



1 A. May I, before we start, just say my sincere condolences  
 2 to the bereaved families.  
 3 Q. Of course. Thank you, Professor.

4 Professor, you were one of the first to highlight  
 5 possible increased risk of Covid-19 in ethnic  
 6 minorities; is that fair to say?

7 A. That's correct, yes.

8 Q. Indeed, one of the ways that it first came to attention  
 9 was by use of Twitter and the use of a tweet.

10 If I can just call that up, please, that's  
 11 INQ000223026. This is a tweet that you put out, as we  
 12 can see:

13 "Dear all - just had a message from a colleague that  
 14 they are seeing many young south Asians being admitted  
 15 with severe #COVID19. Can people share their  
 16 experiences quickly."

17 Looking here we see it's time marked and stamped,  
 18 it's at 1.56 pm on 1 April 2020.

19 In relation to that, what prompted you to send that  
 20 tweet?

21 A. Well, because I do work in ethnic minority health, I had  
 22 some friends who were working in intensive care units in  
 23 hospitals, I'm a general practitioner myself, and they  
 24 phoned me and said, "Kamlesh, we're seeing a lot of  
 25 ethnic minorities at a young age being admitted to

5

1 pathways. You also used the word "artefact".

2 A. Yes.

3 Q. Put in very simple layman's terms, is that the situation  
 4 where, albeit it might look as though something is  
 5 causative, it's actually not?

6 A. Absolutely, yes.

7 Q. You followed that tweet up with a further tweet on  
 8 4 April, a few days later, and in this tweet you  
 9 highlighted some research from the Intensive Care  
 10 National Audit and Research Centre; is that right?

11 A. That's correct, yes.

12 Basically this showed for the first time that there  
 13 were about 30% to 35% of people being admitted into  
 14 the intensive care unit who were from ethnic minority  
 15 backgrounds. The population statistics suggest it's  
 16 about 16%, so it's double the number of people who were  
 17 being admitted to intensive care unit.

18 Q. So some of the first data you were seeing was showing  
 19 a disproportionate level of hospital admissions --

20 A. Absolutely.

21 Q. -- and into intensive care units?

22 A. That's correct, yes.

23 Q. Thank you.

24 What did you do as a consequence of this?

25 A. So I've -- spoke to a number of colleagues. I spoke to

7

1 intensive care units with Covid". Prior to that we  
 2 hadn't heard about this, because most of the Covid had  
 3 happened in heterogeneous populations, China, Italy,  
 4 et cetera, so this is the first time that we'd heard  
 5 about this signal. So that's why I put this out, to  
 6 say: is anyone aware of this? And I did have a lot of  
 7 trolls who came back to say that I shouldn't be  
 8 panicking people about this, yeah.

9 Q. Twitter is not always the kindest of places.

10 A. No.

11 Q. Can I just pick up on word that you used there, and it's  
 12 the use of the word "signal". Can you just assist us,  
 13 what does that mean?

14 A. Signal is something that we may see that we need to be  
 15 aware of being alert about. That means for the first  
 16 time we've seen this alert, we don't know whether this  
 17 is true or not, whether there's an artefact, it's  
 18 because of the populations that are being admitted to  
 19 certain areas -- because it happened more in London and  
 20 the West Midlands initially, there were more people  
 21 being admitted, and there's obviously a lot more ethnic  
 22 minorities in London and West Midlands. So we just have  
 23 to be careful and not say this is a direct causal  
 24 pathway.

25 Q. So signals are effectively about potential causal

6

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 4 where, albeit it might look as though something is  
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 17 being admitted to intensive care unit.

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 19 a disproportionate level of hospital admissions --

20 A. Absolutely.

21 Q. -- and into intensive care units?

22 A. That's correct, yes.

23 Q. Thank you.

24 What did you do as a consequence of this?

25 A. So I've -- spoke to a number of colleagues. I spoke to

1 people who are working in the ethnicity area, members of  
 2 the South Asian Health Foundation, and then I spoke to  
 3 Professor Sir Nilesh Samani, who is based in Leicester,  
 4 who I know very well, and we discussed this, and we  
 5 thought this was something worth alerting the CMO about.

6 Q. Indeed, just to pause you there, later that day you

7 did -- both of you in fact, copied in to the same email,

8 contacted Sir Chris Whitty.

9 A. That's correct, yes.

10 LADY HALLETT: Sorry, I missed the date, Ms Cecil.

11 MS CECIL: 4 April.

12 LADY HALLETT: 4 April, thank you.

13 MS CECIL: Indeed, if we can bring that up, please,

14 INQ000223048.

15 We see a copy of the email. Of course we start at  
 16 the bottom --

17 A. Yes.

18 Q. -- in terms of the email train, we see firstly an email  
 19 from Professor Samani, copying you in, explaining that  
 20 his attention has been brought to the ICNARC audit  
 21 report, and then that that may require further  
 22 exploration, and that you and your team, and indeed his  
 23 team, who have interest and experience in that, would be  
 24 very happy to help if needed.

25 You then follow that up, and we see that at the top,

8

1 and we see your email here. In the second sentence you  
 2 explain that:

3 "In particular recent systemic review data show that  
 4 the multimorbidities with the worst outcomes seem to be  
 5 cardiovascular disease, diabetes and hypertension and  
 6 surprisingly not COPD."

7 What's COPD?

8 A. Chronic obstructive pulmonary disease, so it's a chronic  
 9 lung condition.

10 Q. Why was that a surprise?

11 A. Because when the virus first came round we thought it  
 12 was a respiratory virus, like the flu virus, it affects  
 13 more people who have respiratory diseases, asthma, COPD.  
 14 It did affect people with COPD, but we were surprised  
 15 that a lot more people with diabetes and cardiovascular  
 16 disease were affected with this.

17 Q. As we've heard and indeed we'll deal with slightly  
 18 later, those diseases are particularly prevalent or  
 19 disproportionately so in certain ethnic minority  
 20 populations?

21 A. That's correct, yes.

22 Q. You go on there to explain about anecdotal reports and  
 23 then data, and you explain further there may be many  
 24 reasons for that, and you flag socioeconomic, cultural  
 25 or pathophysiological?

9

1 A. That's correct.

2 Q. You got a response from Sir Professor Whitty, didn't  
 3 you? That response was received on 5 April. He  
 4 explains that the "issue is (rightly) rising up the  
 5 agenda". With regard to the signal that you mentioned  
 6 as being possible, he considered that it was sufficient  
 7 to be looked at by groups with expertise, and he also  
 8 flags the work that is ongoing from PHE, ICU data and  
 9 Biobank, various other pieces of research that are being  
 10 undertaken, and he explains that he "will put out  
 11 a themed NIHR call". What is that?

12 A. So this is National Institute for Health and Care  
 13 Research, it's the main funding body for applied  
 14 research, and basic science research as well. And I was  
 15 really surprised because he took action very, very  
 16 quickly, the following day, so really admirable that he  
 17 did this, that there were some actionable points that he  
 18 came up with immediately, and a call did come out for  
 19 doing further research in this area.

20 Q. Indeed. And certainly there is some correspondence  
 21 further down that also relates to -- the email that we  
 22 have here actually is the last email in the chain, so  
 23 slightly later in time, but there were emails from  
 24 Professor Sir Chris Whitty in relation to it being  
 25 an important point?

10

1 A. That's correct, yes.

2 Q. The Office for National Statistics we've heard a little  
 3 bit from already in relation to ethnicity, but they  
 4 published in May of 2020 their first article or report  
 5 in relation to deaths by ethnic group; is that right?

6 A. That's correct.

7 Q. That's a document that you're familiar with?

8 A. Yes.

9 Q. Indeed we've heard already from Professor Sir  
 10 Ian Diamond that you have been in contact with him and  
 11 worked with him at various stages; is that right?

12 A. That's correct, yes.

13 Q. In relation to that article and the statistics that were  
 14 produced, the provisional analysis showed the risk of  
 15 death involving Covid-19 among some ethnic groups was  
 16 significantly higher than that within the white  
 17 ethnicity population?

18 A. That's correct.

19 Q. When taking into account age in that analysis -- so this  
 20 is right at the beginning of the pandemic, what was  
 21 known as at May of 2020 -- black males were 4.2 times  
 22 more likely to die from a Covid-19-related death and  
 23 black females 4.3 times more likely than white ethnicity  
 24 males and females?

25 A. That's correct, yes.

12

(3) Pages 9 - 12

1 A. That's right.

2 Q. At that stage it wasn't clear whether it was an artefact  
 3 of geography or a true signal?

4 A. Absolutely, yes.

5 Q. Thank you.

6 Now, following on from that, you wrote the first

7 editorial on the topic; is that right?

8 A. That's correct, yes.

9 Q. It was published in the British Medical Journal?

10 A. That's correct.

11 Q. Raising the question: "*Is ethnicity linked to incidence  
 12 or outcomes of covid-19?*"

13 You urged, at that stage, the UK to explore  
 14 the potential signal urgently and that there was a need  
 15 for effectively greater research looking at  
 16 the potential causative links --

17 A. That's correct.

18 Q. -- pathways.

19 You particularly flagged concerns being raised  
 20 because the first ten doctors in the UK to die from  
 21 Covid-19 were from ethnic minorities; is that right?

22 A. That's correct. That did raise eyebrows when we saw  
 23 that in the news on a regular basis, yes.

24 Q. Then, of course, you also had the data that we've  
 25 already referred to?

11

1 Q. At that point it was also noted, and this will become  
 2 relevant for later in terms of the progression of  
 3 the pandemic, that people of Bangladeshi and Pakistani  
 4 Indian and mixed ethnicities also had a statistically  
 5 significant higher -- raised risk of death, but that  
 6 those risk factors or the extent of  
 7 the disproportionality dropped once one had taken into  
 8 account age but also other sociodemographic  
 9 characteristics, including self-reported health and  
 10 disability, and this relied on collation of data  
 11 including the 2011 census?

12 A. That's correct, yes.

13 Q. That reduced, then, to males and females of black  
 14 ethnicity being 1.9 times more likely than those of  
 15 white ethnicity and Bangladeshi and Pakistani ethnic  
 16 minority men being 1.8 times more likely to have  
 17 a Covid-19-related death.

18 So at this point in terms of the ONS statistics, is  
 19 it right to say that it was already flagging up issues  
 20 in relation to comorbidities that existed within ethnic  
 21 minority populations and geographic issues, but that  
 22 the disparity simply could not be explained by those?

23 A. That's right. So basically it was 4 times the risk, and  
 24 once you take into account the deprivation, the previous  
 25 health, comorbidities, it reduces risk by 50%. So 50%

13

1 A. That's correct, yes, it did, yes.

2 Q. And that consequently resulted in a fuller report being  
 3 published?

4 A. Yes.

5 Q. You analysed that report; is that right?

6 A. That's right, yes. We didn't peer review it, it -- once  
 7 it was published we and many others looked at it to see  
 8 the content and the depth of the report.

9 Q. Indeed. In relation to that, were issues flagged in  
 10 relation to structural racism and discrimination?

11 A. That's right.

12 Q. As a link?

13 A. That's correct, yes.

14 Q. And socioeconomic circumstance?

15 A. That's correct, yes.

16 Q. Now, given the link between or potential link between  
 17 structural racism and discrimination and those poor  
 18 health outcomes, as noted in that PHE report, are you  
 19 aware of any other work that looked at those issues?

20 A. There's been a number of studies. The issue with  
 21 structural discrimination and discrimination is how you  
 22 measure it. It's very, very difficult to measure. So  
 23 qualitative interviews where people are asked about it  
 24 will -- you can get a lot of information from.

25 There's a systemic review that's been done about  
 15

1 was accounted for by those factors.

2 Q. That was followed thereafter in June, again dealing with  
 3 what was known at the outset as the pandemic progressed,  
 4 by the first of the Public Health England reports?

5 A. That's correct.

6 Q. In relation to that PHE report, certainly there were  
 7 concerns initially that a truncated report had been  
 8 published; is that right?

9 A. This is from a BMJ article written by  
 10 Professor Raj Bhopal, because he had peer reviewed the  
 11 article, and we wrote in the BMJ stating that he had  
 12 seen a fuller report and he felt that it was his duty to  
 13 inform the public that there were bits of the report  
 14 missing.

15 Q. What bits of the report were missing?

16 A. From what we understand, it was the recommendations that  
 17 may have been missing.

18 Q. Recommendations. Were there also aspects of stakeholder  
 19 engagement that were missing?

20 A. The stakeholder was -- I think, from my recollection, is  
 21 the second report.

22 Q. Second report?

23 A. That's right, yes.

24 Q. That caused a considerable degree of controversy; is  
 25 that fair to say?

14

1 the disproportionate outcomes in people from ethnic  
 2 minority backgrounds, and that identified I think just  
 3 a few papers that had talked about discrimination, and  
 4 again they highlight that it's very difficult to  
 5 measure.

6 But from the qualitative evidence we have from  
 7 the British Medical Association, from the nurses  
 8 associations, there may have been some elements of  
 9 structural discrimination, for example getting PPE given  
 10 to -- from the -- healthcare workers particularly from  
 11 ethnic minorities.

12 Q. And we've heard earlier evidence that ethnic minorities  
 13 are overrepresented within the healthcare workforce?

14 A. That's right, about 20% of the healthcare workforce, or  
 15 1.2 to 1.5 million people within the National Health  
 16 Service, are from ethnic minority backgrounds, yes.

17 Q. Thank you.

18 In relation to that PHE report you wrote of some of  
 19 the limitations, as you saw it, of those reports. The  
 20 first aspect is that albeit that they were welcome,  
 21 because they did shine a light, it was nonetheless  
 22 a missed opportunity to address significant inequalities  
 23 in ethnic minority communities. How did you see it as  
 24 a missed opportunity?

25 A. Well, first of all, the report is very comprehensive and  
 16

1 it was very laudable, the amount of work they did,  
 2 you know, speaking to 4,000 individuals, speaking to  
 3 a number of stakeholders, so it's a vast amount of work  
 4 they'd done. The reason we thought it was a missed  
 5 opportunity, because they did have I think six  
 6 recommendations, is that they didn't have  
 7 the recommendations, although they'd identified them, of  
 8 the wider source of determinants.

9 So, first of all, how to protect these populations,  
 10 and the wider social determinants of how to ensure that  
 11 housing is adequate, it's not overcrowded housing,  
 12 the occupations that people were at higher risk, they  
 13 weren't protected, the educational elements,  
 14 communication, how it was to be done, who was going to  
 15 do it. All of that wasn't there in huge detail.

16 Although they'd identified all the drivers, the  
 17 recommendations or drivers -- the detailed  
 18 recommendations on drivers were missing.

19 Q. Were missing. And there were significant gaps in your  
 20 view; is that right?  
 21 A. That's correct, yes.  
 22 Q. Now, picking up in June of 2020, which is of course when  
 23 the PHE reports -- well, first report -- was released,  
 24 you're aware that ethnicity was discussed at one of  
 25 the SAGE meetings in June, it was SAGE 40, the 40th

17

1 speak to me and we had a Zoom or an MS Teams meeting,  
 2 and that's when Sir Patrick Vallance came along with  
 3 the GO-Science team and mentioned to me that they'd seen  
 4 the signal and they were asking me if I would be willing  
 5 to chair this subgroup.

6 Q. You cannot assist us with why that subgroup was not  
 7 formed earlier; is that right?  
 8 A. I think that people were trying to find evidence for  
 9 this, and, as you say, we need validation from various  
 10 datasets, so ONS signal was the first lot, then the PHE  
 11 data came out. I mean, if you look at the PHE data,  
 12 you know -- we may be talking about data later, but  
 13 the Public Health England report, they didn't have  
 14 anything on occupation, they didn't have data on  
 15 occupation, so we don't know whether that would have  
 16 reduced(?) the risk. So until then I think they  
 17 weren't -- the data weren't as robust. And following  
 18 the Public Health England report, I think they decided  
 19 they needed a chair for the Ethnicity Subgroup.

20 Q. So you took on that role?

21 A. That's correct, yes.

22 Q. And that subcommittee reported directly to SAGE?

23 A. That's correct, yes.

24 Q. In terms of the issues to be focused on, they were, as  
 25 one would expect, a focus on ethnicity, and some of the

19

1 meeting on 4 June?  
 2 A. That's correct, yes.  
 3 Q. And at that point it was accepted within that meeting  
 4 that the evidence suggested a significantly higher  
 5 likelihood of, firstly, testing positive, secondly,  
 6 admission to critical care, and thirdly, the prospects  
 7 of death for ethnic minorities?

8 A. That's correct, yes.  
 9 Q. In particular, that related to black and South Asian  
 10 groups?

11 A. That's correct, yes.

12 Q. At that point, as you've already identified, the risk  
 13 factors or the causative links were assessed as being  
 14 due to a complex interconnected range of factors,  
 15 including socioeconomic deprivation, involvement in high  
 16 risk occupations, geography, household size and  
 17 comorbidities. Did that chime with what you were  
 18 seeing?

19 A. Exactly, and that's exactly what the initial report by  
 20 ONS and the Public Health England report also shone  
 21 a light to as well.

22 Q. As said at the outset, you went on to become the chair  
 23 of the SAGE Ethnicity Subgroup. That was set up on  
 24 5 August. How did that come about?

25 A. So I had an email from GO-Science that they wanted to

18

1 broader social determinants --

2 A. That's correct.

3 Q. -- in relation to ethnicity.

4 In terms of the advice to be provided, was it a case  
 5 of it being commissioned from you, or was it advice that  
 6 you provided on a freestanding basis?

7 A. It was advice on a freestanding basis, completely, yes.

8 Q. The meetings were not officially minuted; is that right?

9 A. We did have minutes of the meetings, for all  
 10 the meetings.

11 Q. Sorry, I should be clearer in my question. There was no  
 12 formal requirement for those meetings to be minuted,  
 13 albeit that high-level minutes were taken?

14 A. That's correct, yes.

15 Q. Indeed the Inquiry has access to those, so I don't  
 16 propose to take us through any of those today.

17 In relation to foreseeability of impact on ethnicity  
 18 minorities, minority groups and potential disparities,  
 19 you've explained that initially it was seen as  
 20 a respiratory virus and therefore perhaps those issues  
 21 weren't considered in the same way they might have been  
 22 had it been seen as actually what it was.

23 But was it foreseeable that there would be  
 24 a disproportionate impact on ethnic minorities?

25 A. Potentially. I think that, looking back on it,

20

1 potential we could have thought about it because of  
 2 the pre-pandemic disparities, and I think they have been  
 3 discussed previously at the Inquiry, among ethnic  
 4 minority groups, particularly in terms of deprivation,  
 5 health, housing, schooling, et cetera.

6 Q. Moving to the autumn period briefly, you had some level  
 7 of involvement with the minister who was placed in  
 8 charge of considering the issues of ethnicity, that's  
 9 the Right Honourable Kemi Badenoch MP?

10 A. That's correct.

11 Q. What involvement did you have, firstly, with her?

12 A. I think there were two meetings that I seem to have  
 13 found. The Cabinet Office contacted me that  
 14 the Right Honourable Kemi Badenoch wanted to speak to  
 15 me, and this was in October and another one in December.  
 16 The October one was a general discussion of what  
 17 the SAGE group were doing. I don't have any firm  
 18 recollection, but it was -- would have been a high-level  
 19 discussion of what SAGE is looking at. I think  
 20 the 16 December one was a teaching session that we did  
 21 for cross-governmental departments.

22 Q. And I understand you did two teaching sessions?

23 A. That's correct, one was on the drivers of risk and one  
 24 was on housing -- no, sorry, vaccinations and housing.

25 Q. Kemi Badenoch's team went on to produce four quarterly  
 21

1 reports to the Prime Minister between June 2020 and  
 2 December 2021?

3 A. That's correct.

4 Q. Did you or the Ethnicity Subgroup contribute to any of  
 5 those reports?

6 A. We were asked to review them and we had to review them  
 7 at pace. We did give some comments on them. I was  
 8 asked by one of the officers to see if I would give  
 9 a quote to the report, but thinking it through the SAGE  
 10 committee, we felt that was inappropriate because SAGE  
 11 was an independent research and science body.

12 Q. So was the view to keep that separate, effectively, the  
 13 SAGE workings and those individuals, and then  
 14 government --

15 A. That's correct.

16 Q. -- produced reports?

17 A. Because they already had advisers who were acknowledging  
 18 and supporting the report.

19 Q. And the work that had been done in relation to those  
 20 quarterly reports had been done by the Equalities team,  
 21 as opposed to the Ethnicity Subgroup that you chaired?

22 A. That's correct, yes.

23 Q. Thank you.

24 So by September of 2020, aspects in relation to causative links were known in relation to occupation,

22

1 housing, instability, socioeconomic status,  
 2 comorbidities and the other --

3 A. Occupations, yeah.

4 Q. Did you and the SAGE Ethnicity Subgroup have regard to  
 5 those factors in advising on policy in response?

6 A. We had a paper that was quite a comprehensive paper, it  
 7 was on drivers of the increased risk among ethnic  
 8 minority groups, yes.

9 Q. Indeed, perhaps we can take you to that now. It's at  
 10 INQ000273842.

11 I'm going to deal with it briefly, if I may, whilst  
 12 just perhaps prefacing it before it's brought up on the  
 13 screen.

14 It's a very lengthy report. It sets out in detail  
 15 where you and the Ethnicity Subgroup see the drivers as  
 16 being.

17 Perhaps if we could just go to page 110, please.  
 18 It's appendix 7. This is the paper.

19 In relation to that -- I'm very sorry, I thought it  
 20 was at page 110.

21 (Pause)

22 Go to page 114, please. There is a very useful  
 23 visual aid.

24 A. 113.

25 Q. 113, please.

23

1 A. Yes.

2 Q. To 113.

3 There is a very useful visual aid that sets out  
 4 the subgroup's workings. It builds on a paper that's  
 5 been adapted by another academic in relation to these  
 6 issues; is that right?

7 A. That's correct, yes.

8 Q. I'm afraid it's a little difficult to see on the screen  
 9 because of the size of the fonts.

10 If I can just take you to what is seen as number 1,  
 11 effectively what we see is a diagram, at the top it  
 12 explains "Shaped by structural racism and other power  
 13 structures"; is that the context in which this is  
 14 placed?

15 A. That's right, yeah.

16 Q. Then what we see is a green box that deals with  
 17 dimensions of ethnicity.

18 A line to that to the left, we see the differential  
 19 exposure and vulnerability and the drivers, and I'm  
 20 going to come to that in a moment, and then the output  
 21 to the far left. Is that right?

22 A. That's correct, yes.

23 Q. So, taking each one of those briefly in turn, we have  
 24 pathway 1, it's the second white box down from the top,  
 25 and the first issue in relation to understanding

24

1 ethnicity is differential exposure.

2 What are the issues that arise there in relation to  
3 certain ethnic minority groups?

4 A. So this is what we've just been talking about in terms  
5 of the risk of a higher exposure among ethnic minority  
6 populations, so this is things like occupations, they  
7 are more likely to work in occupations that are in  
8 direct contact patient-facing roles and in low-paid  
9 occupations. Housing, living in high-density housing,  
10 so small houses with a large number of occupants, living  
11 in multigenerational houses, which is where we state  
12 that there's three or more generations living together.  
13 There's also people who are at -- have poor health, so  
14 they may have other health conditions, as we've talked  
15 about, diabetes, cardiovascular disease, et cetera. So  
16 these are all the issues that may put them at higher  
17 exposure.

18 Q. First --

19 A. And healthcare workers is obviously another one.  
20 Q. So this is the first aspect, is exposure to the virus,  
21 so there is a potentially disproportionate level of  
22 exposure for ethnic minority individuals because of  
23 those factors. That then may or may not result -- as we  
24 see, if we take it across, and then go down, may or may  
25 not result in Covid infection.

25

1 Q. Just dealing with the disease consequence in and of  
2 itself at the moment in terms of the health outcome,  
3 what you identify here are issues such as comorbidity  
4 and then access to healthcare --

5 A. Yes.

6 Q. -- quality of healthcare?

7 A. Yeah. And the access to healthcare may be a driver from  
8 the right side of the dimension, this is about language  
9 and culture and not identifying the disease, not  
10 properly being able to express the disease, not being  
11 aware of the disease and the consequences.

12 So all of those on the right-hand side also are  
13 drivers across all the pathway, yeah.

14 Q. Indeed. Then what we see there is the potential  
15 enhanced risk then of mortality, of death essentially,  
16 that flows through that particular driver.

17 Then, as we continue down, the differential social  
18 consequences in relation to follow-on impacts from that  
19 disease?

20 A. That's correct, yes.

21 Q. Thank you.

22 You do also touch upon, within this, differential  
23 consequences of control measures. I'm not going to go  
24 into that with any detail with you today, we'll talk  
25 a little bit about communications later.

27

1 That then goes into driver 2, which is differential  
2 susceptibility to infection.

3 In summary, is it the case that minority ethnic  
4 groups may be at greater risk, in your view, of  
5 infection because of differences in immune response,  
6 nutritional status and other --

7 A. Other conditions, and obesity is another big risk factor  
8 for ethnic minority populations as well, yes.

9 Q. We've heard a little bit about obesity already in that  
10 respect.

11 A. Yeah.

12 Q. We then see that once one has the infection, there is  
13 then potentially a differential vulnerability to  
14 the disease; is that right?

15 A. That's right, yes. Some of these overlap --

16 Q. Indeed.

17 A. -- as well, as you can see. So this could be because  
18 they have higher stress levels, they may be living in  
19 areas that have poor air quality, et cetera.

20 Q. Okay. That results then in the differential  
21 consequences of the disease, of an infection of  
22 Covid-19; is that right?

23 A. Yeah, so basically, here, if they become ill they have  
24 more disability, there's job losses, poorer health,  
25 perpetuating this cycle of worse outcomes for them, yes.

26

1 But, in short, those are the identified pathways by  
2 the Ethnicity Subgroup; is that right?

3 A. Yeah. I mean, this is a theoretical framework that we  
4 put the pathways through, yes.

5 Q. Just drilling down very briefly and flagging them up.  
6 You've already dealt with occupation. Household  
7 circumstance, that became very important, is that right,  
8 when it comes to looking at subsequent issues in  
9 relation to the second wave?

10 A. That's right. So there was a separate paper that we  
11 did, as I said, the Ethnicity Subgroup, and here we  
12 wanted to validate the data about multigenerational  
13 households. And I think we must have had -- we had the  
14 best data in the world, and we had five database studies  
15 that all concurred to the same conclusion, that  
16 multigenerational households, people with three or more  
17 occupants, was associated with worse infection, worse  
18 disease and worse mortality.

19 Q. Perhaps if I can just pick up on that, then, in relation  
20 to the first wave and the second wave. In the first  
21 wave all ethnic minority groups were at that elevated  
22 risk, particularly acute within black populations; is  
23 that right?

24 A. That's right, yes.

25 Q. But that changed when it came to the second wave, where  
28

1 one saw a decrease in relation to mortality, deaths, for  
 2 black ethnic minority populations but a greater  
 3 disproportionate effect in relation to Bangladeshi and  
 4 Pakistani, South Asian groups; is that right?

5 A. That's correct. So overall, once -- so basically it  
 6 showed that lockdown worked. For nearly -- most of the  
 7 ethnic groups, including the white group, you saw  
 8 a reduction in infection and mortality. But there was  
 9 a higher risk in Bangladeshis and Pakistanis, and we  
 10 looked at what the drivers were -- and this is using the  
 11 ONS data -- and the drivers were likely to be what we've  
 12 already said, the occupations that ethnic minorities are  
 13 in, the housing density --

14 Q. If I can pause you for one moment, when you say  
 15 occupations, what types of work?

16 A. So occupation is people-facing roles, taxi drivers,  
 17 restaurants, healthcare workers, et cetera. And people  
 18 who were on zero-hours contracts, so they weren't able  
 19 to get time out, and so potentially they weren't  
 20 reporting their symptoms.

21 Q. Just picking up on the people with zero-hours contracts,  
 22 in terms of financial stability, did you see that as  
 23 having any role?

24 A. That was one of the reasons that we put forward, that  
 25 that would have definitely been one of the reasons, and

29

1 the most deprived population out of deprivation,  
 2 including ethnic minorities, we near enough eliminate  
 3 the risk that we've seen. So a lot of this we feel is  
 4 due to the social determinants.

5 Q. Just picking up on deprivation and the use of the  
 6 2011 census, because of course that informs the ONS  
 7 statistics --

8 A. That's right.

9 Q. -- it's your view, is that right, that as a consequence  
 10 of that, socioeconomic circumstance and deprivation is  
 11 likely to be under-reported in relation to the role that  
 12 it plays, because of changes since 2011?

13 A. That's correct. So now we have the 2021 surveys that --  
 14 they would be better placed. We've also seen in  
 15 the surveys that the proportion of ethnic minorities has  
 16 increased in England. In terms of whether they're in  
 17 more deprived areas I'm not aware of, but it's likely  
 18 health(?) changes, yes.

19 Q. Thank you.

20 One final aspect, and that relates to biological  
 21 factors. When you refer to biological factors, what you  
 22 are referring to are comorbidities such as diabetes and  
 23 other forms of disease; is that right?

24 A. That's correct, diabetes, cardiovascular disease,  
 25 obesity. There's some possibility of associations with

31

1 some of the qualitative interviews have previously shown  
 2 that as well.

3 Q. I think one of the recommendations that you made at that  
 4 point was for the provision of proper statutory pay  
 5 for --

6 A. Absolutely, yes.

7 Q. Sick pay?

8 A. And similarly we made recommendations on housing, that  
 9 if people are in multigenerational housing there should  
 10 be provision made of housing given for isolation if one  
 11 member of the house was infected.

12 Q. Thank you.

13 Then just to pick up on one final aspect in relation  
 14 to the drivers, can I just be clear with you in relation  
 15 to genetic considerations. Do you consider it likely  
 16 that genetics play a role?

17 A. Well, most of the data shows that there are some, what  
 18 we call SNPs, genetic signals, but there is no  
 19 conclusive evidence to show that this is driven by  
 20 genetics. It does seem to be driven mainly by the  
 21 social determinants.

22 And we've done some additional work subsequently  
 23 showing that if we take 25% of the most deprived  
 24 populations out of deprivation, we halve the risk of  
 25 Covid infections and mortality. If we take 50% of

30

1 psychological aspects as well.

2 Q. Indeed. And that's why I just wanted to be very clear  
 3 about that, that's what you mean by biological --

4 A. Yes.

5 Q. -- it's not genetic, it's those comorbidities?

6 A. That's correct, yes.

7 Q. Thank you.

8 Now, if I may pick up, then, on what that meant for  
 9 the Covid-19 response, in terms of the government's  
 10 response, do you consider that it was successful in  
 11 addressing those disparities or could things, other  
 12 things, have been done?

13 A. So the four quarter reports mention a number of areas  
 14 that the government addressed the disparities, this is  
 15 the Race Disparity Unit four quarterly reports. There  
 16 are a number of things that could be done. In terms of  
 17 the detail, again, in some of them is lacking. There's  
 18 data on pilot areas that were funded to do evaluations  
 19 of what worked, what didn't work. Mention about  
 20 communications on -- for ethnic minority populations.  
 21 And again they mention a number of things that were  
 22 done. But to me there were other ways that this could  
 23 have been done. We have the best data systems in  
 24 the world, and we're the envy of the world with the data  
 25 we have. What we needed was real-time data, real-time

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1 data on people being affected in different areas,  
 2 because we always say local is best, we could have acted  
 3 on this locally. Leicester local public health did  
 4 a tremendous effort but they were lacking in data. So  
 5 if we had data given to us in real time about where  
 6 the highest risks are, we could have worked with our  
 7 community champions within those areas, our community  
 8 leaders in those areas, the pharmacists, the GPs, as we  
 9 did in Leicester, to reduce that risk.

10 Similarly, the test, trace, isolation programme,  
 11 again we didn't have any data coming to us to say where  
 12 is -- are the bottlenecks, which areas are working well,  
 13 which are not working well. And again, if this data  
 14 came on a regular basis, in real time, the local public  
 15 health messaging could have been done.

16 In the reports, you know, there are mentions about  
 17 the culturally-adapted information that was given out  
 18 there. Now, giving out a culturally-adapted leaflet  
 19 doesn't mean that that's going to have a major effect.  
 20 You need to do a lot more than that. You need to work  
 21 with that community. And there are discussions about  
 22 the community champions programmes that were funded, but  
 23 again we're not sure how these were funded, which areas  
 24 were funded.

25 And the key one is the evaluations. You know,  
 33

1 40 million, over £40 million was given out. These are  
 2 the kinds of things that we should be evaluating  
 3 robustly, because we have the data. If you put an  
 4 intervention in Leicester and don't put it in Blackburn,  
 5 I can tell within a short period of time with the data  
 6 that we have whether that intervention's worked or not.

7 Q. Thank you. So is that one of your primary concerns, is  
 8 working out what happened, effectively, with those  
 9 community champions, grants and research projects and  
 10 that data?

11 A. There are soft evaluations that have been done for one  
 12 of them, but others we're not aware of what the findings  
 13 are and how we can implement them. For example, we  
 14 should be implementing them now. Covid is still here,  
 15 we're seeing an increased risk, but we're not hearing  
 16 anything about those messages.

17 And when I say regarding the communication and  
 18 language, Leicester has over 80 languages, London has  
 19 over 300 languages, what we need to do is the local  
 20 people will know the best about what their needs are,  
 21 and it really needs to be localised in terms of  
 22 the response.

23 Q. Thank you.

24 LADY HALLETT: Can I just ask -- I'm sorry to interrupt --

25 MS CECIL: Of course, not at all.

34

1 LADY HALLETT: -- who had the data that you needed?  
 2 A. I'm not sure if the government had the data. If that  
 3 was one of the asks, I'm sure Sir Ian Diamond would have  
 4 provided that data, which he's done for a number of  
 5 things. As I say, ONS have done an absolute sterling  
 6 job in getting data to us quickly.

7 LADY HALLETT: It's just that you began this passage in  
 8 relation to saying we have one of the best data systems  
 9 in the world, so I assumed by that you meant that we  
 10 were collecting the data but --

11 A. It wasn't coming to us, that's right.

12 LADY HALLETT: So it wasn't being shared with you?

13 A. That's right.

14 LADY HALLETT: But you don't know where it was?

15 A. No.

16 LADY HALLETT: Right.

17 MS CECIL: Thank you, I was going to pick up on that myself,  
 18 so that's --

19 LADY HALLETT: Oh, sorry.

20 MS CECIL: No, not at all, that's helpful.

21 And you've explained about the need for real-time  
 22 data and that gap and lacuna there.

23 One of the other aspects that you just touched upon,  
 24 and perhaps we'll go there next, in fact, because you  
 25 have explained the need already for culturally-sensitive

1 and appropriate government communications, is to pick up  
 2 on communications.

3 You were involved with the Centre for Ethnic Health  
 4 Research; is that right?

5 A. That's correct, yes.

6 Q. You made various recommendations and infographics in  
 7 relation to culturally-sensitive and adapted  
 8 communications.

9 If I could ask that that be called up, please, it's  
 10 INQ00223040, and if we can go firstly to page 27 and  
 11 then move to look at 28 and 29.

12 Just while it's coming up, the first page, here we  
 13 are, this is your recommendation as to how to engage and  
 14 involve ethnic minority communities; is that right?

15 A. That's correct. Yes, this is from the Centre for Ethnic  
 16 Health Research and the South Asian Health Foundation.

17 Q. What we see here is, at the very top: use of  
 18 culturally-tailored messaging, different languages and  
 19 formats, some aspects in relation to vaccine hesitancy  
 20 and, perhaps more generally and of general application,  
 21 the use of community and faith centres as part of that  
 22 response?

23 A. That's correct, yes.

24 Q. Perhaps one of the starker things here is actually the  
 25 picture that's in the centre of the page, because

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1 of course that reflects different ethnic minorities,  
2 clearly. Would that be correct?

3 A. That's correct, yes.

4 Q. Presumably that's the purpose of it.

5 But we also see, in advice to government,  
6 professionals, policymakers and scientists, the use of  
7 interpreters, accurate ethnicity coding, you address  
8 PPE, all of those sorts of issues.

9 If we go over the page to page 27, what we then see  
10 is an infographic that's been designed for ethnic  
11 minority communities specifically; is that right?

12 A. That's correct.

13 Q. Building on, effectively, the infographic we saw  
14 previously.

15 A. That's correct, yes.

16 Q. So, again, representative pictorial descriptions in  
17 the middle, and then very clear pictures as to what to  
18 do:

19 "Stay at home and away from others if ill."

20 In the top left-hand corner.

21 "Get tested ..."

22 A picture of somebody with a test.

23 Vaccine, speak to your GP, take part in research  
24 studies.

25 So what you have is something that is, at the very  
37

1 least, albeit this one's in English, you have the  
2 pictorial representations?

3 A. That's right. I'm not sure if you got the exhibits but  
4 we had these in four, five languages as well.

5 Q. Indeed. I don't have all of those exhibits, I'm afraid,  
6 but certainly I was going to pick up on that, and that's  
7 how they've been produced.

8 A. And the thing about this is this is not just translation  
9 and back translation, a lot of people say we did some  
10 translation and back translation, that's not how  
11 cultural competency works, we have to sit with that  
12 population, that ethnic minority population, go through  
13 the nuances of what this means to them. And it does  
14 take time. And that's what we did with all these  
15 infographics. For example, the word "BMI", you and  
16 I will know what BMI is, ethnic minorities don't know  
17 what BMI is, there is no word for BMI in South Asian  
18 languages.

19 Q. And I understand the same applies to the word "virus"?

20 A. That -- absolutely, yes.

21 Q. It's obviously a key word, certainly in our  
22 understanding of Covid-19.

23 Just picking up on culturally-appropriate messaging  
24 and communications, that's quite separate to targeting  
25 interventions or communications, isn't it?

38

1 A. That's absolutely -- yes, it is.

2 Q. In relation to targeting, there are concerns that  
3 tailored public health messaging aimed at very specific  
4 subgroups of the population can result in greater  
5 stigmatisation, racialisation and those sorts of issues;  
6 is that right?

7 A. If you pick on one minority ethnic group and -- whether  
8 it's culturally tailored or not, they will be singled  
9 out as a high risk, and that will marginalise them, that  
10 will stigmatise them, that will create distrust in that  
11 population. So it's how that's been done. And what we  
12 were saying is: this message is for everyone. The  
13 messaging during the pandemic should have gone to  
14 everyone at the same time. But then, in a nuanced way,  
15 made it appropriate for that population.

16 Q. Indeed.

17 A. So they know that: everyone's getting this, but we're  
18 just getting it so that we can understand it better.

19 Q. Indeed. That's the distinction, essentially, that  
20 the messaging in general terms is the same across all  
21 populations but is then tailored specifically in terms  
22 of those communication aids?

23 A. That's correct. I mean, we had an example of that in  
24 Leicester. We had a bus in an area where we had high  
25 vaccination rates and this bus turned up with

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1 a billboard about vaccinations and it was totally  
2 inappropriate to have a billboard there when we already  
3 had high vaccination rates there.

4 **LADY HALLETT:** So what was the impact of that?

5 A. Well, the local communities felt stigmatised. They  
6 were: why are we -- you know, we've worked very hard --  
7 the GPs said: we've worked very hard to get the patients  
8 vaccinated, but the people who are -- why are the  
9 billboards still coming? Because the vaccination rates  
10 are already high in that area, because the local  
11 community worked really, really hard, and they thought  
12 that enough possibly wasn't being done by that  
13 community.

14 **LADY HALLETT:** They didn't see the message and say, "Ah, but  
15 we're ahead of the game here"?

16 A. Well, different people will take it differently, as you  
17 can imagine.

18 **MS CECIL:** Were similar billboards in other areas of  
19 Leicester?

20 A. As far as I'm aware, yes.

21 Q. Thank you.

22 Thank you, those are all the questions I have on  
23 communications. If I can touch very briefly now on  
24 additional involvement within the Covid-19 response.

25 You were also involved in Independent SAGE; is that

40

1 right?  
 2 A. That is correct, yes.  
 3 Q. Your role there was as a primary care researcher. As  
 4 you've already explained, you are a GP by professional  
 5 background, and indeed you remain, as I understand it,  
 6 a practising GP and clinician?  
 7 A. That's correct, yes.  
 8 Q. And that was the reason why you were invited to join in?  
 9 A. That's my impression, yes.  
 10 Q. In terms of your input into Independent SAGE, was that  
 11 based on your role as a clinician?  
 12 A. As a clinician I think the ethnic minority work that I'd  
 13 done was also important to them as well.  
 14 Q. What were the distinctions in the type of work that you  
 15 were doing for Independent SAGE as opposed to your role  
 16 in the SAGE subcommittee for ethnicity?  
 17 A. I think Independent SAGE was discussing various aspects  
 18 on a regular basis and then the main aim was to get it  
 19 out to the public, while within SAGE the issues were  
 20 about looking at the problem, looking at the science,  
 21 getting the group together to look at the science, and  
 22 then give robust evidence to the government in terms of  
 23 the interventions that need to be put in place.  
 24 Q. Did you see any disadvantages in the role of  
 25 Independent SAGE?

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1 A. I didn't see any disadvantages at all. In fact, when  
 2 I was asked by Sir Patrick Vallance to join the SAGE,  
 3 I did mention to him that I was part of Independent SAGE  
 4 and he was -- there wasn't any reason for me to stop  
 5 Independent SAGE at that stage, yeah.  
 6 Q. Thank you. And indeed you carried on in  
 7 Independent SAGE until May 2021; is that right?  
 8 A. That's correct, yes.  
 9 Q. The reason that you left was because of a lack of time,  
 10 essentially?  
 11 A. Absolutely, yes.  
 12 Q. And we've already heard a lot about the types of work  
 13 that you were already engaged in, in the pandemic  
 14 response.  
 15 The final area in that regard is in relation to  
 16 Long Covid, and you have explained that were the chair  
 17 of the National Long Covid Research Working Group, often  
 18 referred to in documents as just the "Research Working  
 19 Group" for short?  
 20 A. Yes.  
 21 Q. That group first met on 11 March 2021 and continues to  
 22 meet in fact; is that right?  
 23 A. That's correct, yes.  
 24 Q. I've just been asked, Professor Khunti, can you just  
 25 keep your voice up, please.

42

1 A. Okay, will do.  
 2 Q. No, not at all.  
 3 With regard to that working group, just to place it  
 4 in context, there are representatives from the nine  
 5 major Long Covid epidemiological studies in the UK, and  
 6 indeed we're going to be hearing from two of those  
 7 individuals -- and I understand they're colleagues that  
 8 are well known to you --  
 9 A. Yes.  
 10 Q. -- Professor Brightling and Dr Evans, on Friday, and so  
 11 as a consequence of that I'm not going to take you  
 12 through the clinical aspects of Long Covid or those  
 13 sorts of issues --  
 14 A. Sure.  
 15 Q. -- because we'll be hearing from them.  
 16 But what I do wish to just touch upon you with is  
 17 why that group was formed, and can you just explain very  
 18 briefly how that came about?  
 19 A. So I think this was following an email exchange we had,  
 20 and there is an email in the evidence from Chris Whitty  
 21 to myself, Professor Sir Ian Diamond and  
 22 Nish Chaturvedi, about a lot of work that's going on, to  
 23 see if we can co-ordinate this work together. So  
 24 I emailed the epidemiological groups that were funded  
 25 from NIHR, the UKRI, and ONS obviously was doing the

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1 work, and they all agreed to be part of this group.  
 2 Q. Indeed. And if I can just -- for those that are  
 3 following the email is at INQ000072959. That's the  
 4 email from Professor Sir Chris Whitty to you and  
 5 Professor Sir Ian Diamond.  
 6 Following on from that, you set up that group; is  
 7 that right?  
 8 A. That's correct, yes.  
 9 Q. As you've just explained. Did you have the -- were you  
 10 under the impression that you reported to the CMO, to  
 11 Professor Sir Chris Whitty?  
 12 A. He'd asked us to set this group up, so whether it's  
 13 reporting or -- he certainly was interested in what was  
 14 going on, and he wanted to know what was going on on  
 15 a regular basis. So I think we initially said it was  
 16 reporting but it was really what we were doing is  
 17 sharing what we were doing with Professor Sir  
 18 Chris Whitty on a regular basis. Initially it was  
 19 two-weekly, now it's four-weekly.  
 20 Q. Indeed, and one of the things that he asked you to  
 21 consider was to co-ordinate on a definition, as we can  
 22 see from this email, "case definitions". Why was that?  
 23 And the reason I ask that question is because there were  
 24 already definitions from the World Health Organisation,  
 25 as you know, and indeed NICE.

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1 A. Yeah, so the definitions have been very different, and  
 2 if you look at the data for Long Covid they vary, some  
 3 say four weeks, some say eight weeks, some say 12 weeks,  
 4 so I think in terms of definitions we did take the  
 5 NICE definition, and it was just to ensure that everyone  
 6 was working in a similar manner as far as  
 7 the definitions go. We weren't going to redefine  
 8 the definition unless there was any evidence to do that,  
 9 but our role was not to redefine the definition.

10 Q. Thank you.

11 Now, just in terms of the working group and the  
 12 output, the product of it, if I can just call up  
 13 INQ000073726.

14 It's an email from you to Chris Whitty, and what you  
 15 have explained there is that you have been having  
 16 the fortnightly Long Covid meetings, they have been  
 17 enormously useful and productive, you explain that one  
 18 of the initiatives that has resulted is a collection of  
 19 Long Covid research papers similar to the Covid-19  
 20 research collection held by UCL, which we may hear some  
 21 of later in the evidence.

22 But the point of your email was really to ask if he  
 23 was agreeable to him(sic) using his name in relation to  
 24 that research collection; is that right?

25 A. That's correct, yes.

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1 in terms of publication and the use of the CMO's name.  
 2 And what we see here is that there's a description,  
 3 Nature:  
 4 "The group is planning to publish the attached  
 5 commentary in Nature ..."  
 6 That's a journal, isn't it?

7 A. That's right, yes.

8 Q. And you have asked whether Professor Sir Chris Whitty  
 9 "would be happy to have the below line included", and  
 10 what we see there is that it essentially says:

11 "Researchers on these studies have formed the  
 12 National Long COVID working group, reporting to the  
 13 Chief Medical Officer for England, to share key findings  
 14 and promote ..."

15 Understanding and so on?

16 A. That's correct.

17 Q. Now, in relation to that, that was being flagged, and  
 18 you can see underneath it says:

19 "From my understanding of the Group, 'reporting to'  
 20 is possibly a bit strong and slightly overstates your  
 21 involvement ..."

22 And they make a proposed modification?

23 A. So reporting would mean that he would have a say in what  
 24 we do, which he absolutely doesn't, and we inform him,  
 25 as I said, with the minutes on a two-weekly or

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1 Q. And he replies shortly thereafter, and we see at the top  
 2 there that he says:  
 3 "I think it would be sensible not to put the 'CMO'  
 4 bit in as it might at some point get people asking about  
 5 clearances (from one side) [presumably that's the  
 6 government side], independence from Gvt (on the other  
 7 [side]) and thinking that I 'endorse' papers."

8 How did that chime with what you had understood his  
 9 role to have been at that point?

10 A. We weren't sure whether we were there to just inform him  
 11 or report to him, but the reporting is very, very  
 12 separate. The funded studies have to report to  
 13 the funders, independent of anyone, so they'd be  
 14 conducting the studies independently of the CMO --

15 Q. Yes.

16 A. -- and reporting to the funders. So, in hindsight, he's  
 17 absolutely right: we're not reporting to him, we're  
 18 informing him.

19 Q. Indeed. And indeed there's a subsequent email from one  
 20 of Chris Whitty's -- the individuals in his office, on  
 21 2 November, and that's at INQ000074244.

22 What we have there is -- it's from, as I say,  
 23 an official within DHSC, but working -- private  
 24 secretary to Professor Sir Chris Whitty, and what that  
 25 does is it flags this in relation to a subsequent aspect

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1 a four-weekly -- and he always acknowledges that, it's  
 2 been helpful for him as the CMO.

3 Q. Did you form any impression that he was seeking to keep  
 4 the working group effectively at arm's length?

5 A. Well, because it's not funded by the CMO, it's funded by  
 6 NIHR, UKRI, so he wouldn't have a say in any of  
 7 the workings of the group, or the individual studies.

8 Q. That perhaps brings me on to the next point, which is:  
 9 why was the working group not set up as a subgroup of  
 10 SAGE? Can you assist us with that?

11 A. Yes, sure. So if you look at all the evidence that's  
 12 been provided so far, there was a paper to SAGE, I think  
 13 led by Nish Chaturvedi, in July of 2021, of a number of  
 14 groups that had looked at Long Covid, and the report  
 15 stated that they were conducting epidemiological  
 16 studies. The SAGE's response would be: if there is  
 17 something concrete there that we can help to improve  
 18 outcomes, that we can do something about, then they  
 19 would take that forward as a recommendation to the  
 20 government.

21 Until now, most of the studies are still evaluating,  
 22 even Chris Brightling in his report said we're in the  
 23 infancy of Long Covid, so the research is still being  
 24 done. What we don't know is the exact causes, exact  
 25 disease trajectories, and there are not currently any

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1 treatments for it at all. So at the moment we're still  
 2 in the research phase of Long Covid.

3 Q. That perhaps explains why it operates differently --

4 A. Absolutely.

5 Q. -- in your view?

6 A. That's right.

7 Q. I have been asked to ask: do you think that that  
 8 reflects a lack of importance given to Long Covid,  
 9 because it's not a formal subgroup of SAGE?

10 A. Absolutely not. If there wasn't importance put to it  
 11 they wouldn't have discussed it at SAGE, but it has been  
 12 discussed. And I think everything else that was going  
 13 on within SAGE was to reduce Long Covid, because they'd  
 14 obviously established Long Covid was an issue. The only  
 15 way currently that the evidence that we had, and even  
 16 now we have, is to reduce the risk of getting Covid in  
 17 the first place. And that was through everything that  
 18 we've discussed at SAGE about reduced risk,  
 19 population-level risk of people getting Covid, and  
 20 that's through NPIs (non-pharmaceutical interventions)  
 21 and vaccinations, and those were large areas of work  
 22 that SAGE was doing. So if we reduce the population  
 23 level of people getting Covid, then the risk of  
 24 Long Covid would be lower as well.

25 Q. You've covered it to some extent in your answer, but  
 49

1 just to be clear, in your view, does the fact that it's  
 2 a working group impact at all upon the advice that was  
 3 then taken on board by SAGE in terms of its importance  
 4 and ...

5 A. Well, when we were still in our infancy, April 2021, it  
 6 was quite early on still and the studies were just being  
 7 set up there, some of the studies are still not  
 8 finished, so we don't have results from many of  
 9 the studies, so it would have been too early to report  
 10 to SAGE with the results.

11 Q. Thank you.

12 If I can just pause for a moment, you've answered  
 13 a number of the areas and so I'm just going to truncate  
 14 those.

15 Just dealing very briefly -- because, as I say, we  
 16 will be hearing on Friday from Professor Brightling and  
 17 his colleagues in relation to that, and Dr Evans -- in  
 18 terms of your understanding, am I right that  
 19 the incidence of Long Covid, albeit not termed as such  
 20 at that point, was aware and apparent throughout late  
 21 spring and early summer of 2020?

22 A. That's when the reports started mainly coming out,  
 23 mainly from the patient groups and then from the  
 24 researchers themselves, yes.

25 Q. And indeed in August 2020 guidance was published in  
 50

1 the BMJ in relation to management of that condition?

2 A. That's correct, yes.

3 Q. Thank you. We will be hearing a little bit more about  
 4 your short report that the working group produced in due  
 5 course, so I don't propose to take you through those  
 6 today. We've heard a little bit already, and indeed  
 7 from Professor Sir Ian Diamond, that the ONS worked with  
 8 you in relation to statistics. Can you recall when that  
 9 was?

10 A. Statistics in relation to Long Covid?

11 Q. Long Covid, my apologies.

12 A. So I think that was in the SAGE minutes of  
 13 November 2020.

14 Q. Indeed, it was -- I believe it's SAGE 69, if it  
 15 assists -- on 19 November.

16 A. That's correct.

17 Q. It's really just to get a broad understanding.

18 A. So I was representing the Ethnicity Subgroup within  
 19 the main SAGE meetings, but because I'd done some work  
 20 in the area of Long Covid I was asked to work with ONS,  
 21 and that's when they were starting the CIS, the Covid  
 22 Infection Survey, and they were going to add  
 23 the Long Covid questions to that, and it was just to  
 24 work with the team regarding the questions that were  
 25 going to be asked and how the study was going to be set

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1 up.

2 Q. Thank you.

3 With regard to your involvement in SAGE, and advice  
 4 provided, were there discussions about advice to be  
 5 provided to government decision-makers and policymakers  
 6 in relation to Long Covid, to your recollection?

7 A. Not that I'm aware of, no.

8 Q. Thank you.

9 In fact, it appears that the first detailed  
 10 discussion on Long Covid doesn't take place until  
 11 February 2021. Can you help us with why it may be that  
 12 it took so long?

13 A. I think most of this, as I've said, is because there  
 14 wasn't any evidence there that one could change anything  
 15 in terms of Long Covid. Long Covid was this new  
 16 disease, we still don't know much about Long Covid, as  
 17 you'll hear from Chris Brightling, so at this phase it  
 18 was mainly trying to get informed from the studies that  
 19 had been done, which are still -- many of them are still  
 20 not complete.

21 Q. Thank you.

22 You have had the opportunity of reading the report,  
 23 haven't you, and just in general high-level terms, do  
 24 you agree with the report of Professors Brightling and  
 25 Dr Evans?

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- 1 A. Yes, completely agree, yes.  
 2 Q. You completely agree, thank you.  
 3 A. There's areas about funding I think he mentions, which  
 4 we've discussed at Long Covid meetings as well, and we  
 5 do agree further funding is required, but there are NIHR  
 6 calls(?) that people can go to, to continue doing this  
 7 work, if they wanted to extend their work.  
 8 Q. I have just three very short points, if I may, and then  
 9 I'll be handing over, my Lady.  
 10 The first relates to the collection of data in  
 11 relation to Long Covid. Effectively at the outset of  
 12 the pandemic, as we've heard, data was not being  
 13 collected. In terms of that, are there any  
 14 recommendations that you would make with regard to  
 15 population-level data collation?  
 16 A. I think longer-term we've learnt a lot from this  
 17 pandemic, there are a number of areas that we can look  
 18 at, but in terms of Long Covid, I think we need to start  
 19 planning for this very early. And the studies like CIS  
 20 and REACT, these are what we call, now, hibernating  
 21 studies, we're not doing them, but they could easily be  
 22 set up -- if another pandemic came, they could very  
 23 quickly be set up.  
 24 Q. Essentially used as sleeping studies to be activated; is  
 25 that right?

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- 1 I think because the diagnosis is so difficult of  
 2 Long Covid -- unless you're a researcher, we're doing  
 3 that on a regular basis -- in clinical practice  
 4 Long Covid is a difficult diagnosis for a busy general  
 5 practitioner. There are training elements already  
 6 inputting for that though.  
 7 Q. We've heard a little bit about that, and obviously we  
 8 can surmise, and you've covered the implications for  
 9 that within your statement in relation to assessing  
 10 that.  
 11 Finally, just in relation to ethnicity and sex, it  
 12 appears that data concerning ethnicity at the moment is  
 13 less consistent in relation to having a causal link or  
 14 that enhanced risk of Long Covid, is that right?  
 15 A. Yes, there are -- so there are some studies that have  
 16 shown that ethnic minorities may have Long Covid when we  
 17 look at the large datasets. When we look at prospective  
 18 studies where people are asked about Long Covid, we seem  
 19 to see less Long Covid, but again I think there maybe  
 20 some nuances here. We've seen ethnic minorities get  
 21 worse disease, we'd expect them to get more Long Covid,  
 22 but this may be the language that's used, and I don't  
 23 think there's work that's been done in terms of  
 24 the language of Long Covid with ethnic minorities, and  
 25 that's an area of work that certainly needs to be done.

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- 1 A. That's right.  
 2 Q. Thank you.  
 3 Then in terms of coding issues, a further tweet from  
 4 you, because you appear to use social media in this way,  
 5 INQ000280199, you tweeted that:  
 6 "Long covid is poorly coded in primary care records  
 7 but there are other ways."  
 8 Again, in relation to collation of data.  
 9 What other ways do you see?  
 10 A. So the coding structures came very quickly, I think  
 11 there were 18 codes that were set up for Long Covid  
 12 within the GP systems. The tweet was in relation to  
 13 a paper that was published a month before from  
 14 OpenSAFELY, that's in the British Journal of  
 15 General Practice, that showed that only 0.04% of  
 16 practices at population level had a code for Long Covid.  
 17 By that time we'd had a number of people with  
 18 Long Covid, but only 0.04% were shown on the GP computer  
 19 systems, and it was variable, 25% of practices did not  
 20 have a code at all. So it showed that there is an issue  
 21 with coding of Long Covid.  
 22 The other areas are that if patients are going to  
 23 Long Covid clinics, for example, if they came back to  
 24 the practice, that's one way of putting Long Covid codes  
 25 in. Otherwise we have to do them prospectively.

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- 1 Q. So we still have a gap there?  
 2 A. Absolutely.  
 3 Q. Can you just assist with women, because women appear to  
 4 be disproportionately impacted in terms of the initial  
 5 outputs for some of these research studies. Do you know  
 6 why that is?  
 7 A. I don't, sorry.  
 8 **MS CECIL:** Not at all. We'll be hearing, as I say, from  
 9 Professor Brightling and Dr Evans in any event in due  
 10 course.  
 11 My Lady, those are my questions. There have been  
 12 applications that have been granted by two core  
 13 participants, the first is FEHMO and the second is  
 14 the Long Covid groups.  
 15 **LADY HALLETT:** I think I'm just going to check. Professor,  
 16 do you mind if we take a break? I'm sorry, Mr Thomas.  
 17 It's just I have been watching our stenographer.  
 18 Are you okay if we take a break now and come back  
 19 afterwards?  
 20 **THE WITNESS:** Sure.  
 21 **LADY HALLETT:** Good, thank you very much. In which case  
 22 I shall be back at 11.30.  
 23 (11.13 am)  
 24 (A short break)  
 25 (11.30 am)

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1 LADY HALLETT: Mr Thomas.

2 Questions from PROFESSOR THOMAS KC

3 PROFESSOR THOMAS: Hello, Professor, I represent  
4 the Federation of Ethnic Minority Healthcare  
5 Organisations, FEHMO.

6 I've only got a few questions for you. One of my  
7 questions has already been asked, but let me come on to  
8 the three questions that I do have.

9 My Lady, I'm starting from question 2.

10 LADY HALLETT: Thank you.

11 PROFESSOR THOMAS: The Chair asked you earlier a question,  
12 she said:

13 "... who had the data that you needed?"

14 Your response was you weren't sure and you said:

15 "I'm not sure if the government had the data. If  
16 ... one of the asks, I'm sure Sir Ian Diamond would have  
17 provided that data ..."

18 "[The data] wasn't coming to us ..."

19 My question is this: so bearing that in mind, what  
20 was the source of the data in the period leading up to  
21 March/April 2020 that connected certain underlying  
22 clinical conditions with increased vulnerability to  
23 Covid-19?

24 A. Okay, so in terms of the data, there were a number of  
25 data points that were available to researchers, and

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1 a cautionary way, that "We're seeing more people from  
2 ethnic minority backgrounds being admitted to hospital",  
3 and we'd not heard of this.

4 And then after that I think the first lot of data we  
5 were relying on was the ICNARC data, which is  
6 the intensive care unit data that's collected nationally  
7 from a number of centres. And we were tweeting this on  
8 a regular basis saying there is still this risk, and  
9 then more patients were admitted, and saying  
10 disproportionately ethnic minorities are more  
11 represented in intensive care unit database.

12 So we were the first ones to make these, all these  
13 signals available to people. And then I think that's  
14 when ONS started looking at the data.

15 Q. Yes. Can I just follow on from that, if I may. So you  
16 were signalling this, did you consider the level of any  
17 such risk to be actionable, you wanted it acted upon?

18 A. Before we act on anything we need a definite  
19 confirmation that there is a causal risk there, and we  
20 hadn't identified -- we knew that there were more  
21 patients admitted to the hospital -- and I am talking  
22 here of May/June time, and that's when ONS did their  
23 first lot of analysis showing and confirming this risk.

24 Q. Right.

25 Let me move on to my last area. Are you aware of  
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1 obviously they were available to the Office of National  
2 Statistics. In terms of the government, I'm not sure  
3 what data were available to them.

4 Q. Okay.

5 A. Unless they commissioned the other groups to do  
6 the work.

7 Q. Yes. But you're clear in your analysis -- well, let me  
8 ask you in a non-leading way: did the analysis of that  
9 data that you did have, that suggested a heightened  
10 vulnerability to Covid-19 based on race and ethnicity?

11 A. Absolutely, yes. And as I mentioned before, it's  
12 the ONS data and the Public Health England data also  
13 suggested that, and then subsequently a number of other  
14 independent researchers have also identified that risk  
15 as well.

16 Q. Okay, thank you.

17 Let me move on to my next question. If there was  
18 a growing expert view in between March/April 2020 that  
19 there was indeed a heightened risk to Covid based on  
20 race and ethnicity, can you say who the main voices who  
21 were making this call, who were -- you know, "This is  
22 a potential problem", who were the main voices?

23 A. So, as I said, the first signal that we mentioned  
24 earlier was that I was the first one to point that risk  
25 out. And, as I said, this -- you know, it was in

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1 any targeted interventions that were formulated to  
2 address the probability of heightened risk of Covid  
3 based on race and ethnicity?

4 I'll repeat the question if you want me to.

5 A. Please, yeah.

6 Q. Are you aware of any targeted intervention that was  
7 formulated to address the probability of heightened risk  
8 to Covid-19 based on race and ethnicity?

9 A. So if you look at the four quarterly reports from  
10 the Race Disparity Unit, you do see that there were  
11 targeted interventions throughout those four reports,  
12 and they were at various levels, including  
13 the communications that we've talked about,  
14 the vaccinations and more data-driven work that could be  
15 done.

16 In terms of my answers I gave earlier, the targeted  
17 interventions were -- we felt it wasn't co-ordinated as  
18 such. They weren't -- the funded individuals, there was  
19 about 60 authorities that were given this funding, they  
20 were left to themselves to decide what to do with that  
21 rather than having a co-ordinated effort -- or even  
22 having co-ordinated pilots, to say, "Let's intervene  
23 here in this area, intervene in this way in this area",  
24 to draw out and reduce the risk and to identify what are  
25 the best interventions that will lead to better outcomes

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1 for people from ethnic minority backgrounds.

2 Q. Yes. I've finished, but just on that, do you think  
3 things were being done timely?

4 A. The first quarterly report was in October, and that's  
5 when they started discussing this. I think the first  
6 lot of funding for community champions was given in  
7 January 2021. Yes. £23.75 million was given for  
8 community champions over, I think, 60 authorities. And  
9 we think that this could have been done earlier, yes.

10 PROFESSOR THOMAS: It could have been done earlier.

11 My Lady, that's all I ask, thank you.

12 LADY HALLETT: Thank you, Mr Thomas.

13 Mr Metzer.

14 Questions from MR METZER KC

15 MR METZER: Thank you, my Lady.

16 Two topics, please, Professor Khunti.

17 First of all, I'm going to cite, I'm not going to go  
18 to the INQ number, but it's INQ000280061, which is part  
19 of Sir Patrick Vallance's dairies.

20 At page 205, Professor Khunti, he recorded an entry,  
21 on 6 October 2020, listing the reasons why  
22 the Great Barrington proposal, namely herd immunity and  
23 let it rip, as you will be aware, is wrong. Number 4 on  
24 that list is Long Covid.

25 First of all, do you agree with Patrick Vallance's

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1 Would SAGE be responsible for informing government  
2 decision-makers about the nature of risk of Long Covid,  
3 as with other factors on Patrick Vallance's list, such  
4 as how long immunity lasts?

5 A. I think that was already in many of the SAGE papers.  
6 The SPI-M modelling had looked at how long the immunity  
7 lasts, after an infection or vaccinations, and these  
8 were all taken into account when the modelling was done.

9 Q. Thank you.

10 You said at paragraph 3.5 of page 13 of your report,  
11 you said:

12 "By August 2020, understanding was sufficient for  
13 guidance on management of 'post-acute Covid' (as the  
14 longer-term effects of Covid-19 were then termed) to be  
15 published in the British Medical Journal."

16 Is it right that SAGE did not provide advice on  
17 Long Covid to government decision-makers by October 2020  
18 when Sir Patrick Vallance made this note in his diary?

19 A. As I mentioned earlier on, there weren't any  
20 interventions for people with Long Covid. Indeed,  
21 you'll hear on Friday we don't have any interventions at  
22 the moment. Really, we're at its infancy in terms of  
23 knowing much about Long Covid. So at that stage we did  
24 not have any interventions to put into place to help  
25 people with Long Covid except to reduce the risk of

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1 view that Long Covid was one of the reasons why letting  
2 the virus spread unchecked was wrong?

3 A. Absolutely. I agree with that. As I mentioned earlier,  
4 at the moment the way to reduce the risk of Long Covid  
5 is through reducing the risk of people getting Covid.  
6 And this is through, as we said, all the NPIs. And now  
7 we have the vaccines that can drive the risk. Vaccines  
8 drive the risk -- reduces the risk, and there's good  
9 evidence now that if people are vaccinated they're less  
10 likely to get Long Covid. If they have Long Covid and  
11 they're vaccinated, there's also data to suggest that  
12 they get less Long Covid.

13 Q. Thank you.

14 Since you've said yes, can you answer this  
15 subsidiary question: should Long Covid be one of  
16 the factors to take into account in assessing the need  
17 for non-pharmaceutical interventions to limit  
18 transmission?

19 A. Yes, absolutely. As I've said, that's one of the ways,  
20 and one of the major ways, of reducing the risk of  
21 getting Covid in the first place, and we know -- also  
22 know that if you have had Covid and you have Long Covid  
23 and you have Covid again, your risks are worse. So  
24 definitely, yes.

25 Q. Thank you.

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1 Long Covid with the interventions I've mentioned, the  
2 NPIs and the vaccination programmes.

3 Q. All right, well, that ties in well to my second topic  
4 that I want to go on to, on recommendations.

5 The Long Covid group, the two questions I want to  
6 ask you about that in relation to something you said,  
7 I think, both in evidence at paragraph 3.8 of your  
8 witness statement. You of course sat on SAGE. Can we  
9 look at the minutes of SAGE 94, on 22 July 2021, which  
10 is INQ000092856. I don't know if that's going to be put  
11 up.

12 LADY HALLETT: It's up on mine.

13 MR METZER: Not on mine, sorry.

14 Could we go to page 4 at paragraph 27. I want to  
15 ask you about the fourth line, which starts:

16 "For those children who do suffer long illness" --

17 LADY HALLETT: You need to be near the microphone, sorry.

18 MR METZER: I'm sorry, yes. It's on my screen, thank you.

19 "For those children who do suffer long illness  
20 duration, there may be a need for guidance to parents,  
21 carers and schools on how to support them."

22 Would you agree that this appears to be  
23 a recommendation from SAGE?

24 (Pause)

25 A. That's what it seems like, yes.

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- 1 Q. Thank you. Do you know if that guidance was prepared?  
 2 A. I'm not aware of that, sorry.  
 3 Q. So you're not able to say, if it wasn't, why it wasn't?  
 4 A. As I said, I was on the SAGE for -- as chair of the  
 5 Ethnicity Subgroup. I did give comments on Long Covid  
 6 particularly for the CIS survey. Children's Long Covid  
 7 is not my area of expertise.  
 8 Q. So be it. And the last INQ I'd like to take you to,  
 9 INQ000249018, which is a WHO policy brief, number 39.  
 10 That's titled "*In the wake of the pandemic: preparing*  
 11 *for long COVID*".  
 12 Can we look, first of all, at the first page and  
 13 just confirm that you're a co-author?  
 14 A. That's right, yes.  
 15 Q. Thank you. Page 4, can we go to, please, which is  
 16 a correction from 22 March 2021, can we take that to  
 17 indicate that the report was published by then,  
 18 March 2021?  
 19 (Pause)  
 20 A. This is the first time I've seen this, so if this is  
 21 there, yes, I do agree.  
 22 Q. So you do agree that we can indicate the report must  
 23 have been published by then, March 2021?  
 24 A. Yes.  
 25 Q. Thank you.

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- 1 The last thing I want to ask you, page 23, please,  
 2 we can see there a number of recommendations for  
 3 policymakers. Do you have that, Professor Khunti?  
 4 A. Yes.  
 5 Q. Yes. Do you agree that these recommendations could have  
 6 been put before SAGE?  
 7 A. I'm just reading those.  
 8 Q. Yes, of course.  
 9 (Pause)  
 10 A. Yeah, so these are recommendations stating that we  
 11 should be implementing patient registers, we should be  
 12 giving guidelines on multidisciplinary services, but we  
 13 didn't have any evidence for this at all. These were  
 14 all consensus recommendations that we gave, as part of  
 15 this document. SAGE was looking at the acute  
 16 complications, and giving advice of trying to reduce  
 17 the risks associated with this, acute effects of  
 18 the pandemic.  
 19 Q. Yes.  
 20 A. In terms of this, there are other areas looking at this,  
 21 there are already clinics that have been set up to deal  
 22 with this. These were all actioned by the government in  
 23 terms of having clinics for people with Long Covid.  
 24 They, I think, pre-date some of the discussions on SAGE.  
 25 Q. Yes. But we can see the implications for policy makes

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- 1 reference to --  
 2 **LADY HALLETT:** Microphone, Mr Metzer. Sorry, it's because  
 3 it's not appearing on your screen.  
 4 **MR METZER:** I'm very sorry, I'm bending down. I'll bring it  
 5 down with me:  
 6 "Although Long COVID is not yet fully understood  
 7 health policy-makers should be preparing to address it."  
 8 A. Yes, so this is to the policymakers, in terms of  
 9 the government policymakers, and we know that they did  
 10 set up the Long Covid clinics because of that.  
 11 Q. Yes. So the last question I ask, therefore, is: SAGE  
 12 could have made similar recommendations on the basis of  
 13 information available at that time, which is early 2021;  
 14 do you agree?  
 15 A. They could have done but, as I said, this wasn't  
 16 a question that was put towards SAGE to look at this  
 17 evidence, because there wasn't any evidence. Even the  
 18 Long Covid clinics were set up to help people with Covid  
 19 but there wasn't any evidence, as such, for that.  
 20 Q. No, just recommendations?  
 21 A. Yes.  
 22 **MR METZER:** Thank you.  
 23 **LADY HALLETT:** Thank you, Mr Metzer.  
 24 **MS CECIL:** Thank you, my Lady. That concludes the evidence,  
 25 unless your Ladyship has any questions.

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- 1 **LADY HALLETT:** No, I have no questions.  
 2 Thank you very much, Professor, for all the work you  
 3 have done generally and for all your help with this  
 4 Inquiry. We are very grateful.  
 5 **THE WITNESS:** Thank you very much.  
 6 (The witness withdrew)  
 7 **MS CECIL:** My Lady, if I may just hand over to Mr Keith.  
 8 **MR KEITH:** My Lady, the next witness is Professor Tom Hale.  
 9 **PROFESSOR THOMAS HALE (affirmed)**  
 10 **Questions from LEAD COUNSEL TO THE INQUIRY**  
 11 **MR KEITH:** Good morning.  
 12 A. Good morning.  
 13 Q. Could you commence, please, by giving the Inquiry your  
 14 full name.  
 15 A. My name is Professor Thomas Hale.  
 16 Q. Professor, thank you very much for attending today and  
 17 for the provision of your expert report prepared for  
 18 this module, which relates to the Oxford Covid-19  
 19 government response tracker for which you are  
 20 responsible in part, although you lead the team that has  
 21 provided and provides that tracker.  
 22 You've prepared this report for us, it's  
 23 INQ000257925, and I believe on the last page -- perhaps  
 24 not the last page, which is page 105, but earlier in  
 25 that report -- you've appended the usual declaration

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1 concerning -- in fact it's on the second page -- you set  
 2 out the usual understanding of your duty to provide  
 3 independent evidence and you confirm that you've made  
 4 clear those matters which are within your knowledge and  
 5 those which are not, and those which are true and those  
 6 which are not.

7 Now, you are a professor or you are the professor of  
 8 global public policy at the Blavatnik School of  
 9 Government. Is that in the University of Oxford?

10 A. That is correct.

11 Q. In essence, are you a specialist in the area or  
 12 the issue of how political institutions evolve, adapt,  
 13 to face the challenges, whatever they may be, that they  
 14 face, globally and in the context of those particular  
 15 countries in which the governments operate?

16 A. That's correct. I focus especially on transborder  
 17 threats such as pandemics where we need to look at  
 18 different government responses, compare them and  
 19 understand how they interact.

20 Q. Professor, whilst you give evidence, please try to keep  
 21 your answers as slow as you can humanly make them, it  
 22 makes it much easier for our stenographer.

23 Do you hold a PhD in politics from Princeton,  
 24 a master's degree in global politics from the LSE, an AB  
 25 in public policy from Princeton School of Public and

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1 the pre-eminent tracker of this information, or were  
 2 there a large number of other bodies also scouring  
 3 the position around the world to see how governments  
 4 were responding?

5 A. It was the largest of these efforts. There were several  
 6 of them, which we've listed in the appendix, close  
 7 collaborators and colleagues, each often providing  
 8 a different set of issues that were the focus. But our  
 9 project became a focal point for many users of the data  
 10 because it had a huge breadth, covering 185 different  
 11 countries around the world, also, in many countries,  
 12 depth, looking at their subnational jurisdictions,  
 13 particularly important in places like India or  
 14 the United States where subnational differences were  
 15 very significant, also including the subnational  
 16 jurisdictions of the United Kingdom. And it became very  
 17 timely, so the data was collected through a team of  
 18 trained volunteers, who eventually numbered 1,500 in  
 19 total, a massive team, all using their contextual  
 20 knowledge from different parts of the world combined  
 21 with our system, which we trained them in, to create  
 22 comparable information.

23 So for those reasons, even though there are many  
 24 trackers of different areas of policy, this one became  
 25 an important tool for many governments, for many

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1 International Affairs?

2 A. I do.

3 Q. Have you written for many years on these areas?

4 A. I do.

5 Q. Thank you very much.

6 The report, does it fulfil this main aim, which was  
 7 to research and review the many thousands of articles  
 8 and pieces of learning which concern themselves with  
 9 the impact of the various governmental measures which  
 10 were applied by governments across the world --

11 A. Correct.

12 Q. -- in response to the pandemic, and based very largely  
 13 on the information collated by your tracker team?

14 A. That's correct. Our project was providing an evidence  
 15 base for many, many hundreds, indeed thousands,  
 16 thousands of studies that took place looking at what  
 17 governments were doing in response to the pandemic and  
 18 what the effects of their policies may or may not be on  
 19 different outcomes of interest, such as the health of  
 20 their populations or their economies.

21 Q. Your tracker, the project which I think you launched in  
 22 March 2020, obviously looked around the world at all  
 23 the various responses that the governments across  
 24 the world put into place.

25 Was it one of a number of trackers? Are you

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1 researchers and for the public at large.

2 Q. Did many governments during the course of the pandemic  
 3 in fact, as a result, incorporate information from  
 4 the Oxford C-19, Covid-19 government response tracker  
 5 into their own responses, their own analysis and their  
 6 planning processes?

7 A. That's correct. So our data were made available  
 8 instantly, in real time, on the internet and so were  
 9 used by many, many governments, researchers, media  
 10 organisations to create a record of who was doing what  
 11 and how does it compare to, for example, government's  
 12 own plans or actions. And that was indeed the idea: to  
 13 facilitate learning.

14 Q. In the United Kingdom, did the two academic leads of  
 15 the tracker project, yourself and Dr Petherick, assist  
 16 the United Kingdom Government by way of taking part in  
 17 or joining the International Comparators Joint Unit,  
 18 expert advisory group, which provided timely and vital  
 19 information to the UK Government on what the impacts  
 20 appeared to be of the various different types of  
 21 measures applied by governments across the world?

22 A. That's correct. Dr Petherick and I had the privilege of  
 23 serving on this committee beginning from the spring  
 24 of 2020, when it was created, and then through its  
 25 various forms until around the middle of 2021, when it

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1       ceased its work.

2       **Q.** Just focusing for a moment on how the information  
3       tracked in the project was assembled, you've mentioned  
4       the very large number of volunteers across the world.  
5       Did those volunteers have -- or were they recruited  
6       locally so that they would have the facility,  
7       the ability to be able to deploy local knowledge in each  
8       country or jurisdiction or subregion when collating the  
9       various aspects of the impact of whatever measures might  
10      have been deployed?

11      **A.** That's exactly the strategy that was used. So it's  
12      quite important for any kind of comparative exercise to  
13      navigate between two fundamental desiderata. One is  
14      a comparable system where you can say A is like A, B is  
15      like B, which necessarily requires a little bit of  
16      abstraction, but also, on the other side, the ability to  
17      have real contextual information, to understand exactly  
18      what a given policy might mean in a particular context;  
19      to use the local language to understand that context, to  
20      understand the meaning of a policy, and to combine those  
21      two.

22           So using a team of volunteers -- and I would like to  
23      really offer, again, our huge thanks for the way these  
24      volunteers gave their time during the pandemic to create  
25      this global public good -- using that combination of

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1       quality assurance, so that your analysis and your  
2       thinking is open to review?

3       **A.** Exactly.

4       **Q.** Now, the Inquiry has heard a great deal of evidence  
5       about non-pharmaceutical interventions, and plainly  
6       you're aware of what they are.

7           In terms of the sorts of measures that you tracked,  
8       in very broad terms, were those measures non -- what we  
9       would call non-pharmaceutical interventions, but also  
10      including the impact of vaccine-related measures, so  
11      they were broadly the same but they included the whole  
12      field of vaccination?

13      **A.** That's correct. So the project began in the spring  
14      of 2020, when the most prominent responses governments  
15      were taking to the pandemic were in the form of NPIs,  
16      often restrictions on movement or travel or requirements  
17      to stay at home. However, as the pandemic evolved, so  
18      too did responses to it, and so our project had  
19      the imperative of adapting and adding new categories of  
20      response as our toolkit against this disease expanded,  
21      and that most significantly took the form of measuring  
22      the different policies that governments put in place to  
23      encourage vaccination, sometimes to require vaccination,  
24      and also how some of the restrictions that have been  
25      used in the pre-vaccine period, such as travel

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1       expertise, in the local context, with a comparable  
2       methodology, is what allowed the data to emerge.

3       **Q.** Do we presume that the data, the information about how  
4       the various governmental measures were coming into  
5       existence and being deployed and what their impacts  
6       were, was assembled by viewing official government  
7       websites across the world, official news reports, and  
8       any publicly available information about what those  
9       measures consisted of?

10      **A.** That's correct. So the volunteers were tasked with  
11      looking at, say, an official government website where  
12      information on different measures and restrictions might  
13      be posted, or, for example, where that didn't exist --  
14      and there are certainly many governments around the  
15      world where communication around Covid-19 measures were  
16      less consistent and clear than in other parts -- where  
17      the suitable information was sourced from government  
18      websites, you know, maybe a less official kind of  
19      document but in a posting on a government website, or  
20      similar information.

21           And importantly, the project has recorded these  
22      original sources as permanent digital records and so  
23      the entire historical archive for each of our data  
24      points is there for consideration.

25      **Q.** And is that an important feature for the purposes of

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1       restrictions, might vary, for example allowing more  
2       freedoms for vaccinated individuals than others. So  
3       those complexities were important.

4       **Q.** Do we have on page 47 of your report the full list of  
5       the Oxford Covid-19 government response tracker  
6       indicators, that is to say the measures or the policies  
7       that were tracked, and we can just see that they can be  
8       conveniently grouped into containment and closure,  
9       economic responses, health systems, and, over the page,  
10      vaccine policies and miscellaneous?

11      **A.** Correct. And richer descriptions are available on the  
12      link provided on page 47.

13      **Q.** It's important, isn't it, to identify the limitations on  
14      the work that your project was able to carry out? You  
15      tracked the measures and you tracked the impact of  
16      the measures. But what the project couldn't do was ever  
17      identify, for obvious reasons, the counterfactual  
18      position: what would have been the impact if these  
19      measures had not been applied in the various  
20      jurisdictions; is that correct?

21      **A.** Correct.

22      **Q.** Is that because, in very general terms, firstly, this is  
23      an observational study, you observed what was happening,  
24      it's not a controlled study of what the impact might be,  
25      in theory, of an intervention. And, secondly, many of

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1 these measures and interventions were being applied  
 2 simultaneously, and therefore it's impossible to say  
 3 what the precise impact may have been or was from any  
 4 individual particular intervention; is that correct?

5 A. Indeed. And so with these differential impacts you  
 6 might find across different NPIs, it's exceedingly  
 7 difficult to say: in this particular instance, say, 5%  
 8 was done by this one, 10% by another. Instead, the  
 9 knowledge we're able to glean from the literature is to  
 10 identify the tendencies that, on average, different  
 11 kinds of interventions, either individually or in  
 12 combination, may have.

13 Q. Of course, if you look at page 47, you can see that  
 14 the measures are self-defined in very broad terms:  
 15 school closures or workplace closing, income support,  
 16 testing policy, and so on and so forth.

17 A. Mm.

18 Q. So it's a very high level assessment, is it not?

19 A. Correct.

20 Q. But it's very useful because it identifies, doesn't it,  
 21 how different governments across the world responded in  
 22 general terms and what the broad consequences were of  
 23 those particular governmental decisions?

24 If we look at page 8, by way of a demonstration of  
 25 a very user-friendly diagram, this, for example,

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1 limits both health impacts and the need for restrictive  
 2 policies."

3 By "restrictive policies", do you mean more  
 4 stringent policies?

5 A. Correct.

6 Q. Stringent measures.

7 Fourthly:

8 "Economic support bolsters compliance."

9 By that, do you mean the provision of economic  
 10 support by government, for example by way of support for  
 11 those who are self-isolating, tends to improve  
 12 the ability or the degree to which a population will  
 13 comply with a particular measure?

14 A. Yes.

15 Q. Fifthly:

16 "Prolonged restrictions can have costs."

17 What sort of costs, in very broad terms, did you  
 18 have in mind by that phrase?

19 A. There are many potential costs. The ones we focused on,  
 20 because they were a source of great interest in the  
 21 literature, were around mental health impacts, around  
 22 domestic violence, around learning outcomes for  
 23 children, and of course for the economy. Of course  
 24 there are many others as well to consider.

25 Q. So now dealing with each of those broad findings in

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1 provides a chart by colour of school closures during  
 2 the Covid-19 pandemic as at 24 October 2020, and it  
 3 shows those countries in which no measures in relation  
 4 to school closures were imposed, those in which they  
 5 were recommended, those in which closures were required  
 6 but only at some levels, and then those countries in  
 7 which all levels of schools, so all ages, schools were  
 8 closed?

9 A. Correct.

10 Q. And you can see the broad thrust of it. All right.

11 Turning to the summary of your research of, as I've  
 12 said, the scientific literature reporting on  
 13 the information collated by your project and by your  
 14 tracker, page 11 of your report, are there a number of  
 15 general findings that you draw from your review of these  
 16 thousands of studies reporting on the data which you've  
 17 collated? So, in essence, what everybody did.

18 Firstly:

19 "Speed matters."

20 And we're going to come and look at these in turn.

21 Secondly:

22 "Strength matters."

23 Those two observations I think are self-evident,  
 24 that their meaning is clear. Third:

25 "Effective use of test, trace, and isolate measures

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1 turn, firstly, speed matters. It may be thought to be  
 2 self-evident, but what is the broad consequence of  
 3 a timely, that is to say a rapid, adoption of  
 4 a non-pharmaceutical intervention? That is to say, the  
 5 imposition of a social restriction or a distancing  
 6 method or a mask-wearing measure or a full stay at home  
 7 mandatory order.

8 A. So the long experience of managing infectious disease of  
 9 all kinds shows very clearly that because such diseases  
 10 tend to spread in a non-linear and, in the case of  
 11 Covid-19, rapid fashion, early interventions, when  
 12 the prevalence is low, are critical to restrain further  
 13 spread. Once spread has reached a certain scale, and  
 14 therefore because more spread means, in exponential  
 15 logic, more and more spread, at a certain speed, it's  
 16 much harder for any policy to have the same effect it  
 17 would have had at a lower level of spread.

18 Therefore, speed matters. And, for example, one of  
 19 the studies we looked at show that a single day of  
 20 delaying a mass gathering ban, so something like  
 21 concerts or sporting events, a single day of delay had  
 22 an impact of perhaps a 7% increase in the cumulative  
 23 death toll during that wave. So one day, 7% increase,  
 24 quite a significant importance for speed.

25 Q. Does your report refer to a number of studies that show,

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1 by reference to measures taken during the first  
 2 five days and also some other studies which show the  
 3 effects of the implementation of NPIs in general terms  
 4 during the first 10 to 14 days, can have a very  
 5 significant impact or did have a very significant impact  
 6 on the transmission of the virus?

7 A. Correct. Most of the studies show there was a two-week  
 8 lag between when a policy might come into effect and  
 9 when you might notice the impact of that on the number  
 10 of cases, which is tied to the time it takes the  
 11 Covid-19 disease to incubate and spread.

12 Q. I've described it, perhaps a little cheekily, as  
 13 self-evident. It is obvious, though, isn't it, that if  
 14 you apply a measure, a restriction, because it takes the  
 15 effect of some sort of restriction, it is bound to have  
 16 a beneficial impact in terms of limiting  
 17 the transmission of the virus?

18 But on account of the way in which a viral outbreak  
 19 or a virus disease will spread, what is the particular  
 20 significance, what is the particular need for acting  
 21 fast?

22 A. It's precisely to stop before it starts. Once it's  
 23 become so widespread that you are inevitably going to  
 24 have some degree of non-compliance leading to further  
 25 spread, it's too late for those measures to have

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1 the kind of clampdown effect they would have had if it  
 2 were just a few people. So it's a simple kind of fact,  
 3 mathematical logic of exponential growth, that once you  
 4 have passed the point of a certain threshold of spread,  
 5 it's not going to be feasible to bring that down without  
 6 a very prolonged and intense level of restriction.

7 Q. Did the tracker and did the reviews, the literature  
 8 reviews of the tracker and the data that it collated,  
 9 reach any conclusions in relation to individual NPIs  
 10 beyond that of the one concerning the banning of  
 11 mass gathering, to which you've already referred,  
 12 including matters such as school closures? Was there  
 13 a significant link between the closing of schools and  
 14 a reduction in the transmission of the virus thereafter?

15 A. Yes. So as was mentioned, the exact impact of any  
 16 single measure in a given instance is always going to be  
 17 difficult to say, because they tend to come in packages.  
 18 But on balance, the literature shows, as you would  
 19 expect, policies that are more effective at preventing  
 20 people from meeting each other are going to be the ones  
 21 that have the greatest impact on cases,  
 22 hospitalisations, and eventually deaths. So stay at  
 23 home measures were obviously one of the most strong --  
 24 we observed, one of the strongest overall tendencies to  
 25 do. But school closures, workplace closures, also

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1 seemed to have this effect.

2 Q. What about mask wearing?

3 A. Mask wearing is indeed one of the factors that has been  
 4 shown. I think I would -- I note the Royal Society's  
 5 report on this fact, showing quite a clear balance of  
 6 evidence that the right kind of mask wearing in  
 7 particular has reduced transmission.

8 Q. When you say the "right" type of mask, do you mean  
 9 medical masks, respirators, as opposed to cloth masks?

10 A. That does seem to be where the evidence shows, yes.

11 Q. Now, you've used the word "stringent". In the context  
 12 of border measures, for example, is there a link between  
 13 the efficacy, the effect of a particular measure or  
 14 border measure and the ruthless degree or the stringency  
 15 by which such a measure has to be applied?

16 A. For border measures, it's important to think slightly  
 17 more broadly about the role they might play alongside  
 18 others. So oftentimes restrictions on international  
 19 travel were geared not at clamping down on local spread  
 20 but, for example, at preventing new entrance into  
 21 a population for example of a new variant. So I might  
 22 suggest that there -- it should be assessed in  
 23 a different way. But yes, on average, we see a tendency  
 24 for stronger restrictions on travel to be associated  
 25 with reductions in the spread of the disease.

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1 Q. And is that fairly obvious, because with border  
 2 measures, with restrictions on travel, there is a range  
 3 of measures which could be applied, from screening for  
 4 symptoms of the virus, whether you've got a temperature,  
 5 whether or not you're showing signs of fever, all  
 6 the way across to a full-blown closure of your border?

7 A. Correct.

8 Q. And if you apply a border measure which is less  
 9 stringent, for example a temperature check or  
 10 a screening, it is much more likely to allow the virus  
 11 to continue to enter any particular country because  
 12 the nature of that sort of measure is extremely hard to  
 13 police and to enforce and to --

14 A. Correct. And it's really the most stringent measures,  
 15 for example closures or required long periods of  
 16 quarantine, say in hotels, that show this particularly  
 17 high effect on transmission.

18 Q. I've already asked you about the generic difficulties of  
 19 trying to apply a counterfactual position and of trying  
 20 to drill down into the impact of specific measures. Is  
 21 it for those reasons that you can't express a view,  
 22 for example, as to what the specific impact might have  
 23 been in the United Kingdom of banning mass gatherings  
 24 earlier? For example, you're aware of the Six Nations  
 25 matches which were held in February and March,

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1 a football match between Atlético Madrid and Liverpool  
 2 and so on, and a racing festival at Cheltenham. Does  
 3 the data and the literature provide you with any answer  
 4 as to what might have been the impact had those large  
 5 mass gatherings not taken place?

6 A. A study could be done, a modelling study, which would  
 7 have tried to use mathematics and statistics to create  
 8 a counterfactual for comparison, but no, we can't look  
 9 back in an observational way and say: had this been done  
 10 earlier, definitely this would be the impact. Rather we  
 11 can say is: let's look at all of the countries in  
 12 the world, see which ones imposed this kinds of mass  
 13 gathering bans, what the impact was on their disease  
 14 situations and then try to interpolate that to the UK.  
 15 That's the level of evidence that we can provide.

16 Q. Turning to the second topic, strength matters. Plainly  
 17 some measures are more stringent, more ruthless than  
 18 others. Stay at home orders, by virtue of their  
 19 mandatory nature, are amongst the most strong policy  
 20 interventions, are they not?

21 A. Correct.

22 Q. Does the data and the review show, not surprisingly,  
 23 unsurprisingly, that stay at home orders had  
 24 the greatest impact in terms of the policy impact? They  
 25 had the greatest consequence?

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1 A. To the extent we can distinguish individual policies, as  
 2 we've discussed, yes, they do seem to have a very large  
 3 impact.

4 Q. Similarly, did the closing of schools and the limiting  
 5 of mass gatherings also have, as these things go, more  
 6 effective impact than other less stringent measures?

7 A. So some of the -- it would depend on the level of  
 8 closure. So some mass gatherings for example were not  
 9 completely banned but were allowed to occur with, say,  
 10 a 2-metre rule or other kinds of mitigating factors, so  
 11 we would say a more stringent measure is one at the top  
 12 of our scale, not so much about the intervention -- kind  
 13 of intervention but rather the degree of stringency to  
 14 which it was applied.

15 Q. Perhaps again self-evidently, the benefit of a more  
 16 stringent measure was, it would seem, not just  
 17 a reduction in transmission but also a better outcome in  
 18 terms of health and death rates?

19 A. Correct.

20 Q. Did that general proposition apply throughout  
 21 the pandemic? So in the latter stages of the pandemic,  
 22 across the world, do stringent measures have the same  
 23 general impact as they did in the earlier stages of  
 24 the pandemic, and if not why not?

25 A. So we must recognise that the bulk of the evidence in

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1 the available scientific literature is based on earlier  
 2 phases of the pandemic, that's when most of these  
 3 studies were done, because even though it's now  
 4 especially self-evident perhaps to us now that these  
 5 kinds of measures did reduce transmission and therefore  
 6 cases and therefore hospitalisations, and therefore  
 7 deaths, that evidence base did not exist in the same  
 8 kind of robust way for this particular disease when it  
 9 had recently emerged. So there's a huge flurry of  
 10 studies in that first period.

11 As the pandemic progressed, new research questions  
 12 around, say, vaccination, drew attention and so there  
 13 was a wider range of topics that needed to be  
 14 considered. But overall, the studies that were  
 15 conducted on NPIs across the period of the pandemic do  
 16 show consistent results.

17 As the pandemic progressed, however, one of the most  
 18 important things to control for -- well, two of the most  
 19 important things to control for were how vaccinated  
 20 a population was, how vulnerable it was, how exposed it  
 21 had been, and in the same vein how different variants of  
 22 Covid-19 were more or less transmissible.

23 So we expect in a more vaccinated population or one  
 24 that had been exposed to higher levels of infection  
 25 before we'll see less of an effect, because there is not

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1 as much vulnerability. And also with a more  
 2 transmissible version of the virus, it would be  
 3 important -- we'll see a less significant effect,  
 4 because more would be needed to achieve less.

5 Q. So, hoping I don't do a terrible injustice to your  
 6 learning trying to summarise it, later during the  
 7 pandemic, when populations by and large had become more  
 8 vaccinated, such governmental measures as were put into  
 9 place at that time would be bound to have less impact  
 10 and less effect because the populations had by then  
 11 already become vaccinated and therefore there was,  
 12 firstly, less need for stringent measures, and secondly,  
 13 by comparison to the beneficial impact of vaccination,  
 14 whatever stringent measure you might otherwise put into  
 15 place would have less impact.

16 And secondly, as variants came through with  
 17 different transmissibility features, for example  
 18 a particular variant might have an impact on young  
 19 persons and children, the closing of schools at that  
 20 point would have proportionately, therefore, a greater  
 21 impact?

22 A. If that were the case, that would indeed line up in that  
 23 way. So the overall relationship remains the same --  
 24 more stringency, more speed, fewer cases, fewer  
 25 hospitalisations, fewer deaths -- but the size of that

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1 effect will go down as the population gains more  
 2 protection through immunity, and the size of that impact  
 3 will go down as the transmissibility of the disease  
 4 increases.

5 Q. Test, trace and isolate measures were applied by  
 6 a number of governments. It's common ground, and not  
 7 open now, I think, to serious debate, that  
 8 the United Kingdom was not a country that was able to  
 9 deploy significant test, trace and isolate measures in  
 10 the early days of the pandemic.

11 Does your data show that test, trace and isolate  
 12 measures were, generally speaking, highly effective?

13 A. Our review of the literature does show this to be the  
 14 case. Indeed, the evidence base, we must say, though,  
 15 is harder here, because it's very difficult to find  
 16 comparable information across countries on, for example,  
 17 the percentage of contacts traced each time, with  
 18 the time it takes to trace those contacts. Even here in  
 19 the UK we don't have, necessarily, consistent  
 20 information about those two key variables over the whole  
 21 course of the pandemic.

22 So here there is a slight difference in the quality  
 23 of the evidence the world has available but the studies  
 24 that have been done nonetheless very clearly show that  
 25 effective test, trace, isolate and support measures were

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1 very helpful.

2 Q. Contrary to what I suggested to you earlier, which is  
 3 that it's generally not possible to demonstrate  
 4 the counterfactual position, have there, in this  
 5 particular field, the field of test, trace and isolate,  
 6 nevertheless been some studies which did attempt to  
 7 predict or to show what the position would have been in  
 8 the United Kingdom had there been more comprehensive  
 9 levels of testing and contact tracing?

10 A. That's correct.

11 So I would direct you to page 15. We have  
 12 summarised a study by Panovska-Griffiths et al 2020  
 13 which was, as I said before, a modelling study, so using  
 14 hypothetical parameters to estimate the effect of  
 15 a counterfactual, and in that case they did show that  
 16 TTI strategies could have been successful in particular  
 17 in the second wave of Covid-19 in the UK if they had  
 18 been more effective at capturing a wider range of  
 19 contacts and more quickly.

20 Q. Turning to economic support and the bolstering of  
 21 compliance, were there a number of studies which showed  
 22 in general terms that when stronger, so more extensive,  
 23 more generous, economic support policies were adopted,  
 24 compliance with whatever social measure, for example  
 25 self-isolation, that was in place was better?

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1 A. Correct. So there are two categories of studies that  
 2 are particularly relevant here: first, a number that  
 3 show that existing levels of economic deprivation or  
 4 short-term economic shocks reduced compliance; and  
 5 secondly, and relatedly, when there's economic support  
 6 that's provided, either through governmental programmes  
 7 such as the furlough scheme here in the UK or, as was  
 8 the case in many countries, through social  
 9 organisations, for example in India an extensive social  
 10 provision of food to vulnerable households, this was  
 11 very helpful in ensuring greater compliance with NPIs.

12 Q. The costs of prolonged restrictions is your next theme.  
 13 Again self-evidently perhaps, the evidence which you  
 14 looked at strongly suggests that strict and prolonged  
 15 non-pharmaceutical interventions will have negative  
 16 impact on mental health, educational prospects,  
 17 particularly deleterious effects on older adults, and  
 18 also the increased prevalence in domestic violence?

19 A. Correct.

20 Q. Were there a number of studies which showed that in  
 21 relation to that latter issue, that of domestic  
 22 violence, there were substantial increases in domestic  
 23 violence as a result of the prolonged use of some NPIs,  
 24 and that was in countries in Europe and in America,  
 25 across the world?

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1 A. Indeed. And it's striking to see such consistency in  
 2 the findings across very different contexts. Indeed, in  
 3 countries where the previous levels of domestic violence  
 4 were also quite different, all showed a similar  
 5 increase.

6 Q. Again, we've heard evidence on this from a number of  
 7 sources, the application of more stringent  
 8 non-pharmaceutical interventions also had  
 9 disproportionate impact on various sectors of  
 10 the populations in each of the countries, on ethnic  
 11 minorities, members of ethnic minorities, ethnic groups,  
 12 women, the elderly, those living alone, and those  
 13 suffering from comorbidities as well as those who were  
 14 otherwise economically disadvantaged?

15 A. That's correct, and it truly is one of the cruellest  
 16 injustices of this pandemic that often similar people,  
 17 similar groups of people who were both vulnerable to  
 18 Covid were also vulnerable to the effects of actions  
 19 against Covid.

20 Q. Some countries have, of course, been praised for  
 21 the stringency and the rapidity of their  
 22 non-pharmaceutical interventions, South Korea being one  
 23 of them, but even in such countries did those  
 24 non-pharmaceutical interventions strike  
 25 disproportionately hard upon some sectors of

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- 1       the population?
- 2   A. They certainly did, and the elderly population in  
3       South Korea, one study showed, was particularly  
4       negatively affected by the policies the government put  
5       into place. And I'd add that these differential  
6       extracts were often exploited by the virus to affect  
7       larger populations. So, for example, in Singapore,  
8       a country which is particularly effective in managing  
9       the disease overall, one large, relatively uncontrolled,  
10      outbreak occurred first in a population of migrant  
11      workers, who are one of the more marginalised groups in  
12      society, and so there the differential impacts were not  
13      just an injustice but also a detriment to the country's  
14      overall response.
- 15   Q. Turning to page 19 of your report, you then turn to  
16      focus upon the United Kingdom Government's own  
17      responses, but in a comparative perspective. By which  
18      do you mean that you've looked at the NPIs which were  
19      applied in the United Kingdom and you've compared them  
20      in terms of the speed and stringency with which they  
21      were imposed by the government here against other  
22      countries and in relation to the particular nature of  
23      those NPIs?
- 24   A. Correct.
- 25   Q. Now, at page 21, do you produce a figure, you call it

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- 1       the virus has already spread in a country.  
2       So did you, on page 23, compare the position of what  
3       delays there had been before the NPIs were applied after  
4       the 100th confirmed case in each of the countries?
- 5   A. Correct.
- 6   Q. And in general terms, what did that chart show about  
7       the extent of the elapse of time or, perhaps more  
8       pejoratively, delay?
- 9   A. It shows very clearly, figure 3B, that in relation to  
10      the spread of the virus, restrictive measures across  
11      the United Kingdom came into place much more slowly than  
12      they were put into place in other groups of comparator  
13      countries, different regions, similar -- countries with  
14      similar political systems, those with similar  
15      populations or age profiles, et cetera.  
16       And this is particularly true, it's really not --  
17       the only real place where the United Kingdom's  
18       restrictions were broadly comparable were for the two  
19       categories, panels E and H, on protection for the  
20       elderly and stay at home requirements, but on every  
21       other NPI we looked at, there's a considerable delay in  
22       the UK measures compared to other groups of countries.
- 23   Q. Are there two points that must be made, two additional  
24      points that must be made, in relation to the chart at  
25      3B: firstly, it might be thought that England had

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- 1       figure 3A, which shows, in respect of England, Scotland,  
2       Wales and Northern Ireland, and by the division of  
3       particular NPIs, school closures, workplace closures,  
4       cancellation of public events and so on and so forth,  
5       how many days elapsed between the first confirmed case  
6       of Covid in each of those countries and the time, the  
7       point at which that particular NPI was imposed?
- 8   A. Correct.
- 9   Q. And in general terms, do you conclude or does  
10      the literature show that for the majority of these NPIs,  
11      England, Scotland, Wales and Northern Ireland delayed --  
12      or there was a greater elapse of time before  
13      the imposition of these NPIs than really the majority of  
14      all other countries?
- 15   A. That's correct. I would also draw your attention to the  
16      following figure, 3B, which looks at --
- 17   Q. We were going to get there.
- 18   A. Wonderful.
- 19   Q. Well, let me ask you this, Professor: the danger in  
20      relying too much upon a chart that shows the delay  
21      between the first confirmed case of the virus and  
22      the imposition of NPIs, is that the first confirmed case  
23      has a degree of variability as to when it might be, and  
24      that may depend on a lot of different reasons, and it  
25      may also not be a fair reflection of the extent to which

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- 1       delayed to a greater extent than Scotland, Wales and  
2       Northern Ireland because, for example, in relation to  
3       school closures, workplace closures and cancellation of  
4       public events, the bar chart is longer? But is that  
5       because, at the point at which the United Kingdom  
6       applied those measures, which it did simultaneously in  
7       many places on many occasions, for England, Scotland,  
8       Wales and Northern Ireland, by that point in time the  
9       virus had been prevalent in England for longer?
- 10   A. That's correct. So if we were looking at this in normal  
11      calendar time, the different parts of the United Kingdom  
12      would look much more similar. If we were looking at  
13      this in calendar time, the United Kingdom as a whole  
14      would look sort of in the middle of the pack relative to  
15      most other countries. But of course the virus doesn't  
16      think about calendar time, it thinks about its own  
17      spread. So this chart is showing us, if you will,  
18      a virus time perspective, and for decision-making that's  
19      of course the key metric.
- 20   Q. The second most important point, perhaps, is that  
21      the stay at home requirement was imposed in  
22      the United Kingdom, the mandatory lockdown, of course  
23      simultaneously or very close in time to the cancellation  
24      of public events, workplace closures, school closures  
25      and the closing of public transport, because that was

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1 the effect of the lockdown, and that is why there is  
 2 very little by way of a delay in relation to the stay at  
 3 home requirement in the middle of that page.  
 4 A. It's because, yes, the stay at home measure came into  
 5 place, you know, on March 23rd, quite close to the 100th  
 6 case, which was -- I think it was a few weeks before  
 7 that. But other kinds of policies can be(?) put into  
 8 place in softer forms before that. So it wasn't a 100%  
 9 "You must not go to school", but there were different  
 10 kinds of suggestions that were being made,  
 11 recommendations, et cetera, so some of that's captured  
 12 here as well.

13 LADY HALLETT: I'm afraid I'm still struggling with the  
 14 virus time and real-time concept. Could you just run it  
 15 past me again, Professor, please?  
 16 A. Of course, my Lady. So the bottom axis here, the X axis  
 17 along the bottom, which is a very small number,  
 18 I apologise, you will see it shows zero on the  
 19 left-hand, then goes 5, 10, 15, 20. So those are  
 20 the number of days since the 100th case.

21 So, for England, that will be -- the clock will  
 22 start -- I'm sorry, I don't have the exact date in my  
 23 mind, but it started before, because England had 100  
 24 cases long before Scotland did, long before Wales did,  
 25 and before Northern Ireland did. So for each of these

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1 jurisdictions, and as well as all the comparators, we're  
 2 measuring when they put in place a measure based on how  
 3 far it was from the 100th case, not when the -- what  
 4 the date on the calendar was.

5 LADY HALLETT: Thank you.  
 6 MR KEITH: Or putting it another way, at the point at which  
 7 the particular measure was imposed for  
 8 the United Kingdom, the virus had already spread further  
 9 in England?

10 A. Correct.  
 11 Q. And more time had passed since the first or the 100th  
 12 case?  
 13 A. Correct.  
 14 Q. Can we then turn to a different topic, which is on  
 15 page 24, the comparison between the timing and intensity  
 16 of UK responses to other countries.

17 On page 25, to go forward one page, you produce  
 18 table 4, which is entitled, we can see from the  
 19 left-hand side of the page, "Policy Strength". Over  
 20 time, that is to say the whole period of the pandemic,  
 21 have you looked at, in these charts, the stringency,  
 22 the general level of severity of the measures applied by  
 23 each country and compared them over time with a very  
 24 large number of other countries across the world?

25 A. Correct.

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1 Q. So if we look at school closures in the top left,  
 2 the red line, which I think we can see more clearly than  
 3 other lines, is the United Kingdom, is it not?

4 A. That's correct.

5 Q. And so we can see that in relation to school closures,  
 6 in the early days there was a fairly high level of  
 7 stringency, the United Kingdom was more severe, more  
 8 strict in terms of the school closures, meaning any  
 9 possibility of what was being done in relation to  
 10 schools, but then the red line comes right down to  
 11 a very low level of stringency and then goes back up.

12 Similarly workplace closures, on the right-hand  
 13 side. We can see that in the early days workplace  
 14 closure was prevalent, of course, in the United Kingdom  
 15 because of the lockdown, was more strict than almost all  
 16 other countries or regions, it comes back down but not  
 17 as far as the lower level of stringency for other  
 18 countries, and then goes rocketing right back up again,  
 19 of course, around the time of the second wave?

20 A. Yeah.

21 Q. We can see, if you scroll back out, a similar pattern of  
 22 cancelling public events, restrictions on gatherings,  
 23 closing public transport, stay at home, but particularly  
 24 restrictions on internal movement, a very high level of  
 25 stringency, effectively, during the first wave, and

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1 then, relatively speaking, a very considerable drop in  
 2 the level of severity, the summer of 2020, and then  
 3 moving right back up again at the time of the second  
 4 wave?

5 A. Correct.

6 Q. What that shows, does it not, is that there was a degree  
 7 of rollercoaster element in the United Kingdom's  
 8 response? By comparison, I emphasise, to other  
 9 countries, we went right up the scale and reacted, some  
 10 would say overreacted, at the first wave, then  
 11 underreacted between waves, and then rocketed right back  
 12 up again at the time of the second wave?

13 A. There's certainly, in the United Kingdom's response, as  
 14 in many other countries, I should add, an element of  
 15 ramping up, ramping down, ramping up, ramping down, and  
 16 so the metaphor of a rollercoaster does come to mind.

17 The important difference between this line of -- red  
 18 line showing the United Kingdom as a whole and the other  
 19 countries. (inaudible) of course, these are averages,  
 20 the other ones, so there will be, within every one of  
 21 those lines, a number of countries, some a bit higher,  
 22 some a bit lower, this is showing the central tendency  
 23 of these different groups.

24 So as the legend has fallen off the screen, zoom in  
 25 here, but you will see, for example, that the yellow

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1 line is Parliamentary democracies, across the world, and  
 2 indeed the UK is higher right through to the middle  
 3 of 2021; after spring 2021 becomes much lower on  
 4 average, across all these different measures.

5 Q. You have already taken us to the earlier charts, which  
 6 showed us much more carefully the delay at  
 7 the beginning. These charts show overall the level of  
 8 stringency over time.

9       Are you able to reach a view as to whether, in  
 10 general terms, the United Kingdom applied  
 11 non-pharmaceutical measures only when it became apparent  
 12 that they were unavoidable, because they were delayed  
 13 and at the time at which they were then imposed we know  
 14 in the United Kingdom the NHS was believed to be likely  
 15 to collapse, and then when they're lifted there is then  
 16 a long period of delay before consideration appears to  
 17 be given to their reintroduction, and then when they are  
 18 reintroduced, again, because of the passage of time and  
 19 the lateness, there is a requirement for those  
 20 restrictions to be ever more stringently reimposed?

21 A. Correct. So we see this rollercoaster tendency where  
 22 restrictions are put into place only after it becomes  
 23 apparent there will be a very severe threat to  
 24 the health system. That's after a large amount of  
 25 community spread has begun. Because it's so prevalent

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1 measures to maintain a very low level of spread, and,  
 2 when a new outbreak would emerge, to quickly react to  
 3 make sure those individuals were not involved in further  
 4 spreading the virus. That prevented them from getting  
 5 to the point of a wider population spread, in many  
 6 instances, that would have required more restrictive  
 7 stringent measures to control.

8       So the effective use of these testing measures was  
 9 a nice way of maintaining a low level of spread and  
 10 therefore not beginning the rise of the rollercoaster  
 11 back up the ramp.

12 Q. Did you also find a link between those countries which  
 13 had that testing capacity and which were able to avoid  
 14 relatively stringent NPIs and those countries which  
 15 suffered the most in terms of excess number of deaths,  
 16 economic performance, and general health impact?

17 A. Correct. So the countries that were riding  
 18 the rollercoaster were referring from a trifecta of  
 19 large health impacts, high, long periods of stringency,  
 20 and negative economic consequences, and those that were  
 21 able to maintain a low level of spread, perhaps through  
 22 effective TTI measures, were able to have a better  
 23 outcome on all three of those measures.

24 Q. Overall, does the literature and the data from your  
 25 tracker project show that there were some areas of

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1 at that moment, the restrictions need to be more  
 2 stringent and to be in place for a longer period of time  
 3 than might have been the case otherwise, but precisely  
 4 because sustaining high stringency for a long period  
 5 comes with costs, there's huge pressure to roll them  
 6 back sooner rather than later and that leaves,  
 7 inevitably, some residual virus circulating in  
 8 the population, which lays the seeds for the next wave  
 9 to emerge. So this kind of tendency to act too late in  
 10 the first instance and to take measures away too soon in  
 11 the second instance does tend to lead to the peaks and  
 12 troughs that these graphs show.

13 Q. Do later charts and figures, which I won't take you to,  
 14 show that an analysis, putting together some of  
 15 the threads that you have identified, of those countries  
 16 which had significant or substantial testing, contact  
 17 tracing and isolation systems against those countries  
 18 which were not obliged to impose NPIs at such high  
 19 levels of stringency because they had effectively  
 20 delayed, show that the presence of significant testing,  
 21 contact tracing and isolation measures allowed countries  
 22 not to have to react by way of the imposition of such  
 23 severe stringent measures?

24 A. Indeed. So countries as diverse as Japan, South Korea,  
 25 Vietnam, others, were able to use testing and tracing

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1 conspicuous success for the United Kingdom: the speed  
 2 and scope of its genetic sequencing, because that  
 3 allowed it to be very well placed to assess  
 4 the emergence of variants and the spread ultimately of  
 5 the virus; a very considerable and impressive degree of  
 6 ability to test and survey and keep tabs on the spread  
 7 of the virus, particularly in the middle and later  
 8 stages of the pandemic, through surveys such as the ONS  
 9 COVID-19 Infection Survey; and the speed and extent of  
 10 the vaccine deployment?

11 A. Correct.

12 Q. But the absence of a test, trace and isolation process  
 13 ultimately led to the data and the findings which you've  
 14 reached in relation to the delay and then the repeated  
 15 reintroduction of extremely stringent and damaging  
 16 measures?

17 A. We do see consistently that countries that performed  
 18 well, were able to avoid the rise and fall of cases,  
 19 deaths and restrictive measures, were those that used  
 20 the testing, tracing, isolation and support measures  
 21 effectively, alongside other measures.

22 MR KEITH: Thank you very much.

23 LADY HALLETT: Thank you very much indeed, Professor Hale.  
 24 An extraordinary project.

25 THE WITNESS: Thank you.

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1 **LADY HALLETT:** I had no idea projects like that were going  
 2 on, and I think one of my previous witnesses asked for  
 3 global comparisons, so extremely helpful, thank you.

4 **THE WITNESS:** You're very welcome.

5 **(The witness withdrew)**

6 **LADY HALLETT:** Shall we break now for lunch?

7 **MR KEITH:** Certainly.

8 **LADY HALLETT:** Because I think this afternoon's witness is  
 9 here, but you'd probably like to have a --

10 **MR KEITH:** By all means.

11 **LADY HALLETT:** 1.45, please.

12 (12.47 pm)

13 **(The short adjournment)**

14 (1.45 pm)

15 **LADY HALLETT:** Mr Keith.

16 **MR KEITH:** My Lady, the next witness is Sir Mark Walport.

17 **SIR MARK WALPORT (affirmed)**

18 **Questions from LEAD COUNSEL TO THE INQUIRY**

19 **MR KEITH:** Could you give the Inquiry your full name,  
 20 please.

21 **A.** Yes, I'm Sir Mark Jeremy Walport.

22 **Q.** Sir Mark, you gave evidence in Module 1, so let me  
 23 welcome you back.

24 **A.** Thank you.

25 **Q.** And thank you for the provision of a further statement,  
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1 and this time the Royal Society report, to which I'll  
 2 turn in a moment, in relation to which were the chair of  
 3 the expert working group.

4 **A.** That's correct.

5 **Q.** You are well known to this Inquiry. By practice you  
 6 specialise in clinical medicine and research as  
 7 a general physician and rheumatologist. You latterly  
 8 became head of the division of medicine at  
 9 Imperial College. You were director of the  
 10 Wellcome Trust from 2003 to 2013, and, most pertinently  
 11 perhaps, from April 2013 to September 2017 you were the  
 12 Government Chief Scientific Adviser?

13 **A.** Correct.

14 **Q.** Your successor was Sir Chris Whitty, on an interim  
 15 basis.

16 **A.** Correct.

17 **Q.** He was followed by Sir Patrick Vallance, as is  
 18 well known. The current incumbent is  
 19 Dame Angela McLean, and she took up her post in this  
 20 year, 2023.

21 You were also the founding chief executive officer  
 22 of the United Kingdom Research Institute, if I have the  
 23 acronym --

24 **A.** Research and Innovation.

25 **Q.** Thank you very much. I began to pause, I wasn't sure  
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1 I'd got that one right.

2 The UKRI is an amalgamation, is it not, of what were  
 3 formerly known as research councils; it provides funding  
 4 to researchers, businesses, universities, charities,  
 5 NGOs and the like in relation to the broad field of  
 6 science and medicine?

7 **A.** Broader than that, actually. So it was created by Act  
 8 of Parliament, came into existence in 2018, and brought  
 9 together the seven research councils, which cover  
 10 everything from the arts and humanities to  
 11 the biological, physical, medical sciences.

12 It also brings together the UK's innovation agency,  
 13 Innovate UK, and also, in the case -- and for all those  
 14 activities is UK-wide. It also incorporates  
 15 Research England, which provides infrastructure support  
 16 for English universities.

17 **Q.** Could you please, whilst you give evidence -- it's my  
 18 fault for not reminding you -- try to go as slow as you  
 19 possibly can.

20 **A.** Sorry.

21 **Q.** The reason I ask you about the UKRI is that during this  
 22 pandemic, although you were no longer the Government's  
 23 Chief Scientific Adviser, did you nevertheless attend no  
 24 less than 54 meetings of SAGE in your role as the CEO of  
 25 the UKRI? Why was that?

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1 **A.** I did, and it was because an important responsibility  
 2 for UKRI was funding the research and, indeed,  
 3 the innovation appropriate to a national emergency. And  
 4 in the context of that, and actually one of the reasons  
 5 for the creation of UK Research and Innovation, is that  
 6 that research included everything from biological  
 7 sciences around the virus itself right through to  
 8 the social sciences, funded by the Economic and Social  
 9 Research Council.

10 **Q.** So, by virtue of your attendance on SAGE, you were able  
 11 to be there as the CEO of UKRI in order to prompt  
 12 the early and rapid funding --

13 **A.** Yes.

14 **Q.** -- of the various pieces of work or research or  
 15 cumulation of data that SAGE required to be done?

16 **A.** Absolutely. It was part of, if you like, a two-way  
 17 transmission mechanism between the mechanism that  
 18 provided scientific advice through Sir Patrick Vallance  
 19 and Sir Chris Whitty, so that we could be sure that  
 20 the research was relevant wherever possible.

21 **Q.** As part of your many roles, are you also an elected  
 22 fellow of the Royal Society, I think a position that you  
 23 have held since 2011, as well as being its  
 24 vice president and, wonderfully, its foreign secretary?

25 **A.** Indeed.

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1 Q. The Royal Society is, I think, the oldest scientific  
 2 academy in existence, or at least in continuous  
 3 existence, having been founded in 1660, but it  
 4 essentially recognises, promotes and supports excellence  
 5 in science, and is it by virtue of that function that  
 6 you came to chair the working group that produced  
 7 the report that you have exhibited for us?

8 A. I was actually asked to chair it before I became  
 9 the foreign secretary, by virtue of my sort of broad  
 10 expertise in the area. The foreign secretary bit came  
 11 later, and reflects the fact that science is global and  
 12 so the Royal Society from its inception was very  
 13 international in its outlook to research.

14 Q. The report that the Royal Society has produced, and it  
 15 forms the heart of your evidence in this module, was  
 16 produced and published, was it not, in order to set out  
 17 in general terms what has been learnt about  
 18 the effectiveness of the application of what we now well  
 19 understand to be non-pharmaceutical interventions; is  
 20 that correct?

21 A. That's correct.

22 Q. Did the working group which comprised, I think, six  
 23 groups of researchers, assemble and examine evidence  
 24 from around the world in order to be able to determine  
 25 the effectiveness of that application?

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1 that every virus is different, in terms of its forms and  
 2 degrees of transmissibility, and that the first line of  
 3 defence, if you like, in relation to dealing with  
 4 a viral pandemic, particularly a respiratory one, was  
 5 the application, the consideration of NPIs because there  
 6 were, of course, in those early days, no antiviral  
 7 treatment and no vaccine?

8 A. That is absolutely correct. There were no specific  
 9 medical interventions at that stage.

10 But it's important to recognise that not only do  
 11 different viruses vary, but the coronavirus itself  
 12 varied over time, and the main driver for the evolution  
 13 of a virus or, indeed, a bacteria is to reproduce more  
 14 effectively. And so, in general, infectious diseases  
 15 tend to become more transmissible, and so the barrier  
 16 function of, for example, a mask becomes harder and  
 17 harder as the transmissibility goes up.

18 Q. In truth, all governments faced a terrible quandary, did  
 19 they not --

20 A. Yep.

21 Q. -- in the early days of the pandemic, because it was  
 22 simply not possible to know with any degree of  
 23 exactitude the nature of the likely spread of the virus,  
 24 and under that heading one might include a lack of  
 25 understanding of Covid, of the coronavirus' reproduction

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1 A. Yes, that's correct.  
 2 Q. NPIs are usefully summarised at page 20 of your report.  
 3 They're very familiar, of course, to this Inquiry.  
 4 They're defined in the report as:  
 5 "Any measure that is implemented during  
 6 an infectious disease outbreak to attempt to reduce  
 7 transmission that is not a vaccine or drug. NPIs can be  
 8 behavioural, social, physical or regulatory in  
 9 nature ..."

10 And they can of course be encouraged to be adopted  
 11 or applied through a variety of approaches from advice  
 12 and guidance to the force of law. And they comprise  
 13 masks and face coverings, social distancing and  
 14 lockdowns, and over the page, test, trace and isolate,  
 15 travel restrictions and controls, environmental  
 16 controls, and communications, which, although not  
 17 a measure, form an essential part of the debate about  
 18 the efficacy of non-pharmaceutical interventions?

19 A. That's correct. And of course they all have in common  
 20 that they're intended to reduce the transmission of  
 21 an infectious disease, in this case a virus, by acting  
 22 to reduce the exposure of people to the hazard which is,  
 23 in this case, SARS-CoV-2 virus.

24 Q. At the heart of any examination of NPIs, and of their  
 25 efficacy, must there be an acknowledgement of the fact

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1 number, whether it was asymptomatic or pre-symptomatic,  
 2 what its incubation period was, what its latent period  
 3 was, what its generational period was, how quickly it  
 4 would double in size and so on, all that was unknown?

5 A. Absolutely.

6 Q. So to a very large extent the application of  
 7 non-pharmaceutical interventions took place against  
 8 a significant background of ignorance?

9 A. Yes, that is absolutely right. And whilst  
 10 the principles of how non-pharmaceutical interventions  
 11 work, as I've already said, because every infectious  
 12 disease is slightly different, then policymakers were  
 13 faced with an extremely difficult challenge, which is  
 14 new infection, as you say, much not known about it, its  
 15 clinical features poorly understood, and so -- but  
 16 nevertheless there were signs that this was a dangerous  
 17 virus, and so important to take precautionary measures,  
 18 and apply non-pharmaceutical interventions.

19 Q. Once it became apparent that this was a virus capable of  
 20 causing death in large numbers as well as severe injury,  
 21 all governments faced a terrible balance or dichotomy,  
 22 which was the absence of the imposition of  
 23 non-pharmaceutical interventions would likely lead to  
 24 unconscionable numbers of deaths, but the imposition of  
 25 non-pharmaceutical interventions against that background

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1 of ignorance, through no fault of government, would  
 2 likely lead to terrible cost and damage?  
 3 A. That is absolutely correct, and so a very strong  
 4 incentive for policymakers to slow the spread of  
 5 infection. And of course the other thing at  
 6 the beginning of this pandemic was that it was not known  
 7 whether it would be possible to make a vaccine or what  
 8 medical countermeasures might become available. But  
 9 there's not only the direct consequences of the virus in  
 10 terms of causing illness, but also the indirect  
 11 consequences in terms of health systems becoming  
 12 overwhelmed, the danger of the breakdown of other  
 13 aspects of national infrastructure. And so every  
 14 incentive to take quite a strong precautionary principle  
 15 and do the very best possible to slow or, if possible,  
 16 to stop the spread of infection. And some countries did  
 17 take a zero Covid approach from very early on. In other  
 18 words they tried to eliminate the spread.

19 Q. I'm pleased to say that we shan't be engaging today,  
 20 Sir Mark --

21 A. No.

22 Q. -- in the conceptual debate of suppression versus  
 23 mitigation --

24 A. Correct.

25 Q. -- but that debate is reflective, isn't it, of one of

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1 the many extremely difficult decisions that all  
 2 governments have to make?  
 3 A. Correct.  
 4 Q. At the time of the commencement of the pandemic, was  
 5 there much by way -- or any objective analytical  
 6 information or research available to governments as to  
 7 the likely effects or impacts of this broad range of  
 8 non-pharmaceutical interventions?  
 9 A. Well, once it became clear, which it did fairly rapidly,  
 10 that it was transmitted by a respiratory route, then  
 11 there was a lot of evidence that if you could keep  
 12 infected people away from uninfected people, that would  
 13 reduce the transmission. So every reason to think that  
 14 non-pharmaceutical interventions would be effective, but  
 15 how effective was unknown.  
 16 Q. Was there a large or any body of randomised controlled  
 17 trial work or analysis from empirical data as to how in  
 18 practice any of these NPIs would work?  
 19 A. No. Minimal information, because so much depends on  
 20 the transmissibility of the virus, and the details of  
 21 the route of the transmission. So there was very, very  
 22 little prior evidence.  
 23 Q. Do we therefore take it from that that because  
 24 governments were forced at great speed to apply  
 25 non-pharmaceutical interventions at the commencement of

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1 the pandemic, there was no opportunity for them to be  
 2 able to put into place at the same time any sort of  
 3 system for empirical conclusions to be drawn about how  
 4 effective the steps were that they were putting into  
 5 place?

6 A. I think it would have been extremely difficult,  
 7 certainly in the absence of prior preparation of  
 8 protocols. And it's also worth say that if you want to  
 9 explore the specific effectiveness of one of these  
 10 non-pharmaceutical interventions, then the perfect  
 11 experiment is to have a population half of whom do use,  
 12 half of whom don't, or use a different one. But it  
 13 was -- policymakers recognised that you need to use  
 14 non-pharmaceutical interventions in combination, and so  
 15 there was a priority to introduce measures in  
 16 combination.

17 Q. And, bluntly, the governments had to get on with the job  
 18 in hand --

19 A. Absolutely.

20 Q. -- and do whatever they could to combat the virus --

21 A. Correct.

22 Q. -- with maximum speed?

23 A. Correct.

24 Q. The study which the Royal Society has therefore carried  
 25 out is an observational study, is it not?

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1 A. It's a systematic review of the evidence. In other  
 2 words, it's to look at all types of evidence. And in  
 3 some cases there were trials which were deductive, in  
 4 other words you could compare a group using masks and  
 5 a group not using masks, but by and large, because  
 6 non-pharmaceutical interventions were introduced in  
 7 combination, it was extremely difficult to dissect  
 8 the relative effects of one non-pharmaceutical  
 9 intervention against another.

10 So, to give you a concrete example, when strong  
 11 social distancing measures are applied, then is  
 12 the effect due to wearing a mask or to the social  
 13 distancing? And so the groups reviewed an enormous  
 14 amount of evidence and came down to a relatively small  
 15 number of studies, in the hundreds, where it was  
 16 possible to achieve some deductive information about  
 17 the effectiveness or otherwise of the non-pharmaceutical  
 18 interventions. But for those systematic reviewers who  
 19 are used to working with placebo-controlled clinical  
 20 trials, they would view the evidence as being far  
 21 weaker, but on the other hand observational research is  
 22 important, and indeed, going back through the history of  
 23 the Royal Society, it's the way we have learnt about all  
 24 sorts of things. You can't always do an experiment, you  
 25 have to rely on observational data.

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1 So we did the work in two parts, really, which was  
 2 to try to work out as much as we could about each of  
 3 the individual non-pharmaceutical interventions, but we  
 4 also did a number of country case studies, because that  
 5 gives you a different observational approach to what  
 6 happens when things are done in combination. You can  
 7 learn quite a lot from those.

8 Q. Were those three case studies in fact studies drawn from  
 9 Hong Kong, New Zealand and South Korea?

10 A. That's correct.

11 Q. Finally by way of introduction, the value of  
 12 the Royal Society's report to this Inquiry is, if I may  
 13 say so, self-evident, but for what general purposes did  
 14 the Royal Society engage this valuable piece of work?

15 A. Erm --

16 Q. Is it, if I may ask, in order to promote the general  
 17 learning and understanding of this topic, or did you  
 18 have an eye towards its use and its importance for  
 19 the purposes of future crises which might befall us?

20 A. I think the answer is both, actually. So research  
 21 advances through individual discoveries, but importantly  
 22 it advances through the aggregation of knowledge derived  
 23 from a variety of studies.

24 During the pandemic the Royal Society did convene  
 25 two committees to provide evidence reviews, and so it

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1 level in Scotland. So we were more interested in  
 2 the evidence and its quality than its geographical  
 3 origins.

4 Q. Thank you very much.

5 Could we now then turn, please, to the general  
 6 findings --

7 A. Yep.

8 Q. -- the conclusions reached by the research done by  
 9 the Royal Society in relation to each of the NPIs, and  
 10 we'll pick up the thread, if we may, at page 28 of  
 11 the Royal Society report under the heading of "Masks and  
 12 face coverings".

13 In general terms, prior to the Royal Society's  
 14 report, there was very little material by way of  
 15 previous systematic reviews into the effectiveness of  
 16 the wearing of masks, and by masks I mean cloth and  
 17 medical and respiratory and the whole range of masks; is  
 18 that correct?

19 A. That's correct, yes.

20 Q. The research looked at available evidence in relation to  
 21 the efficacy of all masks, as I've suggested,  
 22 respirators, surgical masks and face coverings such as  
 23 cloth masks; is that correct?

24 A. Yes.

25 Q. There were a number of -- 35 observational studies, in  
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1 was a logical extension of that work that, at a time  
 2 when it was really important to understand the best  
 3 evidence that we have on the effectiveness of  
 4 non-pharmaceutical interventions, it was a timely report  
 5 to produce.

6 Q. It's implicit in what you've said already, Sir Mark,  
 7 that the review comprised a minute examination of  
 8 studies and reports and research materials from across  
 9 the world.

10 A. Yes.

11 Q. One of the core participants has asked the Inquiry to  
 12 ask of you the extent to which the research covered  
 13 material produced in or relating to Wales, and I suppose  
 14 one could draw from that question a wider question,  
 15 which is: can you say anything about the degree or the  
 16 proportion of that research material which related to  
 17 the United Kingdom as opposed to the rest of the world?

18 A. I don't think I can answer that question specifically.  
 19 We deliberately looked worldwide, and the, you know,  
 20 criteria for inclusion was that it was published in  
 21 English, and so I can't answer the question specifically  
 22 with respect to Wales. But I can say, as an example of  
 23 a study which is actually slightly outside the remit of  
 24 this, we learnt an enormous amount about the efficacy of  
 25 the vaccines from studies that were done at a population

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1 fact, which were looked at. And in relation to  
 2 the effectiveness of masks in reducing SARS-CoV-2  
 3 transmission, if we go over the page, did the majority  
 4 of the studies themselves conclude that masks and mask  
 5 mandates, by which I presume you mean mandatory  
 6 orders --

7 A. Yes.

8 Q. -- to wear a mask, reduced infection compared to those  
 9 studies that found there had been no effect?

10 A. Yes. So there were 35 studies in community settings.  
 11 Three of them were in fact randomised controlled trials,  
 12 and there were 32 observational studies, and then were  
 13 a further 40 studies in healthcare settings, one of  
 14 which was a randomised control trial, and  
 15 39 observations.

16 The majority of those studies, the large majority,  
 17 showed that the masks were effective. And importantly  
 18 there was a gradient. In other words, respirator masks  
 19 were more effective than surgical masks, and mask  
 20 wearing in the context of a mandate, in other words  
 21 an instruction with more or less legal force behind it  
 22 to wear masks, was also more effective.

23 So, if you like, the plausibility of the results was  
 24 emphasised by that gradient of effect. In other words,  
 25 you might expect that a very -- you know, the sort of

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1 masks that you'd wear in a -- if you're exposed to  
2 a dangerous toxin is much more likely to be effective  
3 than a loosely fitting mask.

4 I should qualify it by saying that there was  
5 information about mask wearing in other infections, and  
6 in fact there were evidence syntheses, and we've learned  
7 about flu as well. So it's not that there was no  
8 evidence, but there was no evidence in relation to masks  
9 in coronavirus.

10 Q. The issue of mask wearing is a particularly vexed one in  
11 the context of the general population. To what extent  
12 did the research indicate a level of efficacy for  
13 cloth masks of the type that the government might order  
14 or mandate a population to wear, so non-medical?

15 A. I don't think there were any of the systematic reviews  
16 that could distinguish between, say, cloth masks and  
17 surgical masks, so I don't think we have information to  
18 answer that.

19 LADY HALLETT: Was there also, do I remember, conflicting  
20 advice about mask wearing and its effectiveness and  
21 whether it engendered complacency?

22 A. There are lots of interpretations of the evidence, and,  
23 you know, this is one of the challenges with  
24 observational data. It could be that those who avidly  
25 wore masks of any sort were more likely to socially

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1 distance themselves. So there are other  
2 interpretations. But nevertheless, and particularly,  
3 I think, in the healthcare setting, where people are  
4 more likely to wear the masks correctly as well --  
5 because anyone who saw mask wearing, a lot of masks were  
6 worn underneath the nose where they would do no effect  
7 or weren't fitting properly. So it's another case where  
8 the fact that actually they were shown to be effective  
9 in healthcare settings suggests that there were --  
10 you know, there was, if you like, a causal relationship  
11 between the mask wearing and the protection.

12 MR KEITH: The next broad group of NPIs that the research  
13 addresses is the social distancing and lockdowns on  
14 page 31. Under that heading, does the report include  
15 recommendations for people to stay separated from other  
16 individuals, as well as legal mandates to stay at home?

17 A. There were 34 studies on physical distancing, as opposed  
18 to 151 studies that looked at stay at home orders. So  
19 the group that did the social distancing and lockdown  
20 work divided into, I think, nine different groups of  
21 social distancing measures, which included restrictions  
22 on mass gatherings, I won't read them all out, but  
23 they're listed in the report.

24 Q. Workplace closures, school closures --

25 A. Correct.

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1 Q. -- care home measures, mass gathering and physical  
2 distancing.

3 In general terms, and I suggested similarly to  
4 Professor Hale before you, perhaps not surprisingly,  
5 the research showed that these social distancing  
6 measures were associated with considerable, that is to  
7 say significant, reductions in community level  
8 transmission of SARS-CoV-2?

9 A. That's correct.

10 Q. Was there a link found between the degree of stringency  
11 in the application of these various measures and  
12 the degree of reduction in transmission?

13 A. Yes, broadly there was. So stay at home orders --  
14 the more stringent the measure, the more effective. The  
15 restrictions on mass gatherings were important. But  
16 each of them were effective, and of course quite often  
17 these were applied in combinations as well, and I think  
18 it's important, we will come back to it I think, but  
19 NPIs work in combinations, that's the critical thing,  
20 but none of them -- I mean, physical separation on its  
21 own, if one had been able to physically separate people  
22 for a prolonged period of time, would have a very  
23 profound effect, but would also be possibly unhealthy in  
24 other ways.

25 Q. But a stay at home order --

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1 A. Yes.

2 Q. -- will of course encompass necessarily within  
3 the effect of such an order a form of social  
4 distancing --

5 A. Yeah.

6 Q. -- as well as, depending on the width of the social  
7 order -- an impact on schools, workplace and --

8 A. Absolutely correct. But of course stay at home orders,  
9 you know, have to be modified in order to keep a nation  
10 working, so key workers would still have to go to work.  
11 But correct.

12 Q. One of the more important points in this chapter  
13 concerns the recognition of the effectiveness of social  
14 distancing and the importance of social distancing in  
15 care homes --

16 A. Yes.

17 Q. -- because some of the research showed, quite plainly,  
18 that the strict cohorting of staff alongside residents,  
19 and restrictions on visitors, was associated with  
20 significantly reduced transmission, again  
21 unsurprisingly?

22 A. Yes. I think that's exactly right. I think that none  
23 of this is surprising when you think about the first  
24 principles of stopping an infected person infecting  
25 an uninfected person. But that is absolutely right: in

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1 care homes, if you could restrict the movement of care  
2 workers, for example, between different care homes or  
3 between different populations, that reduces the chance  
4 of anyone infected, in this case an infected  
5 care worker, infecting large numbers of people. So  
6 that's important.

7 Equally, if you have got people in a care home who  
8 are infected, then keeping the staff that look after  
9 them separate from uninfected people is important.

10 Q. Test, trace and isolate.

11 A. Yep.

12 Q. Quite plainly, again, there were a number of papers and  
13 research articles to which the report had regard, and  
14 some of that material in fact comprised detailed data  
15 from the United Kingdom, did it not?

16 A. Yes, particularly the app that was used on the  
17 Isle of Wight.

18 Q. Was that when the government introduced by way of  
19 experiment a non -- I think it was a non-Apple,  
20 non-Google app, and they applied it across  
21 the Isle of Wight to see what the response would be and  
22 whether or not it was effective in ensuring compliance  
23 with --

24 A. That is correct.

25 Q. -- social distancing.

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1 because of course the application of all of these  
2 non-pharmaceutical interventions depends on all sorts of  
3 social and cultural issues as well.

4 Q. Of course.

5 A. Korea was very well prepared because it had had  
6 the outbreak of MERS in 2015, and I think it's fair to  
7 say that not only the government was more prepared but  
8 the community was aware of what happens when you have  
9 a dangerous virus in your country, and so they were able  
10 to adopt -- so testing on its own with sort of voluntary  
11 isolation doesn't work nearly as well as if you've got  
12 very systematic testing, coupled with the tracing and  
13 the isolation. Those are the key other elements.

14 Q. Therefore is the key feature to a system,  
15 a comprehensive scaled-up system of test, trace, contact  
16 and isolate --

17 A. Yeah.

18 Q. -- that it is necessary but not sufficient, because it  
19 may only work either at the beginning of a pandemic or  
20 during the course of a pandemic below certain levels of  
21 incidence, that is to say the spread of the virus or the  
22 level of incidence of the virus has to be below a point  
23 at which the system of test and trace can work in  
24 practice?

25 A. Yes.

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1 A. The evidence overall is strong that if test, trace and  
2 isolate is applied early, and effectively, then it's  
3 actually quite a powerful measure, and we may come back  
4 to it when it comes to the discussion of Korea.

5 But almost all of these interventions -- the other  
6 thing we haven't specifically talked about is sort of  
7 the force of transmission. In other words, when there  
8 are a very large number of cases in a community, so the  
9 exposure goes up. And in the case of test, trace and  
10 isolate, when you've got very many cases then it's very  
11 difficult to apply it at a national level. So with all  
12 of this, early application is important.

13 Q. That's a point, if I may suggest, of enormous importance  
14 in the case of the United Kingdom, because the position  
15 was, wasn't it -- and it's well established -- that  
16 there was no significant or comprehensive test, trace,  
17 isolate system in the United Kingdom in the early days?

18 A. Yes.

19 Q. What the evidence from South Korea, along with  
20 New Zealand, Australia and a number of other countries  
21 shows, that if there is in place such a system, it  
22 becomes possible for the government to be able to  
23 control the spread of the virus before it runs away?

24 A. Yes. I think that is correct. It is, of course,  
25 difficult to extrapolate between different countries,

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1 Q. If the level of incidence is too high, no system of test  
2 and trace, however sophisticated, could get on top of  
3 the problem?

4 A. When the level is very high, then, you know, essentially  
5 you end up testing, tracing and isolating the whole  
6 country, which is where you need -- you get to lockdown  
7 measures. So it is exactly as you describe, it's when  
8 you have geographically limited and low levels that you  
9 can remain able to test at sufficient scale and bring it  
10 under control without locking down everyone.

11 Q. We may never know what the effect would have been had  
12 the United Kingdom had a comprehensive scaled-up test  
13 and trace, isolate system at the beginning, but is there  
14 anything that can be said about the levels of incidence,  
15 the incidence -- the level of spread of the virus, in  
16 the early days in the United Kingdom?

17 A. Well, the one thing we do know is that in February of  
18 2020 there were about 1,500 independent importation of  
19 cases which was across the whole nation from people  
20 who'd been away during the half term school holidays in  
21 Italy, Spain and Switzerland, who had been on skiing  
22 holidays, and because they were a young and fairly fit  
23 population, they managed -- the sort of severe morbidity  
24 wasn't really seen in that population. So the UK was  
25 hit in a very widespread way very early. We didn't have

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1 tests nearly as early at scale as Korea did. So a lot  
 2 of this comes back to the evidence I gave actually in  
 3 Module 1, which is: the real challenge for nations is to  
 4 be prepared.

5 Q. Of course. And were genomic studies in fact  
 6 subsequently carried out, in particular a main study in  
 7 the summer of 2020, which was able to trace back  
 8 the genetic origin of a large number of infections --

9 A. Yes.

10 Q. -- in the United Kingdom to viral infections in France,  
 11 Spain, and Italy?

12 A. Yes. That is correct. And as a result of that we knew  
 13 that these were independent introductions.

14 Q. There was what is known as a widespread -- well,  
 15 a spreading, a wide spreading of individual separate  
 16 infections across the United Kingdom?

17 A. Yes. I think it's -- may go slightly beyond this  
 18 report, but there were important sort of chance events  
 19 in different countries that altered their experience of  
 20 the disease, and obviously those countries that are  
 21 extremely well connected global transport hubs were at  
 22 more -- had more exposure early on.

23 Q. You make the point on page 35, in addition, that even  
 24 where Covid-19 cases are higher, so even where there is  
 25 a higher incidence, test, trace and isolation may still

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1 necessity for people to come in? And of course  
 2 quarantine is then a very powerful tool for that.

3 Q. Starting at one end --

4 A. Yeah.

5 Q. -- does the research show that screening measures were  
 6 particularly effective in controlling the spread of the  
 7 virus?

8 A. Screening measures were very weakly helpful, because of  
 9 the incidence of asymptomatic infection.

10 Q. Could you just elaborate, please, on that?

11 A. Yes. So if you have someone that you're screening on  
 12 the basis of the fact that they have a temperature or  
 13 they're coughing at the border, that will only pick up  
 14 people who have symptomatic infection. On the other  
 15 hand, it may be that there are people who are either  
 16 infected but have no symptoms, or in fact are in the  
 17 earliest days of an infection, and even a PCR test might  
 18 not become positive for two or three days after they've  
 19 crossed the border. So simply health screening on its  
 20 own, even with a one-off PCR test at the border, will  
 21 leak, people will leak through who have the infection.

22 Q. And standing back, of course every government which is  
 23 considering any sort of border measure has to grapple  
 24 with the conundrum of what the impact would be of the  
 25 imposition of border measures in terms of trade, travel,

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1 have an important role to play, because of course it can  
 2 still suppress -- perhaps only around the outer  
 3 margins -- but it can still suppress the virus, even if  
 4 it's not able to completely control its spread?

5 A. Well, that comes back to the need for the combination of  
 6 measures, and so ... but, I mean, you need a very high  
 7 intensity of testing if you're going to be able to  
 8 effect it when there's -- the question is really whether  
 9 the outbreak is geographically localised or whether it's  
 10 spread.

11 Q. Well, that leads us on very neatly to the next broad  
 12 area of NPIs, travel restrictions and controls across  
 13 international borders. Does that cover, in fact, quite  
 14 a wide range of measures from screening --

15 A. Yes.

16 Q. -- checking people's temperatures when they come across  
 17 a border or looking for signs of fever, all the way  
 18 across the spectrum of measure to shutting a border or  
 19 only allowing people in with full isolation and  
 20 quarantine?

21 A. It does, and it includes a quarantine as part of it as  
 22 well. So shutting a border completely is extremely  
 23 difficult for almost any country in the world, because  
 24 we all -- most countries depend on the importation of  
 25 goods and services, and so how do you deal with the

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1 and that presents an even greater problem for those  
 2 countries like the United Kingdom which are more  
 3 interconnected and engage in greater levels of trade  
 4 than some others?

5 A. Yes, that is correct, and there's also the question of  
 6 the prevalence of the virus in the country that people  
 7 are coming to, compared with the country they're coming  
 8 from. So if you're coming from a country which has the  
 9 same variant at the same level, border controls won't  
 10 have much efficacy. On the other hand, if they're  
 11 coming from a country with a much higher rate of the  
 12 virus, then they are potentially very important and also  
 13 when you've got new variants emerging you may be able to  
 14 slow them down.

15 Q. And if a country already has Covid established in it,  
 16 stopping individual members of the public travelling  
 17 into that country will be like -- well, allowing them in  
 18 might be, I think it's been described as throwing a lit  
 19 match onto an already raging fire.

20 A. Yes, but with the exception that if there are new  
 21 variants emerging, then that may still be relevant. But  
 22 I think the real point about the travel measures is  
 23 that, again, you have to implement a comprehensive  
 24 package for them to be effective. And I think  
 25 New Zealand is quite an interesting example we'll come

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1 to, where they have the advantage that they're  
 2 geographically isolated -- I mean, basically you get  
 3 there by plane or occasionally by boat, ship -- but they  
 4 found, even with the most stringent application of  
 5 border controls, there would still be influx into the  
 6 country. So, for example, at the border it may be that  
 7 a border official or someone supervising a quarantine  
 8 facility could become infected and carry the infection  
 9 into the country. So border controls are only effective  
 10 in the context of other stringent measures as well.

11 Q. So that we may be clear, in those small number of  
 12 countries where rigorous border closures enabled those  
 13 countries to keep a tight grip on the virus and, by and  
 14 large, thereafter to avoid long, stringent --

15 A. Yes.

16 Q. -- national lockdowns, for example, those border  
 17 closures were coupled with other NPIs, but in particular  
 18 TTI, test and trace?

19 A. Absolutely, it was test, trace and isolate coupled with  
 20 border controls, and of course it was found that long  
 21 periods of quarantine were more effective than short,  
 22 that compulsory quarantine was more effective than  
 23 voluntary quarantine, and later on in the pandemic it  
 24 was found that you could probably reduce quarantine  
 25 times if you did daily testing. But effective

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1 have been some beneficial outcome, but it's impossible  
 2 to quantify it?

3 A. I think that's right, and of course one of the purposes  
 4 of the report was to provide recommendations for how we  
 5 might fill evidence gaps in the future, and there is  
 6 a clear opportunity to gather evidence when it comes to  
 7 environmental controls.

8 Q. Then the impact of communication.

9 Was that -- you've already described how that's not  
 10 strictly a measure or an NPI, but it's an extremely  
 11 important facet of non-pharmaceutical interventions  
 12 because unless the community adopts and complies with  
 13 them, then their efficacy would be significantly  
 14 underwhelmed.

15 A. That's correct.

16 Q. Was this a topic in which you looked specifically at the  
 17 United Kingdom position?

18 A. We did, because the cultural context of communication is  
 19 so specific, so we restricted ourselves in this case to  
 20 the United Kingdom.

21 Of course communication interfaces with all sorts of  
 22 other cultural aspects of society, so for example social  
 23 cohesion, altruism, all sorts of features of society.

24 So we did restrict ourselves, and the evidence is  
 25 that people did largely comply, so the communication was

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1 quarantine, if you're trying to keep your border as  
 2 a barrier, is -- was an essential feature as well.

3 Q. The next broad area is that of environmental controls,  
 4 on page 39. In the general scheme of things, if the  
 5 rubric or the aim is to control the spread of a virus,  
 6 how important are environmental measures such as air  
 7 cleaning devices, ventilation, surface disinfection,  
 8 screens and so on?

9 A. I'd say that, disappointingly, this was the area where  
 10 there is the weakest experimental evidence, and there  
 11 are a small number of observational studies that show --  
 12 appear to show the effectiveness of environmental  
 13 measures, and that's everything from reducing the number  
 14 of people in an environment to increasing ventilation.

15 Again, everything that is known about the  
 16 transmission of infection says that one way of reducing  
 17 the exposure to exhaled virus is to increase the  
 18 ventilation, so having open windows, increasing  
 19 air flow, but there is remarkably little rigorous  
 20 evidence that could be adduced, and I think it's one of  
 21 those cases where absence of evidence should not be  
 22 taken to be evidence of absence. In other words,  
 23 because we can't demonstrate it doesn't mean that there  
 24 wasn't an effect.

25 Q. So we must leave it on the basis that there may well

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1 working overall, although there were certain features  
 2 about the communication such as the trusted  
 3 communicator, persuasion rather than coercion, a number  
 4 of features like that that were more likely to engender  
 5 trust, because trust in the communications is extremely  
 6 important, and the corollary of trust is  
 7 trustworthiness, and so communicators who were seen to  
 8 be trustworthy were, by and large, well trusted.

9 Q. Two points arising therefrom, please, Sir Mark.  
 10 Firstly, was trust found to be the most common factor in  
 11 terms of impacting upon the effectiveness of  
 12 communication?

13 A. I think it's a major factor, but clarity, consistency,  
 14 a balance between, whilst being authoritative in, as it  
 15 were, the reliability of the information, not being too  
 16 controlling. So ... but, I mean, all of that in a way  
 17 integrates into --

18 Q. Trust?

19 A. -- trust.

20 Q. I in fact was reading out the words of the report  
 21 itself, Sir Mark:

22 "Trust was the most common factor impacting  
 23 communication effectively."

24 A. Yes. Absolutely.

25 Q. Thank you.

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1       Secondly, could you just elaborate, please, on the  
 2       importance of knowledgeable and trusted local groups and  
 3       leaders as communicators? So in the particular context  
 4       of members of ethnic minorities, how important is the  
 5       existence of knowledgeable and trusted local leaders in  
 6       the communication of NPIs and the promotion of trust?

7     A. I think one can extrapolate from advice, say, on  
 8       vaccines to NPIs, because I think there is a sort of  
 9       common denominator; and certainly when it comes to  
 10      improving uptake of vaccines, then there's pretty good  
 11      evidence that people trust people who they feel are like  
 12      them, in similar cultures, more. So it is important to  
 13      have that communication distributed and reflecting the  
 14      diverse nature of a community.

15    Q. Three subissues, if I may.

16      Firstly, how important in the development of trust  
 17      and promulgation of effective communication is the need  
 18      of consistent messaging and the absence of conflicting  
 19      or changing messages?

20    A. I think that there is little doubt that consistent  
 21      messaging is extremely important, and that then takes us  
 22      to how uncertainty is communicated as well. And  
 23      uncertainty is sometimes communicated as: X has one  
 24      opinion and Y has a completely opposite one, and that  
 25      then sends very confusing messages.

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1       uncertainty and the communication of science in general.  
 2       It's the whole nature of science to be sceptical,  
 3       actually, to want further evidence. And I think the  
 4       evidence is actually that the public, and there isn't  
 5       one public, but public audiences did accept and  
 6       understand the fact that there are things which were not  
 7       known.

8     Q. The say the whole nature of science is to be sceptical;  
 9       was it you who described scientists as licensed  
 10      dissidents in --

11    A. No, it wasn't me, but --

12    Q. It could have been?

13    A. It could have been, but it wasn't, no.

14    Q. Therefore, in conclusion on this part of the report, do  
 15      you call, in fact on page 44, for governments in future  
 16      to convey information clearly with consistent messages,  
 17      there we are at the top right-hand corner --

18    A. Yes.

19    Q. -- to convey information by trusted sources such as  
 20      health authorities, but in fact there's a reference back  
 21      to knowledgeable and trusted local group leaders?

22    A. Yep.

23    Q. And, thirdly, there must be a proper balance struck  
 24      between authoritarianism and optional --

25    A. Yes, those were the summary of the evidence review

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1     Q. Because you were looking technically at research  
 2       emanating from the United Kingdom, was one of the  
 3       findings of the report that government guidance in the  
 4       United Kingdom -- which had, as we know, changed  
 5       multiple times, and of course changed across devolved  
 6       administrations as opposed to the United Kingdom -- led  
 7       to the potential for non-compliance, simply because  
 8       people became either confused or desensitised?

9     A. Yes. I'm not sure that the evidence is that rigorous on  
 10      that, but I think it's a reasonable interpretation of  
 11      what happened.

12    Q. Thirdly, to what extent is an absence of scientific  
 13      certainty damaging to the efficiency or efficacy of  
 14      communication? So, putting it bluntly, to what extent  
 15      does a population need to know the scientific basis for  
 16      what it's being told in order to make it comply?

17    A. Well, but that's an interesting question, but it goes  
 18      back to the start of the pandemic and even at the end  
 19      there were huge numbers of things we didn't know, and  
 20      actually an important part of the communication is to  
 21      communicate what is not known as well as what is known.

22      So, whilst everyone would like perfect answers as  
 23      soon as possible, we started with hardly any specific  
 24      answers, we had generic answers, and so that I think is  
 25      a sort of more general issue of communication of

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1       there. That's correct.

2     Q. You then turn, or rather the report then turns to  
 3       a cross-national comparison of NPI effectiveness. You  
 4       are aware, of course, of the report from  
 5       Professor Tom Hale?

6     A. Yes.

7     Q. You may indeed have seen his evidence earlier today. In  
 8       broad terms, are the conclusions from the Royal Society  
 9       report very similar, although they come at it from  
 10      a different angle, to the conclusions reached by  
 11      Professor Hale to the effect that the more stringent  
 12      an NPI, the more effective it is likely to be, and also  
 13      that the availability of comprehensive scaled-up test  
 14      and trace and isolation measures are likely to be of the  
 15      very greatest importance in being able to keep control  
 16      or to regain control of a virus?

17    A. Yes. I read Professor Hale's report, I was sort of  
 18      locked away in a room out there whilst he was giving his  
 19      evidence, so I didn't hear it, but I enjoyed his paper  
 20      and actually I was pleased that it was very  
 21      complementary to the paper produced by the  
 22      Royal Society, so he came from the observational angle  
 23      of looking at policy implementation in different  
 24      countries across the world and correlating it with Covid  
 25      cases --

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1 Q. When you say complementary, I should just make plain,  
 2 you mean it went --  
 3 A. It complemented --

4 Q. -- very well alongside it --

5 A. Yes, correct.

6 Q. -- complemented it, rather than being very nice about  
 7 it?

8 A. Yes, correct.

9 **LADY HALLETT:** Complement with an E.

10 A. Yes, with an E.

11 **MR KEITH:** Yes, indeed.

12 A. Exactly. I did my research on a system of proteins  
 13 called complement, with an E, and people used to  
 14 misspell it all the time, so ...

15 But, yes, and of course the angle from the  
 16 Royal Society report was to do a systematic review of  
 17 the evidence directly, but when it came to our national  
 18 case studies, they fit more with the approach that was  
 19 taken by Professor Hale.

20 Q. Could we then turn briefly to those three case  
 21 studies --

22 A. Yep.

23 Q. -- that's to say Hong Kong, New Zealand and South Korea.  
 24 I don't want you to give an account of how the  
 25 Hong Kong authorities proceeded throughout the whole --

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1 not as they should have been, there were very large  
 2 numbers of elderly members of the Hong Kong population  
 3 who were not vaccinated and so when in particular  
 4 Omicron broke through --

5 A. Yes.

6 Q. -- they were vulnerable and they died in very large  
 7 numbers?

8 A. That is correct.

9 Q. So Hong Kong is a very good example of the beneficial  
 10 impact of go early, go hard in terms of the early  
 11 imposition of stringent NPIs?

12 A. That is correct.

13 Q. With vaccination?

14 A. That is correct, and of course that was the remarkable  
 15 thing about this pandemic, which is that within a year  
 16 of the pandemic starting there were vaccines that  
 17 stopped people dying. So, yes, but that's a correct  
 18 analysis.

19 Q. New Zealand recorded its first case of Covid-19 on  
 20 28 February, not entirely different to the  
 21 United Kingdom, but two weeks later on 14 March it was  
 22 announced that anyone entering the country must  
 23 self-isolate for 14 days, border controls became  
 24 increasingly tightened until the point, at 9 April, when  
 25 only New Zealand citizens and residents were permitted

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1 A. No.

2 Q. -- course of the pandemic in relation to their  
 3 imposition of NPIs, but focusing on the broad thrust,  
 4 the -- and painting it in a very general term, in a very  
 5 general way, the Hong Kong authorities applied, very  
 6 early on, stringent NPIs because of boundary closures in  
 7 early February, a full quarantine policy, either at home  
 8 or in a hotel, from March for travellers arriving from  
 9 Europe and North America, and then from July quarantine  
 10 for all arriving persons. Is that a fair summary?

11 A. Yeah.

12 Q. And therefore they were able -- or rather the virus  
 13 never escaped their control?

14 A. It escaped -- they were able to keep it under control,  
 15 so, yes, it didn't escape in the sense that it was  
 16 there --

17 Q. Indeed.

18 A. -- but at very low level.

19 Q. And where it popped up, the system for test and trace  
 20 and in particular isolation was able to deal with  
 21 outbreaks of the virus over time?

22 A. Yes, that's correct.

23 Q. But where Hong Kong suffered terribly was that when  
 24 these stringent NPIs were lifted, it became apparent  
 25 that the levels of vaccination in the population were

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1 to enter the country at all, and even they had to  
 2 undergo a 14-day quarantine.

3 A. Yes, a compulsory quarantine which was observed, as it  
 4 were, yeah.

5 Q. Therefore although there was a one-month strict lockdown  
 6 and a whole series of local lockdowns, so attempts to  
 7 suppress local outbreaks, and a fairly low level of  
 8 domestic NPIs imposed, New Zealand remained mostly  
 9 transmission free until late 2021?

10 A. Yes, that's correct. I think New Zealand provides  
 11 a very clear illustration of what is needed to make  
 12 border controls work, because we do have very good data,  
 13 and what they found was that in spite of having rigorous  
 14 quarantine there were still cases that were brought into  
 15 the community by probably people working in and around  
 16 the borders, and by using testing, tracing and isolation  
 17 they were able to keep those under control, but from  
 18 time to time there were then episodes that suggested  
 19 there was domestic transmission occurring, so you  
 20 wouldn't have been able to do contact tracing right back  
 21 to the border, and under those circumstances they  
 22 imposed quite strong localised lockdowns.

23 So I think it's an extremely good example of how, if  
 24 you're going to make border closures work, you have to  
 25 do a whole lot of other things as well.

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1 Q. And you must make clear, mustn't you, that -- again to  
 2 repeat perhaps the obvious -- we will never know whether  
 3 the United Kingdom, had it had a developed system for  
 4 test, trace and isolate and had it had quarantine  
 5 facilities, and had it had the geographical, the  
 6 population density and the socioeconomic conditions  
 7 which apply in New Zealand, would have been able to keep  
 8 the virus under similar control?

9 A. That is absolutely correct. So we have a much larger  
 10 population, a much higher population density and  
 11 interconnectedness, and although we are an island, we  
 12 are an island with only a short sea barrier to other  
 13 parts, lots of shipping, and so it is very, very  
 14 difficult to extrapolate from one country to another.

15 Q. But what is clear is that the New Zealand imposition of  
 16 border controls was, by the general scheme of things,  
 17 applied very early?

18 A. Yes.

19 Q. And secondly, whether or not it was to do with the early  
 20 application of those border NPIs, they didn't appear to  
 21 have suffered in the same way that the United Kingdom  
 22 did from multiple, indeed nationwide, seeding of  
 23 infection in those weeks in February?

24 A. Well, that's true, but in fact, I mean, the full  
 25 rigorous quarantining in New Zealand didn't happen until  
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1 9 April, they had a more voluntary policy until then,  
 2 and of course in the UK by 14 March we'd already had  
 3 a very substantial introduction of cases, and they did  
 4 have actually in New Zealand quite a long national  
 5 lockdown as well. So -- but, I mean, the general  
 6 principle is correct that having controlled the first  
 7 major outbreak, then after that they were able to  
 8 maintain it by rigorous border controls coupled with  
 9 other measures.

10 Q. And by 14 March, anybody entering the country had to  
 11 self-isolate for 14 days?

12 A. Yes, that's correct.

13 Q. So had there been multiple seedings around that time in  
 14 New Zealand -- and we will never know whether there were  
 15 or not -- there is at least the prospect that that  
 16 mandatory self-isolation would have had a beneficial  
 17 impact?

18 A. Yes. What I can't tell you is how effective that  
 19 self-isolation was.

20 Q. Indeed.

21 Then finally South Korea. South Korea's population  
 22 is 51.4 million, so I think 15 to 20 million perhaps shy  
 23 of the United Kingdom's, so not entirely unequal in  
 24 size. It, it is very well known, experienced  
 25 an outbreak of MERS which had of course, although more  
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1 localised, a high-consequence infectious disease, had  
 2 a much higher rate of fatality?

3 A. Yep.

4 Q. And it had also therefore put into place and developed  
 5 much more active measures for the control of disease?

6 A. Yes.

7 Q. The SARS-CoV-2, Coronavirus 2, infection was first  
 8 identified in South Korea on 20 January 2020. On  
 9 23 February, public health authorities raised the  
 10 infectious disease alert to the highest level, and then  
 11 combined NPIs were applied over time.

12 Did South Korea have a very sophisticated and  
 13 developed system for community based screening, for test  
 14 and trace, and in terms of contact and isolation, very  
 15 sophisticated systems for electronic --

16 A. Yes.

17 Q. -- contact tracing?

18 So people could be traced through credit card or  
 19 debit card use, through CCTV, through their location --

20 A. Yes.

21 Q. -- because of mobile phone use --

22 A. Yep.

23 Q. -- and so on and so forth?

24 What was the outcome of the application in general  
 25 terms of that level of stringent NPI?

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1 A. Well, they managed to avoid the need to have a lockdown,  
 2 so ... but they were -- it illustrates the necessity of  
 3 being prepared. So they had learnt a lot, as I said  
 4 earlier, from the MERS outbreak, they'd strengthened  
 5 their epidemic intelligence service, and so they were  
 6 prepared to develop an extensive test, trace and isolate  
 7 very early. And in fact the sort of kinetics of the  
 8 South Korean infection was very similar to the UK,  
 9 I mean, the first UK case was in January as well.

10 So with a much, much more rigorous enforcement of  
 11 the tracing and the isolation, they avoided a national  
 12 lockdown. They had some very large superspreader events  
 13 around certain religious organisations on a couple of  
 14 occasions.

15 Q. But notwithstanding those superspreader events, their  
 16 system for NPIs or their system of measures enabled them  
 17 to circumnavigate --

18 A. That's correct.

19 Q. -- the pandemic in a very different way to us.

20 They were able, were they not, to gain approval for  
 21 a diagnostic test at a relatively early stage --

22 A. Yes.

23 Q. -- on 4 February? And does other evidence show that by  
 24 late March they were testing individual members of the  
 25 population at a prodigious level --

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1 A. Yes.  
 2 Q. -- way ahead --  
 3 A. They scaled up --  
 4 Q. -- of the United Kingdom?  
 5 A. -- way ahead of, I would need to check but I suspect  
 6 almost every other country in the world. They were  
 7 very, very fast.  
 8 Q. The report draws the threads together in a number of  
 9 messages, if I may call them that, from page 63 onwards,  
 10 Sir Mark.

11 I needn't, I think, trouble with the summaries that  
 12 are set out there in relation to the need for going  
 13 early, go hard, and for the link between stringency and  
 14 reduction in transmission, because you've covered that.

15 But, on page 64, you make these points: firstly, on  
 16 the basis of strict early application of NPIs, it is  
 17 obvious that it was that combination of NPIs that was  
 18 crucial in terms of efficacy?

19 A. Yes.  
 20 Q. Secondly, that the value of a proper test, trace and  
 21 isolate system is enormous, it is perhaps the core NPI  
 22 if the aim or the goal is to stop a runaway infection or  
 23 to try to regain control.  
 24 Third, as you've already indicated, it is not  
 25 possible however to reach counterfactual conclusions,

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1 "What might have happened here if", and so on.  
 2 Fourth, the key lesson to researchers is to be  
 3 prepared, because it is only by understanding as fully  
 4 as we may the impact of non-pharmaceutical interventions  
 5 will we appreciate the vital importance of test and  
 6 trace, and of ensuring that a combination of NPIs next  
 7 time is used at the earliest possible moment?

8 A. Yes. So I'd qualify what you've just said, I think, in  
 9 two ways.  
 10 Firstly, the effectiveness of non-pharmaceutical  
 11 interventions does depend on the transmissibility of the  
 12 virus, and so no country in the world was essentially  
 13 able to control it once the Omicron variant came out.  
 14 That was the point at which China, with its very  
 15 rigorous restrictions for mobility, just couldn't  
 16 achieve it any more. So there is always that.

17 But that is another argument for acting early,  
 18 because now that we know that there is the potential for  
 19 developing a vaccine during the lifetime, then your best  
 20 chance of doing that is as fast as possible before the  
 21 virus has had a chance to evolve to be more  
 22 transmissible, because that's what they will do.

23 Q. Just pause there.

24 A. Yes.

25 Q. One other ancillary benefit of stopping the spread of

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1 the virus is to stop, of course, the likelihood of  
 2 variants but also to stop the prevalence of syndromes  
 3 such as Long Covid which come, of course, by way of  
 4 injury from the widespread --

5 A. Well, that is correct, and also to avoid the need for  
 6 prolonged periods of restriction of people's liberty  
 7 with all of the consequences that that brings. So being  
 8 quick and being stringent is very important.

9 My qualification of the second comment you made,  
 10 which is about how we acquire the evidence in the  
 11 future: that isn't just for scientists, that is for  
 12 policymakers as well. In other words, what we need in  
 13 any pandemic, and indeed for public health as a whole,  
 14 is high quality data, and so ideally protocols need to  
 15 be developed for how one might deal with the  
 16 observational data in a future pandemic, because  
 17 researchers can't do it in the context of an environment  
 18 that doesn't allow them to.

19 And so I think working with policymakers to agree  
 20 potential protocols, to agree the sort of information  
 21 that's needed is really important, and ideally this  
 22 should be international, because you can learn things by  
 23 comparing country A with country B, with the caveats of  
 24 all the sort of cultural issues we've been discussing.

25 So ... but I think the scientific community, if

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9 Q. To drill down just for a moment in two aspects of that

10 very helpful answer.

11 Firstly, do you set out in the report the need for  
 12 therefore systems of accumulation of data and research  
 13 to be put into place, so you say there needs to be  
 14 during the interpandemic period --

15 A. Yes.

16 Q. -- the interregnum before the next pandemic, the  
 17 pre-positioning of national and international research  
 18 consortia and networks, data infrastructures,  
 19 methodological protocols and mechanisms for the  
 20 collection of data? And do you mean by that we need to  
 21 know in much greater detail what the likely consequences  
 22 are of viral infection in terms of transmissibility and  
 23 the epidemiological impact, but also much more about the  
 24 NPIs which may be deployed in future to be able to  
 25 combat it?

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1 A. Yes, and the analogy is with drugs and vaccines where,  
 2 because there were protocols that could be applied  
 3 during the pandemic, we learnt very rigorously and  
 4 deductively about the effectiveness of, for example,  
 5 dexamethasone in saving lives in people in intensive  
 6 care units, in learning which monoclonal antibody  
 7 therapies were -- anti-inflammatory therapies were  
 8 effective and which weren't.

9 In the same way, if we had very good continuous  
 10 evidence collection during the pandemic, we might learn  
 11 more in real time about the effectiveness of different  
 12 measures at different times.

13 As I've described, however, in relation to  
 14 environmental measures, there are some things one can  
 15 learn from experimental studies between pandemics. So  
 16 it's perfectly possible to understand the distribution  
 17 of particles of viral size in closed spaces, what  
 18 ventilation might do. Some of that work is already  
 19 done.

20 But at the start we didn't really know the balance  
 21 of -- the importance of washing hands and cleaning  
 22 surfaces. We do know that actually enteric  
 23 infections -- so infections of the gut -- decreased, and  
 24 we also know about the effectiveness, to some extent, of  
 25 the non-pharmaceutical interventions from the fact that

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1 influenza and respiratory syncytial virus infections  
 2 dropped during the pandemic.

3 But ultimately each infection is --

4 Q. Is different?

5 A. -- itself, yeah.

6 Q. Lastly, in the context --

7 LADY HALLETT: Is this last?

8 MR KEITH: Yes, this is the last --

9 LADY HALLETT: It's just that I've been asked to take  
 10 a break.

11 MR KEITH: This is the last question.

12 In the context of your earlier answer about the  
 13 terrible conundrum faced by governments in relation to  
 14 whether or not to impose non-pharmaceutical  
 15 interventions, do you call for a much closer examination  
 16 of -- call for the need for a new structure or  
 17 a framework or a policy by which the relative benefits  
 18 and costs of alternative steps which could be taken by  
 19 a government are examined? So a cost-benefit analysis,  
 20 what Lord O'Donnell, you might know, has described as  
 21 a wellbeing cost-benefit analysis?

22 A. Well, I think one of the things we say in the report is  
 23 that there were costs in other domains of life,  
 24 economic, people's wellbeing, education, and those need  
 25 to be analysed as well. And I wouldn't dare to tell

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1 but I thought I'd just --

2 A. I think there is much more to do, and we talked in my  
 3 last appearance about the work of Dr Kirchhelle, who is  
 4 one of your advisers, on the history of public health,  
 5 and I think that the disinvestment in public health, not  
 6 just in the UK but in the richer countries of the world,  
 7 needs to be tackled. But that is a personal opinion  
 8 rather than the sort of -- yes. It goes beyond this  
 9 report, that's for sure.

10 LADY HALLETT: Thank you very much, Sir Mark, I'm very  
 11 grateful. I hope we're not imposing on you too much.  
 12 I have a feeling we may impose on you again, if we may,  
 13 but I don't know, I haven't checked with the other  
 14 modules. But I'm extremely grateful to you again for  
 15 all your help.

16 THE WITNESS: Thank you, my Lady.

17 MR KEITH: I very much regret to say that it was Sir Mark's  
 18 first question this afternoon --

19 LADY HALLETT: Oh, would we impose on him again?

20 MR KEITH: -- would you be wishing to see him again?  
 21 My Lady, that concludes --

22 LADY HALLETT: The problem is we do have a module  
 23 specifically on health, you see, Sir Mark, so it's just  
 24 possible.

25 THE WITNESS: Okay.

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1 A. Yes.

2 LADY HALLETT: -- have you got any estimation of what our  
 3 position is like today here in the UK?

4 A. I think it is not as strong as we would like it to be.  
 5 But that is a judgement, and I should probably resist  
 6 it.

7 LADY HALLETT: And I didn't give you notice of the question,

1                           **(The witness withdrew)**  
2    **MR KEITH:** That concludes today's evidence.  
3    **LADY HALLETT:** Thank you all very much indeed. 10 o'clock  
4       tomorrow, please.  
5    **(3.02 pm)**  
6                           **(The hearing adjourned until 10 am**  
7                           **on Thursday, 12 October 2023)**

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(47) covid... - different

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(48) different... - elaborate

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129/115 129/116<br>130/101 130/116 130/117<br>131/102 131/117 131/118<br>132/103 132/118 132/119<br>133/104 133/119 133/120<br>134/105 134/120 134/121<br>135/106 135/121 135/122<br>136/107 136/122 136/123<br>137/108 137/123 137/124<br>138/109 138/124 138/125<br>139/110 139/125 139/126<br>140/111 140/126 140/127<br>141/112 141/127 141/128<br>142/113 142/128 142/129<br>143/114 143/129 143/130<br>144/115 144/130 144/131<br>145/116 145/131 145/132<br>146/117 146/132 146/133<br>147/118 147/133 147/134<br>148/119 148/134 148/135<br>149/120 149/135 149/136<br>150/121 150/136 150/137<br>151/122 151/137 151/138<br>152/123 152/138 152/139<br>153/124 153/139 153/140<br>154/125 154/140 154/141<br>155/126 155/1 |
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| <b>W</b> | 107/9 107/15 109/22<br>110/16 110/22 112/13<br>112/22 114/9 115/24<br>116/3 117/1 117/19<br>118/12 118/15 118/16<br>118/23 120/1 120/5<br>120/14 122/21 125/13<br>127/23 128/6 128/19<br>129/3 129/7 131/22<br>132/2 132/8 135/16<br>138/4 139/6 143/15<br>144/3 145/7 146/25<br>150/14 151/3 151/10<br>152/24 153/6 153/8<br>154/17 154/18<br><b>while</b> [2] 36/12 41/19<br><b>whilst</b> [7] 23/11<br>69/20 107/17 112/9<br>136/14 138/22 140/18<br><b>white</b> [5] 12/16 12/23<br>13/15 24/24 29/7<br><b>Whitty</b> [12] 8/8 10/2<br>10/24 43/20 44/4<br>44/11 44/18 45/14<br>46/24 47/8 106/14<br>108/19<br><b>Whitty's</b> [1] 46/20<br><b>who</b> [43] 5/22 6/7<br>7/14 7/16 8/1 8/3 8/4<br>8/23 9/13 17/14 21/7<br>22/17 25/13 29/18<br>35/1 40/8 57/13 58/20<br>58/20 58/21 58/22<br>64/16 64/19 65/9<br>71/18 72/10 79/11<br>92/13 92/17 93/11<br>116/18 121/24 122/5<br>125/7 128/21 131/14<br>131/15 131/21 136/7<br>137/11 139/9 143/3<br>156/3<br><b>who'd</b> [1] 128/20<br><b>whole</b> [14] 75/11<br>89/20 96/13 98/20<br>100/18 119/17 128/5<br>128/19 139/2 139/8<br>141/25 144/6 144/25<br>151/13<br><b>whom</b> [2] 115/11<br>115/12<br><b>why</b> [19] 6/5 9/10<br>19/6 32/2 40/6 40/8<br>41/8 43/17 44/22 48/9<br>49/3 52/11 56/6 61/21<br>62/1 65/3 86/24 97/1<br>107/25<br><b>wide</b> [3] 107/14<br>129/15 130/14<br><b>wider</b> [6] 17/8 17/10<br>87/13 90/18 103/5<br>118/14<br><b>widespread</b> [4] 81/23<br>128/25 129/14 151/4<br><b>width</b> [1] 124/6 | <b>Wight</b> [2] 125/17<br>125/21<br><b>will</b> [41] 1/16 3/19<br>3/25 10/10 13/1 15/24<br>34/20 38/16 39/8 39/9<br>39/10 39/10 40/16<br>43/1 50/16 51/3 60/25<br>61/23 79/12 81/19<br>89/1 89/3 91/15 96/17<br>97/18 97/21 97/21<br>100/20 100/25 101/23<br>101/24 102/21 102/21<br>102/22 103/19 103/19<br>103/20 104/18 104/18<br>104/21 105/17 105/17<br>105/22 106/14 106/14<br>106/23 107/13 107/13<br>107/24 108/11 108/11<br>108/25 109/10 109/10<br>109/26 110/9 110/9<br>110/27 111/8 111/8<br>111/28 112/7 112/7<br>112/29 113/6 113/6<br>113/29 114/5 114/5<br>114/30 115/4 115/4<br>115/31 116/3 116/3<br>116/32 117/2 117/2<br>117/33 118/1 118/1<br>118/34 119/0 119/0<br>119/35 120/9 120/9<br>120/36 121/8 121/8<br>121/37 122/7 122/7<br>122/38 123/6 123/6<br>123/39 124/5 124/5<br>124/40 125/4 125/4<br>125/41 126/3 126/3<br>126/42 127/2 127/2<br>127/43 128/1 128/1<br>128/44 129/0 129/0<br>129/45 130/8 130/8<br>130/46 131/7 131/7<br>131/47 132/6 132/6<br>132/48 133/5 133/5<br>133/49 134/4 134/4<br>134/50 135/3 135/3<br>135/51 136/2 136/2<br>136/52 137/1 137/1<br>137/53 138/0 138/0<br>138/54 139/9 139/9<br>139/55 140/8 140/8<br>140/56 141/7 141/7<br>141/57 142/6 142/6<br>142/58 143/5 143/5<br>143/59 144/4 144/4<br>144/60 145/3 145/3<br>145/61 146/2 146/2<br>146/62 147/1 147/1<br>147/63 148/0 148/0<br>148/64 149/9 149/9<br>149/65 150/8 150/8<br>150/66 151/7 151/7<br>151/67 152/6 152/6<br>152/68 153/5 153/5<br>153/69 154/4 154/4<br>154/70 155/3 155/3<br>155/71 156/2 156/2<br>156/72 157/1 157/1<br>157/73 158/0 158/0<br>158/74 159/9 159/9<br>159/75 160/8 160/8<br>160/76 161/7 161/7<br>161/77 162/6 162/6<br>162/78 163/5 163/5<br>163/79 164/4 164/4<br>164/80 165/3 165/3<br>165/81 166/2 166/2<br>166/82 167/1 167/1<br>167/83 168/0 168/0<br>168/84 169/9 169/9<br>169/85 170/8 170/8<br>170/86 171/7 171/7<br>171/87 172/6 172/6<br>172/88 173/5 173/5<br>173/89 174/4 174/4<br>174/90 175/3 175/3<br>175/91 176/2 176/2<br>176/92 177/1 177/1<br>177/93 178/0 178/0<br>178/94 179/9 179/9<br>179/95 180/8 180/8<br>180/96 181/7 181/7<br>181/97 182/6 182/6<br>182/98 183/5 183/5<br>183/99 184/4 184/4<br>184/100 185/3 185/3<br>185/101 186/2 186/2<br>186/102 187/1 187/1<br>187/103 188/0 188/0<br>188/104 189/9 189/9<br>189/105 190/8 190/8<br>190/106 191/7 191/7<br>191/107 192/6 192/6<br>192/108 193/5 193/5<br>193/109 194/4 194/4<br>194/110 195/3 195/3<br>195/111 196/2 196/2<br>196/112 197/1 197/1<br>197/113 198/0 198/0<br>198/114 199/9 199/9<br>199/115 200/8 200/8<br>200/116 201/7 201/7<br>201/117 202/6 202/6<br>202/118 203/5 203/5<br>203/119 204/4 204/4<br>204/120 205/3 205/3<br>205/121 206/2 206/2<br>206/122 207/1 207/1<br>207/123 208/0 208/0<br>208/124 209/9 209/9<br>209/125 210/8 210/8<br>210/126 211/7 211/7<br>211/127 212/6 212/6<br>212/128 213/5 213/5<br>213/129 214/4 214/4<br>214/130 215/3 215/3<br>215/131 216/2 216/2<br>216/132 217/1 217/1<br>217/133 218/0 218/0<br>218/134 219/9 219/9<br>219/135 220/8 220/8<br>220/136 221/7 221/7<br>221/137 222/6 222/6<br>222/138 223/5 223/5<br>223/139 224/4 224/4<br>224/140 225/3 225/3<br>225/141 226/2 226/2<br>226/142 227/1 227/1<br>227/143 228/0 228/0<br>228/144 229/9 229/9<br>229/145 230/8 230/8<br>230/146 231/7 231/7<br>231/147 232/6 232/6<br>232/148 233/5 233/5<br>233/149 234/4 234/4<br>234/150 235/3 235/3<br>235/151 236/2 236/2<br>236/152 237/1 237/1<br>237/153 238/0 238/0<br>238/154 239/9 239/9<br>239/155 240/8 240/8<br>240/156 241/7 241/7<br>241/157 242/6 242/6<br>242/158 243/5 243/5<br>243/159 244/4 244/4<br>244/160 245/3 245/3<br>245/161 246/2 246/2<br>246/162 247/1 247/1<br>247/163 248/0 248/0<br>248/164 249/9 249/9<br>249/165 250/8 250/8<br>250/166 251/7 251/7<br>251/167 252/6 252/6<br>252/168 253/5 253/5<br>253/169 254/4 254/4<br>254/170 255/3 255/3<br>255/171 256/2 256/2<br>256/172 257/1 257/1<br>257/173 258/0 258/0<br>258/174 259/9 259/9<br>259/175 260/8 260/8<br>260/176 261/7 261/7<br>261/177 262/6 262/6<br>262/178 263/5 263/5<br>263/179 264/4 264/4<br>264/180 265/3 265/3<br>265/181 266/2 266/2<br>266/182 267/1 267/1<br>267/183 268/0 268/0<br>268/184 269/9 269/9<br>269/185 270/8 270/8<br>270/186 271/7 271/7<br>271/187 272/6 272/6<br>272/188 273/5 273/5<br>273/189 274/4 274/4<br>274/190 275/3 275/3<br>275/191 276/2 276/2<br>276/192 277/1 277/1<br>277/193 278/0 278/0<br>278/194 279/9 279/9<br>279/195 280/8 280/8<br>280/196 281/7 281/7<br>281/197 282/6 282/6<br>282/198 283/5 283/5<br>283/199 284/4 284/4<br>284/200 285/3 285/3<br>285/201 286/2 286/2<br>286/202 287/1 287/1<br>287/203 288/0 288/0<br>288/204 289/9 289/9<br>289/205 290/8 290/8<br>290/206 291/7 291/7<br>291/207 292/6 292/6<br>292/208 293/5 293/5<br>293/209 294/4 294/4<br>294/210 295/3 295/3<br>295/211 296/2 296/2<br>296/212 297/1 297/1<br>297/213 298/0 298/0<br>298/214 299/9 299/9<br>299/215 300/8 300/8<br>300/216 301/7 301/7<br>301/217 302/6 302/6<br>302/218 303/5 303/5<br>303/219 304/4 304/4<br>304/220 305/3 305/3<br>305/221 306/2 306/2<br>306/222 307/1 307/1<br>307/223 308/0 308/0<br>308/224 309/9 309/9<br>309/225 310/8 310/8<br>310/226 311/7 311/7<br>311/227 312/6 312/6<br>312/228 313/5 313/5<br>313/229 314/4 314/4<br>314/230 315/3 315/3<br>315/231 316/2 316/2<br>316/232 317/1 317/1<br>317/233 318/0 318/0<br>318/234 319/9 319/9<br>319/235 320/8 320/8<br>320/236 321/7 321/7<br>321/237 322/6 322/6<br>322/238 323/5 323/5<br>323/239 324/4 324/4<br>324/240 325/3 325/3<br>325/241 326/2 326/2<br>326/242 327/1 327/1<br>327/243 328/0 328/0<br>328/244 329/9 329/9<br>329/245 330/8 330/8<br>330/246 331/7 331/7<br>331/247 332/6 332/6<br>332/248 333/5 333/5<br>333/249 334/4 334/4<br>334/250 335/3 335/3<br>335/251 336/2 336/2<br>336/252 337/1 337/1<br>337/253 338/0 338/0<br>338/254 339/9 339/9<br>339/255 340/8 340/8<br>340/256 341/7 341/7<br>341/257 342/6 342/6<br>342/258 343/5 343/5<br>343/259 344/4 344/4<br>344/260 345/3 345/3<br>345/261 346/2 346/2<br>346/262 347/1 347/1<br>347/263 348/0 348/0<br>348/264 349/9 349/9<br>349/265 350/8 350/8<br>350/266 351/7 351/7<br>351/267 352/6 352/6<br>352/268 353/5 353/5<br>353/269 354/4 354/4<br>354/270 355/3 355/3<br>355/271 356/2 356/2<br>356/272 357/1 357/1<br>357/273 358/0 358/0<br>358/274 359/9 359/9<br>359/275 360/8 360/8<br>360/276 361/7 361/7<br>361/277 362/6 362/6<br>362/278 363/5 363/5<br>363/279 364/4 364/4<br>364/280 365/3 365/3<br>365/281 366/2 366/2<br>366/282 367/1 367/1<br>367/283 368/0 368/0<br>368/284 369/9 369/9<br>369/285 370/8 370/8<br>370/286 371/7 371/7<br>371/287 372/6 372/6<br>372/288 373/5 373/5<br>373/289 374/4 374/4<br>374/290 375/3 375/3<br>375/291 376/2 376/2<br>376/292 377/1 377/1<br>377/293 378/0 378/0<br>378/294 379/9 379/9<br>379/295 380/8 380/8<br>380/296 381/7 381/7<br>381/297 382/6 382/6<br>382/298 383/5 383/5<br>383/299 384/4 384/4<br>384/300 385/3 385/3<br>385/301 386/2 386/2<br>386/302 387/1 387/1<br>387/303 |
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| <p><b>Y</b></p> <p><b>your... [43]</b> 63/10<br/>64/7 67/3 67/25 68/3<br/>68/13 68/17 69/2 69/4<br/>69/21 70/13 70/21<br/>75/1 75/1 76/4 76/14<br/>78/11 78/13 78/13<br/>78/14 78/15 80/25<br/>84/6 88/5 89/11 91/12<br/>93/15 94/15 103/24<br/>105/19 106/14 107/24<br/>108/10 108/21 109/15<br/>110/2 127/9 134/1<br/>150/19 154/12 155/16<br/>156/4 156/15</p> <p><b>your Ladyship [1]</b><br/>67/25</p> <p><b>yourself [3]</b> 3/15<br/>72/15 155/11</p> <hr/> <p><b>Z</b></p> <p><b>Zealand [13]</b> 117/9<br/>126/20 132/25 141/23<br/>143/19 143/25 144/8<br/>144/10 145/7 145/15<br/>145/25 146/4 146/14</p> <p><b>zero [4]</b> 29/18 29/21<br/>97/18 113/17</p> <p><b>zero-hours [2]</b> 29/18<br/>29/21</p> <p><b>zoom [2]</b> 19/1 100/24</p> |  |  |  |  |
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(70) your... - zoom