

Epidemiology Modelling Review Group: consensus statement on COVID-19

Date: 20 October 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 1.0 and 1.2. R is estimated to be between 0.8 and 1.0 for Scotland, 0.9 and 1.1 for Wales, and 0.9 and 1.1 for Northern Ireland (<u>Figure 1</u>). These estimates are based on models¹ fit to data available up to 18 October 2021, including hospitalisations, deaths, testing, wastewater samples and longitudinal studies
- 2. Combined estimates² show that the incidence³ is between 31,000 and 67,000 new infections per day in England.

Incidence and prevalence

- 3. During its most recent week (ending 16 October), the ONS Covid infection survey estimates⁴ that an average of 977,900 people had COVID-19 in the community in England (95% credible interval 926,600 to 1,028,800). The survey does not include people in care homes, hospitals, or prisons. Estimates from across the 4 nations of the UK are:
- England 977,900 (95% credible interval 926,600 to 1,028,800)
- Scotland 60,100 (95% credible interval 47,600 to 74,300)
- Wales 70,300 (95% credible interval 57,800 to 84,400)
- Northern Ireland 13,900 (95% credible interval 9,100 to 19,600)

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. For example, 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.

Growth rate and reproduction number

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

- 4. 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 0% per day,
- Wales is between -1% to +1% per day, and
- Northern Ireland is between -2% to +1% per day

National estimates of growth rates are summarised in Figure 2.

- 5. 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.
- 6. UKHSA's best estimate for R in in England is between 1.0 and 1.2. R is estimated to be between 0.8 and 1.0 for Scotland, 0.9 and 1.1 for Wales, and 0.9 and 1.1 for Northern Ireland. UKHSA's agreed national estimates are summarised in <u>Table 1</u> and <u>Figure 1</u>, and these are based on the latest data available up to 18 October 2021⁶.
- 7. R is an indicator that lags changes in transmission by two to three weeks⁷, due to the time required for changes to be seen in data streams.
- 8. 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.
- 9. Estimates of R and the growth rates per day become less useful in determining the state of the epidemic when there is a high degree of immunity in the population. Particular care should be taken when interpreting these estimates.
- 10. The incorrect negative PCR test results over the recent weeks reported by a private laboratory in England are likely to have had minimal impact on the national estimates for R

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.

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.

and growth rate, as these results account for a small proportion of tests that have been conducted across the wider testing network.

- 11. The UKHSA is confident that R is above 1 in England and that the epidemic is growing. Models that do not use case data also estimate an increase in R, and that it is above 1.
- 12. Regional estimates of R, growth rate and doubling time have been suspended until we gain a full understanding of the impact of the reported incident of the incorrect negative PCR test results on estimates in the South West, South East and London.

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

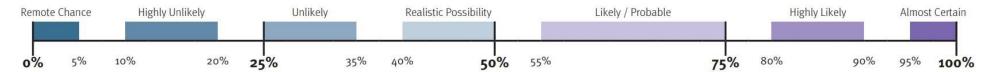
Nation	R	Daily growth rate	Doubling time ⁸
England	1.0 to 1.2	+1% to +3%	24 days to flat
Wales	0.9 to 1.1	-1% to +1%	Flat
Scotland	0.8 to 1.0	-3% to 0%	-28 days to flat
Northern Ireland	0.9 to 1.1	-2% to +1%	Flat

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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.

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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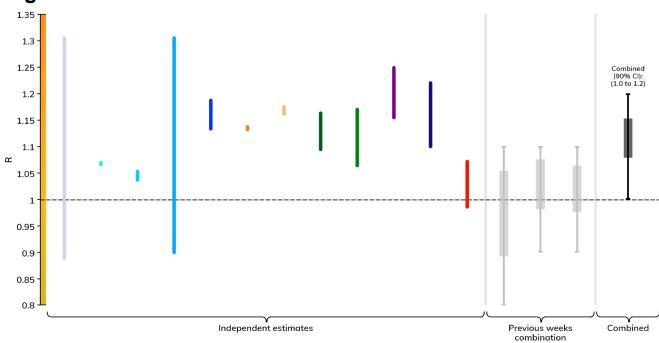
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Figure 1a. Estimates of R in the 4 nations of the UK (90% credible intervals)

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.

England



Scotland

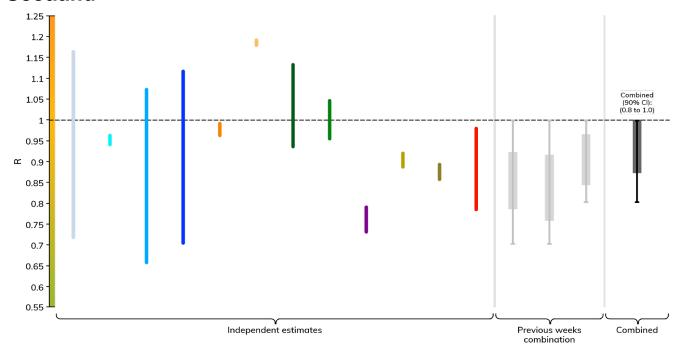
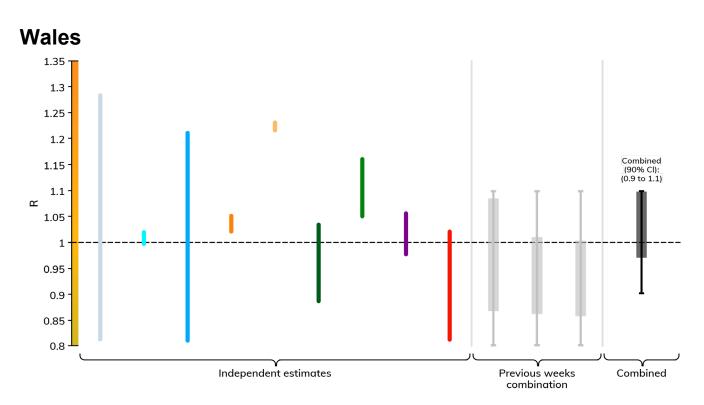


Figure 2b. Estimates of R in the 4 nations of the UK (90% credible intervals)

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.



Northern Ireland

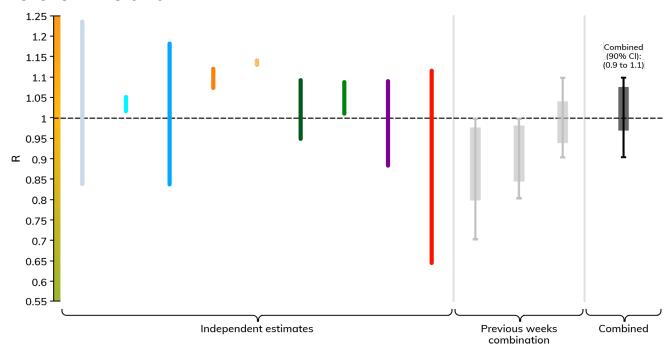
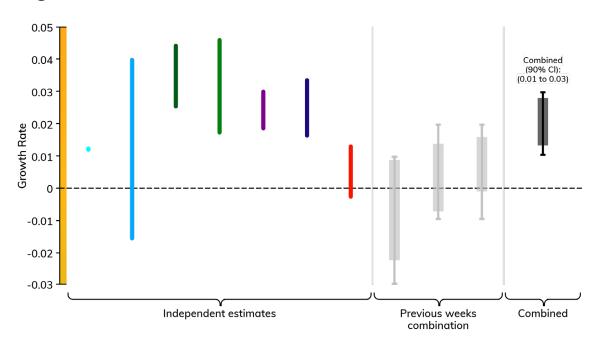


Figure 2a. Estimates of the growth rate in NHS England nations, including 90% credible intervals

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.

England



Scotland

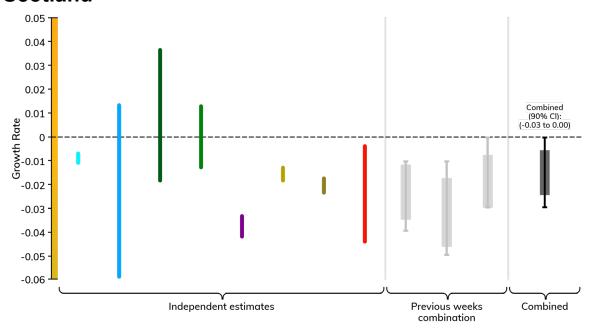
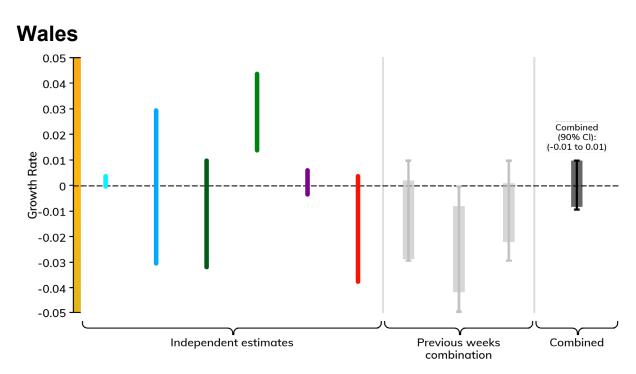
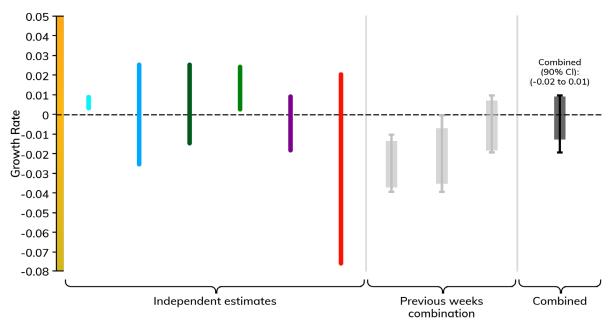


Figure 2b. Estimates of the growth rate in NHS England nations, including 90% credible intervals

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.



Northern Ireland



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