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

Date: 7th April 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 England, Scotland, and Northern Ireland are between 0.8 and 1.0**. **For Wales, R is between 0.6 and 0.9**. These estimates are based on the latest data available up to 5th April, including hospitalisations and deaths as well as symptomatic testing and prevalence studies. It is likely that the majority of the impact of the re-opening of schools is reflected, but not that of behavioural changes which have happened since the easing of restrictions from 29th March.

2. **SPI-M-O is *not confident* that R is *now* below 1 in most NHS England regions**. The upper limit of the range is 1 for six of the seven regions, reflecting a flattening in transmission across the country. There continues to be heterogeneity at a sub-regional level, and it is important that these areas are carefully monitored as measures start to be relaxed. Transmission remains highly heterogeneous more locally.

3. **No UK estimates for R or growth rate have been agreed** by SPI-M-O. As restrictions are lifted differentially across the four nations, UK level estimates become less meaningful and are easily biased by the smaller number of model outputs combined in their calculation. SPI-M-O advises that R and growth rates for the four nations and NHS England regions are more robust and useful metrics than those for the whole UK, and so will cease the production of UK level estimates.

4. SPI-M-O estimates that there are between **5,000 and 9,000 new infections per day in England.**

Incidence and prevalence

5. Combined estimates from seven SPI-M-O models, using data available up to 5th April, suggest there are between **5,000 and 9,000 new infections per day in England**. The ONS community infection survey estimates that there were 15,000 new infections per day in England (credible interval of 11,700 to 16,500) on 24th March 2021.

6. During the most recent week of the study (28th March to 3rd April), the survey also estimates that an average of **161,900 people had COVID-19** in the community in England (credible interval **142,000** to **183,200**); this is in line with the previous week's data and suggests

prevalence continues to flatten. The survey does not include people in care homes, hospitals, or prisons. Estimates from across the four nations of the UK are:

England   161,900 (credible interval 142,000 to 183,200)
Scotland   13,000 (credible interval 8,200 to 19,000)
Wales   3,800 (credible interval 1,900 to 6,500)
Northern Ireland 6,100 (credible interval 3,200 to 9,900)

Reproduction number and growth rate

7. 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].

8. SPI-M-O's consensus estimates for the **growth rate in England and Scotland is between -4% and 0% per day**. **For Wales and Northern Ireland, growth rate is between -6% and -1% per day** and **-3% and 0% per day respectively**. SPI-M-O's national and regional estimates of growth rates are summarised in Table 1 and Figure 4.

9. The reproduction number (R) is the average number of secondary infections produced by a single infected individual; it is an average over time, geographies, and communities.

10. SPI-M-O's best estimates for **R in England, Scotland, and Northern Ireland are between 0.8 and 1.0**. **For Wales, R is between 0.6 and 0.9**. SPI-M-O's agreed national estimates are summarised in Table 1 and Figure 3. R is an indicator that lags by two to three weeks and, therefore, it is likely that the majority of the impact of the re-opening of schools from 8th March is reflected in these estimates but not the impact of behavioural changes that have happened since easing of restrictions from 29th March. These estimates are based on the latest data available up to 5th April.

11. Due to the lag in these indicators, **SPI-M-O is *not confident* that R is *now* below 1 in most NHS England regions**, and these estimates can be seen in Table 1 and Figure 5. The upper limit of the range for six of seven regions is 1, reflecting a flattening in transmission across the country. There continues to be significant heterogeneity at a sub-regional level, and it is important that these areas are carefully monitored as measures start to be relaxed.

12. **Particular care should be taken when interpreting the R and growth rate estimates for Scotland, Wales, Northern Ireland, East of England, London, South East, and South West.** These estimates are based on low numbers of cases or deaths and / or dominated by clustered outbreaks and so should not be treated as robust enough to inform

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

policy decisions alone. Estimates of R and the growth rates per day become less reliable and less useful in determining the state of the epidemic when disease incidence is low or where there is significant variability in the population, such as local outbreaks. Both are average measures and smooth over outbreaks at small spatial scales or over short periods of time.

13. Estimates of R and growth rate for the whole of the UK are averages over different epidemiological situations and should be regarded as a guide to the general trend rather than a description of the epidemic state. They rely on combining a smaller number of models to generate said estimates than those used at the nation level. As restrictions are lifted differentially across the four nations, UK level estimates become less meaningful than previously, and are more easily biased by the models combined in their calculation. SPI-M-O considers the estimates for the four nations and NHS England regions as more robust and useful metrics than those for the whole UK. As a result, **no UK estimates for R or growth rate have been agreed and UK level ranges will no longer be produced**.

CoMix

14. The CoMix study tracks the number of self-reported contacts that individuals have had over time, including exploring differences between regions[2]. It also uses these data to give an alternative method of estimating R. It has now been running for approximately a year and, as shown in Figure 1, this allows comparison of the estimated mean number of daily contacts[3] people in the UK have had since the start of the epidemic in spring 2020.

15. Figure 1 shows that numbers of contacts remained very low throughout the first lockdown until they significantly increased at the start of August 2020, before gradually dropping for adults over the autumn. The drop in contacts at the start of the November lockdown was short-lived; it was sustained for longer during the third lockdown, but mean contacts have started to increase from early March.

16. These findings can also be compared with previous contact surveys, such as POLYMOD and the BBC pandemic project[4], which both estimated the mean daily number of contacts per participant as approximately 11 per day. This is much higher than that estimated by CoMix over the course of the epidemic, which has a maximum of around 6. In all three surveys, number of contacts generally decreases with age. Contacts are dominated by

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[2] CoMix Study – Social contact survey in the UK – Report 53
[3] A contact is defined as anyone who was met in person and with whom at least a few words were exchanged, or anyone with whom the participants had any sort of skin-to-skin contact.
[4] POLYMOD social contacts survey; BBC pandemic project social mixing matrices

contacts within the same age groups, for example children have more contacts with other children than with adults outside of their household.

Figure 1: Mean daily number of contacts in the UK as estimated through the CoMix study from 23rd March 2020 to date for adults (purple) and adults and children (yellow). Contacts are truncated to 50 per participant. Observations are smoothed over two weeks to account for panel effects. Dates on the horizontal axis refers to the midpoint of the survey period.
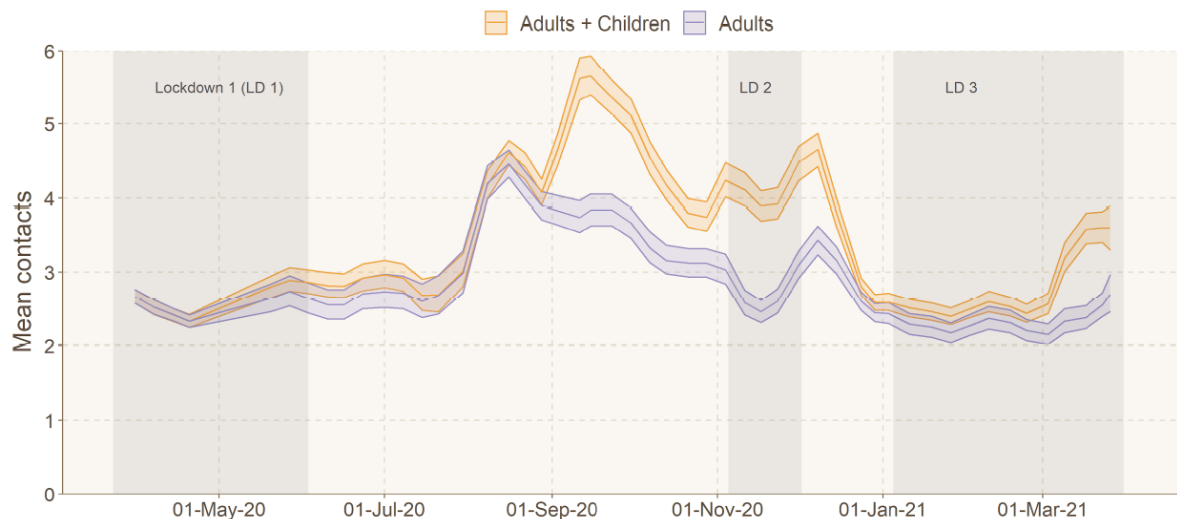
Ready reckoners considering the impact of vaccinations

17. SPI-M-O has previously produced 'ready reckoner' figures to illustrate the relationship between R (vertical axis) and the proportion of contacts made outside the home and school (horizontal axis), with bands representing different school opening strategies[5]. This work has now been developed to consider the impact of vaccination of age groups over time, with each plot assuming that vaccines have been rolled out to a different set of ages, in combination with previously used variables such as COVID security (the effectiveness of risk mitigation measures at reducing transmission for a given contact) and contact tracing efficiency (the percentage of onward transmission events prevented as a result of test, trace, and isolate)[6].

18. The impact of vaccination on R is evident when comparing rows in Figure 2 as the coloured bands begin to shift down. There is little difference between the first plot, in which over 65-year olds have been vaccinated and the fourth, in which over 50-year olds have been vaccinated. This demonstrates that vaccines that have been given to date will have had a relatively small impact on population-wide transmission as, on average, older people have comparatively fewer contacts and, therefore, a smaller role in transmission. As vaccines reach younger age groups, who tend to have the most contacts per participant in social

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[5] SPI-M-O: Comments on social distancing measures; SAGE 43, 23rd June 2020; and SPI-M-O Statement on population case detection; SAGE 56, 10th September 2020.
[6] An interactive version of these ready reckoners presented here is available.

contact surveys, there is a greater impact on population-wide transmission and further increases in active work and leisure contacts are possible without leading to large increases in R.

19. Using CoMix and other contact data give an estimate that current active work and leisure contacts could be around 20% to 30% of their pre-COVID-19 levels, i.e. to the left on the horizontal axis of any 'ready reckoner' plot. As restrictions are eased, contacts will increase, as seen in Figure 1. To keep transmission under control while vaccination rolls out through the eligible population, maintaining R below or around 1 would require a gradual and careful increase in contacts.

Figure 2: 'Ready reckoner' demonstrating how the pattern of effective R values changes as numbers of work and leisure contacts increase, and how that changes with the relative opening of schools (coloured bands) with increasing vaccination roll out. Each box represents another age group protected as a result of vaccination, which is assumed to be instantaneous.

Red band=primary and secondary schools open, yellow=primary schools only open, blue=primary schools partially open, grey band=schools closed. Here, R_0 is assumed to be 4.0; seroprevalence due to naturally acquired immunity is assumed to be 25%; social distancing (during contacts) and COVID security measures reduce transmission per contact by 25%; 20% of onward transmission events are prevented by test, trace, and isolate; children under 11 are assumed to be 25% as infectious as adults and 12- to 18-year olds 50% as infectious; vaccine uptake in low risk groups is 80% and 95% in the oldest age group; and vaccine efficacy against becoming infected is 60% and against onward transmission in those vaccinated but infected is 50%..
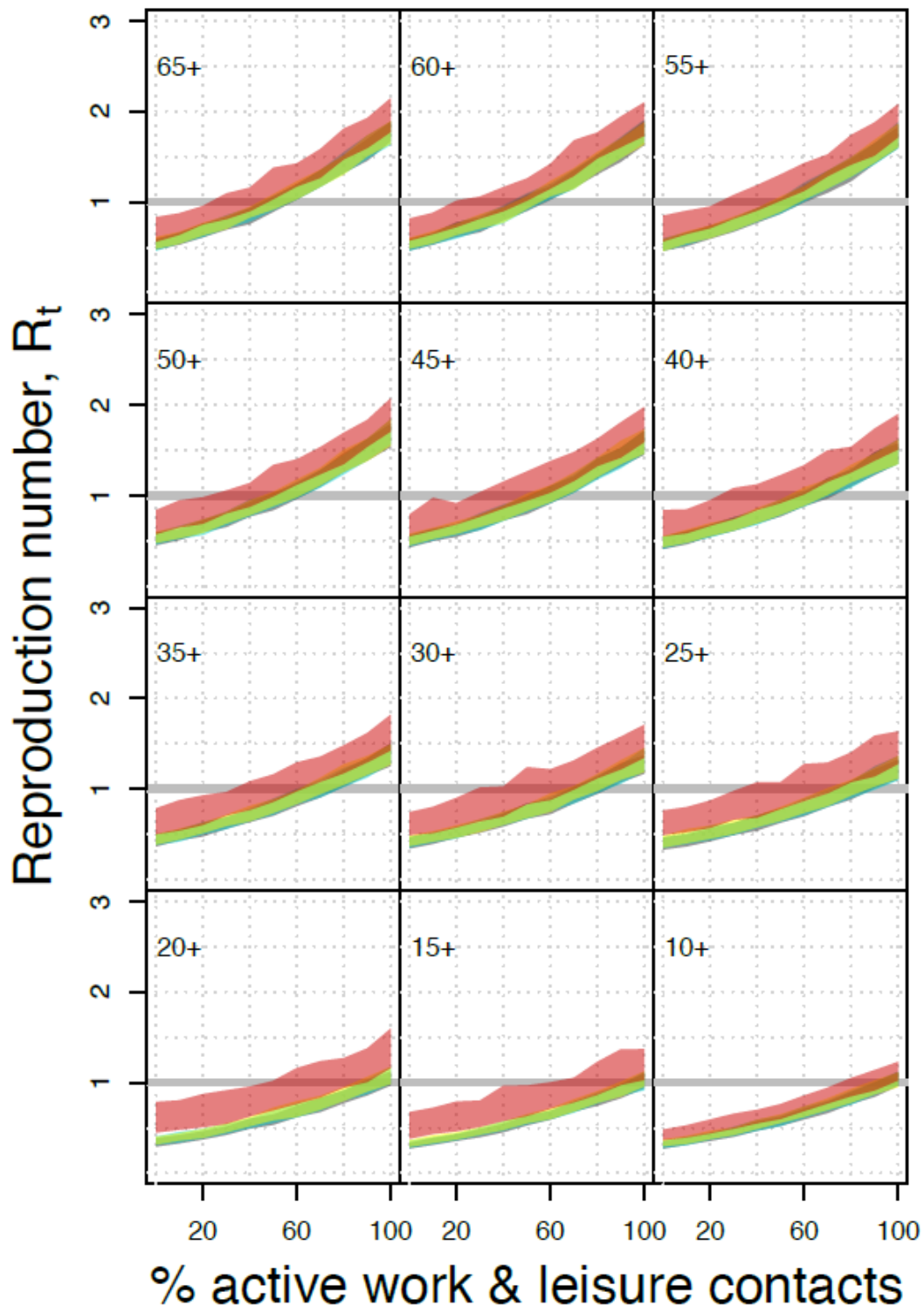
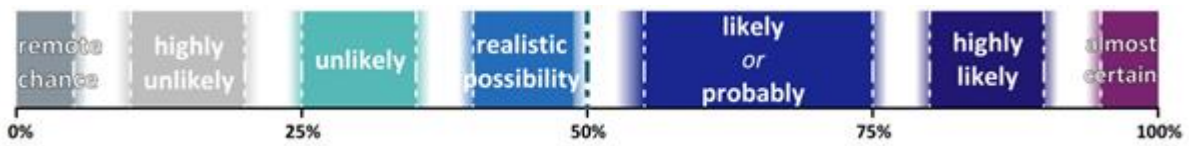# Annex: PHIA framework of language for discussing probabilities

Table 1: Combined estimates of R values and growth rates in the four nations of the UK and NHS England regions (90% confidence interval)[7]

Nation	R	Growth rate per day
England	0.8 to 1.0	-4% to 0%
Scotland*	0.8 to 1.0	-4% to 0%
Wales*	0.6 to 0.9	-6% to -1%
Northern Ireland*	0.8 to 1.0	-3% to 0%

NHS England region	R	Growth rate per day
East of England*	0.7 to 1.0	-6% to -1%
London*	0.8 to 1.0	-5% to 0%
Midlands	0.7 to 1.0	-5% to -1%
North East and Yorkshire	0.8 to 1.0	-4% to 0%
North West	0.8 to 1.0	-4% to 0%
South East*	0.7 to 0.9	-7% to -2%
South West*	0.7 to 1.0	-6% to 0%

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[7] The estimate intervals for R and growth rate may not exactly correspond to each other due to the submission of different independent estimates and rounding in presentation.
* Particular care should be taken when interpreting these estimates as they are based on low numbers of cases or deaths and / or dominated by clustered outbreaks and so should not be treated as robust enough to inform policy decisions alone.

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.
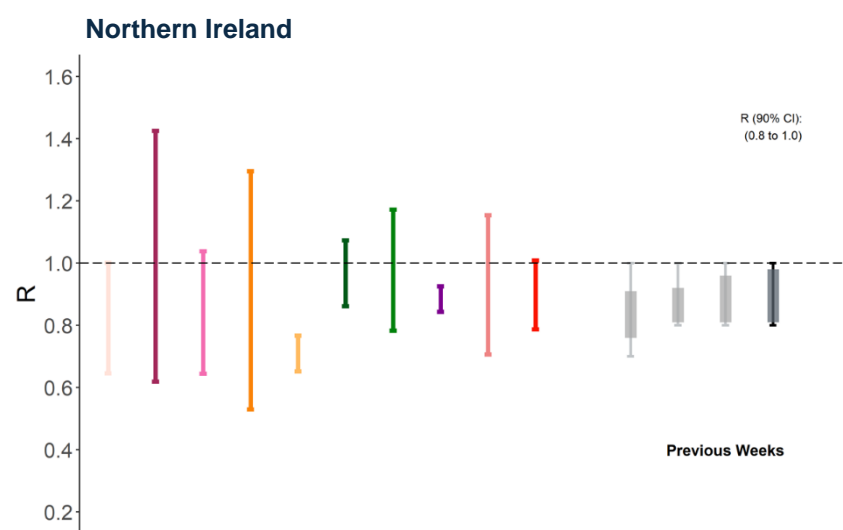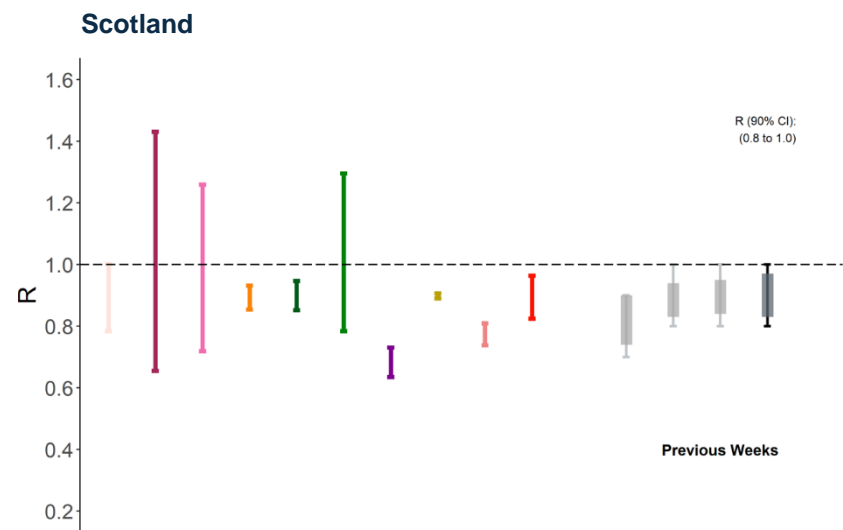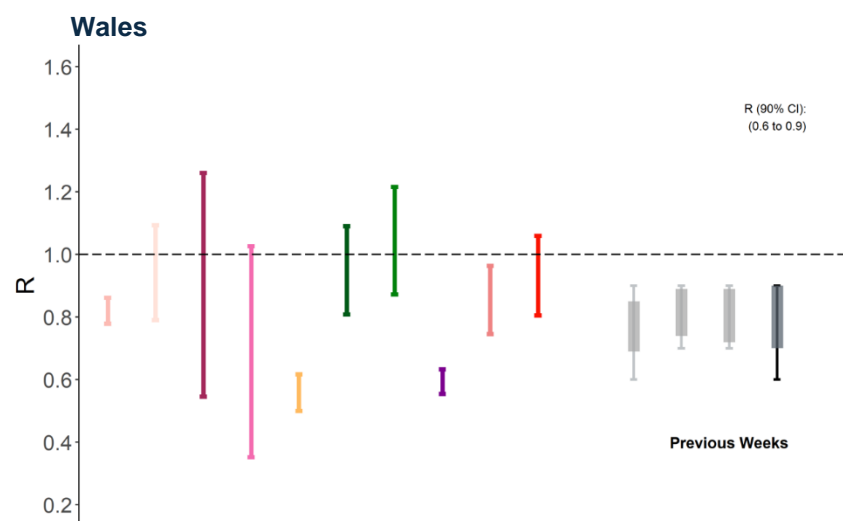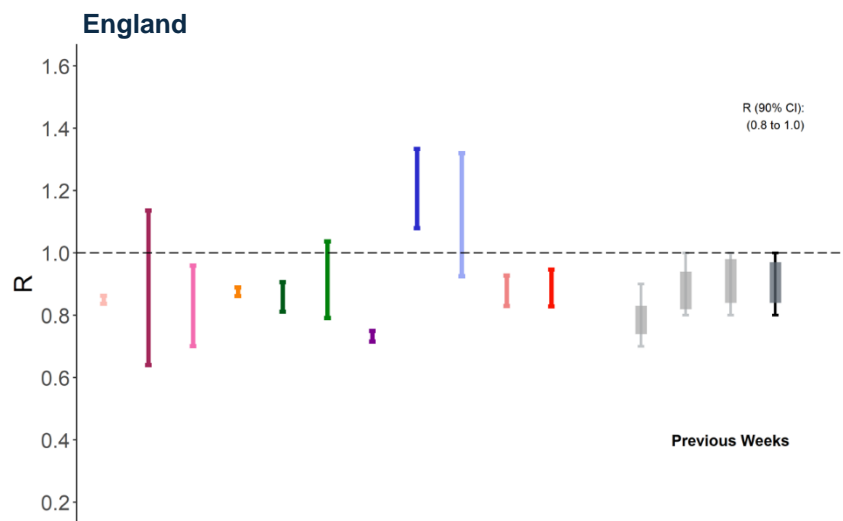
Figure 4: SPI-M-O groups' estimates of the growth rate in NHS England regions, including 90% confidence intervals. Bars represent different modelling groups. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 2 decimal places.
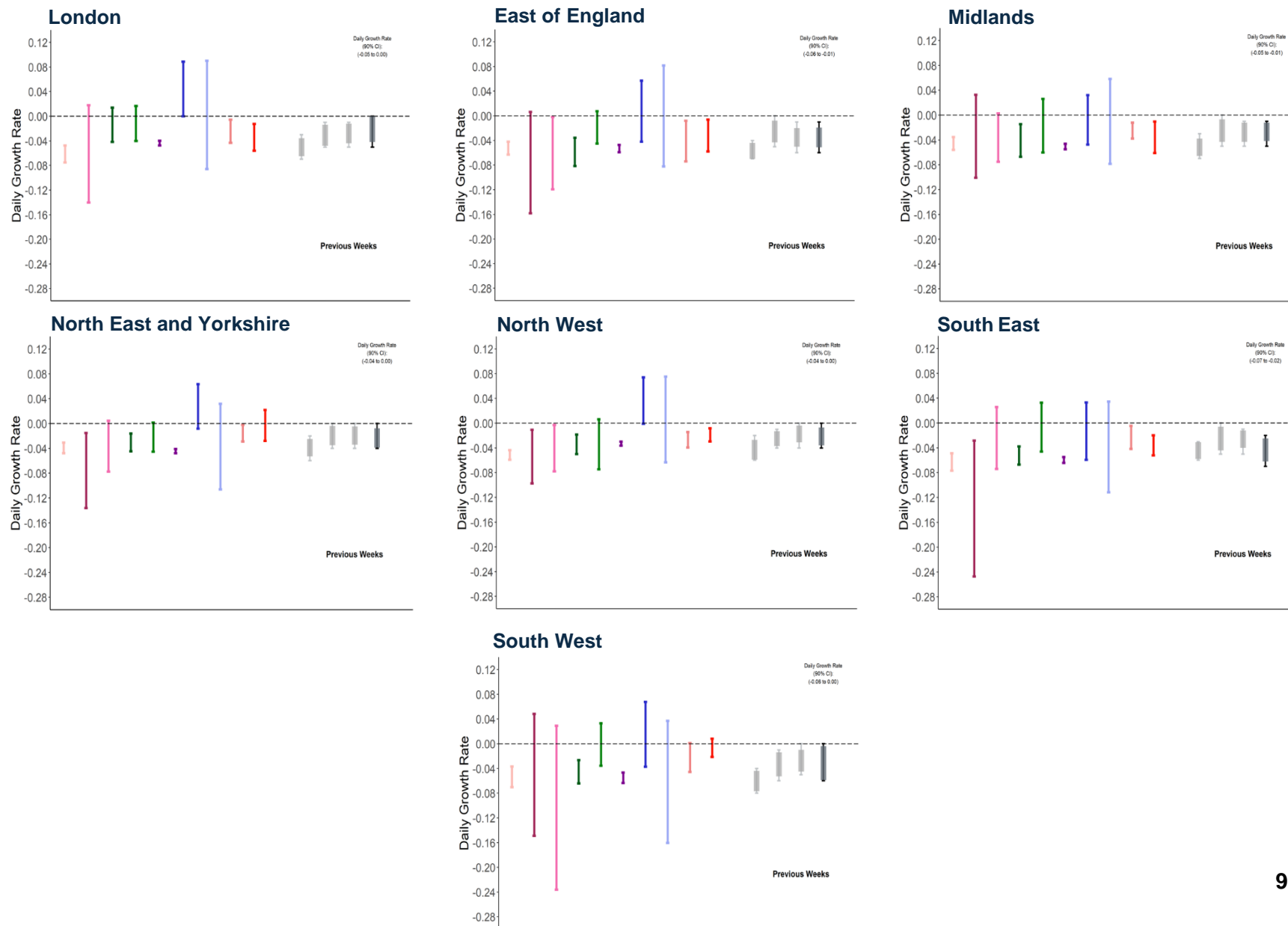
Figure 5: SPI-M-O groups' estimates of median R in the NHS England regions, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 1 decimal place.