

Indicator specification:

PLDR collection of population health indicators

Experimental Measures – Small Area Vulnerability Index (SAVI_21_02)



Version: 1.10

Date: July 2020

Authors: Konstantinos Daras & Benjamin Barr

Overview

Indicator title

Experimental Measures – Small Area Vulnerability Index (SAVI_21_02).

Indicator family name

Experimental Measures.

Summary

The SAVI is an empirically informed measure of COVID-19 vulnerability for each Middle Super Output Area (MSOA) in England. The SAVI index investigates the association between each predictor (proportion of the population from Black, Asian and Minority Ethnic (BAME) backgrounds, living in care homes, living in overcrowded housing and having been admitted in the past 5 years for a long-term health condition) and COVID-19 mortality using a multivariable Poisson regression, whilst adjusting for the age profile of each area and accounting for the regional spread and duration of the epidemic.

Technical description

We used multivariable Poisson regression to investigate the independent association between each predictor and COVID-19 mortality. All predictors including income deprivation (IMD) and aged over 80 years group were initially included in the model and then tested for all possible two-way interactions. A parsimonious criterion-based model building approach was used for including interactions in the final model informed by the Akaike Information Criterion (AIC).

Factors related to the distribution of the initial wave (time to first 10 cases and region dummies) were then set to zero. This removes the effect of the duration of the epidemic in each area and regional factors that are likely due to idiosyncratic characteristics of the transmission dynamics in the initial wave. The model was then used to predict the number of deaths in each MSOA based on the selected 4 vulnerability measures for each MSOA. This was divided by the number of deaths that would have been expected of each area had the average predicted mortality to give the vulnerability index. This essentially provides a measure for each MSOA that indicates the relative increase in COVID-19 mortality risk that results from the level of each of the 4 vulnerability measures for each area. To further improve the interpretability of the index, we also provide a 'shrunk' version of the index for suppressing the extreme high values using the methodology adopted in the IMD 2019 index.

Unique Identifier

SAVI_21_02

Construction

This section provides details and sources for each of the 4 indicators used in the SAVI Index. The SAVI index has been based on the most recent data (available on 12 June 2020) at the MSOA level. The Isles of Scilly (E02006781) and City of London (E02006781) have been excluded due to missing data in these areas, leaving 6789 MSOAs for analysis.

Data sources

- COVID-19 deaths

We used data provided by ONS on COVID-19 deaths of patients as occurred in England between 1 March and 31 May 2020. We adjust for the age profile of each MSOA using national age specific COVID-19 mortality rates obtained from the ONS

(<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsinvolvingcovid19englandandwales/deathsoccurringinmay2020>). The data are based on the date the death occurred and COVID-19 was the underlying cause or was mentioned on the death certificate as a contributor factor (ICD-10 codes: U07.1 and U07.2).

Source: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriage/s/deaths/datasets/deathsinvolvingcovid19bylocalareaanddeprivation>

- Black, Asian and Minority Ethnic (BAME)

Census 2011 data were used to produce measures for the proportion of minority groups (BAME: Black, Asian, Mixed and other minority groups) via the NOMIS web service:

<https://www.nomisweb.co.uk/census/2011/ks201ew>

- Income deprivation (IMD2019) - ***Not included in the final model***

The income deprivation score measures the proportion of the population experiencing deprivation relating to low income and provided by the Ministry of Housing, Communities & Local Government: <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019>

- Over 80 age group - ***Not included in the final model***

Census 2011 data were used to produce measures for the proportion of population over 80 years old via the NOMIS web service: <https://www.nomisweb.co.uk/census/2011/ks102ew>

- Care Home available beds

Proportion of Care home available beds has been calculated using the CQC care directory open data (as reported on 1st April 2020). From the whole list of active locations for providers registered under the Health and Social Care Act (HSCA), we selected only locations indicated as Care Homes and using their postcode we allocated the number of available

beds in each MSOA.

Source: <https://www.cqc.org.uk/files/cqc-care-directory-filters-1-april-2020>

- Overcrowded households

Census 2011 data were used to produce measures for the proportion of overcrowded households via the NOMIS web service:

<https://www.nomisweb.co.uk/census/2011/qs412ew>

- Admitted in the past 5 years for a chronic health condition

The Hospital Episodes Statistics secure data provided by NHS digital, measure the people who have had at least 1 admission of Cardiovascular disease, Chronic Respiratory disease, Diabetes and Chronic Kidney disease in any of the diagnostic positions (primary etc.) for the period 2014-2018, across areas (MSOAs) in England. We calculated directly age standardised proportions of the population admitted for these causes from each MSOA using the European Standard population.

Presentation

Breakdowns

Time period

2020

Demographic

Person

Geographic

Middle Super Output Areas (MSOA) level in England

Disclosure control

This indicator has been produced using a combination of safeguarded and publicly available datasets.

Output: savi_21_02_jul2020_MSOA.csv

Column name	Description
msoa11cd	MSOA 2011 code
savi	SAVI Index
s_savi	SAVI Index (Shrunked)

c_num	COVID-19 deaths
c_rate	COVID-19 rate (per 100,000 people)
exp_asr	Expected COVID-19 Rate (weighted for the age specific mortality rate of each MSOA)
smr	Standardized Mortality Ratio
tot_pop	Population (Census 2011)
days10	Days to first 10 cases
over80	Over 80 age group (%)
age16_64	16-64 age group (%)
wlincome	Average Income deprivation (IMD2019)
bame	Black, Asian and Minority Ethnic group (%)
num_ch	Number of Care Home beds
pct_ch	Care Home beds (%)
chronic	Long-term health conditions (Score)
p_1less	Overcrowded households (%)
ltla_cd	LTLA19 code
ltla_nm	LTLA19 name
utla_cd	UTLA19 code
utla_nm	UTLA19 name
hcl_nm	House of Commons Library MSOA name

Output: savi_21_02_jul2020_MSOA.shp - Shapefile format

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Revision history

Version	Date	Summary of changes
1.00	18 Jun 2020	First release
1.01	22 Jun 2020	<u>ADDITION:</u> COVID-19 deaths, 6 variables used in the SAVI index and codes/names for LTLAs, UTLAs and HCL MSOA names.
1.10	6 Jul 2020	<u>Changes to the final model:</u> Income deprivation and over 80 age group predictors have been removed from the final model. The model have been adjusted for the age profile of each MSOA and the long-term health conditions predictor was age adjusted.