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

Date: 24ᵗʰ June 2020

Summary

1. It is highly likely that the overall reproduction number, **R**, in all four nations of the UK is below 1. 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 in the UK is between -2% and -4% per day**.

3. Regional estimates of R and the growth rate are less reliable and less useful in determining the state of the epidemic at smaller spatial scales. R is an average measure and will smooth over outbreaks at very small spatial scales. There is no strong evidence of systematic regional variation in how the epidemic is growing or shrinking.

4. Given low numbers of infections in the devolved administrations and some regions of England, there is growing uncertainty in estimates of R and growth rate for these areas and they are now less useful indicators of the epidemic. SPI-M-O are formalising proposals for when they consider R to no longer be useful for decision makers and believe that this point is close, especially in the devolved administrations.

5. Any changes in transmission that may have occurred in the past two to three weeks will not yet be reflected in health system data, nor therefore in SPI-M-O's estimates of R or growth rates.

6. It is essential that NHS Test and Trace monitor the proportion of cases identified by contact tracing who are not in known chains of transmission. Cases that are not part of known chains or connected to known outbreaks are indicative of covert transmission

Reproduction number

7. 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.

8. Estimates of R are dependent on differences in modelling methodology (particularly around the assumed distribution of the generation interval, the data sources used, the time frame considered, and the estimation framework) and will always carry some level of uncertainty. SPI-M-O's approach is for different modelling groups to estimate R independently to reflect this inherent uncertainty, then combine them using a random / mixed effects model with equal proportion weights, and to agree a consensus. The methodology for this combination is continuously scrutinised and developed.

9. Uncertainty in R increases as the number of infections decrease, or when it is evaluated for a smaller population, such as for the devolved administrations and regions. 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.

10. **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**. Other data sources, however, may provide more timely indications of changes in transmission, such as the ONS swabbing survey and the CoMix behavioural survey that studies how contact patterns are changing over time.

11. The latest results from the CoMix behavioural survey suggest there continues to be an increase in the number of contacts people are making. It is possible that the nature of contacts has changed compared to the start of the epidemic so it is unclear how increases in movement might impact transmission.

Growth rates

12. Estimates of the growth rate of the epidemic require fewer assumptions and are an inherently less volatile measure, although as with R, they are less useful when incidence is low. Reasons for this have been given in previous consensus statements.

13. 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[1].

14. 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.

15. SPI-M-O's consensus estimate is that the epidemic is slowly shrinking in the UK, with a growth rate which can be interpreted as -2% to -4% per day. SPI-M-O's agreed national estimates of growth rate are summarised in **Table 1**.

Regional variation

16. Estimates of R at regional levels are subject to the same difficulties in interpretation of 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 chance. SPI-M-O does not have confidence that regional R estimates are sufficiently robust to inform regional policy decisions.

17. Consensus estimates for the regional growth rates per day in England are also given in **Table 1** and **Figure 3**. They show that **there is little regional variation in growth rates**. It is highly likely that the epidemic is shrinking in all regions.

18. For completeness, consensus regional estimates of R for England are given in **Table 1** and **Figure 4.** Some of these ranges of R include 1; this does not necessarily mean the epidemic is increasing in that region, just that the uncertainty means that this cannot be ruled out. It is also possible that an outbreak in one specific place could result in an R above 1 for the whole region.

19. Any changes in transmission patterns that may have occurred in the last two to three weeks will not yet be reflected in estimates of R. However, the CoMix contacts survey is a

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[1] The growth rate, λ, 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

more timely indicator as it is based on behaviour changes. The latest results from the CoMix survey indicate higher contact rates in the North West than in other regions. This should be monitored carefully over coming weeks.

Incidence

20. The relationship between infection, symptoms, swab positivity, hospitalisation and death is becoming clearer, but uncertainties remain in estimating the number of new daily infections.

21. Modelled estimates of incidence are generally higher than those from the ONS swabbing surveys. The reason for this is not yet clear. It is likely to be partly explained by the fact that the ONS survey does not include care homes or hospitals, where infection rates are higher than the general population. It is also possible that the data streams available to SPI-M-O are biased towards health and social care associated infections. Further data to disentangle the relationship between transmission in different settings is required. Although combined estimates from 3 SPI-M models give a 90% confidence interval of 5,300-14,500 new infections per day in England, SPI-M has low confidence in this assessment.

22. Data from the ONS swabbing survey between 8th June and 21st June estimate that an average of 51,000 people in the community in England (confidence interval 21,000 to 105,000) would have swabbed positive for SARS-CoV-2 during this time period. The study estimates that between 8th June and 21st June, incidence was 0.041 new infections per 100 people followed for 1 week, with a confidence interval of 0.019 to 0.090. Although ONS's survey can directly estimate incidence, it is based on a very small number of positive tests.

23. It is also essential that NHS Test and Trace monitor the proportion of cases identified by contact tracing who are not in known chains of transmission. Not all cases are equal – the implication of, and response to, an outbreak will differ if these are independent cases or if they are clustered (e.g. infected at the same location).

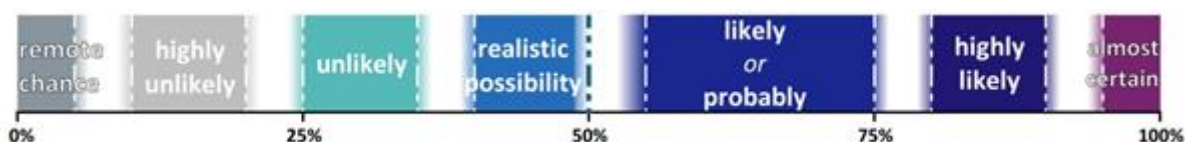## Annex: PHIA framework of language for discussing probabilities

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

Nation	R	Growth rate per day
England	0.7 – 0.9	-5% to -2%
Scotland	0.6 – 0.8	-8% to +2%
Wales	0.7 – 1.0	-7% to +3%
Northern Ireland	0.5 – 0.8	-6% to -3%
UK	**0.7 - 0.9**	**-4% to -2%**

NHS England region	R	Growth rate per day
East of England	0.7 – 0.9	-6% to 0%
London	0.6 – 0.9	-6% to 0%
Midlands	0.7 – 0.9	-4% to 0%
North East and Yorkshire	0.7 – 0.9	-4% to 0%
North West	0.7 – 1.0	-5% to 0%
South East	0.7 – 0.9	-6% to -1%
South West	0.6 – 0.9	-7% to 0%

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.
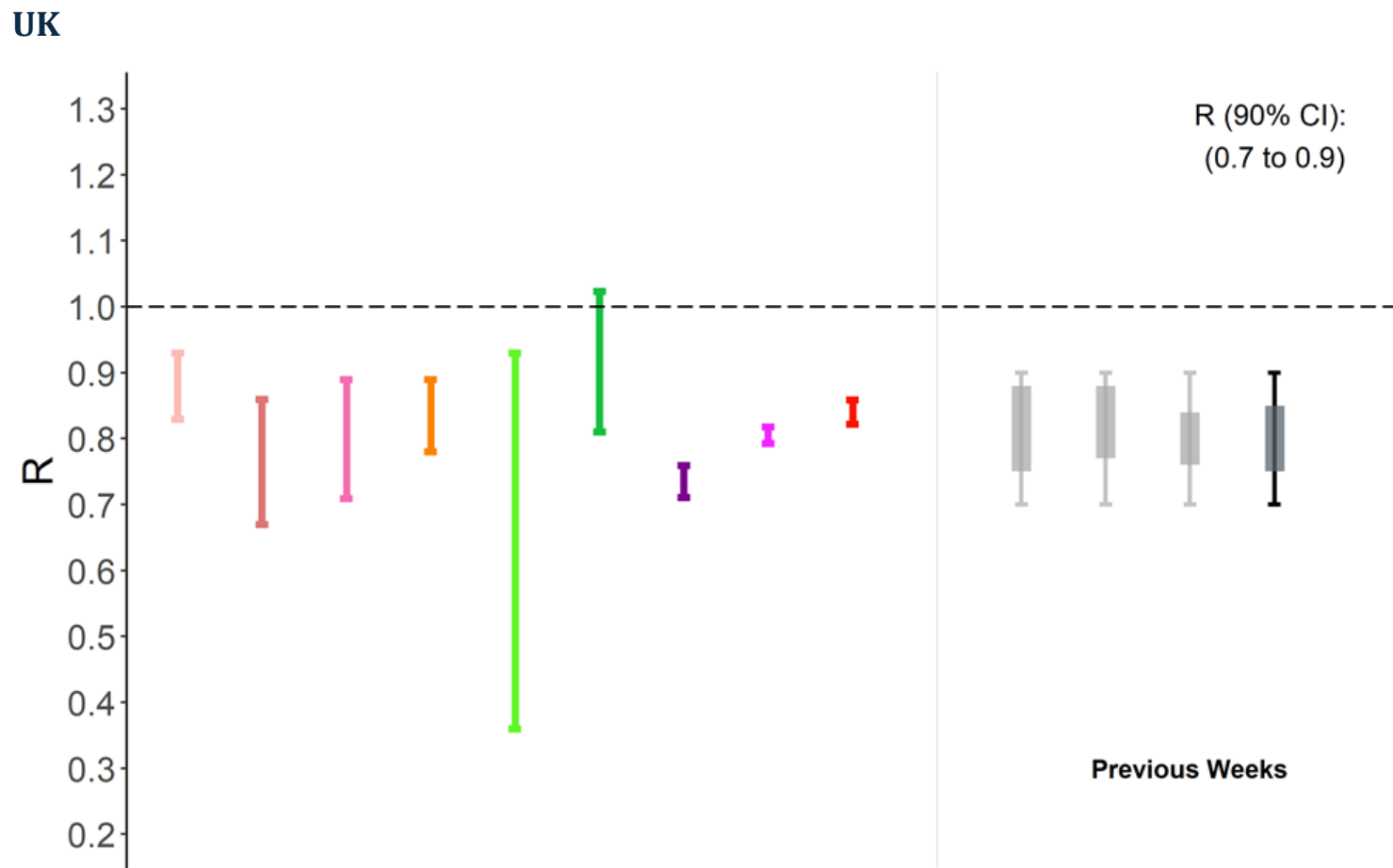
Figure 2: SPI-M groups estimates of median R in the four nations of the UK, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 1 decimal place.
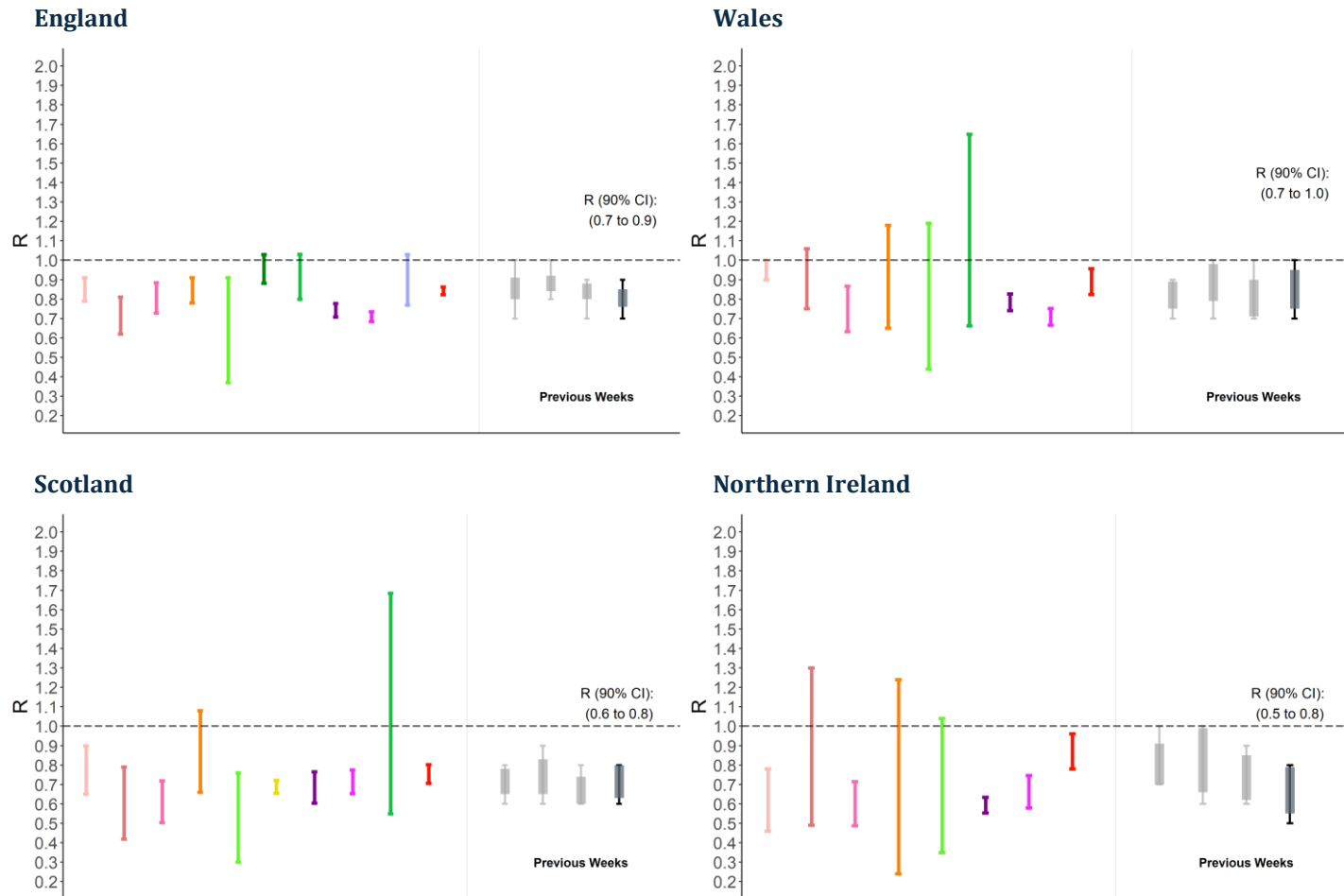
Figure 3: SPI-M groups estimates of the growth rate in English NHS regions, including 90% confidence intervals. Bars represent different modelling groups. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 2 decimal places.
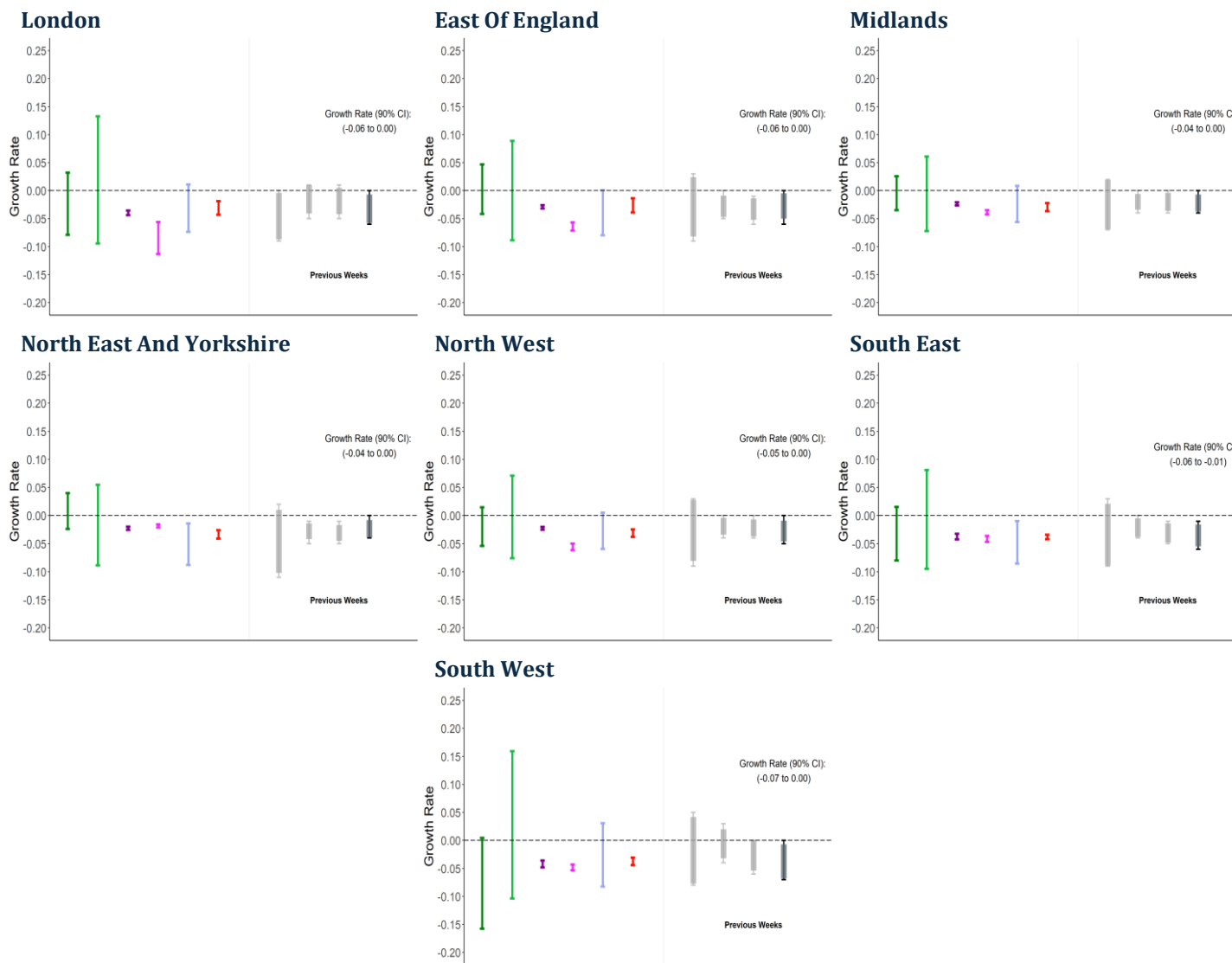
Figure 4: SPI-M groups estimates of median R in the English NHS regions, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 1 decimal place.