SPI-M-O: Consensus Statement on COVID-19

Date: 20th January 2021

All probability statements are in line with the framework given in the Annex.

Summary

1. SPI-M-O's best estimates for **R in the UK and in England are between 0.8 and 1.0**. Estimates of R for Scotland, Wales, and Northern Ireland are between **0.8 and 1.1**, **0.7 and 0.9**, and **0.7 and 1.1 respectively**.

2. SPI-M-O estimate that R is below 1 in the East of England, London and the South East. All other NHS England regions have estimates that span 1 and SPI-M-O are not confident that the epidemic is shrinking in these areas.

3. SPI-M-O estimate that there are between **49,000 and 136,000 new infections per day in England.**

4. R is a lagging indicator and these estimates are based on the latest data available up to 18th January. The effects of the latest measures across the four nations, including the current measures in England from 5th January, are partly but not wholly captured in the latest data. It is difficult to disentangle the impact of current measures and changes in mixing in areas that were in Tier 4 over the festive period.

5. Scenario-based medium-term modelling show that hospital occupancy will remain very high for at least another six weeks, even if R is sustained between 0.8 and 1.0 and vaccination of two million people per week is possible. Vaccines given to date will have had relatively little impact on the epidemic so far.

Incidence and prevalence

6. Combined estimates from five SPI-M-O models, using data available up to 18th January, suggest there are between **49,000 and 136,000 new infections per day in England**.

7. The ONS community infection survey for the most recent week of the study (10th to 16th January) estimates that an average of **1,023,700 people had COVID-19** in the community in England (credible interval **978,900 to 1,070,000**). The survey does not include people in care homes, hospitals or prisons. Estimates from across the four nations of the UK are:

England	1,023,700 (credible interval 978,900 to 1,070,000)
Scotland	52,200 (credible interval 44,400 to 60,800)
Wales	44,000 (credible interval 36,000 to 52,800)
Northern Ireland	29,400 (credible interval 23,000 to 36,500)

8. The latest data from the REACT study are consistent with either growth or decay in the number of people in England testing positive for SARS-CoV-2 between 6th and 15th January.

Reproduction number and growth rate

9. The reproduction number is the average number of secondary infections produced by a single infected individual. R is an average value over time, geographies, and communities. This should be considered when interpreting the R estimate for the UK given the differences in policies across the four nations.

10. **SPI-M-O's best estimates for R in the UK and England are between 0.8 and 1.0**. Estimates of R for Scotland, Wales, and Northern Ireland are between **0.8 and 1.1**, **0.7 and 0.9**, and **0.7 and 1.1 respectively**. SPI-M-O's agreed national estimates are summarised in Table 1 and Figures 3 and 4.

11. R is a lagging indicator and these estimates are based on the latest data available up to 18th January. The effects of the latest measures across the four nations including the current measures in England from 5th January are partly but not wholly captured in the latest data. It is difficult to disentangle the impact of current measures and changes in mixing in areas that were in Tier 4 over the festive period.

12. SPI-M-O are confident that R is below 1 in the East of England, London and the South East. These are areas that have had higher prevalence levels and have been under more stringent restrictions for longer recently, including Tier 4 restrictions over the festive period. SPI-M-O are now confident that the epidemic is shrinking in these areas. On the other hand, SPI-M-O are not confident that the epidemic is shrinking in the other regions of England. These regional R estimates can be seen in Figure 6.

13. For small daily changes, the growth rate is approximately the proportion by which the number of infections increases or decreases per day, i.e. the rate at which an epidemic is growing or shrinking[1].

14. SPI-M-O's consensus estimate is that the **growth rate in the UK is between -4% and -1% per day**, and between **-4% and 0% in England**. SPI-M-O's national and regional estimates of growth rates are summarised in Table 1 and Figure 5.

Medium-term outlook and scope for relaxing current measures

15. A statistical combination of two SPI-M-O models has been used to explore the potential impact of the current measures and vaccination on hospital occupancy and deaths.

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[1] Further technical information on the growth rate can be found in Plus magazine.

Because the full effect of the measures introduced on 5th January 2021 is not yet clear, scenarios have been produced that assume that these will have achieved a range of R values between 0.8 and 1.2 from 5th January until the start of March.

16. The real-world effectiveness[2] of vaccines against infection, hospital admission, and death are not yet known[3]. It is likely that these three quantities will not be the same. For these scenarios, the models have assumed that the first dose effectiveness of the Pfizer-BioNTech against both hospital admission and death is 88%, and that the first dose effectiveness of the Oxford-AstraZeneca vaccine is 70% (in line with JCVI's estimates[4]). In the absence of evidence on effectiveness against infection, both vaccines are modelled as reducing the risk of infection by 48% after the first dose. Trajectories would be different had other effectiveness assumptions been modelled.

17. The models have assumed (based on public statements) that two million people per week are vaccinated across the UK for the next six weeks, with vaccine being administered according to JCVI's priority order[5] and that around four million people have been vaccinated to date[6].

18. Figure 1 demonstrates that even if R is 0.8 for the next six weeks, hospital occupancy will remain extremely high. The impact of vaccines on occupancy during this time would be modest.

19. As described in a paper presented by a member of SPI-M-O, who is a consultant in critical care, current level and profile of activity are not sustainable indefinitely and cannot deliver full routine care in addition to the surge to deliver emergency care to COVID-19 patients.

20. If measures are relaxed when R is just below 1 and prevalence is high, it is almost certain that there will be a **rapid** further increase in hospital admissions. The magnitude of this rise will depend on the extent and duration of such an increase in R.

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[2] Efficacy is performance of an intervention under ideal controlled circumstances whereas effectiveness refers to its performance under 'real-world' conditions

[3] And the effectiveness of a vaccine is against infection is unlikely to be the same as against serious disease.
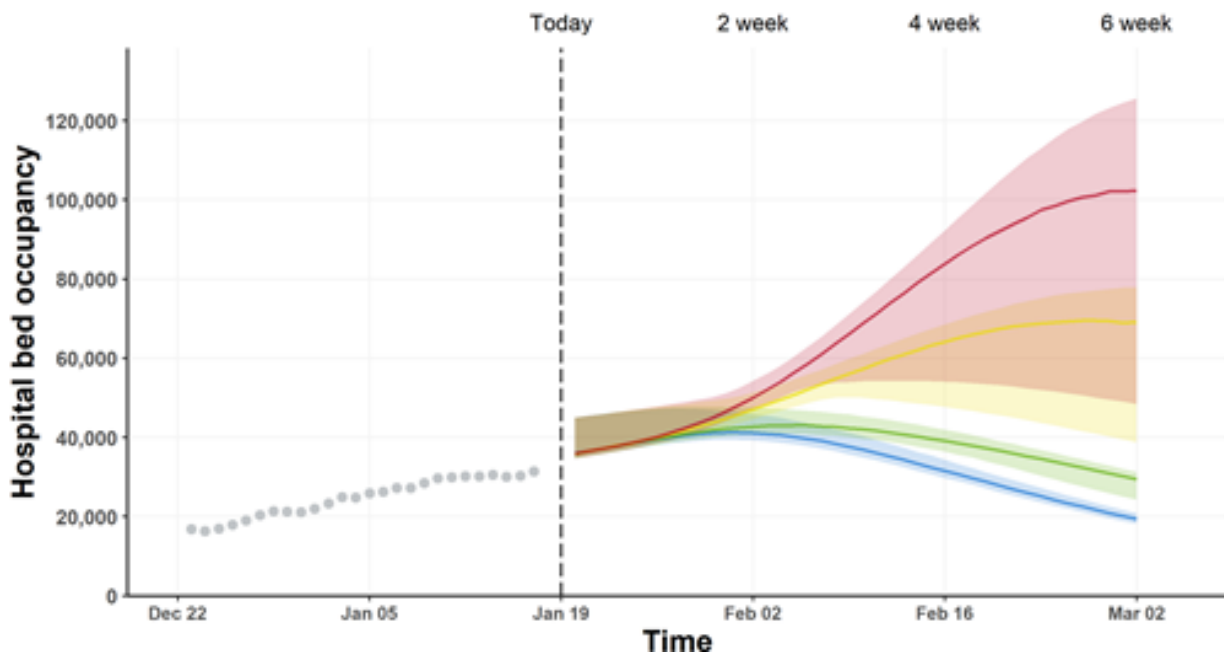
[4] https://www.gov.uk/government/publications/prioritising-the-first-covid-19-vaccine-dose-jcvi-statement/optimising-the-covid-19-vaccination-programme-for-maximum-short-term-impact

[5] https://www.gov.uk/government/publications/priority-groups-for-coronavirus-covid-19-vaccination-advice-from-the-jcvi-30-december-2020/joint-committee-on-vaccination-and-immunisation-advice-on-priority-groups-for-covid-19-vaccination-30-december-2020

[6] For technical reasons for this week only, one model administers all doses before the start of the scenario on the same day.

21. As discussed previously, it will take two to three weeks for a vaccine to induce an immune response, and approximately a further two weeks for an infected person to require hospitalisation. There will be a lag of around four weeks before the benefits of vaccines are seen on hospital admissions, and even longer for deaths. If vaccines were to reduce transmission, a large number of people would need to be immunised to have a meaningful reduction in R.

22. Because a large proportion of hospital admissions are not in the oldest age groups, **vaccination will not provide greater scope to allow R to return above 1 unless vaccines have been rolled out to a large proportion of the population and are highly effective at reducing hospitalisations.**

23. The proportion and number of deaths in over 80yr olds should start to fall in the coming weeks as vaccination takes effect. The numbers of deaths in care homes continues to grow, but should start to fall in the coming weeks, if vaccination is successful.

Figure 1: Six-week scenarios for hospital occupancy in England over a range of R values (0. 8 – blue; 0.9 – green; 1.1 – yellow; 1.2 – red) representing a range of impacts that could have happened as a result of the national lockdown. Models assume that around four million people were vaccinated in the UK prior to 19th January and two million people per week thereafter, with vaccines being administered according to JCVI's priority order. The first dose effectiveness against both hospital admission and death of the Pfizer-BioNTech and Oxford-AstraZeneca vaccines are modelled to be 88% and 70% respectively. Both vaccines are also modelled to reduce the risk of infection by 48% after the first dose. All trajectories show interquartile ranges of model combinations as the shaded band.

Figure 2: Six-week scenarios for deaths in England over a range of R values (0. 8 – blue; 0.9 – green; 1.1 – yellow; 1.2 – red) representing a range of impacts that could have happened as a result of the national lockdown. Models assume that around four million people were vaccinated in the UK prior to 19th January and two million people per week thereafter, with vaccines being administered according to JCVI's priority order. The first dose effectiveness against both hospital admission and death of the Pfizer-BioNTech and Oxford-AstraZeneca vaccines are modelled to be 88% and 70% respectively. Both vaccines are also modelled to reduce the risk of infection by 48% after the first dose. All trajectories show interquartile ranges of model combinations as the shaded band. The red dashed line is the peak from the first wave of the epidemic in spring 2020. Red data points highlight that these are likely to be revised upwards in the future due to reporting delays.
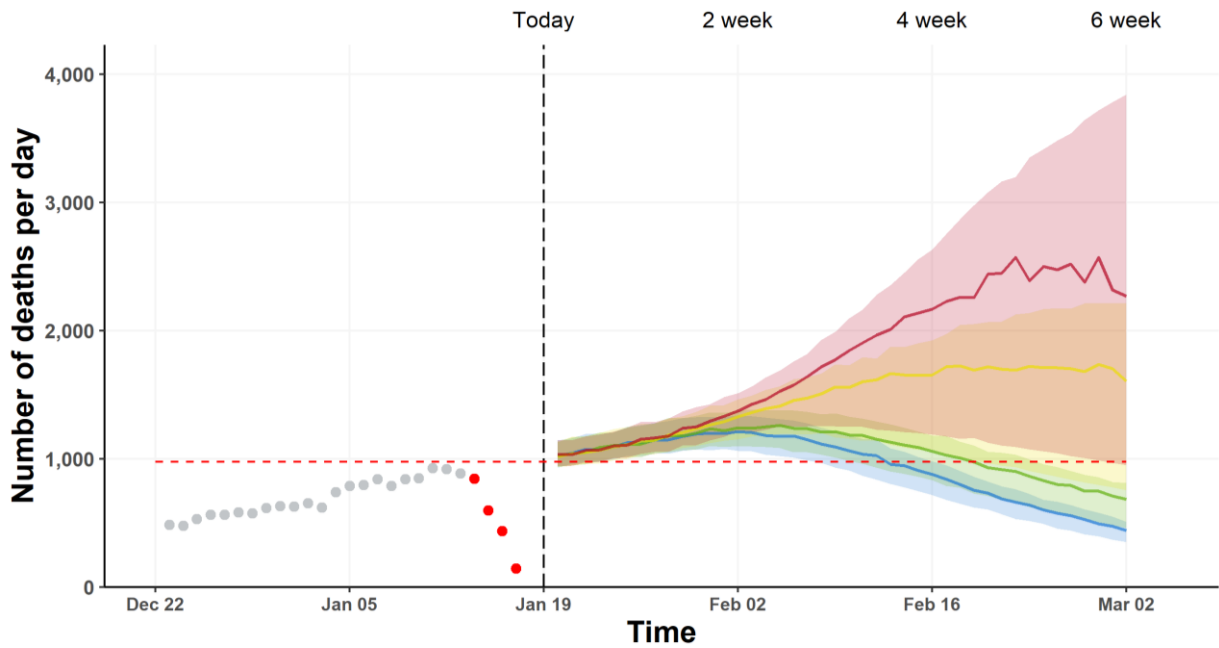
Annex: PHIA framework of language for discussing probabilities
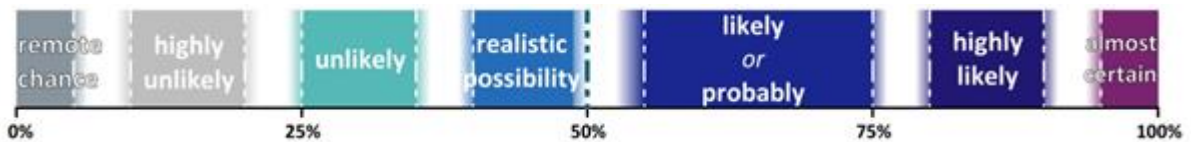
Table 1: Combined estimate of R and the growth rate in the UK, four nations and NHS England regions (90% confidence interval)[7]

Nation	R	Growth rate per day
England	0.8 – 1.0	-4% to 0%
Scotland	0.8 – 1.1	-4% to +1%
Wales	0.7 – 0.9	-6% to -3%
Northern Ireland	0.7 – 1.1	-7% to +1%
UK	**0.8 – 1.0**	**-4% to -1%**

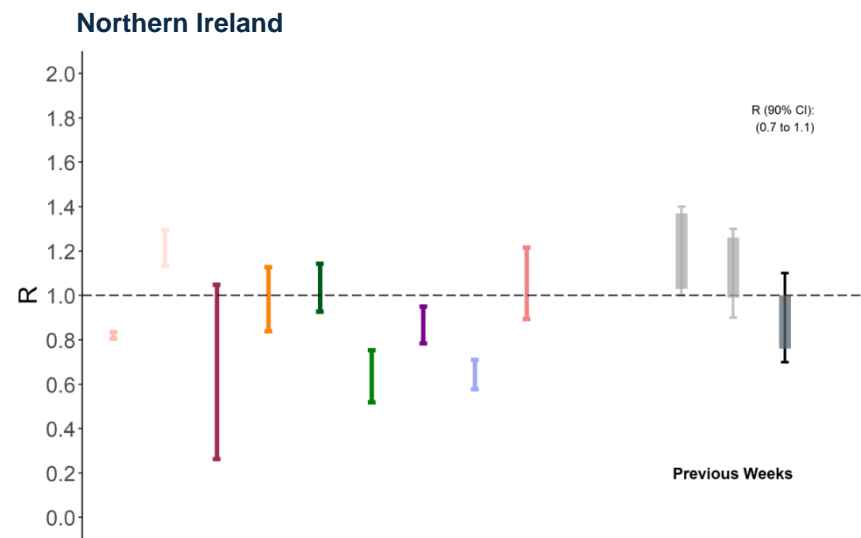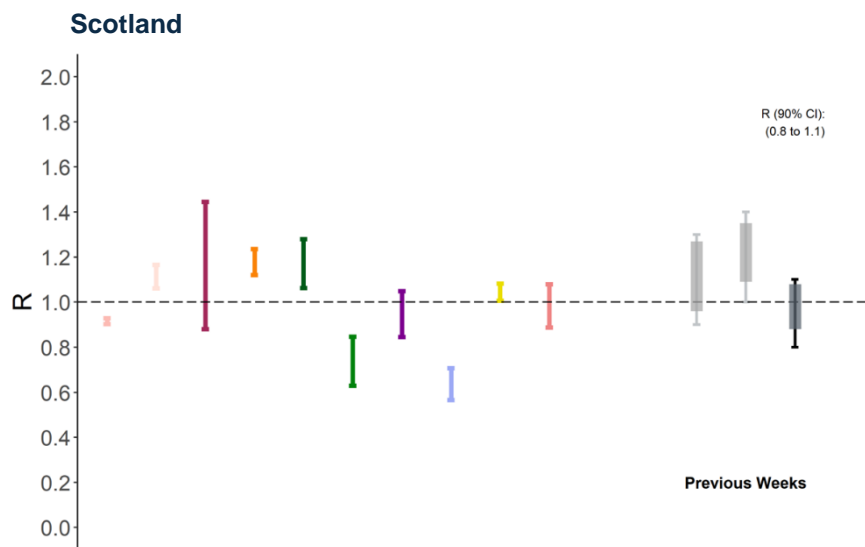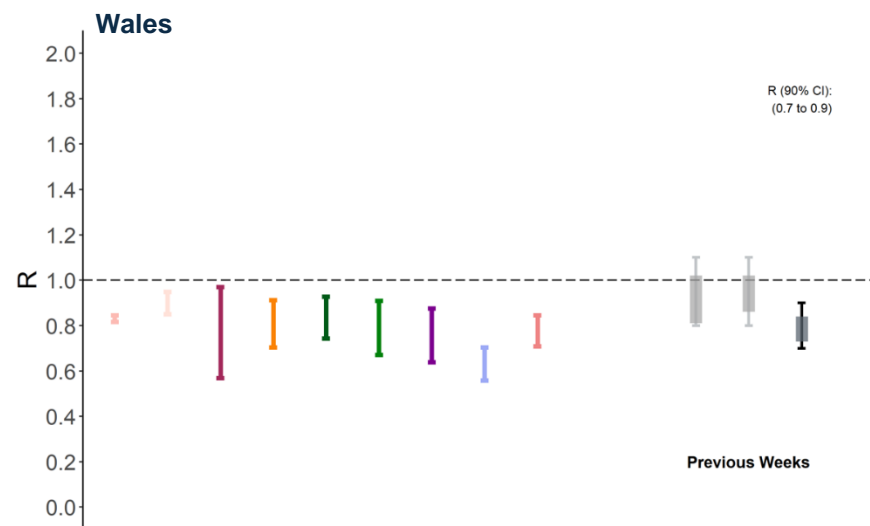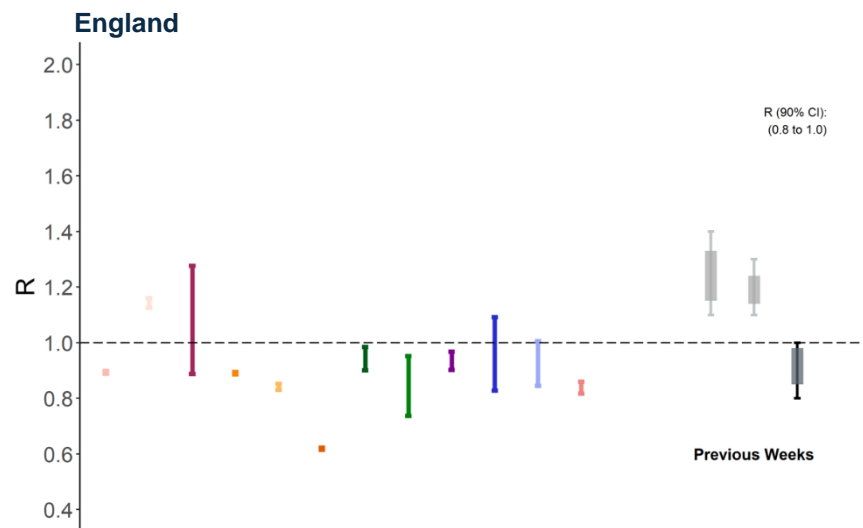| NHS England region	R	Growth rate per day
East of England	0.6 – 0.9	-8% to -2%
London	0.7 – 0.9	-7% to -3%
Midlands	0.9 – 1.2	-2% to +2%
North East and Yorkshire	0.8 – 1.1	-3% to +1%
North West	0.9 – 1.2	-2% to +2%
South East	0.7 – 1.0	-6% to -2%
South West	0.9 – 1.2	-2% to +3%

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[7] The estimate intervals for R and growth may not exactly correspond to each other due to the submission of different independent estimates and rounding in presentation.

Figure 3: SPI-M-O groups' estimates of median R in the UK, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded area represents the combined numerical range and the black bar is the combined range after rounding to 1 decimal place. The UK estimate of R is the average over very different epidemiological situations and should be regarded as a guide to the general trend rather than a description of the epidemic state.
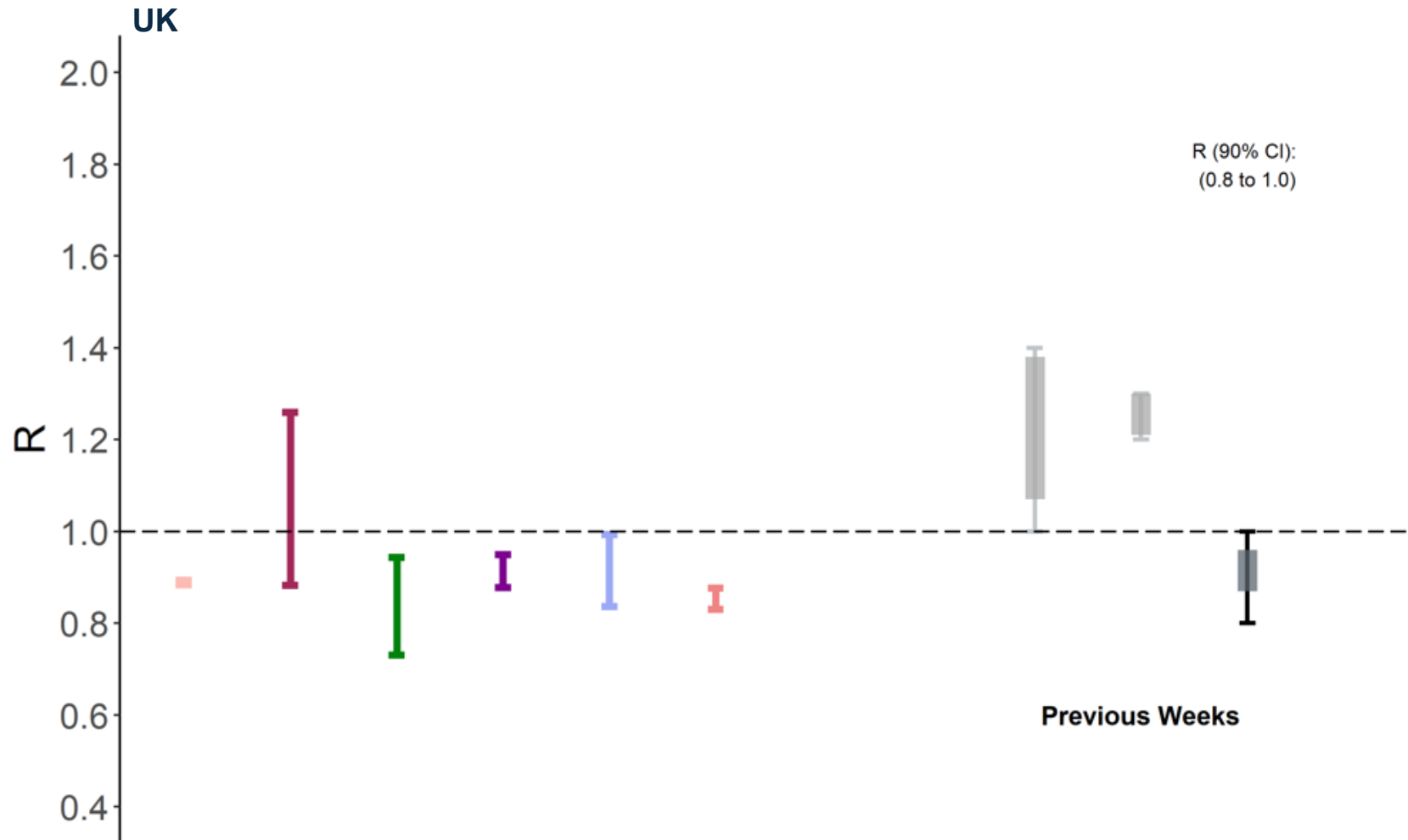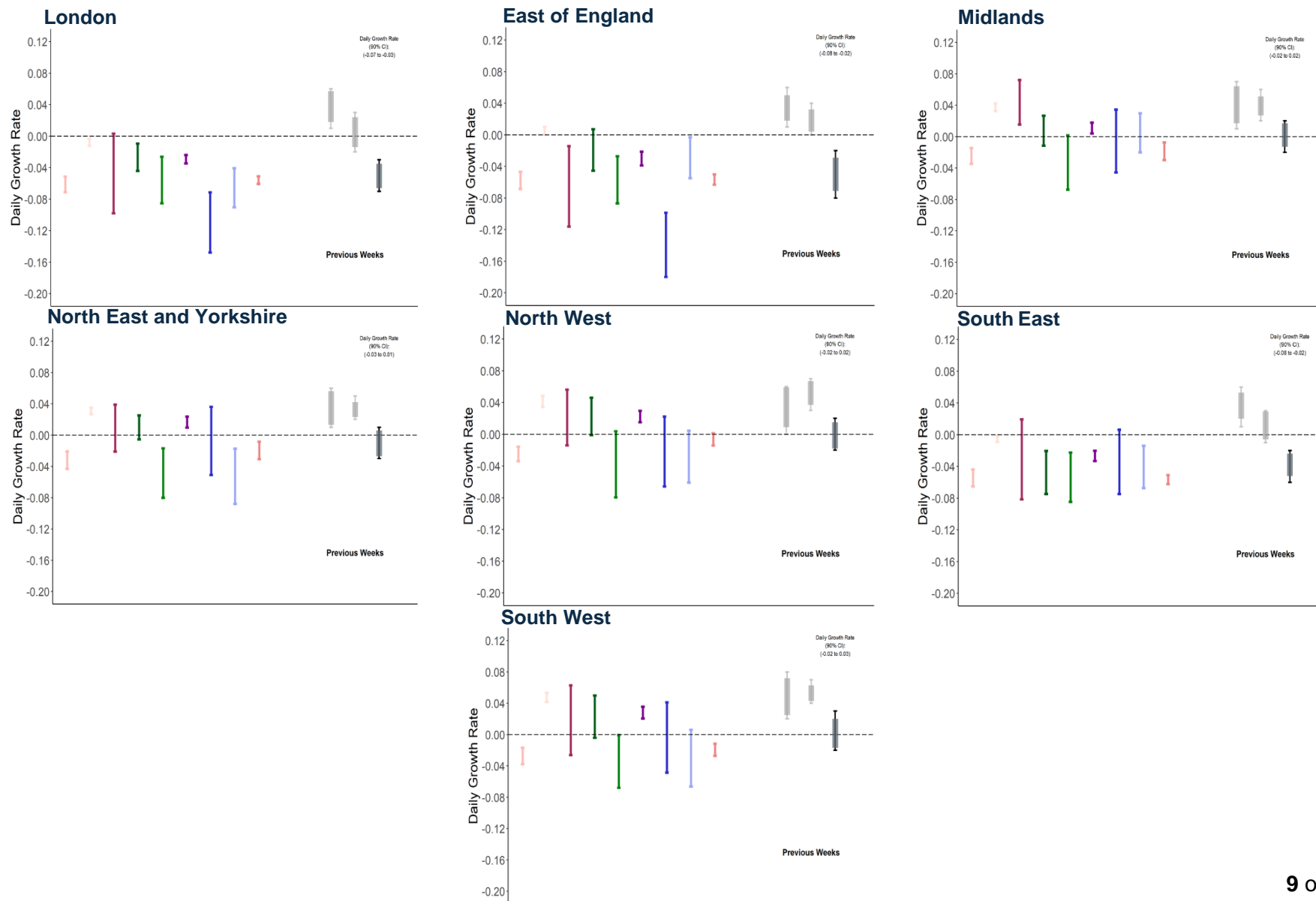
Figure 4: SPI-M-O groups estimates of median R in the four nations of the UK, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 1 decimal place.

Figure 5: SPI-M-O groups estimates of the growth rate in NHS England regions, including 90% confidence intervals. Bars represent different modelling groups. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 2 decimal places.

Figure 6: SPI-M-O groups estimates of median R in the NHS England regions, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 1 decimal place.