

Epidemiology Modelling Review Group: consensus statement on COVID-19

Date: 18 August 2021

Introduction

The UK Health Security Agency (UKHSA) Epidemiology Modelling Review Group (EMRG) shares this consensus statement on COVID-19 with acknowledgment to 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

- The UKHSA's best estimate for R in England is between 0.9 and 1.2. R is estimated to be between 0.8 and 1.1 for Scotland, 0.9 and 1.2 for Wales, and 0.9 and 1.2 for Northern Ireland (<u>Figure 1</u>). These estimates are based on models¹ fitted to data available up to 16 August 2021, including hospitalisations, deaths, testing, wastewater samples and longitudinal studies.
- 2. Combined estimates² show that the incidence³ is between 22,000 and 47,000 new infections per day in England.

Incidence and prevalence

- 3. During its most recent week (ending 14 August), the ONS Covid infection survey estimates⁴ that an average of 698,100 people had COVID-19 in the community in England (95% credible interval 648,800 to 747,700). The survey does not include people in care homes, hospitals, or prisons. Estimates from across the 4 nations of the UK are:
 - England 698,100 (95% credible interval 648,800 to 747,700)
 - Scotland 25,900 (95% credible interval 18,200 to 34,900)
 - Wales 23,500 (95% credible interval 16,600 to 31,900)
 - Northern Ireland 35,300 (95% credible interval 26,200 to 45,500)

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, and in this weeks' estimates fewer models were available for inclusion in incidence estimates for England here.

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> <u>plus.maths.org.</u>

- 5. EMRG's consensus estimates for the growth rates in the 4 nations are (90% credible interval):
 - England is between -1% to +3% per day,
 - Scotland is between -3% to +1% per day,
 - Wales is between -2% to +7% per day, and
 - Northern Ireland is between -2% to +2% 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 0.9 and 1.2. R is estimated to be between 0.8 and 1.1 for Scotland, 0.9 and 1.2 for Wales, and 0.9 and 1.2 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 16 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, and estimates may not represent transmission trends now.
- 10. This week, UKHSA's estimates of the range of R includes values above and below one, for all nations and regions. There is uncertainty in the status of the epidemic and its future trends.

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)

Nation	R	Daily growth rate	Doubling time ⁸
England	0.9 to 1.2	-1% to +3%	Flat to 28 days
Wales	0.9 to 1.2	-2% to +7%	Flat to 10 days
Scotland	0.8 to 1.1	-3% to +1%	-30 days to flat
Northern Ireland	0.9 to 1.2	-2% to +2%	Flat ⁹
NHS England region	R	Daily growth rate	Doubling time ⁸
East of England	0.9 to 1.2	-1% to +4%	Flat to 19 days
London	0.9 to 1.1	-2% to +2%	-40 days to flat
Midlands	0.9 to 1.2	-1% to +4%	Flat to 20 days
North East and Yorkshire	0.9 to 1.1	-2% to +2%	Flat ⁹
North West	0.9 to 1.1	-2% to +2%	Flat to 36 days
South East	0.9 to 1.2	-2% to +3%	Flat to 23 days
South West	0.9 to 1.2	-1% to +3%	Flat to 26 days

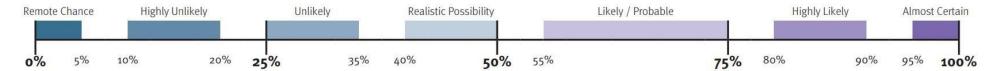
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⁸ Any estimates with a halving or doubling time of more than 40 days have been described as flat. Negative values of doubling time indicate a halving time (the time expected for cases to fall by 50%). Doubling time here is calculated using the growth rate.

⁹ When a doubling time estimate is reported as flat, there is uncertainty as to whether infections are increasing or decreasing.

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 1 decimal place

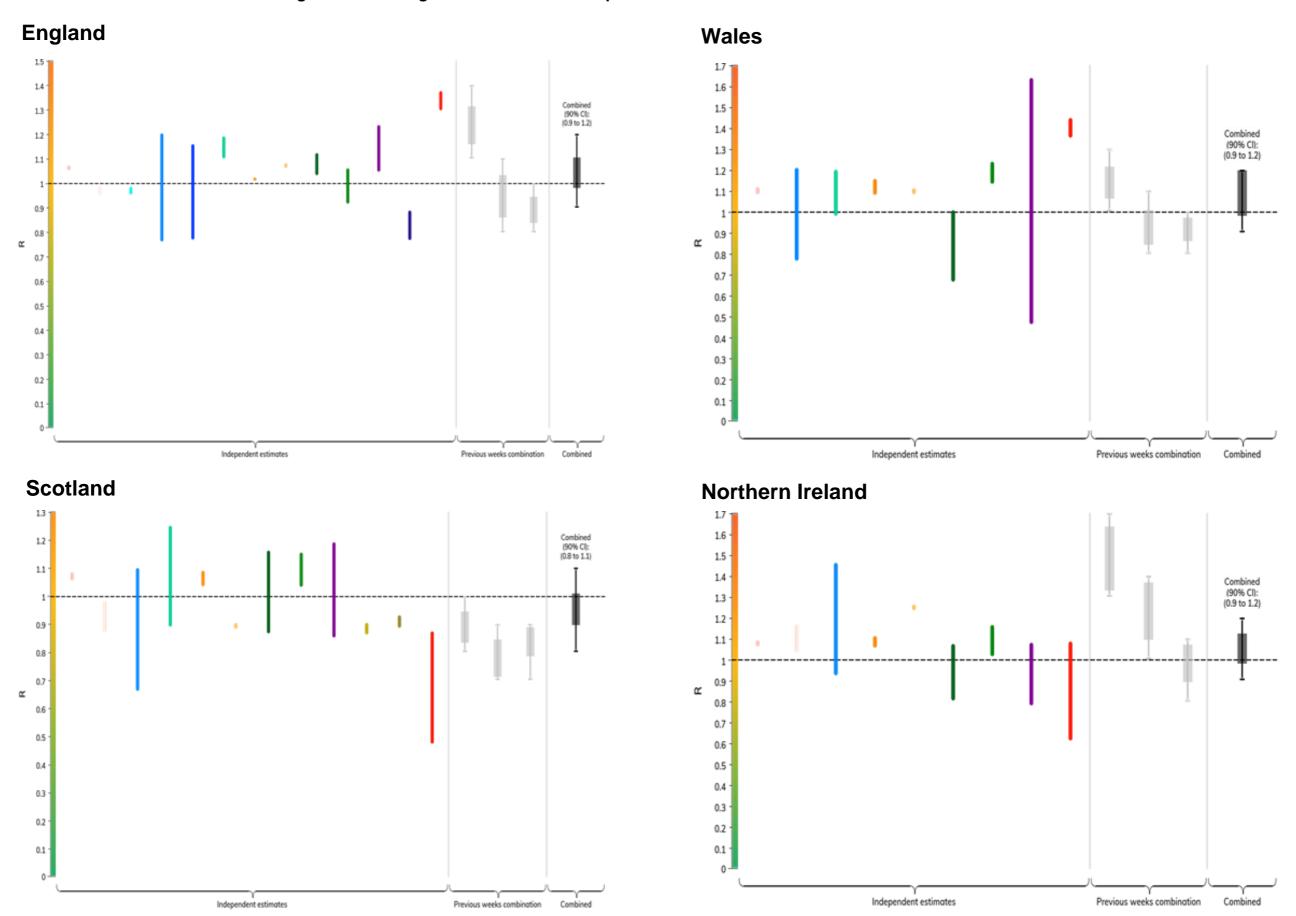
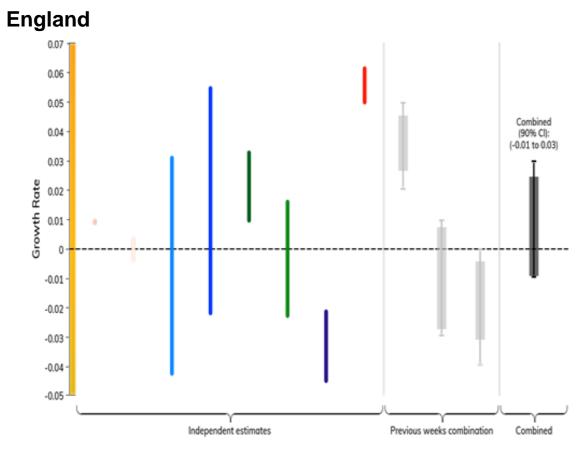
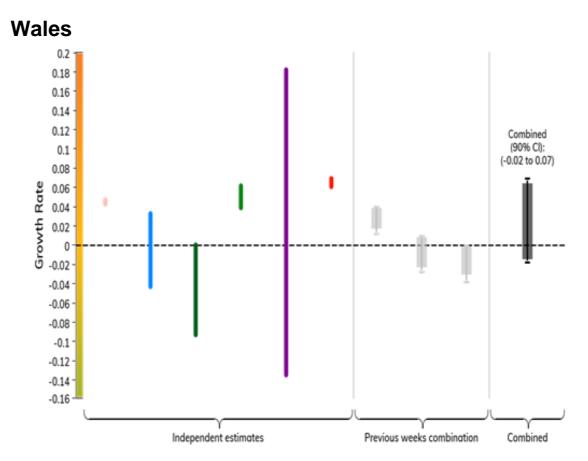


Figure 2. Estimates of the growth rate in NHS England regions, including 90% credible intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding outwards to the nearest percent





Scotland 0.08 0.06 0.04 0.02 0.02 0.04 -0.06 -0.08 -0.11 -0.12 -0.14 Independent estimates Previous weeks combination Combined Combined Combined Combined Combined Combined Combined Combined

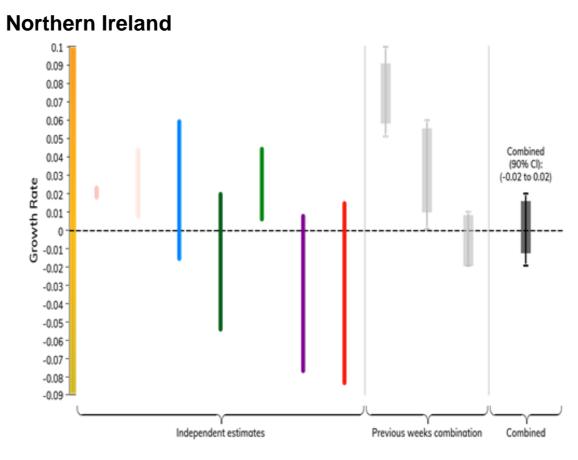
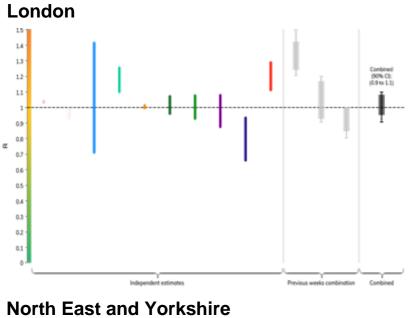
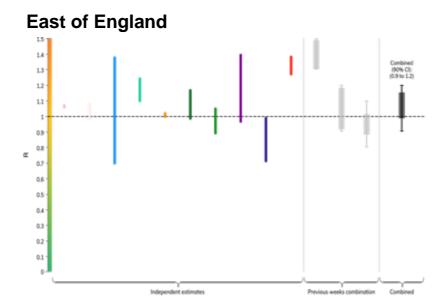
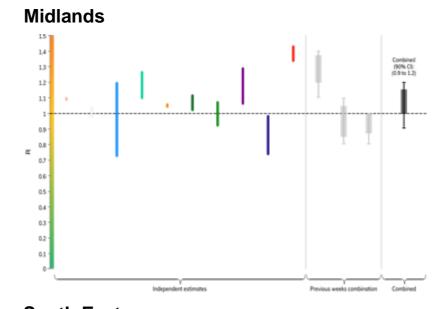
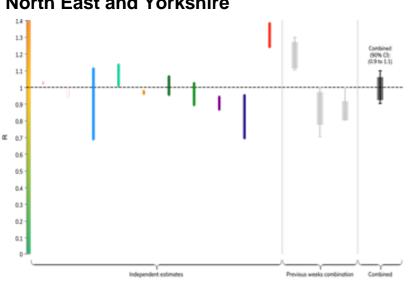


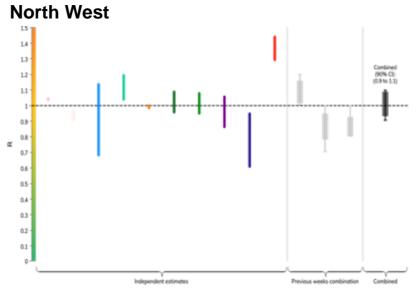
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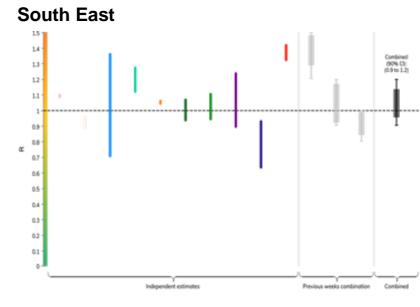


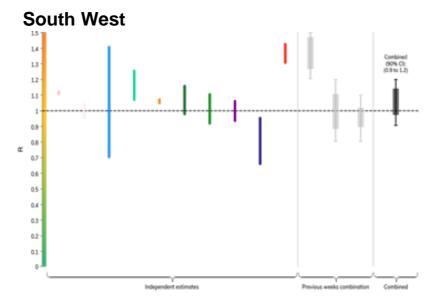












About the UK Health Security Agency

The UK Health Security Agency is an executive agency, sponsored by the <u>Department of Health and Social Care.</u>

UKHSA Website: https://www.gov.uk/government/organisations/uk-health-security-agency

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