

Supplementary Table 1. Variables used in the analysis

Variable	Definition	Transformation	Analytical role
COVID-19 deaths	Observed deaths involving COVID-19 in each council-year	None	Outcome
Expected deaths (Ekt)	Age-standardised expected deaths for each council-year, used as model offset	None	Offset
Total positive tests	Total positive COVID-19 tests in each council-year	Log-transformed after adding 0.5	Proximal epidemiological indicator
Hospital patients per 100,000	Annual hospital patients per 100,000 in each council-year	Log-transformed after adding 0.5	Exploratory health-service indicator
Mean length of stay	Mean hospital stay duration in each council-year	Log-transformed after adding 0.5	Exploratory health-service indicator
Marriage registrations	Number of marriages in each council-year	Log-transformed after adding 0.5	Exploratory ecological proxy
Unemployment rate	Council-level unemployment rate	Standardised	Structural vulnerability indicator
Net migration rate	Council-level net migration rate	Standardised	Contextual demographic indicator
Smoking quit rate	Council-level smoking quit rate	Standardised	Exploratory ecological proxy