

Coronavirus: why we need local models to successfully exit lockdown

May 18 2020, by Brian Castellani and Camila Caiado



Credit: shutterstock.com

It's fair to say the world has never been more aware of the importance of mathematical and statistical modelling as it is today.

National models for the COVID-19 epidemic, such as the one produced by [Imperial College](#), in the UK have been at the forefront of public health decisions. This is mainly because they do the important job of providing worst-case scenarios and putting the severity of the problem in

perspective. They show what can quickly happen when an infectious disease like COVID-19 is not properly managed.

Models are representations of a process and help us understand a problem and the potential implications of policies and decisions by mapping out a set of possible future scenarios.

Because uncertainty is intrinsic to any such process and can't be fully captured, models are not perfect. But they are useful when used in the correct context.

Problems arise when national models are applied at a regional level, as they lose their relevance and can even be harmful. They can often provide wildly incorrect predictions that can misguide local hospitals, care homes and local authorities. A decision to resume certain procedures in hospitals, for example, may be prudent in one region, but not another. And we won't know without local models.

The reason is simple enough: national models lack a built-in understanding of the considerable complexities of the regional and local context in the UK.

We are part of Durham University's COVID-19 Community Health and Social Care Modelling Team, which is working to develop models grounded in the idea that local context is everything.

Our approach responds to the needs identified by the local NHS Trusts and councils, as well as local authorities. It is based on addressing the major limitations of the current top-down national programme in the UK and elsewhere.

There is no single COVID-19 curve

Perhaps the most important limitation of current modelling is the perception that the national trend is the most important one.

For us the more important questions need to be: What, exactly, does the curve look like for our [local area](#)? What does it mean to us? And how does that trend compare to other areas and the national model?

Here are two graphs. The first shows the COVID-19 curves for all English regions.

The second shows some of the slowest growing trends amongst the authority districts in the north-east and Yorkshire and the Humber regions of England.

What is striking in both is how the curves differ. For example, London had a sharp rise, while the south-west region had a slow and rather flat increase. In turn, compared to Sheffield, the slowest trends in the north-east have never really "peaked" in the same way. In fact, many have remained relatively flat and, given the effectiveness of social distancing measures, will probably continue to do so.



What's right for London is not right for Durham. Credit: shutterstock.com

Such insights are crucial, as they provide more realistic forecasts to help build locally sensitive policies that are needed both to care for COVID-19 patients and to ensure the wider health and socioeconomic stability of the entire community.

For example, in a region where a spike in cases currently looks improbable, NHS Trusts can start thinking about resuming non-critical services such as elective surgery.

We need short-term forecasts

The second limitation of national modelling is the failure to offset its long-term predictions (which can often be a few months or more) with more regionally focused, short-term estimates, such as seven-day forecasts that are updated regularly.

There is no point in providing only long-term forecasts that leave the [local authorities](#) guessing what to do next when updates do not arrive. Forecasts need to be updated more regularly and broadcasted as soon as new data becomes available, which is often not done quickly enough.

Forecasting needs to be a nationally contextualised but locally focused tool that generates multiple trends. Local authorities and healthcare providers must be equipped to analyse and [model](#) their own data, not just share it. The [information flow](#) needs to go both ways.

Context is everything

The third limitation of national modelling is a failure to demonstrate how different contexts account for different COVID-19 curves. These contexts could be any combination of geographical location, access to healthcare, strength and diversity of the local economy, population size and density, existing inequalities and health vulnerabilities. All of these factors, and more, are what account for how COVID-19 spreads and affects a population.

A distressing example in the UK is the recent statistical bulletin released by the [Office for National Statistics](#). It focuses on deaths involving COVID-19 by local area and socioeconomic deprivation occurring between 1 March and 17 April 2020.

Its conclusions are stark: "People living in more deprived areas have experienced COVID-19 mortality rates more than double those living in less deprived areas. General mortality rates are normally higher in more

deprived areas, but so far COVID-19 appears to be taking them higher still."

These discrepancies will only matter more as many countries move out of lockdown. At the local level, different communities, particularly poorer urban and rural areas, will have very different sets of struggles to deal with.

Next steps

With these limitations in mind, it's clear that the UK's exit strategy should take the local context into account. The measures needed for London will likely differ from those needed in County Durham.

Communities therefore need local models alongside the ability to adapt national policies into local strategies, so they can make policy decisions that reduce rather than create health harms and inequalities.

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