

Epidemiology Modelling Review Group: consensus statement on COVID-19

Date: 11 August 2021

Introduction

The UK Health Security Agency (UKHSA) Epidemiology Modelling Review Group (EMRG) shares this consensus statement on coronavirus (COVID-19) with acknowledgment to the Scientific Pandemic Influenza Group on Modelling Operational sub-group (SPI-M-O) who have developed and shared modelling methodologies and contribute model outputs to these combined estimates.

All probability statements are in line with the framework given in Annexe A.

Summary

- 1. The UKHSA's best estimate for R in England is between 0.8 and 1.0. R is estimated to be between 0.7 and 0.9 for Scotland, 0.8 and 1.0 for Wales, and 0.8 and 1.1 for Northern Ireland (<u>Figure 1</u>). These estimates are based on models¹ fitted to data available up to 9 August 2021, including hospitalisations, deaths, testing, wastewater samples and longitudinal studies.
- 2. Combined estimates² show that the incidence³ is between 35,000 and 64,000 new infections per day in England.

Incidence and prevalence

- 3. During its most recent week (ending 7th August), the ONS Covid infection survey estimates⁴ that an average of 726,700 people had COVID-19 in the community in England (95% credible interval 679,300 to 777,800). The survey does not include people in care homes, hospitals, or prisons. Estimates from across the 4 nations of the UK are:
 - England 726,700 (95% credible interval 679,300 to 777,800)
 - Scotland 28,100 (95% credible interval 20,300 to 37,800)
 - Wales 14,100 (95% credible interval 8,900 to 20,500)
 - Northern Ireland 34,400 (95% credible interval 25,600 to 44,600)

Growth rate and reproduction number

4. For small daily changes, the growth rate is approximately the proportion by which the number of infections increases or decreases per day, that is, the speed at which an epidemic is growing or shrinking.⁵

¹ Model estimates are required as quantities such as the Reproduction Number (R) are not directly observable. Instead, a variety of independently produced models are used to interpret the data and estimate R.

² Different nations and regions may use different sets of models for these estimates; hence caution should be applied in drawing direct comparisons. Fewer models produce estimates for Wales and Northern Ireland.

³ The number of new infections per day.

⁴ These estimates can be subject to revision as further information is available and modelled.

⁵ Further Technical Information on the growth rate can be found in Plus Magazine: <u>The growth rate of COVID-19</u> plus.maths.org.

- 5. EMRG's consensus estimates for the growth rates in the 4 nations are (90% credible interval):
 - England is between -4% to 0% per day
 - Scotland is between -4% to -1% per day
 - Wales is between -4% to 0% per day
 - Northern Ireland is between -2% to +1% per day

National and regional estimates of growth rates are summarised in Figure 1 and Figure 2.

- 6. The reproduction number (R) is the average number of secondary infections produced by a single infected individual; it is an average over time, geographies, viral variants, and communities.
- 7. UKHSA's best estimate for R in England is between 0.8 and 1.0. R is estimated to be between 0.7 and 0.9 for Scotland, 0.8 and 1.0 for Wales, and 0.8 and 1.1 for Northern Ireland. UKHSA's agreed national estimates are summarised in Table 1 and <u>Figure 1</u>, and these are based on the latest data available up to 9 August 2021⁶.
- 8. R is an indicator that lags by two to three weeks, ⁷ due to the time required for changes to be seen in data streams.
- 9. This inherent lag means that recent fluctuations should not be expected to be consistent with these estimates.

⁶ Different models fit to different windows of time using different methodologies, hence not all models will fit up to this precise date.

⁷ Different data-streams and different models are expected to be lagged in their estimates by different amounts when compared with the true underlying epidemiological situation. This is due to multiple lags such as reporting and delays in the infection processes. However, the consensus combination generally reflects a 2-week lag.

Table 1. Combined estimates of R values growth rates and doubling times in the 4 nations of the UK and NHS England regions (90% credible interval)⁸

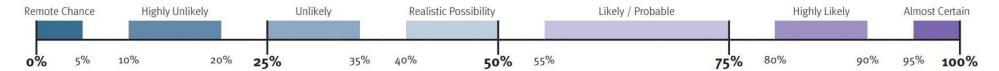
Nation	R	Daily growth rate	Doubling time ⁹
England	0.8 to 1.0	-4% to 0%	Flat to -22 days
Scotland	0.7 to 0.9	-4% to -1%	Flat to -17 days
Wales	0.8 to 1.0	-4% to 0%	Flat to -22 days
Northern Ireland	0.8 to 1.1	-2% to +1%	-34 days to flat
NHS England region	R	Daily growth rate	Doubling time ⁸
East of England	0.8 to 1.1	-3% to +1%	-31 days to flat
London	0.8 to 1.0	-3% to 0%	Flat to -31 days
Midlands	0.8 to 1.0	-3% to +1%	-28 days to flat
North East and Yorkshire	0.8 to 1.0	-3% to 0%	Flat to –23 days
North West	0.8 to 1.0	-4% to 0%	Flat to –21 days
South East	0.8 to 1.0	-4% to +1%	-20 days to flat
South West	0.8 to 1.1	-3% to +1%	-26 days to flat

⁸ The estimated 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.

⁹ Any estimates with a halving or doubling time of more than 40 days have been described as flat. Negative values of doubling time indicate a halving time (the time expected for cases to fall by 50%). Doubling time here is calculated using the growth rate.

Annexe A. PHIA framework of language for discussing probabilities

The yardstick splits the probability scale into 7 ranges from remote chance (0 to 5% probability) to almost certain (95% to 100% probability).



Acknowledgements

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Figure 1. Estimates of R in the 4 nations of the UK (90% credible 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 outwards to one decimal place

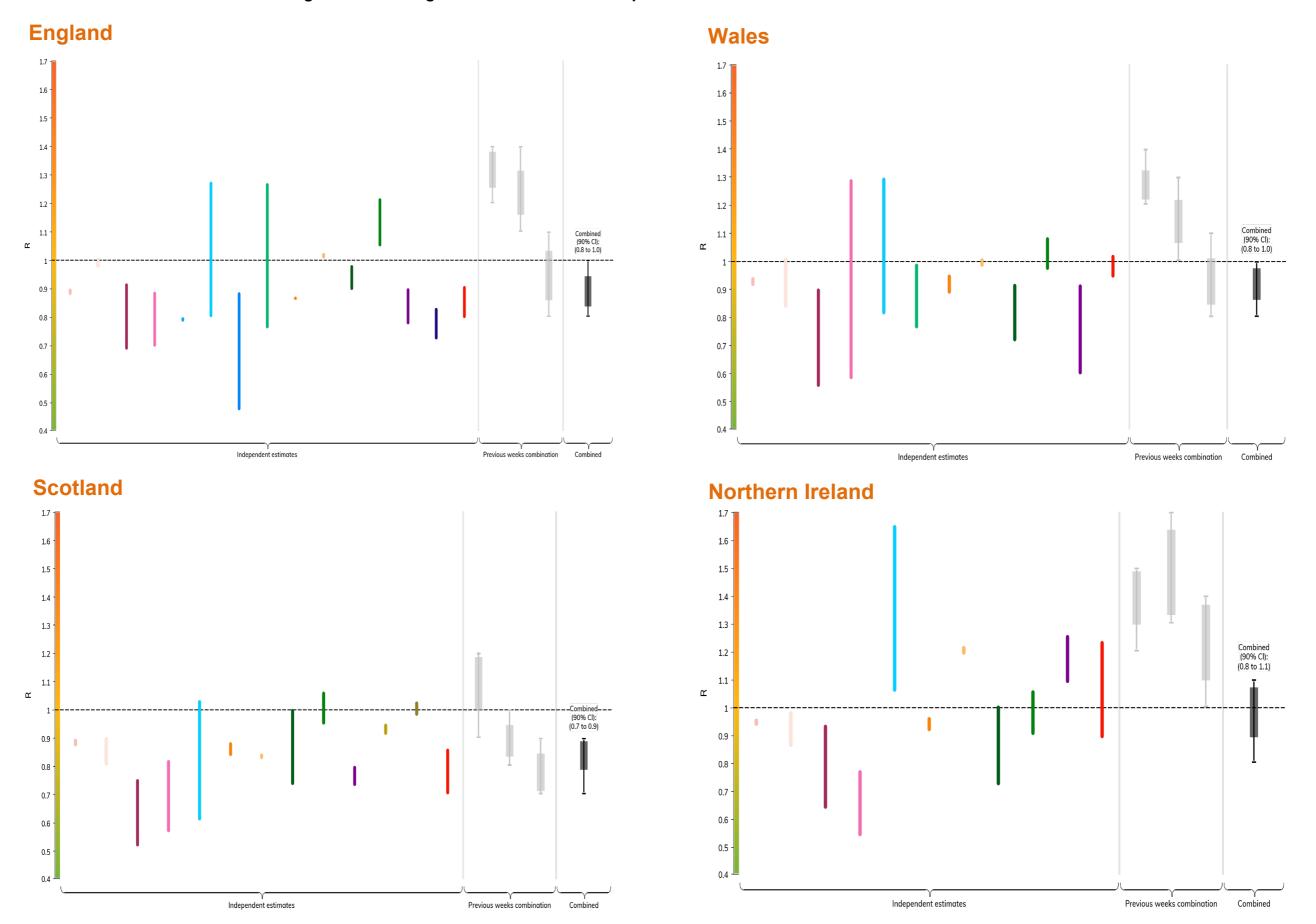


Figure 2. Estimates of the growth rate in NHS England regions, including 90% credible intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding outwards to the nearest per cent

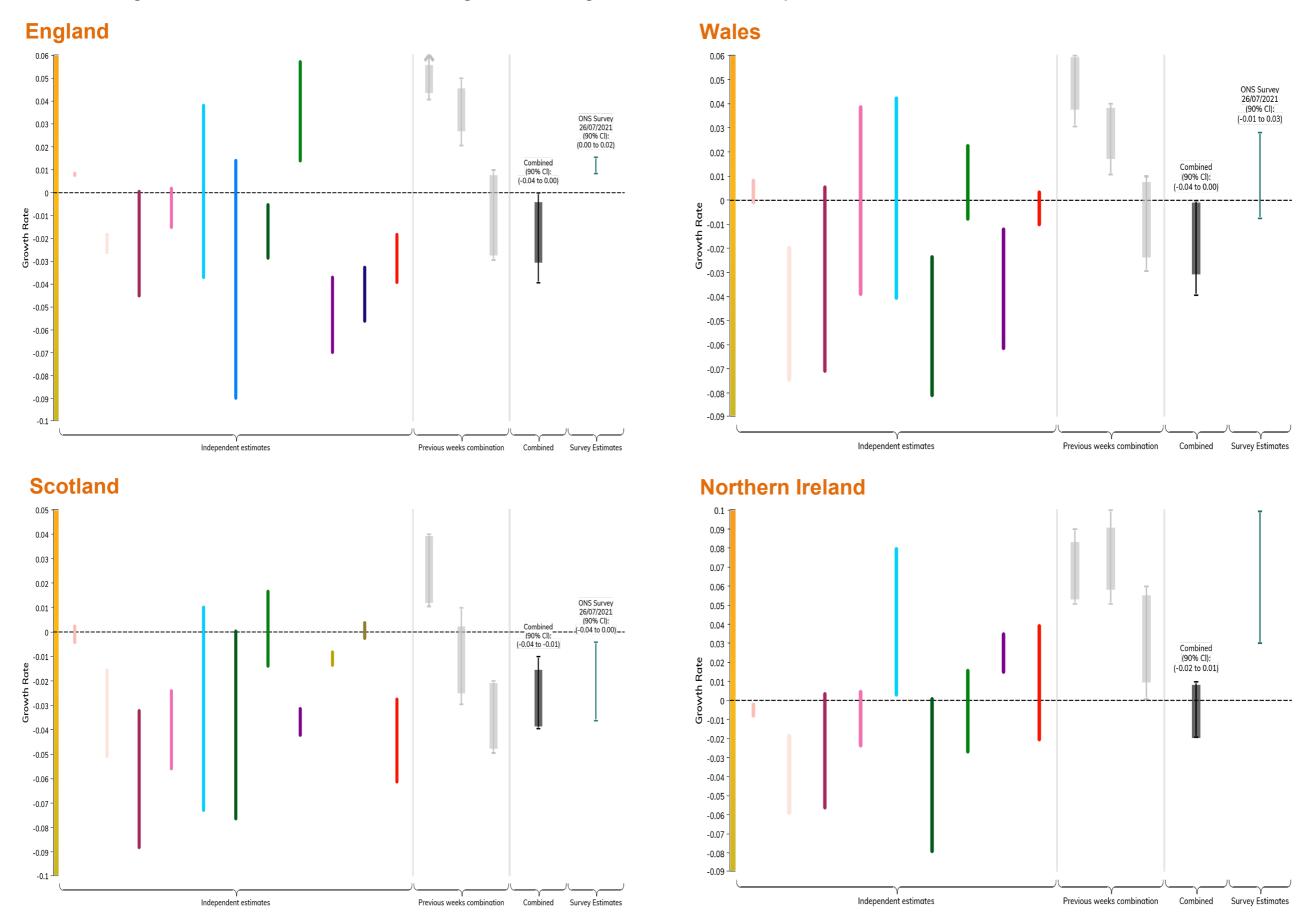
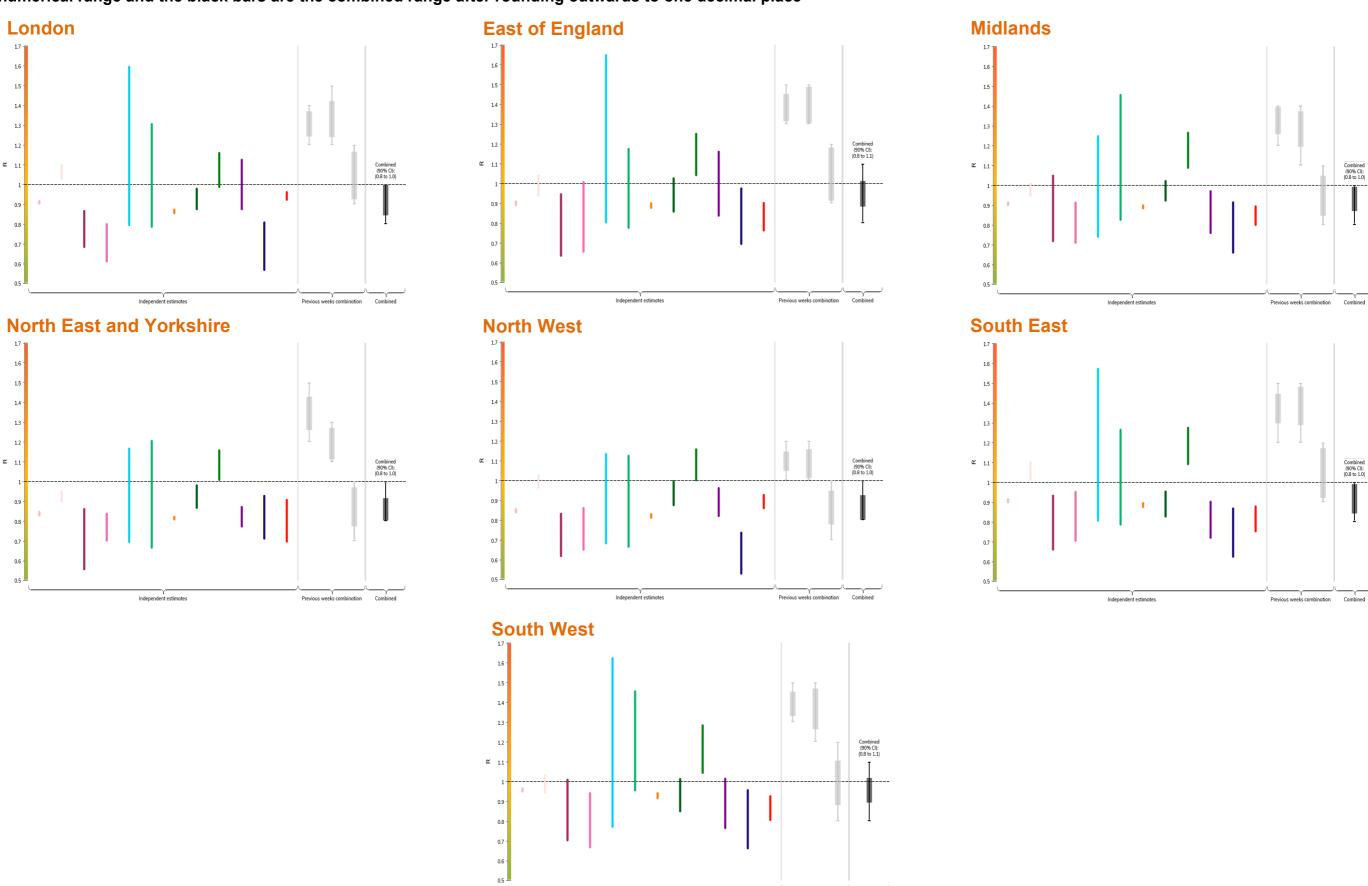


Figure 3. Estimates of R in the NHS England regions, including 90% credible intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding outwards to one decimal place



About the UK Health Security Agency

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