Office for National Statistics

Understanding community level influences on COVID-19 prevalence in England

New insights from comparison over time and space

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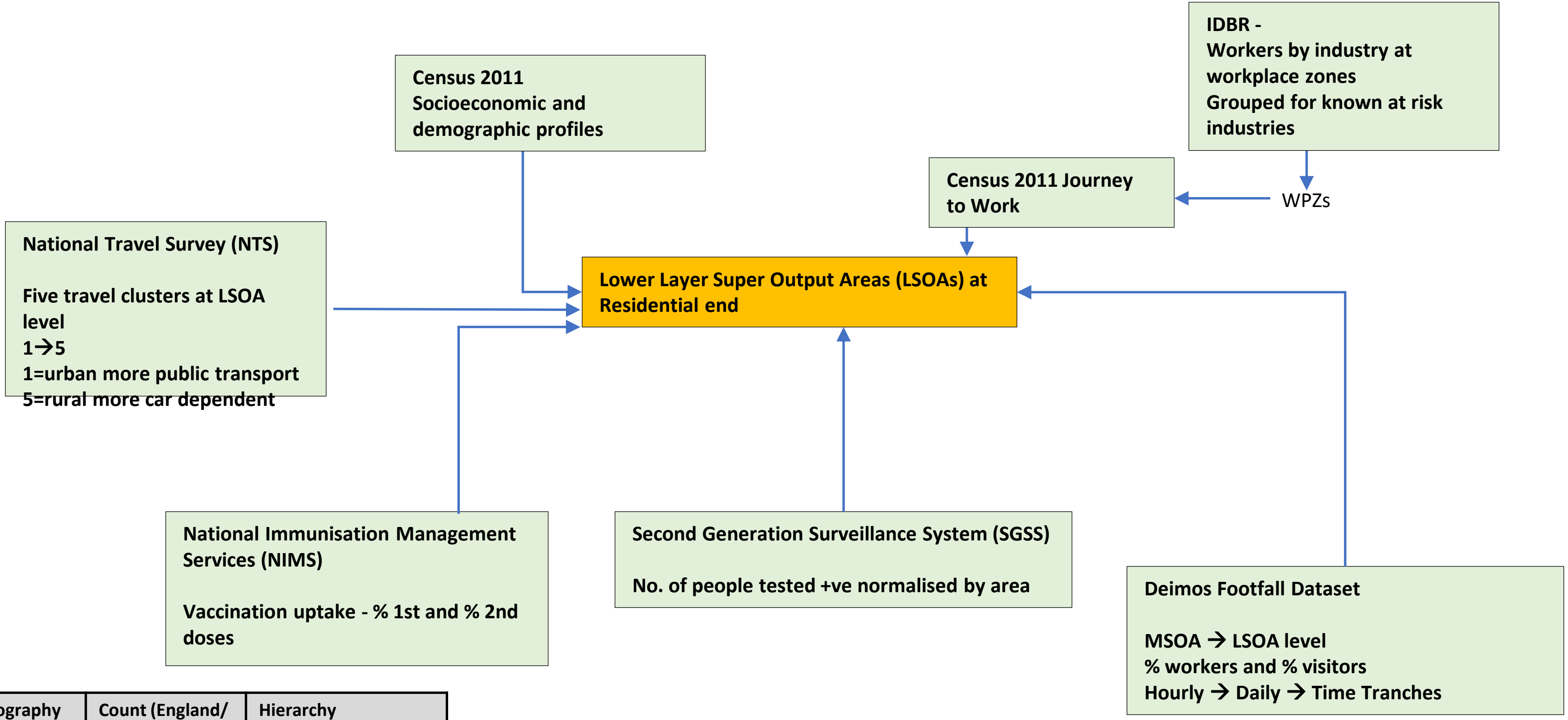
Background

- Part of DSC support in response to COVID-19
  - Developing understanding of risks at community level
  - Workplace risks after controlling for residential characteristics, NPIs, travel patterns, vaccination, etc.
  - Early warning system
  - A new framework for augmenting data from different sources
- Stakeholders
  - JBC (UKHSA)
  - HSE is taking it further as part of the PROTECT COVID-19 National Core Study on transmission and environment
  - ONS HAPI

Method of analysis

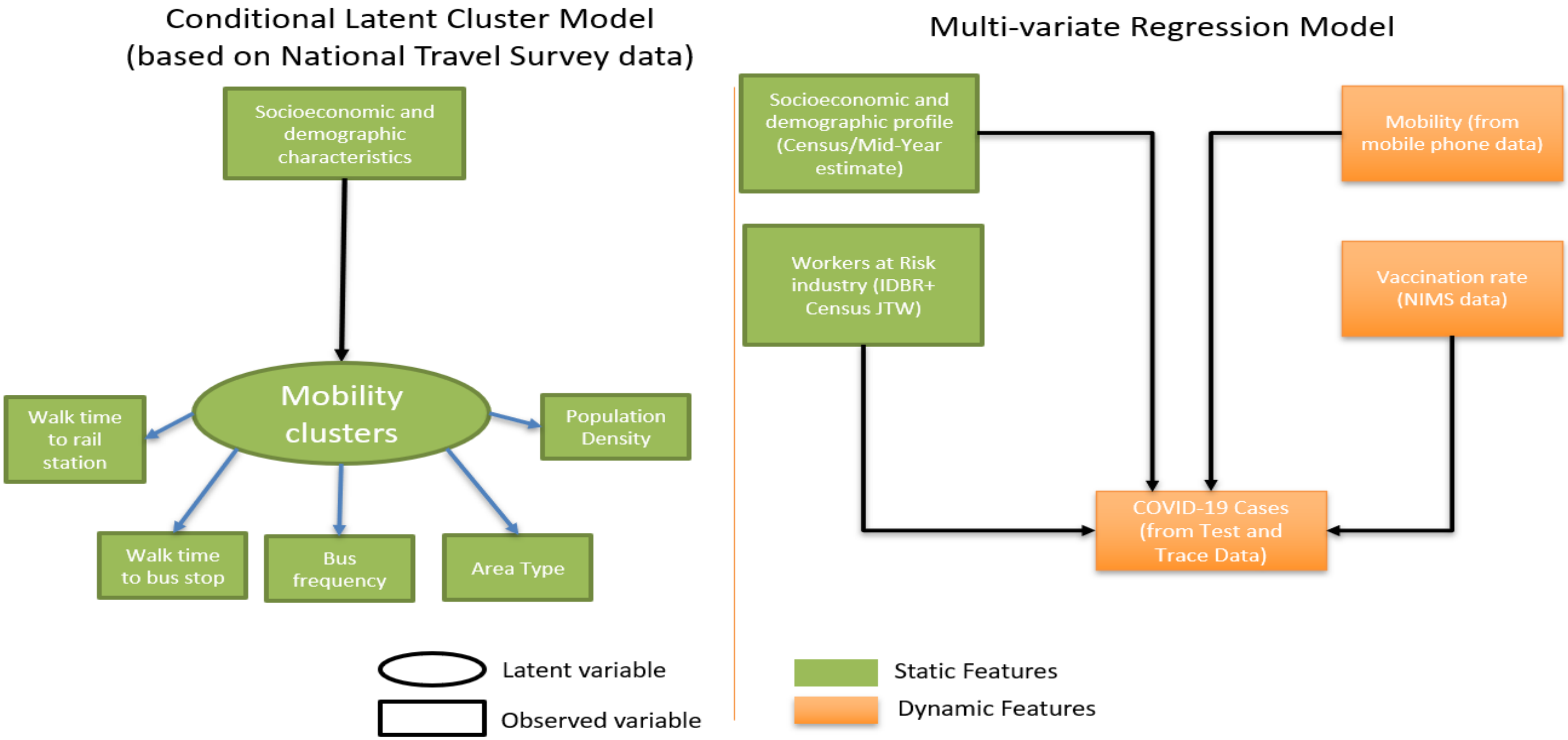
Data Sources



Geography	Count (England/ Wales)	Hierarchy
OA	181,408	Within LSOA
LSOA	34,753	Within MSOA
MSOA	7,201	Within LA
WPZ	53,578	Constrained to MSOA

Census geography - Office for National Statistics (ons.gov.uk)

Model framework



Source: https://link.springer.com/article/10.1007/s11116-020-10098-9

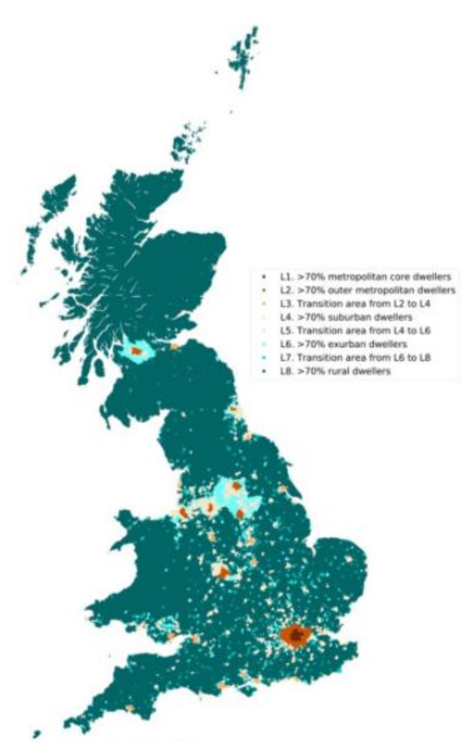
Analysis time tranches

Tranche	Period	External influences during different stages of the pandemic
1	2020-05-03 to 2020-08-30	Low prevalence; schools closed; Alpha and Delta variants not yet emerged; no vaccine available
2	2020-09-06 to 2020-11-08	High prevalence; schools open; negligible Alpha variant; Delta variant not yet emerged; no vaccine available.
3	2020-11-15 to 2020-12-27	High prevalence; schools open; Alpha variant becomes dominant; Delta variant not yet emerged; negligible vaccine coverage.
4	2021-01-03 to 2021-02-14	High prevalence; schools closed (except for pre-school); Alpha variant dominant; Delta variant not emerged yet; over 10 million first vaccine doses by the end of the time period.
5	2021-02-21 to 2021-04-25	Low prevalence; schools open; Delta variant negligible; over 35 million first and 15 million second vaccine doses by the end of time period.
6	2021-05-02 to 2021-07-11	High prevalence; schools open; Delta variant becomes dominant; over 45 million first and 35 million second doses administered by the end of the time period.
7	2021-07-18 to 2021-12-05	Lifting of almost all lockdown restrictions in England and before the Omicron variant became dominant.

Findings

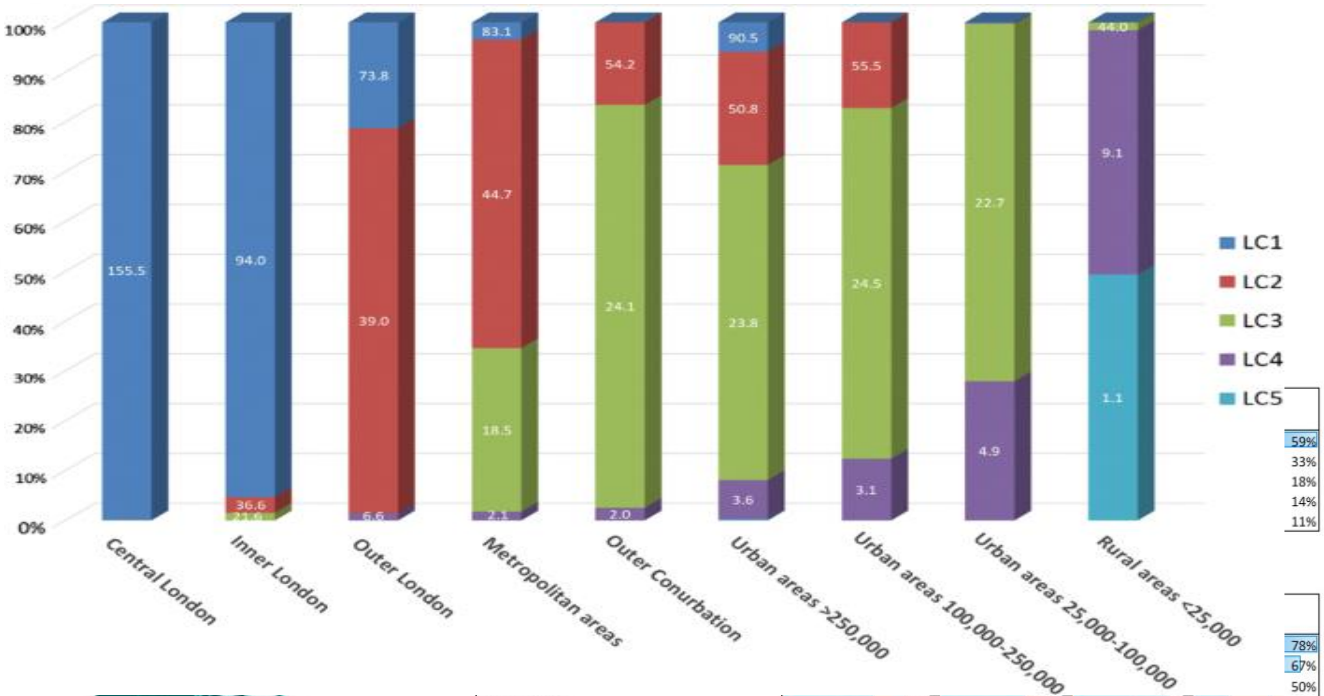
Comparing latent clusters with conventional Area types

Latent geography according to commuting behaviour



source: Jahanshahi and Jin, 2020

source: Department for Transport

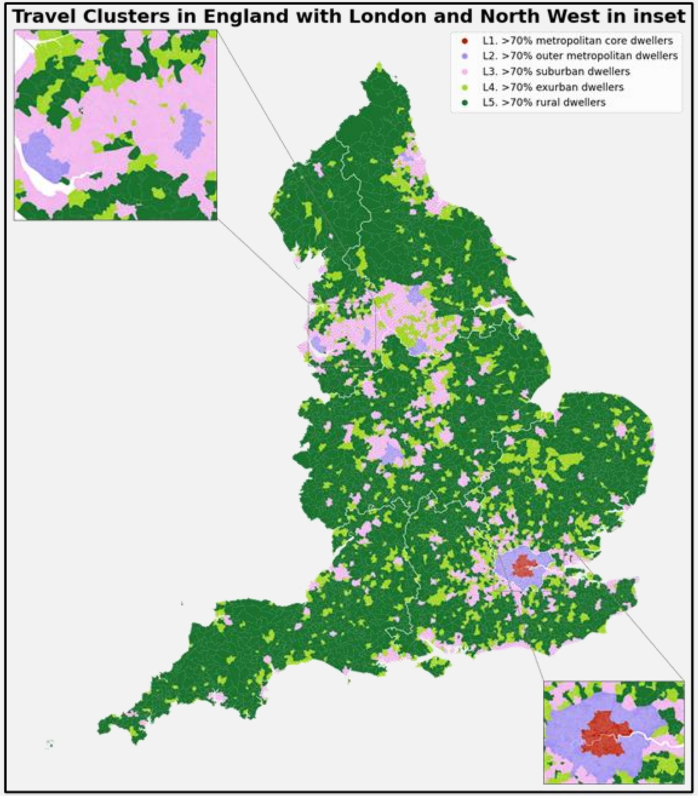


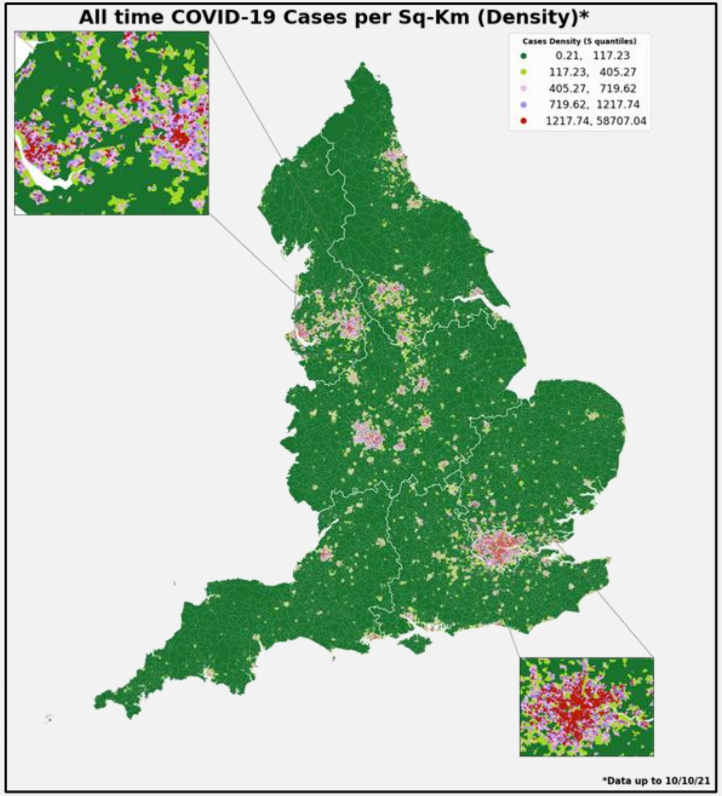
59%
33%
18%
14%
11%

78%
67%
50%

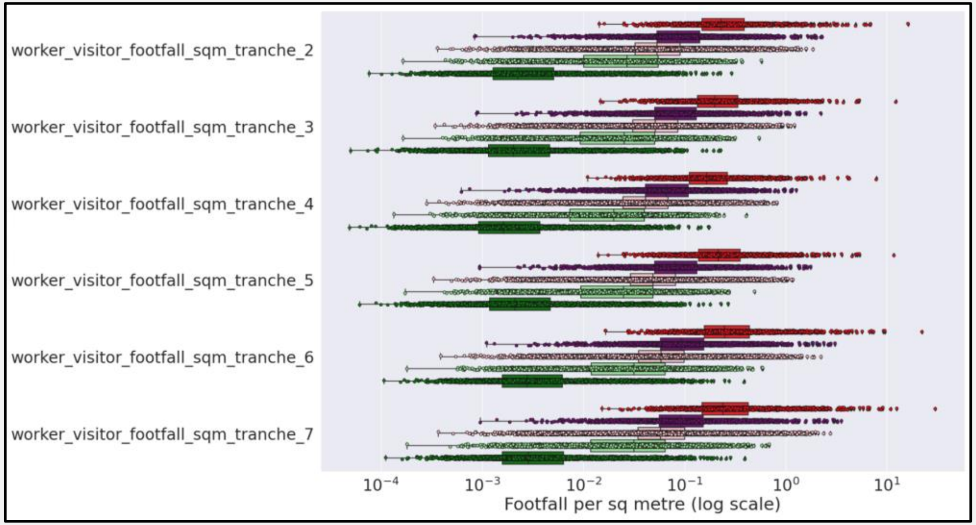
Metropolitan areas outside London	6.7	24.5	75%	21%
Outer Conurbation	7.5	23.8	83%	14%
Urban areas >250k population	8.5	24.7	76%	21%
Urban areas 100k-250k population	8.3	22.7	79%	18%
Urban areas 25k-100k population	9.0	22.8	79%	19%
Rural areas <25k population	10.8	23.8	87%	12%

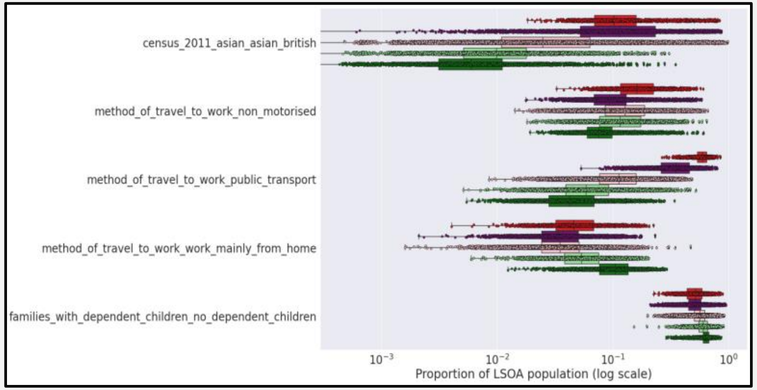
Distribution of cases and travel clusters

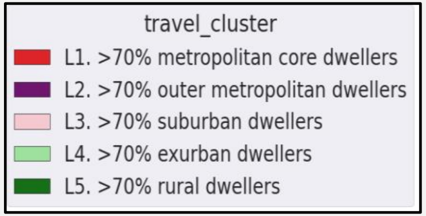


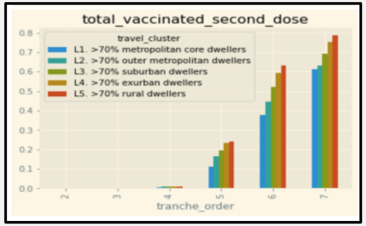


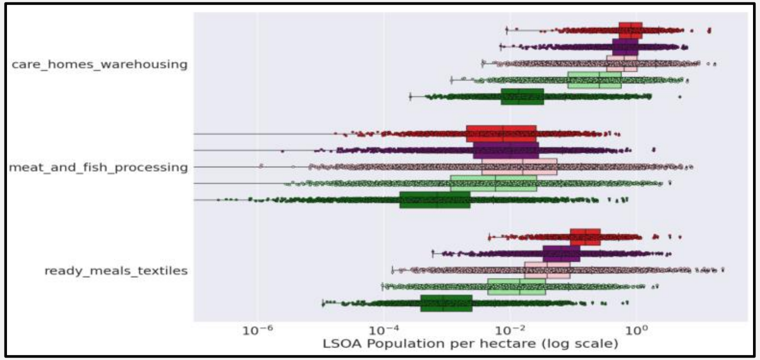
Spatial correlations



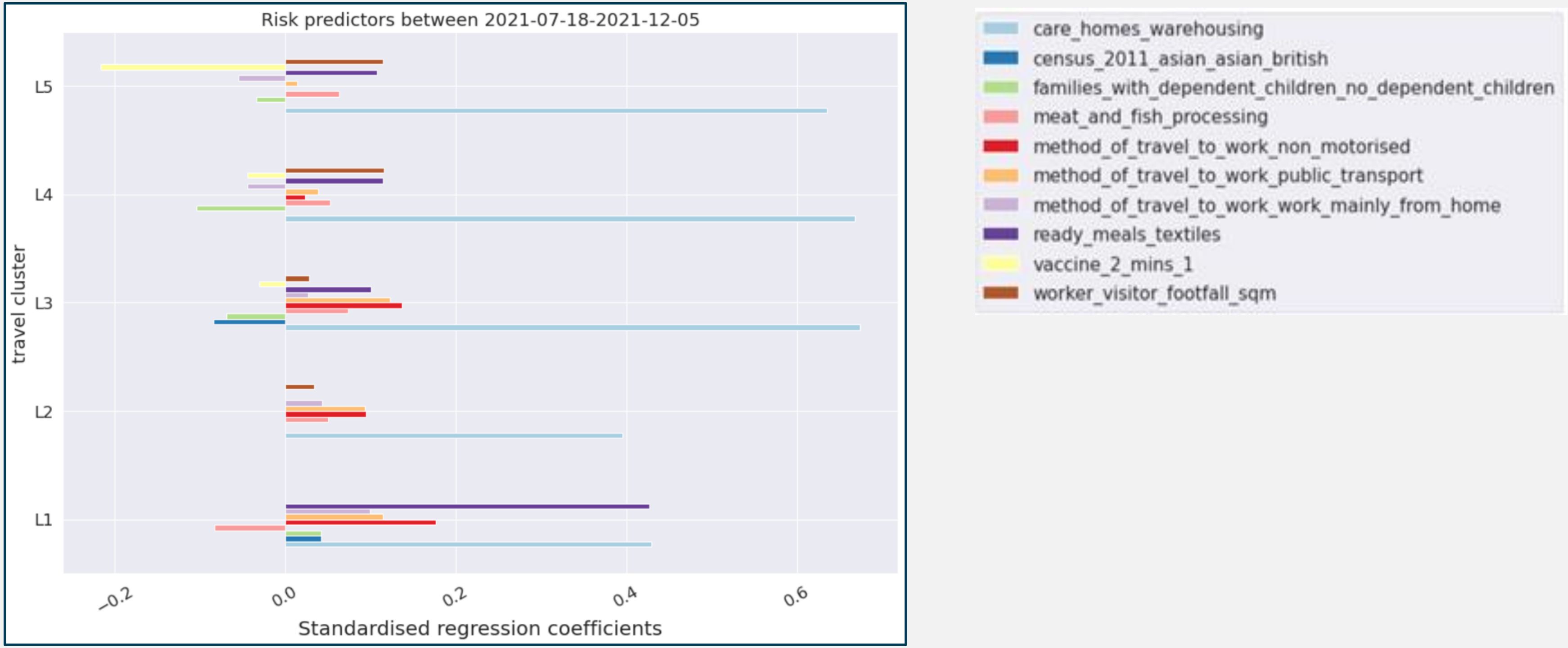




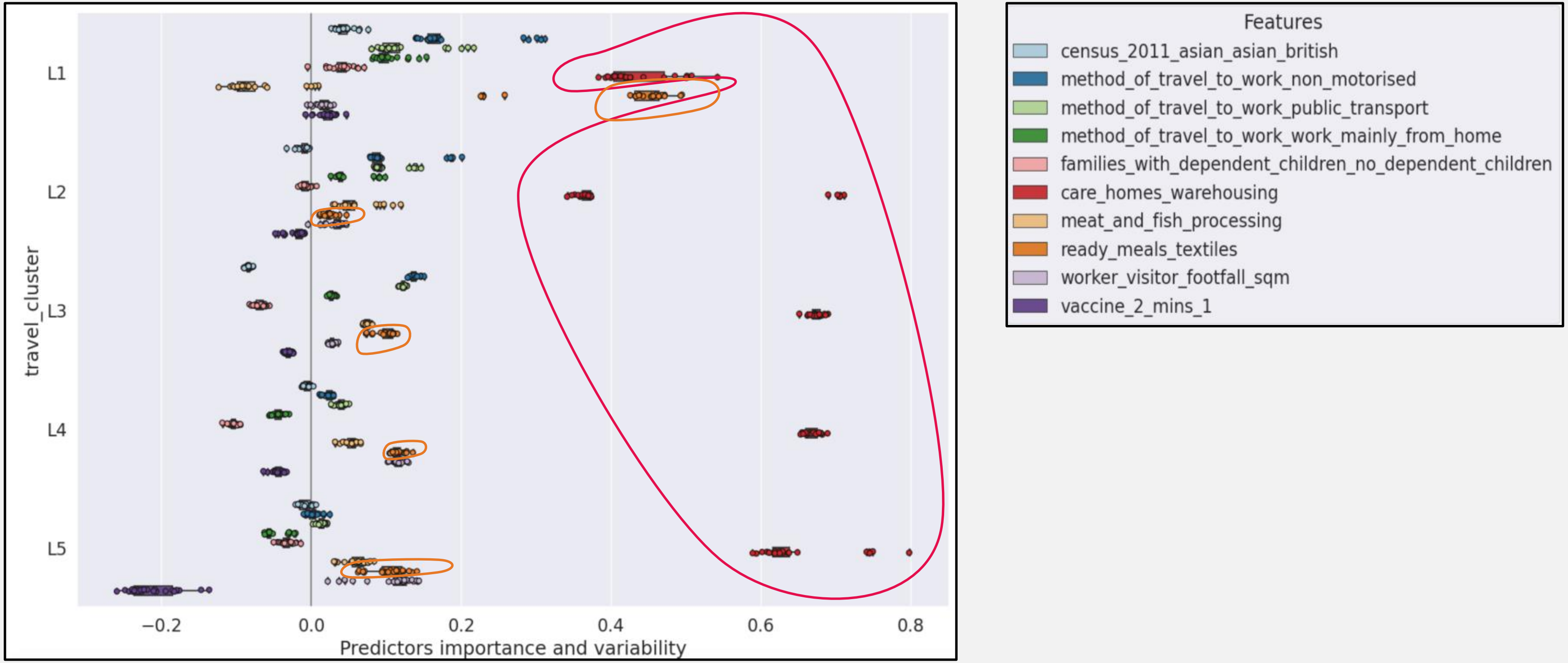




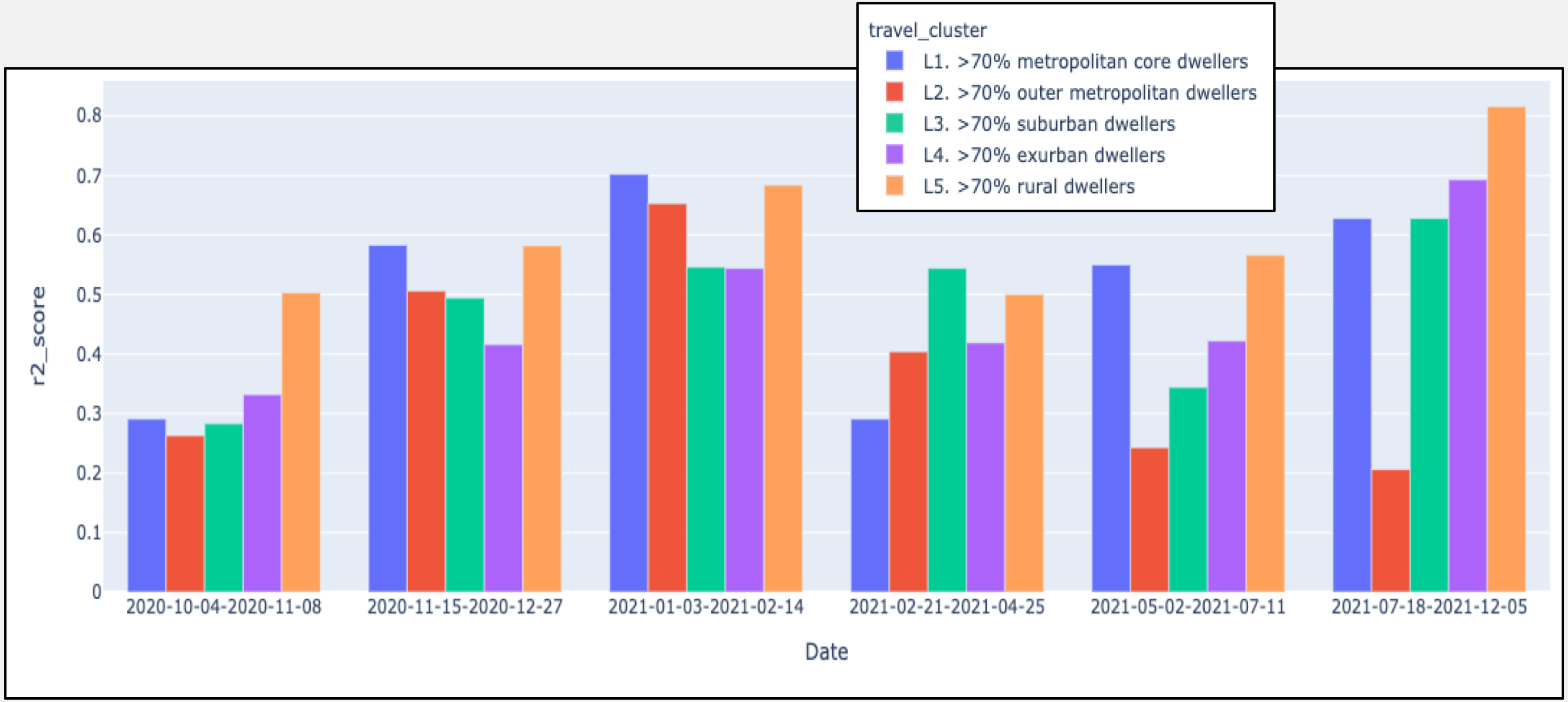
Findings – example of post lockdown time tranche



Findings – Stability over time



Findings – Goodness of fit



Main Findings

- Areas with a larger proportion of residents working in care homes and warehouses and to a lesser extent ready meals and textile sectors are prone to higher risk of infection across all travel clusters and all time periods modelled
- The critical role of geographical variations in influences on COVID-19 Incidence – e.g.
  - Bigger proportion of small families and fewer density of children are prone to lower risk of infection in medium and smaller urban and rural areas
  - Family size, however, is not a significant risk factor in central and inner London and metropolitan cities
- Use of public transport has been identified as one of the main risk factors in smaller and bigger urban areas alike.

Questions and Discussion

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