1. A brief overview of your qualifications, career history, professional expertise and major publications.

I have a BSc in Genetics from University College London and a PhD from the University of Reading (1995) in coronavirus replication. I was a post-doctoral researcher at the University of Alabama at Birmingham (USA) from 1994 to 1997 studying RNA virus entry and replication. I was a post-doctoral researcher at the Institute for Animal Health (now the Pirbright Institute) from 1997 to 1999 working on avian coronavirus. I became an independent group leader (Lecturer) at the University of Reading initiating a research group on coronaviruses. I moved from Reading to Leeds in 2002 and in 2012 took up a position at the University of Liverpool as Chair (Professor) in Infection and Global Health. I am now a Deputy Associate Pro-Vice Chancellor Research and Impact at the University of Liverpool. I am also the Director of the BBSRC/DEFRA funded UK-International Coronavirus Network.

I have run a research group on viruses for 22 years and have around 30 years expertise on coronaviruses and related viruses. I have published on porcine, avian and human coronaviruses including SARS-CoV, MERS-CoV and SARS-CoV-2. As part of the European Mobile Laboratory, we were one of the first groups to use sequencing to study the evolution and spread of a virus during an outbreak – the 2013-2016 Ebola virus outbreak, and I have 10 years of experience with this virus. I also have major expertise on human respiratory syncytial virus. My research group consists of six post-doctoral researchers and 10 PhD students.

My current research group is funded by a $10M contract from the US Food and Drug Administration (FDA) to investigate severe coronavirus infection in humans and animal models with relevance to medical countermeasures. This was the largest research contract ever awarded by the FDA Office of Counterterrorism and Emerging Threats (OCET). My other funding is from UKRI, the EU and the Defence Science Technology Laboratory. We specialise in viral evolution, the host response to infection or exposure to biological and chemical threat agents.

I have published numerous publications as first, senior or consortium author on corona and other viruses including in the journals of Nature and Science. These can be found using my Google Scholar profile: https://scholar.google.com/citations?user=MBGsvm4AAAAJ&hl=en&oi=ao

2. A list of the groups (i.e. SAGE and/or any of its sub-groups) in which you have been a participant, and the relevant time periods.

The precise details you require can be found with GO-SCIENCE and also https://www.gov.uk/government/publications/scientific-advisory-group-for-emergencies-sage-coronavirus-covid-19-response-membership/list-of-participants-of-sage-and-related-sub-groups.

I was a co-opted member of NERVTAG for COVID-19, as such I was also a participant at SAGE when required due to my role on NERVTAG. I was a member of the Advisory group for testing – serology. I am not sure if this was directly linked to SAGE, it was run out of the Department of Health. I have also been part of ad hoc discussions on viral variants called by the CSA etc.

3. An overview of your involvement with those groups between January 2020 and February 2022, including:

a. When and how you came to be a participant;

I joined NERVTAG in late April/early May 2020. In April 2020 I was talking with Peter Horby (NERVTAG chair) at a NIHR Health Protection Research Unit in Emerging and Zoonotic Infections meeting – of which we are both members. I remarked to Peter that there did not seem to be a coronavirologist (a scientist who studies coronaviruses) on either SAGE or NERVTAG or any of the government advisory panels. There were probably three of us at the time in the UK. Peter responded immediately and asked for recommendations of people and what their expertise was – he asked me to include myself in the mix. I was then officially invited as a temporary member on the 21st April 2020. I think my first meeting was NERVTAG 15.

b. The number of meetings you attended, and your contributions to those meetings;

The number of meetings I attended can be found from NERVTAG secretariat/GO Science. My contribution was around expertise on coronaviruses, providing examples of work on other coronaviruses relevant to SARS-CoV-2 and also expertise on SARS-CoV-2 due to ongoing funded research projects.

c. Your role in providing research, information and advice.

See answer to (b). During the COVID-19 pandemic my major funding was from the US as discussed. Where possible I leveraged this and other funding to help provide answers for scientific questions posed by NERVTAG and SAGE as generally it was too slow/uncertain to get funding from UKRI to answer specific time limited problems, this then informed advice. Examples of this include: (1). Conducting co-infection experiments to investigate whether influenza virus infection would exacerbate SARS-CoV-2/COVID-19 and therefore inform advice on the influenza vaccination campaign. (2). Investigating the effects of different variants in animal models to inform information on potential changes in disease severity e.g. Omicron. (3). Conducting work on anti-virals for SARS-CoV-2 to monitor for resistance etc.

4. A summary of any documents to which you contributed for the purpose of advising SAGE and/or its related subgroups on the Covid-19 pandemic. Please include links to those documents where possible.

NERVTAG/GO-Science should have a list of these. I led/co-led or participated in a number of documents/reports for NERVTAG commissioned by SAGE/Cabinet Office or initiated by NERVTAG.

5. A summary of any articles you have written, interviews and/or evidence you have given regarding the work of the above-mentioned groups and/or the UK's response to the Covid-19 pandemic. Please include links to those documents where possible.

To my knowledge I have not given interviews or written articles or provided evidence for the work of these groups. I deliberately gave sparse interview during the pandemic so that I would not be asked about the role of these groups. Where I did give interviews, I did so in personal capacity and not as a member of them (as requested) and this was stated to journalists at the time – and sometimes this was recorded as such. I also thought there were many scientists/clinicians who were quite frankly gobbing off in the media in areas in which they had no qualifications – so I only stuck to interviews where I thought I had reasonable knowledge.

6. Your views as to whether the work of the above-mentioned groups in responding to the Covid-19 pandemic (or the UK's response more generally) succeeded in its aims.

This may include, but is not limited to, your views on:

a. The composition of the groups and/or their diversity of expertise;

I thought NERVTAG worked really well, there was a healthy mixture of different expertise and personalities with a good challenge culture, rather than suffering from group think. Key individuals were identified and included, and we were free to explore appropriate issues and report back. Generally looking at the committees and leadership and influence at a government level there may be a slight bias towards clinically qualified individuals – but perhaps that is the nature of the issues at hand. Certainly, for NERVTAG between the permanent and co-opted members I think the relevant expertise was present.

See comments under 7 (ii) and 7(iii). I think NERVTAG was good because we had clinicians who actually treated patients on the group. I think though there may have been an absence of doers on some of the advisory committees who were actually working at the coal face and could give realistic ideas about the difficulties of implementing policy decisions.

b. The way in which the groups were commissioned to work on the relevant issues;

I was not involved with the commissioning but was happy to volunteer to take part in or led in areas in which I had expertise.

c. The resources and support that were available;

The UK obviously put a lot of money into research around the COVID-19 response and a lot was funded which was great to see. The only thing that irked is that as a group of coronavirologists we got together (with other stakeholders) and put in a bid for the first major funding call by UKRI/MRC around February/March 2020. In which, based on over 100 years of coronavirus experience, we predicted variants, the need for shifting diagnostics and vaccines and this was not funded for some reason, which struck us as a bit bizarre at the time.

A number of us in NERVTAG (or perhaps a lot of the research active members) used their laboratories to investigate issues at hand and I think a discretionary research fund would have helped in this area to provide additional data for NERVTAG.

d. The advice given and/or recommendations that were made;

I had no issue with this at a personal level. Sometimes my advice was used and sometimes it was not, sometimes differing opinions won out. I will say I thought Peter Horby did an excellent job chairing NERVTAG and ensuring all views were heard and where possible a consensus of opinion was achieved.

e. The extent to which the groups worked effectively together;

I think there were some cross group meetings but certainly representation on each group worked well to address particular problems and challenges.

f. The extent to which applicable structures and policies were utilised and/or complied with and their effectiveness.

I don't have the expertise or data to answer this question.

7. Your views as to any lessons that can be learned from the UK's response to the Covid-19 pandemic, in particular relating to the work of the above-mentioned groups. Please describe any changes that have already been made, and set out any recommendations for further changes that you think the Inquiry should consider making.

These are my personal opinions, and some may be with the benefit of hindsight or being an armchair general, but some I challenged at the time.

(i). I thought the vaccine effort in terms of implementing the selection of the most appropriate vaccines was great. Kate Bingham was obviously the right person for the right job at the right time.

(ii). About the follow-on boosts then this fell down a bit, mainly in the delays in deciding what to do. My wife worked on the ground in the vaccination effort, and they were hit in terms of manpower whilst decisions were made and caused a lot of unseen effort to fill the gaps.

(iii). I think the behavioural experts may have been a bit off the mark with their thoughts on the social mixing of students, behaviour of school children and people in general.

(iv). I though the test and trace effort was a dogs dinner. In the end the testing was great, but the tracing was rubbish. At the start of the pandemic, we did not follow the experience of countries that dealt with SARS and MERS – have rigorous testing, tracing and isolation. These were also the lessons from the Ebola outbreak that were ignored. Time and time again the UK were hit with multiple waves of SARS-CoV-2. Particularly when the vaccination effort was ramping up, here I would use the delta variant from India as example.

(v). Around testing at the beginning of the pandemic. I am surprised that the testing facilities maintained by the Animal and Plant Health Agency at Weybridge (developed and maintained after the foot and mouth outbreaks) and those at the defence labs were not used by Public

Health England. I would imagine there would have been sufficient capacity to do rigorous testing (and therefore tracing) at the start of the pandemic.

(vi). I and many friends in virology were surprised at the abandoning of the isolation on symptoms and also contact and just to isolate on symptoms. This sounded really ill-advised given that we knew coronaviruses and many other viruses spread asymptomatically.

(vii). Clearly if we have another disease X we have to consider what pandemic plan to use and how to balance this with the economic and social cost.