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

Date: 9th December 2020

FINAL – SIGNED OFF BY SAGE

Summary

1. SPI-M-O's best estimates for **R in the UK and in England are between 0.9 – 1.0 and 0.8 – 1.0 respectively.** Estimates of R for Scotland, Wales, and Northern Ireland are 0.7 – 0.9, 0.9 – 1.2, and 0.8 – 1.1 respectively. R is a lagging indicator and these estimates are based on the latest data available up to 7th December.
2. R and growth rates have increased for Wales and Northern Ireland, decreased in Scotland, and remained constant for England as a whole, compared to last week. There have been small increases in R in some NHS England regions such as East of England, Midlands, and the South West. Only the R estimates for the North West and North East & Yorkshire are securely below 1. For all other regions, the R estimates are close to or spanning 1.
3. SPI-M-O estimate that there are between **34,000 and 50,000 new infections per day in England.**
4. **It is too early to see the impact of the end of national restrictions in England or of the new tiers, implemented from 2nd December, in these estimates.** It will likely take several more days for the data to fully reflect these changes in testing data and longer for those impacts to flow into hospitalisation and death data.
5. Scenarios considering high or low transmission in the run up to 23rd December and high or low transmission over the festive period, combined with considerations on current data trends, show significant uncertainty of what might happen over the coming weeks.
6. Additional questions have been added to a regular polling survey, that ask about people's intention to form a bubble and, if so, how many other households it would likely include. Analysis of this data under a reasonable case with up to 50% of people forming some sort of bubble suggests that current Christmas plans have a more moderate impact on mixing over the festive period than a counterfactual scenario where all households are part of a three-household bubble formed at random.

Incidence and prevalence

7. Combined estimates from seven SPI-M-O models, using data available up to 7th December, suggest there are between **34,000 and 50,000 new infections per day in England**. Compared to last week, the range has narrowed with the lower bound increasing by 1,000 and the upper band decreasing by 10,000.
8. Modelling from the ONS community infection survey for the most recent week of the study (29th to 5th December) estimates that an average of **481,500 people had COVID-19** in the

community in England (credible interval 450,800 to 513,600). The survey does not include people in care homes, hospitals, or university halls of residence. The equivalent estimates for the devolved administrations are:

England	481,500 (credible interval 450,800 to 513,600)
Scotland	43,300 (credible interval 32,100 to 56,000)
Wales	25,600 (credible interval 17,300 to 35,600)
Northern Ireland	7,800 (credible interval 4,400 to 12,100)

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 estimate for R in the UK is between 0.9 – 1.0 while in England this is between 0.8 – 1.0.** Estimates of R for Scotland, Wales and Northern Ireland are 0.7 – 0.9, 0.9 – 1.2 and 0.8 – 1.1, respectively. R is a lagging indicator and these estimates are based on the latest data available up to 7th December. SPI-M-O's agreed national and regional estimates are summarised in Table 1 and Figures 2, 3, and 5. SPI-M are not confident that R is less than one in Wales, nor in some regions of England.
11. **It is too early to see the impact of the end of national restrictions in England or of the effect of the new tiers system, implemented from 2nd December, in these estimates.** R remains broadly consistent in England with the levels estimated in previous weeks. It will likely take several more days for the data to show expected changes in numbers testing positive and longer still to show subsequent changes in hospitalisations and deaths.
12. The epidemic is estimated to be shrinking in some NHS England regions, with all regions having a lower bound of R below 1. East of England, London, and South East have upper bound R estimates above 1 (all 1.1). SPI-M-O is not confident that R is below 1 in these regions and more recent data are consistent with epidemic growth.
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 and in England is between -2% to 0% per day**. SPI-M-O's national and regional estimates of growth rates are summarised in Table 1 and Figure 4.

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

Festive period: scenarios and extended bubbles

15. The introduction of the new tiering system in England and the planned relaxation of restrictions over the festive period means the medium-term trajectory of the epidemic is highly uncertain. A subset of SPI-M-O models have been used to investigate a range of scenarios over this festive period.

16. Modelling groups have used their expert judgement alongside current data trends to create high and low transmission scenarios before 22nd December and from 28th December onwards, based on the potential impact of the new tiering system in England. These may equate to specific R values (for example, estimates during national restrictions in England for low scenarios, or similar to values from periods of growth in transmission), or map to previous impact of tiers[2].

17. Two further scenarios over the festive period itself (23rd to 27th December) are also considered. In one scenario, transmission temporarily increases particularly to older people. Different groups have modelled this in different ways, such as increasing R by around factor of 1.5, or to levels seen during September 2020. Another scenario sees transmission decrease overall but mixing during the holidays still leads to increased infections in older people. Modelling groups have, again, done this through different methods, such as multiplying R by around a factor of 0.9.

18. There is considerable variation between individual model projections over these periods in both hospitalisations and deaths (Figure 1), reflecting the uncertainty around the potential impact of the new tiering system, and the extent of and compliance with bubbling over the festive period. This is the case for both scenarios that consider low transmission up to 23rd December with low transmission over the festive period (low/low) and high transmission up to 23rd December with high transmission over the festive period (high/high). Uptake of bubbling and people's compliance to guidance over the festive period is unknown so it is not possible to say which of these scenarios is more likely.

19. In the high/high scenario, it can be seen from Figure 1 how an increase in hospitalisations occurs after the festive period, starting in late December or early January. This is followed by increases in deaths later, towards the end of January.

20. **These scenarios, and the differences between them, show the range of considerable uncertainty over this period when considering *both* scenarios over the period.** As a result, they should not be considered forecasts or predictions of what is likely to happen. They also demonstrate that it will not be until January 2021 that the impact of the coming month can be understood. Significant disruption to data streams (especially testing) will lengthen this period of uncertainty.

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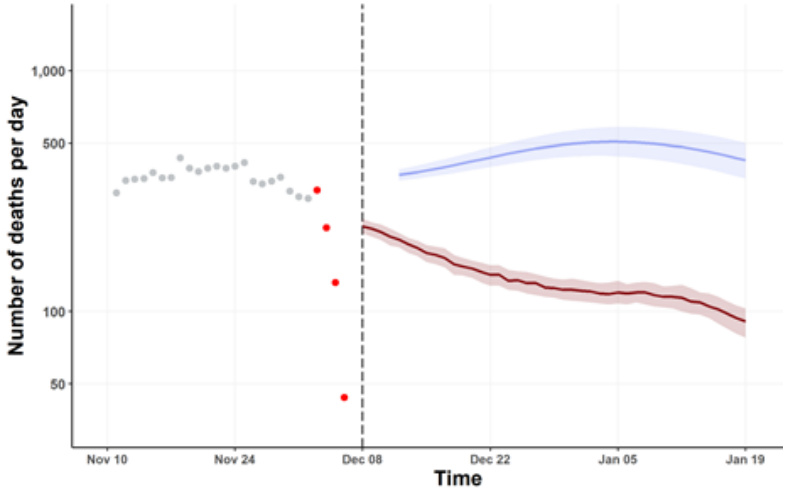
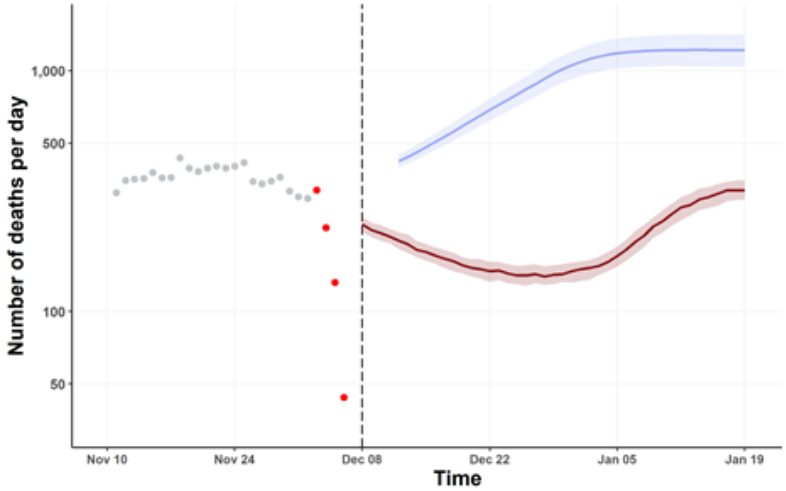
[2] SAGE papers: SPI-M-O: Statement on tiers in England and Impact of Interventions TFG: The UK's four nations' autumn interventions

Figure 1: Plots showing two individual model outputs for deaths and hospitalisations in England under high/high and low/low scenarios *(Log scale)* and the divergence between them. Shaded bands around individual outputs represent the interquartile range for that model. The space between the individual model runs give some sense of the considerable uncertainty over this coming month. **These are not intended to be forecasts or predictions.**
Grey dots reflect past data; red dots are data points that are likely to be revised in the future.

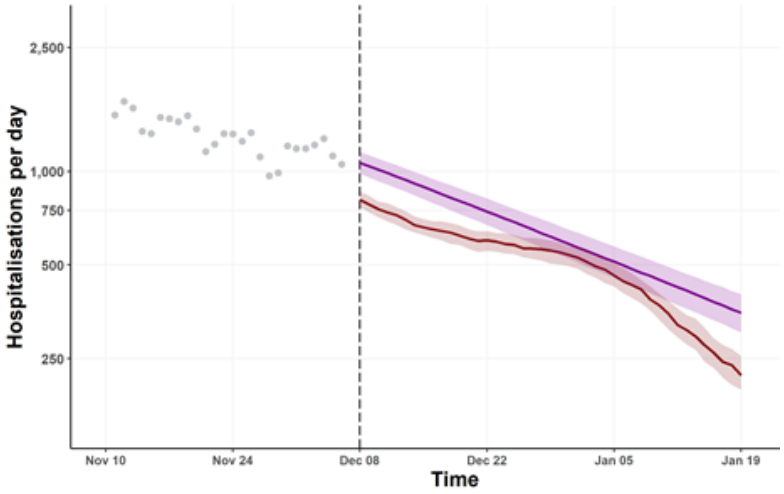
Deaths (low/low)



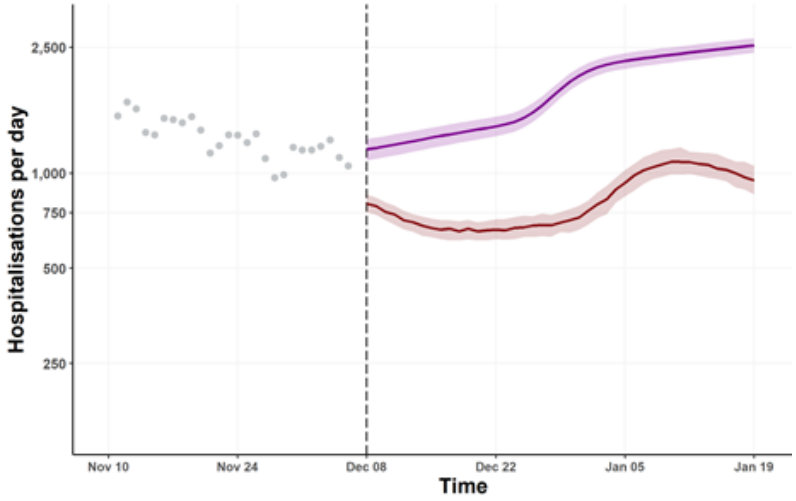
Deaths (high/high)



Hospitalisations (low/low)



Hospitalisations (high/high)



21. Additional questions have been added to the regular Cabinet Office YouGov polling survey that ask about people's intention to form a bubble and, if so, how many other households it would likely include. Data from this survey (around 2,500 adults questioned between 30th November and 1st December) suggest around 45% of households are "definitely" or "probably" planning to form a festive bubble, with most planned bubbles involving two or three households in total, although some larger ones are also planned.

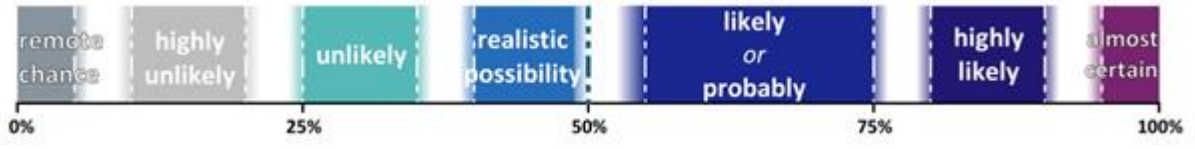
22. These new data have allowed previous analysis by one SPI-M-O group to be extended to consider the impact of extended bubbles over the Christmas period (23rd-27th December 2020). Under a reasonable case[3], current Christmas plans suggest a more moderate impact of mixing over the festive period than a three-bubble counterfactual scenario (where *all* households are part of three-household bubbles formed at random).

23. 14% of households plan to form bubbles of four or more households. While preventing these larger bubbles would be beneficial in terms of reduced transmission, this effect is likely to be less than a scenario where all respondents who are undecided choose not to form Christmas bubbles at all. 21% of households have yet to decide if they will form a Christmas bubble[4]; if they decided not to bubble with other households, there could be substantial benefit thanks to reduced transmission.

24. A further 25% of households who responded said they were "definitely not" planning to form a Christmas bubble, which further reduces the impact of current Christmas plans compared to the counterfactual scenario where *all* households are part of three-household bubbles. **These small choices by individuals and households could have a large overall impact on the transmission of SARS-CoV-2 at the end of 2020.**

25. It is possible that the formation and ceasing of bubbles may have additional effects on transmission. The period between 23rd-27th December will result in a new transmission network as new connections are made. The network returns to normal work and school connections afterwards, potentially introducing infection into new groups. These effects, however, are unknown.

Annex: PHIA framework of language for discussing probabilities



[3] This scenario assumes that a total of just less than 50% of households go on to form some sort of Christmas bubble. This is made up of those who said they "definitely" (33%) or "probably" (8%) will form a bubble, and a proportion of those who "don't know" [total 9%]

[4] 12% of those who responded said that their household "might" form a bubble, and a further 9% responded that they did not know if they would.

Table 1: Combined estimate of R and the growth rate in the UK, four nations and NHS England regions (90% confidence interval)[5]

Nation	R	Growth rate per day
England	0.8 – 1.0	-2% to 0%
Scotland	0.7 – 0.9	-5% to -2%
Wales	0.9 – 1.2	-1% to +4%
Northern Ireland	0.8 – 1.1	-3% to +1%
UK	**0.9 – 1.0**	**-2% to 0%**

NHS England region	R	Growth rate per day
East of England	0.9 – 1.1	-1% to +2%
London	0.9 – 1.1	-1% to +1%
Midlands	0.8 – 1.0	-3% to -1%
North East and Yorkshire	0.7 – 0.9	-4% to -2%
North West	0.7 – 0.9	-4% to -2%
South East	0.9 – 1.1	-1% to +1%
South West	0.8 – 1.0	-4% to 0%

[5] 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 2: 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.

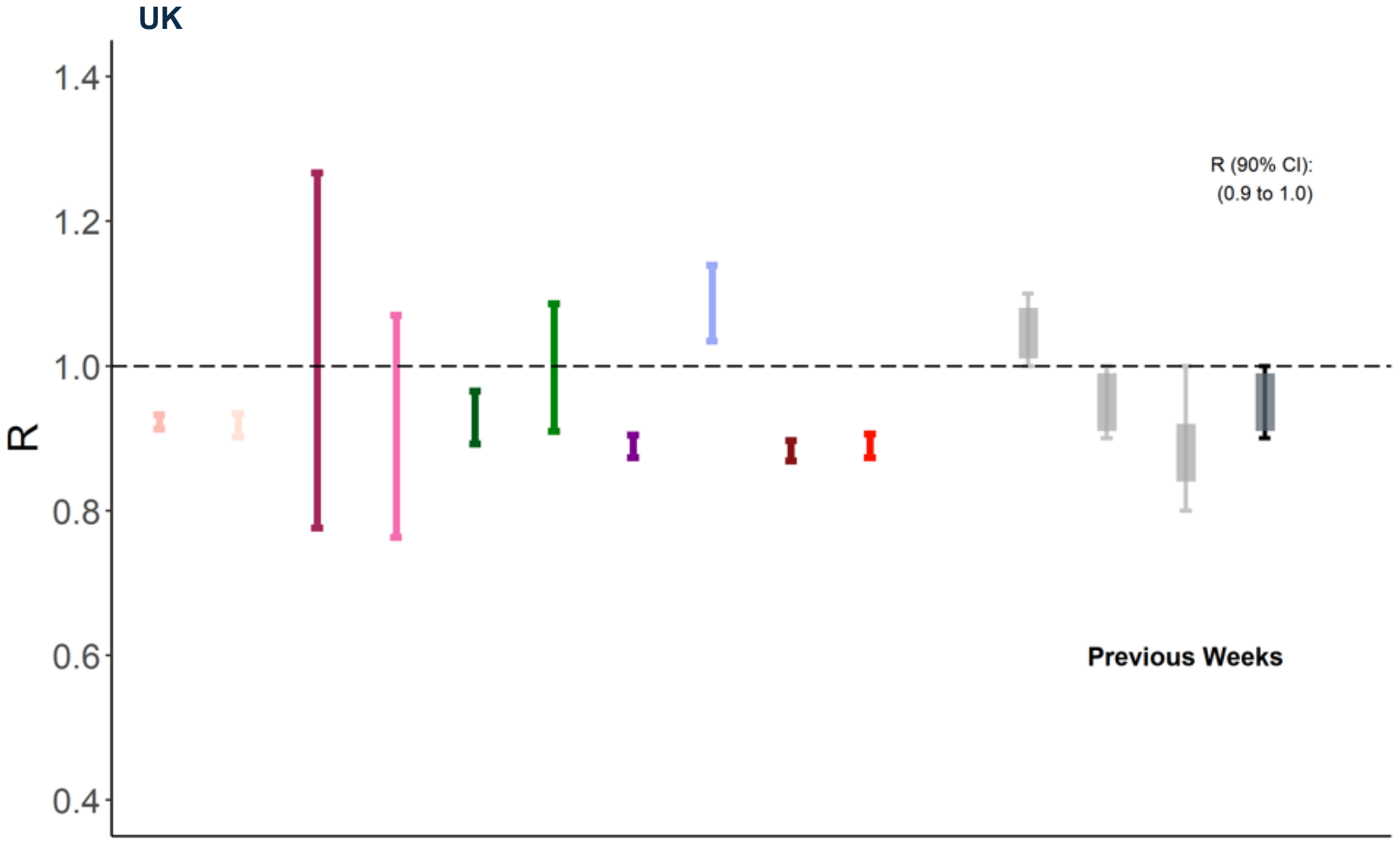


Figure 3: SPI-M-O groups estimates of median R in the four nations of the UK, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 1 decimal place.

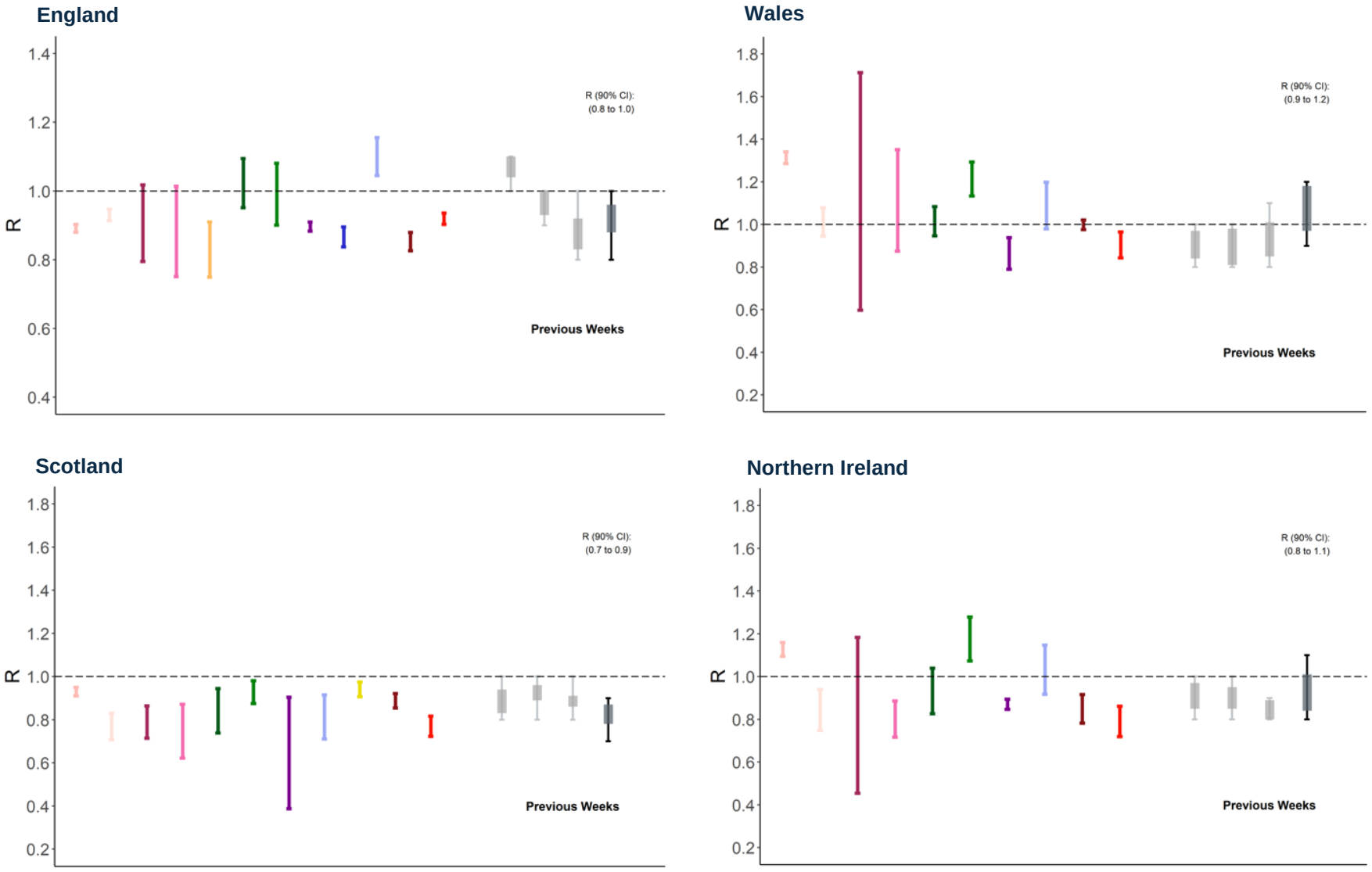


Figure 4: SPI-M-O groups estimates of the growth rate in NHS England regions, including 90% confidence intervals. Bars represent different modelling groups. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 2 decimal places.

Figure 5: 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.