Witness Name: Julia Gog
Statement No.: 1
Exhibits: JG/1 – JG/6
Dated: 28 June 2023

UK COVID-19 INQUIRY

FIRST WITNESS STATEMENT OF JULIA GOG

I, Julia Gog, Professor of Mathematical Biology, University of Cambridge, will say as follows:

INTRODUCTION

1. I make this statement in response to a request from the UK Covid-19 Inquiry dated 23 February 2023 made under Rule 9 of The Inquiry Rules 2006 ("the Request") asking for a witness statement for Module 2 of the Inquiry.

2. This statement is to the best of my knowledge and belief accurate and complete at the time of signing.

3. The below evidence is drawn from my own experience. I am unable to provide a view on Government decision making as I was not directly involved in that process. Nor I am able to make any statements on behalf of any committee I was a part of.

APPOINTMENTS

4. I was appointed to a university position in Department of Applied Mathematics and Theoretical Physics ("DAMTP"), University of Cambridge ("Cambridge") in 2006, initially as Lecturer, then later as Reader. I have been in my current post as a Professor of Mathematical Biology since 2017. I have been a Fellow of Queens' College, Cambridge, since 2002.

5. I am a mathematician with 25 years of experience of research in infectious disease dynamics. My research specialism is the spatial spread and evolution of influenza, and

since early 2020, COVID-19. Neither DAMTP nor Queens' College played any role in pandemic response in and of themselves, but both have members who were involved in pandemic response.

6. As my research is related to infectious diseases, I am engaged with Cambridge Infectious Diseases ("CID"): CID is a research network for researchers at Cambridge interested in infectious disease, including over 100 senior academics and hundreds of early-career researchers. CID had no role in pandemic response in and of itself, although some members of CID, including me, were involved in pandemic response in their own right.

7. In the Request I have been asked about my involvement with the Cambridge Centre for Science and Policy ("CSAP"). I participated in two episodes of their 'Science and Policy' podcast; otherwise, I have not had any involvement directly on COVID-19 and do not have any information about their effect on political decision-making. On occasion, I meet with current CSAP Policy Fellows as part of their programme visiting Cambridge, but not during the period where SAGE was in operation for COVID-19.

8. My involvement with specific government advisory groups is outlined below.

SPI-M-O

9. I have been a member of the Scientific Pandemic Infections Group on Modelling ("SPI-M") since 1st August 2018. My membership continued at the point the group moved to operational mode in response to COVID-19 in late January 2020, whereupon it became known as the Scientific Pandemic Influenza Group on Modelling, Operational subgroup ("SPI-M-O"). It is important to note that while the Scientific Advisory Group for Emergencies ("SAGE") does not exist outside of emergencies, SPI-M does, as part of the Department for Health and Social Care ("DHSC").

10. Prior to becoming operational, SPI-M usually met every few months; approximately 4 times per year. I was approached by Graham Medley in early 2018 to discuss SPI-M, and subsequently invited to join on 31 July 2018 (JG/1 - INQ000187298; JG/2 - INQ000187299), given my mathematical background and experience working with academic groups in the USA. Prior to COVID-19, SPI-M's focus was on the infectious

disease modelling relating to pandemic influenza preparedness. This work included preparation and updating of summaries such as the "SPI-M modelling summary" (JG/3 - INQ000187300). Before COVID-19, I was not asked to carry out modelling specifically for SPI-M, but to attend the meetings to input my expertise on work presented there.

11. The meetings (held remotely) became more and more frequent during January 2020 and by the end of January 2020 SPI-M was linked to SAGE, and became operational as SPI-M-O. By early February 2020 it became evident that the SPI-M-O work was going to be full time and I would not be able to make a full contribution to this body of work alongside my usual day-to-day duties at Cambridge. DHSC provided me with a letter (JG/4 - INQ000187301) which could be given to the head of DAMTP and President of Queens' College, asking that I be released from my normal duties as a Professor and Fellow, or to minimise demands on my time.

12. Both my Head of Department and college President were immediately extremely supportive and many of my responsibilities such as teaching and committees were excused or covered during Spring 2020 and reduced for the remainder of the time where SPI-M and SAGE were operational. My understanding is that this rapid support I received from my home institutions was not the norm among the academics who volunteered to advise the government during the pandemic, who had to continue with very substantial elements of their normal work. I am very grateful for the support I received from Queens' College and DAMTP.

13. I was a general member of SPI-M-O, contributing modelling and scrutiny of others' modelling on a wide range of topics. Occasionally, when one of the chairs was absent, I would cover as acting chair.

14. The SPI-M-O secretariat were central in managing the work, serving as an interface between the academic volunteers and government organisations. My understanding is that they acted as a filter on requests, ensuring that requests that reached us were appropriate to our expertise and capacity. The SPI-M-O secretariat and chairs together shaped the questions and requests that were put to SPI-M-O members. They also dealt with the onward communication of our work. I never sent my work directly to any policymakers, or to Patrick Vallance, the Government's Chief Scientific Advisor ('GCSA') at the relevant time, or Chris Whitty, the Chief Medical Officer ('CMO') but rather everything I contributed went through SPI-M-O (or SAGE for

where I contributed directly to those meetings). The secretariat itself is made up of civil servants, and my view is that they had appropriate scientific expertise, and many of the senior secretariat had PhDs in relevant fields.

15. SPI-M-O has now reverted to its pre-pandemic function as SPI-M with a smaller membership, and I remain a member. An example of my recent contribution was providing my thoughts to the group responsible for providing an initial draft of a document on the evidence gained during the COVID-19 pandemic regarding the effect of restrictions on international travel, in order to consider their likely effectiveness in the case of a future outbreak or pandemic. (The most recent version of this work I have seen was still draft – I am unsure what, if any, changes were made subsequently, but our role in initial drafting was complete).

SPI-M-O Spatial Heterogeneities subgroup

16. One of my regular contributions to the SPI-M-O main meetings was as a member and chair of the Spatial Heterogeneities subgroup, which was also at times known as the Spatial Variation or Regional Variation subgroup. It focussed on fine scale heterogeneities and was in operation from February 2021 to March 2022. Heterogeneities here refers mainly to geographic variation in COVID-19 patterns across the UK, but also to variations across demographic factors such as age.

17. Multiple researchers from SPI-M-O research groups presented their findings to the subgroup based on using a broad set of different approaches on a range of recent data. This was a way of trying to interpret the latest signals of COVID-19 dynamics, for example identifying geographic hotspots or outliers, and in particular anything which warranted further consideration as a pattern consistent with the establishment of a new variant.

18. There was usually a meeting of the Spatial Heterogeneities subgroup the day before each main SPI-M-O meeting. My role was to chair these meetings, to compile documentation from contributors and form a summary to go to the corresponding main SPI-M-O meeting.

SAGE

19. I was first invited to be a SAGE participant on 10 March 2020 for a meeting planned for 12 March, but the meeting was delayed to 13 March. I attended the 13 March meeting in person. In total I attended 35 SAGE meetings between March 2020 and February 2022.

20. My understanding is that my participation in SAGE was associated with my membership at SPI-M-O. My contribution related to papers that I had been involved in preparing, responded to questions on days when I was acting chair of SPI-M-O and occasionally I contributed on specific points where my expertise was applicable.

Children's Task and Finish Group

21. My involvement with contributions specifically on schools and children was initially through an informal subgroup of SPI-M-O in early February 2020, to consider the possibility of closing schools, and in which I was asked to coordinate the response to go to a main SPI-M-O meeting. I remained a contributor on various continuations through to mid-April, largely focussed on the role of children in population transmission of COVID-19 and the effect of school closures on the unfolding epidemic, convened by the SPI-M-O secretariat, and reporting to SPI-M-O and at various points to SAGE. This work culminated in a paper to SAGE 26 on 16th April 2020 (JG/4A - INQ000074924).

22. Immediately following SAGE 26, a new interdisciplinary subgroup of SAGE was formed to focus on broader questions regarding children and COVID-19 than the modelling considerations of transmission. This new group included representatives from the Department for Education (Osama Rahman, Director of Analysis and Chief Scientific Advisor) and the Independent Scientific Pandemic Insights Group on Behaviours ("SPI-B") (Professor Brooke Rogers, King's College London). I was part of this group as a lead representative of SPI-M-O, and sometimes as co-chair. This group was known as the "Interdisciplinary Task and Finish Group on the Role of Children in Transmission". It brought together many different groups and the relationships formed between scientists from different fields have endured long past this period. I reported to the main SPI-M-O meetings about the work taking place in the Children's Task and Finish Group.

Other subgroups

23. I attended about half of the Medium-Term Projections SPI-M-O subgroup meetings ("MTPs"), usually to ensure I was up to speed on the current picture before SPI-M-O meetings, particularly when I was acting as SPI-M-O chair. I did not contribute any projections to these meetings; I mainly attended to observe but occasionally asked questions or made comments.

24. I do not have systematic records of the other more transient subgroups of SPI-M-O, and I am unsure which were officially subgroups as opposed to additional meetings of a subset of participants when some research required extra discussion time either beyond the main meeting or in preparation for work for a future meeting.

25. As far as I remember, although I cannot recall the exact dates, in early 2020 there was a SPI-M-O working group on "Behavioural and Social Interventions" ("BSIs" which later became more commonly called non-pharmaceutical interventions, "NPIs").

26. In 2021 there were additional meetings before the main SPI-M-O meetings to look in detail at the work relating to the "roadmap" for lifting interventions, which I attended as a general member of SPI-M-O to help offer scrutiny of the modelling work. These were informal meetings to allow more time for asking questions and discussion of the scientific and technical detail ahead of and in preparation for a main SPI-M-O meeting, and consequently I do not believe they were minuted.

Variant Technical Group

27. Variant Technical Group ("VTG") is convened by the UK Health Security Agency to consider variants of COVID-19 and is not a subgroup of either SPI-M-O or SAGE. I joined in or around May 2021 due to my expertise on emerging variants and work from SPI-M-O, particularly to communicate work from SPI-M-O teams on the Delta variant. I acted as a representative to ensure a link with SPI-M/SPI-M-O and have attended most meetings since.

MODELLING

28. My scientific contribution to the above subgroups was through expertise in modelling. I explained epidemic modelling in a video made by the Government Office for Science, as follows: "Epidemic models are a way to represent how a disease spreads

across the population. During COVID-19, a lot of epidemic models were used so they became quite complex, and were written as a computer code, and the outputs were simulations. Epidemic models are made using our best understanding we have at the time of both the current situation and the science. A range of assumptions will go into these models for example how people are currently mixing. Models are used to explore scenarios which have not happened. For example, when schools were closed we wanted to see what would happen if they opened. What comes out of the epidemic modelling is a range of simulations giving an idea of things that could happen. To zoom out, models are not necessarily right or wrong. They are there to be useful. There is a number of reasons why the output of models is not exactly what happened. And of course, fundamentally, it is because we are simulating things that are in the future and have not happened yet. There will be some things that change, that we were not expecting, for example people's behaviour can be slightly different. Epidemic modelling is a bit like weather forecasting. For the short term it gives a very good reflection of reality, but the further you go into the future the less certain it is." (JG/4B - INQ000193996)

29. As explained in the video, models are not there to provide an exact forecast of reality. We never represented modelling outputs as a prediction of precisely what is going to happen. Outputs are there to show the worst-case scenarios that are consistent with current knowledge, and how these are likely to change when different interventions are made. For example, modelling can show the likely impact of shutting schools, or of vaccination of the population. That said, any model is limited by both knowledge of the current situation and by assumptions, particularly when we are new territory with respect to population behaviour and response to interventions.

30. Modelling and insights from the modelling work were presented to SPI-M-O and SAGE. The models helped us to understand where we were in the pandemic, and provided an insight into the likely patterns that would emerge over coming weeks. They also allowed us to explore what the effects would be if particular decisions were made, and also to highlight knowledge gaps. However, there was a misconception by the public as to what purpose models served. As one of my colleagues, Graham Medley, explained, models 'are not meant to be predictions of what will actually happen, and a range of scenarios are presented to policymakers with numerous caveats and uncertainties emphasised' (JG/5 - INQ000187302).

31. We were not tasked with considering the economic or social implications of interventions, nor could we have been, as that was outside of our expertise as modellers of infectious disease dynamics. It may be that it would be helpful to have an equivalent of SPI-M-O for this work in future, although I cannot say what difference that might make.

RAMP

32. Professor Michael Cates, the Lucasian Professor of Mathematics at Cambridge worked with the Royal Society to establish the Rapid Assistance in Modelling the Pandemic initiative ("RAMP") in March 2020; I was on the steering committee. RAMP's role was to provide volunteers to assist epidemic modellers, through computation and number-crunching, as well as summarising the rapidly growing literature of COVID-19 scientific papers published both in the UK and internationally. About 1800 individuals and teams volunteered. Approximately half of the volunteers were from academe and half from industry. Participants tended to have some experience in computation, mathematics or data analysis, but not epidemic modelling specifically. They provided additional resource in the form of extra human time to assist those of us contributing through SPI-M-O.

JUNIPER

33. Models require challenging to determine whether they are accurate and appropriate for the task. If multiple research groups have similar outputs, modellers can be confident that their output is sound, particularly if the different groups use different modelling techniques and/or take slightly different input assumptions. Joint Universities Pandemic and Epidemiological Research ("JUNIPER") consortium was set up to bring together several small epidemiological modelling research groups from a number of different universities. It resulted in more effective collaboration and coordination, avoiding duplication of work and allowing work to be prioritised where there was most capacity and expertise. It also had the benefit of a diversity of perspectives and modelling approaches, meaning we could provide more robust challenge to modelling work presented to SPI-M-O, including to the work done by the larger individual research groups at Imperial College London and the London School of Hygiene and Tropical Medicine ("LSHTM").

34. However, in my view it took too long for JUNIPER to obtain funding; the process of

proposals, application and assessment took several months, and the earliest possible date for funding from UKRI to start for JUNIPER was 19th November 2020, over nine months after the beginning of the emergency. This funding meant we could employ a scientific programme manager, fund more researchers, have resource to support science communication, and ensure greater efficiency in our work.

35. The idea of JUNIPER emerged from the COVID-19 pandemic, but it proved successful, with a strong sense of collaboration, so it is still ongoing. JUNIPER included several post-doctoral research associate positions, building capacity in epidemiological modelling for now and future emergencies.

OPERATION OF SAGE

Roles

36. SAGE does not exist as a standing committee, but rather is convened specifically for emergencies. Participation in this is specific for the situation in hand, and this meant that roles within SAGE are not defined; in my view, this was more efficient as it allowed for fluidity. Roles evolved to meet needs over time. It was clear to me that I was not a member of SAGE as such, rather I was a participant of a specific SAGE meeting or series of meetings – an approach which makes sense to me.

The first lockdown, and government decision-making more generally

37. The first SAGE meeting I attended was on 13 March 2020, at which point the first national lockdown was already very likely; I was then on planned personal leave in the week commencing 16 March. As such, I was not closely involved in the discussions at SAGE regarding the first national lockdown. In any event, the decision to lockdown was ultimately a political one, which SAGE would not have been involved in.

38. I have been asked whether the first national lockdown should have taken place earlier in the pandemic. I am not able to give a view on this; although I consider that there is clear evidence that locking down earlier would have slowed transmission at that time, the decision was, rightly, a political one. Politicians must weigh up many factors in making this decision, including, for example, the likely effect on the economy and the effects on the physical and mental health of the population. They must also consider

what they think the likely levels of adherence to restrictions will be. I am not able to comment on these wider factors. This is also the case for subsequent government decision-making; in some cases, making a different decision might have affected the trajectory of the epidemic, but many other factors had to be weighed in the balance. I cannot say whether such decisions were right or wrong. I was also not in a position to see how the modelling produced by SPI-M-O was, or was not, relied upon by Ministers in making decisions, so cannot comment on whether there was an over-reliance, or indeed an under-reliance, on our modelling.

39. It has been suggested that Ministers' desire to avoid a lockdown affected the advice given by SAGE. I cannot speak for other SAGE members. In terms of modelling, it is important to note that we address the topics and questions that we were asked. However, within the parameters of the modelling that was requested by government, I personally never felt political pressure to lend weight to a specific outcome.

Transparency and communication of scientific advice

40. In my view, the list of SAGE 'members' not originally being public contributed to a misunderstanding on the influence of SAGE in decision making. I had assumed the participation would be public from the outset. I found it very strange that that was not the case. As far as I am aware, none of the independent academics asked for the list to be protected. This initial secrecy resulted in my being harassed when the list was leaked and published by the Daily Mail. It seems to me that a consequence of this secrecy was that the public considered SAGE 'members' to be in a position of decision making, while that was not the case. We provided a view from scientific expertise, and then it was the politicians who ultimately decided which course to take.

41. As mentioned above, it was not visible to me how the outputs presented at SAGE were then passed onto politicians and used. I found out about the political decisions in the same way as the public.

42. In my opinion another factor contributing to this misconception was that the boundaries between scientific advice and decision-making were not clearly communicated to the public. The narrative communicated was that the government was "following the science", which implied that Ministerial decisions were dictated by the science. In reality, scientific advisors offered a scientific viewpoint based on the available data and research knowledge, with many caveats and uncertainties, but it was ultimately

politicians who decided which factors to take into consideration and made decisions accordingly.

SAGE advice and subgroups

43. SPI-M-O had a formal consensus statement, including current consensus on nowcasting including estimates for R and the growth rate, and this consensus statement always carefully included consideration of the knowledge gaps and uncertainties.

44. The approach I saw in SAGE was to bring together the input of different subgroups with various expertise, and to seek scientific consensus. In the main SAGE meetings, GCSA would frequently check the conclusions he was drawing from the discussions, to ensure that he had understood inputs accurately and was correctly capturing uncertainties. I was not aware of a formal SAGE consensus statement, but the proceedings in those meetings aimed to make sure that both the CMO and the GCSA understood the full picture from all the different papers at SAGE. My understanding is the GCSA and CMO would then brief politicians, using the input from SAGE, although I had no sight of this process or how our work was used beyond SAGE meetings. Politicians were never directly involved with SAGE and did not ask questions directly. Everything went through the GCSA, CMO and deputy CMOs, and GCSAs as appropriate. I am confident that scientific and modelling uncertainties were effectively communicated to and understood by the GCSA and CMO; I cannot comment on the extent to which they were communicated to and understood by politicians.

45. In my experience, SAGE subgroups communicated and collaborated very efficiently. Subgroups were also an effective way to allow more dialogue between researchers with different approaches and from different fields, and also for a much larger group of researchers, particularly early career researchers, to contribute towards the work of SAGE.

The 'roadmap' in early 2021

46. My involvement in SAGE and SPI-M-O meetings that related to the 'roadmap' for lifting interventions, in early 2021, was as a general member of SPI-M-O. I was involved in each phase, and my main role was as that of most members of SPI-M-O; to provide a

robust challenge to the modelling produced by the several groups, including challenging of assumptions, and questioning to understand the reasons behind any differences in the outputs from different groups.

47. The roadmap included dates when steps of unlocking may happen, with checks beforehand on the state of the epidemic. The planned steps were five weeks apart as a minimum. My understanding was that this was a fine balance between a desire to unlock as quickly as possible, but long enough between steps so that the effects of the previous step could be assessed so that there was some confidence the next phase of unlocking could happen safely. The modelling work then was pivotal after enough days of the previous step for any epidemiological changes to have filtered through to changes in data, but before the decision to proceed with the next step, and thus it was important for there to be robust challenge to ensure the modelling outputs were as robust as they could be under extremely tight time constraints. In my view, this was one of the most valuable contributions from SPI-M-O collectively to the UK's pandemic response.

Strengths and weaknesses

48. In my personal view, the SAGE structure had more strengths than weaknesses. It is, in my opinion, an extraordinary way of working which does not have parallel in most other countries. It gives the government good access to a wide range of scientific expertise integrating both government research but also to independent university academics. What decisions are then made from those scientific contributions is not something that those academic participants of SAGE have further influence over, but rather those contributions are drawn together in a forum with capability to understand and challenge those contributions. There are many other different structures in other countries, but in the context of COVID-19, none that I have heard of have had the strength of being able to tap into such broad academic expertise, yet still are integrated to contribute to government through senior scientific advisors.

49. As I only had an insight into a small part of SAGE, I feel I am more able to comment on the strengths and weaknesses of SPI-M-O. In SPI-M-O there was certainly adequate challenge. It was a very diverse group as it incorporated representation from many research groups across the UK, compromising a range of experts in disease modelling. These modellers brought a wide spectrum of different technical expertise, background knowledge and specialist approaches. This gave a broad

repertoire of possible approaches to questions and the option of multiple distinct approaches to be used in parallel, and a diversity of thought. The chairs were always very conscious to make the most of this, to enable challenge and to ensure as many voices as possible were heard.

50. The size of SPI-M-O (as opposed to the 3-4 modellers typically directly participating on SAGE) also resulted in more diversity of participants and my impression was that there was a great care that members were drawn from a breadth of expertise and specialism. As academics, we also already had long-standing links with international expertise including disease modellers based in a range of countries, and this could be brought into SPI-M-O when needed. For example, when the Omicron variant started spreading, we had a presentation from and valuable discussion with a group of modellers from South Africa on early findings.

51. Another example of the benefit of SPI-M-O members having active academic links is that many of us were also researchers taking part in a programme at the Isaac Newton Institute for the Mathematical Sciences ("INI"). The INI programme in 2020 (normally in person, but this one of course was online) brought together researchers from the wider mathematical modelling community, including internationally. An example activity here is the discussions in June 2020 on what is already known for other disease on contact tracing that may be pertinent to COVID-19; a summary report was drawn together as a paper and made available to SAGE (JG/6 - INQ000187303).

52. The main weakness I can highlight was the provision of data where there were considerable shortcomings compared to what we believed should be reasonably possible. I cannot comment why SPI-M-O modellers were not provided with more complete and timely data sets. We asked via the SPI-M Secretariat very many times for improvements in data flows and additional data, but very little was resolved. To date, I have no reason to believe that data provision will be improved in any future emergency as it was not resolved during the course of the pandemic.

53. By way of a concrete example, SPI-M-O researchers had access to counts of *positive* tests by spatial location, age and socio-economic factors for England, but they did not have the same data for *negative* tests. This considerably increased the uncertainty of our outputs. To give an example why this would matter; a simple increase in the number of positive tests in some age group could indicate either a true increase in the infection rate, or it could be no actual change infection but simply an increase in the

proportion of people testing, perhaps due to a change in messaging or test availability. It is difficult to disentangle these very different situations without knowing the denominator; the total number of tests for that age group for that week, including negative tests. There was no obvious fundamental ethical reason to require the withholding of data on negative tests (that did not also apply to positive tests). Repeated requests highlighting the need for these were never quite refused nor resolved: we were neither supplied with a reason why the datasets must have these limitations, nor were we ever given any other explicit pushback on these data requests.

PAPERS

54. I have been asked to provide summaries of papers I was an author or co-author of. The individual titles of these papers will specify what these papers were concerning without the detail of the result. Each paper also already contains a summary agreed by all authors at the time, giving an accurate overview for the reader, and sometimes also a shorter executive summary. These summaries are written to be understandable by SPI-M-O or SAGE secretariat, so will assume a general scientific and quantitative background, but are generally worded without assuming detailed mathematical modelling expertise. Some will require contextual knowledge common to all scientific discussions at the time (e.g. in June 2021 "S+" and "S-" were shorthand for S-gene positivity in PCR testing, which in turn indicated the likely variant of the time that those cases corresponded to).

LESSONS LEARNED

Funding of independent academic research groups

55. I support continued use of a SAGE-like structure, as it effectively gives government access to expertise from independent researchers. The model for scientific advice to reach UK government is viewed with admiration by many other countries. The role of SAGE and subgroups was focussed on advice for government. Its role, correctly, did not include aspects such as (i) public communication of science, nor (ii) acting as a direct forum for all scientists who wanted to contribute. However, I recommend there is further consideration as to where these roles could sit in a future emergency. Necessarily, these both need to be centred outside government structures, but need

not be separated from the scientists directly involved in SAGE, indeed should have a route to escalate research findings to SAGE or a subgroup. My personal view is that the Royal Society could play a central role in both of these functions during a future emergency. This could provide stronger public communications from the more diverse and wider scientific community than only the individuals who made themselves available to the media, and also strengthen the conduit between SAGE and wider UK research communities, including research groups that are not directly part of SAGE or subgroups.

56. In the early days of the pandemic, two large groups (at Imperial College London and LSHTM) were able to react more quickly than the many other UK epidemiological modelling groups, as they had more personnel as well as being specifically funded for emergency response. By Autumn 2020, I felt more confident that we had a secure range of contribution and challenge of modelling, coming from the involvement of more research groups particularly those convened by JUNIPER. However, it could have been even earlier than Autumn 2020 if more epidemiological modelers were funded from the outset. In an emergency response it is crucial that the systems and funding is already in place long-term to ensure there is human capacity and expertise, plus a rapid response of emergency funding when it is clear that additional researcher time is going to be needed. Particularly in modelling and other fields with high uncertainty and range of possible approaches, it is important that the UK's research capacity and expertise is not concentrated in a single or small number of research groups: multiplicity and diversity of approach is important. Multiple groups are not replicating the same work, but rather giving separate modelling views leading to more reliable outputs.

57. I believe the contributions that UK universities made were not recognized and consequently were not adequately compensated for. I was acting as a volunteer and would estimate over 90% of my time for over two years was spent on the COVID-19 response - this was in effect a cost borne by Cambridge and Queens' College. I was also fortunate in receiving support from Cambridge which included not only welfare support during a very challenging time, but also help with communicating with the media. After my name was made public as a SAGE 'member', I was bombarded by emails including numerous media requests. Cambridge assigned one of their communication personnel to support me in managing these. In my opinion this kind of support should have been available centrally right from the start of this emergency as not all universities have the means to provide such support and care to their academics

who are volunteers for an emergency response. The time of academics, contributed by universities releasing their academics should be adequately compensated so universities are not disadvantaged by releasing their researchers and teachers for contribution to the national response.

Data

58. I have already mentioned above that certain data sources were never provided to modellers.

59. A further data issue was that the data SPI-M-O was provided was not publicly available and had to be kept confidential, along with the results obtained from direct use of this data (unless special permissions had been obtained), so natural routes of discussion with the wider research community on live research was inhibited. That was a limitation, as there is more challenge and scrutiny when work has a wider audience, plus potentially input of valuable suggestions for alternative approaches or further work. It also took some time for data sharing agreements to be reached, which caused delays in modelling in the early stages of the pandemic.

60. I suggest that in a future emergency there should be realistic plans in place for formal agreements to be reached very quickly between research institutions and data providers. Another very important tool, which should be held up as an example for the future, was the government COVID-19 data dashboard. I personally switched to using the dashboard data, as it was consistently in a good form to work with needing little to no pre-processing and any resulting analysis I had could be openly discussed with all colleagues. The more these data sets are in the public domain the better, as these allow collaboration both of scientists already involved in the response with the area's research community, and also allow the wider research community, even beyond the specialist field, to have the potential to contribute valuable insights.

Establishing relationships

61. A way scientists and government can work more effectively in the future is by building relationships outside of emergency periods. A lot of difficulties early on stemmed from the unfamiliarity of the culture and language used in both academia and government. This could have been reduced had there been more firmly established relationships

which would have resulted in more effective collaboration immediately during emergency periods. Stronger dialogues outside of emergencies are not only important for scientists working in fields relating to outbreaks and pandemics, but potentially also for all other areas in the national risk register.

STATEMENT OF TRUTH

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

Name: JULIA GOG

Date: 28th June 2023

Signature: **Personal Data**