Mathematics Institute
Zeeman Building
University of Warwick
Coventry CV4 7AL

robin.n.thompson@ Irrelevant & Sensitive

Assistant Professor of Mathematical Epidemiology

THE UNIVERSITY OF WARWICK

30 September 2022

Module 2 of the UK Covid-19 Public Inquiry
Request for Evidence under Rule 9 of the Inquiry Rules 2006
Reference for Request - M2/SAGE/01/RT

Dear Lady Hallett and the Solicitors' Team

As requested, please find answers below to the queries in the questionnaire that you sent me by email.

If any further information is required, please do not hesitate to get in touch.

Yours sincerely,

Robin N. Thompson

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

I am an Assistant Professor of Mathematical Epidemiology at the University of Warwick. My expertise lies in developing and analysing mathematical models of infectious disease outbreaks.

I started working at the University of Warwick in January 2021, following an independent Junior Research Fellowship position at Christ Church, University of Oxford. My job and education history is included below.

Current Appointment:

Assistant Professor, Mathematics Institute and Zeeman Institute for Systems Biology and Infectious Disease Epidemiology Research (SBIDER), University of Warwick. 2021-Present.

Education/Qualifications:

First class honours degree in mathematics, University of Oxford, 2007-2011.
Ph.D. "Parameter inference and outbreak modelling for forecasting and optimising control of invading infectious diseases", University of Cambridge, 2011-2015.

Employment:

Postdoctoral Researcher, Oxford, 2015-2017.
Junior Research Fellow, Christ Church (Oxford), 2017-2020.
Assistant Professor (0.2 FTE), London School of Hygiene and Tropical Medicine, 2019-2020.

I have co-authored 72 peer-reviewed research articles, almost entirely in the field of infectious disease epidemic modelling.

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. 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;
b. The number of meetings you attended, and your contributions to those meetings;
c. Your role in providing research, information and advice.

I played a relatively minor role in the SAGE subgroup SPI-M, attending two meetings as a participant (10/2/2021 and 24/2/2021) and a later meeting as an observer. The reason for my attendance at those meetings is that I had conducted research that was relevant to discussions at SPI-M, and so I was invited to attend to present that research and answer questions if required. I believe that my attendance at the first of those meetings was because I was recommended by Prof. Julia Gog (University of Cambridge), who I conducted collaborative research with, and I was invited by the SPI-M Secretariat.

In addition to attending those meetings, I co-authored research that was submitted to SPI-M (please see below). Most recently, this has been through membership of the team at the University of Warwick (the most senior researcher in the team is Prof. Matt Keeling, who I believe you have also contacted).

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.

I contributed to the following documents that were submitted to SPI-M. Where documents were submitted multiple times (e.g. for updates) I have included the dates that I believe reflect the first submission.

I have included an asterisk next to the documents on which I played a leading role (either through conducting the analysis myself or through being the senior named researcher on that work) and have provided a summary of the main result of the analysis in those cases.

20/4/2020 - Estimates of nosocomial and community transmission of COVID-19 in England

11/5/2020 - Reproduction number estimates of COVID-19 in care homes, hospitals and the community in England

27/1/2021 - Assessing the impact of secondary school reopening strategies on within-school transmission and absences: a modelling study

*10/2/2021 - Minimising case numbers is essential to reduce the risk of vaccine escape
Summary: In this work, we used a simple mathematical model to demonstrate that the risk of a vaccine escape variant emerging is likely to be higher when the daily incidence of cases is higher. This suggests that reducing case numbers using non-pharmaceutical interventions leads to a reduction in the risk of novel variant emergence (including vaccine escape variants).

*3/3/2021 - Inference of COVID-19 generation times using UK household data
Summary: This work provided initial estimates of the SARS-CoV-2 generation time in the UK. The generation time reflects the speed of virus transmission between people (specifically, the generation time is the time interval between infections in infector-infectee transmission pairs; in other words, the period between individuals becoming infected and then transmitting the virus).

3/3/2021 - The impact of uptake and adherence on transmission and absences resulting from secondary school reopening strategies involving rapid testing

24/3/2021 - Analysis of school absences and Lateral Flow Test results following return of all pupils to school in England in March 2021

11/8/2021 - Modelling within-school SARS-CoV-2 transmission in secondary schools in England in September 2021

*8/9/2021 - Adherence to app-based notifications at 2-day and 5-day notification windows
Summary: This work explored the impact of changing the notification window in COVID-19 mobile phone contact tracing applications. The notification window is the number of days prior to a positive test that contacts identified through the application are notified. This work demonstrated the principle that using a 2-day window could lead to a greater reduction in

overall transmission that using a 5-day window, if a 2-day window is associated with a higher adherence to isolation measures (because fewer people are asked to isolate).

*22/9/2021 - Effect of the Delta variant on the SARS-CoV-2 generation time
Summary: This work involved estimation of the generation time of the delta variant compared to the generation time of the alpha variant, based on analysing UKHSA data for transmission in households. The generation time reflects the speed of virus transmission between individuals. The results suggested that the generation time of the delta variant in households was shorter than the analogous quantity for the alpha variant.

24/11/2021 - Analysis of school absences and Lateral Flow Test results following return of all pupils to school in England in Autumn 2021

8/12/2021 - Analysis of school absences, vaccine coverage and Lateral Flow Test results following return of all pupils to school in England in Autumn/Winter 2021

22/12/2021 - Analysis of school absences and Lateral Flow Test results for school-aged children in England in Autumn and Winter 2021

23/3/2022 - Reporting and information loss in education absences data

In addition, I believe that at least two of the papers above were sent to SAGE. Specifically:

20/4/2020 - Estimates of nosocomial and community transmission of COVID-19 in England
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1012426/S0200_LSHTM_Nosocomial_.pdf

3/3/2021 - The impact of uptake and adherence on transmission and absences resulting from secondary school reopening strategies involving rapid testing
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1067141/S1155_Warwick_Schools_Daily_Contact_Tracing__1_.pdf

Finally, I co-authored this review paper that was sent directly to SAGE (and published online):
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1007514/S1336_International_Vaccination_Potential_impact_on_viral_evolution_and_UK_public_health.pdf

In addition, I co-ran the Rapid Review Group (RRG) as part of the Royal Society's Rapid Assistance in Modelling the Pandemic (RAMP) initiative. This group conducted reviews of modelling analyses on demand (and often with a short turnaround time of 24-48 hours) for SPI-M/SAGE and for government. The purpose of the RRG was to assess modelling analyses that were being considered as potentially useful to guide policy and to summarise their key findings. As a rough estimate, the RRG reviewed around 100 modelling analyses.

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.

Throughout the pandemic, I have been studying the spread of SARS-CoV-2. A list of my publications is available here: https://robin-thompson.co.uk/publications/ I would be happy to provide further information about any of the publications listed there as required. In particular, the following papers contain research that is closely related to the asterisked documents in the above list of documents submitted to SPI-M:

> Hart WS, Miller E, Andrews NJ, Waight P, Maini PK, Funk S, Thompson RN. Generation time of the alpha and delta SARS-CoV-2 variants: an epidemiological analysis (2022) Lancet Inf. Dis. 22:603-610.
>
> Leng T, Hill EM, Keeling MJ, Tildesley MJ, Thompson RN. The effect of notification window length on the epidemiological impact of COVID-19 contact tracing mobile applications (2022) Comms. Med. 2:74.
>
> Hart WS, Abbott S, Endo A, Hellewell J, Miller E, Andrews N, Maini PK, Funk S, Thompson RN. Inference of the SARS-CoV-2 generation time using UK household data (2022) eLife 11:e70767.
>
> Thompson RN, Hill EM, Gog JR. SARS-CoV-2 incidence and vaccine escape (2021) Lancet Inf. Dis., S1473-3099:00202-4.

I also appeared in the media a number of times (on the radio, on television, on podcasts and being quoted in the written media), particularly in the early stages of the pandemic. As an example, I wrote this article for ITV (and appeared on ITV news and the ITV podcast): https://www.itv.com/news/2020-03-21/coronavirus-why-social-distancing-works

The main reason for my media appearances was to explain concepts from mathematical epidemiology to the public. None of my contributions were as a representative of SPI-M (they represent my own personal views), nor were they about the work of SPI-M or SAGE.

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;
b. The way in which the groups were commissioned to work on the relevant issues;
c. The resources and support that were available;
d. The advice given and/or recommendations that were made;
e. The extent to which the groups worked effectively together;
f. The extent to which applicable structures and policies were utilised and/or complied with and their effectiveness.

Given my limited involvement in SPI-M, I can only comment on some aspects of this question. From the SPI-M meetings that I attended, it was clear that a range of experts in infectious disease outbreak modelling were providing their latest results for discussion, on topics such as the latest estimates of the time-dependent reproduction number (the R

number). As these presentations were open to questions and comments from the group, SPI-M seemed to work well not only in allowing the latest scientific results to be provided to policy advisors but also in providing a forum for timely review of those results by other epidemic modellers. It seemed like a large group of epidemiological modellers were invited to SPI-M meetings from multiple different institutions; their analyses and views were distilled into consensus statements that were passed on the SAGE.

In terms of support that was available, it is worth noting that contributions to SPI-M were conducted by researchers on a voluntary basis (as far as I am aware). Many researchers were participating in SPI-M in addition to their usual jobs (involving university teaching, university admin, supervising research students, and so on). I think that this is important context when assessing the success of SPI-M in responding to the pandemic.

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.

Resources: Following on from my answer to the question above, in a future public health emergency, it would be ideal if resource was provided to academics conducting research for policy advisory groups. Specifically, it would be possible for government to pay universities to "buy out" researchers' time during an ongoing epidemic. This would reduce the need for those researchers to have to teach or do university administrative tasks, giving them more time to focus on important research about the public health response.

Additionally, SPI-M researchers are often line managers of more junior postdoctoral researchers who conducted much of the research submitted as evidence to SPI-M. These postdoctoral researchers are typically employed on short fixed-term contracts funded through senior researchers' research grants. As a result, senior researchers have to apply for research funding, which is a time-consuming task. While this may usually be reasonable, it was necessary for senior researchers to do this while also conducting research for SPI-M, which did not seem like an efficient use of senior researchers' time during a pandemic. I would therefore also support the provision of funding to universities to support postdoctoral researchers during public health emergencies.

In addition to measures that can be taken during a future public health emergency, it is worth emphasising the need for infectious disease outbreak modelling (and other aspects of epidemic preparedness) to be funded in advance of the next emergency. While it is uncertain precisely what the next public health emergency will be, the development of adaptable mathematical models of epidemics (and computing tools allowing their use by others) is of clear importance for public health, and resources should be provided to allow these to be developed before the next epidemic. The natural way to do this would be to encourage UK research councils to fund projects related to infectious disease modelling and epidemic preparedness.

Data: In my analyses of the generation time for COVID-19 (with my former PhD student Personal Data), which were presented at SPI-M, I used data that I obtained through personal communication with employees of the UKHSA. This would not have been possible without

"knowing the right person" to contact. I would strongly advocate for fast provision of (anonymised) data to SPI-M members during future public health emergencies, to allow lessons to be learnt from the data as quickly as possible to guide policy. By providing the data to SPI-M as a whole, it would be possible for multiple research groups to analyse the data. Conducting multiple analyses of the same data provides a stronger basis for policy advice.

On a related note, academics rely on publishing scientific articles in academic journals for their own career progression. To ensure that work for policy advisory groups does not hinder career progression, particularly for early career researchers, it would be ideal if analyses conducted for SPI-M can be published in scientific journals (along with the data used), perhaps following the public health emergency. This requires permission to be provided to be able to publish analyses based on the data. However, I view this as secondary to ensuring that relevant data are provided in a timely fashion to SPI-M members to conduct policy-relevant research.

Provision of support to SPI-M Finally, I would encourage more thought to be given to ways in which SPI-M members can be supported by other infectious disease modellers who are not in SPI-M. Initiatives like the RRG, through the Royal Society RAMP project, should be supported in future public health emergencies, to help take the pressure off SPI-M researchers (who are already very busy). The RRG provided reviews of epidemiological modelling analyses to SPI-M members, meaning that they were able to read summaries and assessments of those analyses without having to read the analyses themselves in detail, allowing them to concentrate on their own important work for SPI-M. This seemed to work well during the COVID-19 pandemic.

A brief description of documentation relating to these matters that you hold (including soft copy material held electronically). Please retain all such material. I am not asking for you to provide us with this material at this stage, but I may request that you do so in due course.

If required, I should be able to obtain copies of any of the submissions to SPI-M/SAGE that I have listed under the question beginning "A summary of any documents…" above. Usually, the original copies will have been saved by the lead contributor of that research, and I understand that the SPI-M Secretariat should also have copies.