

Note added for publication

This paper contains estimates of the reproduction number (R) for the UK and four nations.

R is an average value that can vary in different parts of the country, communities, and subsections of the population. It cannot be measured directly so there is always some uncertainty around its exact value. Estimates for Scotland, Wales, and Northern Ireland are subject to greater uncertainty given the lower number of cases and increased variation.

Different modelling groups use different data sources to estimate R using complex mathematical models that simulate the spread of infections. Some may even use all these sources of information to adjust their models to better reflect the real-world situation. There is uncertainty in all these data sources, which is why R estimates can vary between different models, and why we do not rely on one model; evidence is considered, discussed and R is presented as a range.

Given wide uncertainty ranges, it should not be concluded from estimates in this paper that R is higher or lower in different nations.

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

Date: 27th May 2020

Summary

1. SPI-M-O's best estimate is that the overall reproduction number, R_t , in the UK is between 0.7 and 0.9. The change from last week is due to methodological improvements. It does not imply that R_t has dropped.
2. There is no evidence of R_t being different in the different nations of the UK. There is, however, greater uncertainty in the estimates for Scotland, Wales, and Northern Ireland due to the smaller numbers of cases and deaths.
3. Any changes in transmission that may have occurred in the past two to three weeks will not yet be reflected in clinical data, nor therefore in SPI-M-O's estimates of R_t .

Reproduction number

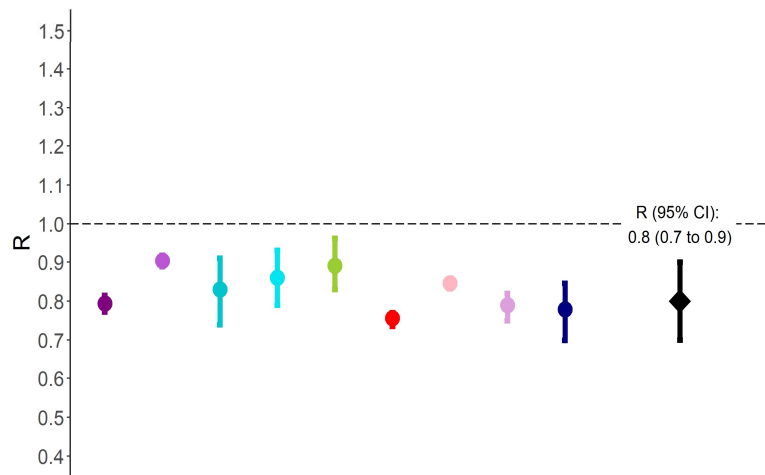
4. The reproduction number is the average number of secondary infections produced by a single infected individual. R_t is an average over time, geographies and communities. Whilst it varies in different parts of the of the population, separating out transmission within and between these parts increases uncertainty.
5. There are three settings which are particularly relevant to the current situation: the community, care homes, and hospitals. These are not independent; infection can be spread between hospitals and care homes, from these settings back into the community, and vice versa. These cannot be captured though estimating R_t separately for care homes and hospitals. **SPI-M-O recommends that the situation in particular settings is not**

monitored using R_t , but rather in terms of how the number of cases and deaths in them is changing and, where possible, epidemiological investigation of how the three epidemics interact.

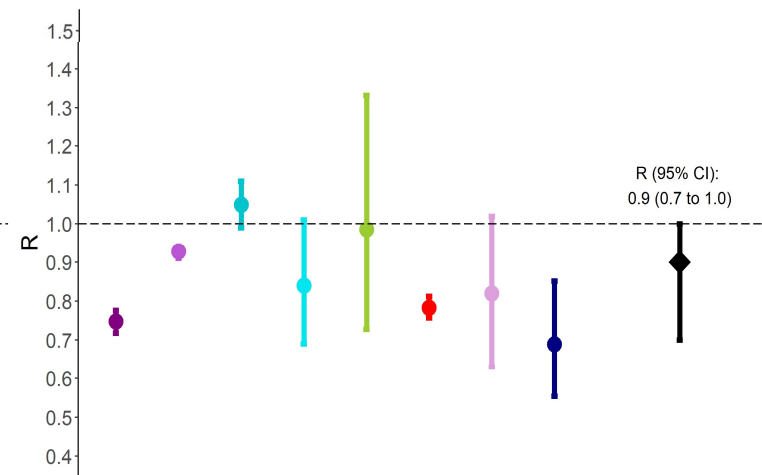
6. Estimates of R_t are dependent on differences in modelling methodology (particularly around the assumed values of the generation time, the data sources used, the time frame considered, and the estimation framework) and will always carry some level of uncertainty. SPI-M-O's approach is for different modelling groups to estimate R_t independently to reflect this inherent uncertainty, then combine them using a random / mixed effects model with equal proportion weights, and to agree a consensus.
7. Any changes in transmission patterns that may have occurred in the last two to three weeks will not yet be reflected in the clinical data, nor therefore in SPI-M-O's estimates of R_t .
8. Uncertainty in R_t increases as numbers of infections drop, or when it is evaluated for a smaller population, such as for the devolved administrations. SPI-M-O agreed estimates of R_t are summarised in **Figure 1**.
9. SPI-M-O's consensus view is that the overall **R_t in the UK is between 0.7 and 0.9**.
10. SPI-M-O's consensus view is that the overall **R_t in England is between 0.7 and 0.9**.
11. SPI-M-O's consensus view is that the overall **R_t in Scotland is between 0.7 and 0.9**.
12. SPI-M-O's consensus view is that the overall **R_t in Wales is between 0.7 and 1.0**.
13. SPI-M-O's consensus view is that the overall **R_t in Northern Ireland is between 0.7 and 1.0**.
14. Without a highly effective system of testing, tracing and isolating, there is little headroom for loosening measures without R_t returning above 1.
15. The most recent data from London School of Hygiene and Tropical Medicine's COMIX study were predominantly collected between 17th and 21st May. This concurs that R_t remains below 1. The COMIX estimate has increased slightly, which may be a result of a change in methodology leading to inclusion of a very small number of retail workers with a very large number of contacts (> 100).
16. Epidemiological studies to estimate the generation time (from observation of serial intervals) in the UK are urgently required to better understand the epidemic and especially the reproduction number.

17. Due to a technical problem at ONS, a full update from their swabbing survey was not available for this SPI-M-O meeting. There is no evidence of a change in prevalence while this survey has been running.

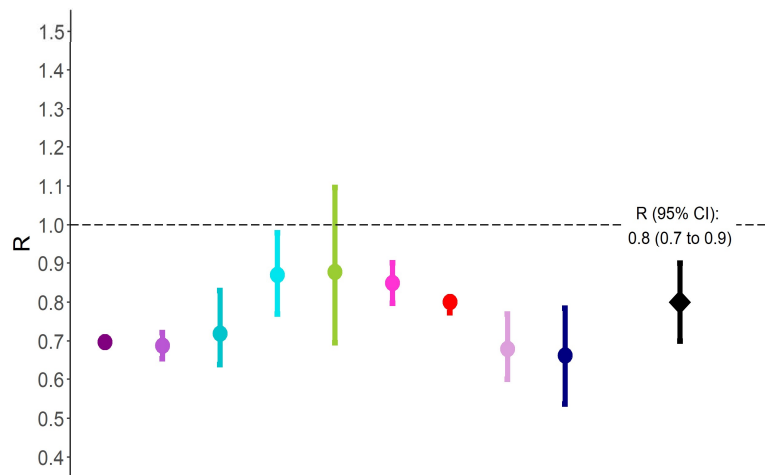
England



Wales



Scotland



Northern Ireland

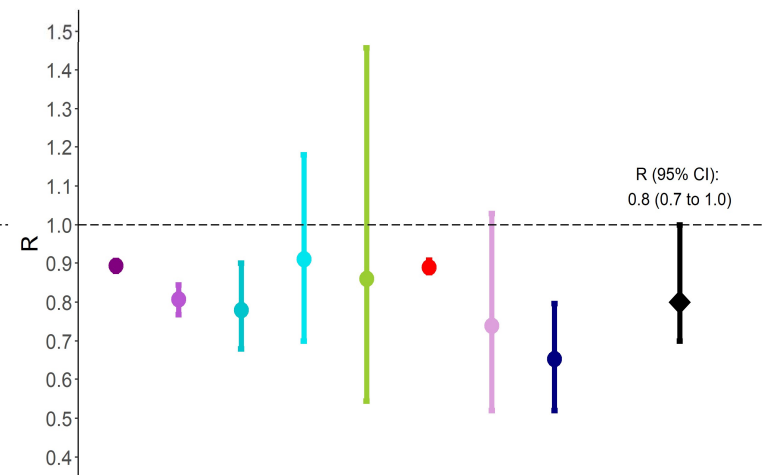


Figure 1: SPI-M groups estimates of median R_t by nation, including 95% confidence intervals. Bars represent different modelling groups. Black bars are combined estimates.

Note added for publication: Please note that the midpoint of the combined estimate is the mean of the distribution from the meta-analysis, not SPI-M-O's assessment of the most likely value.

UK

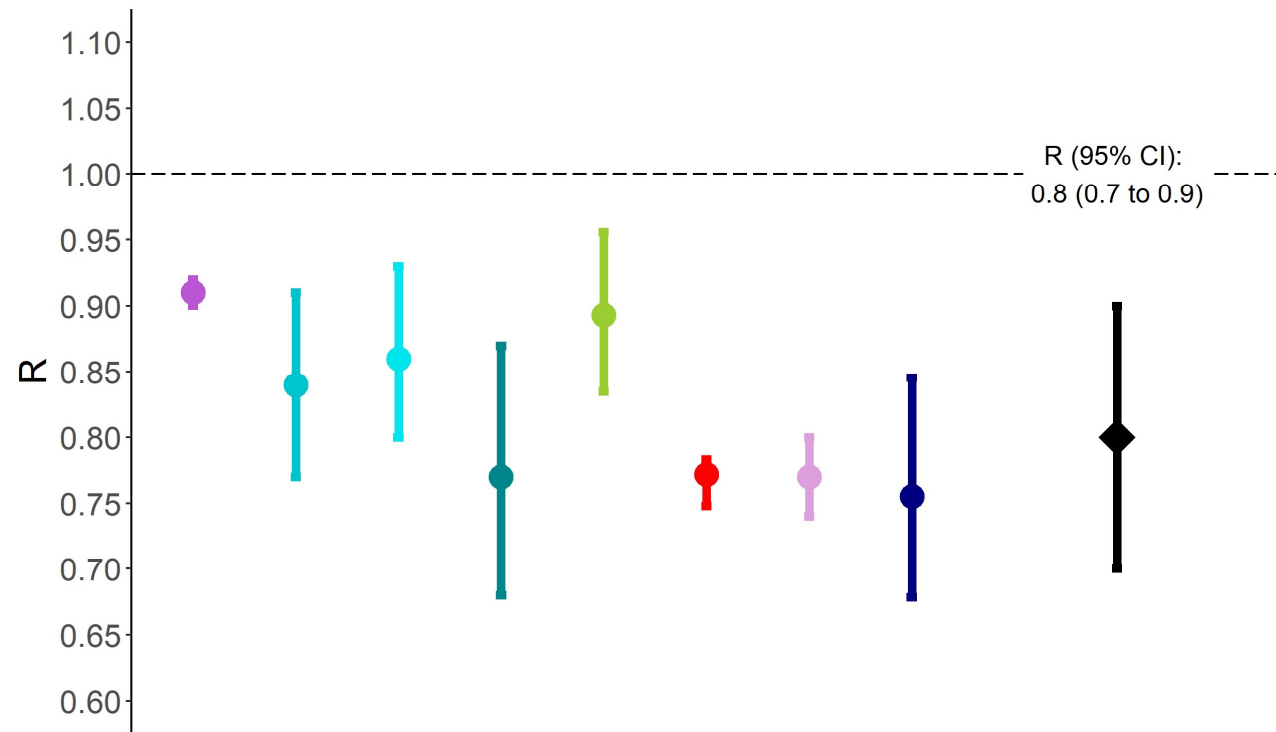


Figure 2: SPI-M groups estimates of median R_t in the UK, including 95% confidence intervals. Bars represent different modelling groups. Black bars are combined estimates.

Note added for publication: Please note that the midpoint of the combined estimate is the mean of the distribution from the meta-analysis, not SPI-M-O's assessment of the most likely value.