

SYNOPSIS

Review of “Modelling the impact of the tier system on SARS-CoV-2 transmission in the UK between the first and second national lockdowns”

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Article citation:

Laydon DJ, Mishra S, Hinsley WR, Samartsidis P, Flaxman S, Gandy A, et al. Modelling the impact of the tier system on SARS-CoV-2 transmission in the UK between the first and second national lockdowns. *BMJ Open*. 2021;11(4):e050346. Available from: <https://doi.org/10.1136/bmjopen-2021-050346>

One-minute summary

- The United Kingdom (UK) developed a tier system for public health measures on October 14, 2020 to provide a consistent set of COVID-19 control measures with geographical flexibility. Tiers consist of multiple non-pharmaceutical interventions (NPIs) and were determined by lower tier local authorities (LTLAs) in response to their local transmission intensity.
- In this study, the authors examined the effects of the three tier system on the COVID-19 pandemic in the UK between the first and second national lockdowns (before the emergence of the B.1.1.7 variant of concern).
- This was a modelling study looking at publicly available data on regional NPIs and their effect (estimates) on the real-time reproductive number, R_t .
 - 310 LTLAs were included in the analysis.

Findings:

The tier system was introduced on October 14, 2020 and continued until the second national lockdown on November 5, 2020.

- Tier 1 interventions had negligible effects on transmission rates
 - Tier 1 had no discernible effects in addition to the secular trend, scaling R_t by 1 (coefficient reduction mean = 1.0, 95% confidence interval [CI] [1.0 – 1.0])
- Tier 2 interventions reduced transmission by 6% (5%–7%)

- Tier 2 was slightly more effective and scales R_t by a factor of 0.94 (coefficient reduction mean = 0.94, 95% CI [0.93 – 0.95])
- Tier 3 interventions reduced transmission by 23% (21%–25%)
 - Tier 3 had significant effects and scales R_t by 0.77 (coefficient reduction mean = 0.77, 95% CI [0.75 – 0.79])
- If every LTLA had gone into Tier 3 by the second national lockdown (November 5, 2020), then 288 LTLAs (93%) would have begun to suppress their epidemics (i.e., reduced R_t to less than 1); however, only 90 (29%) did so in reality.
- The relatively small effect sizes found in this analysis demonstrate that interventions must be at least as stringent as Tier 3 in order to suppress transmission, especially considering more transmissible variants (at least until effective vaccination is widespread or a much greater percentage of the population has immunity).
- It is important to note that nationally, transmission increased from July to September, and then plateaued and began to decline before the introduction of the tier system. This suggests that transmission reduction was not solely attributable to the tiers. Additionally, the estimates do not imply that the Tier 1 interventions would have zero effect, but rather that they have no *additional* effect beyond the secular trend.

Additional information

- In this study, the authors estimated the effects of Tiers 1, 2 and 3 between the first and second national lockdowns in the UK. Estimated reproduction numbers were combined with data regarding NPIs and tiers and this data was entered into a Bayesian hierarchical model with a latent factor analysis.
- Interventions were compiled from each LTLA over time between July 1, 2020 and November 5, 2020 using government websites. Estimates of transmission rates were calculated backwards from observed deaths (day of death), cases and serological survey data.
- Tiers were inconsistently defined across LTLAs (e.g., some LTLAs left gyms and fitness centres open under tier 1, while most did not).
- Four interventions were implemented in all 310 LTLAs when under Tier 1: 1) limiting indoor gatherings to at most six people; 2) limiting outdoor gatherings to at most six people; 3) curfew of 22:00 for hospitality venues; and 4) instruction to work from home where possible.
- Tiers 2 and 3 had additional interventions such as: ‘travel discouraged’, ‘no indoor mixing’, ‘overnight stays discouraged’ (Tier 2) and ‘residents cannot leave the local area’ and ‘pubs and bars closed table service only’ (Tier 3).

PHO reviewer’s comments

- The study examined the impact of the tier system as a whole and therefore it was not possible to determine the effects of individual public health measures, which would be helpful to allow for more targeted measures.

- The authors note that the effect sizes reported quantify the instantaneous impact of the tiers on R_t ; however, they acknowledge that the effects of the tiers may vary over time and may lag before showing any effects.
- The model was designed so that it assumes that the tiers will either reduce transmission or have no effect; thus, the possibility of an increase in transmission was not accounted for.
- This study was conducted before the B.1.1.7 variant of concern was identified in the UK; therefore, results may not be generalizable to jurisdictions with high levels of variants.

Citation

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