Title: The 2020 SARS-CoV-2 epidemic in England: key epidemiological drivers and impact of interventions

Short title: Epidemiology of SARS-Cov-2 in England

One-sentence summary: We fit a model to surveillance data, to estimate SARS-CoV-2 transmissibility and severity, and the impact of interventions.

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Abstract

England has been severely affected by COVID-19. We fitted a model of SARS-CoV-2 transmission in care homes and the community to regional 2020 surveillance data. Only national lockdown brought the reproduction number below 1 consistently; introduced one week earlier in the first wave it could have reduced mortality by 23,300 deaths on average. The mean infection fatality ratio was initially ~1.3% across all regions except London and halved following clinical care improvements. The infection fatality ratio was two-fold lower throughout in London, even when adjusting for demographics. The infection fatality ratio in care homes was 2.5-times that in the elderly in the community. Population-level infection-induced immunity in England is still far from herd immunity, with regional mean cumulative attack rates ranging between 4.4% and 15.8%.