Appendix 1. Detailed statistical methods

Statistical models

We fit 4 separate linear regression models for the log-growth rate outcome, as well as 4 models for the log corrected growth rate outcome. The linear regression models include spline smoother of date, with penalties that are designed to guard against overfitting (32). All models were fitted using mgcv, an R package for fitting generalized additive models (19), and using the restricted expected maximum likelihood method. These models were:

> *Canada-wide models*
> Unadjusted: y ~ b0 + b1*mobility_lagged + s(date, basis ="tp")
> Adjusted: y ~ b0 + b1*mobility_lagged + s(date, basis ="tp") + b2*temperature_lagged
>
> *Province-level models*
> Unadjusted: y ~ b0 + b1*mobility_lagged + s(date, province, basis = fs)
> Adjusted: y ~ b0 + b1*mobility_lagged + s(date, province, basis = fs) + b2* temperature_lagged

In the above equations, "s()" represents a smoothing spline with a knot for each 6-week period (32). The Canada-wide models used thin plate splines (represented by basis= tp), while the province-level models used factor-smooth splines that allowed an efficient measurement of separate splines for each province (represented by basis = fs).

Calculation of mobility threshold

The mobility threshold was calculated from the fitted model parameters. The mobility threshold was derived based on the equation of a line, namely by identifying the mobility level when the log-growth rate (y) was zero.

> *Threshold calculation*
> y = b1*mobility_lagged + R
> 0 = b1* mobility_lagged$_{threshold}$ + R
> mobility_lagged$_{threshold}$ = -1*R / b1

In the equations b1 represents the coefficient for mobility, and R represents the sum of the remaining effects in the model (i.e. the intercept, [b0], the effect of the spline of date, and the effect of temperature for the adjusted models [b2*temperature_lagged]). For both the Canada-wide and the province-level threshold estimates, an 80% confidence interval around the estimated mobility threshold was calculated by simulating 10,000 sets of coefficient values from the fitted multivariate normal coefficient distribution, and calculating the 10th and 90th percentile of the mobility threshold based on these values. Mobility levels above the threshold and upper confidence limit had a 5 in 10 and 9 in 10 chance of being above the threshold, respectively, while mobility values below the threshold and lower confidence limit had a 5 in 10 and 9 in 10 chance of being below the mobility threshold, respectively.