were aware of the risk that data from China may have contained inaccuracies which gave rise to a risk we would underestimate the

severity of their outbreak; this did not mean these were necessarily deliberate in whole or part given the speed of the epidemic and the limitations in testing. I cover this point at paragraphs 7.36 to 7.38 above.

7.60. The Inquiry has asked about comments in an email discussion with Neil Ferguson and others on 21 February 2020 (INQ000148969) on why it was premature to talk about ending containment at that time. It is important in answering this to recognise that containment is a global strategy. The aim is (like with SARS or with the Ebola crisis in West Africa) ideally to get back to a situation where there the disease is no longer a global threat, or at least (like MERS) where a largescale epidemic or pandemic is unlikely. Once a country has declared that containment is no longer possible that has global implications. My view was the UK on 21 February 2020, at a point 9 cases had been identified in the country and 0 deaths, was not in a position to declare that containment had failed, a statement with international implications if true **(CJMW8/127 – INQ000250983)**. By late February 2020 I thought it highly likely we would get to that point (so to that extent I agreed with Prof Ferguson), but it was not yet certain.

Policy development in February 2020

7.61. In my view, the GCSA and I shared a common understanding of the need for urgent action throughout February 2020. Our positions were informed by the opinions of SAGE, of which there is a contemporaneous record. Neither of us argued against the conclusions of SAGE, nor did we disagree with them and both of us approved minutes. I do not believe there were significant differences between the GCSA and me on the policy planning approach to be adopted at this time. In this early period of the pandemic, as we had not worked so closely together by this point as we would come to, we did on occasions have different approaches to the tactics of how to get things through Government and the points at which pressing would be most effective. I do not consider these to have been significant however, and do not think they had any material impact on the UK's response.

7.62. The best account of policy planning undertaken in February 2020 can be found in the COVID-19 action plan published 3 March 2020 **(CJMW8/128 – INQ000057508).** This described what was ultimately referred to as the "contain, delay, research and mitigate" framework.

7.63. In following this approach, the UK Government implicitly rejected two alternatives which were advocated by some: either to let the virus circulate unchecked in an attempt to protect only the most vulnerable; or to pursue a so-called 'zero COVID' policy. This middle position was in line with that followed by the vast majority of European countries, which accepted that COVID-19 would circulate, and aimed through Government and societal actions to keep this at a lower level so as to reduce the risk of death, serious illness, or that health services would be overwhelmed. In answer to a direct question from the Inquiry, I did not at any time advise the Prime Minister that a strategy we should 'take it on the chin' was a sensible basis for policy planning, nor did I ever believe this was sensible policy given the likely loss of life involved.

7.64. I was asked by officials for my comments on multiple iterations of this four point action plan and offered my views on areas on clinical and public health matters. I also, at the request of the Permanent Secretary at the Department of Health, undertook a high-level fact check to ensure the final version was scientifically accurate. I provided further detail on my advice at the time in a press conference on 3 March 2020 (**CJMW8/129 - INQ000047933)**.

7.65. I considered, and still consider, the "contain, delay, research, mitigate" strategy to have been a reasonable one at the stage it was set up. As I will outline below, with the benefit of hindsight we moved too slowly in March 2020 because we thought we were further away from a significant countrywide wave in the UK than subsequently became apparent. The strategy however was not the reason for this delay. In my view, this was predominantly a product of the limited testing we had access to in the first part of the pandemic, combined with the simultaneous seeding of COVID-19 across a large part of the country due to imported infections from Europe in mid-February 2020 which we did not detect until later.

7.66. The Prime Minister was undoubtedly concerned early in the pandemic about the risks of overreaction given the economic and social impact this would have. Given his wide responsibilities, I do not consider this was an unreasonable thing for him to worry about. My job was to lay out as best I could the potential public health risks to assist him in taking balanced decisions.

7.67. The Inquiry has asked me whether the Prime Minister should have been more involved in the response to COVID-19 in February 2020. I respectfully cannot answer that since I do not know the reasons he chose not to be, the competing calls on his time and how he chose to prioritise. This is much better answered by him. Mechanistically, the Cabinet Office, CCS, and DHSC officials continued to plan and would have done so with or without the Prime Minister. COBR ministerial meetings met, chaired by the Secretary of State for Health and Social Care, who understood the brief. Clearly however, in Government if the Prime Minister gets involved in a particular matter this signals importance and urgency to the wider system.

Awareness of measures in other countries

7.68. I was aware of the measures being taken by other nations early in the COVID-19 response as these were widely reported in the press, available through formal reporting (e.g. DipTels), and via informal contacts and bilateral discussions. I have set out some of our international engagement in more detail above at paragraphs 2.80 to 2.90.

7.69. When considering the interventions of other countries there were at least two stages in our approach. The first was one of science and public health; were they epidemiologically appropriate in the UK and could we practically enact them? Advice incapable of being enacted is of limited use in an emergency. There was then a second set of questions which were for political leaders. These concerned the legal, social and economic impacts of such measures, and balancing these against the public health impacts.

7.70. Quite a lot of concern with some of the measures being used elsewhere was that whilst they may prove effective, they would be unfeasible or impractical. We did not for example have the testing capacity or contact tracing infrastructure of South Korea in early 2020 due to their prior investment in this area, and so trying to emulate their approach exactly would have been unrealistic. We have a very much more integrated economy reliant on international trade for basic goods, including food, than New Zealand. It was not that we thought conceptually that the measures adopted in these countries could not work, but rather that they seemed less likely to be feasible given our own situation. The approach we observed in early 2020 in China had been demonstrated to work in their context, but depended on a particular interaction between

the State and citizens. It was a political decision as to whether to follow or not, but there were good reasons for thinking UK social responses would not necessarily be the same as those in China.

7.71. In considering any intervention used internationally, it was always essential to think through how the interventions might work in the UK over the pandemic as a whole, rather than just over the first few weeks. Commentary that implies the commentator would have liked the results of the first few months of another country's response but not their later course misses the reality that these are linked.

Our understanding at the end of February 2020

7.72. On 27 February 2020, SAGE concluded that in a reasonable worse case scenario "*80% of the UK population may become infected, with an overall 1% fatality rate in those infected*" **(CJMW8/99 - INQ000203874)**. This was based on the data SAGE had up to that point and is set out usefully in a table they published **(CJMW8/95 - INQ000074896)**. By this time, SAGE minutes were being widely read across Government and observers from many government departments were present at SAGE meetings. This allowed, and resulted in, wide dissemination of this information.

7.73. The scientific background to SAGE decisions is best judged from the contemporaneous record and the papers from the specialist groups such as SPI-M that fed into it. The figures of an approximately 1% IFR and an upper bound of 80% of the population becoming infected which were adopted for the RWCS were however reasonable both at the time based on what was known, and subsequently do not seem unreasonable based on what later transpired. These figures were in respect of the original (less infectious) Wuhan variant and applied to the pre-vaccine era.

7.74. The RWCS is exactly that; it is the highest figure which could occur reasonably and generally does not take account of any mitigation strategies. As a result, the expectation is that the true figure will be lower than the RWCS once Government and society have acted.

7.75. SAGE sent a summary of this view to the Cabinet Office by proposing edits on a note the Cabinet Office was drafting for the Prime Minister on 27 February 2020

(CJMW8/130 - INQ000236383). Key conclusions included in that note were that COVID-19 looked increasingly likely to become a pandemic and that the risk could be in line with the pandemic influenza RWCS. COBR met on the 28 February 2020 and both the GCSA and I attended. The assumptions from the SAGE meeting the day before were included in the papers of that meeting **(CJMW8/99 - INQ000203874)**.

7.76. As of 28 February 2020, 20 people in the UK (eighteen in England, one in Wales and one from Northern Ireland) had tested positive for COVID-19 with no deaths. 83,351 people were confirmed as infected worldwide, 4,527 outside of China. This date saw the first confirmed domestic case being identified which could not be traced back to an infection abroad, as well as being the date on which the WHO raised the global risk level to "very high". From about this time, community transmission was likely to have been increasingly established in the UK. Although imported spillover cases had occurred earlier in February, the widespread seeding of COVID-19 to the UK from France, Spain and Italy is currently understood to have occurred from mid-February onwards, and likely manifested itself in sustained community transmission from the end of the month onwards **(CJMW8/131 – INQ000224069)**.

7.77. This widespread seeding was not recognised at the time but had serious implications for the speed with which the UK's first wave developed and was a key difference in our experience compared to that of many other nations. In China (Wuhan), South Korea, and Italy (Lombardy) the experience was that the national epidemic started in one place and then spread out from there. The more widespread simultaneous seeding across the UK resulted in a more rapid first wave, which to a greater extent affected the whole country simultaneously, than that which other nations had previously witnessed.

7.78. The Inquiry has asked to what extent the virus and disease were properly understood by me in January and February 2020. If the question is whether my and our collective understanding over that period was the same as it is now, very clearly the answer is no. I have outlined how our understanding changed in respect of many of the scientific fundamentals in Section 5 above.

7.79. There were very large numbers of things we did not know about the virus clinically and epidemiologically in addition to the likely responses to the pandemic of populations and

Governments. If we were to re-run the advice given in Government based on what we know now, it is pretty obvious that it would have been very different. We were well aware at the time that we had a very limited understanding of this new infectious threat. If the question is whether we understood it as well as other international observers at the time based on the contemporaneous data, then I do not think we were a major outlier in terms of our understanding in the initial two months, and have not subsequently seen evidence other nations at a similar point in their epidemiology had a better understanding.

Advice in respect of mass gatherings in February – March 2020

7.80. Throughout the early pandemic, and in particular around the end of February and beginning of March 2020, my advice was sought on mass gatherings. In particular, I spoke to the Secretary of State for Digital, Culture, Media and Sport about sporting fixtures on 28 February 2020.

7.81. My advice to core decision-makers between January and March 2020 about public gatherings was entirely informed by SAGE **(4 February 2020 - CJMW8/94 - INQ000051925, 13 February 2020 - CJMW8/132 – INQ000106109, 27 February 2020 - CJMW8/99 – INQ000203874, 3 March 2020 - CJMW8/133 – INQ000061520, 5 March 2020 - CJMW8/134 – INQ000061521, 10 March 2020 CJMW8/51 – INQ000061522, 13 March 2020 - CJMW8/135 – INQ000236391)**. It was fully recognised that this was a difficult issue. There was a legitimate concern in SAGE that if mass events due to be held in the open air were cancelled at short notice, then people who would have travelled to a venue and would have been watching them outdoors would instead have crowded into pubs and other indoor venues, possibly increasing risk. In retrospect, in my view this missed some important points, of which the most important was the signal it sent of normality at a time when that was not what we were trying to convey. Whilst it remains the case that outdoor events are considerably safer than indoor ones from a COVID-19 perspective (although not zero risk), pictures on television of massed crowds were very unhelpful. In hindsight, we also likely underestimated the risk involved in travel to and from venues and in getting into the venue itself. Having said that, it is of course impossible to quantify the difference in the

spread of infection between those events taking place and what would have happened (taking into account, for example, the pub scenario) had they been cancelled.

Advice to the health and social care system

7.82. Since 2012, the responsibilities previously held by the CMO in respect of the NHS in England have instead been held by the NHS National Medical Director (in Scotland, Wales and Northern Ireland other divisions of responsibility occur). I do not therefore have a direct role in the organisation or operation of the NHS.

7.83. Nevertheless, I did and do work closely with the NHS National Medical Director, Professor Sir Stephen Powis, as part of my broader contribution to leadership of the medical profession in England. Sir Stephen was an excellent colleague and medical leader over the period of the pandemic, as well as a good communicator of science and clinical information to the public via the media. Largely, guidance to healthcare providers was given either by the NHS, or by PHE as it was, on matters such as infection prevention and control. For social care workers, the same advice would usually have come from PHE. This is a usual way in which the NHS and PHE (now UKHSA) interact.

7.84. Core political decision makers (as defined by this Module of the Inquiry) have much less of a role in advising on guidance to health and social care providers when it comes to technical matters, such as infection prevention and control. Such information was passed from technical infection prevention and control experts to those treating patients directly, rather than via Ministers. The NHS National Medical Director, PHE National Infection Service Director and I sent a number of CAS alert messages to clinicians in January and February 2020. These are set out in my First Statement at paragraphs 5.95 to 5.127. They are also available publicly and were from the point at which they were sent. I and the other CMOs often gave technical (as opposed to operational) messages directly to the medical profession via a variety of routes where that was appropriate.

7.85. One technical area in which I did advise touching on the interests of the health and social care system was in relation to making COVID-19 a notifiable disease. The principal reason I was keen on COVID-19 being a notifiable disease was that this is an

established mechanism to allow free treatment for people from other nations who do not otherwise have NHS entitlement. In the context of an infectious disease outbreak such as COVID-19, this helps minimise risk to the wider general population.

7.86. Notifiable diseases are treated for free because without this there is a risk that people with a potentially communicable disease would not come forward and seek treatment out of fear of the bills that will result. They then stay out of hospital and remain in the community where they are at risk of transmitting the disease to others. There were also some secondary gains from having COVID-19 as a notifiable disease, such as health staff being required to report domestic cases which should improve epidemiological reporting. In my view, the timing of this decision on 5 March 2020 was sensible in the overall context of the COVID-19 response, and likely made little material difference to the outcome.

Isolation and the HCID network

7.87. By 3 February 2020 there had been two cases of COVID-19 in the UK (announced on 31 January 2020). A third case was announced on 6 February 2020. Small numbers such as these were possible to manage in the HCID network.

7.88. I have been asked by the Inquiry whether it is correct that on 3 February 2020 plans for the response to COVID-19 extended to 50 specialist beds with a further 500 available for isolation. I have seen those figures provided by the Secretary of State for Health and Social Care to Parliament. However, I understand the reference to the availability of specialist isolation beds in early February to simply be a reflection of what beds were available, rather than any judgement of the scale of the COVID-19 problem. As I told the Inquiry in my Module 1 oral evidence, the HCID network is best conceived as a series of concentric circles. There are two high consequence infection centres in London and Newcastle designed for the highest risk patients (for example Ebola, which has a mortality of up to 70% and a high risk of being transmitted in hospital). These units have a very small number of beds across the two sites. Beyond these are a group of high consequence infectious disease specialist centres arranged in a HCID network of around 50 beds. Thereafter, there are approximately 500 further specialist infection beds with isolation facilities outside the HCID network. Were these to be exhausted, the NHS would rely on negative pressure side rooms in hospitals outside of specialist

infection units, then general side rooms, and then finally the use of general wards capable of cohorting infected patients together.

7.89. At the point that the principal aim was to contain any cases so as to contain (if possible) the spread of the disease, the HCID network would have been capable of caring for all the initial cases that required hospital admission. This was part of the contain process and would have also served to prevent onward infection of COVID-19 spillover cases to healthcare workers and the general public. Once significant domestic transmission occurred however, it was clearly not going to be possible to manage all cases in the HCID network, and the NHS would need to rely on wider isolation beds, and in time, cohorting of infected patients on the same ward. The disadvantages of having HCID classification when it is not needed are laid out above at paragraphs 7.47 to 7.50.

The first two weeks of March 2020

7.90. SAGE advice on 5 March 2020 was:

"There is epidemiological and modelling data to support implementation – within 1 to 2 weeks – of individual home isolation (symptomatic individuals to stay at home for 14 days) and whole family isolation (fellow household members of symptomatic individuals to stay at home for 14 days after last family member becomes unwell) to delay COVID-19 spread, modify the epidemic peak and reduce mortality rates" **(CJMW8/134 - INQ000061521)**.

7.91. NERVTAG's advice on 6 March 2020 for isolation of cases was:

"NERVTAG's recommendation for the length of time in self-isolation is between 7 and 14 days. In the current situation NERVTAG would prefer this period to be towards the longer end of the range. The caveat accompanying this recommendation is that those in immunocompromised groups and those on steroids (including those with lung disease) to be considered for longer periods of self-isolation due to the reports of increased shedding and vulnerability. NERVTAG would revisit this when more data is available" **(CJMW8/49 – INQ000087540)**.

7.92. On 9 March 2020 there had been three deaths reported in the UK. On the same date in Italy there were 336 deaths reported **(CJMW8/136 - INQ000236385)**. The advice from SPI-M on 9 March was that 7 days isolation of cases gave the same benefit as 14:

"From a population perspective, the difference between 7 and 14 days is negligible, but you might expect higher compliance from 7 days" **(CJMW8/50 - INQ000048000)**.

7.93. On 10 March 2020, SAGE advised:

"5. Based on surveillance, including cases in intensive care units (for whom there is no travel history accounting for infection), the UK likely has thousands of cases – as many as 5,000 to 10,000 – which are geographically spread nationally.

6. Transmission is underway in community and nosocomial (i.e. hospital) settings.

7. Available data for the UK are accruing fast. Firmer estimates of infection rates will be available next week...

12. The UK is considered to be 4-5 weeks behind Italy but on a similar curve (6-8 weeks behind if interventions are applied)

14. SAGE endorsed NERVTAG's advice that individual case isolation should last for 7 days from onset of symptoms." **(CJMW8/51 – INQ000061522)**.

7.94. On 12 March 2020, UK Chief Medical Officers raised the risk to the UK from moderate to high **(CJMW8/137 – INQ000052485)**. This was in response to the clear increase in transmission.

7.95. On 13 March 2020, SAGE stated:

"1. Owing to a 5-7 day lag in data provision for modelling, SAGE now believes there are more cases in the UK than SAGE previously expected at this point, and we may therefore be further ahead on the epidemic curve, but the UK remains on broadly the same epidemic trajectory and time to peak.

2. The science suggests that household isolation and social distancing of the elderly and vulnerable should be implemented soon, provided they can be done well and

equitably. Individuals who may want to distance themselves should be advised how to do so.

3. SAGE is considering further social distancing interventions – that may best be applied intermittently, nationally or regionally, and potentially more than once – to reduce demand below NHS capacity to respond. The modelling sub-group is discussing potential interventions on Monday 16th, for review by SAGE on Tuesday 17th.

4. The behavioural science suggests openly explaining to the public where the greatest risks lie and what individuals can do to reduce their own risk and risk to others, even if this is ahead of measures announced by the Government – but SAGE recognises that taking individual measures may be more feasible for some than others. Greater transparency could enable personal agency, send useful signals about risk and build trust.

5. Measuring the impact of all interventions depends on sufficient, relevant data delivered on time: it is a priority to ensure accurate and complete data are available with minimal delay" **(CJMW8/138 - INQ000109142)**.

7.96. The GCSA and I communicated this SAGE advice to core decision makers formally on the morning of 14 March 2020 in a 9:15am meeting with the Prime Minister, Secretary of State for Health and Social Care, Chancellor of the Duchy of Lancaster, Cabinet Secretary, Chief Adviser Dominic Cummings and Cabinet Office and No 10 officials. A summary of the SAGE advice was sent to Mr. Cummings on 14 March **(CJMW8/139 – INQ000236387)**. This advice was published that day **(CJMW8/140 – INQ000236386)**.

7.97. The minutes were distributed on 14 March and a slightly amended version followed on 16 March. This amendment followed an email exchange between Sir Jeremy Farrar and the GCSA. Sir Jeremy expressed his concern that the minute did not reflect the urgency of action needed. GCSA explained the below:

"My read out to politicians has spelled out the urgency clearly but if we haven't reflected that in the minutes then we should" **(CJMW8/141 - INQ000236389)**.

Accordingly, the amended version read:

"The science suggests that household isolation and social distancing of the elderly and vulnerable should be implemented as soon as practical (i.e. they can be done well and equitably). Individuals who may want to distance themselves should be advised how to do so" **(CJMW8/135 – INQ000236391)**.

The previous version had read:

"The science suggests that household isolation and social distancing of the elderly and vulnerable should be implemented soon, provided they can be done well and equitably. Individuals who may want to distance themselves should be advised how to do so" **(CJMW8/138 – INQ000109142)**.

7.98. My view is that the revised minutes provided a central assessment of the views in SAGE at that time. There were a variety of view points and this was a reasonable central summary of those views. The GCSA and I further laid out those views in the subsequent meeting with the Prime Minister. I believe it was clear to core decision makers that action was needed at speed, faster than had previously been anticipated, and this can be seen in the readout of that meeting with the Prime Minister **(14 March 2020 - CJMW8/142 – INQ000136751)**.

16 March to 23 March

16 March 2020

7.99. On 16 March 2020, the total number of cases known to be in the UK was 1,544 and the total number of deaths was 55 **(CJMW8/143 – INQ000203882)**. On this date, the Secretary of State for Health and Social Care advised the public against all unnecessary social contact. The Prime Minister urged people to work from home and to avoid pubs and restaurants. Isolation of households with a symptomatic case was introduced and social distancing for the moderately clinically vulnerable was announced **(CJMW8/55 – INQ000203947)**.

7.100. This advice was in my view a very major policy shift and a substantial move away from the personal philosophy of the Prime Minister and many members of his Government. It was also a major departure from the assumed policy of the previous planning for an influenza pandemic. It was very important in terms of its impact on COVID-19 and the public's perception of safe ways to minimise risk. People often incorrectly remember

23 March 2020, rather than 16 March 2020 as the start of Government's efforts to make a strong push for a reduction in social interactions.

7.101. The Inquiry has asked about the modelling report by Imperial College on 16 March 2020. This was a useful report but it was only one amongst many other modelling inputs. The Imperial model did however have a wider impact than its input into SAGE. Because it demonstrated graphically some of the possible scenarios (with wide confidence intervals) it also helped to change the debate more widely.

7.102. There had always been an assumption we would need some NPIs if a pandemic occurred. These have always formed a part of response to pandemics and major epidemics, and have included self-isolation for those with symptoms, quarantine, closure of hospitality and close-contact professions and closure of schools. The real question in practical terms at this point was what was the minimum set of interventions which could realistically move R from being above 1 to below 1, and how much confidence did we have in that assessment. Nobody wanted to introduce more restrictive interventions than necessary due to the very high social and public health cost of the interventions over time. If the interventions used were insufficient however, then R would remain above 1 and the epidemic in the UK would continue to expand exponentially, albeit at a slower rate.

7.103. Given our relatively limited understanding of COVID-19 at this time, the considerable uncertainty as to what impact the various social interventions would have in the UK (modelling is one thing but real data is even more important) and the limited testing available, we did not think it safe to introduce only the absolute bare minimum set of interventions that might get R below 1. Were those actions to turn out to be insufficient, which we would not know until several weeks had passed following their introduction, we would have been left with a still growing epidemic, a large number of additional people infected and an NHS which would have been very exposed.

7.104. My advice was that of SAGE, which was strongly in favour of the above actions by Government taken on 16 March. It would certainly have been preferable from an epidemiological point of view for this action to have been taken sooner, but this is clearer after the event than it was at the time. Had the testing capacity been available

to demonstrate how fast the epidemic was moving at this stage, I think it highly likely it would have been taken earlier, although how many days earlier is difficult to say.

7.105. It was never possible before the event to be completely confident of the public's response to such a wide sweeping recommendation to restrict their professional, social and economic lives, especially as this advice against all unnecessary contact had not been used before. Concern about COVID-19 in the general public was however now high. It was also the view of SAGE, informed by SPI-B, that the public would respond provided the potential risk was large enough, the reasons for actions were laid out and it was seen as fair across society.

17 March 2020 to 23 March 2020

7.106. On 17 March 2020, there had been 57 deaths in the UK reported, and 14 more would be announced later that day. On 17 March in France there were 148 deaths reported. They would introduce their own package of restrictive NPIs that day **(CJMW8/144 - INQ000049665)**.

7.107. The measures introduced in France, and prior to that in Italy, received substantial news coverage. Not only professional advisers, but wider Government, were very well aware of them. My impression at that time based on the views of modellers and SAGE was that the UK was slightly behind the epidemic curve in those two countries as of this date (but on the same exponential trajectory). We had of course introduced our own considerable measures only the day before.

7.108. My advice to the Prime Minister on the public health indications for restrictions on schools in England on 18 March 2020 was that of SAGE (**CJMW8/145 – INQ000061525)**. Initially, SAGE had thought it would be possible to achieve control of COVID-19 (meaning R below 1) without school closures, but as the data on force of transmission emerged the collective view of SAGE changed.

7.109. The disadvantages of closing schools are obvious. The impact on the life chances of children, particularly in areas of deprivation, can be substantial. Schools also play an important role in allowing work and other activities by parents. There was therefore a strong preference to have school closure as one of the last options reached for, and

as measures were later unwound for school attendance to be one of the first to be reinstated. There was also a practical question about schooling for children of NHS, care and other essential workers who would not be able to go to work if their children had to be home schooled, and also the most vulnerable children. It became the view of SAGE however, informed by modelling, that given the force and speed of transmission it was unlikely we could reliably get R below 1 without school closure.

7.110. 18 March 2020 also saw the circulation of a draft paper intended for the Prime Minister and Secretary of State for Health and Social Care about further measures, in addition to those announced on 16 March, in response to the specific epidemiological situation in London **(CJMW8/146 – INQ000048119, CJMW8/147 – INQ000048120)**. My advice on the sense of imposing a local lockdown on London specifically was that of SAGE **(CJMW8/145 – INQ000061525)**.

7.111. The Inquiry has asked me about my contemporary views on the statement by the Prime Minister on 19 March 2020 that the UK could turn the tide of coronavirus in 12 weeks. I thought this statement very optimistic if it was taken to mean the path of the pandemic as a whole rather than a single wave. To the extent that the Inquiry has separately asked about various comments allegedly made by the Prime Minister, Cabinet Secretary and Deputy Cabinet Secretary in private settings where I was to my knowledge not present (references to, respectively, injecting the Prime Minister with COVID-19, chicken pox parties, or that the country was "heading for a disaster"), my knowledge of these comments comes entirely through hearsay or the media.

7.112. The Inquiry has asked about the accuracy in recording my views of what they describe as a readout of a meeting I attended with the Prime Minister on 19 March 2020. Firstly for strict accuracy the document referred to was as far as I can see an informal email between Treasury officials about a pre-meeting; it is neither an official readout, nor is it about a meeting with the Prime Minister. I consider it is an informal email version of what was probably a report by me to the pre-meeting of SAGE the day before (SAGE 17), of which there is a contemporaneous Minute which I did clear and accurately reflected my advice and views at the time. The email is accurate in part, and comments correctly that I would have said (as SAGE notes) it takes 2-3 weeks to see the effect of any action, and that high levels of adherence would be needed for a significant effect to be seen. The informal Treasury email readout also says "the CMO was strong on

the fact that measures already introduced + school closures should - with 75%+ levels of compliance - reduce the levels of transmission so that R falls below 1". Whist I cannot recall my exact words what I would have been trying to convey which would have been what SAGE said, which is that the measures if adhered to would have a 'significant effect'. By training and temperament I would be very unlikely to state strongly that such interventions would bring R below 1 at a point there was very great uncertainty about the effects of these measures, the force of transmission, and very many other issues around the virus, its transmission and control. In the subsequent meeting with the Prime Minister I would also have conveyed the views of SAGE, as recorded in SAGE Minutes cleared by me the day before.

7.113. On 20 March 2020, the Prime Minister announced the closure of pubs, restaurants, gyms and other social venues **(CJMW8/148 - INQ000203946)**.

7.114. Between 21 and 23 March 2020, I shared with various senior leaders and Government the document *'Coronavirus: summary of strategic and tactical approach to the epidemic'* **(CJMW8/63 - INQ000203890)**. The purpose of this was to pull into one place a variety of points which were in my view not always joined up across the system. I was asked specifically by the Cabinet Secretary to add some comments on how the pandemic might come to an end. The document did not ask for a decision or any specific response, but I am confident it was read and understood quite widely in Government. I felt it was sensible to have a single document pulling things together in this way based on what we knew at the time, accepting there was a lot we did not know or where our scientific understanding would ultimately change. In particular, I had a concern that without a wider strategic framework, we could end up with a series of largely unrelated tactical decisions over the whole arc of the pandemic which were strategically incoherent.

7.115. The SAGE advice on 23 March 2020 was:

"*1. UK case accumulation to date suggests a higher reproduction number than previously anticipated. High rates of compliance for social distancing will be needed to bring the reproduction number below one and to bring cases within NHS capacity.*

2. Public polling over the weekend on behaviour indicated significant changes but room for improvement in compliance rates.

3. Estimated COVID-19 fatalities are anticipated to overlap with those who are likely to be within the final year of their lives. It is important to get an accurate excess deaths estimate, including potential deaths due to the measures taken.

…

7. The data suggest that London is 1 to 2 weeks ahead of the rest of the UK on the epidemic curve. Case numbers in London could exceed NHS capacity within the next 10 days on the current trajectory.

8. The accumulation of cases over the previous two weeks suggests the reproduction number is slightly higher than previously reported. The science suggests this is now around 2.6 to 2.8. The doubling time for ICU patients is estimated to be 3 to 4 days.

…

18. There is significant uncertainty concerning the impact of interventions brought in thus far on numbers of cases.

…

20. SAGE noted that social distancing behaviours have been adopted by many but there is uncertainty whether they are being observed at the level required to bring the epidemic within NHS capacity.

21. Key areas for further improvement include reducing contact with friends and family outside the household, and contact in shops and other areas" **(CJMW8/149 - INQ000129072)**.

7.116. Thereafter, the well known restrictions announced by the Prime Minister on 23 March 2020, a full national lockdown, were brought into effect.

7.117. The Inquiry has asked whether I advised a slow, incremental and gradualist approach to the introduction of NPIs; I did not. With the benefit of hindsight, I am confident that there were measures that would have been better brought in a number of days earlier than they were. Whether an incremental approach or a sudden imposition of all the measures was preferable is however I think quite difficult to answer, even in retrospect. The timing of interventions was often not a matter of medical or scientific advice, but one of practical reality. For example, a recommendation to work from home requires much less preparation by Government than a legally binding stay at home order.

Nevertheless, there would to my mind be no obvious advantage in waiting to impose any measures at all until Government was ready, politically and practically, to implement all of them. That was my view at the time and remains my view.

Limitations imposed by testing capacity

Consequences of limited testing

7.118. The main limitation in any form of surveillance in the first few months of 2020 was our lack of testing capacity at scale. At the point when we did not have evidence of domestic spread, what little testing capacity we did have was concentrated on surveillance of potential imported cases and contact tracing around those cases. I sent out a joint CAS alert on 23 January 2020 to the NHS asking for potentially exposed people with symptoms to be tested **(CJMW8/04 – INQ000047537).** At this time, our case definition employed a limited geographical footprint. As the initial epidemic spread to several countries, the geographical footprint on which test eligibility was based similarly expanded.

7.119. Once it became clear we had domestic spread of the disease, it became necessary to swing our limited testing to testing based on symptoms without any geographical basis. This clearly was inadequate as a proper surveillance mechanism but for a disease with very non-specific symptoms, where testing was therefore essential to confirm cases, it was the best that was achievable with the testing resources we had.

7.120. The lack of testing at scale was a problem for the UK throughout the first few months of the pandemic. It meant that the tests that were available had to be very heavily concentrated on clinical case management. By this I mean they had to be used to identify which of those patients who presented to hospital with symptoms compatible with COVID-19 were in fact suffering from the disease, and which patients had the many other conditions (both infective and non-infective) which could give rise to those same symptoms. This was particularly complex given the non-specific nature of COVID-19's symptoms, during the respiratory virus season (late winter and early spring). It was important to identify cases accurately in hospital for their optimal management, both for their own benefit and for reduction in nosocomial spread, so making them the priority for the limited testing capacity was logical and uncontroversial.

7.121. It was strongly my view, and that of virtually everyone involved in the COVID-19 response, that testing capacity in the early stages of the pandemic when it was expanding rapidly and exponentially in the UK was insufficient. This forced us to limit testing for surveillance and led to us underestimating how far along the upward curve of the epidemic wave we were. It made it very difficult to test in hospitals and other care settings. It was not simply that the number of tests available were too few, but that the speed of turnaround was initially too slow because a small number of centres were having to handle all the tests, often with travel time for samples. There was therefore a realistic possibility that people would be tested, and then become infected, infectious, or deteriorate clinically in the period between being tested and getting a result.

7.122. The decision by PHE to switch from community testing to a focus on clinical testing was a practical necessity. I agreed with the logic at the time because there was no obvious viable alternative. Had we had the testing capacity, we would of course wished to have continued with both clinical testing and surveillance, but PHE and the NHS had to prioritise the limited testing capacity available. It would not have been reasonable to have people who were ill in hospital not being diagnosed with COVID-19 because the limited testing was being used in community testing. It was therefore a public health decision, but only in the narrow sense that given the very limited testing and contact tracing availability and capacity, the health system had to prioritise.

7.123. Once more testing was available, we expanded community testing again and introduced testing in a number of other settings whilst continuing with testing in clinical settings. This was where we ended up after a significant scale up effort, but it was not where we were in March 2020. The Inquiry has asked whether the decision to stop community testing and tracing in March 2020 was due to pursuing a 'herd immunity' strategy; clearly it was not. Stopping community testing was a result of the practical need rather than any wish to do so. There was never any intention to pursue a herd immunity strategy as it is normally understood, a matter I cover in greater detail at paragraphs 7.143 to 7.160 below.

7.124. There was a concern early in the pandemic, which I have discussed at paragraph 5.23 above, that asymptomatic testing may have yielded unreliable results. Of more practical importance in the first three months however was that the tests available were

so limited in number that using them on asymptomatic people, when we were unable to test all the people who were symptomatic, made no practical sense. It was only once we had sufficient testing capacity to allow us to meet the demands of symptomatic people that the possibility of extending testing to those without symptoms arose. It is important therefore to separate out the theoretical considerations from the practical realities. Even if we had been confident that asymptomatic testing was as sensitive as it was for symptomatic people they would have been (and were) low down the list of priorities in this initial period of extremely constrained supply.

Difficulties in scaling up testing

7.125. The reasons for the UK's difficulties in scaling up testing capacity in the early stages of the pandemic response are complex, and I am not the best person to lay them out. In brief however, unlike some nations we did not have an industry capable of rapid scale up of diagnostic testing. Nor was PHE, which had been very fast to develop a prototype test, equipped to scale up testing to the extent necessary, which would have required prior investment by Government in this capacity. This weakness was exacerbated by global shortages of key materials required for testing since demand went up simultaneously everywhere. It is an area where we have much to learn, in particular from Germany and South Korea, both of which were able to achieve rapid scale up in the early stages of the pandemic relative to the UK. Some of the technical issues in this regard are laid out in the Technical Report at Chapter 6 **(CJMW8/01 - INQ000203933)**.

7.126. I, the GCSA and SAGE all made the point about limited testing, which was well known to colleagues in PHE. I do not consider that the reason PHE were unable to scale up at speed in the first three months of the pandemic was because they did not know, or did not care, that this was a major limitation. Rather they were not set up to be able to achieve this kind of scale up in advance and this in my view is one of the major learnings from the pandemic; the ability to scale diagnostic testing is essential but requires planning and investment in advance. This capability is essential in all epidemics and cannot simply be switched on from a standing start once an emergency has begun. It takes prior investment.

7.127. I was not closely involved in the practical decisions about how to scale up testing since many other far better qualified people were already engaged on this operational issue. It was clear that a substantially new approach to scaling up was going to be needed for the volume and speed of expansion required. I had very high respect for the scientific capacity within PHE but this was a different, operational issue and there were a variety of ways it could have been achieved. The method to achieve this that was chosen by the Government, which I did not play any meaningful role in, was ultimately successful and given the limitations I think is a great credit to those involved. I was not involved in the setting of daily testing targets.

Specific issues at this time with regards to discharges from hospitals to care homes

7.128. I was not closely involved in the decisions in relation to the need to free up hospital beds by way of discharging patients to care homes. I was aware of them however, and thought that the benefits of doing so outweighed the disadvantages. To that extent, I agreed with the decision even though the impetus for it came from the NHS. It might be worth me therefore laying out why I thought at the time, and continue to think, that this was a prudent decision in which there were both risks in doing nothing and risks in acting, but where doing nothing in my view carried the greater risks.

7.129. The first group of people who would benefit from a swift move from hospital to care homes during a rapidly expanding wave of a new infection was the older and vulnerable people who were in medical beds in hospital but were fit for discharge (i.e. they no longer had any medical reason to be in hospital and could have received equally good care in a care or nursing home). The reason for this was that we were having an exponential rise in cases of COVID-19, and it was predictable that this would first manifest itself in hospitals where sick people come. I have already laid out how COVID-19 disproportionately affected the elderly above at paragraphs 5.59 to 5.60. Keeping such individuals in hospital unnecessarily therefore exposed them to a foreseeable risk of harm (from catching COVID-19) whilst conferring no benefit on them.

7.130. Given that the doubling time of COVID-19 was measured in days, every additional day that a vulnerable person unnecessarily spent in hospital increased the daily risk that they would catch COVID-19 as a result of them being in that setting, even with the best

care and infection control practices available. The idea that hospitals are uniquely safe places is a complete misunderstanding; nosocomial spread of infections in hospitals has always been, and remains, a risk for multiple infections everywhere in the world. Hospitals are far from an ideal place to be for someone who is vulnerable to an infection, if they do not need to be there for clinical care. The difficulties in preventing COVID-19 spread within hospitals became clear as our understanding of the virus and testing capabilities later increased, but were not surprising for a respiratory infection. Much (probably most) of the transmission of SARS and MERS occurred in hospital or healthcare settings.

7.131. Whilst the risk of importation of COVID-19 from hospitals to care homes was non-trivial from the time domestic transmission became established, this risk to other care home residents would only increase for every additional day that an elderly person from that care home remained in hospital during the exponential rise of cases in hospital before returning to their care or nursing home. I have previously commented on the scarce availability of COVID-19 tests early in the pandemic but also the slow turn around for those tests which were available. It was therefore, given the limited and slow testing, not the case that someone could have been tested prior to discharge and received the result in a timely manner, so as to allow their clinician to have confidence that the individual being discharged was not infectious.

7.132. A further group of people who benefitted from the discharge of medically fit individuals back to care or nursing homes were patients who became unwell, either from COVID-19 or another condition, and who required hospital beds. This included other people in care and nursing homes, who were at relatively high risk of needing hospital care compared to the general population. There was an obvious need to free up beds, increase hospital capacity and make staff time available for the potentially very large wave of hospitalisations which would occur due to COVID-19. This was a very important operational point for the NHS. We did not know in advance how big the wave was going to be, nor whether we would be successful in getting the epidemic first wave to turn over before the capacity of the NHS was overtopped. As was clear in Module 1 of this Inquiry, the relative lack of capacity in the NHS in terms of available beds was always going to limit our room for manoeuvre in a serious pandemic overall and compared to other nations.

7.133. Two things were obvious from mid-March 2020: that it would be ideal to test patients going from hospital (and indeed other settings) into care homes for COVID-19; and that we did not have sufficient testing capacity nor was the turnaround time quick enough to achieve this. Over time the availability of tests made it realistic - but it was not in March or early April. My advice from mid-April 2020 was therefore that testing should be undertaken **(14 April 2020 - CJMW8/150 – INQ000236441)**, but this was of course dependent on having sufficient testing capacity to achieve it, and a fast enough rate that someone would not be sitting in hospital for several days with the potential of becoming infected whilst waiting for a test result. These were operational questions.

Key principles in the early pandemic

'Flattening the curve'

7.134. 'Flattening the curve' was a way of trying to express in shorthand the fact that the Government had chosen to take a middle path of three possible options. As I have stated, the first possibility was to let the peak reach its natural height. The other extreme was to go for what was subsequently called Zero COVID - suppressing the virus with an ambition to have almost zero cases for the duration of the pandemic. The UK decision, in common with the great majority of other Western nations, was to try to suppress the peaks of transmission and therefore reduce the number of people who would become infected, whilst accepting that given the transmissibility of this virus some cases were now bound to occur and that zero COVID-19 was practically unrealistic over the prolonged period of a likely pandemic. This middle way was the purpose of NPIs in the UK. Although the way in which it was described may have evolved from the original terminology of 'flattening the curve', the general concept remained constant.

7.135. The reason for not allowing the peak to reach its maximum height was twofold: it would both lead to a much high number of people being infected and therefore suffering the consequences of COVID-19, including death, serious morbidity and, although we were initially unaware of it, Long COVID; and it would have led to the NHS being overwhelmed, resulting in avoidable deaths for both COVID-19 patients and those with other non-COVID conditions. Avoiding both scenarios was therefore the aim of the policy. The overall strategic goal was to minimise deaths and avoidable disability.

7.136. The reason that we did not think that keeping COVID-19 at almost zero was realistic in the UK over the prolonged period of a pandemic was the force of transmission in the context of no prior immunity. We thought it might be possible for a short period but was very unlikely to be achievable for a prolonged period, particularly in times like winter which benefit all respiratory viruses. Most countries considered whether this option was realistic and discarded it.

7.137. Although from time to time there was talk in the UK of being able to eliminate the virus, or even eradicate it globally, this was in my view never realistic other than elimination in small geographical areas for very short periods of time. Eradication of viruses is exceptionally difficult even with highly effective tools. To date, we have only eradicated a single virus of humans: smallpox. Smallpox is a disease which is extremely easy to diagnose and for which the vaccine is highly effective and confers usually lifelong protection. From the time COVID-19 became a pandemic, it was my view that it was with us for the indefinite future. This remains my view. Diagnosis was difficult, force of transmission was high and we had no vaccine or other highly effective countermeasure. The consequence was that on any occasion where the virus was suppressed to zero in the UK there would soon be reimportation from other countries, as has occurred multiple times globally. Preventing reimportation to the UK would be more difficult than in less networked countries.

7.138. The question therefore was the extent to which it was desirable and achievable to suppress the virus. There was a legitimate argument for trying to suppress COVID-19 to a very low level until highly effective medical countermeasures were in place, but how long that would take, if indeed it was feasible at all, was entirely uncertain. Our initial central view was that it was likely to be over a year and possibly many years before we had highly effective medical countermeasures. Further, there were, and were understood to be, both benefits and dis-benefits even from a narrow public health point of view of the widespread societal interventions which would be required even just to keep R_0 below 1.

7.139. I laid this out near the beginning of the pandemic **(21 March 2020 - CJMW8/63 - INQ000203890).** My view then was, and still is, that there would potentially be four forms of death and severe disease as a result of COVID-19. These subsequently

became known in my correspondence with key decision makers in shorthand as A, B, C, D deaths (there were several variations of this and this is a summary).

7.140. The first, type 'A', and the most immediate need, were those deaths from COVID-19 directly. The second, 'B' deaths, would occur because the emergency services were overwhelmed and so treatable medical emergencies such as heart attacks, strokes, severe asthma, other infections and surgical emergencies, as well as severe COVID-19 cases could not be treated. Intensive Care Units (ICUs) would be full and urgent elective care would be stopped making management of very severely sick individuals extremely difficult. The third, 'C' deaths, would be caused by both the social measures and NHS measures taken to combat the virus. These included reductions in preventive care, postponing less urgent elective care, and also loneliness, mental health and social issues as a result of lockdown and similar measures. Fourthly, 'D' deaths, which were potentially very serious over the long run, resulted from the impact from pushing people on marginal incomes further into deprivation. This would have a very long effect on health in all its domains given the very well-known links between deprivation and chronic or premature ill-health.

7.141. The aim of 'lockdowns' and other social measures (NPIs) was to reduce the number of deaths directly from COVID-19 (type A deaths) and those due to the NHS being overwhelmed (type B). It was clear, and this was my advice, that some of the effects of C and all the effects of D would be exacerbated by the very social measures we were using to control the virus, and the more severe or wide ranging the NPIs the greater the damage would be. There was therefore a very difficult path to walk between going too late or not hard enough, and therefore getting a larger wave leading to the problems of A and B, and going too early at a point when there was no major advantage in lockdown or other social measures, and getting all the disadvantages of C and D with relatively little benefit. The decision-making of the time has to be understood in this context. Further, this of course only looks at the public health benefits and dis-benefits of action; other social and economic consequences, both from a high pandemic wave and from the effects of lockdown, are separate and in addition to these.

7.142. At no point therefore, in my mind, was there any logic in actively allowing a wave to get anywhere near its potential peak. Rather, the whole point of policy was to prevent this. On the other hand, the damage done by prematurely going into major social

measures including lockdown was non-trivial across multiple domains, including public health.

Herd Immunity

Core Concepts

7.143. The Inquiry has asked a series of questions around the concept of population immunity and herd immunity. It is helpful prior to answering these to give some detail about the concepts of immunity, population immunity, herd immunity and my understanding of this with respect to COVID-19 both at the start of the pandemic and now. In my view, it is a much more complex concept than is often understood, including by some in Government and even inside the medical profession.

7.144. By way of background, I spent much of my professional career researching and working with diseases for which full population immunity/herd immunity is never achieved. It therefore can never be part of a strategy for their control. For example, with malaria, which I concentrated on in my research career, the entire population in high transmission areas may catch the disease multiple times a year and population immunity close to the herd immunity threshold is never approached. For malaria, repeated exposure leads to an increasing ability for that individual to avoid severe disease, but infections still occur and asymptomatic yet infected and infectious individuals can still cause severe infections in others via the mosquito vector. The example of malaria also makes an important additional point, namely that immunity to severe disease can occur even when immunity to infection and infectiousness does not. This is a feature of a high number of diseases. This immunity leads to protection for the person concerned but does not confer any significant protection to their neighbours.

7.145. In the case of HIV, on which I spent a lot of my clinical time, the disease destroys the immune system over time as part of its process so to talk of immunity makes no sense. In contrast, with Ebola and similar diseases, the extreme mortality (up to 70%) is too high to achieve full herd immunity by means of natural infection even if that occurs. The community as a whole therefore cannot develop anything approaching substantial population immunity absent a vaccine.

7.146. For many infections, immunity is too short lived for the population to achieve meaningful levels of population immunity. This should make clear that aiming for full population immunity prior to understanding a disease has serious and initially unquantifiable risks scientifically.

7.147. Other than a limited number of vaccine preventable diseases such as measles, the majority of important human infections do not rely on herd immunity as it is normally understood as a principal strategy for their control.

7.148. For herd immunity, in the sense of reaching the 'herd immunity threshold' such that the disease is controlled by population immunity alone, to be achieved by natural infection, for an infection with a R significantly above 1 an extremely high proportion of the population have to be infected, at which point the disease may naturally go into abeyance, but only if immunity is high and prolonged. All of these immune naive individuals are exposed to the clinical risks of a first infection however, and then have to remain immune to infection or at least infectiousness for a very prolonged period thereafter. If their natural immunity fades with time, as it does for the endemic human coronaviruses, 'herd immunity' will fail to control the virus, which will continue to spread in the community.

7.149. The only situation in which I consider herd immunity to be a sensible goal of policy is therefore where there is a highly effective and safe vaccine which confers prolonged immunity without the clinical risk posed by a first infection. This was my view before COVID-19 and remains my view now. It is the situation for measles in many countries currently due to use of the MMR vaccine. As seen with measles however, if the level of population immunity slips below the herd immunity threshold (in the case of measles, due to poor vaccine uptake) then outbreaks and subsequently epidemics can occur.

Application of these principles to COVID-19

7.150. When COVID-19 began, we had no way of telling whether immunity to infection was achieved at all, if so for how long, and whether there would be a vaccine which could reproduce this. With the force of transmission of the original Wuhan strain, even had first infection conferred multi-year/lifelong immunity to infection, an extremely high proportion of the population would have had to become infected for anything near the

herd immunity threshold, as commonly understood, to be approached. If the first infection did not confer long lived immunity from becoming infectious it would never be achieved.

7.151. As soon as it became clear that we had a high chance of a pandemic I assumed we would need to recommend NPIs to try to reduce transmission and aim to get R below 1 (which would have made no sense had we been aiming to increase immunity as a goal). For example, in an email of 22 February to the GCSA, I said:

"I think the key thing is for SAGE to concentrate on the possible building blocks and their scientific basis. The Chinese have done this by throwing the kitchen sink at it: we will have to be more targeted so identifying the interventions with the greatest likelihood of pulling R below 1 is the key (and ideally ruling out ones with little chance of success)" **(CJMW8/151 – INQ000236382).**

7.152. My view was however that it was likely that second infections, even if they occurred, would probably be less severe than first infections allowing people to go back to some form of normality. This is the norm for the great majority, although not all, infections. This is very different from herd immunity as normally understood and is entirely to do with the protection of the individual by their immune system from severe disease. Even this was however by no means certain when COVID-19 first emerged, nor could it be tested until a significant period of time had elapsed and we could reliably work out whether people had been reinfected. The details of this are laid out in the Technical Report.

7.153. Some degree of population immunity short of the herd immunity threshold is however important when considering NPIs and the modelling that was used to help provide advice. If, and it is an if, some degree of population immunity to infection (i.e. not just to severe disease) short of a herd immunity threshold is achieved, either by vaccination or natural infection so R_t is lower than R_0 as laid out in paragraph 5.47 above, this reduces the number of social distancing and other NPIs needed to achieve the same effect in terms of controlling the disease. In this situation, the population immunity is doing some of the heavy lifting needed to keep the rates of infection in the general population low, but it still depends on social interaction measures (NPIs) remaining in place albeit at a lower intensity. One of the reasons we were able gradually to reduce

the number of NPIs over the first two years of the pandemic was because of the steadily building population immunity once the vaccine programme was well underway, due to a combination of immunity by vaccination and some immunity via prior infection. For this reason, population immunity was also an important thing for the modellers to consider.

7.154. From this follows my own view throughout the pandemic; we needed to be aware of the level of population immunity since this had practical indications for our response, but trying to achieve population immunity and certainly the herd immunity threshold by way of first infection as a matter of policy made no sense. In a disease which was able to get to all parts of the population and which carried an appreciable mortality in the elderly and medically vulnerable in particular, the aim should be to reduce rather than increase the number of infections in the population as far as practicable.

7.155. There was a school of thought, best characterised by the Great Barrington Declaration, that we should simply shield the most vulnerable and then let the virus achieve population immunity to the level of the herd immunity threshold in the rest by means of natural infection **(4 October 2020 - CJMW8/61 – INQ000203988)**. I considered this suggestion in all its forms to be scientifically flawed, practically flawed and morally problematic. I have laid this out more fully in my First Statement, so do so in briefer form here.

7.156. Its scientific flaw was that achieving the herd immunity threshold by natural infection with the result that there would be prolonged immunity in the population was far from certain for the reasons I have outlined above. Indeed, we now know that Omicron can re-infect people who have previously been infected after a relatively short period of time. An exceptionally high proportion of the population would have needed to be infected, with many suffering harm including large numbers of deaths.

7.157. Secondly, the suggestions relied on the assumption that we could correctly identify who were the most vulnerable to getting severe disease when in fact a very high proportion of the people who were severely unwell with COVID-19 had limited risk factors (the Prime Minister being one). Therefore, reliably identifying the people who would come to harm from COVID-19 was not possible.

7.158. Thirdly, shielding itself is almost impossible to achieve with complete success over the prolonged period which such an approach would have required. The shielding programme in the UK was in my view a sensible approach conceptually as a way of reducing the risk to the most vulnerable. It was however by no means complete protection from infection and had some very significant downsides. These included isolation and loneliness for vulnerable and older people. Despite their and others' best efforts, people shielding still had to have some form of interactions to obtain just the basic necessities and COVID-19 is extremely transmissible from people, many of whom may not know they are infected. There are infections it is relatively easy to protect vulnerable people from, but COVID-19 is not one of them.

7.159. I was aware that some in central Government were discussing population immunity and herd immunity, although I was not certain that they had always fully understood it. Notwithstanding that, as far as I am aware at no point was trying to achieve herd immunity by way of infecting a high proportion of the population the policy of Government, nor was it at any point my advice or that of SAGE.

7.160. This is not to say that immunity is not an important part of the Government approach to COVID-19. The whole point of a vaccination programme is to achieve maximum population immunity with minimum damage from the virus. The reason that we now have an open society whilst COVID-19 is still circulating is because of immunity which is now a hybrid of vaccine induced and immunity via natural infection. Severe cases are relatively rare compared to the pre-vaccine era. That is however a very different situation to one where we are faced with a completely immune naïve population.

Behavioural Fatigue

7.161. The Inquiry has asked about a comment I made in March 2020 in a press conference about 'behavioural fatigue'. Inevitably, I made quite a number of communication missteps during the pandemic, but this was my most prominent. It had two major disadvantages, both of which I realised at the time. The first was that it was read to imply, understandably, although this was actually not my intention at all, that this notion arose out of the advice we were receiving from SPI-B. It was not, and the behavioural scientists on SPI-B were understandably upset by this and said so publicly (and reasonably).

7.162. Secondly, it implied that this was a major part of the caution about beginning the lockdown too early. It was not. This debate had almost no relevance to scientific advice on decisions about the precise date to start the first social measures including lockdown. The public health, social and economic disadvantages of a lockdown were obvious and many, and start from the day a lockdown is imposed, and therefore starting one prematurely (i.e. before it would have a positive effect) was clearly something that no policy maker would want to do. Concerns about whether the public would over the pandemic as a whole find something as onerous as a full lockdown more difficult to maintain as time went by were not central to the decision on exactly which day to start lockdown. It therefore was a communications error by me on two fronts and whilst it did not actually change the course of decision-making it was unhelpful. My only mitigation for this is that I was wholly unused to repeated national press conferences and had not learned the message discipline that I got better at as the pandemic progressed through force of practice.

7.163. This is not to say that there is not some evidence that over time some populations, population groups and individuals became less enthusiastic about social measures against COVID-19 and indeed other epidemics. Whilst this had no relevance to advice on which day to start the first lockdown, it was important as a long-term consideration; maintaining public support over the whole arc of the pandemic was important to think about from the beginning and a reasonable thing to identify to decisionmakers. I thought at the time, and still think, that it was highly likely as the pandemic wore on the public would find the effects of a lockdown or other major NPIs increasingly onerous and this was a widely held view (although not by all behavioural scientists as laid out above). For example, there was a WHO conference entirely devoted to pandemic fatigue (of which I was not a part) in October 2020 **(CJMW8/152 – INQ000236430)**. When we look back to the number of cases (793) and deaths (54) that had been reported on the day of the first lockdown which the public overwhelmingly supported they were very different to the numbers on the day of the second lockdown (24,141 cases and 378 deaths) which was more debated. The experience of a number of nations with population unrest, as well as academic studies, demonstrated that a gradual waning of support did become a significant issue in several nations. The concept of people becoming less willing to adhere to highly restrictive measures over time, and planning on the basis it might occur if we did not take steps to maintain public

support was therefore in my view reasonable, but it was unhelpful to highlight at this point in the pandemic as it was irrelevant to the issue of the exact timing of the first lockdown (rather than being just one part of many broader considerations), and proved an unhelpful distraction.

7.164. The Inquiry has asked me about a comment in an email of 11 March 2020 in an email to David Hunter that "my main concern at the moment is sustainability if we go too early" (INQ000048039). In particular they ask if this was a reference to the concept of behavioural fatigue. It was not. I was concerned about issues of sustainability of social interventions for multiple reasons, and at many points during the pandemic. It was clear to me, and others, that this was going to be a very long haul; I was not certain everyone commenting had in March 2020 appreciated that or the consequences of maintaining prolonged social interventions. The costs in public health terms of many of the social interventions (including but not limited to what became lockdown) were very severe. These included the issues of loneliness for those in shielding; the economic hardship of people not able to work (at this stage Treasury support and its duration was not yet clear) with consequent impact on deprivation; impacts on schooling on children among many others. Whilst the duration of public support was a legitimate thing to consider it was only one of very many issues incorporated within sustainability.

7.165. The Inquiry has asked me to comment on some words of the GCSA in the media on 13 March 2020. Like me, he was under extraordinary pressure of work and had very limited media experience on this scale. I did not think it changed the realities of Government decision making or the population adherence to them. I would challenge almost any doctor or scientist to have to do the amount of media that the GCSA, the DCMOs and I had to do over the first two years of the pandemic without making any missteps. I consider the GCSA was an excellent and consistent interpreter and communicator of very complex science throughout the pandemic.

Self-isolation and household isolation

7.166. Self-isolation was a mechanism by which people who were known to have COVID-19, had a very high risk of COVID-19 (e.g. because they displayed typical symptoms) or were contacts of people with COVID-19, took themselves out of society to avoid

infecting others. In all the advice on self-isolation by people with COVID-19 or their contacts, we had to balance advising a long enough period that the great majority of transmission would be prevented, but not so long that we were knowingly and unreasonably leading to the isolation of people who had a very low chance of being infectious. We also were concerned that making the period of isolation longer would, or at least could, reduce people's willingness to declare they had COVID-19 or adhere to isolation. This was increasingly important as some people had to self-isolate multiple times, which became very onerous for some.

7.167. The length of this period of recommended self-isolation varied through the pandemic as we got more information on the transmission dynamics of the virus. A balance of risks however was always there; we had to assume that a small tail of people would be infectious for a longer period whereas some people would cease to be infectious after a relatively short period and before self-isolation ended. This is typical of many infections. This is laid out in more detail at paragraphs 5.33 to 5.40 above.

7.168. Household isolation, where an entire household isolated when there was one known case, was inevitably longer than isolation was for an individual because there was an assumption that there would be significant amounts of transmission within households. This meant that people would become unwell and therefore infectious sequentially rather than simultaneously. The same balance of neither having it so long that we were recommending isolation of households with a low chance of being infectious, nor so short that a significant amount of transmission would occur after release, was key to the decision-making.

The key role of trials

7.169. At various points, particularly early in the pandemic, some senior decision-makers and their senior advisers (and also some senior political figures not in Government and internationally) thought that given the seriousness of the situation, it was appropriate to deploy particular medical countermeasures (drugs in the main) then being promoted in some part of the press in advance of any trial evidence that they worked.

7.170. I was very firmly against this. All effective drugs and medical interventions come with side effects and unintended consequences. Proper trials are usually the only way to

work out whether the balance of risk and benefit are favourable. An early example is chloroquine, with other examples including ivermectin and Vitamin D. So far none of the interventions that were being pushed as appropriate for immediate deployment early in the pandemic have proved to have significant efficacy in clinical trials. On the other hand, several interventions which were not widely predicted to work have proved to do so, in particular dexamethasone and other immunomodulatory drugs. Trials are the way to give the best treatment to people which properly balances risk and benefit based on evidence. I hope that a strong recommendation of the Inquiry is that clinical trials are important. It was perfectly reasonable to trial the interventions that were in vogue, and for example major trials of chloroquine, ivermectin and Vitamin D were undertaken in the UK and elsewhere, and I supported this, but there has to be a very strong justification for deploying a drug widely in advance of trial evidence. Fortunately, the UK is very effective in its ability to undertake clinical trials to a very high standard as was demonstrated during COVID-19.

PART 8: Variants

Paragraphs 5.239-5.245 of the First Witness Statement of Professor Sir Christopher Whitty dated 15 August 2023

Variants

5.239 All viruses mutate over time, so it was likely that new variants of COVID-19 that differed to the original 'wild-type' strain would emerge over time. The rate of change varies considerably between different viruses. Most of the time the changes are so small that they have little impact on the virus, or disadvantage the virus, but sometimes the virus mutates in a way that provides it with an advantage. These then may become dominant. This might occur by virtue of greater transmissibility or, as immunity accumulates due to vaccination and prior infection, it might mean immune-evading, or both. Where drugs are widely used, as in HIV, they may also evolve to escape those drugs.

5.240 When public health officials assess that a mutation might have significant characteristics such as increased transmissibility, severity or ability to infect a person this was designated a Variant of Concern (VOC). The key VOCs during the time period were;

- Alpha (B.1.1.7) designated a VOC by the WHO on 18th December 2020. Alpha first emerged in the South-East of England, was significantly more transmissible than the original Covid-19 variant and had global impact.
- Beta (B.1.351) designated a VOC by the WHO on 18th December 2020. Beta emerged in Southern Africa.
- Gamma (P.1) designated a VOC by the WHO on 11th January 2021. Gamma emerged in Brazil.
- Delta (B.1.617.2) designated a VOC by the WHO on 11th May 2021. Delta emerged in India, and dominated globally in 2021. Delta was intrinsically more transmissible that previous variants and showed some immune escape.
- Omicron (B.1.1.529) designated a VOC by the WHO on 26th November 2021. Omicron emerged in Southern Africa. It had a large number of mutations and from early data a more sizeable immune escape. Omicron dominated from then to the end of the time period (February 22nd) and various strains of Omicron

(BA2, BA4/5 and others) continue to dominate as this statement is written (December 2022 to July 2023).

Where a virus emerged and was first detected is not necessarily where it first evolved.

5.241 The response to any variant is specific, and often highly technical at the start, to understand the mutations and their likely implications. There are many variants and assessing which are going to go on to dominate based only on mutation data and initial spread is difficult. If a variant does dominate then the response to the variant quickly becomes the response to COVID-19 in general.

5.242 The OCMO played a role in gathering early intelligence on new variants as they emerged and often spoke to expert colleagues in other countries as part of that. This included:

5.242.1 On 27th April 2021 GCSA and I met with Professor Vijay Raghavan, the Principal Scientific Adviser to the Government of India to learn about Delta. We met again on the 25th May 2021.

5.242.2 On 8th December 2021, I met with Dr Michelle Groom Head, Division of Public Health Surveillance and Response and Dr Waasila Jassat Public Health Specialist at the National Institute for Communicable Diseases and others in South Africa to learn about Omicron. We met again on 14th December 2021, with a wider cast list including GCSA and further South African technical experts. We met again on 17th December 2021.

5.243 The OCMO played a role in support of PHE and subsequently UKHSA which had the technical lead in ensuring Ministers were aware of emerging data on new variants. For example between 26th November and 30th December 2021 I had around 27 formal meetings with the Secretary of State for Health and Social Care on Omicron. Professor Van-Tam and Professor Harries also were involved in many discussions on variants.

14.2 The first variant of concern, Alpha, emerged in the UK. The process for initially assessing the threat once a VOC was identified shows the escalation from PHE and NERVTAG through to Secretary of State via technical discussions **(CJMW8/153 – INQ000072143)**. In January 2021 a Variant Technical Group was set up by PHE **(CJMW8/154 – INQ000203912)**, their technical briefings are available online.

5.244 Subsequent variants of concern were imported and much of the discussion between experts and within Government was on how to slow the rate of importation.

Paragraphs 4.27- 4.30 and 4.80 - 4.96 of the Fifth Witness Statement of Professor Sir Christopher Whitty dated 1 February 2024

Infectiousness

4.27 COVID-19 was, from the outset, a highly infectious disease. Over the course of the pandemic it evolved to become more infectious, and indeed is still evolving. Some of that evolution was gradual with slightly more infectious or immune-escaping variants displacing one another with relatively limited impact on the epidemic, but there were three significant points where its infectiousness increased markedly in the UK; the evolution of Alpha, Delta and Omicron, each successively more infectious than the last. Each of these gave rise to a wave of infection.

4.28 The best, although not only, shorthand for the infectiousness of the infection was R, the force of transmission. When R is above 1 an epidemic or pandemic is expanding (doubling), when it is below 1 it is contracting (halving). The natural R_0 for the original (Wuhan) variant was between 2 and 3, meaning on average one person gave it to two to three others, in the absence of immunity and any countermeasures. The natural R_0 for Omicron was significantly higher than this, but it emerged into a population with significant prior immunity due to vaccination and prior infection which dampened (but did not remove) its effective force of transmission R.

4.29 R was calculated by several groups internationally, and in the UK brought together to SAGE following work by the SPI-M modelling and epidemiology group. Advice I and the DCMOs gave both to the public and the NHS on transmissibility was based on their calculations, which can be tracked through the minutes of SAGE.

4.30 Alongside this there was a significant international effort to understand biological mechanisms of transmission. There was a major shift in the evolution from Delta to Omicron in the effectiveness of the transmission of COVID-19. This is covered in the Technical Report, Chapter 1: understanding the pathogen **(CJMW8/01 – INQ000203933)**.

Variants of Concern

4.80 A significant number of new variants emerged during the period of this Module. This was to be expected for a coronavirus and most did not cause any significant concern

once characteristics and vaccine effectiveness were able to be fully assessed. Each variant which was expanding needed investigating and it can take weeks fully to understand any differences in infectiousness or severity compared to prior variants, although if significant we would expect to start to see signals in the epidemiological evidence relatively early.

4.81 When public health officials assess that a mutation might have significant characteristics such as increased transmissibility, severity or ability to infect a person this is designated a Variant of Concern (VOC). The key VOCs during the time period were;

- Alpha (B.1.1.7) designated a VOC by the WHO on 18 December 2020. Alpha first emerged in the South-East of England, was significantly more transmissible than the original Covid-19 variant and had UK and global impact.
- Beta (B.1.351) designated a VOC by the WHO on 18 December 2020. Beta emerged in Southern Africa. It had a relatively modest impact in the UK.
- Gamma (P.1) designated a VOC by the WHO on 11 January 2021. Gamma emerged in Brazil. It had a relatively modest impact in the UK.
- Delta (B.1.617.2) designated a VOC by the WHO on 11 May 2021. Delta emerged in India, and dominated in the UK and globally in 2021. Delta was intrinsically more transmissible that previous variants and showed some immune escape.
- Omicron (B.1.1.529) designated a VOC by the WHO on 26 November 2021. Omicron emerged in Southern Africa. It had a large number of mutations and from early data a potential more sizeable immune escape. Omicron dominated in the UK and globally from then to the end of the time period covered by this Module.

4.82 The most relevant ones for this Module are Alpha, Delta and Omicron. The basic R_0 number for subsequent variants increased, with Alpha, Delta and Omicron all having a higher natural R number than the original Wuhan variant. The higher the R number, the more action is required to bring it below 1 and so change the epidemic from one that is doubling to one that is halving. The SPI-M-O estimates of the R number are available online and I have provided a copy with this statement **(15 May 2020 – CJMW8/97 - INQ000203987)**.

4.83 As new variants emerged, there was a need for further data on risk of reinfection and how it was impacted by the changed antigenic makeup of the new variant. Throughout 2020, national surveillance data was used to monitor reinfection rates, including from newly emerging variants, and showed evidence of increased reinfections with the emergence of the Delta and Omicron variants. In all cases confirmed positive on a daily basis on average until mid-November 2021 around 1.4% were in those who had previously been infected (and therefore counted as reinfections), increasing to 10% in January 2022 following the emergence of Omicron.

Alpha

4.84 Alpha emerged in the second half of the second wave (November 2020) and became a very serious threat both in the UK and internationally. The second wave should in reality be seen as two separate waves; a Wuhan second wave and then a subsequent Alpha first wave which overlap with one another. Alpha was significantly more transmissible than the original COVID-19 strain.

4.85 Towards late 2020 rising case rates in the south-east of the UK were investigated and found to correlate with a negative result for the S gene target. This variant was later labelled the 'Alpha' variant by the WHO and was relatively easy and fast to track using S gene target failure in qPCR testing **(CJMW8/155 – INQ000103186)**.

4.86 It was found through phenotypic testing to have increased transmissibility conferred by changes in receptor binding and also changes in innate immune control **(CJMW8/156 – INQ000381237, CJMW8/157 – INQ000381225)**.

Delta

4.87 The next period was the Delta wave from February 2021. First described in India this even more transmissible variant travelled globally and was imported into the UK.

4.88 Delta began to exhibit a more rapid growth rate and went on to dominate globally in 2021. This was occurring at the same time as the UK was rapidly vaccinating its population and gradually lifting Non-Pharmaceutical Interventions (NPIs). Laboratory studies showed that Delta was intrinsically more transmissible than previous variants **(CJMW8/158 – INQ000381226)**. It also showed some modest immune escape properties, potentially allowing it to break through immunity granted by vaccination or

prior infection from wild type SARS-CoV-2 with greater efficiency than Alpha **(CJMW8/159 – INQ000273318)**.

Omicron

4.89 By November 2021 many countries worldwide, including the UK, were reaching their highest rates of sequencing. Sequencing from Southern Africa and travel-related sequencing from Hong Kong allowed the rapid identification of a novel variant of concern, Omicron, as soon as the first 4 sequences had been uploaded by Southern African researchers to the online sequence database GISAID **(CJMW8/160 – INQ000381239)**.

4.90 Omicron was characterised by a very large number of mutations, including 35 across the spike gene, many at known antigenic epitopes. The large antigenic distance between Omicron and the wild type spike protein, combined with antibody waning, resulted in some relatively poor neutralisation of Omicron by sera from vaccines – and this necessitated rapid implementation of vaccine booster programmes by the NHS to counter immunological waning associated with the establishment of this variant **(CJMW8/161 – INQ000381240)**.

4.91 At the start of the first UK Omicron wave, we had confidence in only two things based on the data; that Omicron was substantially more transmissible even than Delta (clear epidemiological evidence), and that there were multiple genetic variations which might have been associated either with vaccine escape or other features which could be beneficial to the virus (based on genetic data).

4.92 Although there were media reports of the virus being less severe in South Africa, which were strongly pushed by some South African commentators, the technical advice we were getting from the highly competent South African authorities was considerably more cautious than this. They had also just had a major Beta wave (inducing Beta immunity widely in their population) which made interpreting the epidemiology from South Africa in the UK context, where we had not had such a Beta wave, more difficult. They were also initially less certain that it was less severe, and if so by how much. The South African population is also significantly younger than that in the UK.

4.93 A significantly more transmissible virus, which is slightly less likely to cause severe disease, can still lead to very high numbers of severe cases, and especially if there was some degree of immune escape to vaccination.

4.94 A strong narrative developed among some that this was just a trivial infection and nothing to worry about. This struck me and the DCMOs as being based more on expediency and hope rather than hard data. The subsequent surge of hospitalisations into the NHS as the Omicron wave pushed through the UK, despite widespread vaccination of the at risk population, backs up that interpretation.

4.95 Had Omicron been only slightly more severe, or the vaccine slightly less effective against the significantly genetically diverse new variant, the situation would have been potentially quite serious. Neither of these were known with certainty in late 2021. Even with significant restraint by the general public in terms of social mixing, 16,537 people were in hospital with COVID-19 on 14 January 2022, most of which were Omicron cases. It was not a trivial infection for many people, especially for the elderly **(CJMW8/162 – INQ000236456, CJMW8/163 – INQ000236457)**.

4.96 The UKHSA's Variant Technical Group publish variant risk assessments which may be of interest to the Inquiry.

PART 9: Asymptomatic Transmission

Paragraphs 6.55 – 6.63 of the First Witness Statement of Professor Sir Christopher Whitty dated 15 August 2023

Asymptomatic transmission

14.3 Whether, and to what extent, there was asymptomatic infection and asymptomatic or pre-symptomatic transmission was debated from the beginning of the epidemic, with robust data accumulating slowly in the global literature. This gradual accumulation is laid out in the Technical Report to future CMOs and GCSAs **(CJMW8/01 – INQ000203933)**. This was a global view- for example on 9th June 2020 Dr Maria Van Kerkhove, the WHO's technical lead on the COVID-19 pandemic, made it clear that the actual rates of asymptomatic transmission were not yet known.

6.55 For SARS and MERS, two other coronaviruses which emerged recently, asymptomatic and pre-symptomatic transmission is thought to be very rare although asymptomatic infection without transmission may occur. This influenced initial thinking. Diseases where a small proportion of infected people are infected from an asymptomatic source, even when it occasionally occurs, can be controlled by removing only those who are symptomatic as this would be likely to pull R below 1 and end an epidemic.

6.56 Asymptomatic infection and asymptomatic transmission are different and care is needed not to conflate them. Asymptomatic infection is where a person has acquired the virus but does not have symptoms; it occurs in many diseases. Asymptomatic viral transmission occurs when the infected but asymptomatic person passes the virus on to someone else. Asymptomatic infection does not necessarily lead to asymptomatic transmission (though it is a prerequisite). In principle it is possible to have extensive asymptomatic infection with almost no asymptomatic transmission. Asymptomatic transmission or not is also not a binary division- for some diseases there is a correlation between severity of symptoms and infectiousness with a mildly symptomatic person being less infectious than a severely symptomatic one. Many symptoms, such as coughing and sneezing, are themselves part of the transmission mechanism (fewer symptoms leads to lower transmission). People tend to avoid those obviously symptomatic and symptomatic people tend to try to protect others by avoiding close contact with them (so more symptoms lead to lower transmission). Someone who is infected and infectious may start as asymptomatic and then become symptomatic (pre-symptomatic) or they may have symptoms that are very mild and so will not alter their

behaviour or necessarily be seen by the individual as symptoms (pauci-symptomatic). Whether to classify the pre-symptomatic and pauci-symptomatic as asymptomatic or not adds to the difficulty of knowing the degree of asymptomatic transmission. There are important practical differences between pre-symptomatic and asymptomatic spread.

6.57 Asymptomatic and pre-symptomatic transmission are for these and other technical reasons not easy to study. In the absence of a reliable test that detects infection in an individual without symptoms, determining who is asymptomatically infected is not possible.

14.4 Asymptomatic transmission (or not) is important as one part of the response to a pandemic is isolating those who have the virus **(CJMW8/164 – INQ000048273)**. Before a rapid test is widely available this can be done by asking anyone with a specific set off symptoms to isolate. The higher the level of asymptomatic and pre-symptomatic transmission the less well this will work.

14.5 It was recognised at an early stage of the initial outbreak that asymptomatic transmission could be a possibility **(25th January 2020 - CJMW8/165 – INQ000047556)**. As with many areas of knowledge on COVID-19 knowledge about the degree of asymptomatic transmission accumulated over time, with a gradual shift towards emphasising the role of asymptomatic infection being important. There was no single instance or study where it suddenly became clear that asymptomatic transmission was happening in x% of cases. It's possible to see the changing evidence by looking at the minutes of NERVTAG and of SAGE from January 2020 to June 2022 which refer to both asymptomatic infection and asymptomatic transmission:

NERVTAG 21st January **(CJMW8/166 – INQ000023119)**:

there are currently no data on infectiousness in relation to symptom onset and whether asymptomatic or subclinical patients are infectious.

NERVTAG 28th January **(CJMW8/167 – INQ000047820)**:

members were not unanimous but the predominant view was that the force of infection from asymptomatic individuals, if present at all, is likely to be lower than symptomatic individuals.

SAGE 28th January **(CJMW8/57 – INQ000057492)**:

There is limited evidence of asymptomatic transmission, but early indications imply some is occurring.

SAGE 4th February **(CJMW8/94 – INQ000051925)**:

asymptomatic transmission cannot be ruled out and transmission from mildly symptomatic individuals is likely.

NERVTAG on 21st February one member brought up some evidence that **(CJMW8/168 – INQ000119469)**:

suggests that 40% of virologically confirmed cases are asymptomatic. Another noted *the data on asymptomatic and symptomatic proportions in China are not well documented.*

SAGE 13th March asked PHE **(CJMW8/138 – INQ000109142)**:

to contact Italian counterparts to request serology samples. If available, PHE to test these samples to ascertain symptomatic vs asymptomatic case ratio.

SAGE 16th March **(CJMW8/03a – INQ000075664)**:

antibody testing is particularly vital to address the central unknown question of the ratio of asymptomatic to symptomatic cases.

NERVTAG 3rd April **(CJMW8/169 – INQ000220209)**:

there is information available on the detection of infection in asymptomatic individuals but little information on the transmission risk from asymptomatic individuals…. the importance of clarifying between pre-symptomatic transmission and asymptomatic transmission and using the correct terminology. It was agreed that there is data of pre-symptomatic transmission (both direct and indirect, based on the models) both pre-symptomatic and asymptomatic transmission are assumed in the SPI-M models. In their model, ~40% of cases don't seem to display symptoms and these cases are given an arbitrary assumption of 50% infectiousness compared with symptomatic cases. Imperial have a similar model and use similar assumptions… They concluded that *the level of 50% for asymptomatic infectiousness was realistic and recognised that more data is required.*

NERVTAG 24th April PHE reported that **(CJMW8/170 – INQ000120161)**:

swabs were taken in six care homes in London over the Easter weekend. All residents and staff were sampled and a total of approximately 500 swabs were collected. The six care homes were at different stages of outbreak. One of the homes had only identified two cases and had very few symptomatics. It was found that 75% of the residents carried the virus and only 25-33% were symptomatic. Approximately 45% of the healthcare workers were also carrying the virus, with 25-33% symptomatic.

1st May NERVTAG **(CJMW8/171 – INQ000220211)**:

SPI-M and Imperial use an estimated figure of 50% infectiousness for asymptomatic compared with symptomatic infections. The proportion of asymptomatic infections is age-dependent in the SPI-M model, from approximately 75% in children to <20% in the over 70s. Snap shot data may be misleading as some individuals may be pre-symptomatic not asymptomatic. Members discussed the strength of the evidence of infectiousness of asymptomatic individuals. The assumption used for modelling is asymptomatics are 50% as infectious as symptomatics. JE referenced work from Vietnam and Germany which appears to show asymptomatic transmission but acknowledged the difficulty in distinguishing asymptomatic from pre-symptomatic infection.

13th May NERVTAG **(CJMW8/172 – INQ000203994)**:
noted that NERVTAG had been asked to comment on the proportion of individuals who were truly asymptomatic and the relative infectiousness of those individuals. AH's team have produced a systematic review, using papers with complete follow-up. The pooled estimate is 11% (CI of 4-18%), with a wide range of values in the studies. Members discussed other reviews and suggested that this value was low compared with other estimates, which average around 30%.

14th May SAGE **(CJMW8/173 – INQ000120519)**:

NERVTAG has reviewed various studies on asymptomatic infection. Many do not differentiate between asymptomatic/pauci-symptomatic individuals and pre-symptomatic individuals. SAGE noted that longitudinal sampling in the ONS study will assist in clarifying this difference going forward but needs to include more than "asymptomatic on the day of infection". Taking all evidence into account, between 10% and 35% of individuals may be truly asymptomatic (low confidence), and many more may have few symptoms. Review of ONS data will help refine the estimate. It is possible that asymptomatic individuals are less infectious, but this

cannot currently be quantified. There is a key knowledge gap concerning how positive testing correlates with the presence of live, recoverable virus (i.e. infectiousness), although PHE is currently investigating this.

11th June SAGE said **(CJMW8/42 – INQ000120527)**:

the percentage of people who are asymptomatic remains uncertain and could be between 30-80%; it may vary by age and other characteristics.

18th June SAGE said **(CJMW8/174 – INQ000062591)**:
individuals likely to facilitate the seeding of super-spreading events may be asymptomatic or paucisymptomatic. Understanding asymptomatic infection is key to understanding super-spreading events.

14.6 On 9th July 2020 WHO published a report acknowledging asymptomatic transmission **(CJMW8/88 – INQ000203997)**. It still concluded that the scale of asymptomatic transmission remained unknown.

14.7 NERVTAG looked at 22 studies prior to 25th August 2020 and found a pooled estimate for the asymptomatic proportion of SARS-CoV-2 infections was 28% (95% CI 20%-35%) **(CJMW8/175 – INQ000203996)**. Note that this is for infection, not transmission.

6.58 The exact proportion of asymptomatic transmission has still not been established beyond doubt and has likely changed over time. The current central view is that SARS-COV-2 has a greater proportion of asymptomatic transmission than previously seen with other major coronaviruses. The proportion is likely to have changed throughout the pandemic with new variants with different infectiousness, and with the roll-out of vaccination meaning people have immunity which tends to make symptoms less severe, or apparent.

Paragraphs 4.11 – 4.26 of the Fifth Witness Statement of Professor Sir Christopher Whitty dated 1 February 2024

Pre-symptomatic and asymptomatic transmission

14.8 I was aware of the possibility of asymptomatic spread of COVID-19 (as opposed to there being just asymptomatic cases, without the potential for those cases in turn to then generate further infections) from early January 2020. As an example, I discuss this possibility with Sir Jeremy Farrar by email on 19 January 2020 **(CJMW8/78 – INQ000183355)**.

4.11 There is however a significant difference between the possibility that asymptomatic infection might occasionally occur (likely), and the idea that asymptomatic transmission would be a major part of the force of transmission. Evidence that asymptomatic transmission was a sufficiently important part of the epidemiology that it had a significant impact on the pandemic overall accumulated slowly. There was no single point where I and others in the international scientific community moved from thinking it was improbable to thinking it was a major issue; rather it was a gradual process of accumulation of evidence. The UK was not an outlier in this and WHO also gradually changed its position as the evidence accumulated. Even as late as 9 July 2020, the WHO's position was that the scale of asymptomatic transmission was unknown **(CJMW8/88 – INQ000203997)**.

4.12 The exact proportion of asymptomatic transmission has still not been established beyond doubt and has likely changed over time. The current central view is that COVID-19 has a greater proportion of asymptomatic transmission than previously seen with other novel coronaviruses. The proportion is likely to have changed throughout the pandemic as new variants with different infectiousness, and the roll-out of vaccination, meant people benefitted from immunity which tends to make symptoms less severe, or less apparent.

4.13 The midpoint of the scientific view, and therefore our advice to Ministers and other core decision-makers, including in the NHS, about the reliability of testing asymptomatic people changed over the first few months of the pandemic. The initial advice in SAGE given by Dr Maria Zambon, who had originally developed the test and is an acknowledged international expert in this area, was that testing for asymptomatic disease was likely to be less sensitive than that for symptomatic disease **(28 January 2020 – CJMW8/57 – INQ000057492)**. Accordingly, with very limited testing capacity available in the UK for many months, it was initially appropriate not to test

asymptomatic patients if this would cause shortages that would leave us unable to test symptomatic patients. Subsequently, studies showed that it was possible to identify asymptomatic people by means of testing, and so the advice changed, as did testing capacity.

4.14 I would like to make clear the difference between pre-symptomatic and asymptomatic spread. First, it is sensible to repeat a point made in witness statements in Modules 1 and 2; asymptomatic infection (a person is infected without having symptoms) is different from asymptomatic transmission (a person with no symptoms can transmit to others). Pre-symptomatic transmission is where a person becomes infectious, and becomes symptomatic, but they are infectious for a period (hours or days) before the symptoms appear. In asymptomatic transmission, the individual can transmit the virus despite having no symptoms at any point.

4.15 There are important differences between pre-symptomatic transmission and asymptomatic transmission from a perspective of disease control. The most important is that in pre-symptomatic transmission the case will be identified and counted, and their contacts can be identified and isolated, relatively easily (albeit later than in symptomatic infection). In asymptomatic transmission, it is much less likely the index case will be identified early enough to institute contact tracing unless they are by chance tested whilst infectious. This makes contact tracing as a method of control less effective, and if a large proportion of the infection is from asymptomatic transmission much less effective.

4.16 Whether, and to what extent, there was asymptomatic infection and asymptomatic or pre-symptomatic transmission was debated from the beginning of the epidemic, with robust data accumulating slowly in the global literature. This gradual accumulation is laid out in the Technical Report to future CMOs and GCSAs (**CJMW8/01 – INQ000203933)**. This was a global view - for example on 9 June 2020 Dr Maria Van Kerkhove, the WHO's technical lead on the COVID-19 pandemic, made it clear that the actual rates of asymptomatic transmission were not yet known.

4.17 For SARS and MERS, two other coronaviruses which emerged recently, asymptomatic and pre-symptomatic transmission is thought to be very rare although asymptomatic infection without transmission may occur. This influenced initial thinking. Diseases where a small proportion of infected people are infected from an asymptomatic source, even when it occasionally occurs, can be controlled by removing only those who are symptomatic as this would be likely to pull R below 1 and end an epidemic.

4.18 Asymptomatic infection and asymptomatic transmission are different and care is needed not to conflate them. Asymptomatic infection is where a person has acquired the virus but does not have symptoms; it occurs in many diseases. Asymptomatic viral transmission occurs when the infected but asymptomatic person passes the virus on to someone else. Asymptomatic infection does not necessarily lead to asymptomatic transmission (though it is a prerequisite). In principle it is possible to have extensive asymptomatic infection with almost no asymptomatic transmission. Asymptomatic transmission or not is also not a binary division- for some diseases (but not for all) there is a correlation between severity of symptoms and infectiousness with a mildly symptomatic person being less infectious than a severely symptomatic one. Many symptoms, such as coughing and sneezing, are themselves part of the transmission mechanism expelling virus with greater ballistic force (fewer symptoms leads to lower transmission). People tend to avoid those obviously symptomatic and symptomatic people tend to try to protect others by avoiding close contact with them (so more symptoms lead to lower transmission). Someone who is infected and infectious may start as asymptomatic and then become symptomatic (pre-symptomatic) or they may have symptoms that are very mild and so will not alter their behaviour or necessarily be seen by the individual as symptoms (pauci-symptomatic). Whether to classify the pre-symptomatic and pauci-symptomatic as asymptomatic or not adds to the difficulty of knowing the degree of asymptomatic transmission. There are important practical differences between pre-symptomatic and asymptomatic spread.

4.19 Asymptomatic and pre-symptomatic transmission are for these and other technical reasons not easy to study. In the absence of a reliable test that detects infection in an individual without symptoms, determining who is asymptomatically infected is not possible.

4.20 Another important factor in transmission is viral load, put simply the extent to which the virus multiplies in the infected host. It is possible to have two patients infected with COVID-19 with broadly similar symptoms. However the viral loads and therefore the propensity for transmission (the most amount of virus available in respiratory particles from that patient able to be passed on) will also vary between patients and over time. Viral load is generally unknown with an individual patient unless they are being studied by repeat sampling over time. However it is known to rise and then fall with a typical COVID-19 patient and may persist for up to 14 days and occasionally longer, although 7-10 is more standard. Viral load is generally a good predictor of infectiousness but is of little practical value unless the patient can be tested repeatedly, usually daily.

4.21 Asymptomatic transmission (or not) is one important part of the response to a pandemic, as is isolating those who have the virus. Before a rapid test is widely available this can be done by asking anyone with a specific set of symptoms to isolate. The higher the level of asymptomatic and pre-symptomatic transmission and the greater the range of non-specific symptoms that are possible, the less well this will work.

4.22 It was recognised at an early stage of the initial outbreak that asymptomatic transmission could be a possibility **(25 January 2020 – CJMW8/165 – INQ000047556)**. As with many areas of knowledge on COVID-19 knowledge about the degree of asymptomatic transmission accumulated over time, with a gradual shift towards emphasising the role of asymptomatic infection being important. There was no single instance or study where it suddenly became clear that asymptomatic transmission was happening in x% of cases. It's possible to see the changing evidence by looking at the minutes of NERVTAG and of SAGE from January 2020 to June 2020 which refer to both asymptomatic infection and asymptomatic transmission:

NERVTAG 21 January:

there are currently no data on infectiousness in relation to symptom onset and whether asymptomatic or subclinical patients are infectious **(CJMW8/166 – INQ000023119)**.

NERVTAG 28 January:

members were not unanimous but the predominant view was that the force of infection from asymptomatic individuals, if present at all, is likely to be lower than symptomatic individuals **(CJMW8/167 – INQ000047820)**.

SAGE 28 January:

There is limited evidence of asymptomatic transmission, but early indications imply some is occurring **(CJMW8/57 – INQ000057492)**.

SAGE 4 February:

asymptomatic transmission cannot be ruled out and transmission from mildly symptomatic individuals is likely **(CJMW8/94 – INQ000051925)**.

NERVTAG on 21 February one member brought up some evidence that:

suggests that 40% of virologically confirmed cases are asymptomatic. Another noted *the data on asymptomatic and symptomatic proportions in China are not well documented* **(CJMW8/168 – INQ000119469)**.

SAGE 13 March asked PHE:

to contact Italian counterparts to request serology samples. If available, PHE to test these samples to ascertain symptomatic vs asymptomatic case ratio **(CJMW8/138 – INQ000109142)**.

SAGE 16 March:

antibody testing is particularly vital to address the central unknown question of the ratio of asymptomatic to symptomatic cases **(CJMW8/03a – INQ000075664)**.

NERVTAG 3 April:

there is information available on the detection of infection in asymptomatic individuals but little information on the transmission risk from asymptomatic individuals…. the importance of clarifying between pre-symptomatic transmission and asymptomatic transmission and using the correct terminology. It was agreed that there is data of pre-symptomatic transmission (both direct and indirect, based on the models) both pre-symptomatic and asymptomatic transmission are assumed in the SPI-M models. In their model, ~40% of cases don't seem to display symptoms and these cases are given an arbitrary assumption of 50% infectiousness compared with symptomatic cases. Imperial have a similar model and use similar assumptions… They concluded that *the level of 50% for asymptomatic infectiousness was realistic and recognised that more data is required* **(CJMW8/169 – INQ000220209)**.

NERVTAG 24 April PHE reported that:

swabs were taken in six care homes in London over the Easter weekend. All residents and staff were sampled and a total of approximately 500 swabs were collected. The six care homes were at different stages of outbreak. One of the homes had only identified two cases and had very few symptomatics. It was found that 75% of the residents carried the virus and only 25-33% were symptomatic. Approximately 45% of the healthcare workers were also carrying the virus, with 25-33% symptomatic **(CJMW8/170 – INQ000120161)**.

1 May NERVTAG:

SPI-M and Imperial use an estimated figure of 50% infectiousness for asymptomatic compared with symptomatic infections. The proportion of asymptomatic infections is age-dependent in the SPI-M model, from approximately 75% in children to <20% in the over 70s. Snap shot data may be misleading as some individuals may be pre-symptomatic not asymptomatic. Members discussed the strength of the evidence of infectiousness of asymptomatic individuals. The assumption used for modelling is asymptomatics are 50% as infectious as symptomatics. JE referenced work from Vietnam and Germany which appears to show asymptomatic transmission but acknowledged the difficulty in distinguishing asymptomatic from pre-symptomatic infection **(CJMW8/171 – INQ000220211)**.

13 May NERVTAG:

noted that NERVTAG had been asked to comment on the proportion of individuals who were truly asymptomatic and the relative infectiousness of those individuals. AH's team have produced a systematic review, using papers with complete follow-up. The pooled estimate is 11% (CI of 4-18%), with a wide range of values in the studies. Members discussed other reviews and suggested that this value was low compared with other estimates, which average around 30% **(CJMW8/172 – INQ000203994)**.

14 May SAGE:

NERVTAG has reviewed various studies on asymptomatic infection. Many do not differentiate between asymptomatic/pauci-symptomatic individuals and pre-symptomatic individuals. SAGE noted that longitudinal sampling in the ONS study will assist in clarifying this difference going forward but needs to include more than "asymptomatic on the day of infection". Taking all evidence into account, between 10% and 35% of individuals may be truly asymptomatic (low confidence), and many more may have few symptoms. Review of ONS data will help refine the estimate. It is possible that asymptomatic individuals are less infectious, but this cannot currently be quantified. There is a key knowledge gap concerning how positive testing correlates with the presence of live, recoverable virus (i.e. infectiousness), although PHE is currently investigating this **(CJMW8/173 – INQ000120519)**.

11 June SAGE said:

the percentage of people who are asymptomatic remains uncertain and could be between 30-80%; it may vary by age and other characteristics **(CJMW8/42 – INQ000120527)**.

18 June SAGE said:

individuals likely to facilitate the seeding of super-spreading events may be asymptomatic or paucisymptomatic. Understanding asymptomatic infection is key to understanding super-spreading events **(CJMW8/174 – INQ000062591)**.

4.23 On 9 July 2020 WHO published a report acknowledging asymptomatic transmission **(CJMW8/88 – INQ000203997)**. It still concluded that the scale of asymptomatic transmission remained unknown.

4.24 NERVTAG looked at 22 studies prior to 25 August 2020 and found a pooled estimate for the asymptomatic proportion of SARS-CoV-2 infections was 28% (95% Confidence Intervals (CI) 20%-35%) **(CJMW8/175 – INQ000203996)**. Note that this is for infection, not transmission; asymptomatic transmission by definition has to be from asymptomatic people, but not all people with asymptomatic infection will transmit on (and indeed in some infections only a very small proportion will, or none at all).

4.25 The exact proportion of asymptomatic transmission has still not been established beyond doubt and has likely changed over time. The current central view is that SARS-COV-2 has a greater proportion of asymptomatic transmission than previously seen with other major coronaviruses (MERS, SARS). The proportion is likely to have changed throughout the pandemic with new variants with different infectiousness, and with the roll-out of vaccination meaning people have immunity which tends to make symptoms less severe, or less apparent.

PART 10: Tracing

Paragraphs 10.22 – 10.28 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Contact Tracing

10.22. The principles of contact tracing are straightforward, although the practical delivery often is not. People with an infectious disease are identified and self-isolate. A list of all their contacts in the period between when they might have become infectious and their self-isolation are identified; these people are contacted wherever possible and asked to isolate to break the chain of transmission. In some cases, the contacts of the contacts may be asked to isolate (depending on speed of transmission and of contact tracing resources). This is a well established method of infectious disease control, which is easiest in diseases such as sexually transmitted infections and to a lesser extent touch diseases such as Ebola, where there is a high chance the person infected knows all their recent contacts.

10.23. I was involved at a strategic and technical level in the discussions about the potential uses and limitations of contact tracing in the context of COVID-19. SAGE gave views on this at several points during the pandemic and these are laid out in the Minutes of those meetings. This advice was reflected in the advice I gave key decision makers. I was not however involved in the practical or operational delivery of contact tracing in this pandemic.

10.24. A distinction should be drawn between contact tracing with the aim of improving epidemiological understanding (i.e. data collection), and contact tracing for the purpose of identifying and potentially isolating infectious people so as to reduce transmission (disease control). Whilst there is some overlap, they have different aims and may employ different techniques. Contact tracing for both purposes was considered early in the pandemic, and certainly from January 2020. Many people involved in the response to COVID-19, including me, had for example been involved in the response in Sierra Leone to the 2014-16 Ebola epidemic. We therefore had very recent experience of using contact tracing at scale for both these purposes since this was the principal means of control for community transmission in that epidemic.

10.25. The PHE system of contact tracing was well developed and well integrated with local authorities and their Directors of Public Health, provided the number of cases were small. In the case of COVID-19, two major limitations put very heavy constraints on this in practice in the first few months.

10.26. The first, and practically the most important, was the lack of testing at scale for a disease which had very non-specific symptoms in people who were infectious (subsequently found to be no symptoms at all in some cases) and rapid transmission. Secondly, the contact tracing system once a diagnosis was made had some scaling capacity, but it was relatively limited given the very large numbers of cases, and the even larger numbers of potential contacts. These case numbers rose rapidly and exponentially in COVID-19 and exponential scaling in response is not an easy task. This issue of scale up of contact tracing capacity would have been a limitation even had the testing been available to target the contact tracing more accurately; without it it was a serious practical problem.

10.27. In other countries, such as South Korea and Germany, greater prior investment in this capacity to rapidly scale up contact tracing arguably led to a greater ability to undertake and maintain it until a later stage of the epidemic (i.e. when they had larger numbers). This required prior investment. If you cannot accurately and rapidly identify the disease in the majority of cases then contact tracing soon ceases to have much public health effect, although it may continue to serve some epidemiological purposes for tracking the disease. In a disease where the doubling time is days, identifying a small percentage of cases after the event and only isolating their known contacts will obviously have limited impact. At this point, using very limited testing capacity for this purpose instead of for clinical management of sick patients ceases to make public health sense. This was one of the reasons community testing in the UK was stopped once domestic transmission was widespread; we did not have the capacity both to use testing for clinical management and for contact tracing, and contact tracing was the lower priority given this forced choice.

10.28. My technical views on the public health impact of NHS Test and Trace are accurately reflected in the Technical Report at Chapter 7. In respect of the operational strengths and weaknesses of the model chosen, I am not the correct person to ask since I was

not closely involved in operational issues on this subject. I would note however that the epidemiological output from the Test and Trace system was essential to subsequent decision-making. Those who criticised Test and Trace did not always lay out what alternative model they would have used against the very short timescales involved, and more importantly the trade-offs this will have included and where the people who were to undertake it were to come from.

PART 11: Isolation

Paragraph 6.14 of the First Witness Statement of Professor Sir Christopher Whitty dated 15 August 2023

Self-isolation

6.14. Self-isolation is an example of reducing person to person contact with someone who knows, or suspects, they are infected, or is at higher risk of developing the infection. This may be through testing (proven case) through symptoms (possible case) or as a recent contact of a case (contact-tracing). In all of these situations there is a considerably greater risk that the person is infectious than the general asymptomatic population, so they need to take all practical measures to avoid meeting others in a way an infection may occur. Usually this is for a specific period of time during which they are potentially infected, or until testing shows they are no longer infectious.

Paragraphs 7.166 – 7.168 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Self-isolation and household isolation

7.166. Self-isolation was a mechanism by which people who were known to have COVID-19, had a very high risk of COVID-19 (e.g. because they displayed typical symptoms) or were contacts of people with COVID-19, took themselves out of society to avoid infecting others. In all the advice on self-isolation by people with COVID-19 or their contacts, we had to balance advising a long enough period that the great majority of transmission would be prevented, but not so long that we were knowingly and unreasonably leading to the isolation of people who had a very low chance of being infectious. We also were concerned that making the period of isolation longer would, or at least could, reduce people's willingness to declare they had COVID-19 or adhere to isolation. This was increasingly important as some people had to self-isolate multiple times, which became very onerous for some.

7.167. The length of this period of recommended self-isolation varied through the pandemic as we got more information on the transmission dynamics of the virus. A balance of risks however was always there; we had to assume that a small tail of people would

be infectious for a longer period whereas some people would cease to be infectious after a relatively short period and before self-isolation ended. This is typical of many infections. This is laid out in more detail at paragraphs 5.33 to 5.40 above.

7.168. Household isolation, where an entire household isolated when there was one known case, was inevitably longer than isolation was for an individual because there was an assumption that there would be significant amounts of transmission within households. This meant that people would become unwell and therefore infectious sequentially rather than simultaneously. The same balance of neither having it so long that we were recommending isolation of households with a low chance of being infectious, nor so short that a significant amount of transmission would occur after release, was key to the decision-making.

Paragraphs 8.137 – 8.138 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Self-isolation

8.137. Throughout the pandemic, we had concerns about potential levels of adherence to self-isolation, although the great majority of the population intended to do so. Two things helped this. The first was the advent of lateral flow tests meaning that people could respond only to a positive test rather than whenever they had symptoms that might be compatible with COVID-19; this both reduced the number of people who needed to self-isolate and made it much more clear to them, their contacts and their families that they were doing so for a purpose. The second in my opinion was keeping the period of self-isolation as short as was reasonable on the grounds of what we knew about transmission.

8.138. There was a significant debate in Government about the role of financial support for people who are self-isolating. My opinion was that for workers who are paid if they are off sick, or who could work from home, the financial risk from self-isolation was usually a relatively unimportant factor. For people who had employment which meant that if they did not work they did not get paid however, there was a strong financial incentive not to self-isolate. Compounding this was the fact that in general, these jobs tended to be lower paid or the self-employed, for whom the loss of over a week's wages was

highly problematic in terms of their disposable income. The evidence of this was most clear in care homes. Care homes which paid members of staff when off sick or self-isolating had lower rates of transmission than those which did not. There was also clear evidence that COVID-19 transmission was highest in areas of deprivation, where such jobs were more common, although this association might not be causal. The Treasury were generally not convinced by these arguments in favour of payments for working people who were self-isolating and who were not otherwise paid for that time.

PART 12: Borders

Section 9 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

Borders and Travel

Initial measures in January to March 2020

Scientific Rationale

9.1. To answer the questions posed by the Inquiry on borders, it is important to make a few framing comments which help orientation.

9.2. Possibly more than any other area of the pandemic, decisions on borders, in particular when it came to cancelling flights or even more so closing borders, had to be political decisions. The economic, trade, diplomatic, consular and legal implications of closing borders are very profound. What to do for vulnerable British citizens stranded overseas, the consequences on the validity of health insurance policies, the substantial impact on the availability of food and medicines when a large amount of trade stops very suddenly and issues around compensation are just some of the very complicated calculations. The public health input on disease transmission is therefore only a part of the complex decision-making process. This is potentially complicated further by the fact that people often project their political persona through their approach to borders, whether it be as a free trade liberal, a nationalist or other political identities.

9.3. Debates between the four nations of the UK on border measures were one of the few areas which proved quite difficult even at a technical level. The starting point for political leaders in the four nations on border issues was different, perhaps unsurprisingly as attitudes to borders are essentially a political issue. Since there are no hard borders between the four nations of the UK, maintaining a position which took account of the various positions of the Governments of the four nations (i.e. Conservative (England), Labour (Wales), Scottish Nationalist Party/Green (Scotland), and Democratic Unionist Party/Sinn Féin (Northern Ireland)) was not always straightforward. This was both inevitable and unsurprising.

9.4. Secondly, it is important to recall that the great majority of the seeding of COVID-19 which caused the first major wave in the four nations of the UK was from Europe, in particular Spain, France and Italy. Temporally, this occurred to the greatest extent in mid-February 2020 **(CMJW8/133 – INQ000224069)**. Even had we prevented every case entering the UK from East Asia, which the genetic evidence suggests we were quite effective at, the first wave would still have occurred and been driven by this spread from mainland Europe.

9.5. To have had a meaningful effect on delaying the first UK wave we would therefore have had to close our borders to Europe. We knew from the extensive work preparing for a no deal Brexit that the UK was and is critically dependent on continual imports from Europe, for among another other things food and medicines, especially through the short straits at Dover. The UK economy is different in this regard to New Zealand, Australia or China. Further, had for example the UK closed our borders to European nations, we could not have guaranteed that they would have reopened their borders when it suited us. This was not a medical issue, although the availability of food and medicines for the population ultimately is.

9.6. Thirdly, when COVID-19 first arose there were broadly speaking two paths the epidemic could have taken, as previously laid out. The first was a relatively localised epidemic similar to SARS with spillover cases arriving in the UK but of a disease which was relatively non-transmissible and therefore low risk for a substantial outbreak. Such a disease should have been possible to contain by existing PHE structures.

9.7. The alternative possibility was of a disease which was much more highly transmissible and which would turn into a pandemic that no public health system would cope with easily. In these circumstances, the strong scientific view (bordering on a consensus) is that closing borders only serves to delay the arrival of a pandemic, but does not prevent it.

9.8. This scientific opinion that border closures delay but do not prevent pandemics was and still is widely accepted in the technical literature, including internationally, and the lived experience of COVID-19 does nothing to undermine this view; no country escaped, however closed its economy (e.g. North Korea). Once COVID-19 had left China and spread widely it was going to get to the UK eventually by one route or

another. People often hope that a pandemic is going to pass them by if they only close the borders; inevitably this proves to be incorrect.

9.9. Ministers often started from the reasonable and popularly assumed position that closing the borders might mean that the risk passed the UK by, and that to achieve this border closures would only need to be temporary when in fact they would have to continue for the rest of the pandemic or at least until medical countermeasures were available (years). The assumption that border measures are more effective than they are is natural and widespread around the world.

9.10. This does not mean that border measures have no role even in a highly transmissible pandemic; they can be very useful for delaying the first cases, or the first cases of a new and concerning variant, and in identifying cases or new variants and ensuring that people who arrive in the UK are aware of the relevant rules and how to go about seeking medical care. An example where I recommended that border measures should be instituted very rapidly was when a COVID-19 outbreak in mink in Denmark raised the possibility of a new zoonotic variant **(CJMW8/176 – INQ000236414, CJMW8/177 – INQ000071515)**. The Danes were themselves taking active steps to control this by culling the farmed mink population and it seemed prudent given the risk of a new variant to cease trade and travel with Denmark until the cull was over and no new variant had emerged.

9.11. The Prime Minister and other Ministers wrestled with border issues throughout the pandemic. I understood that their aim was to balance public opinion, trade, diplomatic and public health considerations. My advice and that of SAGE was considerably easier since I only had to consider the public health indications.

9.12. The Inquiry has asked whether I witnessed the Prime Minister saying words to the effect of 'aren't people going to think we are mad for not closing the borders?'. Reframing that slightly, it certainly was a concern of the Prime Minister and other Ministers to maintain public confidence through border measures where necessary. In my view, this is a legitimate political objective which falls outside the public health advice. It might very well be that Ministers decided the public would demand border closures, and choose to close them on that basis; that does not mean the public health advice from me or others should be that this had to be undertaken because it would

be effective as a public health measure. In previous epidemics, I had witnessed Ministers taking perfectly reasonable political decisions on border measures because they might help maintain public confidence, rather than because they had any strict public health rationale.

Scientific Advice

9.13. SAGE reviewed the issue of border measures several times, and repeatedly came to the same conclusion. At best, once COVID-19 had left China, closing the borders would likely only delay the arrival of cases by some weeks **(3 February 2020 - CJMW8/90 – INQ000203939)**. The WHO advice was also that border closures were not an effective tool against COVID-19. The UK CMOs jointly laid out some general principles on border measures which I set out below:

"1) Imported cases matter most when the UK has a low level of infection. When domestic transmission is very high imported cases are such a small amount of total that they are make no significant difference to the epidemic. As the UK moves to situation where local incidence and prevalence is much lower, imported cases could become a higher proportion of the overall number of infections and so preventing them can have some benefit. This is a gradual process, so there is not a 'threshold'. It is however the case that once rates of domestic transmission are low it is potentially a material issue.

2) That benefit only exists to a significant degree when people are coming in from a country with a higher rate of infection (chance of being infected) than the UK, and so the person being asked to self-isolate has a higher probability that they have the disease than the UK population, therefore adding to the risk. Quarantining for 14 days those people who come from a country with a higher rate than the UK may have a useful impact on the epidemic once the UK is at low levels, but quarantining those from countries with a lower rate than the UK will not.

3) However, quarantining is not only, or even mostly, about the epidemiology at this stage of the COVID-19 epidemic. Wider public confidence in the response, impact on travel and trade among other issues should be considered when making policy on quarantining at the border and may be more important in policy terms. This is not for the UK CMO's to offer advice on, as it is not where their expertise lies. Points 1) and 2) they are agreed on" **(9 May 2020 - CJMW8/65 – INQ000203899)**.

9.14. NERVTAG's view on 13 January 2020 was that:

"the body of scientific evidence and previous experiences indicate that port entry screening, whilst not having zero effect, has low efficacy and the benefit is very unlikely to outweigh the substantial effort, cost and disruption" **(CJMW8/76 – INQ000023107)**.

9.15. On 27 January 2020, I met the Secretary of State for Health and Social Care. The readout from this meeting states:

"*SofS asked whether we should be implementing a travel ban for the whole of China under the understanding that the virus is no longer contained to Wuhan. CMO commented that this is not straightforward and would not stop the illness coming to this country if it is highly transmissible"* **(CJMW8/178 – INQ000106067)**.

9.16. On 3 February 2020, SAGE considered travel restrictions. They noted the following:
"1. On the expected impact of travel restrictions, SAGE estimates – with limited data – that if the UK reduces imported infections by 50%, this would maybe delay the onset of any epidemic in the UK by about 5 days; 75% would maybe buy 10 additional days; 90% maybe buys 15 additional days; 95%+ maybe buys a month.

…

17. Gaining 5 to 10 days of extra time for the NHS and wider HMG to prepare for a WN-CoV epidemic would be of limited value.

…

20. Ongoing transmission of WN-CoV in other countries would negate the effectiveness of travel restrictions on passengers coming directly from China – as might other international travel restrictions which force travellers from China to use alternative means or routes to travel" **(CJMW8/90 - INQ000203939)**.

9.17. On 3 February 2020, a SPI-M-O paper to SAGE estimated that based on current information from China, the average delay expected to result from a 90% reduction of travel from China might be up to two weeks **(CJMW8/179 – INQ000051882)**. Travel

restrictions served only to modify the estimated epidemic onset dates, rather than prevent the importation of cases.

9.18. By 23 March 2020, once there was widespread domestic transmission, SAGE concluded that the numbers of cases arriving from other countries were estimated to be insignificant in comparison with domestic cases, comprising approximately 0.5% of the total **(CJMW8/149 – INQ000129072)**.

9.19. Following consideration of a paper from the Home Office commissioned by their CSA Professor Sir John Aston, which contained questions on borders, on 28 April 2020 SAGE advised:

"30. As the number of cases in the UK decreases, the potential proportion of imported cases may increase. It is possible to estimate the number of cases which may be imported and their proportion of the total.

31. Determining a tolerable level of risk from imported cases requires consideration of a number of non-science factors and is a policy question.

32. Measures implemented at the border may change the level of risk and these will be reviewed" **(CJMW8/20 - INQ000053212)**.

Border measures from January to March 2020

9.20. The Inquiry has asked whether on reflection I think that a decision should have been taken to close the UK borders in January to March 2020. For the reasons outlined, I consider this to be a political question not principally a public-health one. From the narrow public health perspective, unless we closed borders to all nations for a prolonged period we would at best have delayed by a short period the onset of COVID-19. Selectively closing borders only to those countries we knew had COVID-19 would have had little impact since the majority of importation came from countries in Europe which, at the time, had extensive COVID-19 transmission of which (excepting Italy) we were unaware. Those arguing for a complete closure of the border to all countries would have needed at the time of giving that advice to be clear for how long they considered this an appropriate step, what their exit strategy would be, and what actions would be taken to mitigate the public health harms from, for example, interruptions of food and drug supplies.

9.21. Arguably, enhanced monitoring of passengers and the handing out of information for those arriving from Wuhan should have occurred some days before it did. As things turned out, this would have made little difference to the initial path of the pandemic in the UK since the great majority of the seeding occurred from Europe.

9.22. This is one area however where we should not allow hindsight to give a favourable gloss. Were we running things again earlier intervention would have in my view been prudent and I would have advised measures more rapidly. Enhanced monitoring does not confer any of the significant downsides associated with stopping flights or closing borders. Set against this however is that enhanced monitoring in the absence of a proven test obviously has much less utility than had effective testing been available. It is also very labour intensive if it is to avoid blocking up airport flow, taking many public health staff to operate it.

9.23. There was a lot of discussion about the best approach to flights from China. Had I been asked whether there was merit in banning these, I would have likely reflected the advice from SAGE, the WHO and others, and advised that banning flights solely from China, were there to be a pandemic, might delay but would not prevent ingress of the disease to the UK. There was an appreciation that the Chinese New Year on 25 January 2020 might accelerate spread of the disease throughout China were human to human transmission occurring (at that point not certain). To some extent, this would also have been an issue for the international Chinese diaspora and the Chinese heritage British population visiting relatives in China. The issues outlined above about the difficulties of stopping flights were also considered. It was very unlikely that COVID-19 would have been exported solely to the UK, but not to any other international destination with links to the UK. The impact of bilateral flight closures therefore should not be exaggerated.

FCO advice

9.24. A separate issue arises in respect of FCO advice against all but essential travel, or all travel, to mainland China. Here it is important to be clear what FCO (FCDO) travel advice is for. It is not meant to be a proxy for public health advice to protect the UK, and in my view it would be wrong to use it as a surrogate for domestic public health

measures. These should be openly declared based on public health advice and democratic political oversight. Instead, FCO advice is there specifically to advise travellers on their individual risk when visiting a country abroad. This may for example be for reasons of political instability, terrorism or disease outbreak. It has significant implications, for example for many forms of travel health insurance which may be invalidated if a travel advisory is in place.

9.25. There are two ways in which the risk to a traveller to China was increased at this time from a public health point of view. The first was due to the probability of travellers catching COVID-19 and suffering one of the severe outcomes of it. The second was the collapse, serious limitations on, or significant impairment of the Chinese medical system such that travellers from the UK with urgent or emergency healthcare needs were unlikely to have these met when travelling in China. I am not aware of data implying that significant numbers of travellers to China from the UK who left over this period came to medical harm for these reasons.

9.26. I set out this logic on 25 January 2020 in advice concerning the evacuation of British nationals from Wuhan:
"I think there are two reasons we should be considering evacuating people who are older or have pre-existing health conditions from Wuhan and the surrounding area if they request it, and if this is practical:

a. *This seems to be the group most affected by the novel coronavirus, and it is very difficult to determine level of risk as inevitably the data coming out is going to be behind the reality.*
b. *My principle* (sic) *reason however is that it is clear that the current health services in Wuhan and surrounds are overwhelmed and also may well be a risk area for acquiring the novel virus. Therefore if they need medical services for other conditions (which is almost certainly more likely than for the novel virus) they may not be able to get them"* **(CJMW8/180 - INQ000047557)**.

9.27. As laid out above, FCO travel advice is about individual risk, not the public health risk to the UK. From mid-March 2020, by which stage we were giving very strong public health advice in the UK, the global risk from COVID-19 in virtually every country to which UK travellers go in significant numbers was clearly either substantial or would

predictably become so in the short-term future. The individual risk was therefore significant. On 17 March 2020, the FCO advised against all but essential travel to other countries. I see no strong reason why this advice from the FCO should not have been given then, or should have been given later. Exactly when the advice should have commenced is ultimately a matter of judgement based on the facts at the time rather than those known subsequently. Acknowledging that the extent of COVID-19 spread globally was at that stage underestimated due to widespread limitations in testing, I cannot confidently point to a date where it was obvious that FCO should have introduced measures earlier.

Screening at ports of entry

9.28. Screening passengers for a disease for which we did not have tests, and where the known symptoms were extremely non-specific (e.g. fever, cough), carries significant difficulties. Furthermore, this was compounded by the fact that as we subsequently discovered, many cases would be missed because they did not have those symptoms yet (in the incubation period) or were asymptomatic entirely.

9.29. Those countries which tried it by and large did not sustain their attempts for very long as it led to a very large number of false positive cases who had to be isolated or otherwise processed at airports for no benefit, whilst simultaneously failing to detect all the cases who arrived since they did not at that stage have symptoms. The key things necessary to make such an approach work are either a rapid test or very typical symptoms. I am not aware of any country which attempted screening in the era before rapid tests were available which felt this was an effective public-health manoeuvre for controlling their pandemic response.

9.30. On 17 January 2020, DHSC shared advice from myself and Sir Jonathan Van-Tam with PHE (our comments are those added in red to a document asking for our views): *"Thank you very much for sharing IMT and SRG recommendations on port health. The CMO and DCMO have now considered these and their feedback follows in red:*

Rec 1 – For direct flights between Wuhan and Heathrow, implement an announcement during the flight asking passengers to report symptoms to cabin crew combined with the requirement for a General Aviation Declaration (radioed by the pilot to the airport

prior to landing) that there is nobody unwell on the aircraft. If an individual is declared unwell, the flight will be dealt with according to existing operational plans.

This is NOT supported. NERVTAG has not recommended entry screening and this recommendation would, in effect, be self-reported entry screening for symptoms that might identify some NcoV19 cases but also lots of other things. Also, some passengers might hide symptoms for fear of consequences. If the aircrew detect a clearly unwell passenger its BAU for them to issue a GAD.

Rec 2 – For terminals receiving direct flights (i.e. at London Heathrow), ensure isolation capability is available for the immediate management of suspected cases

This is appropriate for interception and safe management of people who self-report having seen arrival notices (see below i.e. if used) and/or who are picked out by aircrew or customs as looking very ill in some way which would be BAU.

Rec 3 – For all ports in England, prioritising those known to receive higher volumes of travellers from Wuhan via indirect routes:

i. *Accelerate the roll out of the RING card (an aide memoire which highlights key symptoms of infectious diseases) to frontline Border Force staff in conjunction with supporting training. This is to support early recognition of compatible illness in passengers entering the UK.*

This is a potential option but NOT YET as it will be hard to recognise anything that distinguishes NcoV19 from ARI in general and support BF staff.

ii. *Add WN-CoV-specific information to the existing operational support information used by all airport ground staff. This is to support early recognition of compatible illness in passengers.*

Agreed but NOT YET

iii. *Public information posters displayed in English and Chinese. It is suggested that includes information about NHS 111 should they be unwell after leaving the airport, but discussion with NHSE is underway to agree this. Posters can either be targeted to those airports known to receive direct flights and higher volumes of indirect*

travellers, or across all airports. This is to ensure that arriving passengers know about the symptoms to be aware of should they develop, and actions to take.

Potentially OK but NOT YET

CMO is content for preparation work for options 2 and 3 to be done 'quietly' so they could be implemented quickly if deemed necessary in the future.

In summary, CMO/DCMO advise that it would be TOO SOON to do any additional measures on the basis of one case in Japan and one in Thailand (places with high Wuhan traffic and China generally). If by Monday we have two cases who have been in the UK (one fleetingly) and maybe a couple more 'pop-up' cases elsewhere in the world e.g. HK or Australia for example, then it might be the time to consider acting.

CMO is also conscious that there have been no new case declarations in China itself since 06JAN20 which could mean the outbreak is over and we are picking up tail ends or there will be a second round of reporting. **(CJMW8/108 - INQ000151331)**.

9.31. On 21 January 2020, NERVTAG provided advice on port health, including entry screening and a range of other port health measures. Amongst its detailed conclusions, the group's view was:

"4.8. NERVTAG summarised that the changing epidemiology did not change the fact that port of entry screening has low efficiency and could only detect a proportion of all cases entering the country. The Chair summarised that NERVTAG still supported the position that port of entry screening for those travelling from Wuhan was not advised.

4.9 NERVTAG felt that providing information to travellers and providing effective means for screening febrile travellers attending healthcare settings was likely to be a better option." **(CJMW8/166 - INQ000023119).**

9.32. On 22 January 2020, I sent the below to DHSC and PHE:

"I think given the cases overnight we need to be ready

A) to put up posters everywhere in airports

B) to hand out leaflets to all returning flights from China

In pretty short order.

I think we need to have a fallback plan for temperature screening" **(CJMW8/181 - INQ000047518)**.

Measures in place for travellers

9.33. On 26 January 2020, Sir Jonathan Van-Tam sent this to CCS in relation to repatriation flights arranged by the Government for British nationals in Wuhan:

"On arrival at LHR or wherever, the usual enhanced port measures (invite disclosure of anyone unwell + travel leaflets), no thermal screening and no testing. Makes no sense as Maria [Zambon] very clear with SAGE that she is unsure of sensitivity of coronavirus PCR in early stages of symptomatic illness (likely to be lower) – sensitivity will be even lower in the asymptomatic and might be close to zero if asymptomatic but infected people do not shed virus before symptom onset (a current unknown). No quarantine for arrivals" **(CJMW8/182 – INQ000236381)**.

9.34. At this time, our advice to the public was: "*If you develop respiratory symptoms within 14 days of travel to Wuhan, and are now in the UK, please stay indoors and avoid contact with others where possible, call your GP or ring 111 informing them of your symptoms and your recent travel to the city"*

9.35. In respect of those on repatriation flights, the Secretary of State for Health and Social Care ultimately decided to arrange for these individuals to be quarantined at Arrowe Park Hospital upon their return.

9.36. Over the period January to March 2020, there was an evolution in our advice to both the public and the medical profession in respect of how we defined suspected cases of COVID-19. At first, this advice was heavily based on symptoms combined with geography, firstly Wuhan, then expanding to China, then wider Asia and eventually including European countries. The geographical element of CAS alerts was gradually expanded from late January to mid-March, and the emphasis on geographical elements of the medical history was steadily decreased, especially in severe cases.

9.37. On 12 March 2020, we sent the first CAS alert that removed the geographic element completely, and from then on geographical elements were not deemed relevant

because domestic transmission was clearly the dominant driver of the infection in the UK. The 12 March CAS alert stated:

"We are now in the delay phase of our response to COVID-19. This entails significant changes to how we identify and manage potential cases of COVID-19. Advice for NHS organisations is now as follows:

1. From today the public are being advised to stay at home (self-isolate) without any testing for COVID-19, regardless of travel history or contact with confirmed cases, if they have: a. A new continuous cough OR b. High temperature (of 37.8 degrees centigrade or higher)

2. The geographic element of the case definition has now been removed. Travel and contact history are no longer important for diagnosis, which is on the basis of symptoms alone. If people who have travelled do not have symptoms they do not need to stay at home, regardless of their travel history" **(CJMW8/183 – INQ000048070)**.

9.38. Previous iterations of this advice had some geographic element, initially a very major one, but this was gradually reduced with greater emphasis given to symptoms irrespective of geography. The last CAS Alert prior to this change was on 10 March and said **(CJMW8/184 – INQ000068943)**:

"This letter updates the advice sent on 5th March 2020. Major changes are highlighted in blue font. The key changes are to expand the case definition to include those presenting in hospital with certain symptoms, regardless of travel history. Advice for NHS organisations is as follows:

Individuals presenting at hospital.

To improve case detection in those with no geographic link, patients who require admission to hospital should be tested ***regardless of travel history*** *if they present with*

• Clinical or radiological evidence of pneumonia or acute respiratory distress syndrome

OR

• Influenza-like illness

Infection prevention and control measures whilst awaiting test results, including isolation and cohorting of patients, should be implemented in line with your Trust seasonal influenza operational plan.

Individuals with relevant travel history.

If someone has returned from these specific areas in the last 14 days, they should self-isolate even if they do not have symptoms. If they do develop symptoms, they should use NHS111 online at 111.nhs.uk (if they have no internet access, they should call NHS111). The areas are:

• Iran

*• Italy**

• Special care zones in South Korea as designated by the Government of the Republic of South Korea

• Hubei province

** This applies to the whole of Italy if the individual has returned **after 9th March**, when the Italian government extended the lockdown to the entire country.*

*If the individual returned **before 9th March and has symptoms**, they should use NHS111 online at 111.nhs.uk (if they have no internet access, they should call NHS111).*

*If the individual returned **before 9th March and does not have symptoms**, they should only selfisolate if they have been in the original locked-down region of Lombardy and provinces of Modena, Parma, Piacenza, Reggio Emilia, Rimini, Pesaro and Urbino, Alessandria, Asti, Novara, Verbano Cusio Ossola, Vercelli, Padua, Treviso and Venice in the preceding 2 weeks.*

If someone has returned from the following areas in the last 14 days and develops symptoms, however mild, of acute respiratory infection including at least one of:

• shortness of breath or cough (with or without fever);

• OR fever with no other symptoms;

they should self-isolate at home immediately and use NHS111 online at 111.nhs.uk (if they have no internet access, they should call NHS111). They do not need to self-isolate if they have no symptoms. These areas are:

• China (except Hubei province which is listed above)

• Hong Kong

- *Macau*
- *Taiwan*
- *Japan*
- *Malaysia*
- *Republic of Korea (except areas which are listed above)*
- *Singapore*
- *Thailand*
- *Vietnam*
- *Cambodia*
- *Laos*
- *Myanmar*

Border measures from June 2020 onwards

9.39. My advice and the advice of the other UK CMO's on travel restrictions once there was significant domestic transmission are laid out in our joint note to the Cabinet Office of 9 May 2020 **(CJMW8/65 – INQ000203899)**. This was provided in order to assist Ministers who were considering whether to introduce a 14-day period of self-isolation and the collection of contact details for incoming travellers to the UK.

9.40. Our advice was that imported cases mattered most when the UK has a low level of infection relative to the levels abroad. Conversely, when domestic transmission was very high, the contribution of imported cases to the total was usually so small that it made no significant difference to the course of the pandemic in the UK. There was therefore some potential benefit in preventing imported cases from summer 2020 onwards, once the effect of the first lockdown had been to reduce the UK domestic incidence of COVID-19 to very low levels. This reflected advice from SAGE.

9.41. Any benefit to reducing the UK epidemic only existed to a significant degree if people were arriving from a country where their chance of being infected exceeded that in the UK. In those circumstances, a traveller arriving from a higher incidence country added to the overall UK risk because their chance of having the infection was greater than for an individual in the UK. For these individuals, there was some merit in requiring them to isolate for 14 days (i.e. the incubation period of COVID) upon arrival. The same was not however true of individuals arriving from countries with an incidence lower than the UK. Those individuals would have a lower risk of having COVID-19 than someone already in the UK, and so statistically as a group they posed no risk of worsening the UK domestic COVID-19 pandemic.

9.42. As had been the case in respect of border measures in January to March 2020, the ongoing arrangements from summer 2020 onwards were not only about the epidemiology. Wider public confidence in Government's handling of the pandemic, the impact on travel, trade and other issues needed to be taken into account. This was a matter for political decision makers guided by advice from many fields, and was not something where the public health advice could be considered in isolation.

9.43. A policy of travel corridors was introduced from early June 2020. JBC led on this policy and took the lead on the technical aspects and thresholds for countries to be categorised on what became a "red", "amber" or "green" basis. The broad principles underlying the system had however been agreed by all four UK CMOs prior to this. The position of JBC is summarised well in their June 2020 paper, which I quote below: *"The current blanket approach to mandatory self-isolation is currently justified on the basis that (a) it is difficult to ascertain with confidence the risk levels in certain countries; for example a country with high levels of disease will in fact report low incidence and prevalence if there inadequate testing capacity or limited access to testing; (b) risk levels may vary as incidence/prevalence changes within a country, but reporting may be lagged by several weeks; and (c) international travellers may have visited higher risk countries during the incubation period, before or after travelling from a low risk country in which they are ordinarily resident. As requested by the PM, we are now developing an approach stratified by the public health risks posed. However implementation risks, particularly linked to confidence in incidence/prevalence reporting and compliance, remain inherent in any risk-stratified approach.*

The CMO has advised that there is limited public health rationale to require people to self-isolate when they arrive from countries which have a lower incidence of coronavirus than the UK.

We would also need to have confidence in their testing capacity, accessibility and the credibility of incidence reporting. The DCMO has advised that once UK incidence is low, there is a clear public health rationale to require international arrivals from countries with a higher incidence of coronavirus than the UK to self-isolate on arrival, including where the reported incidence is low but we have little confidence in the reliability of reporting or the country's disease trajectory is rapidly escalating. This is especially true if traveller arrival volumes from those countries is high" **(CJMW8/185 - INQ000236410)**.

9.44. When significant new variants arose (e.g. Delta, Omicron) the important question was not the overall risk of COVID-19 but the risk of importing that variant. Therefore, if the UK had a low incidence of, say, Omicron, and another country had a high rate, border measures could be considered on the basis that delaying the establishment of that variant would have some public health benefit. Once UK domestic transmission of that variant was established, the advantages fell away.

9.45. The mechanism by which travel advice was given, certainly after the first few weeks of the pandemic, involved multiple government departments. As I have identified, it is an area of policy which cuts across multiple areas of Government and the national interest, and so this was appropriate. I therefore consider that the various measures introduced after this time were considered with care. This does not necessarily mean they were the 'right' outcome, but it does mean that the decision taken took account of several facets of the problem. Determining whether the measures ultimately arrived at were proportionate overall is something which should be assessed against the political aims they were meant to achieve, and the weighing by politicians of the public-health, diplomatic, commercial, security of essential goods, consumer or other major priorities.

9.46. One important technical detail is the difference between screening before travel and screening at airports on arrival. Screening prior to travel has some significant advantages to fellow travellers and aircraft staff by reducing the probability a currently infectious person is in an enclosed space for often prolonged periods with many others.

PART 13: Public Communication

Section 14 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

COVID-19 public health communications

Role of the CMO in communications

14.1 I was involved in providing scientific, clinical and public health communications throughout the pandemic to the general public. This was most visibly done by televised live press conferences, usually with the Prime Minister or other Ministers and the GCSA. I also undertook some individual press conferences out of DHSC, joint press conferences with the GCSA and some background press conferences to inform journalists which were not directly quoted. I used meetings open to both the public and the press to lay out some scientific thinking and public health messages, in particular appearances before Select Committees in Parliament which often received wide media coverage.

14.2 My role in these was technical, as in my view it should be. Where I had a choice, I confined myself to information or advice that in my view the public would find useful in their response to the pandemic. This was typically the questions they would normally ask of a doctor, public health specialist or scientist. It was not my role to explain, defend or attack Government thinking or actions when these were not technical. The Prime Minister or Minister leading the press conferences rightly expected to take the role of explaining Government thinking.

14.3 There was much misinformation and disinformation during COVID-19. Here I would differentiate very sharply between a significant number of citizens with entirely legitimate concerns and questions during a very frightening period, and a small number of sometimes malign actors whose principal aim was to persuade others not to take COVID-19 seriously or to fear medical or other countermeasures, including vaccines. In respect of the first group (concerned citizens), I considered it very firmly my job to understand people's concerns as best I could, and to address these concerns as directly, clearly and honestly as I was able. This is normal medical practice.

14.4 The task was more complex in respect of those deliberately seeking to place misinformation. Repeating their false myths with the aim of knocking them down was more likely to alert people not previously aware of their deliberately provocative and inaccurate (or dishonest) narrative, amplify its content and in doing so, potentially cause further confusion. My approach therefore was to simply provide accurate information and not engage directly with deliberate misinformation.

14.5 I do not recall a situation where the Prime Minister put pressure on me not to express a view in public. The rules of engagement were essentially clear, whilst not explicit. I did not talk to the media or publicly unless I was asked to by Ministers or exceptionally with clearance from relevant senior communications officials. In return, I never had any pressure to modify what I did say in answer to any public question. Occasionally my answers to questions were uncomfortable for the Government, but I was never criticised subsequently by the Prime Minister, other Ministers or communication leads for this.

14.6 In part this reflects the independent nature of the CMO role within Government. More importantly however, the Prime Minister and wider Government accepted that the main benefit of me giving advice and opinions in public was that I was obviously free to say what I thought was technically correct. The public could therefore trust that the advice was a professional opinion rather than the Government line. In my view, professional advice from any profession, including medical, scientific, legal, military or economic is only useful to the extent that it is an accurate reflection of the professional view of the person giving it. This does not mean the advice is right, but it is at least independent, and known to be so.

Communications by others

14.7. I considered the decision by individual scientists on SAGE to contribute to media, often on repeated occasions, to be an overall positive. There were however some significant risks. Several of the scientists involved were extremely good and articulate communicators of science. The reason they were on SAGE was because they were seen to be some of the best scientists with relevant experience in the UK and having them explain the science as then understood directly to the UK population was a good thing. Many non-SAGE scientists were also very good and accurate communicators of

science and the general public benefitted substantially from their insights. Some of the non-SAGE talking heads commentating in public, including people with academic positions, did not in my view always have a full grasp of the technical details or had relatively minority (or even fringe) opinions. Having the best scientists also in the public sphere avoided the less mainstream opinions having a monopoly at a point when the public was extremely keen on accurate information.

14.8. SAGE was, rightly, made up of major scientists with varying opinions, especially when the data were ambiguous or absent. As a result, there was not always unanimity in SAGE, nor would that have been desirable. On some occasions, scientists who were part of the SAGE system chose to argue their own position on a contested issue in public, either by direct briefings or indirectly as an anonymous source. I was not always convinced this was a sensible thing to do; there is always a spread of opinion (indeed avoiding group think is important) and the point of the system is to try and find a midpoint of contemporary scientific opinion. It was however their right as independent academics provided they did not express their view as the opinion of SAGE.

14.9. It is important to remember that there were from the very beginning of the pandemic broadly two outrider opinions in the scientific mainstream: that we were doing far too much as this was going to burn its way out, probably by immunity; and that we were doing far too little and should be aiming for zero COVID **(CJMW8/186 – INQ000203964, CJMW8/187 – INQ000064527)**. The central position in science, both in my own personal view and the one put forward by SAGE, was between those two extremes. Had SAGE scientists not engaged in the media, I think these two outlier positions would have achieved even greater prominence, leading to confusion in the public mind.

14.10. In my view the COVID-19 public dashboards, which I had no part in designing or commissioning, were a triumph of communication of science and public health. They were purely factual, based on solid data, and spared many details which were of limited interest to most people. They were also picked up a lot by journalists who amplified their message. Inevitably, they were not relevant to everybody, but to a large segment of the population they were a popular, trustworthy and useful resource. I would like to pay tribute to those who designed them.

The public narrative

14.11. My expertise is not as a public communications professional. I therefore did not contribute to the details of the various campaigns, except to be consulted about whether they were scientifically wrong.

14.12. The Inquiry has asked whether I consider the UK Government's public communication to have been characterised by a 'fear' narrative. I can only answer on the basis of my own aims and actions. I tried through various media ranging from press conferences to a Gresham lecture to provide a balanced understanding of the risks at both an individual and population level. One example of my way of trying to explain this was laid out in this publicly available slide (very similar to what I also said in press conferences):

" At an individual level the chances of dying of coronavirus are low.

- *Over the whole epidemic, even if there is no vaccine, a high proportion will not get it.*
- *Of those who do, a significant proportion (exact number not yet clear) have no symptoms*
- *Of the symptomatic cases, the* ***great majority*** *(around 80%) a mild-moderate disease.*
- *A minority have to go to hospital, most need only oxygen. The great majority of these survive.*
- *A minority of those need ventilation.*
- *A minority of every age group sadly die with current treatment, but even of the oldest group most do not."* **(CJMW8/188 – INQ000236408)**.

14.13. This formulation was subsequently misused repeatedly by antivaxx propagandists to imply I said there was no risk from COVID-19, which is clearly false. I thought however it was important that people did not live their lives with an exaggerated fear of COVID-19, but rather had a balanced view of their personal risk but also the substantial risk to more vulnerable people, and at a population level the high number of potential deaths given the very high numbers infected. In my view, this balanced view of risk is exactly what the general public had. I consider for example that the great majority of younger

citizens who took significant social and economic hits to adhere to government guidance were fully aware of the fact that their personal risk of mortality was extremely low, and they were doing it principally to protect more vulnerable others, most of whom they would never meet. This altruism was very admirable.

14.14. I do not, and have never, considered that excess fear is an appropriate communication strategy from healthcare professionals. Neither however is glossing over risk. If anything, the fact we did not appreciate the importance of Long COVID may have led to an under emphasis on the risk to younger and otherwise healthy individuals. A balanced view of risk is important to individual as well as population decision making.

Effectiveness of communications

14.15. I consider the Government's communications efforts, including mine, to have had mixed success. On the positive side, I think they were accurate to the best of our ability based on what was known at the time and given the extraordinarily compressed timescales, once we had worked out approaches to visualisation of data which were reasonably clear. The fact that people understood the messages in the main I think was demonstrated by the extraordinary adherence to public health messages that was seen throughout the pandemic. Some key scientific concepts such as R were in my view communicated relatively effectively. The general population engaged with often quite complex data to a degree which I think surprised some onlookers (but not me; my experience as a doctor has been that the great majority of people are very interested in, and have a sophisticated understanding of, data when they think it is relevant to their lives or those of their families).

14.16. There were however some significant limitations. We certainly did not manage to communicate as effectively with some groups, including some ethnic minority and linguistic minority groups, as we should have done. This was particularly true early in the pandemic. Getting the emotional tone right between false reassurance and stirring excess fear was quite complex; my role was relatively straightforward in the sense that it was simply to provide the facts but for those involved in public communications, including advertisements, more complex judgements had to be made. I do not feel qualified to judge whether these were the best under the circumstances, and would fully acknowledge that they were very difficult calls.

14.17. Like the GCSA and the DCMOs, I considered the concept that the Government was 'following the science' to be a misunderstanding, and potentially a misleading one. As laid out above, the decisions political leaders and other core decision-makers were taking were informed by the scientific and medical evidence available at the point in time the decision was taken. They were however also rightly informed by economic, social, political, diplomatic, operational, political and other issues. That Government was informed by the science of the moment, alongside many other inputs, is a more accurate formulation, albeit a less snappy one. At no point did I consider Ministers constrained my ability to express my understanding of the science of the time in Government, or to the public.

14.18. Whilst we did not state for every fact in a press conference or communication exactly how the division between scientific advice and political decision was split, in my view this was understood by the great majority of the public. Neither the GCSA, the DCMOs nor I were prepared to present data with which we were not personally comfortable. This sometimes involved a process of negotiation with communication teams who were keen to present a clear narrative. I never felt that this was intended to deceive, but rather it was an attempt to simplify which in my view occasionally extended to oversimplification.

14.19. In written statements by the Prime Minister and other Ministers when we were also at the podium, the GCSA and I usually had prior sight of what would be said in the scripted statement and the ability to correct technical scientific or medical errors in advance. For errors of fact made by Ministers or others in answer to questions, where I felt it was material I tried as best I could to correct it contemporaneously. At no point was I subsequently challenged on my decision to do so by the Prime Minister or others, even when this was occasionally embarrassing. Many minor errors were simply a matter of a slip of the tongue or minor misremembering, including by me, the GCSA and DCMOs as well as by Ministers. We tried to correct these rapidly when they were material, and in subsequent press conferences when they were largely technical.

14.20. There was always a tension between expressing a clear central view so that the public understood the point, making clear that there was some uncertainty (particularly early in the pandemic), and spending so much time caveating the view that the central

message was indecipherable. Communicating via the relatively short exposure during media clips and press conferences imposes very significant limitations and getting the balance right between these is not at all easy. My sense, based on feedback, was that people were aware that we had uncertainties; the exact details of these were probably neither possible to communicate accurately nor particularly important to communicate given the time constraints and the need for clarity.

14.21. In my view there was no point at which we had been so definitive on an issue that when we had to change position as the scientific midpoint changed (for example on facemasks) this was not understood and accepted by the reasonable majority.

14.22. The Inquiry has asked whether I thought there was an overemphasis in communications on surface transmission and hand washing in the initial period of the pandemic, and an under emphasis on airborne transmission and ventilation. In terms of the balance of time spent talking about these, undoubtedly were we to rerun the scientific communications at the beginning of the pandemic we would put more emphasis on airborne transmission and in particular ventilation. It was not however dichotomous; from early in the pandemic the importance of outdoor spaces was strongly emphasised in the practical advice. Hand washing is a simple technique which was and remains relevant. The ratio between these undoubtedly shifted as the scientific understanding evolved but changes in the scientific consensus were inevitable with a new infection and we said so from early on. I do not consider this was a major contemporaneous error based on the information at the time.

14.23. I had, and have, no data on which to base the impact of public reports of alleged or proven breaches by senior Government officials of the rules. At the time, my view was that whilst these undoubtedly caused considerable and understandable anger, the average person made decisions about their own behaviour based on their own judgement of what was right and wrong to protect others. I continued to make the scientific and public health points and acted on the basis that the majority of the population probably continued to act according to their own view about what was the correct approach, irrespective of what those in Westminster and Whitehall did, and did not take senior Government figures as their role models. The most corrosive element was any undermining of the sense of fairness- we are all in this together and the rules

apply equally to all. From the beginning fairness was emphasised, for good reason, by SPI-B and SAGE as essential to maintaining public support for measures.

14.24. On 31 October 2020, the GCSA, at the request of the Prime Minister, presented modelling data relevant to the decision to impose a second national lockdown; I was present in support of the GCSA. Neither he nor I particularly liked presenting modelling data in press conferences due to the very wide uncertainties involved which were difficult to explain in the short time available. As I have said, wherever possible I avoided doing so and preferred to use actual data. Nevertheless, it had some importance for the public and in decision-making so it was a reasonable request from the centre to expose it to public view.

14.25. There was at the time a criticism, mainly from those who did not want to support a lockdown or other NPIs, that some of the scenarios presented were out of date. This of course was true; most scenarios will be out of date to some degree at the time they are presented. The question is whether they were misleading in terms of the broad thrust of the pandemic and the implications for public behaviour. Those criticising the scenarios appeared to want to believe that a lockdown or other new social measures could be avoided because a bad outcome was not going to occur if they discredited the models.

14.26. The virus of course pays no more attention to debates around models than it does to religious festivals. It was back to doubling, and in the context of going into winter and a still largely immune naïve and unvaccinated population, it was not clear why it was not going to continue to double without action. The exact path was debatable; the direction of travel was clear. Some of the attempts to discredit what was essentially a simple point about exponential increase were either based on restricted understanding of doubling or were in my view disingenuous. It is worth re-reading some of the criticism of the time, and then comparing it to how the reality played out over the next few weeks.

The UK's approach to communications

14.27. The particular format that the UK Government chose to use for the press conferences was unique to the UK, but the broad approach was quite similar to a number of other countries. The approaches generally split into those where the political leader took the

press conferences in practice on their own (even if scientists were present in the room), those where the scientific/public health leads held the press conferences on their own without political input, and those which were a hybrid.

14.28. There are arguments for and against each of these but in the context of a prolonged emergency the hybrid model had some advantages. There were major issues around what the Government was deciding to do, and these were in my view best fronted by, and questions answered by, the Prime Minister and other elected political leaders who had taken a decision on behalf of the public. It is not the job of scientific or medical advisers to defend or criticise Government policy. Ministers are also highly experienced at communicating to the general public via media; this is a key political skill. At the same time, there are important medical, public health and scientific questions which the general public wished to know the answer to and which it was not realistic to expect political leaders to be able to provide, particularly in a question and answer session. The hybrid model allowed both to occur.

14.29. On a few occasions political leaders asked us to do press conferences or other media without politicians present. These were generally where the Government had not yet made a formal decision but wished the general public to understand the underlying epidemic.

14.30. Some countries chose to have a single scientific voice. I am glad that for this prolonged and major pandemic the UK model allowed for a restricted rotating cast of scientific and health advisers with different communication styles. The strain of press conferences to those of us not used to them was very considerable, and preparation for them was extremely time-consuming. It also meant that when one of us made a slipup or communicated poorly (I have given the example of my communication around 'behavioural fatigue') we were not the only voice which could become discredited by a poorly expressed answer to a single question. Therefore, although it led to some risk that the public could become confused by a rotating cast, on balance I think the benefits of this model for an emergency running over years outweighed the disadvantages. Had it been an emergency of a few weeks, a smaller cast list would probably have been better.

14.31. There was some degree of specialisation in the communication roles we tended to take. Purely scientific data tended to be presented by the GCSA, clinical data by me, vaccine data by Sir Jonathan Van-Tam and so on, but we were all capable of answering questions on any of these subjects as we had formed a collective scientific view.

14.32. The Inquiry has asked what problems I believed were caused by any apparent alignment between me as CMO with the Prime Minister and other Ministers in broadcasts and briefings, and whether we should have distanced ourselves more from them. I was well aware that multiple voices, including many I respected, made public calls for me and the other clinical and science advisers to distance ourselves (or still better speak out against or denounce) the Prime Minister and other Ministers. In my view however the separation of roles was clear to most reasonable observers. I was a professional technical adviser, and restricted as best I could my public comments to that role. I tried very hard not to comment, positively or negatively, on the policy decisions of Ministers, and not to criticise individuals whether Ministers or others, even if it might on occasion have been popular to do so. On occasions if asked in a press conference I would say if I thought government policy was unlikely to work- that is a technical judgement. I usually only did that when I thought there was some public health benefit to doing so. Some of those asking for me to dissociate myself from government I think saw a very neat division between communication on the one hand, and being able to give scientific advice on the other, and would have liked my communication to have been entirely separate to the government's. Policy and communication are however linked at multiple levels. In my view the fact we were giving commentary with the Prime Minister meant the scientific advice was much more clearly conveyed to a wider audience than if we had not been. The advantages of that for public understanding and public health outweighed the disadvantages of appearing to some to be too close to the Prime Minister in my view. There were plenty of senior scientific and medical leaders, occupying positions where they were not working closely with Ministers, who were perfectly capable of providing a running public commentary on and critique of government policy (and did); that is not the role of the CMO.

PART 14: Disparities

Section 11 of the Fourth Witness Statement of Professor Sir Christopher Whitty dated 22 August 2023

COVID-19 Disparities

Identifying disparities

11.1. Once an epidemic or pandemic begins, it is likely to lead to some groups living in disparity or discrimination being affected disproportionately. This has been true for almost all infections through history, although the mechanism by which this occurs, and the groups it affects, vary depending on the infection. I made this point in my Second Statement for Module 1 but repeat it here for Module 2:

"The importance of identifying and mitigating as far as possible inequalities and disparities in health is one of the aims of all public health. Communicable as well as non-communicable diseases tend to be most likely centred in areas of deprivation. The mechanism by which this occurs and can be countered is however different between different pandemics and epidemics. In cholera where this was first studied systematically it was by exposure to unsafe water; in epidemic typhus by exposure to lice; in HIV through intravenous drug use; and in tuberculosis (TB) through overcrowding, poor housing and malnutrition, among other factors. Expecting pandemics to be more severe in deprived areas is therefore generic to most infections, but why, and therefore how to combat this depends on the pandemic and its transmission and biological characteristics, and in particular route of transmission.

….

The most important way in which public health measures reduce the risk to areas of deprivation is to control the pandemic or epidemic in society as a whole. There may also be specific measures which reduce the risks to the most vulnerable populations (which are almost inevitable) but they depend on the infection involved."

11.2. The earliest disparity that became apparent in respect of COVID-19 was by age, and specifically older age: this was first indicated by data from Chinese scientists and clinicians and was subsequently repeated in Italy, the UK and globally. Various subsequent risk factors appeared early in the data and included gender (this varied over the pandemic's first years), obesity, diabetes, immunosuppression,

neurodisability, several other medical comorbidities, disabilities and ethnicity. Deprivation remained a risk factor of its own even when other factors were controlled for. Older age remained however the greatest risk factor at a population level.

11.3. The aim of identifying these disparities was not merely to observe, but to act to try to minimise preventable harm. I was involved in putting in place at a relatively early stage of the pandemic studies to try and identify medical conditions associated with poor outcomes, and to examine the causes of, and potential solutions to, the observed differences by ethnicity, outlined below.

11.4. In considering the various groups at risk, it is important to differentiate between an increased risk of acquiring COVID-19, and an increased risk of having severe disease or dying from COVID-19 once it was acquired. These have very different practical implications. For example, obesity or older age do not increase the risk of infection (in fact in the case of age it is probably the reverse due to relatively fewer different social contacts compared to younger adults on average) but they do increase the risk of severe outcomes once infection has occurred.

11.5. On the other hand, living in a multigenerational household, being employed in a high contact role such as social care or taxi driving, or living in densely populated areas do not in themselves increase the risk of severe outcomes. They do however significantly increase the risk of a vulnerable individual acquiring the infection. In practice, deprivation often simultaneously increased the risk both of infection, including through housing and employment, and the risk of severe disease, for example through higher pre-existing rates of diabetes, obesity or multi-morbidity. Deprivation also often served to reduce the speed with which individuals sought care and their level of engagement with health services in addition frequently to having worse pre-existing health and greater risk of acquiring disease.

11.6. Exacerbating this, many of the key social measures taken to combat COVID-19 had greater negative impacts in areas of deprivation than in more affluent areas. Greater proportions of the population in these areas depended on work paid only for the time spent working, meaning that time off for self-isolation was more financially damaging than for salaried work; families were often less equipped to be able to support home

schooling for children; outdoor spaces were often less available for relatively safe social mixing; and so forth.

11.7. This led to an extremely difficult combination whereby the probability of someone in an area of deprivation acquiring, having severe disease from, and being harmed by the countermeasures to COVID-19 were all greater in areas of deprivation than in more affluent areas. Many of these households were also least able to home-school as parents were not able to work from home. Later in the pandemic, disparity also manifested itself in differential uptake of vaccination, with inevitable consequences. I gave advice on issues around deprivation and different groups of at-risk individuals throughout the pandemic as evidence emerged, rather than at one specific point in time.

11.8. It was in my view predictable that there would be significant structural inequalities in the health outcomes for COVID-19. It was not in my view entirely predictable which groups these would be other than that broadly people living in deprivation tend to have less good outcomes from most infections and indeed most public health problems. To give an example of this, in my early medical career the last major pandemic was HIV/AIDS. There was in the UK very heavy inequality in HIV centred around gay men (then highly discriminated against), people of both genders with a heritage from southern Africa, intravenous drug users and commercial sex workers - all groups who suffered from discrimination and often deprivation. This is a completely different group from those affected disproportionately by COVID-19, although the issues of segregated risk into marginalised and vulnerable communities were equally severe.

Response to the disparity in outcomes

11.9. Given this, we felt it was important to undertake the collection of data and research studies to identify the key vulnerable groups, and in turn identify any possible countermeasures. It is important here to recognise the difficulties involved in confounding and bias in epidemiological studies of this kind. In the first wave of COVID-19, people of African and Afro-Caribbean heritage were sadly very highly overrepresented in those who acquired and died from the disease. Identifying the proportion of that excess risk which was as a direct result of ethnicity, and that which was due to the fact that a higher than average proportion of people living in densely

populated areas or in high contact professions (and who therefore could not work from home) came from these communities, was not straightforward. It did however have important practical implications. In the second wave, UK citizens of South Asian heritage had a much higher risk than in the first wave. This reflected the fact that the first wave had a particularly big impact in London, which has a very high proportion of UK citizens of African and Afro-Caribbean heritage, and the second wave initially had a particularly high impact in the Midlands, where there is a very high proportion of the UK's population with South Asian heritage.

11.10. Accordingly, I was involved in the commissioning of several relevant studies. This included setting up CO-CIN, commissioning NERVTAG and Professor Hippisley-Cox to do detailed work on the risk for different groups (Q-COVID) **(CJMW8/189 – INQ000236458)**, and directing the NIHR to do a themed call on ethnicity. The latter of these funded 10 studies including:

- UK-REACH: United Kingdom Research Study into Ethnicity And COVID-19 outcomes in healthcare workers; **(CJMW8/190 – INQ000236443)**
- Ensuring that COVID-19 trials consider ethnicity: the INCLUDE Ethnicity Framework for randomised trials **(CJMW8/191 – INQ000236444)**; and
- Quantifying the association between COVID-19, ethnicity, and mortality: A cohort study across three UK national databases **(CJMW8/192 – INQ000236445)**.

11.11 Further examples are the report on the impact of COVID-19 on BAME communities **(CJMW8/193 – INQ000106482)**, the NERVTAG sub-group work on stratifying by risk **(CJMW8/194 – INQ000236454)**, an evidence call for research on ethnicity by NIHR in April 2020 **(CJMW8/195 – INQ000236455)** and the CO-CIN study, which reviewed a range of risk factors including ethnicity **(CJMW8/196 – INQ000425563)**.

11.12 I was also involved in discussions with healthcare colleagues from multiple ethnic minority and other cultural groups to get their insights into the experience of the communities they had closest links with, and to identify possible countermeasures to COVID-19 in those communities. Later in the pandemic, this included supporting those groups to maximise vaccine uptake. The importance of healthcare worker volunteers from different communities engaging with their communities whilst continuing to

maintain their very hard main jobs was both very inspiring, and based on external evidence, very important **(CJMW8/197 – INQ000236421, CJMW8/198 – INQ000236420)**.

11.13 As I have identified, there was a particular issue with occupational safety as a consequence of those from minority communities being commonly employed in public facing key worker roles which could not be undertaken from home. In my view, the key to improving the safety of these individuals, which included health and social care workers, was principally to optimise safety for all rather than to trying to differentiate by every at risk group in the work place. It very rapidly became apparent that trying to have different safety regimes for workers from different ethnicities (for example) who were otherwise well and undertaking the same work would be impractical. There was a judgement that there needed to be some extra protection for those at the greatest risk, but this was often double edged. Shielding for example reduced the risk of COVID-19, but increased the risk of loneliness. Reducing the risk to all by reducing COVID-19 transmission in the community, and reducing the risk to all in workplaces were generally the most effective ways to reduce the risk in particular at-risk groups.

11.14 Notwithstanding the efforts described above, whilst I did my best to reflect the importance of disparities and inequalities in the advice I gave to key decision-makers, and I am also confident this was true for the DCMOs, nobody looking back at COVID-19 can claim this was sufficient. The scale of the difference by deprivation and ethnicity is clear; what would have been effective countermeasures is less so. The biggest difference numerically was, and remained throughout the pandemic, older age.

Limitations of our response

11.15. One weakness in data capture is that ethnicity is often poorly or confusingly captured, or not captured at all. Ethnicity was for example not a part of death certification. NHS data on ethnicity is often patchy and does not always rely on self-identified ethnicity, although this is arguably improving. In fairness to those who try to do this, it is not a straightforward endeavour. Many people, entirely reasonably, have multiple simultaneous cultural identities, combinations of ethnicities by biological heritage and cultural choice. Even in research studies, classification by ethnicity is often crude and lumps together groups of individuals who are culturally or genetically very distinct.

11.16. It is essential that in any pandemic or epidemic there is an assumption and recognition that some particular groups will be particularly badly affected. It should also be assumed that there is a very high chance these will be in deprived groups or those living with social stigma or other forms of inequality. Identifying these in advance is however often difficult. It was in COVID-19; many of the disparities identified were obvious in retrospect but were not clear before they became apparent, and some which we were expecting fortunately did not occur (for example high mortality in children). Looking for disparities in outcomes with the expectation they will be found in marginalised groups but without preconceptions as to which, and then responding to these differences where that is practical, is key.

11.17. Even more important than identifying that there are disparities in risk is identifying differences in response to countermeasures. In the case of COVID-19, these included a differential ability to take time off work, to isolate within homes, varying levels of trust in health services and public health messaging, and the response to the vaccine being available. Identifying and addressing these was of great importance.

11.18. A few of the errors made early in COVID-19 were both predictable and simple to fix. Accordingly, they should not have occurred. An example was the delay in getting proper translation of key public health material into the common languages spoken in the UK by those whose first language is not English. A slightly more subtle one was recognising that some important groups were getting their public health advice not from UK-based outlets such as the BBC, ITV or major UK papers, but mainly from foreign language channels, or indeed English language channels from other nations. Repeating key messages from Downing Street press conferences was unlikely to address this.

11.19. The aim of the COVID-19 pandemic strategy was principally to protect the most vulnerable. This was explicit in the advice given. It took some time for every vulnerability to become clear and this changed as science progressed and clinical data emerged. The first high risk group identified, and numerically the largest by some distance, were older citizens. Some of the risk factors other than age for which evidence emerged were largely predictable, for example immunosuppression, whereas some such as obesity were less obvious until the data appeared.

Paragraphs 4.38 – 4.68 of the Fifth Witness Statement of Professor Sir Christopher Whitty dated 1 February 2024

Risk Factors

14.9 Mortality rates varied considerably across the population, with the strongest risk factor by some way being older age; this was identified early. Other risk factors for mortality include pre-existing health conditions including obesity. The understanding of who was at risk changed through the pandemic, but older age was established early and remained the most common risk factor. Children and young people were at very low risk of severe outcomes relative to adults, but severe cases and deaths still occurred in this age group **(CJMW8/199 – INQ000066784)**.

4.38 People from ethnic minorities were at higher risk of mortality from COVID-19 overall. There was a complex interaction between COVID-19 and ethnicity that became clearer with time. The increased representation of people from ethnic minority groups was in large part due to increased risk of being infected, for example due to occupation (e.g. in close contact occupation) or living in higher risk areas, but there were additional factors including higher pre-existing rates of chronic diseases. I commissioned a report on this from Professor Kevin Fenton published in June 2020 **(CJMW8/193 – INQ000106482)**. Subsequent studies built on this work. The risk by ethnicity changed over the course of the pandemic.

4.39 As with most epidemic infections those in areas of deprivation suffered most from higher infection and mortality.

4.40 Mortality rates from COVID-19 in the most deprived areas of the country were more than double that found in the least deprived areas, with differences remaining after adjustment for age, sex, region and ethnicity. As a single group, ethnic minorities experienced higher all-cause death rates and death rates from COVID-19 compared to those of white British ethnicity, with relative differences varying throughout the pandemic and across different ethnic groups **(CJMW8/200 – INQ000101218)**.

4.41 In the working-age population, COVID-19 death rates were consistently and markedly higher for men than women throughout much of the pandemic, but this varied by occupational group **(CJMW8/201 – INQ000148395)**.

4.42 Another group at particularly high risk for severe disease and premature mortality were those with a disability. In the first wave, 6 out of 10 deaths in England were among

people who reported having a disability **(CJMW8/202 – INQ000089756)**. Research based on the learning disability register found a persistent, unadjusted, marked increased risk in COVID-19 hospitalisation and mortality for people with a learning disability – though it is important to note that there are major limitations with the learning disability register as a robust assessment tool, with wider coding for learning disability, difficulties in risk attribution to particular learning disability conditions and that not all analyses adjusted for underlying health conditions **(CJMW8/203 – INQ000381220)**.

4.43 Co-morbidities such as diabetes, severe asthma and obesity were identified as risk factors for poor outcomes and were more prevalent in more deprived and in some ethnic minority groups. Linked primary care records of over 17 million adults with over 10,000 deaths between February and December 2020 found that while comorbidity did explain some of the different death rates by ethnicity, people from black and South Asian ethnic groups were both more likely to test positive and more likely to die from COVID-19 during the first wave compared with people from white ethnic groups after adjustment for deprivation, age, sex and comorbidity **(CJMW8/204 – INQ000381221)**. Analysis of the second wave found that while differences in testing positive and higher death rates among South Asian ethnic groups remained, they were far less stark for black ethnic groups.

4.44 Disentangling the principal drivers was often complex because of the overlapping nature of many of the risk factors. For example, some British South Asian populations might have higher probability of being in contact professions such as taxi driving or care work, higher rates of diabetes, more multigenerational households and being in an area of enduring transmission such as in the north-west of England.

4.45 Working out which was a risk factor and which was a confounding factor was inevitably complex and some residual confounding was likely.

4.46 The risks of severe infection for pregnant women were significantly higher than for non-pregnant women of the same age, and there were increased rates of mortality in pregnant women. These findings were not apparent very early on in the pandemic and only became clearer as more and more data emerged. The risks were higher for pregnant women in the later stages of pregnancy (28 weeks or beyond). Those aged over 30, living with obesity or with gestational diabetes were at particularly high risk **(CJMW8/205 – INQ000381222)**. This was compounded later in the pandemic by the fact that uptake of vaccine was lower in pregnant women than other groups. This low

uptake was driven in large part by disinformation, some deliberate, about risks of the vaccine in pregnancy.

4.47 Infection with COVID-19 during pregnancy, in common with many other infections, increased the risk of premature birth **(CJMW8/206 – INQ000381223)**.

4.48 The Royal College of Obstetrics and Gynaecology produced useful advice for pregnant women about COVID-19, some of which included work with OCMO, Royal College of Midwives and the Faculty of Occupational Medicine **(CJMW8/207 – INQ000381249)**.

Disparities

Identifying disparities

4.49 Once an epidemic or pandemic begins, it is likely to lead to some groups living in disparity or discrimination being affected disproportionately. This has been true for almost all infections through history, although the mechanism by which this occurs, and the groups it affects, vary depending on the infection. I explained this phenomenon in greater detail in my Second Statement at paragraphs 5.55 to 5.58.

4.50 As I have stated above, the earliest disparity that became apparent in respect of COVID-19 was by age, and specifically older age: this was first indicated by data from Chinese scientists and clinicians and was subsequently repeated in Italy, the UK and globally. Various subsequent risk factors appeared early in the data and included gender (this varied over the pandemic's first years), obesity, diabetes, immunosuppression, neurodisability, several other medical comorbidities, disabilities and ethnicity. Deprivation remained a risk factor of its own even when other factors were controlled for. Older age remained however the greatest risk factor at a population level.

4.51 The aim of identifying these disparities was not merely to observe, but to act to try to minimise preventable harm. I was involved in putting in place at a relatively early stage of the pandemic studies to try and identify medical conditions associated with poor outcomes, and to examine the causes of, and potential solutions to, the observed differences by ethnicity, outlined below.

4.52 In considering the various groups at risk, it is important to differentiate between an increased risk of acquiring COVID-19, and an increased risk of having severe disease

or dying from COVID-19 once it was acquired. These have very different practical implications. For example, obesity or older age do not increase the risk of infection (in fact in the case of age it is probably the reverse due to relatively fewer different social contacts compared to younger adults on average) but they do increase the risk of severe outcomes once infection has occurred.

4.53 On the other hand, living in a multigenerational household, being employed in a high contact role such as social care or taxi driving, or living in densely populated areas do not in themselves increase the risk of severe outcomes. They do however significantly increase the risk of a vulnerable individual acquiring the infection. In practice, deprivation often simultaneously increased the risk both of infection, including through housing and employment, and the risk of severe disease, for example through higher pre-existing rates of diabetes, obesity or multi-morbidity. Deprivation also often served to reduce the speed with which individuals sought care and their level of engagement with health services in addition to having worse pre-existing health and greater risk of acquiring disease.

4.54 Exacerbating this, many of the key social measures taken to combat COVID-19 had greater negative impacts in areas of deprivation than in more affluent areas. Greater proportions of the population in these areas depended on work paid only for the time spent working, meaning that time off for self-isolation was more financially damaging than for salaried work; families were often less equipped to be able to support home schooling for children; outdoor spaces were less available for relatively safe social mixing; and so forth.

4.55 This led to an extremely difficult combination whereby the probability of someone in an area of deprivation acquiring, having severe disease from, and being harmed by the countermeasures to COVID-19 were all greater compared to more affluent areas. Many of these households were also least able to home-school as parents were not able to work from home. Later in the pandemic, disparity also manifested itself in differential uptake of vaccination, with inevitable consequences.

4.56 It was in my view predictable that there would be significant structural inequalities in the health outcomes for COVID-19. It was not in my view entirely predictable which groups these would be other than that broadly people living in deprivation tend to have less good outcomes from most infections and indeed most public health problems. To give an example of this, in my early medical career and that of the DCMOs the last major pandemic was HIV/AIDS. There was in the UK very heavy inequality in HIV

centred around gay men (then highly discriminated against), people of both genders with a heritage from southern Africa, intravenous drug users and commercial sex workers - all groups who suffered from discrimination and often deprivation. This is a completely different group from those affected disproportionately by COVID-19, although the issues of segregated risk into marginalised and vulnerable communities were equally severe.

Response to the disparity in outcomes

4.57 Given this, we felt it was important to undertake the collection of data and research studies to identify the key vulnerable groups, and in turn identify any possible countermeasures. It is important here to recognise the difficulties involved in confounding and bias in epidemiological studies of this kind. In the first wave of COVID-19, people of African and Afro-Caribbean heritage were sadly very highly overrepresented in those who acquired and died from the disease. Identifying the proportion of that excess risk which was as a direct result of ethnicity, and that which was due to the fact that a higher than average proportion of people living in densely populated areas or in high contact professions (and who therefore could not work from home) came from these communities, was not straightforward. It did however have important practical implications. In the second wave, UK citizens of South Asian heritage had a much higher risk than in the first wave. This reflected the fact that the first wave had a particularly big impact in London, which has a very high proportion of UK citizens of African and Afro-Caribbean heritage, and the second wave initially had a particularly high impact in the Midlands, where there is a very high proportion of the UK's population with South Asian heritage.

4.58 Accordingly, I was involved in the commissioning of several relevant studies. This included setting up CO-CIN, commissioning NERVTAG and Professor Hippisley-Cox to do detailed work on the risk for different groups (Q-COVID) **(CJMW8/189 – INQ000236458)**, and directing the NIHR to do a themed call on ethnicity. The latter of these funded 10 studies including:

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4.59 Further examples are the report on the impact of COVID-19 on BAME communities **(CJMW8/193 – INQ000106482)**, the NERVTAG sub-group work on stratifying by risk **(CJMW8/194 – INQ000236454)**, an evidence call for research on ethnicity by NIHR in April 2020 **(CJMW8/195 – INQ000236455)** and the CO-CIN study, which reviewed a range of risk factors including ethnicity **(CJMW8/196 – INQ000425563)**.

4.60 I was also involved in discussions with healthcare colleagues from multiple ethnic minority and other cultural groups to get their insights into the experience of the communities they had closest links with, and to identify possible countermeasures to COVID-19 in those communities. Later in the pandemic, this included supporting those groups to maximise vaccine uptake. The importance of healthcare worker volunteers from different communities engaging with their communities whilst continuing to maintain their very hard main jobs was both very inspiring, and based on external evidence, very important **(CJMW8/197 – INQ000236421, CJMW8/198 – INQ000236420)**.

4.61 Notwithstanding the efforts described above, whilst I did my best to reflect the importance of disparities and inequalities in the advice I gave to key decision-makers, and I am also confident this was true for the DCMOs, nobody looking back at COVID-19 can claim this was sufficient. The scale of the difference by deprivation and ethnicity is clear; what would have been effective countermeasures is less so. The biggest difference numerically was, and remained throughout the pandemic, older age.

Limitations of our response

4.62 One weakness in data capture is that ethnicity is often poorly or confusingly captured, or not captured at all. Ethnicity was for example not a part of death certification. NHS data on ethnicity is often patchy and does not always rely on self-identified ethnicity, although this is arguably improving. In fairness to those who try to do this, it is not a straightforward endeavour. Many people, entirely reasonably, have multiple simultaneous cultural identities, combinations of ethnicities by biological heritage and

cultural choice. Even in research studies, classification by ethnicity is often crude and lumps together groups of individuals who are culturally or genetically very distinct.

4.63 It is essential that in any pandemic or epidemic there is an assumption and recognition that some particular groups will be particularly badly affected. It should also be assumed that there is a very high chance these will be in deprived groups or those living with social stigma or other forms of inequality. Identifying these in advance is however often difficult. It was in COVID-19; many of the disparities identified were obvious in retrospect but were not clear before they became apparent. Looking for disparities in outcomes with the expectation they will be found in marginalised groups but without preconceptions as to which, and then responding to these differences where that is practical, is key.

4.64 Even more important than identifying that there are disparities in risk is identifying differences in response to countermeasures. In the case of COVID-19, these included a differential ability to take time off work, to isolate within homes, varying levels of trust in health services and public health messaging, and the response to the vaccine being available including vaccine uptake. Identifying and addressing these was of great importance.

Reinfection

4.65 It was uncertain at the start of the pandemic how protective having had a previous infection was. Over time it became clear that a previous infection was partly protective against future infection. There were very few reinfections identified early in the pandemic. However, as the virus mutated, and the time between infection and present got longer, we started to see more reinfections.

4.66 Risk of reinfection has varied widely in epidemic-potential infections, ranging from lifelong infections where people remain infectious from infection to death such as untreated HIV, infections where a single short-lived infection generally confers lifelong protection such as measles, and infections where prior infection provides partial, temporary, or minimal protection from subsequent infection such as influenza and malaria. Cross-protection between different variants of a disease is also highly variable.

4.67 Extrapolation from biologically similar or evolutionarily related pathogens provided the earliest clues to whether reinfection was likely, and after what interval. Immunity to SARS-CoV-1 and MERS-CoV was thought to wane over time based on best available evidence, and there was evidence of confirmed reinfections with seasonal human coronaviruses. This meant that from an early stage there was an assumption that reinfections with SARS-CoV-2 were possible. There was also a reasonable assumption that the virus would mutate over time which in turn could impact reinfection risk through immune escape.