

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

*Date: 8<sup>th</sup> July 2020*

## Summary

1. It is highly likely that the overall reproduction number, **R**, in all four nations of the UK has been below 1 in recent weeks. SPI-M-O's best estimate for **the UK is that R remains between 0.7 and 0.9.**
2. The **growth rate** records how quickly the number of infections is changing each day. If the growth rate is greater than zero (i.e. positive), then the number of infections will grow. If the growth rate is less than zero (i.e. negative) then the number of infections will shrink. SPI-M-O's consensus estimate is that **the growth rate per day in the UK is between -5% and -2% per day.**
3. Regional estimates of R and the growth rates per day are 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, for example local outbreaks. Both are average measures and will smooth over outbreaks at small spatial scales or over short periods of time.
4. **Care should be taken when interpreting the R and growth rate estimates for: Scotland, Wales, Northern Ireland, East of England, London, North East and Yorkshire, South East and the South West.** This is because these estimates are based on low case numbers and/ or are dominated by clustered outbreaks.
5. As prevalence of infection falls, national and regional forecasts become less meaningful. It becomes increasingly important to monitor the level of transmission at a local level in order to detect and respond to local outbreaks. Initial modelling by several groups suggests it is possible to detect areas where transmission has exceeded local or regional trends using combined pillar 1 and pillar 2 data. This preliminary work has been shared with the JBC.

## Reproduction number

6. The reproduction number is the average number of secondary infections produced by a single infected individual. R is an average over time, geographies and communities. Whilst it varies in different geographies and settings of the population, separating transmission within and between these sub-populations increases uncertainty.

7. Uncertainty in R increases as the number of infections decrease. SPI-M-O's agreed national estimates of R are summarised in **Table 1** and **Figures 1 and 2**. SPI-M-O's best estimate for **the UK is that R remains between 0.7 and 0.9**. The previous three consensus estimates of R have been included to show the trend in the estimates.
8. **Any changes in transmission patterns that may have occurred in the last two to three weeks will not yet be reflected in the epidemiological data, nor therefore in SPI-M-O's estimates of R.** Furthermore, the latest iterations of the ONS swabbing survey and the CoMix behavioural survey were conducted before the relaxation of social distancing measures on the 4<sup>th</sup> of July. Any changes that have occurred since then will not be reflected in these estimates of R.

## Growth rates

9. Estimates of the growth rate of the epidemic require fewer assumptions and are an inherently less volatile measure although, as with R, uncertainty increases when incidence is low. Reasons for this have been given in previous consensus statements. As with R, SPI-M-O's consensus estimates of the growth rate are based on a statistical combination of estimates from several modelling groups.
10. For small daily changes, the growth rate is approximately the proportion by which the number of infections increases or decreases each day, i.e. the rate at which an epidemic is growing or shrinking<sup>1</sup>.
11. SPI-M-O's consensus estimate is that the epidemic is slowly shrinking in the UK, with a growth rate each day that can be interpreted as -5% to -2% per day. SPI-M-O's agreed national estimates of growth rate are summarised in **Table 1**. Rounding and difference in the models used in the combinations account for differences between estimates of R and growth rates. Such variation highlights the importance of policy makers applying judgement based on these metrics, and not relying solely on their values.

## Regional variation

12. Estimates of R at regional levels are subject to the same difficulties in interpretation as national estimates, and these are amplified due to the smaller numbers of cases. Publishing several estimates increases the statistical chance that one of them is high by

---

<sup>1</sup> The growth rate,  $\lambda e^{\lambda t}$  is the slope of the exponential curve  $y = e^{\lambda t}$ , where  $y$  is the number of new infections, and  $t$  is time, given in days. This approximates to  $\lambda$  for small values of  $t$ .

chance. SPI-M-O does not have confidence that regional R estimates are sufficiently robust to inform regional policy decisions.

13. Consensus estimates for the regional growth rates per day in England are also given in **Table 1** and **Figure 3**. For completeness, consensus regional estimates of R for England are given in **Table 1** and **Figure 4**, some of the ranges of R include 1.

### Reliability of R and growth rates

14. R becomes an unreliable measure for deciding policy when case numbers fall to low levels, there is variability in estimates from different data streams or there is high degree of variability in transmission, for example due to a localised outbreak.
15. SPI-M-O's provisional framework suggests that **care should be taken when interpreting the R and growth rate estimates for: Scotland, Wales, Northern Ireland, East of England, London, North East and Yorkshire, South East and the South West**. This is because these estimates are based on low case numbers and/ or clustered outbreaks.
16. **SPI-M-O recommends these estimates are published alongside the following wording "care should be taken when interpreting these estimates as they are based on low incidence and/or clustered outbreaks within this area"**.

### Incidence

17. The relationship between infection, symptoms, swab positivity, hospitalisation and death is becoming clearer, but uncertainties remain in estimating the number of new daily infections.
18. Combined estimates from four SPI-M models give a 90% confidence interval of 2,800-11,100 new infections per day in England.
19. Data from the ONS swabbing survey between 22<sup>nd</sup> June and 5<sup>th</sup> July estimate that an average of 14,000 people in the community in England (confidence interval 5,000 to 31,000) would have swabbed positive for SARS-CoV-2 during this time period. The study estimates that between 22<sup>nd</sup> June and 05<sup>th</sup> July, incidence was 0.02 new infections per 100 people followed for 1 week, with a confidence interval of 0.01 to 0.05. Although ONS's survey can directly estimate incidence, it is based on a very small number of positive tests.

### Short term forecasts

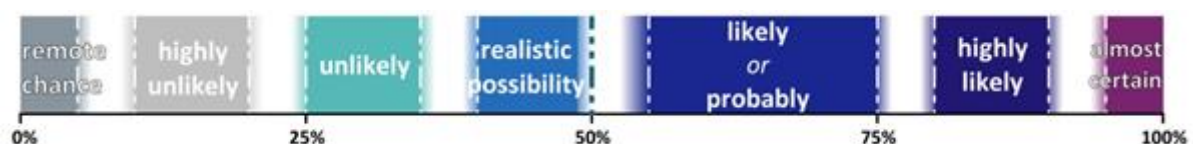
20. As the incidence of COVID-19 reduces, it becomes more difficult and less useful to produce forecasts for the epidemic at a national or regional level. Hospital bed occupancy

and the daily number of deaths have declined substantially across all nations and regions of the UK. Hospital-based utilisation data are being revised and analysed. **Therefore, SPI-M-O recommends that work on the short-term forecasts of hospital bed occupancy is paused, to be restarted if there is a significant increase in transmission.** SPI-M-O will revisit this on a regular basis and some groups will continue to produce forecasts of deaths as part of their regular work.

### Local monitoring and detecting hotspots

21. As national and regional forecasts become more difficult, it becomes increasingly important to monitor the level of transmission at a local level in order to detect and respond to local outbreaks, and to detect national resurgence.
22. Initial modelling by several groups suggests it is possible to detect areas where transmission has exceeded local or regional trends using combined pillar 1 and pillar 2 data. This type of modelling can be used to flag areas of interest, with more detailed analysis being required to understand the reasons for any apparent increases in transmission and determine the appropriate response. This preliminary work has been shared with the JBC.
23. Data for England is currently available at LTLA level. More work should be carried out to determine whether this is most appropriate geographic level to monitor transmission, with there being a trade-off between geographic areas being small enough to detect an outbreak and large enough to ensure results are robust. The number of cases being recorded in a local area is partly determined by the number of tests conducted. Furthermore, knowing why a test was conducted, e.g. whether through symptomatic individuals coming forward for tests, or through routine workplace testing, would provide valuable information that could be used improve our ability to detect hotspots. The testing effort and behaviour data are needed to enable better interpretation of patterns of cases.

### Annex: PHIA framework of language for discussing probabilities



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

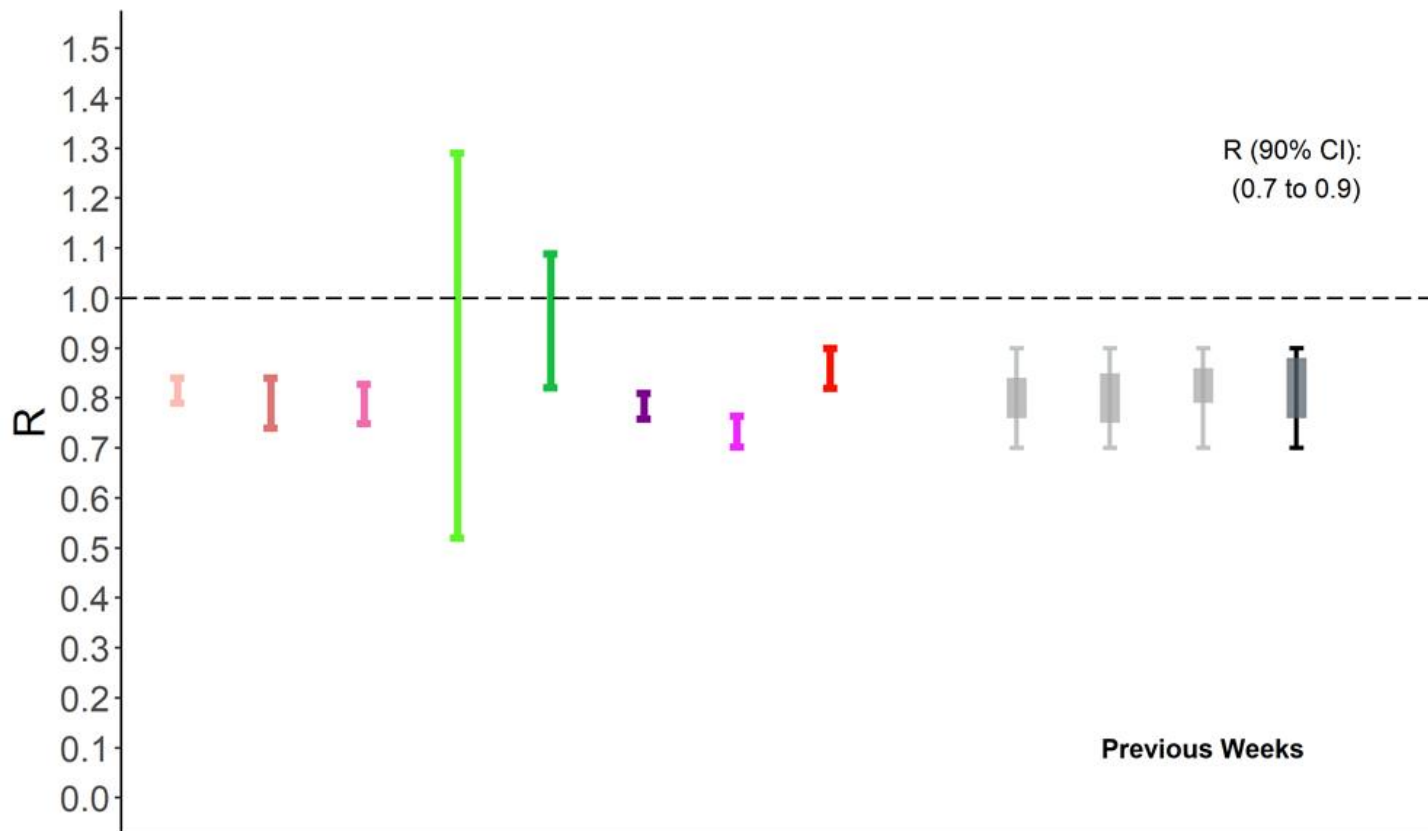
<b>Nation</b>	<b>R</b>	<b>Growth rate per day</b>
<b>England</b>	0.8 – 1.0	-4% to -1%
<b>Scotland*</b>	0.6 – 1.0	-8% to +1%
<b>Wales*</b>	0.7 – 1.0	-6% to +2%
<b>Northern Ireland*</b>	0.5 – 0.9	-8% to +1%
<b>UK</b>	<b>0.7 – 0.9</b>	<b>-5% to -2%</b>

<b>NHS England region</b>	<b>R</b>	<b>Growth rate per day</b>
<b>East of England*</b>	0.7 – 1.0	-4% to +1%
<b>London*</b>	0.7 – 1.0	-5% to +1%
<b>Midlands</b>	0.7 – 0.9	-6% to -2%
<b>North East and Yorkshire*</b>	0.7 – 1.0	-5% to -1%
<b>North West</b>	0.7 – 1.0	-5% to -1%
<b>South East*</b>	0.8 – 1.0	-4% to 0%
<b>South West*</b>	0.7 – 1.1	-6% to +1%

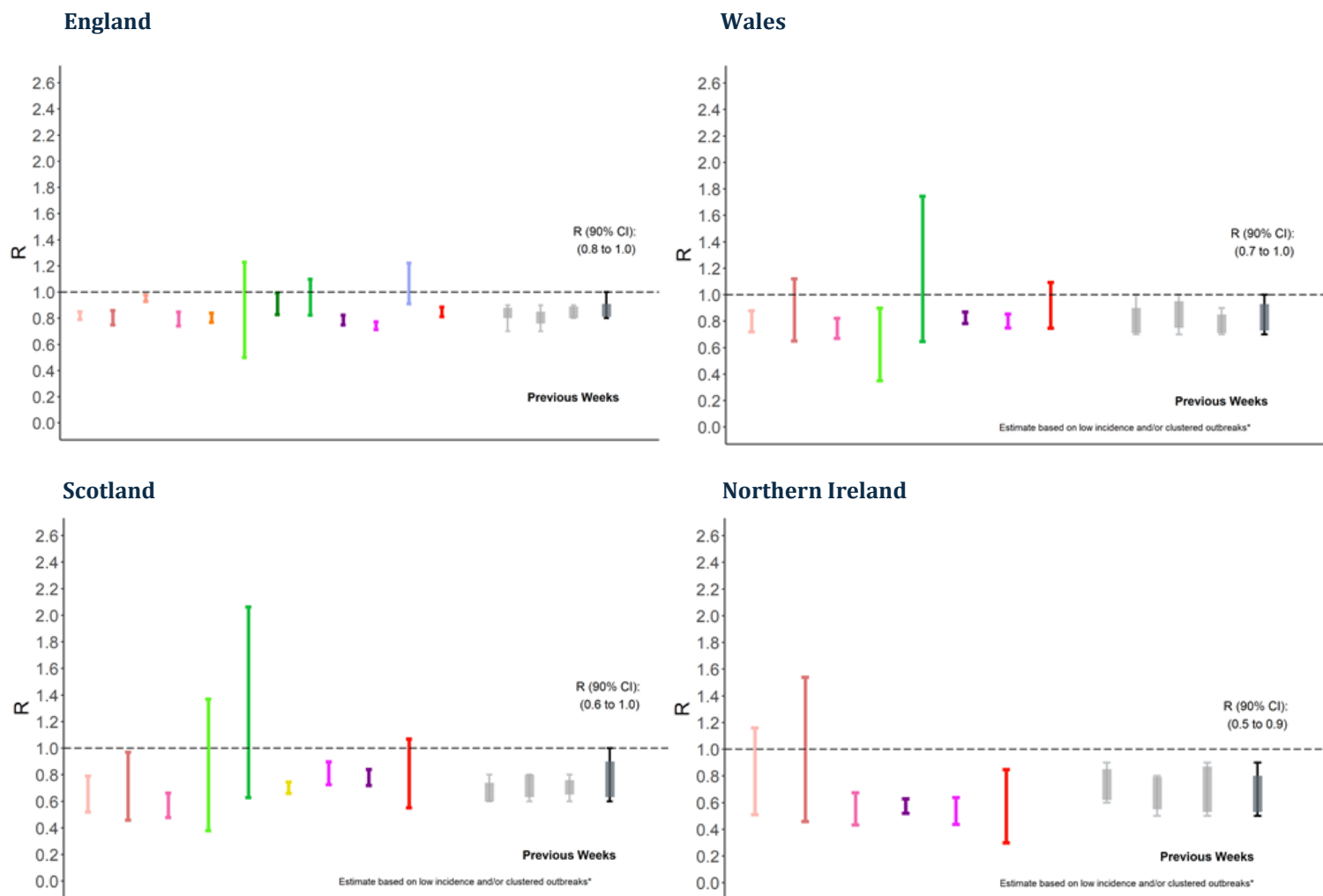
\*Care should be taken when interpreting these estimates as they are based on low incidence and/or clustered outbreaks within this area.

**Figure 1:** SPI-M 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.

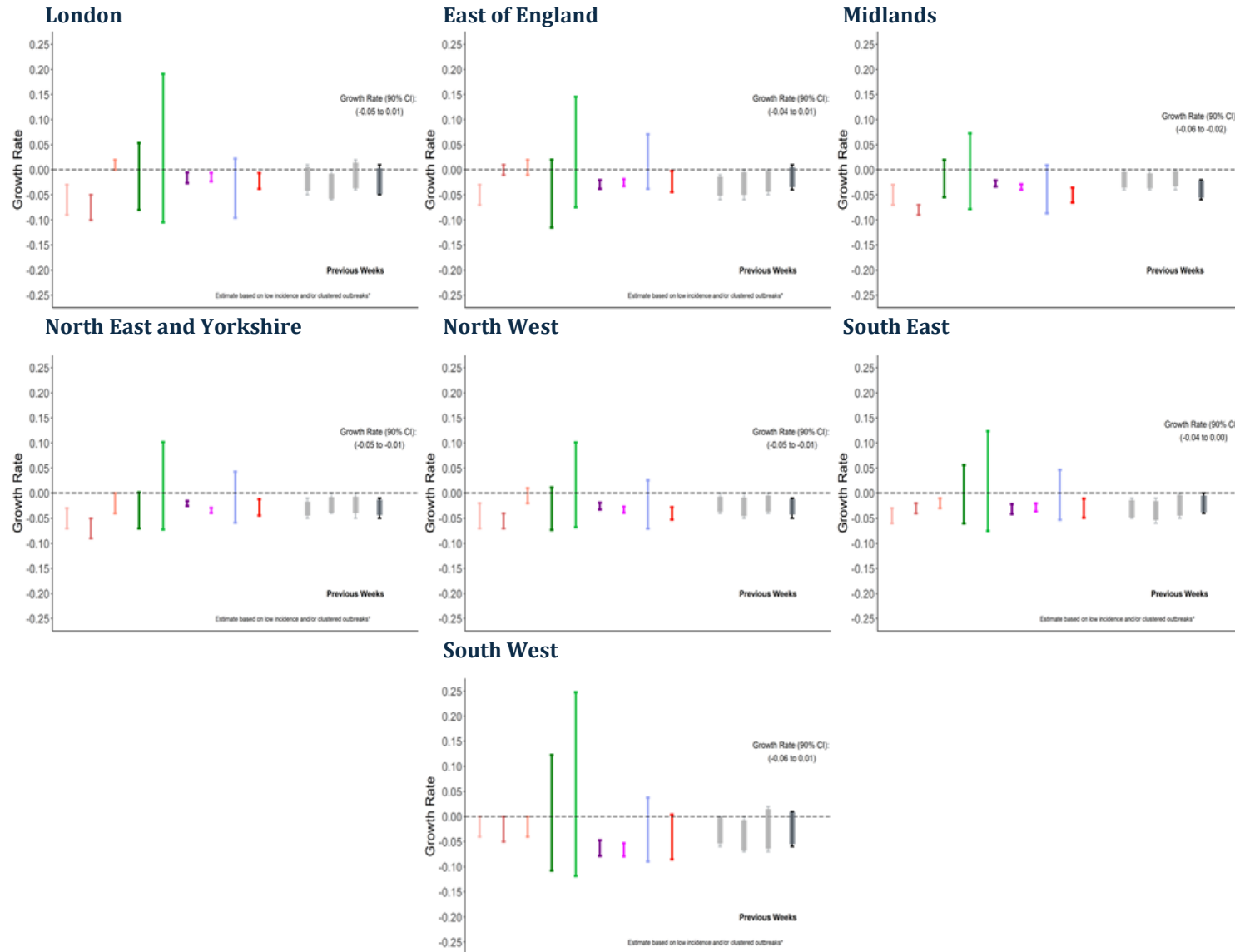
## UK



**Figure 2:** SPI-M 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 3:** SPI-M 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 4:** SPI-M 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.

