Tuesday, 13 May 2025

(10.00 am)

LADY HALLETT: Ms Cartwright?

MS CARTWRIGHT: Good morning, my Lady.

My Lady, Hazel Gray is the lady in the witness box. Can I ask for her to be sworn, please.

MS HAZEL GRAY (affirmed)

LADY HALLETT: Ms Gray, thank you so much for your contribution to the impact film. It was extraordinarily moving and I appreciate how difficult that must have been and how difficult it's going to be this morning, so thank you very much for what you're doing.

THE WITNESS: Thank you.

Questions from LEAD COUNSEL TO THE INQUIRY FOR MODULE 7

MS CARTWRIGHT: Could you please give the Inquiry your full name.

A. I am Hazel Amanda Gray.

Q. Ms Gray, do you have a copy of the witness statement there with you?

A. I do.

Q. It's a 26-page statement. Can I ask you to turn to the last page, please. It's a statement dated 9 April this year. And can I ask you to confirm that the contents of that statement are true to the best of your knowledge and belief?

A. They are indeed.

Q. Thank you. Now, my Lady has already identified that you have already helpfully assisted Module 7 with the story you told us through the video about the death of your parents, Violet and George Little. And we're going to start with that in a moment. But before doing so can we just identify that the statement you have provided is a statement that gives us thematic issues in respect of TTI that are of significance to the group that you're a member of: the Northern Ireland Covid Bereaved Families for Justice.

A. That is correct.

Q. And everyone will already be aware but for the purposes of this module it was a group that has been in place and started since December 2021?

A. That's correct.

Q. Could I ask you, then, to start with just expanding on what we already know from the impact video that we watched yesterday about the thematic issues of concern relating to the care -- or what happened to your parents, and their deaths, George and Violet Little. And perhaps to do so, it's clear from the impact video yesterday that they died a month apart, but can I ask you, then, to just explain what the thematic issues are that are of concern to you linked to their deaths,

please.

A. Well, they died actually a month and a day apart. And the issues were, I presumed that, you know, that -- a lot of people in the community presumed things were actually being done by our health trusts and by the government to prevent the spread of this virus, and only when it came to my own doorstep did I realise just that what I presumed was not actually happening at all, and that people who were working with vulnerable people and people who were going to get particularly ill if they got the virus, the carers coming to my mother, were actually not being tested, nor were other healthcare workers.

And to me it seemed to be a total lack of common sense that -- this was nine months into the pandemic, not two weeks or two months. This was nine months later. And these people were actually spreading a virus.

Q. Thank you.

A. And nothing was being done to counteract that.

Q. You tell us in the witness statement a little about the health conditions that your mother in particular had, and how your father was concerned to protect her from the virus, and perhaps if we just identify the visits from the carers. It's right, isn't it, that your

parents lived in quite a rural area in County Fermanagh?

A. That's a very rural area. The nearest neighbours are about a mile away, totally surrounded by beautiful countryside, and you know they lived in a beautiful house. And my father, whenever the pandemic started, he would have been -- before the pandemic started he would have been my mum's main carer, 24 hours a day, but then there was a comprehensive care package that was in place where carers would have come in four times a day to hoist my mum in and out of her wheelchair and in and out of bed. She needed personal care. My mum was as sharp as a pin mentally but physically, because of previous complications over health over the years, she was confined to a wheelchair for over 18 years.

So we relied very, very heavily -- me being an only child as well, it was more than my father and I could have managed to look after herself. So we did need those carers to come in four times a day. It didn't matter what day of the week it was; it was every day of the year.

Q. And you detail within the witness statement that because of how careful the family were being about visits and who was seeing your parents, that you are confident that the Covid came in with the carers; is that correct?

A. That's correct, yes. You see, I would have brought them

their food, and my father didn't generally go out any more whenever the pandemic came around, so they were isolated even then, sort of unless the carers or myself came, or my daughters. But whenever my dad took the infection in his foot that he ended up in the GP's, and that's when the test took place, after the GP's recommendation.

Q. Thank you.

A. That came back positive the next day and I immediately went and had a test and I was negative. So I knew that it wasn't me that had passed the virus to them.

And then my mum, obviously then we got her a postal test because of her, you know, vulnerability in January. I didn't want to bring her out into the cold, wet, damp sort of atmosphere. And then hers came back positive as well. So -- and then after hers came back positive, mine was positive as well.

So I'm fairly confident that I didn't bring the virus to them and nobody else would have been in the house other than the carers.

Q. Now you tell us in the witness statement, and in fact I think it's something that you tell Robin Swann, who we have evidence from, that I think on identifying that your father had tested positive for Covid, you in fact spoke to the carers and asked them when they'd last been

tested, and I think it was their response that really concerned and alarmed you. Can you just clarify what they told you about that when you spoke to them?

A. Well, when my father's test came back positive, my main concern was the carers were going to come within a few hours and that I needed to be sure that they were aware that they would need to take extra precautions, as I would have thought they would -- needed to do, and when I found the domiciliary care manager -- this was a Saturday morning so it was particularly hard to actually try to get somebody in, you know, the healthcare system.

So I did manage to get in touch with the domiciliary care manager and I asked him that question: when was the last time the carers would have been tested? More thinking of them, rather than, you know, that they had spread it. And his answer was it wasn't the hospital trust's policy to actually test carers who were going into the homes of vulnerable people.

And that was the shocking realisation of -- that this was what was happening in the country: that carers were going into the homes of people who were not tested.

Q. Now I'm not going to display it on the screen but what you've just described as being totally shocked we see in the text message that you sent to Mr Swann, I think who

is someone you know?

A. I've known Robin Swann for a number of years, through a youth organisation many years ago.

Q. I'm just going to read aspects of the text you sent on 7 December. So this is after your father tested positive, is in the hospital, and shortly before he died. You say this:

"I'm sorry to contact you direct Robin and I'm sure you're busy but I've made a discovery which has totally and utterly shocked me and mine. Unfortunately my dad has tested Covid positive and is now in hospital. My mum is wheelchair bound and has 2 carers coming in 4 times a day. On getting my Dad's result on Saturday morning, I asked my mum's carers when they were last tested, and they said they're never tested ... I rang their manager and I've been informed that it's not policy for carers in the community to be tested at all on a regular basis. I feel this has been the most likely cause of the transmission as my Dad rarely leaves the house now and I'm so confused as to how those looking after the most vulnerable are not being routinely screened. Again I'm sorry to have to bring you this but I thought best to go direct to you and see what the thoughts were in having this policy."

And you've also provided the fact that almost

immediately, Mr Swann responded and said he'd look into the matter.

A. That's right.

Q. And perhaps, then, if we sort of move forward, then, equally it's right, isn't it, that you went to school Arlene Foster and similarly when your father died, the terms of that message were also shared with her about a concern in the community about the lack of testing of the carers?

A. That's correct, yes.

Q. Thank you. Now, we've touched upon your father but I think it's right also that you identify that your father died first and then a month later your mother passed away. Is there anything else in respect of the thematic issues linked to your mother's death and test, trace and isolate that you wanted to bring to the attention of her Ladyship?

A. Just the fact that when my mother was in hospital, I kept getting messages from the hospital to say that my mum had tested positive. And when I would have queried the people from the Department of Health who were making the phone calls, they didn't know that my mother was actually in the hospital, and they were using me as her contact, presuming that she was in the community. So there's some sort of a haphazard system was going on,

that the people in the places that should have known didn't know where my mum actually was. But the hospital kept testing my mother, which didn't quite mean anything to me, why did they keep testing her, other than that they were keeping her in isolation in hospital.

The hospital where she was in actually had single beds rooms, so there was no wards as such. Everybody in the new modern hospital had a single room. So my mum was really isolated, and when we're talking of isolation, being in a room by yourself most of the day must have been the most horrendous experience, and not having anybody coming to visit. I mean, I can't begin to imagine what it must have been like for my mother knowing that my father had passed away and nobody was there with her to comfort her.

I mean, they did say on the day of her funeral, the 20th -- the day of my father's funeral, 20 December, she actually watched the clock and the doctor afterwards whenever they asked me to come in, because she had basically slipped into unconscious state, said that she had watched the clock. And she was very aware of the time, obviously.

Q. Now, we'll come on to one of the concerns you have in particular around -- potential recommendation around a situation where people have got -- tested positive but

are dying, and what you would like to be considered for future recommendations. I'm not going to go into the detail but you also speak very movingly in your statement about the impact of yourself having to isolate, having tested positive at a time when both parents were in hospital, and the significant impact that had upon you, isolating in their remote family home and being alone, and the profound impact that had upon you.

A. So to this day, I find it extremely hard to even go into that house now. I tend to need somebody with me. I can't spend any length of time in the house. People say to me why do I not go and live in the house and there's no way I could ever possibly, after experiencing those ten days on my own, and I mean on my own, I had to experience my father's death on my own, and had to experience everything in between, trying to make contact with the hospital, trying to make funeral arrangements, basically you did everything on your own. I would never have risked passing this virus on to anybody else.

Q. Thank you. Now, you've already identified that your parents' deaths were in December 2020 and January 2021, and your concerns that we're now nine months after the pandemic and there's still these issues that you experienced in relation to testing that really concern

you?

A. That's right, yes.

Q. But can we move now to the thematic issues, please. And in doing so we appreciate that a large number of those from Northern Ireland Covid Bereaved Families for Justice have contributed to your statement but, in particular, we're grateful for the contributions provided as to their experience of these thematic issues from Caroline Lynne, Martina Ferguson, Marion Reynolds, Catriona Myles, Catherine and Claire Regan, and Tom Black. But can I summarise with you now, before we move to recommendations, just some of the thematic issues that have been identified in this witness statement.

The statement details the concerns of the group about decisions at the outset of the pandemic and the failure to immediately prioritise testing in Northern Ireland. I think it's described as the "lost month of February" in 2020. Is there anything else you'd like to say about that issue on behalf of the group?

A. Just that there seemed to be a haphazard system in place. As I say, we had a system, and if it had been continued, who's to say that it wouldn't have made differences? The people in the know who were making decisions seemed to just follow what England were doing. So that seemed to be just the process of "We will

follow, sort of, the leader". So when we had a system, maybe we should have been actually using the system rather than just "Let's not do this anymore".

Q. And I think that's one of the thematic issues identified in the statement about the suspension of community testing and contact tracing in Northern Ireland in early March 2020 when the group believe there was available capacity still within Northern Ireland?

A. That's right.

Q. Thank you. Now, you've already told us about the concern around the testing of the care workers but I think it's right also that you'd identified an issue linked to the testing of the paramedics that attended on your parents. Is there anything you want to say about that, please?

A. Again, something which to me is very common sense would be that somebody who is coming to actually see to somebody who isn't well should be properly equipped and not just wear a basic plastic apron and a mask and a pair of gloves, paramedics were coming to my father and my mother in their uniforms, just with basic PPE, and when I asked them did they get tested, they said no. Who would do their jobs if they were going to be tested and come back positive?

So it was this attitude of: "if we don't get tested,

we won't know whether we're positive or not."

So that was obviously, again, a big issue, that this virus was being spread by people who were doing their jobs and caring for people who were already sick. So the process, to me, just did not make sense. Prevention is always better than cure.

Q. Thank you. Now, the statement also details, and perhaps if you will allow me to headline these before we move to conclusions, concerns about failures in implementing a system of backward contact tracing or to appreciate the benefits of tracing as a theme?

A. Yes.

Q. Discharge from hospital to care homes following a positive test or no test?

A. Yes.

Q. The absence of a robust system to test, trace and isolate the virus and the detrimental impact of isolation of vulnerable groups and individuals?

A. Yes.

Q. Inadequate measures to protect those benefiting from care, testing within care homes and healthcare facilities, including at the point transfer from one to the other?

A. Yes.

Q. Not effectively using measures such as testing to lessen

restrictions in isolation?

A. Yes.

Q. The absence of routine testing of healthcare workers, very much an issue linked to your parents' deaths?

A. Very much so. As I say, paramedics, carers, nurses, anybody in that profession I believe there should be more robust measures in place. Any measures would have been better than no measures at all to actually test.

Q. And another theme that's identified in this statement is inadequate financial support provided to those required to isolate, and the financial incentive to avoid self-isolating by workers?

A. Yes, that was a fear that I thought: is it because people were afraid of losing, you know, money that they are just bypassing and not get tested?

Q. Thank you.

Now, the statement with the full 24 pages of thematic concerns of the group will be published. Is there anything else about those thematic issues before I move to the conclusion of the statement that you'd wish to draw to the attention of her Ladyship?

A. No. As I say, the full statement would include all the concerns. And, as I say, it has just been shocking to find out what way the country was being run. And, as I say, so many people like myself had a presumption that

measures were being taken when they weren't. And I said it's not rocket science. It's common sense, most of it.

Q. Before I go to that conclusion, one of the things that you detail within the statement is you say this about the circumstances of you having Covid and wanting to be with your parents, you say:

"This has left me with a strong feeling that it must be a human right to have someone with you when you pass away, where this is possible."

You say that you believe this view is consistent with the views of many of the group, and you ask that the Inquiry consider this when making recommendations for the use of isolation in any future pandemic.

A. Yes. As I say, if it had of been an animal, a vet would encourage the animal owner to be there with them until the very end. I twice didn't get that opportunity, and so many people have had that similar experience.

The trauma of not being there for your parents' last breaths will stay with me forever, and I know there's so many people that that is the ultimate -- just piece of hurtful experience that they had. My parents disappeared. I never seen them again.

Q. Before I move to the conclusion, and perhaps it's just more a general issue, the Inquiry and her Ladyship has already heard much about the impact of no funerals, but

perhaps just to identify, even though there was no funeral for your father, he was a significant member of the community, a band member all his life, but his band essentially lined the street as he went past in the hearse as a mark of tribute, but that, equally, is something that you just wanted to be noted around the further impact of the loss of your father?

A. Yes. As I say, he deserved a send-off. He didn't get a send-off. I mean, people tried their best, they lined the road, they lined the streets. It was as much as anybody could do to do that for him.

Q. Thank you. So then let me then just deal with the conclusions, please. The statement of the group says this:

"[We] would ask that the Inquiry ensure that the above issues are considered and addressed in this Module, and that recommendations are made to prevent the failings which this statement identifies, and other such failings, from being reappeared in the future.

"77. One overarching issue raised is the apparent lack of humanity and common sense, which is apparent from what is described as above. I would hope that one important lesson learned is that this should be central to any response in the future."

A. Most certainly.

Q. And I think you, finally, wish to leave with your views as to what the bottom line of all of this is. Could you perhaps just deal with your bottom line, please.
A. My parents, their lives were cut short prematurely. And their experience was horrendous, for me, for them, for the whole country.

All those who lost their lives must not have meant nothing. They cannot have died in vain. We must have changes in this country, and we must have positive changes, that people never have to experience this type of trauma over a virus again.

As I say, prevention is better than cure and measures must be put in place now, and I plead with all the people that can make this difference. We must be prepared, because this could happen again at any time.
MS CARTWRIGHT: Mrs Gray, thank you.
A. Thank you.
LADY HALLETT: Ms Gray, thank you very much indeed. You've done your very best to make sure they didn't die in vain, so thank you so much for what you've done. You're obviously a devoted daughter. Have you got people to support you in your grief?
THE WITNESS: Yeah, I thankfully have.
LADY HALLETT: Apart from the members of the --
THE WITNESS: Yes, I have my daughter with me today. And my

other daughter --
LADY HALLETT: Good.
THE WITNESS: -- and my partner hopefully are watching at home.
LADY HALLETT: I'm sure they'll do their very best to get you through it. It's going to take a long time.
THE WITNESS: Yes. I just want to thank everybody in the Northern Ireland Covid Bereaved Families for Justice as well, and our legal team.
LADY HALLETT: Thank you very much indeed.
THE WITNESS: Thank you.
MS CARTWRIGHT: Thank you, Ms Gray.

My Lady, the next witness, Nicola Boyle, on behalf of Scottish Covid Bereaved is appearing over of the link.

Could I then please call Nicola Boyle.
LADY HALLETT: Ms Boyle, I hope we haven't kept you waiting. Can you hear me?
THE WITNESS: Yes, I can.
LADY HALLETT: We are just setting up the screens so that Ms Cartwright can see and hear you as well.
MS CARTWRIGHT: I'm afraid I can't see at the moment. I will twist rather than delay.

Could I ask, please, for the witness to be sworn.

MS NICOLA BOYLE (affirmed)
LADY HALLETT: Is there anything we can do to increase the volume?
MS CARTWRIGHT: If that could take place.
LADY HALLETT: Right, we're going to make an effort to -- at the moment you're fairly -- so I don't know if it's because the volume is turned down too much or you're very softly spoken so we'll do what we can to improve it but in the meantime, Ms Cartwright, we'll carry on.

Questions from LEAD COUNSEL TO THE INQUIRY FOR MODULE 7

MS CARTWRIGHT: Thank you.

Could I ask you, please, to give your full name to the Inquiry.
A. It's Nicola Rachel Boyle.
Q. Thank you. And Ms Boyle, can I check that you can see and hear me?
A. Yes.
Q. Thank you. Can we then start, please, with identifying this statement you provided to the Inquiry. It's a statement dated 10 April 2025, it's 26 pages, and are the contents of that statement true to the best of your knowledge and belief?
A. Yes, they are.
Q. Thank you. Ms Boyle, can we, firstly, thank you because your statement is provided on behalf of Scottish Covid

Bereaved and it's right, isn't it, that you detail within this statement that the common goal of the group of the bereaved members of Scottish Covid Bereaved is that you do not want your loved ones' deaths to have been in vain, you want lessons to be learned to prevent others having to experience what you have been through, and that you believe that by sharing your experiences, both good and bad, that you'll assist this Inquiry in establishing what really happened and to reach appropriate conclusions, recommendations and lessons to be learned?
A. Yes, that's right.
Q. Now, Ms Boyle, we're going to look together at some of the thematic issues which are eloquently set out over the 26 pages, but before doing so, do you wish to identify some of the thematic issues of concerns to you and your family arising out of the death of your mother-in-law, Margaret Boyle?
A. Yes, I do, thank you very much. So --
Q. Just pause for a moment.

My Lady, if you wanted to follow that passage of the statement it starts at paragraph 86.
LADY HALLETT: Thank you.
MS CARTWRIGHT: Sorry to interrupt you, Ms Boyle. Please now identify the issues that arose in Margaret Boyle's

case and her death that are a concern to you and your family.

A. Thank you. We lost my mother-in-law on 20 October 2020, she lived alone. She had some underlying health conditions but still lived a very independent life. She was very much hands-on with her children, her grandchildren, very family orientated. She really was the backbone of our family. When the pandemic began, she shielded for a number of months. That left her very alone and isolated. She lived alone and she wasn't able to see family as she normally would, mostly every day. So that really affected her quite a bit.

There was a pause in shielding if I recall correctly, I think it was perhaps around about August of that year. There was a certain relaxation of the restricting -- the restrictions, the shielding restrictions. At that point I think she was -- just felt so -- I think affected mentally by the months and months of being alone that she did decide to go out into the community, as far as the restrictions would allow. So when she contracted Covid, it was community transmission. We don't know exactly where.

It became apparent that she was very unwell with Covid. We suspected that she had Covid, we more or less knew she did, but it was trying to get her access to a

test at that point. So my husband and I had had Covid a couple of weeks, maybe about a week before she did. She was too unwell to leave the house to order a test, so -- she did have some technology in the home, but she wasn't particularly digitally literate. She was able to use it but needed to be gently coached by a family member. And in any case at that point she was probably too unwell to be able to negotiate ordering a test online, so I did it for her. I ordered a test online.

And we lived in a different local authority area from her and it took, I guess, about 40 hours to arrive. By that point her health had deteriorated quite significantly. She was too unwell to go from upstairs in her bedroom down to the front door to collect the tests which had been posted through the letterbox.

An ambulance was called for her and the ambulance crew attended and administered the test for her. However, it wasn't registered. She didn't -- the ambulance couldn't register it and she wasn't able to at that point. She wasn't admitted to the hospital. The ambulance could have took the test away and posted through a letter -- sorry, a priority postbox, however it wasn't registered so it just disappeared. We never, ever got those test results.

Days and days later my husband then, because we'd

just had Covid, he actually drove over and had to take her to a mobile testing centre, which was probably about 13 miles away, was the closest appointment she could get. So my husband took her and then returned her to home. She was then subsequently became even more unwell and was admitted to hospital, still with no test results at all. And finally the hospital tested her on admission and confirmed what we'd known all along: that she'd had Covid.

And by that point she was really gravely ill. And probably I think it was less than 48 hours after admission to hospital, she died alone in a room alone. There was no one with her when she died. We weren't allowed to visit her. And we think the hospital don't really know what time she died at. We think she'd maybe been dead for about half an hour or so before she was discovered.

Q. Thank you.

You -- across that, the issues of various different tests, either test results not arriving or the issue about not getting results, you've mentioned your husband taking your mother-in-law to that test centre. You, I think, say in your statement that it wasn't local but the only location where a test was available, and that further raised a concern about poor accessibility for

the vulnerable and marginalised, who wouldn't have had ease of access to transport like your mother-in-law had?

A. No. I mean, she had a car but she wasn't well enough to drive at all, that's correct.

Q. Okay. Ms Boyle, is there anything else you want to say, then, about the thematic issues linked to Margaret Boyle's death on 20 October 2020? But if not, we can move to the thematic issues.

A. Yeah, I think just in summary, she was elderly, vulnerable, and we feel that she was just -- you know, people like her were just forgotten about, really. There was little or no support and she was just so alone during that time, and subsequently died alone.

Q. Thank you.

Now, Ms Boyle, the statement that deals with all of the thematic issues will be published, but can we just look at a number of those that are of most concern to the Scottish Covid Bereaved. One of the issues that's identified in the statement is the link between nosocomial and care home deaths and issues with the United Kingdom's ability to successfully test, trace and isolate; is that correct?

A. Yes.

Q. The statement also details concerns relating to testing criteria, symptoms and delays in expanding wider

recognition of symptoms of Covid-19, and you say in the statement that this was due to the lead on this being taken by the UK Government and UKHSA, and that the group has a concern of the impact this had on delayed diagnosis and treatment, notwithstanding good practice guidance, particularly regarding the elderly, and the ZOE study list of symptoms.

A. Yes.

Q. And can I briefly then, on that issue, we're grateful to the Scottish Covid Bereaved for bringing to the Inquiry's attention the British Geriatric Society guidance, and very briefly ...

Sorry, it won't be displayed on the screen, but, my Lady, for your note, and it will be published, it's INQ00587314.

And I know, Ms Boyle, you will have had a chance to consider that document, and page 3 of that guidance from 25 March 2020 by the British Geriatric Society identified that, in respect of Covid-19 in care homes, residents may commonly present with non-respiratory tract symptoms such as new onset, worsening confusion, or diarrhoea; and again, I think that's an issue in particular the group wish to draw to the attention -- around essentially the classical symptoms not being there for the elderly?

A. Yes.

Q. And it being known in March of 2020?

A. Yes, that's correct.

Q. Thank you.

I think it's right, isn't it, that a further thematic issue is the lack of testing in care homes and hospitals leading to spread of infection?

A. Yes, absolutely. As you'll see from the statement, our members have plenty of examples, unfortunately, around that theory.

Q. I think perhaps on the same theme, the statement details inadequate and delayed testing within health care and care settings but also the failure to test upon transfers between hospitals and care homes?

A. Yes.

Q. The statement also draws out variations in isolation policy and strategies across Scotland and the United Kingdom, and the inconsistency in how isolation policies were implemented and adhered to?

A. Yes, absolutely, yes.

Q. The statement also identifies the issue of accessibility of mobile testing centres in Scotland for those living in rural areas and the borders?

A. Yes, that's correct. And not even just rural areas and the borders, even in the bigger cities where testing was

supposed to be more accessible as well. It just -- it wasn't.

Q. You've also identified in the statement poor communication and guidance in respect of TTI and the impact on vulnerable groups and marginalised in society, and I think you treat your mother-in-law as one of those also?

A. Yes.

Q. The statement also identifies an issue of concern regarding the Scottish local authority boundary system, that was designed with a view to ease of policing rather than risk based. And that's drawn out in the statement; is that correct?

A. That's correct, and the example, actually, of my husband driving to my mother-in-law's house to take her out for a test, you know, strictly speaking he was breaking the rules because he was going into another local authority area.

Q. Thank you. And I think you've also identified in the statement the confusing different approaches to, across, certainly across Scotland and the United Kingdom -- and England as to guidance and the confusion that resulted in respect of different approach in different areas; is that correct?

A. Yes.

Q. I think there's also a concern of the group around when the lateral flow test was stopped and free tests were withdrawn, and the impact on those on low income?

A. Yes.

Q. And you've also identified, I think, lack of provision of financial and practical support for those required to isolate?

A. Yes, yes. Our members -- well, in the statement we draw that out as well. People were, we understand, just scared of losing money or being financially ruined if they didn't turn up for work and that would have affected their adherence to the rules.

Q. I think the statement also identifies the overwhelming of contact tracing capacity in the early stages of the pandemic?

A. Yes. Tests were too slow, so what was the point of the -- apart from the inconsistencies within the contact tracing, if the testing's too slow, then that calls into question the efficiency of the whole model.

Q. Thank you. Can we then, please, unless there's any other of the thematic issues, and I appreciate there are many, many more detailed in this statement, is there anything else you want to draw out before we just briefly deal with recommendations set out in the statement?

A. No, thank you.
Q. Okay. The statement ends, from paragraph 111 through to 127, with giving the views of Scottish Covid Bereaved in respect of lessons learned and recommendations, and perhaps if we just look at number of those together. You've identified, by the group, that in respect of testing, that testing protocols and guidance in the early part of the pandemic were focused on those individuals arriving in or returning to the United Kingdom from other countries, and you have identified that no cognisance was taken of the risks of asymptomatic transmission, although this was understood from at least January of 2022?
A. That's correct, yes.
Q. Again, just identifying one of the recommendations in respect of tracing, you say that tracing of staff and patients in hospitals and healthcare settings was plagued by wholly insufficient testing capacity, and your members believe that in the early stages of the pandemic, the delay in getting the test results back, which could be as much as five days, significantly contributed to the rapid, extensive, and catastrophic transmission of Covid in hospital and healthcare settings?
A. Yes.

Q. And then in respect of isolation, you've identified that the members' experiences demonstrate that within different care homes and hospitals, sometimes even within the same ward, there was inconsistency in how isolation policies and guidelines were implemented and adhered to?
A. Yes.
Q. You also offer observations to her Ladyship that she can consider with care around scaling up prioritisation and discharge of patients from hospitals to care homes. But you say this at paragraph 124:
"Planning for a future pandemic should include robust systems for 'step-down' care facilities to relieve the pressure on acute hospitals -- like the use of Nightingale Hospitals, with provision for staffing from, for example, a pool of recently retired staff, staff redeployed due to 'pause' in routine work, those in the Army or Navy reserves, final year medical and nursing supervision."
A. Yes.
Q. And you say this:
"If such testing is available in a future pandemic we believe that no patient with a positive test or with known exposure to the pathogen, and with a test result which could be a false positive -- for example,

a situation where an individual may test negative on Day 2 ... but positive on Day 3 should be discharged into a nursing or care home unless that home has facilities for barrier nursing and full PPE."
A. **(Witness nodded)**.
Q. Then, finally, in conclusion, Ms Boyle, you say this:
"It is clear to the Scottish Covid Bereaved that testing capacity in the United Kingdom and Scotland was inadequate at the start of the pandemic. Serious improvements must be made going forward to ensure that the UK has the ability to scale up test and trace systems quickly when required. This is an issue of great importance to our members as ultimately this is key to preventing the spread of virus."
A. Yes.
Q. And then finally:
"Test, trace, and isolate is the key to protecting the most vulnerable in our society in future pandemics. It is also key to allowing relatives to be able to visit vulnerable loved ones in care settings and hospital settings and to be with their loved ones at the end of life. Going forward, there requires to be a test, trace and isolate system that is adequate, efficient, well-resourced, and can be quickly put into operation when required for future pandemics."

A. Yes, that's correct.
Q. Ms Boyle, is there anything further you wish to say before concluding your evidence?
A. No, I know that her Ladyship has the statement. I don't want to draw out any more individual instances because each of our member's experience is important, so I just leave my statement with the Inquiry.
MS CARTWRIGHT: Thank you, Ms Boyle.
My Lady.
LADY HALLETT: Thank you very much indeed, Ms Boyle. I was just looking through your statement. You and your group raised your concerns relatively early on, didn't you, about a year into the pandemic, with the likes of Ms Sturgeon and Mr Swinney and Mr Yousaf? Did anything change as a result of your raising the issues with the leaders of the Scottish Government?
A. This is slightly difficult for me to answer, I'm afraid, my Lady, because I was not a member of group until June 2023.
LADY HALLETT: Ah, right.
A. I wasn't actually involved in that process, so I regret that I can't assist on that issue specifically.
I wouldn't want to mislead the Inquiry.
LADY HALLETT: No, totally understood. Thank you very much indeed. Thank you for all that you've done to help the

Inquiry and all that you obviously did to try and help your mother-in-law as well.

THE WITNESS: Thank you.

LADY HALLETT: Thank you very much.

MS CARTWRIGHT: Thank you.

LADY HALLETT: Ms Mitchell, have you had a chance to talk to Ms Boyle, and you're okay to carry on now?

Thank you very much, Ms Boyle. I'll ask them to cut the link now.

MS CARTWRIGHT: Thank you.

My Lady the next witness is in person, it's Professor Martin McKee, please.

Could the witness please be sworn, thank you.

PROFESSOR MARTIN MCKEE (sworn)

Questions from LEAD, COUNSEL TO THE INQUIRY FOR MODULE 7.

MS CARTWRIGHT: Thank you. Could you please give the Inquiry your full name.

A. Clifford Martin McKee.

Q. Thank you. Professor McKee -- do you have a copy of your witness statement in front of you?

A. I do.

Q. It's 33 pages. It's dated 3 February 2025, where we see your signature on that last page, and can I ask you to confirm, is the content of that statement true to the best of your knowledge and belief?

A. It is.

Q. Thank you. Now Professor McKee, you set out extensively within the witness statement your background, qualifications, experience, and expertise, but can we together just identify those matters.

It's right, isn't it, that you are a professor of European Public Health and Medical Director of the London School of Hygiene and Tropical Medicine?

A. I was the Medical Director up until 2023, but I'm no longer.

Q. Thank you. Can you just give us some idea as to how long you've been a professor of European Public Health?

A. Oh, since about 1997.

Q. Thank you. You are one of the research directors of the European Observatory on Health Systems and Policies?

A. That's right.

Q. And that was a partnership posting by the WHO?

A. That's right. It is a partnership of governments, international agencies and universities.

Q. Thank you. You were and are a member of Independent SAGE?

A. Yes, I am.

Q. And you are a member of the EU Expert Panel on Effective Ways of Investing in Health?

A. Yes. Again, I was a member for three terms but it then

ceased to exist.

Q. Can we just have some idea, then, when it ceased to exist, please?

A. Oh, about three, four -- about two years into the pandemic.

Q. Thank you.

A. And then other arrangements were put in place.

Q. Thank you. Can you then, please, just help us with your role as a research director of The European Observatory and the joint responsibility for the Covid-19 health system response monitor that was used to collate information on national responses to Covid-19, again run in partnership with the WHO and the European Commission, so it might be helpful for our Ladyship to understand a little bit about that role, please.

A. Of course. So the observatory, four of us established it in 1997, initially with a number of European governments and the World Health Organisation. We've now expanded to, I think, 11 governments, the European Commission, the World Health Organisation, London School of Hygiene and Tropical Medicine, London School of Economics, Technical University Berlin, the Health Foundation in the UK, and we provide the material for the rotating EU presidency, the health reports, we provide a series of profiles of health systems in

countries across Europe and other high-income countries and we do a whole series of studies on different topics, we've done quite a lot on resilience, for example, in the light of the pandemic, and I'm currently leading our work on artificial intelligence in health, but we cover a very broad range of issues.

And my responsibility is to liaise with our partners, who are in the various governments, particularly with the World Health Organisation and the European Commission, to make sure that the work that we're doing is meeting their needs and expectations.

LADY HALLETT: So I don't have the stenographer on strike, if you could try and slow down, Professor McKee, I'd be really grateful, thank you.

THE WITNESS: I beg your pardon, my Lady.

MS CARTWRIGHT: Thank you.

Now, you were also a health adviser to the WHO regional director for Europe.

A. That's right.

Q. You're a member of the Pan-European Commission on Health and Sustainable Development in the light of the pandemic?

A. That was a report that was commissioned by the WHO regional director, it was chaired by Mario Monti, the former Italian Prime Minister and European Commissioner.

I was the rapporteur so I drafted the report and I wrote the evidence review, but it was the other commissioners who were mainly retired senior politicians, people from central banks, that sort of thing. Lord O'Neill, for example, from the UK was a member.

Q. Thank you. And I think, just for my purpose, before I ask you to clarify anything else from your expertise and experience, you're also a former president of the British Medical Association?

A. Yes.

Q. Having that term between 2022 and 2023?

A. I am, yes -- or I was.

Q. Professor McKee, we've summarised there decades of knowledge and experience. Is there anything else that I've not drawn out with you at the moment that's relevant to your knowledge and expertise before we get into the detail of your evidence?

A. No, I think that covers everything. But if I would -- if you will permit me -- just to express my sympathy for all of those who lost family and friends during the pandemic, and also my thanks to all of those who contributed in so many ways to the response.

Q. Thank you.

Now, we're going to look at a number of topics together during the course of just over an hour or so

with myself, but can we start with dealing with your role during the pandemic and contributions to Independent SAGE.

My Lady has already heard much about Independent SAGE but can you sort of, first of all, just briefly deal with Independent SAGE and its role in the pandemic, please.

A. We were a group of scientists from a range of disciplines who felt that there was a gap and it was one that we could potentially fill. It came from the -- the way in which we looked at the relationship between evidence and policy. And of course that's directly relevant to my work in the European Observatory.

I think there was a sense that questions were being asked of the scientific community in the UK without them necessarily knowing why the questions were being asked.

And we've had many examples. My colleague at the London School, Sir John Edmunds has made the point that had they had a more nuanced understanding of the way in which care workers in social and long-term care homes might have multiple jobs in multiple homes, they would have developed the models differently. And he has given evidence to say that they were not aware of that because no one from social care was in the modelling group in SPI-M.

So we felt that there is, first of all, an important value to bring together a wide range of disciplines.

And again, this stems from my previous research, I should have said, in public health. Public health science, one of the main things we do is act as a sort of glue between different disciplines and bodies of knowledge. My own personal research has included looking at the health effects of the collapse of the Soviet Union, of the global financial crisis. And there you're drawing work from laboratory science, from clinical medicine, all the way through the social sciences to political sciences, to understand how it all comes together.

So we felt that the advisory system which had the virology group and NERVTAG, the behavioural scientists in SPI-B, the modelling group in SPI-M, working almost in silos was not particularly helpful and we might be able to add something to that.

We also felt that it was important for -- and there are differing views on this, and here we drew particularly on the lessons from the Phillips report into BSE and the scientific -- and its comments and scientific advice.

I find it particularly helpful to have dialogues with the policymakers I'm advising, because I can

understand why they're asking the question and, in particular, where there are misunderstandings, because we are dealing with complex issues like exponential growth, for example, asymptomatic transmission, and often one finds that things that one side take for granted, the other side may not be aware of.

So that ability to listen and to pick up on the clues that there may be a lack of understanding, we felt that that was important.

The other thing that we felt was important was to look at how we communicated evidence, because, again from my work in the Observatory in particular, we think a lot about cognitive biases, and there is a huge amount of evidence that two people with different views on the world, perhaps political views, given exactly the same evidence -- this is including from clinical trials where this has been done by randomising them -- they will interpret them in completely different ways.

So that's why we felt it was important to find ways of synthesising the information and communicating it, which we did in our weekly briefings and in our reports, trying to make it understandable but very much listening to the concerns that the people were having and understanding what information people wanted.

Q. Thank you.

And I think in respect of the reports published by Independent SAGE, I think you identify there were some 130 or so during the pandemic, and that you contributed to almost all of them?

A. In some way or another.

Q. Thank you.

Now, we may look at the detail of a number of those during your evidence, because you particularly highlighted in your statement reports of significance to the systems of test, trace and isolate.

It's right, isn't it, that Independent SAGE provided a blueprint to achieve an excellent find, test, trace, isolate and support system --

A. Yes.

Q. -- that was published in October of 2020?

A. Mm-hm.

Q. And I think, having made views known in May of 2020 about what the system required from the perspective of Independent SAGE, that you produced a paper in respect of supported isolation in March of 2021 as to why supported isolation is crucial to prevent community transmission?

A. Mm-hm.

Q. And you provided reports on managed to supported quarantine in respect of key questions for the future in

June of 2021?

A. Mm-hm.

Q. And perhaps just briefly if I touch upon one of the reports that was provided, in October 2021, from Independent SAGE was a statement on Covid-19 testing at the Immensa Health Clinic, Dante Laboratories in Wolverhampton.

A. Mm-hm.

Q. Do you just want to briefly deal with the publication of that independent report about the Immensa lab, and can you just, first of all, identify what was the issue that was of concern to Independent SAGE around testing at the Immensa lab?

A. So the issue with this laboratory, in fact there were two contracts with this laboratory -- of the company operating the laboratory, which had a testing centre in Italy and then one in Wolverhampton in England, was that there were a growing number of reports that people who were testing positive on lateral flow tests were testing negative on the tests that were being done in the laboratory. And then, after some time, the work of the laboratory was ceased.

But I think what concerned us was that this seemed to have been a problem that had been recognised by various people for some time, and in fact it had been

raised initially in a report in The Sun newspaper in January of that year, and then the Welsh authorities, the Welsh Government and Public Health Wales, had expressed concern. They were using it for surge testing and they were getting aberrant results, and they raised it with the test and trace system in -- in -- the UK test and trace system and raised concerns. And nothing was done about this.

But what particularly concerned us was that our philosophy was that we should be listening to ordinary people.

And there was a Facebook group in Stroud, in Gloucestershire, who were recognising that there were quite a lot of people in their community who were testing positive on lateral flow tests but negative on the PCRs, and they were wondering why, and they raised the issue. And nothing was done about this.

Now, of course, when we wrote our report we could only account for what we could see that was in the public domain.

Subsequently, UKHSA had published a serious untoward incident report which sheds much more light on it, which we didn't have in our report, and really highlights many of the concerns, in fact all of the concerns, that we had about this approach to testing. So, for example, it

was claimed that the laboratory was accredited. It wasn't accredited.

Many things were claimed. It was said that everything was under control. It wasn't under control. There were major failures of governments that were illustrated in the UKHSA report, which we did not have access to at the time.

So I think we put it out because it was illustrating this concern that we had that people who were raising issues were not being listened to, the public health community in Wales and this group in Gloucestershire. And that should have been a signal to do something about it.

But letters -- and again, the UKHSA were able to look at the process, and show that letters were not answered, not responded to. There were breakdowns of communication, things that -- many things that should have been done were not done.

Q. Thank you. And I think that's additional information you've learnt from having reviewed UKHSA's --

A. Mm-hm.

Q. -- serious incident report in respect of the Immensa lab?

A. That's right.

Q. And we'll take up that topic when we hear from

Dr Harries in due course.

And can I ask you again as a broad principle, without having yet really looked any of the detail of any of these Independent SAGE reports, but can I ask, in your experience, to what extent did the government -- or the governments of the devolved administrations meaningfully engage with advice from Independent SAGE or follow its recommendations in respect of the test, trace, isolate system and the recommendations?

A. So the Scottish Government did engage, and a number of a number of our members were based in Scotland, and in fact we had very positive feedback from Ms Sturgeon on one occasion, and -- so there was that process. But it in a way took place not -- by virtue of our members being in the advisory groups.

Of course we did have -- some of our members were on SAGE in the UK, particularly in the behavioural -- in SPI-B. However, as I think you've heard elsewhere, there was a sense that sometimes the behavioural science bit was not heard as much as it might have been.

We were also heard in Northern Ireland particularly by the Assembly and several of us were invited to give evidence to the Assembly health committee and we understand that it was listened to in Wales.

But in terms of England, when we wrote our initial

report we were very determined not in any way to be unhelpful. We felt that our contribution was that we could answer questions that were not put to the scientific community -- the Scientific Advisory Group, but we shouldn't be contradicting them, the scientific advice, unless there was a very good reason. And I don't think we ever actually did. There might have been slight nuance but we were saying very much the same things.

So I did share before publication our first report with senior colleagues in the department -- in the medical part of the Department of Health and made one or two small edits.

But after that, there was no real interest at all.

Q. Okay. Thank you.

LADY HALLETT: Was it thought that you were second-guessing SAGE, in England?

A. Well, I think that -- well, I think you have already asked Sir Patrick Vallance about this, and certainly there was a view there, and obviously we were initially established by Sir David King, my Lady, and -- who had been in his role before.

We did not feel in any way that we were, and we took great care not to, because that would have been very unhelpful, particularly in a climate of disinformation.

The last thing that we wanted to do was undermine trust, and we really took quite a lot of care to do that.

But I think unfortunately, although the personal relationships were fine, there was that perception, but not from us, and -- when we really worked very hard to prevent that from happening.

LADY HALLETT: Thank you.

MS CARTWRIGHT: Thank you.

Now, I've no doubt that the Government Office for Science would want it to be made absolutely clear that SAGE's advice -- sorry, SAGE's position was to provide advice --

A. Mm-hm.

Q. -- and advice to specific questions asked, but they were not the decision makers?

A. Of course.

Q. And similarly, that the context of SAGE advice was often in the context of a specific ask without then knowing what happened to it afterwards, but from your knowledge and experience of members that contributed to SAGE, is there anything else you would wish to say about the need and role that Independent SAGE were playing at this time?

A. I think if you do look at some of the statements that have been made, there's clearly a difference in view,

I've, in the light of this, reviewed statements by Sir Chris Whitty, Sir Jonathan Van-Tam and others, who have differing views about the relationship between science and policy, and I think in one of Sir Chris's comments, you know, he talks about there -- this issue of to what extent -- in fact, he says, if you will forgive me, he says that in fact the scientific advisory group should answer the questions, should spend about, I think he said about 80% of its time on doing that, but it should have the opportunity to raise other things as well, otherwise it's only a branch of government.

I don't think that view was shared by everybody. Other people felt that it should only answer the questions.

So my understanding from reading the statement, witness statements that they gave to your Inquiry, my Lady, is that there were differing views on this. Subtly differing views.

Q. Thank you. Could we then, please, identify two different ways of describing the test, trace, isolate that you've detailed in your witness statement and perhaps just give an explanation. It's a matter that's been touched upon by the way of the terminology of the testing and tracing mattering. Can you explain why you've described the system of find, test, trace,

isolate, support, rather than simply test, trace, isolate. What's the significance of a system of find, test, trace, isolate, support?

A. So I think we see this system, whatever it is, as a system that has many different elements, all of which need to work together. And there is very little point in having a perfect testing system if you don't actually find the cases. You need -- I think the experience that we've seen in other countries, and, you know, particularly the very recent evidence that had been gained from the Ebola outbreak, again, a lot of lessons that were learnt from that, that should have been learnt from that, weren't; what was happening in South Korea, for example, the importance of going out to find cases was a critical part.

In a way, you know, it's like opening up a shop and saying well, you know, it's available, it's there, it can be used, and nobody comes. So you do need to proactively go out and find cases.

And then the S, the "support" at the end, we knew that if you were telling people to isolate, they would need some support.

And in this, I was able to draw on my work in the global financial crisis because one of the issues that we recognised in our research was the concept of

precarious existence, precarity, which was very prominent in the francophone literature until about 2012 and not so much in the anglophone literature. But it's the challenge of those people whose lives are characterised by uncertainty from one week to the next of whether they will have income, employment, food or shelter. And for them the ability to comply or adhere to instructions is really very, very challenging.

So we felt that it was important to look at their needs and to support them, and indeed, separately from Independent SAGE, we published a paper with my colleagues from Glasgow, Margaret Douglas and others in the British Medical Journal in, I think, about April of 2020, in which we were absolutely clear about the need to interrupt the transmission of the virus, but also recognised that that would have many consequences for education, for employment, and particularly for the large number of people in the UK in the gig economy, in the informal economy, in multiple employment, and it was really important to understand their lived experiences and to put in place systems that would support them. Otherwise you could -- with the best will in the world, they may want to do that but they simply can't.

Q. Thank you.

Can I ask you your views, having given a context to

the wider system of find, test, trace, isolate, support, of the importance of engagement of effective groups when devising schemes for financial support?

A. Absolutely, because again -- I mean, this stems from work that many of us have done, but when you're trying to put in place, you have a sort of ideal model of an implementation, of something that you want to put in place, but if you don't do the work to understand the lived reality of people -- maybe I could give an example of another study -- I mean, this may seem almost irrelevant but it's actually not -- where -- I do a lot of work in cardiovascular research worldwide, and a project, a clinical trial we did of an innovation in Malaysia and in Colombia, where we spent a year working with the communities. The basic elements of the intervention were the same in both countries but we spent a year working with the communities to understand in these rural areas the lived reality and to design our intervention, to be consistent with that.

We need to find out how people live their lives, what they do on a Tuesday morning. What they do on a Friday evening. What are their fears? What are their anxieties? So I think we felt that that was crucial, and, of course, community leaders can play a role in that. I'm not naive. You can't start going out and

doing extensive long-term research in the middle of a pandemic, but I think you need to be gathering all the information you can, and not be doing it on a, sort of, preconceived template of where you go and do things. You should be -- again, like my point about the Facebook group and the Immensa Laboratory, when signals come in from somewhere, we should be making use of them -- in a way, drawing on what the intelligence services now do, and with the concept of open source intelligence. The same sort of idea.

Q. Thank you. I'm going to ask, please, to be displayed, please, it's paragraph 11 of your witness statement which is INQ00475066. It's internal page 5, please.

Now, just to orientate ourselves, we're on the 4 May 2020 following a public briefing from Independent SAGE.

A. Mm.

Q. And we can see detailed within this paragraph, it's said as follows:

"Can we take a whole systems approach to understanding tracking and tracing ... we are arguing for someone to map out all the functions that need to be in place from accurate population registers to quality control of tests, and with a particular focus on the boots on the ground, which I would argue will have to be

in local authority public health and environmental health departments."

Now, can I ask you first of all, you reference "boots on the ground" and "local authority public health".

A. Mm.

Q. Do you have any comment on the use of the public health structures in May of 2020 in respect of this system of test, trace and isolate?

A. I think that, my Lady, your Inquiry has already heard quite a lot of evidence that people in the public health community felt that they were left out of the system, that they were not brought in, and yet, when they were, as in Leicester or Sandwell -- and you will be hearing later, from Liverpool, then that actually made a material difference, because they understood the local context. And again, later in my witness statement, I provide links to accounts of, in particular, Leicester, where you had a challenge with multiple languages being used, and in fact, we've heard from the impact statements, and so on, of the challenges of not doing that.

The approach that we were advocating here is one that we use in our research anyway. The need for looking at a problem, to give you some examples from my

own work, why is it that people with Type 1 diabetes in many countries in the world are dying unnecessarily? Insulin has been discovered since 1921. It should be easily available. But there are so many things that need to come together to get the insulin into the country through the airport, distributed across the country, to have the trained staff who can -- and the pharmacists, and so on.

So when dealing with an issue like this, or our work on cancer screening, which is what I referred to at the bottom there, you need to have everything in place and you need to not just look at one focus -- it's not just about having lots of tests. We know to take an example, with cervical screening, as an example, Germany does vastly more cervical screening tests than Finland and yet gets far worse outcomes because it's not organised and there isn't a systematic approach. In Finland they have a systems approach and it works.

Q. Thank you.

And so can I ask you, with that paragraph identifying the need for a whole-system approach, we know this is the beginning of May 2020 and that by 28 May 2020, each of the four nations had implemented their strategy, under different titles, for test, trace and isolate.

A. Mm.

Q. Are you able to comment on whether each of the nations did implement whole-systems approach in their TTI strategies?

A. I didn't really see evidence of that, to be perfectly honest. And that -- of course I was not in the room where it happened, so it may be that these things were discussed. And of course there were many practical challenges, so I don't want to second-guess what people do. But the nature of the dialogue that was reported in the number of tests being done and so on did not signify to me that these issues were being taken account of. And particularly when we listened to, from the impact statements, the reports of: where do you go to get a test? How easy is it to get there? How fast can it be got back? These are all the things that a systems analysis would do, and which were done in countries like South Korea and Germany and so on.

Q. Thank you. We'll look at those together a little later in your evidence, but, before we take a break, could I ask you just to give us a bit more detail around a document I displayed yesterday as part of my opening, which is -- in fact you and your professional colleagues are the authors of the --

A. Yeah.

Q. -- "Win the game".

Please could we display INQ000587459, the snakes and ladders.

A. Okay.

Q. Can I first of all ask what you were intending to demonstrate by using snakes and ladders and how the need for test, trace and isolate to -- how that process should work, please.

A. So I think what we were trying to convey in a -- was that we did need a systems approach, that it wasn't just about doing lots of tests, that you needed to have all of the elements in place. So it was a way of trying to represent a systems approach.

But the other thing I would say is that this was really part of our view that you need to try to explain these ideas in ways that are understandable. We know, for example, and your Ladyship has already heard about the challenges that people faced with concepts like exponential growth, there are international surveys of graphic literacy and the ability to understand graphs, which is unfortunately, sadly, much lower than we might want it to be. So therefore, when we are communicating science, we need to think of other ways of doing it.

Now, others will judge whether this was successful or not but we felt that it was a way to catch people's

attention, to make the point that you needed to have all of these elements in place, and that there are -- in a way, the snakes and the ladders are what we would talk -- if I was giving a lecture on systems theory, I would say this is about the path dependency, the non-linear relationships, and the feedback loops which characterise complex systems. But this is perhaps a better way of explaining it to people who aren't into the issues of complexity theory.

MS CARTWRIGHT: Thank you.

My Lady, is that a convenient place to take a break?

LADY HALLETT: Perfect timing, Ms Cartwright.

MS CARTWRIGHT: Thank you.

LADY HALLETT: We take regular breaks, Professor, I hope you were warned, for the sake of everyone, particularly the stenographer. I shall return at 11.30.

MS CARTWRIGHT: Thank you.

(11.15 am)

(A short break)

(11.30 am)

LADY HALLETT: Ms Cartwright.

MS CARTWRIGHT: Thank you.

Now, Professor McKee, I just want to deal with some aspects of chronology in the system in Independent SAGE's view, and to start this next portion of

questioning can we just look at your paragraph 14. It doesn't need to be displayed.

A. Paragraph 40, 4-0?

Q. 14. You say:

"On 11th September 2020, we [that's Independent SAGE] published a report entitled 'Testing for COVID-19: the why, the who and the how'. In summary, we emphasised that controlling COVID-19, especially without widespread immunity, requires an integrated approach involving expanded testing, rapid contact tracing, and effective isolation measures. The goal is to achieve minimal transmission rates, thereby avoiding damaging lockdowns. Testing is seen as a comprehensive pathway that beginning is by identifying individuals for testing and leads to actionable public health interventions."

And it says:

"We criticised the UK testing system, NHS Test and Trace ... for focusing on volume rather than effectiveness."

Can you just expand on what the criticism is around volume rather than effectiveness?

A. Well, we obviously needed to have lots of tests, so volume was important. But it should not be an end in its own right.

And again, I go back to my earlier point, to use the

example of cervical screening, where there are countries that do lots and lots of cervical smears but actually get very, very poor outcomes because they're not doing it as part of a comprehensive system, not necessarily screening the right people, the people at most risk, and then not having it as part of an integrated pathway so that if a woman gets a positive result then she's followed up and gets appropriate treatment.

So this was very much in keeping with the way in which -- with our approach to research, in health systems, in that we are dealing with systems that are all interlinked, and interact with each other.

I'm not going to get into a lecture on systems at this point, but there is a large body of evidence that is used to help us to see through these things, and how they interconnect. Basically finding out who is in charge of each bit of the system, what it is that they're doing, what is their world vision -- we use the term "Weltanschauung", a German word, to understand how they see their bit of it, the environmental constraints. Who owns it? Who can make the final decision about continuing something or stopping it?

So that was where we were coming from, that we needed to be seeing all of these different bits and how they related and basically who was in charge.

Q. Thank you. And you say "basically who was in charge", and so was there some doubt in your mind as to who was in charge in September 2020?

A. Well, we do say that at least in one of the reports, that obviously Baroness Harding was in charge, ultimately, and there were group of, I think, 15 people, and the senior management who were looking at different bits. We were concerned about the lack of a public health input there, and the ability to bring all of these things together. I think the -- again, the concern that there was insufficient attention to -- you know, within a complex system like that, one should be monitoring those groups that are not being tested, identifying the barriers they face and doing something about it.

Q. Thank you.

A. We felt that there were a number of gaps there that, had a proper systems approach been taken, then many of those problems, which we have heard in the impact statements, many of those problems would have been addressed.

Q. I'm going to take you in a moment to the statement you referenced around the role and involvement of Dido Harding, but, before I leave the content of paragraph 14, there is the criticism contained within that statement to the United Kingdom system, NHS Test

and Trace, and can I just clarify, did the criticisms that were pertaining at that time in September 2020 apply equally to the approach to test and trace adopted in Wales, Scotland and Northern Ireland?

A. I think it's fair to say that we did not give so much consideration because most of us did not have the detailed knowledge to be able to distinguish what was going on there.

Q. Thank you. Well, then let's move together to the document where we do see the reference to the role of Dido Harding. It's "A blueprint to achieve an excellent Find, Test, Trace, Isolate and Support system". It's INQ00045926 (sic).

A. Mm-hm.

Q. If we ask for that to be displayed, please. Sorry, INQ000145926. I apologise, I gave a rogue reference.

A. Mm-hm.

Q. Thank you.

A. Yep.

Q. Perhaps if we just orientate ourselves, we can see we're now on October 16, 2020, when this document was published. And if we turn over the page, please, to the "blueprint to achieve an excellent Find, Test, Trace, Isolate and Support system", why was it felt in October 2020 that there was a need to be setting out

a blueprint from Independent SAGE's perspective?

A. Well, because we felt that the system was not delivering what it should have done because by this stage we had seen the experience of a number of other countries, South Korea, most notably, but actually, Germany, Belgium, Uruguay, various others, that seemed to be doing this much better. And so we felt that, well, first of all, having a comprehensive system was important to arrest the spread of the infection but also to allow people to live as normal lives as possible. It's both parts. And in our other papers we've talked about the different roles that testing can do and I know that Professor Buchan will also be talking about this later because he and I co-authored one of the papers that looked at this.

There are many purposes of testing and it is about balancing, it is about trying to reduce, as far as possible, the spread of the infection but also minimising the adverse consequences, and we felt that it wasn't delivering that. We felt that we were getting the worst of both worlds.

Q. Thank you.

Now, we can see the summary of the blueprint that's set out there, which was Independent SAGE were calling for the replacement of what's described as:

"... the failed, falsely named and private sector run 'NHS' Test and Trace with a system for England which is rooted in the regions of England and in local areas. It must be integrated throughout with the National Health Service and provide for the needs of people and the communities in which they live."

Is there anything further you would wish to expand upon --

A. Yes.

Q. -- why that was the view of Independent SAGE?

A. Yes, because we did not feel that it was actually delivering on the testing and tracing. I would maybe want to clarify the point about private sector involvement. We're not ideologically opposed to private sector involvement. The private sector is clearly hugely important in many areas, like the production of technology, and of pharmaceuticals and so on, and, you know, many of us, myself included, have worked closely with many of the major pharmaceutical companies in the past and therefore recognise that they have a role.

But the difficulty is, and this partly stemmed from earlier work that we'd done looking at the private finance initiative, and the challenge that came out of the papers, the work that I and colleagues had been involved in, yes, there's the expense, but the

fundamental problem is that once a contract has been agreed, it is incredibly difficult to change. And we see that with the PFIs for the hospitals, where the models of care have been developing over the 25 years of the contracts and you can't really change them.

And that actually came out from one of the other documents that you supplied me with and asked me to comment on: a meeting between the Secretary of State for the Foreign and Commonwealth Office and the Secretary of State for Health and the Chancellor of the Duchy of Lancaster, where a paper was produced which looked at experiences in other countries, and the comment from the Health Secretary was: yes, thank you, but of course, we have already designed the test and trace system and therefore we can't actually change it.

I mean, obviously they could in due course, but we were concerned about the inflexibility and particularly when we looked at some of the experiences where the army had been delivering the mobile testing centres and had demonstrated a degree of flexibility, I think one of the papers that I referenced illustrates that, that they were able to, for example, the contract specified that the testing centres should be open during working hours, but it was in a place where many of the workers were on night shifts and that could not be changed, whereas when

the military were doing it, they could change it.
So I think that's the flexibility in these contractual arrangements, which actually other countries like South Korea seemed to be able to overcome, there's a less adversarial system and a degree of flexibility that we seemed to be very -- we seemed to struggle with doing so. It's really the flexibility to adapt to changing circumstances.
Q. Thank you. Can I just pause you there.
You referenced in giving that answer one of the documents that's been provided, I think, as part of your evidence pack. And is the document you're identifying the minutes of the Foreign Secretary and --
A. Yes.
Q. -- First Secretary of State's meeting regarding international comparators --
A. It is.
Q. -- of 8 May 2020?
A. Mm.
Q. I'm not going to take you to it but, for completeness, my Lady, that's INQ000088651.
I just wanted to orientate the date of that meeting you were referring to.
A. Mm-hm, yeah.
Q. Can we then return to the blueprint, the SAGE blueprint,

please, and I'm looking now at the third bullet point, please, we see there. It says this:
"In each top-tier local authority, the local Director of Public Health should have the leadership role and convene the necessary management structure in conjunction with the local NHS and local authority."
Why were you making such a call in October of 2020?
A. Well, I think this reflects a view that we had -- many of us had actually since the changes in 2012 when the reorganisation of the NHS took place and the directorate at the role of the director of the public health in our view was somewhat diminished and obviously had suffered from loss of resources. But we still felt that these were the people who ...
I go back to my point that public health is the glue in the system. It is having the epidemiological knowledge but if you look at -- you know, in our training, because we train many of these people who go on to these roles, they have training in economics and sociology and behavioural sciences and epidemiology and statistics. Now, obviously if you have a complex statistical question you will get a statistician to do it, but it is the ability to bring the things together that we feel that the director of-- a well trained, highly motivated director of public health should be

able to do. To understand that it's not just about the numbers. They can understand the graphs, they can understand the trends, but they also understand the social determinants of health, the inequalities, their causes and so on, and can synthesise it. That's where we feel that they can make a contribution.
Q. Thank you.
Turning then to the next bullet point, it records:
"Laboratory capacity, in particular, is crucial to our ability to control the virus throughout the [United Kingdom]. Independent SAGE calls for the establishment of a national COVID testing consortium, including all current providers, under the auspices, oversight and management of NHS."
So, just pausing there to understand the point that was being made, the Inquiry is aware that at this point the project of establishing the Lighthouse laboratories had commenced.
A. Mm-hm.
Q. Can you assist with what was being said there about what was required around laboratory capacity?
A. I think you will hear more from Sir Paul Nurse and Professor Alan McNally on this, however, reading what they have said -- in fact we do quote Paul Nurse in this report -- there was a sense that there was capacity that

could have been used and was not being used, there were problems with the flow of reagents. And he will say this much more eloquently and with much more detailed knowledge, and I think Professor Pillay will also talk about this later on in this module.
But from what we were hearing -- and of course Deenan Pillay, Professor Pillay, was one of our members in Independent SAGE -- then we felt that there was a need to bring everything together so that people could identify where the problems lay and what might be done about them. We felt that it was fragmented and we felt that -- well, I think you will hear more about what we felt at the time.
Q. Thank you. And in fact we don't need to turn to it at the moment but, just whilst we touch on that topic, you do detail within the witness statement the concerns regarding the outsourcing of the TTI programme despite the availability of NHS, public health, veterinary and academic laboratories.
And you've already touched upon the concerns relating to Immensa but also the under-utilisation of existing capacity, smaller targeted testing facilities, to go alongside --
A. Mm-hm.
Q. -- the development of the larger Lighthouse labs?

A. Yes, because the situation in different parts of the country will be different. The way in which you organise the testing will be different in London from the Outer Hebrides, for example. So I think you do need to have that degree of flexibility.

And, you know, that's my -- has been a concern that we've had about many of these centrally-led initiatives. Of course the science is the same everywhere. The principles are the same. But there should be sufficient flexibility, as there was in South Korea or in Germany, with the decentralised structure to adapt to what the situation that you're faced with is.

Q. Thank you.

Now, the next bullet point is the following:

"Isolation will not work unless people are supported to enable them to isolate. Self-isolation should be replaced by 'supported isolation' with assistance, if needed, with accommodation, domestic assistance, and financial support up to £800."

And again, perhaps just to orientate at this time, particularly in England there had been, from the September, the availability of the £500 --

A. Mm.

Q. -- under the Test and Trace Support Payment Scheme. Can you assist on why it was that Independent SAGE was

suggesting the £800?

A. Well, I think when we work out the -- first of all, a lot of people were not able to get the £500, so that was a problem and it was a complex system, and I think we've heard that there were differences in the ability of people to get it in different parts of the country, but we just felt that it was inadequate, actually, for the cost that people were bearing.

I can't say that we did anything particularly using primary data to come up with £800 but we certainly felt it should be more than £500. And we also were mindful in all of this that the amount of Statutory Sick Pay in the UK is right at the bottom, right at the bottom, in Europe, in fact in the table I have here it's below Estonia and Slovakia and Bulgaria when you look at the first week of sick leave. So we were being very miserly compared to other countries.

Q. Thank you.

Can we move then, please, to the next page of the blueprint. We can see that it details:

"Eight months into the pandemic, it's clear that England's find, test, trace, isolate, and support programme ... is failing, leading the government to rely on a succession of restrictions on people mixing to control the pandemic. The result is that the

United Kingdom has some of the greatest excess death rates and economic damage anywhere. In the second quarter of 2020, the UK's GDP fell by 20% or around $143 billion according to the OECD1. South Korea, which rapidly suppressed the virus through a smart system of test, trace, isolate and support, experienced only a 3% drop in GDP, with only two short local lockdowns."

Again, can I confirm, was that the universal view of Independent SAGE at this point, that the system was failing?

A. Yes, I think it was, as far as I recall. I think so.

Q. Now, I think this is the passage you've already highlighted. We can then see:

"'Who is in charge?', asked our Nobel laureate Sir Paul Nurse in several media interviews earlier this year. The answer for [Find, Test, Trace, Isolate, Support] is Baroness Dido Harding and her 15 advisers in what is now the most important boardroom in the United Kingdom. Thousands of lives, jobs, businesses and pensions, as well as the NHS, now depend upon their decisions. Yet the board has no director of public health, no data scientist, [general practitioner] or nurse, no social or behavioural scientist, community mobilisation expert, virologist, local politician or NHS logistician. We believe the government now needs

a radical reform ..."

So can you just be clear about what was really being said at this time?

A. This was the point that we needed to have the testing and tracing system as part of a broader system which would encompass all of the things that we were saying and all of the elements that we had on our snakes and ladder graphic. We just felt that there was very much a numerical focus on getting the number of tests up, the number of people contacted, but without really thinking through what it was trying to achieve, and in the previous paragraph, we'd basically alluded to the view that there are alternative ways of doing this.

Q. Thank you.

I'm going to, before leaving this document, take you over the page again, please, and just to ask for some clarification, please, on paragraph 3.

A. Mm.

Q. We can see it's identified that:

"The key local figure with the responsibility for population health is the local Director of Public Health. Within each upper tier local authority in England, the appointed [Director of Public Health] should be placed in charge of organising and managing the FTTIS programme. In Scotland and Wales they cover

manageable populations and work closely with the multi-disciplinary outbreak management teams. Northern Ireland is handicapped by having, since 2009, only a single [Director of Public Health] for the whole province and they should consider how public health expertise and the FTTIS resources can be deployed to ensure adequate connection with local communities and councils. The active involvement of key health professionals at a local level, including [GPs], community pharmacists, health visitors, environmental health officers and school nurses, will be extremely important and should be part of ongoing communication networks that ensure everyone understands the vital role that they can play."

Are you able to comment any further on how only having one Director of Public Health negatively affected Northern Ireland?

A. I think the problem there was that there had been a sustained disinvestment in public health. When I tried -- I qualified from Belfast, I trained in internal medicine then subsequently in public health and I worked in public health at a time when there were four health boards in the province, and at that time there was a substantial public health infrastructure which had been eroded quite markedly. I left in 1987. So I think

that it wasn't just that there was only one Director of Public Health; it was the fact that this was symptomatic of a significant disinvestment.

But again, it goes back to the need for local knowledge because although it is only a small country, a small territory, there is quite a lot of diversity within it. In fact, we heard from one of the impact statements that in the rural areas of Fermanagh or Tyrone, are very different from the built-up areas, the post-industrial parts of Belfast. So I think having that detailed local knowledge, and in particular, I think, what is so important in all of these is that the Director of Public Health has the personal contacts and the trust and the -- those relationships that allow you to work out where there are weaknesses, where maybe somebody is not up to it and they need to be supported or replaced or something like that, and it is quite difficult, in a territory that is actually the size of some independent -- larger than a number of independent countries like Iceland or Malta or even getting up to the population of Slovenia or Estonia.

Q. Thank you.

Now, again, just for the matters of chronology, can I take you briefly into the statement on the Immensa laboratories which was published on 22 October.

A. Mm-hm.

Q. It's INQ000535915.

Thank you.

If we move over the page, please, we can see detailing there and I'm not going to go into the detail, the concerns that Independent SAGE had as to the move to the use of the private contractors.

A. Mm.

Q. But then can we move over the page again, please, to paragraph 7. We can see a call again for:

"The need to rapidly re-assemble [Public Health England], NHS and aligned university laboratory capacities and their clinical leaderships, to drive future laboratory support of COVID response. This should be associated with the migration of outsourced contracts back to such a consortium wherever possible."

Now obviously this is as the Lighthouse laboratories were established and being increased, and I don't want to display the map of when each was opened --

A. Mm-mm, yeah.

Q. -- but, again, can you provide any detail, or are you deferring to others, to give the detail as to why, still in October 2020, there was this call to essentially do something different around laboratories for testing?

A. So, in the first paragraph of the recommendations we

called for a rapid publication of the report of the UKHSA review process, which we now have, the final report of the Serious Untoward Incident Investigation.

We were concerned about issues of governance here, of oversight of the contracts. And I have to say all of our concerns have been -- were in fact validated by that very detailed review by UKHSA.

And we found that, for example, statements were made that a senior public health doctor said that the lab was accredited to all of the appropriate standards, a government spokesman said the lab was fully accredited by the UK's independent accreditation service, and then the independent accreditation service said that it wasn't, neither it nor the Italian labs that were part of the same company had ever been awarded UKAS accreditation.

And what became clear was that what was being accepted in the due diligence for these contracts was that a commitment to become accredited rather than actually be accredited.

So there were lots and lots of concerns, and there are many more, of letters not going -- going unanswered. No one quite clear who to talk to about the problems. And we just felt, from what we had at that stage in the public domain, that it really wasn't working and

somebody needed to look at it again.
Q. Thank you.
And I think if we could just go back a page, please, we see at the bottom of page 2 -- thank you -- the reference there to, I think, the statement:
"In the aftermath, Dr Jenny Harries ... announced that the laboratory in question was fully accredited ..."
And the rest of the detail you just set out.
A. Mm-mm, yeah.
Q. Thank you. Can we then move to just some general questions, please, about TTI mobilisation and infrastructure.
Could we please display INQ000535912, which is the Independent SAGE position paper on supported isolation.
Thank you.
So we can see this document is March 2021.
And can we move then, please, to page 4. We can see, under the paragraph "The UK experience with supported isolation" it's recorded that, in March 2021, Independent SAGE expressed a view that the UK:
"... could have broken transmission chains if we had mobilised local test and trace capacity during February and early March 2020, with proper incentives for isolating households, and community facilities provided

for less severe cases."
And so can I ask, do you maintain the view expressed by Independent SAGE and consider that TTI could have been effectively mobilised in March of 2020, despite barriers including the lack of infrastructure and speed of the seeding infection?
A. I think that it could have been mobilised. I mean, obviously whether we would have definitely been successful, that's a question that we can't answer. We don't have the counterfactual. But -- and it was, of course, complicated by the fact that there was so much seeding of cases across the United Kingdom coming in from holiday resorts and -- you know, people coming back from holidays and so on, and obviously the football match in Liverpool and so on.
So I think that I -- I'm not sure I would say with absolute confidence that we would have done it, but I think that we would have had a much better chance of doing that. And particularly because whenever those local test and trace teams, led by the very competent directors of public health in places like Leicester and Sandwell and Liverpool and so on, when they did get mobilised they were able to add substantially to what was being done by the National Test and Trace System, because they had the local knowledge. And of course we

also wouldn't have had to wait.
The thing is that I think it's often underestimated just how difficult contact tracing is. People who contact trace for meningitis or for tuberculosis or sexually transmitted diseases are often soliciting from individuals the most intimate details of their life, who they did different things with, what they did with them, and so on and so forth. And that requires a degree of skill.
Now, obviously there is a limited tracing capacity, but it would have been possible, in our view, to have redeployed people under their guidance and support, as happened, for example, in intensive care units: we didn't have enough intensive care nurses to manage all the ventilators, but one could manage less-well-trained staff to look after two or three of them, and therefore essentially multiply your force.
So I think that we could have done more. I can't -- I can obviously not be certain that we would have been able to do -- to have stopped it.
I also have to recognise that -- to go back to the point about complexity, where path dependency starting conditions are incredibly important -- we were not in a good place. And, my Lady, your report from Module 1 makes this very clear, that we were not where we would

have wanted to have been, whereas South Korea and Germany and other countries were in a much better place.
So I think we could have done better, but I can't be confident that we could have stopped it.
Q. Thank you. We will come on to look at international comparators, particularly around contact tracing, when I move to another topic. But can I ask you, just on another document that's been provided to you, please.
Could we, please, display the Academy of Medical Science paper INQ00475107, and this internal page 36 of that paper, which was from July 2021.
I know you've had an opportunity to consider this document.
A. Mm-hm.
Q. And obviously this was also commenting on the Academy of Medical Science view as to failings in TTI.
A. Mm-hm, yeah.
Q. But having had a chance to consider this document, do you agree that United Kingdom failed to prepare adequately for the predicted autumn second wave?
A. I do, I'm afraid. I don't think that the time was used -- in many ways, and not just in this, I think that one of the things that other countries did -- I'm thinking of Germany and Belgium in particular -- was to really prioritise ventilation, filtration, clean air

quality. That's something that we really could have done to allow us to reopen particularly schools much earlier, to make them safe.

But I felt that there was a sense that almost this would be over by Christmas, and -- among many people, and we did not do the -- put in place all the things that needed to be there. Yeah, I agree with that.

Q. But can I ask you, because I think this Academy of Medical Science paper identifies that -- the failings that they have identified was failing to improve testing, tracing and isolation, despite the calls that had been made from bodies such as the Academy of Medical Science.

A. Yeah.

Q. I know you went to deal with -- you accepted that around ventilation and air quality, but do you share views as to the role that TTI played in respect of the predicted second wave?

A. I do. I do.

Q. And that having been established, could you assist as to what steps should have been taken during the period, and particularly towards the second wave?

A. I think what was already happening in some of the local authorities that I've already mentioned, I think we should have been learning the lessons from them, and

finding out what worked -- I mentioned Leicester in particular, Sandwell, and some others, and looking at how we could have replicated that elsewhere because they were working with the national Test and Trace System but they were going beyond it. There were a lot of issues around data flows and I think Professor Buchan will talk to you about the challenges that they faced with getting data in Liverpool.

So those arrangements could have been resolved, I think, during that time. The communication networks, the communication pathways could certainly have been improved. So generally, making the system work better.

I think, at the same time, we were finding that there were parts of the countries where, not unsurprisingly, places where there were large numbers of families in homes and multiple occupancy, overcrowding, from ethnic minorities where there may have been issues with language and so on, I think more could have been done to understand the barriers that had to be overcome to put in place the -- to make sure that the system was as responsive as it could be, because in effect, what was happening was that those communities were -- by your inability to really drive down the infections, you have a locus from which the cases can then subsequently expand.

Q. Thank you. That can be taken down, please.

Can I then seek your views, please, on the topic of asymptomatic transmission --

A. Mm-hm.

Q. -- which you've touched upon throughout your statement in various places. Perhaps if we orientate ourselves, and it doesn't need to be displayed, if you want to go to your paragraph 23 where you've commented upon:

"... the acknowledged challenge posed by asymptomatic individuals who can unknowingly carry and spread the virus. This underscored the importance of widespread testing and effective tracing to identify and isolate those cases even when symptoms are absent."

You have also helpfully referenced in your statement studies you published in June of 2021 looking at lessons from countries that implemented find, test, trace, isolation, and support, and I think those reviews also observe that rapid testing strategies, including point-of-care testing --

A. Mm-hm.

Q. -- and serologic assays were implemented to confirm outbreaks and detect asymptomatic cases.

Can I seek your view, then, on the position that, at one point, that there was no value in testing even when symptoms were absent?

A. I think it comes back to my point about "finding" as being a find, test, trace, and so on. I think what we learnt from a number of episodes early on, in fact from February 2020, March 2020, that this was an infection that was spreading among people who were asymptomatic and, particularly, a whole series of examples from choirs in the United States in Seattle, in South Africa, at a funeral, where people had done the backward contact tracing; in a case in a church in Korea where 5,000 cases were linked to one church service. And that highlighted the importance of going out to find people -- to recognise that the transmission was occurring before people developed symptoms, which is unlike with a number of other viruses, and it just adds to the difficulty that we face. Often, you know, with others, people are spreading once they have actually become infected, and that's somewhat easier to deal with, but this was a virus that was already spreading in people who had not yet developed symptoms. So it called for doing something other than waiting for them to develop symptoms, and then coming forward for a test.

So I think asymptomatic testing was important.

Q. Thank you. Can we then --

LADY HALLETT: Can I just ask, when do you say, do you say February onwards that should have been --

A. Well, there were examples from other countries. It comes back to this point about learning lessons from elsewhere, which I don't think that we were terribly -- we were doing terribly well, and there were a number of cases in Amsterdam, in Germany, in Seattle, where this was becoming clear. I think it was not appreciated whenever the virus first emerged -- the assumption was that people would get infected, they would start coughing and they would spread it. But then we already had the signs from February in fact, from some of the -- I think from South Korea -- that -- but multiple cases that came out that really did, for many of us, did set the alarm bells ringing, my Lady, but did not seem to have set them ringing in all the right places.

And I think, actually, you have heard it elsewhere, there has been a reluctance, for a long time, to accept the nature of the airborne transmission of this virus even though the evidence was accumulating.

MS CARTWRIGHT: Thank you.

Just on that timeline, could I take you, please, to INQ000475172, which is the press release that accompanied --

A. Oh, yes.

Q. -- the further expansion of access to coronavirus testing on 28 April 2020. And if we just move to the

next page, please, we can see that on 28 April 2020 the United Kingdom Government announced that testing of all asymptomatic NHS and social care staff and care home residents was being rolled out.

"Working with Public Health England, the Care Quality Commission and the Association of Directors of Adult Social Services, the Government is piloting sending packages of 'satellite' test kits directly to care homes across England to enable testing of residents."

A. Mm-hm.

Q. Can I ask you then: are you able to comment on the likely impact of the delay in ensuring regular asymptomatic testing for care home staff and residents from 28 April until mid- August 2020?

A. I think that is a question for the modellers but I might make a broader point on this, if I may, which is that the continuing changing of the advice was confusing and undermined trust. And often, talking with my colleagues, we've developed a sense that with so many aspects of what people were being asked to do, it was to fit with the available resources, be it what PPE -- how much PPE was available, how many tests were available, and therefore the scientific rationale was retrofitted to that, whereas I think if there had been a clearer

explanation as soon as we had the evidence about the nature of transmission and what needed to be done, but also, and I accept that it's incredibly difficult, politically, to say, "In ideal circumstances we would like to do this, but we cannot because there is a global shortage of lots of things", then I think that would help with trust.

Now, it may then be more difficult for the politicians because they face more questions about "What are you doing to fix this?", and so on, but the way in which many of these things are presented it is as if -- well, we are told that the policies will change without any clear explanation for why, and it is difficult to look at this and say that the nature of the virus has changed, the nature of the science has changed, particularly with a government that is claiming to have been led by the science. This gives the impression of being led by the resource constraints, which is perfectly acceptable and understandable, but it would help with, I think, preserving the trust which is so important in all of this, and eliminating -- and reducing the confusion.

Q. Thank you.

Now, I think your answer just covered this, obviously the delayed implementation of asymptomatic

testing for healthcare workers is of particular concern for Covid-19 Bereaved Families for Justice Cymru. Is there any other clarification you would wish to give about the introduction of testing, asymptomatic testing as it applies to Wales?

A. I can't say specifically with regard to Wales but I think generally, there has been so much written about the circumstances in which -- I mean, by people like my colleague, Rachel Clarke in her book "Breathtaking" or Dom Pimenta in his book about trying to reach out to procure PPE, I think we have -- there is definitely a sense that people on the front line were not being listened to, and their concerns were not being heard, and many of the decisions that were being made did not resonate with the reality as they saw it, particularly as their colleagues were becoming ill and, tragically in too many cases, dying.

Q. Thank you. Can we look together then, please, at your paragraph 62, which is INQ000475066 at page 23, paragraph 62, still on the topic of asymptomatic testing. And perhaps almost on the theme that her Ladyship has heard from Hazel Gray today around the experience of her father contracting Covid in December 2020, that she believes was brought into the home by care workers who were not being tested. You say

this:

"Regular asymptomatic testing for care home staff and residents began in July 2020 but access to tests remained a challenge for many, with care home testing being unreliable until mid- August. Laboratories struggled to report results promptly with less than 40% of tests returned the next day, leading to significant delays. This underreporting suggested that the actual number of new cases was much higher than reported, with estimates indicating around 9,600 new cases daily."

A. Mm-hm.

Q. And so is there anything further you want to say around the, sort of, the delays until even after the announcement in April 2020 -- so, actually, going back to your boots on the ground position, for this to be happening in practice on the ground in care homes up and other institutions up and down the country?

A. We wrote a paper at one point with a colleague at the London School of Economics who is an expert on the social care system and we asked: did the government really throw a protective ring around the care home sector? And we concluded that it didn't. There was definitely a sense -- and that's come out from my colleagues who are modellers, I've already mentioned -- of a lack of understanding of the nature of the

workforce in the care home sector, the irregular employment, the gig economy, the people working in multiple places. And I think that this really would have benefited in our -- and again, I stress that I was not in the room where these decisions were being made so I cannot know what -- and this is an issue for the Inquiry, obviously -- what was being discussed and what was being considered. But it did seem strange to us that this was not a priority with a lot of vulnerable, elderly people. But also the way in which -- care homes are a classic example of an incubator of infection. Now, in my previous work we'd looked at other incubators of infection, in particular at mines in Africa where migrant workers come together and infection spreads; the cruise ships were another example from early in the pandemic; prisons in the former Soviet Union where I've worked a lot.

So care homes were one of these places where people mixed together in close proximity and you can actually spread the infection very effectively, because people are -- they're not isolated. People are moving in and out, the staff are moving in and out. And, therefore, this seemed to us that it should have been a priority because we should have recognised that these were the incubators, the institutional incubators, that we were

very familiar with from the literature on, as I say, from mines, from prisons, and from elsewhere.

Q. That can be taken down, thank you.

Professor McKee, I now wish to seek the evidence you can give to assist the Inquiry with the additional views informed by your knowledge of international experience, and to do so, can we use an article you co-authored, it's INQ000535928.

A. Mm-hm.

Q. And we can see it's titled "Fixing England's COVID-19 response: learning from international experience".

A. Mm.

Q. And if we look over the page, please, page 2, you there set out a wide range of recommendations in respect of testing, tracing, and isolation. And so can I pick out some of those topics, and seek your assistance, please.

We can see under Recommendation (2) for testing:

"Validate and implement pooled reverse transcription polymerase chain reaction for surveillance testing and asymptomatic testing of healthcare workers, care homes and hospital pre-admissions and initiate environmental surveillance by testing wastewater as an early warning system or outbreaks."

Can I ask you, first of all, just to give clarification about what pooled testing is.

A. Sure. So, essentially, if you have -- you've got one test, say you've only got two tests left. What you can -- or a small number of tests -- you can take all of the samples, combine them together and if you test them and find there is no evidence of infection you can say -- maybe there were ten people, samples pooled, you can say that's fine, they're all negative and then you can move on and look at the next ten, and whenever you do get one that comes up as positive, then you use your tests to look individually at the samples that went into that.

So it's a way of economising on the testing, and -- in fact, laboratories in the NHS were doing this anyway, some of them were doing this. But we felt that this was something that had proven to be helpful elsewhere, and should be looked at, and perhaps used to a greater degree.

I'm not entirely sure just how much was taken -- some was in the United Kingdom but I gather not everywhere.

And then the second issue was about testing wastewater.

We know that is a very effective way of monitoring the level of lots of things, in fact, in the population, from infections to cocaine. And most European countries

have continued to monitor Covid, SARS-CoV-2 in their wastewater. England hasn't, but other countries have. And again, it's another signal.

And it comes back to my point that as in any form in intelligence gathering, you want as much information from as many sources as possible to synthesise. And this is just more information that helps you to find things.

Q. Thank you. Can we just turn to the next page, please. And it's the first column, if we just scroll down a little, it's the paragraph that starts with "One way". If that could be expanded, please.

You detail within this article that:

"One way to significantly increase capacity in a relatively short space of time is ... pooled testing."

And you go on to identify the pooled testing that had been used successfully in a number of countries, including China, the United States of America, Germany, Portugal, New Zealand, Rwanda, Uruguay, Israel and Vietnam.

And can I ask you: should decision makers in the United Kingdom have been aware of the utility of pooled testing and implemented it effectively before autumn 2020, while incidence was low, in order to increase capacity?

A. Well, first of all, the point is that you can only do it when the incidence is low. Once it gets above about 10% then it's not particularly effective because you're very likely to get positive samples in all of your pooled tests. So it only works at a certain time.

And, clearly, there were many people in laboratories that were very familiar with this and were doing it anyway. I'm just not sure how well that was appreciated at a more senior level.

But it goes back to my point. I mean, I wasn't in the rooms where these discussions were taking place. It didn't seem that these messages were being picked up. And I think you will be talking to Professor McNally later on in the week, I think that would be a very good question, because he will know much better than I do, or Professor Pillay.

Q. Thank you. And would it be fair to say that as you weren't in the room, you can't really say what decision makers were having regard to?

A. Mm.

Q. But have you seen any evidence of whether the international experience and expertise in respect of pooled testing was being considered?

A. That I can't say.

Q. Thank you. Can we then just, a little further down in

the same paragraph, you recommend validation and implementation of pooled testing for surveillance testing --

A. Mm.

Q. -- and asymptomatic testing of healthcare workers, care homes, and hospital pre-admissions.

Do you know whether that was ever implemented?

A. I don't know. I don't know whether it was ever implemented. But these are the sort of areas where it is most useful, because you're expecting that the numbers of infections within your pooled samples will be low, so therefore -- this is not going to work where you're testing symptomatic people.

Q. Thank you.

Can I then go back a page, again to your table of recommendations, and ask some questions about contact tracing, and also the importance of international experience.

We can see that you recommended, in respect of tracing, to:

"Invest in workforce and technology in existing regional public health teams, while providing further training to existing Serco and Sitel tracers, and ensuring they follow up to check if people are isolating properly, and need any support."

And I think the Inquiry is aware that the contact tracing centres, the large volume that had been set up, were through call centres that Serco and Sitel were using. So what was the issue around Serco and Sitel that you're flagging being linked to contact tracing?

A. Well, it goes back to my point about contact tracing being a very skilled task, and it was not clear to us, and, in fact, it was clear from there were problems from the accounts that we were hearing, that having a very formulaic approach to going through it with a script was not really working terribly well, and you do need that availability to be able to pick up nuances and so on. So I think it was generally a point, an idea, that it would have been better to have gone with the public health teams rather than bring in call centre staff who maybe five or six weeks earlier had been chasing up debts or looking for insurance claims, or telemarketing, or something like that. We felt that this was a more skilled role than was appreciated.

Q. Thank you. And I don't need you to turn it up, but with you referencing that issue you do say in your paragraph 73(b) of the statement:

"Contact tracing is essential for identifying individuals who may have been exposed to infectious agent. This requires a well-trained workforce."

A. Mm.
Q. "This is definitely not a role for individuals with minimal training, working off a checklist or flow diagram."
A. Yeah.
Q. "Contact tracing is a highly skilled occupation, often involving asking questions about intimate personal details. They must be skilled in communication, cultural sensitivity and data privacy to ensure trust and compliance."
A. Mm, and I think this is borne out by the experience of those local authorities, or the local public health teams that did take this on, in that they significantly increased the number of people who were being contacted.
Q. Thank you. And can I ask you then, with the issue of need for trust, are you able to comment at all as to whether the contact tracing and that centralised approach would have impacted upon the necessary trust that would be required amongst ethnic minority communities?
A. This was a really difficult one. We've recently been, in the European Observatory, doing a lot of work on trust, we had an interministerial conference in Estonia at the end of 2023 and we've recently published a book on it, and here I might just quote an old Dutch saying

which is that trust arrives on a tortoise but leaves on a horse; in other words, it takes a very long time to build up, and once it has, you can lose it so easily. And, in fact, we saw that during the pandemic, there's a published paper which looks at the impact of Mr Cummings move to Durham, and on levels of trust in England and in Scotland where they were monitoring them separately, it was different.

So these are communities that, in many -- and it will vary, because there are a huge number of different ethnicities that will have had different sets of relationships with authorities and in different parts of the country. But in many cases they have had good reasons to distrust authority, and I think it is really important to look at what the reasons are for the distrust, and how they can be allayed.

And this is something that we know so much about already from vaccine hesitancy, because if we look at the global campaign against polio, and again, it's something that I and others have worked on, looking at the way in which religious concepts are brought to bear to undermine belief in vaccine safety, we should know these things. We should be able to anticipate that they need to be addressed.
Q. Thank you. Can we then look together briefly, please,

at the topic of backward contact tracing?
A. Mm-hm.
Q. And we can see that you identified in the recommendations at (3):

"Increase resources to enable a greater focus on identifying clusters using retrospective tracing for more effective control."

Would backward tracing be, essentially, retrospective tracing?
A. Yes, it is. And we recognise that whenever you're in the middle of the -- in the midst of the pandemic and the cases are exceptionally high, and your resources are constrained, that you can't do everything, and you particularly can't do this. But we felt that the -- this had proven to be particularly effective in countries like South Korea, where they had been able to maintain a high level of normality in day-to-day life by focusing on going back to identify the clusters and then identifying people who were infected that way.

So we felt that it should have been given more consideration than it was. But we recognised that there are constraints in all of these things.
Q. Thank you. Now we can see, if we move to page 4 of this same document, please, around tracing -- thank you. Thank you. Page 4. Thank you.

So the first column is still the tracing aspect, and we'll look together in a moment about the observations you make about successful backward tracing in Japan, South Korea and Uruguay.
A. Mm.
Q. But the Inquiry has received in earlier modules the report of Professor Hayman, and in his report early in the Covid pandemic he identified that studies in Japan traced contacts of persons with Covid-19 forward for isolation and monitoring and backward to the source of infection. They then shut down those areas where the transmission was shown to be occurring until preventative measures could be reinforced at those sites.

And Professor Hayman commented that:

"Such precision and short-term lockdowns demonstrated that, unlike influenza, initial Covid-19 outbreaks could be contained and transmission interrupted, and also noted that the same was true in Singapore and South Korea."
A. Mm.
Q. And I think you've been provided with a copy of that extract of the report?
A. Yes, I have.
Q. We can see in your article, you and your co-authors were

making a similar observation --
A. Yes.
Q. -- about the successful use of backward tracing in Japan, South Korea and Uruguay.
A. Mm.
Q. Are you able to assist then, was there any reason why effective backward tracing could not have been implemented from the outset in the United Kingdom?
A. I think in fairness, there was -- my sense is that there was a recognition that public health in the United Kingdom generally had been underinvested in and it was much weaker than it had been in the past, especially -- I mean, if I look back to when I was training in public health in the 1980s and early 1990s. So I -- and again, other people can answer this better than I can -- my sense is that there were low expectations of what public health could have delivered because there was a feeling that it was not in a good place. And -- I suspect that may have been something to do with it, and the fact that the public -- and -- I was speaking at a conference in Birmingham last week, actually, to a large number of people in health protection, and I was making some of these similar points, and there was very widespread agreement that they had not been -- people had not been brought in,

that they had not been spoken to, they had not be involved to anything like the extent that they could have been. And I think that there was a feeling just that, you know, are they really -- is there enough in place? Are the structures there? I feel there was a sort of degree of defeatism, I sense.
Q. Thank you.

I'm going to stay with this document but I'm just going to reference what you say in your witness statement at your paragraph 45. And it is on the theme that you've just identified, about the impact to public health of cuts. You say:

"Contact tracing requires a well-resourced public health infrastructure and a trained workforce. Despite the use of digital technologies, manual contact tracing remained essential. Countries with decentralised systems and a strong connection to local services were more successful in detecting clusters and complex outbreaks early."

And you then gave examples of South Korea --
A. Mm.
Q. -- Taiwan, Germany, New Zealand, Denmark, and Vietnam --
A. Mm.
Q. -- as to their approaches to contact tracing. We have the full detail in the witness statement but is there

anything else you'd wish to draw out about the learning from those countries?
A. The issue of the extent to which the UK learnt from other countries has been addressed at length by many other people, including a report of the -- a joint report of the Health and Social Care, and Science and Technology committees in Parliament, and in particular, Jeremy Hunt and others have commented on this. Jeremy Farrar has also commented on it in his book, the former director of the Wellcome Trust and now Chief Scientist at WHO. And there is, I think, widespread agreement that there was insufficient learning from what was happening in other countries. And when it happened, it happened rather late.

I mean, I've gone through some of the early statements, and, you know, we did have, a memorandum of understanding with the European Centre for Disease Control, but it was only signed on 1 December 2021.
Q. Thank you.
A. So we didn't have -- there was, I think, a lack of -- I think we'd lost a number of the informal contacts we'd had before, and -- yeah, I think it was a problem.
Q. Thank you. And we are going to hear evidence from Lord Bethell, who had a key role in respect of TTI, and we have a statement he has provided, which says -- and

we'll explore it with Lord Bethell:

[As read] "I don't believe we did enough to learn from countries like Taiwan, South Korea and New Zealand on their use of contact tracing technology. I pushed hard on the Taiwanese example in particular [which you believe could have been a realistic example to follow] and I'm disappointed that this was not pursued with greater enthusiasm."

So can I ask you, particularly on the Taiwanese example, and contact tracing technology, can you give us any further detail about what is so unique about Taiwanese contact tracing --
A. Well, I don't think that it was unique, it was just that it was well developed, because, of course, they, like number of countries in east Asia, had the experience of the threat of SARS in 2003. So I think they were just generally prepared, and they did have a strong infrastructure in place. Now it became more problematic later.

I should say that I visit Taiwan every year, and have done for many years, and so I work closely with Taiwanese colleagues. So, from my point of view, it was very easy to have those conversations to see what was going on.

I'm not sure what other connections there were

between the UK and Taiwan, you will obviously be aware of the geopolitical situation there, but it did seem that they were the first to become aware of the outbreak in Wuhan after China. You know, they had been gathering chatter on social media sites. They had acted extremely quickly, and they've had a longstanding record as being -- having very strong public health infrastructure.

Q. Thank you.

Now, just looking back at the article, please, and we can see one of the areas identified was the delivery of contact tracing with the Massachusetts example.

A. Mm.

Q. So can I ask, in terms of -- according to your research, backward contact tracing combined with standard contact tracing had the potential to double the effectiveness of the NHS Test and Trace system. And could I ask, do you have views on whether this was a system that could have been implemented relatively quickly, using the Massachusetts example that you've cited?

A. The thing is that no model from anywhere else can be taken wholesale and put down and you expect it to work because, again, going back to my point about the need for a complex systems approach, you need to know what's already in place, you need to know what the connections

are and so on, but I think all of these examples could have informed what we did, and should have, I think, raised the question of whether we had -- whether our expectations were high enough, whether our ambition was high enough.

And, I have to say, I felt sometimes there was a sense that our ambition was not as high as it might be. Which was, of course, complicated by the fact that some people were arguing at the time for herd immunity. So that was another factor that politicians were hearing from one side, that actually, maybe you shouldn't be doing all of this and it's a matter of suppressing the curve and just waiting for it all to be over.

Q. Thank you.

Now, again in the highlighted passage, about the middle of the page, we see reference to Operation Moonshot.

A. Mm.

Q. It's described as much less costly than Operation Moonshot, and the efforts have been made to contact trace.

A. Yes.

Q. Can we first of all identify what Operation Moonshot was on the chronology. It was displayed as part of the opening yesterday, when essentially the system moved

from the thought process of Operation Moonshot to then the programme of community testing.

Perhaps can I just identify with you that is it correct and is it your understanding that in July 2020 consideration was given within government of whether rapid testing delivered on an all-citizen basis could be viable and that's what was referred to as Operation Moonshot?

A. You'll have to forgive me if I don't have the exact chronology in my head for all of these things. So much was happening. But it was certainly being discussed at around that time. And yeah, it was an idea. One of the -- I think it built on this concept of mission-oriented work, where you have a target to achieve, and therefore you throw everything at it. And the example is the Apollo Moonshot, of course.

Q. Thank you.

A. And it was an initiative that, when we saw the presentation on it, we had some considerable concerns, partly for the reason -- well, for a number of reasons, but one of which was that it received to be replicating what we felt was a non -- not optimally functioning centralised system being dictated from above and being imposed on very heterogeneous communities in the UK, and very different from what was being done -- talked about

in Liverpool, for example, which had some superficial similarities -- again, Professor Buchan will describe this -- but was deeply embedded in the community.

Q. Thank you. So, summarising, Operation Moonshot as a mass testing of the whole population at least twice over a one to two-week period, accompanied by isolation of everyone who tested positive, which was a thought process of Mr Johnson to eradicate the virus.

A. Mm.

Q. You authored an article which you characterised as Boris Johnson's Moonshot becoming lost in space.

A. Ha!

Q. Why did you so characterise it?

A. Well, in fact, when I looked at the slides, the point about a systems analysis is that all the different bits need to connect up -- and there is one slide -- I'm not sure if I can find the -- I have the slides here somewhere in this rather large pile of documentation -- of a large number of circles floating around, a bit like celestial bodies in orbit but with no real connection. So I think I was motivated by that particular slide.

There was a sense that it really did not address the issue of needing to be embedded in the local reality. And then there were other -- I mean, there were a lot of conflicts in it. There were -- for example, in one

slide there was a very detailed outline on how this would work on an hour-by-hour basis on a particular -- you know, on days such and such a committee would meet at 9.30 and another one at 11.30, and then there were other bits which were somewhat vague like "set up a laboratory", "procure the technology", without any further detail. So we found it difficult.

And the other thing of course was that it was influenced by what had been tried in Slovakia, and I was concerned that if it is to be -- again, the idea of taking models from elsewhere and just adopting them wholesale, it was important to find out what had happened in Slovakia. Unfortunately -- I've obviously got colleagues in Slovakia and we wrote a piece for the British Medical Journal with my colleague Professor Najiva(?) from Košice in Slovakia, which looked at what was going on there, why it was different. It was different because they had a very accurate population register. They had brought in not only their own armed forces but armed forces from neighbouring countries, and they had a very punitive approach to people who were not being tested.

So we did not think this could easily be extrapolated, although, you know, the Slovakian model, as imposed in a smaller country, yes, it did have some

benefits but it didn't eliminate it. So we could spot a lot of problems.

Q. Thank you. Then, finally, using this article on international comparators, can we go back to the table on page 1, please, just to briefly ask for any additional views on isolation.

A. Mm.

Q. We can see that the recommendations to improve isolation touch upon a number you've already given evidence about during our time together.

A. Mm.

Q. You were recommending expanding the criteria for pay cover by statutory sick pay.

A. Mm.

Q. Identifying employers who do not allow staff to self-isolate; to issue regular support and information to those self-isolating; and following SAGE advice to allow swab isolating contacts.

So can I ask you -- again, you detail in the article itself examples, international examples, but can I ask you, is the area of isolation support one of the clearest examples of the amplification of inequalities by the Covid response in the UK?

A. I think the -- our failure to support people who were isolating, I think has been one of the major barriers --

one of the major problems to suppressing this infection, because when we look at the parts of the country, particularly in the north east and the north west in some of the inner -- in the urban areas, these are places that we know that people are living very precarious existences. We've got lots of other evidence on that. And we had a survey data, we had -- again, Professor Buchan will be able to tell you about the very granular data they had from Liverpool. I think that was in -- the work they did was amazing and a very valuable source that we could have learnt much more from. So, yes, I think that failure.

The fact that we were also -- there were so many people who were missing out on statutory sick pay because of our employment model. It was not very generous.

And then, as we heard in the impact statement from Northern Ireland earlier today, or the witness from Northern Ireland earlier today, who described how care workers would come having not been tested because they were discouraged from being tested because if they took time off there would be nobody to do the job. So there was clearly an issue there -- there were clearly issues there. So it resonated very much with that.

Q. Thank you.

A. We felt isolation -- there's no point in testing somebody if they don't isolate.

Q. Thank you.

That can be taken down, please.

Can I then ask you just briefly, we've already identified the Payment Support Scheme, obviously the call early on for that figure to be £800?

A. Mm.

Q. But are you able to comment at all as to how enforcement of isolation -- we know in the United Kingdom and in Wales the requirement to isolate was enforceable, with sanction. In Northern Ireland and Scotland, it was advice rather than -- strong advice rather than isolation with enforcement. Are you able to comment at all on the impact of enforcement policies alongside isolation?

A. So in an ideal world you would not have to enforce it because people would have enough trust, and they would have the opportunities, they would be able to supported in isolation, that enforcement would be a very, very rare event. Ultimately that is a political decision for politicians who will understand the limits of what they can do. And that may be rooted in history, it may be rooted in the nature of the relationship between the individual and the state. And if I was to look at

Northern Ireland, I could think of many reasons why they might take a different approach in terms of the legal enforceability. So I think that -- they will have.

But I think in circumstances like this, it is easy for us to say: well, politicians have to take into account other considerations. I do feel that whenever the scientific evidence is one of those considerations, then the other consideration should be equally made explicit. And they may be justifiable because of the history of -- and the relations between different communities.

Q. Thank you. Two final topics.

We've already touched upon the issue of the importance of equity and having regard to the impact on disadvantaged groups. But can I ask you to what extent were the issues we've looked at together of the TTI system foreseeable as to the impact they would have particularly on the ethnic minority communities?

A. I think they should have been foreseeable. I mean, it's difficult to see why they wouldn't be. The difficulty is that when you look at the very broad -- you know, some people say there are 300 different languages spoken at home in London. There are going to be some ethnic groups that actually have -- and we know have -- better health than the -- if I use the word -- I mean the --

the population with its origins in the UK, and some that have much worse. And even within the Indian subcontinent, the Bangladeshi population often does significantly worse than the Indian and the Pakistani. And within all those groups there are differences, because you have to factor in religion and caste and all sorts of other things.

But even if we didn't -- and that's where the local knowledge comes in, because in somewhere like Leicester for example, they will be aware of, you know, which is the Gujarati community or which is the community from, I don't know, West Bengal or somewhere like that. They will be different but they will understand that in a way that somebody like me cannot -- sitting in London cannot possibly do.

But we definitely should have been aware that those groups -- and Traveller communities, Roma -- I know that in the Northern Ireland -- in Sir Michael McBride's statement he talks about reaching out to the Roma community. But we should have been aware that all of these communities would have -- could have particular issues that needed to be taken into consideration.

Q. Thank you.

And finally for my purposes, please, Professor McKee, you comment upon recommendations which

we've already touched on around test, trace and isolate. We looked at them topic by topic. But can I ask you, do you have any views on whether there's now a lack of any meaningful legacy or strategy for the next pandemic threat?

A. Oh dear, yes. I mean, I mentioned -- we talked about wastewater testing a little while back. Most other European countries have continued to do that. We're not doing it. I really am concerned that many of the weaknesses that we had going into the pandemic we still have because many of the systems and structures are -- have continued, things have been dismantled.

The other issue is we are just about to have a major reorganisation -- well, we're having the abolition of NHS England in England, and that is going to lead to a loss of institutional memory.

I think we need to remember that one of the problems we had was that exercises like Exercise Alice and Cygnus and others that had been done had been put on the shelf and people that often forgotten about them. The Phillips report on BSE I think should be a bible for anybody looking at a major crisis, and yet it was -- all of those lessons were forgotten about.

And I think that's deeply worrying, the loss of institutional memory. But also we still haven't

addressed the strength of public health in this country, I don't think. I think we still have many problems there.

MS CARTWRIGHT: Thank you.

Professor McKee, we need to break. There's more questions after the break from --

LADY HALLETT: No, we're going to carry on.

MS CARTWRIGHT: Oh, thank you.

LADY HALLETT: Thank you.

MS CARTWRIGHT: My Lady, I'm not going to deal with Professor McKee but we have helpfully been provided with the WHO pandemic treaty that's in place, and certainly that's something that can be brought to your attention as to the current change that's occurring.

THE WITNESS: Yeah.

MS CARTWRIGHT: But I'll now sit down and hand over to those that have been given permission. I think first of all there's --

LADY HALLETT: Mr Jacobs.

MS CARTWRIGHT: Thank you.

LADY HALLETT: Mr Jacobs, thank you.

Questions from MR JACOBS

MR JACOBS: Professor, just one question on behalf of the Trades Union Congress.

I want to pick up this question of financial and

practical support for self-isolation, but also the issue just touched on of having a meaningful legacy and strategy for the next pandemic threat.

How, in your view, should this issue of support for self-isolation be addressed in advanced planning for the next pandemic?

A. I think we need to have a serious information-gathering exercise to understand what it is that prevents or makes it more difficult for people to isolate. And it's not just money, it's the availability of -- and in a number of east Asian countries, there were systems for delivering food to people, for example. That might be important. Delivering medicines to people.

We will have, obviously, things have moved on because we have now found new ways of working digitally, communicating, but I think that there is a real problem and one of the -- we mentioned right at the very beginning the Pan-European Commission on Health and Sustainable Development where I was the rapporteur. We identified a major problem being inequality in digital access which is a problem that -- for many of us, we are permanently connected to our smartphones, but for a lot of vulnerable groups they are not, and it may not be that they don't have a smartphone, it may be -- and Professor Buchan will talk eloquently about this because

he did some really good work in Liverpool -- that they don't actually have the airtime, they don't have the data, and that is linked to well, all sorts of things.

So I think we need to have a much more nuanced understanding of what people need.

But it comes back to my point: we need to talk to people and see the world through their eyes and not through our eyes, because people like me are not typical.

MR JACOBS: Professor, thank you.

LADY HALLETT: Thank you, Mr Jacobs.

Mr Wilcock? Oh, it's not Mr Wilcock. I'm so sorry.

Questions from MS McDERMOTT

MS McDERMOTT: Marie-Claire McDermott. Unfortunately, Mr Wilcock is indisposed today.

Professor McKee, the questions I want to put to you today have been covered for the most part, but can I just ask you to clarify some aspects arising from your evidence, and I'm just going to reflect on what we've heard in Module 1 and I know from your evidence you've reviewed and rehearsed some of those expert reports. But in Module 1 we looked at and heard from Professor Whitworth and Dr Hammer, who recommended that consideration should be given to learning from the experiences in China and neighbouring Asian countries.

Now, of course, that's a critical perspective, emphasising the importance of learning from international responses that has been consistently echoed in your evidence today and obviously in the various articles and reports you contributed in and had written.

But the experiences identified by Professor Whitworth and Dr Hammer included, in particular, ensuring that hospitals and care homes were adequately resourced to cope with an influx of infected and infectious patients. Can I just confirm with you, do you say that there was a failure to adopt those type of measures in the UK?

A. So I think what happened in east Asia was that after SARS, they had constructed their facilities in ways that they could keep so-called "dirty", unquote, and "clean" cases separate, and much more work on infection control and ventilation and things like that. We had not. And I think it is well known that our hospital facilities are -- I should just preface this by saying that I've written or edited quite a few books on hospital design, and compared to the innovations and imagination you see in other European countries, the particular model that we have adopted has tended to go for the most basic construction rather than looking at the more imaginative

ways in which you can do things.

So I think for care home -- well, that's more for hospitals. But I think that we -- I don't believe that we had really factored those issues in so much.

Q. And the other aspect of the lessons that you referred to from learning from others, would you say that that's primarily because of the investment, or the lack thereof, in public health that you've, again, rehearsed today.

A. Well, if we're looking at the UK as a whole, first of all, many in the scientific community have excellent contacts on a scientific basis, so that happens all the time. And most research is now international. But I think, and, you know, I have to be careful what I say here, but certainly since 2016, our informal contacts have become -- in fact, I know, because I see it almost from the other side, from the European side -- much, much less good than they were before. And I think a lot of that is to do with so many of these channels being informal, and like with the paper that we did on Slovakia, my ability to call up a friend who is a professor in Slovakia, and we know each other well, we have mutual trust, to find out what's going on.

There were a number of other times whenever something was happening in another European country that

I could just call a colleague who would know.

And I think we have lost a lot of that, and -- but also, I think that there has been a longstanding tradition that we tend not to look at what happens in other countries, and this has been noted in books on lesson learning in public policy, contrasting the situation here with, you know, the classic one is Japan under the Meiji Restoration where they were looking at ideas everywhere else, but there is a literature on this, a literature on the UK's willingness to take ideas from elsewhere.

Q. I suppose that may well answer my final part of that question and whether the failure to take the measures and look at the measures taken by other countries accounts for the stark divergence in the outcomes between the UK and, in particular, in the eastern Asian countries?

A. I think it contributes a large amount to it. It is complicated. I mean, even the measurement of outcome, and you need to separate pre-vaccine and post-vaccine, and so on, but we did not do well, and I think we should have been learning, but I'm not the first one to make this point. As I've said, it's been made in parliamentary committees, it's been made by people like Sir Jeremy Farrar and others, repeatedly, and Richard

Horton and so on. So I think, yes, I think there's a widespread agreement that we could have learned more.

And, you know, there were contacts but I don't think they were anything like as good -- and they are the informal contacts. It's the fact that you're talking to your colleagues in other countries and you have been talking to them for 20 years.

Q. I'm very grateful for that.

I'm going to move on to talk about Northern Ireland specifically. And looking at the Independent SAGE report of 12 May 2020, and for the record, that's INQ000249693. I'm not going to bring it up on screen but at paragraph 9, I'm going to quote that, it states that:

"Managing the risk of importing cases from other countries, with consequent high risk of transmission, is vital. This should be introduced as soon as possible, treating Great Britain and the island of Ireland as distinct health territories."

For the most part, Northern Ireland Government tethered itself to the decisions of Westminster and the Northern Ireland Chief Medical Officer, Professor McBride, accepted that Northern Ireland, prior to 12 March, there was a relatively small number of confirmed cases and therefore contact tracing had the

potential to have a significant impact in the course of the pandemic in delaying community transmission.

Are you able to comment on whether the Northern Ireland administration did enough to engage fully with the introduction of Independent SAGE's strongly recommended approach of case finding, testing, tracing, and isolating?

A. Certainly we had conversations with the health committee of the Assembly but not with the Northern Ireland Government. And I listened carefully to counsel for the Department of Health in Northern Ireland yesterday on the rationale for stopping testing. The Republic of Ireland continued contact tracing throughout, and obviously it was a decision to be made in Stormont taking account of the number of cases and the testing capacity, but that doesn't really explain why, given all of those, that could lead to a decision at some point, that you might have to abandon testing and tracing, why it was the same, at the same time as in the rest of the United Kingdom, if it is not simply that they were adopting what had been decided at COBR.

I think that is a question that needs to be asked of those who were in the room, where the decision was made. But it does seem somewhat difficult to understand why the decision was made at exactly the same time whenever

the epidemiology was so different.

Q. And where there was capacity?

A. Yeah, so again, I don't have -- and again, I tried in preparation for this, I was trying to go back to the data and, actually, it is very difficult to get the historical data from the Northern Ireland dashboard, and I've resorted to asking ChatGPT for the number of cases and I'm not sure that the numbers are entirely plausible so I hesitate to quote them, but again, just it would be nice if that was a little bit more user friendly. But that was problem throughout the pandemic because as you might know, I did quite a lot of media appearances in Ireland, north and south.

Q. You did. Thank you, Professor McKee.

My final question: in the second of two papers produced as a result of the Covid-19 Health System Response Monitor, HSRM, you summarise at paragraph 48:

"While testing was a critical component of the public health response, it needed to be part of a comprehensive strategy that included contact tracing and support for isolation. This holistic approach was necessary to manage and prevent the spread of Covid-19 effectively."

My question is: to what extent did the Northern Ireland response achieve those aims?

A. Well, Northern Ireland stopped doing the, you know, stopped in early March doing many of those things, and the rationale was that other things were being put in. But we do know from other modellers and others, and I think it might be the Royal Society of the Academy of Medical Sciences' report that adding a well-functioning test and trace system on top of all the other measures adds another 15 or 20% to the effectiveness. So I think it could have done more.

MS McDERMOTT: I'm very grateful.

Thank you, my Lady.

LADY HALLETT: Thank you, Ms McDermott.

Thank you very much indeed, Professor. That completes the questions that we have for you. Thank you for your help.

THE WITNESS: Thank you.

LADY HALLETT: Very well, I shall return at 2.00.

MS CARTWRIGHT: Thank you.

(12.59 pm)

(The Short Adjournment)

(2.00 pm)

LADY HALLETT: Ms Cartwright.

MS CARTWRIGHT: Good afternoon, my Lady. Can I ask for Professor Fraser to be sworn, please.

PROFESSOR CHRISTOPHE FRASER (affirmed)

LADY HALLETT: I hope you were warned you wouldn't be on until this afternoon, Professor.

THE WITNESS: Yes.

LADY HALLETT: Please sit down.

Questions from LEAD COUNSEL TO THE INQUIRY FOR MODULE 7

MS CARTWRIGHT: Can you please tell the Inquiry your full name.

A. I'm Christophe Fraser.

Q. Thank you.

Professor Fraser, you've provided a witness statement to the Inquiry, you should have a copy in front of you. It's 57 pages. It's dated 19 March 2025. Have you had an opportunity to consider the contents?

A. I have.

Q. And are they true to the best of your knowledge and belief?

A. They are true to the best of my knowledge and belief, yes.

Q. Thank you.

Can we start then, together, start by identifying the relevant background qualifications, career history, that you have, right up to present date, to then inform the evidence that you're going to give to us principally in respect of the apps.

So it's right, isn't it, that you are a professor of infectious disease epidemiology?

A. Yes.

Q. Is that at the Nuffield Department of Medicine at the University of Oxford?

A. Yes.

Q. It's right, isn't it, that you were part of the Senior Leadership Team at the Pandemic Sciences Institute?

A. Yes.

Q. And does that continue to present day?

A. That continues, yes.

Q. You are also a Professor of Pathogen Dynamics in the Big Data Institute.

A. Yes.

Q. And as we will come to look at together this afternoon, you contributed to the design and analysis of the UK's digital contact tracing programme, and in particular the development of the NHS Covid-19 apps.

A. Yes.

Q. And --

A. Just a minor point of clarification. I'm no longer a professor in the Big Data Institute, though I was at the time when the work was done.

Q. Thank you. And we'll come on to look together at your involvement, in fact in respect of the development of

two apps effectively.

A. Yes.

Q. Thank you. You were also, is that correct, during the pandemic, an academic consultant for NHSX?

A. Yes.

Q. You are a member of Covid-19 Genomics UK?

A. Yes.

Q. And also OpenABM-Covid-19?

A. Yes.

Q. And does that continue to present day?

A. The COG-UK, the Covid General Mix Consortium, has been discontinued, and the OpenABM software that my team and partners developed, we no longer support those software as part of -- no.

Q. But that -- essentially this is the software that was being developed as part of the work on the apps?

A. Yes.

Q. And we'll look at that together.

And I think it's right isn't it that you were part of the Rapid Test Consortium during the pandemic?

A. I was, previously part of it, yes.

Q. Thank you.

And it's right up to present day, is it, that you are a member of the Oxford Martin School of Digital Pandemic Preparedness?

A. Yes, that's correct.
Q. And then, separately, you were also involved in PRESTO. Can you explain what PRESTO is, please, and your role within it?
A. So PRESTO is a project that started one year ago, and it is an international collaboration, together with an intergovernmental agency called the Coalition for Epidemic Preparedness Innovation. The aim of the project is to accelerate the testing of vaccines in the event of future epidemics or pandemic potential, and whilst the development of vaccines is clearly the responsibility for others, where epidemiology, modelling and contact tracing comes in is in the process of evaluating new vaccines, particularly in a situation where a relatively small number of people are infected, and in a situation where control measures might be largely containing transmission where epidemiological considerations are important.
Q. Thank you.
Now, we'll -- I want to identify other relevant work that you tell us about in your witness statement, just as part of this rooting ourselves in your knowledge and expertise.
I'm at your page 46 where you say this:
"Since 2022 I have been a member of two of the UK

Department of Health and Social Care's ... standing committees, the SPI-M committee and the NERVTAG committee. SPI-M, the Scientific Pandemic Infections [group on Modelling], is a committee of mathematical modellers that advises DHSC on pandemic planning and emerging threats. NERVTAG, the New and Emerging Respiratory Virus Threats Advisory Group, is a multi-disciplinary group that provides a wealth of perspectives and guidance based on current and emerging situations."
And are you still, as of today, part of both of those groups?
A. I am.
Q. Thank you. You also tell us you are a member of the UKHSA expert technical working group on mpox, a standing you've had since 2022, and that provides multi-disciplinary academic advice to UKHSA on this new emerging virus?
A. I am, and that role continues on an *ad hoc* basis.
Q. Thank you. And is it correct, you reference mpox, but is it looking beyond mpox at other emerging viruses?
A. That particular UKHSA committee is focused on mpox and only on mpox.
Q. Thank you.
You also tell us that since 2022 you've been

a faculty member in Oxford University's newly formed Pandemic Sciences Institute, which we covered a moment ago, and you tell us you lead on the data analytics and epidemiology and collaborate closely with colleagues in vaccines, treatments, ethics and social science?
A. That's correct.
Q. Thank you.
Then finally, by way of background, in terms of historic knowledge, it's right, isn't it, that between 2003 and 2016 you were a professor in the Medical Research Centre for Outbreak Analysis and Modelling at Imperial College London?
A. That's correct.
Q. And that dealt with SARS-CoV-1?
A. Yes.
Q. And also between 2015 and 2016 you were part of the WHO's International Ebola Response Team?
A. That's correct, yes.
Q. Thank you.
So can I ask you then -- first of all, we're going to focus most of your evidence on your involvement in the development of the Covid apps, and then recommendations, but there is relevant evidence, you tell us, about learning from your involvement in the SARS and MERS viruses. So can we first of all identify

a concept that you describe in your statement of the test, trace, isolate and quarantine, and the importance of that for pandemic planning, please.
A. Yes. So the first example to focus on was the SARS outbreak in 2003. So it was an outbreak that started in China, in Guangdong, and resulted in cases in 28 countries, with sustained transmission in six countries. It caused 8,096 cases, of whom 774 died.
It was, in many people's estimation, including mine, a near miss in terms of the risk of that developing into a pandemic. Now, that was clear at the time and seems even clearer with the benefit of hindsight.
It was caused by a virus that was genetically very similar, a genetic relative to the virus that caused Covid. So the virus that caused SARS was SARS coronavirus 1, and the virus that caused Covid was SARS coronavirus 2.
The outbreak was contained, as in eliminated entirely, despite spread in 28 countries, through a process of test, trace, isolate, and quarantine, being the foremost control measure.
At the time I was a junior scientist and we'd developed a mathematical model of the spread -- we were working particularly closely with the government of Hong Kong at the time -- to understand transmission and

to understand the role of control measures. And the first observation was the importance of superspreading, and the fact that the spread was every heterogeneous and you needed to be able to identify and prevent these very large outbreaks.

Then the second piece of work was focused on test and trace. Test and trace is a very simple concept: you test people, you trace their contacts and find their contacts, but it's actually quite tricky to model mathematically, it's a different process from other things that we normally consider in modelling epidemics. And the finding of our modelling was that -- what made SARS easier to control was that most transmissions came from people who were already quite symptomatic, quite ill, at the point when they transmitted the virus.

So if you compare to Covid, for SARS in 2003, if you like, the transmission started sort of four, five days later compared to Covid, if you were to compare two patients side by side or two groups of patients. And so people were already symptomatic.

And what we showed was that in terms of the parameters that you'd put into planning assumptions, SARS in 2003 was basically as infectious or maybe even more infectious than Covid with an R number of about 3 or thereabouts, but it was actually much easier to

control because essentially none or very little of the transmission involved asymptomatic or pre-symptomatic people.

So we developed, at that point, we developed a mathematical model of test and trace and we showed that the two parameters that you really needed to know about to predict how effective test and trace would be as a frontline measure, were the infectiousness, this R number, and the proportion of transmission that was pre-symptomatic.

And this is a model which I -- my team and I returned to at the beginning of Covid to gain insights into test and trace for Covid.

Q. Thank you. And so if I am incorrectly summarising this, please correct me. So your work on SARS had identified as part of the modelling it was essential to know pre-symptomatic transmission to inform the model?

A. That is correct, yes.

Q. So then can I ask you in terms of when we move forward to the pandemic, the Covid pandemic --

A. Yeah.

Q. -- the Inquiry has already heard much evidence about asymptomatic transmission and the knowledge about asymptomatic transmission. Can you give your view to the Inquiry as to how important it was in the very early

days to be looking at asymptomatic transmission?

A. So I think it was crucial to understand asymptomatic and pre-symptomatic transmission, and in terms of what was publicly available, the first reports published on the epidemic in Wuhan commented that about 70% of cases in Wuhan hadn't had a contact with somebody symptomatic.

Now, of course, that could have been misreporting and people not answering the questions correctly, so therefore I phoned up my colleague who led the investigation, and he confirmed that this really did appear to be true. And we, throughout early February 2020, we looked at the contact tracing data from Singapore that was updated in real time on an interactive website, and we saw that, interestingly, the majority of people who were appearing as cases in Singapore were reporting contacts who weren't symptomatic, because the contact tracing was very fast and efficient, but that when the contact tracers returned a day or two later, these contacts became -- these likely source cases, became symptomatic.

So we then were able to parameterise a statistical model to estimate and we found that consistently across both of those data sources, about half of all transmissions were coming from people where a source case wasn't yet symptomatic, was either asymptomatic or

had very few symptoms at the point of where transmission is likely to have occurred.

Q. Thank you.

Now, can I -- you've referenced February 2020 but you also then told us about making a telephone call to someone who you knew would be able to confirm the position in Wuhan. Can you just help us as to the likely time when you would have made that call that confirmed what you'd read around pre-symptomatic and asymptomatic transmission -- roughly?

A. I'm not entirely sure of the date. It was first an email, and it was following the publication of the first timed series of cases in the New England Journal of Medicine, led -- an investigation led by my colleague, Professor Cowling, in the University of Hong Kong.

Q. Thank you.

A. And that would have been the last days of January or the beginning of February.

Q. Thank you. Can I ask you, with that knowledge you had confirmed by trusted colleagues, what -- you've already referenced that that impacts upon the model but from the perspective of test, trace, and isolate, what does that mean for what the test, trace, and isolate system needed when pre-symptomatic and asymptomatic transmission is a significant driver of the virus?

A. So the consequences of this, so we didn't -- so in terms of my team, my role wasn't -- I didn't have an established role within Outbreak Response, that was a role I'd left in 2016. So we started looking at this properly in late January, and decided throughout February -- I spoke to trusted colleagues in the UK and assured myself that they would find this analysis useful -- we were all, everybody was trying to find, you know, where they could be useful, that we would revisit these assumptions about test and trace, and throughout February we collated the necessary data and developed the model and the model predictions and what we found was we were rather pessimistic throughout February 2020 about the capacity for test and trace, as it stood, as we understood it to be implemented in the UK, to be particularly effective because it needed to be not just comprehensive in terms of finding the contacts but it needed to be fast, fast from the point where the source case requests a test and gets that test result, and finds their contacts, that needed to be -- that cycle, the whole cycle, needed to be completed in, sort of, two to three days rather than the, sort of, week to ten days which was the situation in the UK, I think, at that point in time.

Q. Thank you. You tell us in your witness statement,

essentially what you've just described, and I'm at your paragraph 16 now, that comprehension at the end of January, that the spread of the virus was going to be a severe event?

A. Yes.

Q. And then on 30 January 2020, the meeting at Oxford University of Medical Sciences Division, where you reported that both -- it was reported that your opinion and that of colleagues in different countries, that this was likely to be a pandemic of major international consequence. Are you able to assist us as to which different countries where you'd got the knowledge from? You've obviously referenced Wuhan and Hong Kong. Were there any other countries you'd spoken to at that time to inform that view?

A. So I think in the meeting we heard from colleagues in Vietnam and Thailand as well. And in terms of the severity, I'd confirmed with colleagues in the United States, the Netherlands and France, fellow epidemiologists, to see if we were all getting similar numbers, and we were all of the impression that the infection-fatality rate, the proportion of infected individuals who were dying at that stage, was of the order of 1%. I think the final estimate came in at about 0.75, 0.8%. So those original estimates were

reasonable accurate.

The other thing that struck us, and that the R number was above 2. So I think it was very clear at that stage that we were heading towards a major event., a pandemic that would have a big impact.

The other thing that was very concerning at that stage were the reports that were coming in from China and from Singapore that a significant fraction of individuals required hospitalisation. I think their policies in China and Singapore probably favoured hospital -- more hospitalisation, more than was ever done in the UK, but they were indicating that about 5% of individuals, infected individuals would require hospitalisation in their data, and needed oxygen support.

And then we had meetings with -- within our department, some of my colleagues worked in the Oxfordshire NHS Trust who were interested in having a modelling view as to what that would mean for a local hospital, such as the Oxfordshire NHS Trust.

Q. Thank you. I'm going to come on to deal with, then, the meetings in March onwards around the development of a contact tracing app. But you've obviously mentioned the need, particularly with the Covid virus, for there to be a speed of contact tracing?

A. Yeah.

Q. And so was it clear in your mind that it was essential very early on for the need for an effective and efficient test, trace, isolate, and quarantine system to respond to the Covid virus?

A. I think it was clear to me at the time. That is the standard first-line response to, you know, a coronavirus situation, including the MERS coronavirus, and it's also the standard first-line response to other new viruses that we have dealt with, you know, as a community in the last few years, including, you know, the haemorrhagic viruses, the Ebola, the Marburg, and so on. And even looking back further on my work on HIV, you know, the way HIV and the transmission of HIV was originally understood was through a process of finding people's partners.

Maybe, if I may comment on a point that you've raised, I think another point that was really important in that early meeting was that my colleagues in the vaccine team presented a very clear timeline in terms of the development of the Oxford vaccine. And I think this was, this was important, because for a future response, because non-pharmaceutical interventions and control, I think, could be understood as something to hold back the viruses prior to vaccination. You know, it wasn't an

unlimited commitment to living with non-pharmaceutical interventions. It was until treatments or vaccines became available, and -- I think that's, you know, maybe a lesson for going forwards is that non-pharmaceutical interventions have their place, because in general, treatment and vaccines will improve survival rates over time in different situations.

The other point, I think, with contact tracing and the other importance of contact tracing is how we get -- it is how we get to find out about what is a risky contact and what isn't and how a virus is transmitted, by studying the data on those early cases.

Q. Can we then look together, and I want to briefly summarise how it was that you came to think about the need for this contact tracing app. Your statement tells us, and I'm at you are paragraph 90 now, that during February 2020, you decided to start with a mathematical modelling framework that you'd developed in 2003 to model SARS Covid 1. And you obviously took regard to the asymptomatic transmission but essentially that led to your thought process of the need for this contact tracing app.

And I think certainly your statement tells us from the beginning of March you had identified from literature review, as well, of the need for a smartphone

app for Covid-19, informed also by what different countries in Asia were doing.

Is that a fair summary that gets us to the beginning of March? Or please, if you want to correct anything I've just said, do so.

A. I think that's broadly correct. It was -- we were essentially trying to parameterise our predictions for how effective contact tracing might be, based on our understanding of the delays in testing and the delays in contact tracing.

And simultaneously we were looking at reports of apps that were being used in Taiwan and South Korea, in China, and so on, which were focused on, you know, safe entry and so on.

And we asked ourselves what we would do if we were to develop an app. And because we were thinking about contact tracing, we had the idea that contact tracing would be an obvious application. And this would shorten the duration, really, from a person becoming aware of being a case to their contacts being notified, from something that took several days of -- to something that could be instantaneous if a large fraction of people were using the app.

Q. Thank you. I'm going to display a figure legend that you've provided in your statement, just to give some

overview as to the thought process but also how it was operating on your development of the app using the bluetooth contact.

Please could we display INQ000475153. It's the legend, please, on page 8. Thank you.

Professor Fraser, I think we're all broadly familiar with the concept as to why it was necessary for contact tracing apps. Is there anything you want to say, bearing in mind this is clearly your initial app 1, we're going to call it, that was being developed and was then trialled on the Isle of Wight in May of 2020. But do you want to give an overview about your app, how it used bluetooth, and so, when we come to then move to app 2 we understand the distinction between app 1 and app 2, please.

A. So we presented the concept for such a proximity tracing app, and I have to say, in terms of the design of the app and figuring out the functionality of what was possible, that was developed with many contributions from other people. My background is not in technology; my background is in epidemiology and public health.

So, just in terms of the schematic, I think there's a few things that appeared important to us. The -- so, person A here is the person who we're following over the course of a day, who comes into contact between

different people. The first thing is we thought you wouldn't necessarily want to give the same notification to everybody. If somebody had had a fairly distant contact, in this case people H and I, at work, you might want to give them just a low -- a lower degree of notification.

The other thing which we did is we included the results of -- this was work that had to be done in -- speed(?). So this is the mathematical model that I developed for SARS in 2003 but with Covid parameters instead, and you can see the range of assumptions about what proportion of cases you could identify and what proportion of their contacts would be found and quarantined. Both, you know, without pre-judging how difficult or easy this might be, but showing that there was then an impact on the epidemic, quantified by the growth rate, and there was a range of assumptions where the epidemic could in fact be controlled with this system of instantaneous tracing.

And in the paper we also show similar projections, similar modelling results, with delays of two, three, four days in contact tracing, showing that you would have a much smaller impact in this situation of Covid.

Q. Thank you.

Can that schematic be removed from the screen.

I'm going to look with you now at the development of your app, but perhaps just to give an overview, to give some context to app 1 and app 2, it's right, isn't it, that you went on with others, through NHSX, to develop the Covid-19 app 1, as we'll call it; is that correct?

A. So I was an epidemiological adviser to NHSX for the development of app 1, and I was integrated within the team, so I had, you know, an NHSX email address and attended meetings and advised on developments.

And then as we moved over to app 2, I had the same role within NHS Test and Trace, yes.

Q. We'll look at that together in a minute. So, again, just using the overview for the distinction between app 1 and app 2, app 1 was developed as part of NHSX?

A. Yes.

Q. App 1 was the app that was trialled in the pilot on the Isle of Wight in May of 2020?

A. Yes.

Q. That then there came a time where app 2 started to be developed, which was not using bluetooth, but using the Google and Apple notification system. So a different system.

A. So, if I may, both systems use bluetooth. The primary distinction is that they use bluetooth in a different way, and they stored different information. So app 1,

it was the app itself that accessed the bluetooth signal, and did the calculation and stored the information as to who'd come into contact with whom, and users who had tested positive or who were deemed positive would upload the network of their contacts into a central server. So it was --

Q. Just pause there because I think that bit is quite important.

So app 1, the data would then be uploaded off the phone on to a centralised database?

A. Some of the data would be uploaded onto a centralised database, yes.

Q. Thank you.

Whereas app 2, which I'm going to call the Apple and Google app, that didn't upload the data anyway, is that correct? The data remained on the phone?

A. So the data on the network of contacts. There were other data -- which, you know, we might discuss later -- about individuals, but none of the data about who you might have contacted was ever uploaded, and it wasn't even accessible to the app.

So it was -- the exposure notification feature was in the operating system of the phones. So it was protected in the sense that the data was in the operating system of the phone and the network of whom --

who had contacted whom was never reconstructed. It was decentralised.

So, if you like, your phone would have a list -- for app 2, the privacy preserving one, would have -- your operating system would have a list of anonymous IDs of people you'd contacted, and then NHS Test and Trace would upload a list of IDs of people who have tested positive in the last few hours, and your phone would compare those two lists, and if there was a match your phone would say, you know, it looks likely you've been close to somebody who is positive, and would do some calculation then. The app would calculate whether that was really a risky contact, and if it was a risky contact, would notify the person. But there was never any information created on whom had contacted whom in the past.

Q. Thank you. And just to clarify, it's app 2, the app that you've described as the privacy preserving app, which was essentially the app that was then -- went live as the Covid-19 app on 24 September 2020?

A. Yes, that's correct.

Q. Again, just to identify app 2, app 2 was -- that work was done through NHS Test and Trace rather than NHSX; is that correct?

A. So I think both apps were initially developed by NHSX.

I was not involved in the initial development of app 2 during -- while it was with NHSX. And then as it went live it was transferred to NHS Test and Trace.

Q. Thank you.

Now, when we looked yesterday in opening at the strategies that were implemented in May of 2020 as part of NHS Test and Trace, it was headlining that the app was about to go live shortly. And so when we look at that in the context of May 2020, was the expectation at that time that it was app 1 that was the app that was going to be implemented nationally?

A. Yes, I think that was the expectation, yes.

Q. Thank you. But in due course, for various reasons which I'll ask for your view and comments on, the decision was made not to go with that one where there were some concerns about privacy because of the uploading to a centralised database, but the decision was to go with app 2?

A. That's correct.

Q. Thank you. And so can we -- hopefully it's helped rather than -- and not confused -- can we just work through your involvement up to that point because I'd like your input as to when were -- there was an announcement being made nationally that an app was expected to go live in May, to get your views as we move

through the chronology on -- any views you have about the delay in an app going live for use in the United Kingdom?

A. So there are a number of features in terms of our team's involvement. There were three predominant areas. So the first were -- which I'll go through very quickly -- were about the ethics and the issue of privacy. And my colleague Mike Parker, who is Professor of Ethics at Oxford, we engaged very early on because we realised that this was going to present some difficult issues. He very quickly became an adviser to, or a member of SAGE, and I can't really talk for his work, though I'd be happy to try and summarise it if useful.

My own team's work was on a number of questions. So first is, I think, as you discussed yesterday, there were severe strains on testing capacity and, in fact, by the time the app was being developed in early March 2020 --

Q. Just pause there. When we say the app, we're talking about app 1 --

A. App 1. By the time app 1 was being developed in early March 2020, the ask, as it was, was to consider what could be done without community testing. So based on -- contact tracing based on symptoms. So, you know, you would be told that you were a contact of maybe

a probable case of Covid and you should be cautious as a result. And that was the app that was trialled on the Isle of Wight. So it didn't depend on limited testing capacity and the reason for that was because -- so that it could be deployed very quickly without having to wait for testing capacity to catch up.

We then looked at lots of different -- many different schema for sparing tests. So, you know, could you test one person and then assume that if their contacts are symptomatic, that they must have Covid because the index case had Covid, and permutations like this, to both look at the question as to how effective it would be, but also would it be disproportionate in terms of too many people being pinged?

The -- we also looked -- my team was also responsible for developing the risk score in the app. So we were aware from the early data on superspreading that it looked like there was a mode of transmission that was airborne. So this was before the sort of two-minute -- 2 metres/15-minute rule came in, so we developed a model of transmission based on a mixture of aerosol and direct contact, and we proposed a scheme for how the app could learn based on data as to what the true risk was.

And so the -- and then the third thing that was

very -- a major piece of work, was looking at the impact of differences in age groups, and the effective of digital exclusion, particularly in the elderly, and the fact that, you know, children and the elderly, for different reasons, probably wouldn't use the app, and how the app would, you know -- we received data from the Department for Culture, Media and Sport on the uptake on the -- on the use of phones across different age groups and developed a much more granular model to look at that.

We then also analysed the data, the epidemic data from the Isle of Wight which was certainly consistent with app 1 having had a big impact on the Isle of Wight.

Q. Can we come on to that, and the pilot on the Isle of Wight. And so can you just confirm to the chair in terms of development of app 1, I think we're going to hear from Matthew Gould that was part of the team leading the work on app 1. Who else, from a decision-making position, was involved in the development of app 1? Can you assist us with that?

A. So Matthew Gould, as the CEO of NHSX, would have been involved in decision making. I was not involved in decision making. My role was as an adviser. There would have been Peter Wyral(?). There would have been -- Geraint Lewis from Public Health England would

have been present. There would have been Mark Briers, as the chief scientist who was brought in from the Turing Institute with expertise in data systems and interpreting bluetooth signals. And there was a rather large team assembled looking at governance, inclusion, and other such issues.

Q. And just so we're clear, when you talk about inclusion, you've talked about digital exclusion, so in the development of app 1, were issues of disparity being looked at as you developed the app?

A. During app 1, those issues were being looked at. The main one that we looked at, which is the most salient one, was exclusion of age group, particularly given that the data which was very clear about the increased severity of disease as people got older, and the fact that older people are less likely to use smartphones, but other issues of disparity were looked at. I would say that they were much more foregrounded in app 2 when we moved over to app 2.

Q. Let's just work through your paragraph 29. You tell us that:

"NHSX took on the development of the contact tracing app [1]. The implementing partner was a company called Pivotal."

And your role from that point onwards was:

"... to advise on the epidemiology, impact on hospitals, and ethics."

You say that your first model was rather simple, that you started building a detailed agent-based simulation that could encode important information, of which age effects were the most important.

"Contact rates varied by age; smartphone usage varied by age; susceptibility to serious disease, hospitalisation and death varies by age."

And over the page, please, to your paragraph 30, you say:

"The development of the first step was remarkably fast, with test versions available within two weeks ..."

And you say:

"... this was even before the first UK lockdown started."

You say:

"[Your] group's focus within the team was the epidemiological considerations in risk scoring for the app, and understanding the likely public health impact of the app under different assumptions about population uptake and adherence to advice."

So can you help us, then, as to -- just from your perspective in terms of the timeline. We know there was the trial on the Isle of Wight. And from your

understanding at that time and your team for the development of app 1, when did you anticipate that it was likely to be available nationally?

A. I think the feedback from or the decision was made after the pilot of what -- on the Isle of Wight, that whilst the trial -- the app had been, from our estimation, successful, and from user reports that the trial had gone well, that the view was that it should be integrated with testing and that contact tracing shouldn't go ahead on the basis of contact tracing people who have symptoms but they should wait for a test.

So this was a first -- from that point on, I think once that decision was made, it was going to take a while, because you then needed to figure out how to integrate test results into the app from that point on.

Q. Thank you.

Perhaps if we just look at the -- the success -- I think you say you thought the trial on the Isle of Wight had gone well.

Can we look at your paragraph 55, please. You say that:

"... The Isle of Wight Test and Trace Programme was launched on May 5, 2020. The app was available for download by the general public from May 7, and was

downloaded by more than 54,000 (38%) of the people on the island during the trial period."

You tell us:

"On May 18, community testing was introduced nationwide, initially for all people over the age of 5 years, and for everyone on May 28, when the national contact tracing service reintroduced traditional contact tracing. There was no nationwide contact tracing app during the period of study."

Then you go on over the page, I think, to tell us the results as to how it operated on the Isle of Wight but the role it had also had around reducing transmission.

And so can I ask you, you've told us that there was then more work needed because there was a desire to link the app to testing, but in your view would there have been value of the app as it was following the Isle of Wight trial to have been launched at that stage, as a way of assisting with understanding of contact and tracing as part of a TTI system?

A. So our analysis of the epidemic on the Isle of Wight was consistent with a large effect of the app in reducing transmission. I would say that's not something that you can prove causally, because -- I mean, what happened -- because the epidemic was relatively small, but the

epidemic on the Isle of Wight was one of the fastest growing epidemics in the UK of a local area at the point when the app was introduced, and it was one of the fastest declining epidemics after the app was introduced.

So that was certainly consistent with large effect, but it's a single observation, so that doesn't prove a cause.

I think there would have been a public health value in releasing this very quickly, but I do respect the counterargument, and the counterargument was that people would -- might have quickly lost confidence because, you know, contact tracing people based on self-reported symptoms could have resulted in a considerable misuse or confusion, and quickly led to people ignoring the notifications, was one concern. And there was also very substantial public debate about privacy and whether the data about -- storing people's networks, contact history, was proportionate or not.

I should say, going into this work, my view was -- as an epidemiologist, I was not familiar with the debate on privacy around this. And, with the benefit of hindsight, I think I'm quite sympathetic to the view that, in the long term, preserving people's privacy with phone apps is important, and perhaps the legacy of

having made the decisions in favour of privacy were good ones in terms of having people's trust for these tools in the future.

Having said that, the straightforward answer to your question is: yes, I think it would have made an impact then and there. Whether it had been a durable impact and whether there might have been more harm in the long term is a matter of speculation.

Q. Thank you.

So, following on from the Isle of Wight trial, you've told us already that which we also see at paragraph 58, that essentially the learning was that the national contact tracing app should be integrated with the new PCR testing service for Covid. So can you help us, then, from app 1's perspective what happened following on from May? Did you continue to develop the app with a view that it would link to the PCR testing?

A. So, yes. And of course -- so we continued being part of the app team. Of course that decision then meant that there was -- you needed time to make sure that PCR testing capacity could meet this team -- meet this need or this new sort of requirement, and they continued -- we continued to develop our modelling and answer queries from the UK and internationally. There were many other contact tracing apps being developed internationally.

One of the areas which I think was on a lot of people's minds during May is one of the results of our early simulations was that if 80% of people use the app -- it's not something, in fact, we emphasised, but that you could suppress the epidemic entirely, combined with some social distancing plus a very high uptake of the app, that that could suppress transmission entirely, and that became sort of misinterpreted as: if you don't get this very high uptake, then the app is useless.

So what we developed were simulations showing what would happen if you had 10% of people using the app, 20% of people using the app, so on and so forth. And showing that in fact there's a fairly gradual relationship in between the proportion of people using the app and the effect of the app, which was then borne out empirically after the app was released. We see that relationship across the UK comparing different local areas to each other, and so that was helpful, or so we were told by policymakers.

The other thing that happened was that the privacy discussion continued, and it then became clear that Google and Apple had released an alternative solution that was more privacy preserving and that the UK was in fact developing -- NHSX had in fact commissioned a separate team to develop an alternative app based on the

Google and Apple programming.

Q. Thank you --

A. -- (inaudible - overspeaking) --

Q. We'll go on to look at that. So I just want to complete, then, app 1's work and team 1. You've just identified that then there was a separate team that was developing app 2 that went live on 24 September 2020. Was there any crossover between the app 1 team and the app 2 team?

A. Not as far as I'm aware. Not within NHSX.

Q. But is it right that you were essentially giving epidemiological advice to both app 1 and app 2?

A. I was giving epidemiological advice to app 1 and at the point where the decision was made in the -- by the UK Government to go with app 2, I switched over to having a role, giving epidemiological advice to app 2.

Q. Thank you. And we can then just identify when team 1 and app 1 were told that the UK Government were not going to use your app or the app 1?

A. Unfortunately, I haven't documented the date in my witness statement, and I don't have it. I'd be happy to supply that. It was an internal briefing to the app 1 team, followed by a press release, a national press release, by the Secretary of State, Mr Hancock, Dido Harding, and Mark Briers, the chief scientist.

Q. And is that linked to the launch of app 2?

A. No, that was an announcement of the decision to switch to the Google and Apple system, and an explanation as to why that decision was made.

Q. Thank you. So I'm going to go to your paragraph 67, please, and this is now the development of app 2 and the involvement we know that was successful with Google and Apple. You tell us that on March 30, you had a meeting with Google engineers who informed you that they were interested in your work, on app 1. On April 4, they confirmed they had their own programme. On 10 April, Google and Apple announced their joint programme called Exposure Notification, which is the Google and Apple exposure notification. The application programming interface was released through May, and in June NHS Test and Trace announced a change of strategy from the first NHS app, app 1, to a new app that used the Google Apple Exposure Notification system.

I think you tell us that the commercial developer for app 2 was Zuhlke Engineering, and the app's ownership changed from NHSX to NHS Test and Trace. Is that right?

A. That's right.

Q. And essentially, then, when app 1 was stood down, you transferred across to app 2?

A. So just in terms of re-reading as you've read it, it sounds like all of that happened on March 30. Actually, it was a sequence of events over two to three months that I've summarised within one paragraph. So apologies if that isn't sufficiently clear.

Q. No, thank you.

Can I ask for your views and understanding of what was happening, then, on the ground during this time? Because paragraph 68 suggests that there were some difficulties. You say this:

"The changeover from the first to the second app, with an overlap of efforts was a difficult time within the app team, with conflicting accounts. I was not involved in decision making around that change. My understanding is that there were at least five considerations. First, privacy, since the [Google and Apple Exposure Notification] system was decentralised and therefore did not expose users' contact network information to a central server. Second, the technical and reputational benefit of being supported by Google and Apple. Third, issues in accurately measuring distance between phones. Fourth, specific issues hindering the consistent functioning of the app on Apple iPhones. Fifth, the apps had different commercial suppliers, namely Pivotal [app 1] and Zuhlke, and

therefore it is possible there was preference for one supplier over the other."

And you say your team's only involvement in the decision was that you were asked to model a scenario where communication between Apple iOS devices was ineffective, and you say that these devices make up about half the smartphones in use in the UK. You say you quickly emailed the leadership team of NHSX to indicate that if this was the problem with the first NHS app, then your recommendation was to switch to the Google and Apple Exposure Notification system.

A. That's right.

Q. Thank you.

Then can I ask you at a time before the government decided to go with app 2, was there any support for app 1 over app 2 and, actually, that should be the preference to go with app 1?

A. So the -- I was asked to comment. I was -- and produced a public report comparing the architectures of app 1 and app 2. Part of what made the situation difficult internally was that it felt like there was a need for a decision, the period lasted quite a long time, and the co-existence of these two app programmes. There was a need for a decision, and the debate was, I think, evidently harmful to the app programme overall, and

would have been brought to an end by taking a decision. So having this open situation was inherently harmful.

My understanding, with the benefit of hindsight, talking to the people involved in development of app 2, is that it didn't actually slow them down. So it didn't slow down the development of the app that was eventually released. That is what I've been told.

And then the issue about this centralised versus decentralised and privacy, I was asked: would it provide epidemiological utility to have this centralised design? And the rather long answer is that there would be some epidemiological utility in being able to look at heterogeneities in transmissions, but that wasn't a consideration that should be given a lot of weight. What really mattered was user trust and engagement and that the decision should be based on which of the solutions was likely to have the best trust and user engagement and I think, you know, that was probably the app that favoured user privacy.

Q. Can I ask that with you mentioning that you were being asked as to whether there was epidemiological justification for having the data on a centralised position, and you have obviously indicated that it only had a very small role, but was it ever being said that that would be given the reason as a preference to go

with app 1?

A. It was a stated reason, and I was not comfortable with that presentation. I don't believe it was a major -- the epidemiological concerns were a major factor to be considered in comparing app 1 or app 2.

Q. And can you help us where it was stated that the reason -- there was an epidemiological reason for the data to be held centralised, where was that stated? Was it publicly stated?

A. It was publicly stated by the CEO of NHSX, Matthew Gould, and by Dr Levy from the National Cyber Security Centre. And it's entirely possible that I did not present the epidemiological pros and cons in a very clear-cut manner. I think it seems to me clearer with the benefit of hindsight.

Q. And I think it seems to be what you're saying is that you felt uncomfortable, would it be fair to say from a public trust point of view, to be saying there was an epidemiological reason for the data to be held centrally?

A. That's correct.

Q. Okay. Can I then ask you briefly for any views or comments you have. We know that, ultimately, on 24 September app 2 went live nationally but we also know that different apps were developed and utilised in

Northern Ireland and Scotland. Do you have any knowledge as to the benefits or disbenefits of, essentially, different apps in the different devolved nations?

A. So I was an adviser within what became the England and Wales app, and I was not party -- what was important was that the apps should be interoperable across the nation. Whether it's one app or multiple apps that essentially have a similar functionality and interoperable -- I think is -- you know, that's -- it's not a -- something that matters epidemiologically, what matters is user engagement, that determines effectiveness.

I have read, in preparation for this, you kindly -- your team kindly shared with me documents from their Wales, Scottish and Northern Irish teams. And it does appear that there is a logic to having, from the outset, an app which can work fluidly across borders.

So the Northern Irish app was essentially identical, in my understanding, to the one that was used in the Republic of Ireland. And the argument presented by the government of Wales was that there was sufficient traffic across the Welsh/English border that having, sort of, common design and interoperability from the outset was desirable. But I was not involved in those discussions at the time.

Q. No. And so, whilst different apps, would it be fair to say the important key is that those apps are interoperable?

A. Yes, that's correct.

Q. And did there come a time essentially where all of the apps that were being used nationally could work interoperably, to the best of your knowledge?

A. To the best of my knowledge, interoperability -- it might have taken a few weeks, but it eventually all of these apps were interoperable, yes.

Q. Thank you. Now can I -- on app 2, on 24 September, can I ask your views and comments as to the extent to which issues of disparity were considered, and also issues of accessibility, just so there's a clear understanding about the thought process from those perspectives, and how that featured and factored into the development of app 2, please.

A. Yes. So app 2 continued on -- we continued our work looking at exclusion of people in different age groups, and, in particular, one of the issues with using the Google-Apple system is that it didn't work on older phones. So sort of some of the older handsets. But there were many other functionalities in the app, venue check-ins, symptomatic testing, access to tests, and so on, and there was efforts to make sure that those were

accessible on older handsets.

The -- really thinking back to meetings, there was a lot of emphasis on inclusion. The pilot for app 2 was done again in the Isle of Wight, but in Newham, in London, which is a very mixed and multi-ethnic part of London, and that was done to understand the impact of the app in different settings.

The app was released with 12 languages, and those languages were chosen quite -- based on surveys of which languages would be most useful to people who have low fluency in English. The reading age of the language was tested to be comprehensible to somebody with a reading age of eight or above.

So I think in terms of process -- and a lot of adverts and community engagement were done in different communities.

In terms of process, it was really something that was thought about very seriously. However, we don't -- because of the privacy design, we don't have detailed data on who was using the app, but both in terms of surveys and in terms of looking at the geographical distribution of app users, it remained the case throughout the course of the app that there were very substantial disparities in terms of the app use and the resulting number of cases and lives *(sic)* averted in

different parts of the country.

Q. Can I ask you, then -- you do identify, at paragraph 82 -- and perhaps that could be displayed, please, of INQ000475153, paragraph 82.

You were able to identify, I think from its launch on 24 September 2020 -- you say this, that the broadly -- there was a broad agreement on the number of deaths averted in England and Wales during the first three months of the NHS Covid app.

And that it placed a central estimate between 4,200, and 8,700. And is that just over the first three months of the app going live?

A. That's over the first three months, yes.

Q. So a significant impact, once that app was in use?

A. And the number -- the two numbers were obtained by different methods, and both of these methods were aiming to be quite conservative in our approach. The number 4,200 was a number that came out of the modelling, and we didn't model all of the indirect benefits of cases prevented. So these were cases directly prevented by the app. And the 8,700 was a statistical estimation based -- using a method which -- based in so-called causal inference, that tries to remove the confounders.

What we saw was that there was a very strong association between app use and mortality, but some of

this could be explained by sort of association with other factors which had nothing to do with the app. So what we did is we compared local authorities that were next to each other, and that had had a similar number of cases prior to the app being launched, and -- but they differed in that one local area had slightly more app users than the others. And we did that comparison again and again across the country to come up with that number, 8,700.

And then, if I may, just an additional piece of evidence, was that when it was launched for the first month, it was launched with a kind of safety mode where it pinged very few people, just to see that the app was behaving as expected, and it was properly turned on, as it were, after a month. And we saw that the effect, we measured with the a statistical model, mirrored exactly that sort of tuning up of the app after a month.

Q. Thank you.

Can we then display paragraph 76, please, which is on page 27 of the same statement, INQ000475153.

And it's your paragraph 76. You say this:

"Ideally, national testing and tracing would have been scaled up at the period of low COVID transmission during the summer of 2020 rather than launching in the autumn. My understanding is that this was not possible

due to the time needed to develop the systems. On the one hand, there would have been substantial public health benefit in launching earlier, even if by a few weeks, due to the low rate of infection during the summer. On the other hand, it was important that the app be launched only after it was technically ready, since first impressions were likely to shape longer-term users' impression."

Is there anything you want to add to that paragraph?

A. I guess -- I mean, there was an opportunity during the summer of 2020 to really get on top of the epidemic.

I think one of the -- looking back over the pandemic overall, one of the features I think which maybe hasn't been emphasised enough is that we never saw -- there was no point during the pandemic where the public health system wasn't overwhelmed, where the public health system was operating within its capacity.

So if you look at countries where public health systems were operating within capacity, you have isolated outbreaks and you essentially respond to them with the combination of testing and manual tracing and app-based tracing, and you always have more public health capacity than you need, as it were. Whereas in the UK, it was always, you know, less, slightly less, or much less than would be needed to achieve that.

I think there was an opportunity during the summer of 2020 to reach that stage, certainly by the autumn of 2020, with the reopening of schools and of universities. With very large outbreaks around there, that opportunity was missed.

And I guess that comes to the recommendations, looking forwards, that really it's so important to have these kind of systems, or, you know, we can -- people can have different views as to which systems -- the details of which systems we really need, but they need to be ready from the outset so the public health sort of is on top of the situation before it spins out of control.

Q. Can we then, before the break, just look, please, at the maps you've provided of the UK. And I'm going to take you, first of all, to the one that we find on page 27 of your statement, please.

And perhaps if you could expand the map of England and Wales, please.

Perhaps just to contextualise this plan, you've been able to identify that when the app was launched on 24 September alongside the national advertising campaign, over 10 million people downloaded the app in the first week. But then, can you help us at all, because certainly if we look at the percentage of uptake

in the population from -- as shown on there, that certainly, there seems to be a significant lesser uptake in Wales, and obviously there are then areas, particularly, highlighted by yellow with the least uptake. And so, first of all, with Wales, are you able to assist us at all as to why there seems to be a substantial overview of lesser uptake in Wales over other areas of England?

A. I can't say in detail. It's quite stark. My understanding is that one of the drivers of adoption was the use of QR code check-ins and this was not adopted to the same extent in Wales. I don't, unfortunately, have all of the details about that difference in policy available to me now, and if it's important, I'd be happy to verify that and get back to the Inquiry.

Q. Thank you. And just on that point in terms of the benefit on the app, obviously it had a role around the contact tracing aspect but is it right that the app also was crucial to the check-in service and so there was another driver of people wanting it, is it was part of that ability to check in in restaurants and the like, and --

A. Yeah.

Q. -- and so that was kind of a linked benefit to encourage download?

A. Absolutely. It was a convenient way for people to check into venues. People could choose to sign in leaving their name and phone number, but the app was more privacy-preserving and a convenient way of doing so. You could also order a test, you could check your symptoms, such as they were, and you could get a local alert at the point where, you know, there were differences between regions.

Q. Thank you. And are you able to assist, Professor Fraser, on the areas shaded in yellow? I'm afraid I've not cross-referred where those areas are. Certainly as someone that hails from the north-west I suspect I've got an idea where some of the yellow areas are. Are you able to help as to any input or additions you can add around the areas in yellow and areas where there's lower uptake of the app?

A. So there -- these are areas in east London, northwest England around Manchester and Liverpool, where the uptake of the app was lower. And in surveys -- and where economic indicators indicated substantial and longstanding disparities, socioeconomic disparities, lower wealth, they're areas which notably had more deaths in wave 1 and wave 2 and beyond. So there's really a very strong concentration and strong correlation -- sorry, strong association -- between the

areas where there was less uptake of public health. They are also the areas where typically there was less uptake of vaccination, where uptake of vaccination was slower, and where, sadly, mortality was concentrated.

And that's when I -- why, when I, sort of, referred to how we used these data to estimate the impact of the app, we couldn't do a straightforward association nationwide. What we had to do was to compare areas, if you like, which were next to each other with similar levels of disparity, similar epidemics when the app was introduced, and compare the outcomes relative to small differences in app uptake.

But I think it does show, doesn't it, that the -- there was a lot of thought put into how to make the app accessible and appealing and useful in different areas, but fundamentally, probably, you know, maybe the impact of being asked to self-isolate is very, very different based on your work and your household situations.

I think it's a perfectly understandable response that, you know, the people would engage less in those areas, and unfortunately in those efforts, did not make the desired impact in terms of addressing these disparities.

MS CARTWRIGHT: Thank you.

My Lady, is that a convenient moment to break?

LADY HALLETT: Certainly. I shall return at 3.35.

MS CARTWRIGHT: Thank you.

(3.18 pm)

(A short break)

(3.35 pm)

MS CARTWRIGHT: Thank you, my Lady.

LADY HALLETT: Ms Cartwright.

MS CARTWRIGHT: Professor Fraser, can we look at some additional graphs that also show us how successful the app was. It's your page 31, please. I'm not going to take up time going through each of these other than just to identify what is shown by each of the graphs.

If we look at, first of all, graph a, I think that demonstrates the cases, is that correct, that were averted as a result of the app?

A. That's right. So --

Q. So -- sorry. Please, you tell me what that shows.

A. Yes, so over time, it's the cumulative count of cases averted, and this was derived with the modelling approach rather than the statistical approach, so the one that counts direct cases averted. So, compared to the previous estimate that we saw, it was the lower of the two, the most conservative method. And it shows that by the end of the first year about a million cases were averted, with some degree of -- a large amount of

uncertainty shown by the shaded area.

We didn't replicate the statistical analysis for comparison because by the end of 2021, there was so much vaccination that it was quite hard to separate, you know, statistical analysis.

Q. Can we briefly then look at graph b, which I think identifies hospitalisations averted as a result of the app.

If graph b could be expanded. Thank you.

A. So a similar plot showing about 44,000 hospitalisations averted by the end of the first year.

Q. Thank you.

If we could then expand graph c.

A. 9.59, 9.6, so just short of 10,000 deaths averted over the course of the first year.

Q. Thank you.

Then if we could then look at a different graph, of England and Wales, at d, I think this shows the estimate cases averted in each local authority. And again, we can see plainly it identifies difference across local authorities, and particularly lower tier authorities; would you agree?

A. I would agree.

Q. And then finally if we could just expand the map of England and Wales for e, and that also shows the

estimated% reduction in cases in each lower tier local authority; is that correct?
A. That's correct.
If I may just take a moment to express my condolences to the families of the bereaved and to -- represented here and nationwide.
Q. Thank you.
Can we please look then briefly at your paragraph 114, which really allowed, after pandemic, to do some analysis around length of contracts. And I think you've identified that the significant thing you've identified when the data has been reviewed is the significant feature was duration of exposure, and actually the longer the exposure, that was when the risk of transmission occurred, and actually for brief periods of contact, there was relatively low risk of exposure to Covid; is that correct?
A. So that's correct. On average. There's obviously a lot of variation about this, but on average, the inferred transmission rate -- so this was an analysis that was done after the app was discontinued.
It was -- because of the privacy-preserving design, it was difficult -- a technically difficult analysis to do, but we estimated that about 1 -- the transmission rate at about 1-2% per hour of close contact, so really

quite low, and whilst, you know, many short contacts -- people had many short contacts, and that can add up if many of those are with infectious individuals, that the predominance of transmission was through the longer-duration contacts.
Maybe we'll come back to the recommendation that this kind of data is something that we should be generating at the beginning of a pandemic rather than in retrospect, and how that might happen.
Thank you.
Can I then briefly deal with lateral flows, because one of the things that you've identified, at your paragraph 93, is that:
"Quarantine was the most harmful expect of NHS Test and Trace."
A. Mm.
Q. And you provided the opinion that:
"There was evidence that it could [have been] replaced by daily testing with lateral flows, or at least offered as an alternative."
A. That's right. So I think the data were quite clear, really from December 2020, and maybe even before that -- certainly I became aware of the data that the performance of the lateral flow tests was pretty good in the sense that -- if you thought about them as tests to

detect somebody who was infectious, so had enough virus that they were infectious, rather than a test just to see if they were infected.
So PCR tests could detect very low levels of virus but these lateral flow tests would pick up somebody who is infectious. And if you tested in the morning, your chance of then -- tested negative in the morning, your chance of infecting somebody over the course of the subsequent day was very low. And we modelled that based on the data that were available.
And we also showed that there was another benefit. So not quarantining, obviously there's a clear benefit, being able to get on with your life at the expense of just doing a test in the morning seems good, but also this would allow, if a contact were to become infected, this would allow that contact to themselves be identified as a case very quickly, and in turn, then be contact traced immediately.
So if you -- if we think about the app as it eventually became, by the end of 2021/2022, it was what in early 2020 we thought, you know, was almost science fiction, that you could test yourself, find out that you're positive, your contacts find out within two hours that they're a contact. They can test themselves. If they're positive, their contacts get immediately

notified and then a whole cluster of infection can become aware of their status, you know, very quickly.
And of course, you know, some of that happened by other means as well, WhatsApp, informal communications in households, but this added to that process of awareness.
Q. Thank you. And you go on to say in paragraph 94 that in your opinion:
"... quarantine stopped being proportionate at some point during the spring of 2021, as the government pursued the roadmap to reopening and vaccinations were rolled out."
And you say:
"In particular during the 'pingdemic' of June of 2021, contact tracing would have been perceived as less problematic had quarantine been replaced with regular testing."
A. So that's right. So the "pingdemic" was named by the press, who have an ear for a catchy term, and what it described was a process whereby, at the time, essentially re-opening had happened, stage 3 reopening, pubs were open and the football tournament, the Euro football tournament which had been delayed for a year happened. Many people gathered in homes and pubs and many people were pinged because they -- these were

genuinely risky events. Many people got infected.

What we saw with the app data was not just that contact rates were sky high, the highest we saw at any stage throughout the pandemic but, actually, the probability of transmission. These were genuinely very risky contacts.

Now, the question I asked myself is, is it proportionate to have the pubs open for football on the one hand and, on the other hand, if somebody is then a contact, to ask them to stay at home for ten days, when there are rapid tests available? And in my view, it was not proportionate. In that kind of open-society context, which I think made sense for vaccination, people shouldn't have been being quarantined with a relatively low risk that they were in fact infected.

Q. And I think you say unfortunately the policy of quarantine was maintained until 18 August 2021 which generated substantial negative opinion.

A. That's right.

Q. Perhaps if we look perhaps -- the press called it the "pingdemic", if we can look at the graph on page 44, essentially we can see on that map that certainly perhaps when the pingdemic was most active, would you agree, it was the June and July, essentially, when Euro 2020 was happening in June add July of 2021, and

the period of time around contacts at Christmastime?

A. Exactly. So there's Christmas shopping, Christmas and New Year. We also discovered that there were very low contact rates during January, so at the other end. We could see peaks in the number of people, contacts, you know, at different days of the week, Friday and Saturday night in particular, festivals. But those were the big events where there -- and we can see the impact of the football tournament because the app was operating in England and Wales so you saw different peaks in the nations according to whether the matches involved the English team or the Welsh team.

Q. Thank you. And I think it's something you felt particularly passionate about because the fact that there was still the requirement to quarantine, the pingdemic, but you, I think, engage with the media in July of 2021.

Can we briefly display INQ000475151, which I think is one of the articles where -- apologies, INQ000475151 -- where essentially you were begging people not to delete the app because of the pingdemic, but really, seeing what you've told us, that there was a need for quarantine to come to an end.

A. I'm not sure I would recognise the term "begging people", that was a headline writer, it wasn't the bit

I wrote.

Q. Apologies if I adopted it.

A. That's perfectly -- it's what the article says. Throughout the pandemic I took the view that, as an adviser engaged and -- with a government programme, I wouldn't publicly -- I wasn't a commentator, so I wouldn't express public opinions; I would explain the work we were doing and that my colleagues were doing and try to represent it as best as I could, but I wouldn't take public opinions on programmes I was engaged with, whether or not, you know, I agreed with each of the decisions. But on this one I felt strongly, and decided to break my own rule on this point. Yes.

Q. Thank you.

Now, we know ultimately that the app was decommissioned on 27 April 2023.

A. Mm-hm.

Q. The app team was disbanded. Your contract as an adviser with the Department of Health and Social Care came to an end, but significantly Google and Apple decommissioned the Exposure Notification on September 28, 2023, and you say that they had committed from the outset that this software was a functionality develop specifically for Covid and would not become a permanent feature of their operating systems.

A. That's right.

Q. And I think perhaps that leads us into the detail of your statement that deals with recommendations. And you set them out with what starts at paragraph 130. But I think you've a view as to the order of the recommendations that you've detailed, and so can I start with your recommendation at 135.

So can I ask you, first of all, to give the relevant evidence you wish to give to my Lady about the need for the United Kingdom to change doctrine in preparing for novel viruses to reflect that most epidemics are controllable, please.

A. So my view, and this was largely my view before the pandemic, but even more so with the benefit of hindsight, something I hold more strongly, is that epidemics are technically controllable, since they're dependent on a process of contact between people, and -- you know, people can use barriers, masks, test and trace, and reductions in contacts. And we've learnt that really quite large changes are possible, and that is, you know -- but that a lot of these measures also cause harm. So really, the question is less, in my view, on whether a new pathogen is controllable or not but it's what would it take to control it. And, you know, what are the relative harms of the epidemic versus

the control measures?

And we might think back to 2009 swine flu, which I think most people would regard as something that was not worth -- where there was a relatively mild -- there were fewer flu mortality in 2009 than there were the year before. Of course, that meant that protections could be targeted to those most vulnerable in 2009.

At the other end of the spectrum, something like a haemorrhagic fever, like Ebola or Marburg, there would be no controversy -- or even SARS-1, with 10% fatality rate -- there would be no controversy in pulling all of the stops to control this.

So the question is really where the boundary between those things are. And I think public health can also move that boundary by having control measures that have the greatest effect on transmission at the least possible harm.

So I think the -- contact tracing is one of the things, test, trace, isolate is one of the things that can offer sort of a substantial benefit. And if we think about futures pandemics, you know, where we might have vaccine candidates and treatments -- certainly for flu we already have treatments and vaccine candidates stockpiled, we can use test, trace, isolate to distribute those treatments and vaccines.

So the issue is that public health needs to be on top of transmission, allowing a choice to be made, because if you wait until the data available to determine the right course of action, you might be in a situation where, by the time you have the evidence, your choice of actions is restricted, you're already no longer capable of doing test, trace, isolate because it's too late. Test, trace, isolate is a bit like Whack-a-Mole, you know, you have the outbreak here and you need your teams to be going in and responding with sufficient capacity to every single outbreak you can only do that if you start really early and if you stay on top of things.

Q. Thank you.

A. And to do that, you need to be willing to do it before you need to know that you need to do it. So you need to do it and then you need to collect the data so that if a better course of action is desired, you then have the choice to switch to that better course of action.

Q. Thank you. And I think you essentially identify that when a new epidemic begins spreading initial efforts should focus on containing or suppressing spread and collecting the necessary data for decision making. And you've given a number of examples of countries, including Norway, Denmark, Taiwan, South Korea,

Singapore, New Zealand, Australia, where they were able to control infection, hold back the epidemic until vaccines were rolled out in 2021, and that those countries also did not experience excess mortality from the pandemic, nor did they suffer worse economically and nor were all undemocratic?

A. That's right.

Q. Can we then move, please, to I think what you've tiered as your second key recommendation. I'm not going go through each, your statement will be published at detail all. Your, I think, second tiered recommendation is that the United Kingdom should develop standing capacity to test many people for novel viruses, to perform manual contact tracing with accuracy and speed, and to roll out digital contact tracing within weeks at the start of the public health emergency.

Do you want to just expand upon that recommendation, please.

A. So in the UK we have some capacity for PCR testing of novel pathogens and contact tracing. My understanding is that that capacity is not substantially bigger than it was at the beginning of 2020. I think it needs to be more substantial. That will obviously cost money that could be spent for other more immediate needs but I think it's an investment, you know, which would pay

many times over in the event of an emergency.

And I think the -- I think my next recommendation is more details on the digital contact tracing. We do not, as far as my understanding is, the UK is in a situation where, essentially, we do not have a detailed plan at this point in time for that early public health response that would then precede things like vaccination, and so on, down the line.

And we need -- yeah.

Q. So can I ask you, so you've told us throughout your evidence about the time it took to develop the contact tracing app. So if there was to be a pandemic tomorrow, what's your view about how long it would take to get a contact tracing app up and running again?

A. So as it was decommissioned, that was a question that the UKHSA addressed, and my understanding is that the time was about four months to get things up and running. And that it would be difficult. So the code has been frozen, it's available, it's open source code, but it doesn't have the Google and Apple side of things. And phones change very quickly. I mean, the capacity to do this app was really quite dependent on technology that was introduced 2016 through 2018. We're already seeing new receptors on phone, ultra wideband, so on and so forth, and we also have a diversity of phones.

So it's not something, reawaking this code, you know, from its, sort of, frozen state, it's not at all a straightforward process.

Renegotiating the agreement with Google and Apple and the governance -- the governance which was a link between Google, Apple and the public health authorities was something that nobody was happy with. There isn't a better framework in place at the moment so you would have to reopen all of those discussions. And, in particular, other features which I thought were really good features, you know, the QR code check-in, being able to order a test and so on and so forth. They didn't work as well as one might have hoped. Now seems like a good time to figure out how to make those things really work for next time.

Q. So Professor Fraser, what does that need now to be taking place within government?

A. Well, as with any partnership, it needs a partnership with government, with funding; it needs a partnership with public health, who would commission and fundamentally own this because it has to be integrated with other public health boards; it needs the input of scientists, epidemiologists, but also from the technology sectors. So it needs a partnership to be put together.

And I think you mentioned in your opening, we have started the process from the academic side of bringing together, you know, the economists, the behavioural scientists, and the demographers who think about social disparities and so on. The engagement -- but to expand it further, we need a government commitment and the government, I think, needs to bring the technology sector, as well, to the table, to prepare this. And to really have activities -- two things. Really, we need activities during so-called peacetime, you know, where contact tracing, the UK's had some unusual influenza cases, a small number, introduction of new viruses, where contact tracing has been important. So, you know, the technology and the -- most importantly, the learning of communities and individuals can be done during this peacetime period, as maybe there isn't really a peacetime because there are always new viruses, but it needs very contained outbreaks, and we also need a plan for rapid deployment within weeks, should we face another epidemic -- when we face the next epidemic of, sort of, pandemic potential.

Q. I think you suggest in your recommendations that if that's done, we should be ready to issue an app within, I think, a period of three to four weeks?

A. I think that's right. If you imagine -- you know, it

became fairly clear by the second, third week of January that this was a major event. If you imagine that by the mid-February we were already scaling up contact tracing and collecting -- you know, with people's consent -- collecting data on what the risks -- you know, what was a risky contact, what wasn't a risky contact, could have allowed people to focus much more on those risky contacts that lasted an hour, two hours. We could have been giving recommendations for social distancing and getting feedback immediately, realtime feedback, on whether contact rates were really going down, how people were responding. That would have given many -- it would have empowered individuals but also given many more policy options in terms of calibrating the response.

Q. Thank you. And finally, Professor Fraser, I'm just going to essentially summarise three other of your recommendations briefly, because I think they stand alone without needing expansion.

You also recommend that the UK should address the substantial social, ethnic and geographical disparities in health, and in uptake of public health interventions, learning from countries where inequalities were not so stark, as well as from its own vaccine rollout during Covid-19 that suffered from fewer problems of inequality.

You additionally recommend that the UK should plan a system of financial and social support for quarantine, a plan to replace it, if possible, by a policy of regular testing.

And you've also recommended that closing schools should be a measure of last resort and non-pharmaceutical interventions other than test, trace, isolate, quarantine, such as regular asymptomatic testing, are needed to balance controlling infections with keeping schools open.

I apologise for summarising in that way, but I think they are, fair to say, also significant recommendations you suggest to my Lady; is that correct?

A. That's correct.

MS CARTWRIGHT: Professor Fraser, those are my questions.

My Lady, do you have any?

LADY HALLETT: No, thank you, but I know Mr Thomas has.

Mr Thomas is over there.

Questions from PROFESSOR THOMAS KC

PROFESSOR THOMAS: Good afternoon, Professor Fraser. Can you hear are me okay?

A. Yes, I can. Thank you.

Q. Professor Fraser, I've only got a few questions for you. Let me start by introducing who I represent.

I represent FEMHO, the Federation of Ethnic Minority

Healthcare Organisations, and they have an obvious concern in relation to how matters touched upon their members during the pandemic.

Now, Professor Fraser, you've acknowledged the role of digital contact tracing and the NHS Covid-19 app in managing the pandemic. However, it has been highlighted throughout this Inquiry that public health technologies such as the app did not fully take into account the needs of ethnic minority communities.

Can you elaborate on whether any specific measures were considered to ensure that these digital solutions were inclusive, particularly in relation to the diverse socioeconomic and cultural backgrounds of the communities I've mentioned?

A. Yeah, thank you for your question. So I really -- I mean, I -- I think, in terms of the pandemic, clearly shone a harsh light on the inequalities in our country. As an epidemiologist working in public health, I've always been aware of social determinants of health outcomes being important, but I think, as a point of reflection going forwards, I think it would be more central in our thinking in terms of developing modelling and recommendations going forwards than it was, given the evidence of the outcomes in the pandemic.

Now, to the task of representing the app team, I do

think -- and it's not my work, and it's difficult to do justice, I think the app team was very committed on this issue in terms of intent, and the app was available in 12 languages. That was really important. There was specific advertising in different communities, differentiated, recruiting community representatives to speak to their app in the media. But I think, in terms of fundamentally the measure, you know, the test, trace, isolate, quarantine, obviously the impact of isolation and quarantine is very different depending on the work and living conditions.

I think there are historical -- and, essentially, the support payments, for example, didn't mitigate enough for those different impacts.

I also think that there are historical reasons why commitments to privacy when it comes to sharing NHS data, you know, different communities have different views on this, built from bad experiences in the past, where data were inappropriately shared in the past. So I think there were some legitimate reasons for that distrust and trust needs to be earned with trustworthiness.

I do think -- and the maps and surveys speak for themselves, the full disparities were not fully addressed despite those efforts, so I think there's more

work to be done going forward.

Q. Okay. Let me move on to my second question.

In your view, to what extent were the NHS Covid app and other test, trace, isolate, support measures culturally competent?

A. Could I ask you to elaborate on the term "culturally competent"?

Q. Well, takes into account the needs of different ethnic, socioeconomic groups on a cultural basis. Effectively it means what it says on the tin.

A. So I would say that the -- in a way, the process of scaling sort of large-scale contact tracing at a point where there were, sort of, many more infected cases and many more people to be -- that needed contact tracing to -- than could be reasonably communicated with by people with, sort of, appropriate expertise, who could differentiate their advice, meant that, in answer to your question, probably it wasn't differentiated to people's needs.

Q. Can I -- forgive me for stepping in, but can I just give you a very obvious example, an example that I gave to her Ladyship in my opening yesterday, and it's simply this: many minority ethnic households are multi-generational. That in itself will have an impact, won't it?

A. So in terms of -- so what I think on this is, absolutely, different living conditions and multi-generational households are clearly associated with worse outcomes, clearly make it much harder to isolate or quarantine within a household. And that insufficient effort was made -- I think the problem wasn't so much the contact tracing, maybe, it was more that the consequence of the contact tracing, which was, you know, being asked to self-isolate for a large number of days, had a very different impact according to your living standards and place, according to what your house was like, according to what your work was like. There was insufficient support. And other countries, we saw, would give more support and offer, you know, that people could spend time in a hotel, for example, if they felt they were unable to protect their loved ones within their household.

Q. Finally this, and I want to be forward looking, that has been a point that FEMHO wants to make: what changes could be made, going forward, to ensure that things become more culturally competent? What changes do you think we could make?

A. So this is where I think developing a strategy during a period where we hopefully have time before the next pandemic, community engagement, and working with

infections, you know, that affect different communities in the UK now, both through, sort of, real infections and also through, kind of, research, social research, with, led by, people from different communities, having more diversity in the people conducting the research and in, sort of, tailoring strategies and developing forward-looking strategies that make sense to different people's lives and different people's needs while also respecting the needs to control the epidemic as much as possible to stop those -- the negative outcomes from epidemic spread.

PROFESSOR THOMAS: Professor, may I thank you for your time. Thank you, my Lady.

LADY HALLETT: Thank you, Mr Thomas.

Mr Stanton -- I'm looking directly at him, so if you look around the pillar, Professor, you might be able to see him at the back.

Questions from MR STANTON

MR STANTON: [Inaudible: microphone off]. I ask questions on behalf of the Covid-19 --

LADY HALLETT: Is the microphone on?

MR STANTON: Oh, my -- it's signalling on. Is that any better?

A. Yes.

Q. Can you hear me?

A. Thank you.

Q. Professor, good afternoon. I don't know if you caught any of my introduction. I ask questions on behalf of the Covid-19 Bereaved Families for Justice Cymru.

I'd like to go back, please, to the issue of asymptomatic transmission which you dealt with earlier. You described earlier, and this is also at paragraph 19 of your witness statement, how by February 2020 you had established that the rate of asymptomatic transmission was at a much higher incidence for SARS-CoV-2 than for SARS-CoV-1, and that you quickly arrived at an approximate incidence rate of 50%, that is about half of source cases were not symptomatic.

Can I ask you, to what extent was this high rate of asymptomatic transmission more widely understood at this time, at this early stage?

A. So there are a number of academic publications or preprints blueprints that came out at around a similar time and then academic publications that brought the different data together. As I mentioned, in my earlier response and also, you know, the findings were surprising and concerning for the, sort of, obvious reasons that it would make control much harder than it otherwise were, there was a lot of checking, informal communication with epidemiologists, including those who

had written those papers. You know, could they verify that this was not just people not wanting to answer the question about those symptoms, which might be understandable?

So I believe it was fairly -- and there were some big publications, you know, in major journals led by other authors that appeared at the same time. And I guess this kind of underpins my evidence. I think we were very careful, as well, this a novel intervention, and really, throughout what we were saying, opening ourselves up to scrutiny, it's something that I feel is really important, especially in this high-profile situation, that, you know, people who would take a different opinion from us are encouraged to do so through anonymous peer review and through public discussion, so that we can make sure that, you know, we weren't, you know, we all -- we all get things wrong and the calculations don't, you know, go as we should. I think on this point, the evidence really emerged quite clearly throughout February and March 2020.

Q. Professor, thank you.

One quick follow-up, Professor, please. Are you able to provide any insight as to why you and your colleagues had an immediate awareness of this issue which you describe in your statement as "startling",

whereas others took much longer to acknowledge this feature of the virus?

A. I mean, the one qualifier I would put on our analysis, and our information -- sorry to digress slightly, before I will answer your question -- yesterday I think there was a discussion about what the symptoms actually are, and typically in scientific papers when people say "asymptomatic", they typically mean not the symptoms which we've decided are the diagnostic symptoms of Covid. And I think what's been quite useful is that paucisymptomatic, so a few symptoms, and I suspect that there is a grey area and I think it has become clearer later that asymptomatic may involve some mild symptoms which are just not the defining symptoms of Covid.

As to your -- sorry, I have managed to ...

Q. I wondered, Professor, why you so immediately and, as you described, in a startling way recognise this feature whereas others seem to have taken much longer to accept asymptomatic transmission?

A. Well, within the scientific community there's always a divergence of views on any one given topic. My understanding is -- I mean, there's an issue -- I guess there's an issue about what your starting assumptions are and how strong evidence you need to change your mind about the starting -- your starting assumptions.

So it's sort of what your prior beliefs are, you know, what your planning assumptions are, and how do you change your mind. And maybe different people, depending on where you start from, would take a different route to reaching the strength of evidence.

I think -- in particular, I think within -- there's a slight difference, often cultural -- justifiable cultural difference between medicine and public health, where, in medicine, you know, you do no harm. You don't do an experimental approach until you've got really strong evidence that you might do something differently, whereas in public health there just isn't that luxury. You have an epidemic that's growing. None of the things you're going to do, none of the options being tested has a double-blinded randomised controlled trial that you need to do. So you're going to have to act on the sort of balance of probabilities -- sorry -- on what seems like the most likely scenario, rather than, sort of, having a strong evidence.

But it's still, you know, the papers -- there's still a heterogeneity between papers on this topic and maybe ...

MR STANTON: Thank you, Professor, that was helpful. Thank you.

LADY HALLETT: Thank you, Mr Stanton.

Mr Weatherby.

Mr Weatherby is just there.

Questions from MR WEATHERBY KC

MR WEATHERBY: Thank you.

Professor, just one topic from me, and you've already addressed it but it's so important I just want to make sure we've all got it clear, and it's about effective planning in respect of TTIQ, and now, as of today, five years on from the pandemic, and what effective planning is there today in the UK which would put us in that group of countries that Ms Cartwright took from your statement: Norway, Denmark, Taiwan, South Korea, Singapore, New Zealand, Australia, rather than there we were in 2020.

Now, as I understand your evidence, the work that you and others did in terms of the apps would be very useful in giving us a head start, but it's been discontinued. It would be better if the UK picked up that project now to make sure we were ready to go next time. So that's the first point. Have I understood your evidence correctly on that?

A. Yes.

Q. The other point, you said that, in terms of testing capacity and contact tracing capacity, as I understood your evidence -- please confirm or not -- we're more or

less in the same position as we were at the outset of the pandemic?

A. More or less.

Q. Yeah. That's concerning.

A. It -- I agree.

Q. Yes. Is there any other planning in respect of test, trace, isolate, quarantine, support, that has been undertaken which puts us in a better position to join that better performing group of countries?

A. So if I may sort of address what's a very important question with -- in different parts and with appropriate qualifiers.

Q. Yes.

A. First of all, with respect to the importance of the app, my -- it so happened my expertise developed through the pandemic was with the app, but it's part of a system.

Q. Yes.

A. The whole system is important. And in fact some of those countries didn't particularly use digital approaches at all; they had public health capacities in other ways, you know, Norway and Denmark. Some countries made extensive use of digital approaches, you know, Taiwan, South Korea, Singapore. Singapore had a 98% adoption of either the app or the wearable device for people who were digitally excluded. So there isn't

one size fits all.

Q. No.

A. All of them did test, trace, isolate, and quarantine.

Secondly, I think we have to acknowledge, you know, when we do global simulations of epidemics, the UK is a very well-connected country. So we are -- pretty much wherever an epidemic starts in the world, we will be ahead of the curve rather than in the middle of the pack, in terms of -- so we don't have the luxury in the UK of seeing how things pan out in other parts of the world before, you know, making a decision in the UK. So the UK, to some extent, has to make a decision blind.

Then the third thing is I really want to pay respect to the colleagues I work with in public health, who are extremely committed now in terms of how they respond to outbreaks, and extraordinary colleagues in the app team, and in NHSX and NHS Test and Trace, who were commitments -- and it's really -- and, you know, I -- it's really a matter of resources, and resources -- committing resources in a very tight funding environment, where there are very many demands on the government's resources for immediate and pressing problems.

Q. Yes.

A. And it is: how does this pandemic preparedness fit in?

It is a real challenge. But I -- I absolutely agree with the concern that you expressed that I don't believe we're adequately resourced to enable such a very fast response.

And one of the learnings from Covid is that if -- you know, if you flood the system with the resources once the pandemic has started, you can do extraordinary things, but you would have done them better -- and a much reduced cost -- if you'd worked things through in advance. And in addition you'd have been able to differentiate and address disparities and make things which make sense for -- you know, much more multi-faceted in such a situation.

Q. Yes. So the greater resources would help these extraordinary colleagues in public health, to put us in a better position if a pandemic comes along next week or next year?

A. Better resources and a clear steer of what the overarching strategy is, in the face of a --

MR WEATHERBY: A clear overarching strategy. Thank you very much.

LADY HALLETT: Thank you, Mr Weatherby.

Professor, that completes all the questions we have for you. You've been, rightly, very complimentary of the colleagues you work with but I'm sure that this

country owes you a huge debt of gratitude for all the work that you did. So thank you very much for everything you did during the pandemic to develop the app, and thank you very much for the help you've given to the Inquiry.

THE WITNESS: Thank you, my Lady.

MS CARTWRIGHT: Thank you, my Lady.

LADY HALLETT: Very well. 10.00 tomorrow, please.

(4.24 pm)

(The hearing adjourned until 10.00 am the following day)

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