

Supplementary Material

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Table S1. Indicators considered for inclusion in Static Socio-Ecological Vulnerability Index which were not retained in the final model. Reference lists are not exhaustive.

Indicator	Source	Geography	Modification	References
Population density	NOMIS ¹	MSOA		(1–3)
Higher Education progression rate	Office for Students (TUNDRA) ³	MSOA	Proportion population in higher education at age 18 or 19.	(1,4–6)
Air Quality Index	Gov.uk ²	LSOA	Averaged over LSOAs within MSOA	(7–9)
Rural Urban Classification	Data.gov ⁵	MSOA	Classification categories to numeric values 1-7 (1=most urban)	(2,7,8,10–13)
Long term illness	PHE Fingertips ⁶	MSOA		(2,7,14)
Cancer, % of GP patients with diagnosis on/after 1/4/2003	PLDR ⁷	LSOA	Averaged over LSOAs within each MSOA	(12,15–17)
Chronic Kidney Disease, % of GP patients >18	PLDR ⁷	LSOA	Averaged over LSOAs within each MSOA	(1,18)
Coronary Heart Disease, % of GP patients	PLDR ⁷	LSOA	Averaged over LSOAs within each MSOA	(3,14,19,20)
Stroke/Transient Ischaemic Attack (TIA), % of GP patients	PLDR ⁷	LSOA	Averaged over LSOAs within each MSOA	(19,21,22)
Atrial Fibrillation, % of GP patients	PLDR ⁷	LSOA	Averaged over LSOAs within each MSOA	(23)
Spend on adult social care per person, aged 18+†	LGInform ⁸	LA	Same value as LA	(7,17)

Smoking, prevalence of current smokers in 18+	PHE Fingertips ⁶	LA	Same value as LA	(7,16,22,24)
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1 <https://www.nomisweb.co.uk/>; 2 <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019>; 3 <https://www.officeforstudents.org.uk/data-and-analysis/young-participation-by-area/about-tundra/>; 4 <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates>; 5 <https://data.gov.uk/dataset/9c0e093d-d267-4eb8-90d8-54475ab4d1ff/rural-urban-classification-2011-of-middle-layer-super-output-areas-in-england-and-wales>; 6 <https://fingertips.phe.org.uk/>; 7 <https://pldr.org/>; 8 <https://lginform.local.gov.uk/>

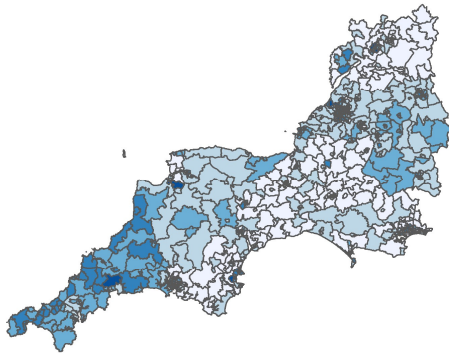
LA Local Authority; LSOA Lower Super Output Area; MSOA Middle Super Output Area; PLDR Place-Based Longitudinal Data Resource; TIA Transient Ischaemic Attack; TUNDRA Tracking underrepresentation by area. †Indicators with greater than 5% missing data. Indices were constructed using means of non-missing variables, so that all MSOA were assigned an index value irrespective of data completeness.

Comparative Index Construction

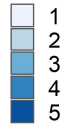
The index of Macharia *et al.* (2020) was constructed by combining variables associated with domains of vulnerability into two separate sub-indices (SVI and EVI) after each variable was scaled to a mean of 0 and oriented such that higher values indicated greater vulnerability. Each sub-index was compiled by summing the mean of the scaled variables in each domain, divided by the number of domains. Similarly, the SVI and EVI were subsequently combined by finding the mean of the two indices.

Figure S1. Distribution of quintiles of each subdomain of the static socio-ecological COVID-19 vulnerability index (SEVI) across the South West of England.

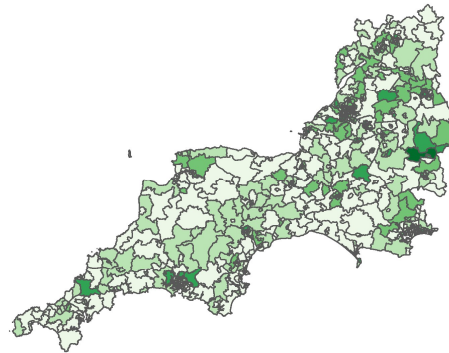
South West
Domain 1: Socioeconomic



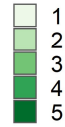
Quintile



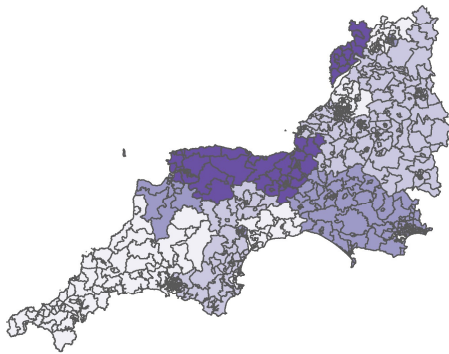
Domain 2: Ecological



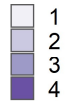
Quintile



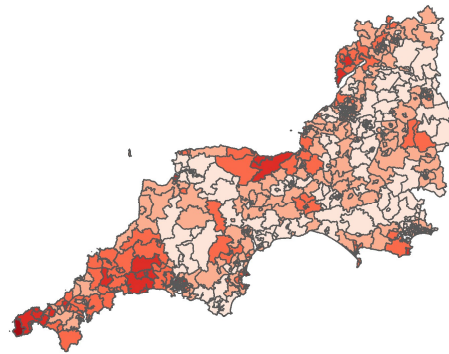
Domain 3: Healthcare



Quintile



Domain 4: Epidemiological



Quintile

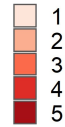
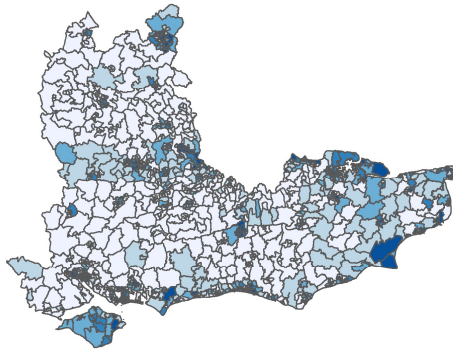


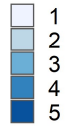
Figure S2. Distribution of quintiles of each subdomain of the static socio-ecological COVID-19 vulnerability index (SEVI) across the South East of England

South East

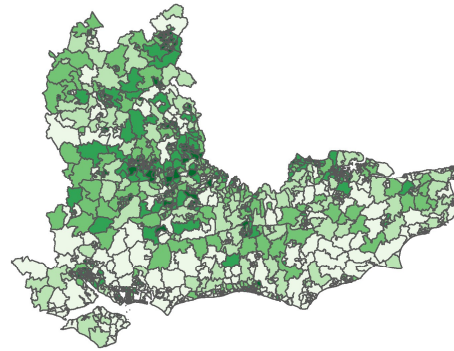
Domain 1: Socioeconomic



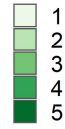
Quintile



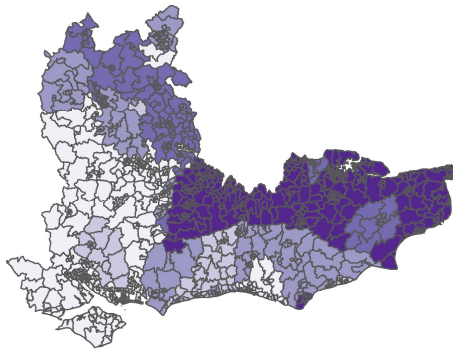
Domain 2: Ecological



Quintile



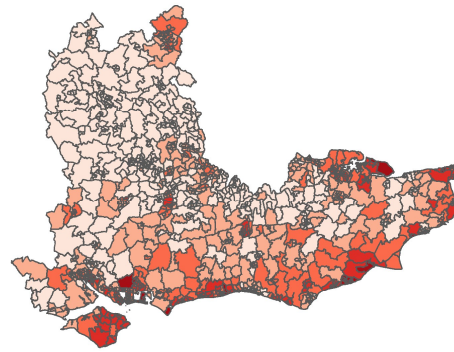
Domain 3: Healthcare



Quintile



Domain 4: Epidemiological



Quintile

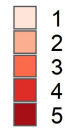
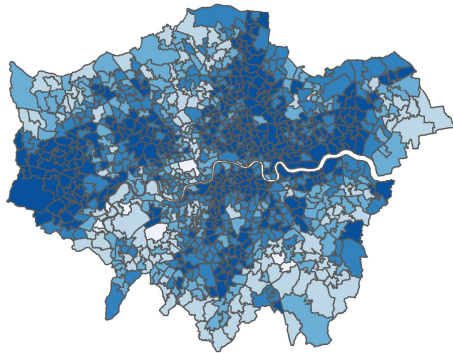


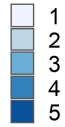
Figure S3. Distribution of quintiles of each subdomain of the static socio-ecological COVID-19 vulnerability index (SEVI) across London.

London

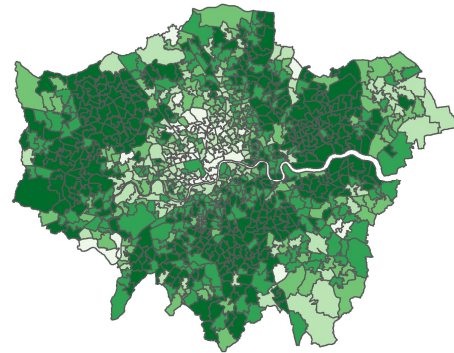
Domain 1: Socioeconomic



Quintile



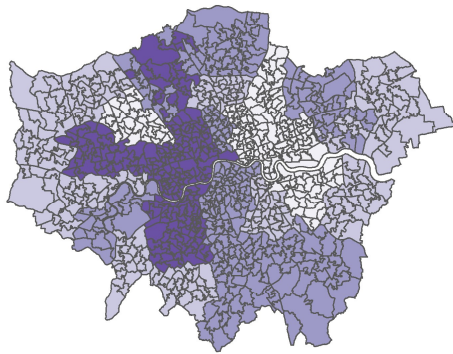
Domain 2: Ecological



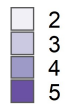
Quintile



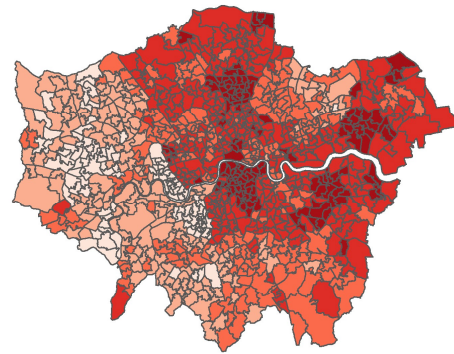
Domain 3: Healthcare



Quintile



Domain 4: Epidemiological

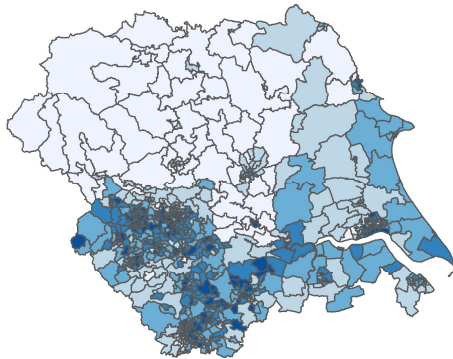


Quintile

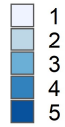


Figure S4. Distribution of quintiles of each subdomain of the static socio-ecological COVID-19 vulnerability index (SEVI) across Yorkshire and The Humber.

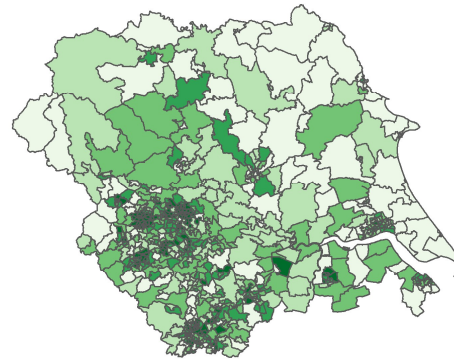
Yorkshire and The Humber
Domain 1: Socioeconomic



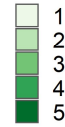
Quintile



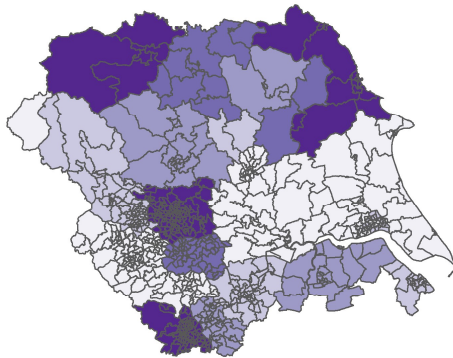
Domain 2: Ecological



Quintile



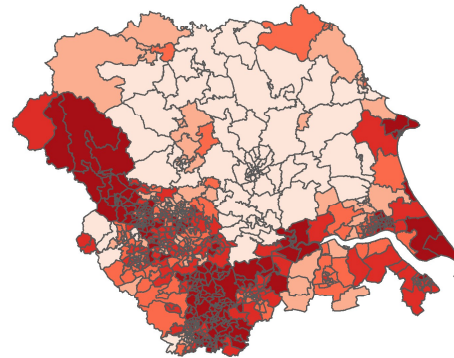
Domain 3: Healthcare



Quintile



Domain 4: Epidemiological



Quintile

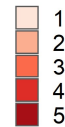


Figure S5. Distribution of quintiles of each subdomain of the static socio-ecological COVID-19 vulnerability index (SEVI) across the East Midlands of England

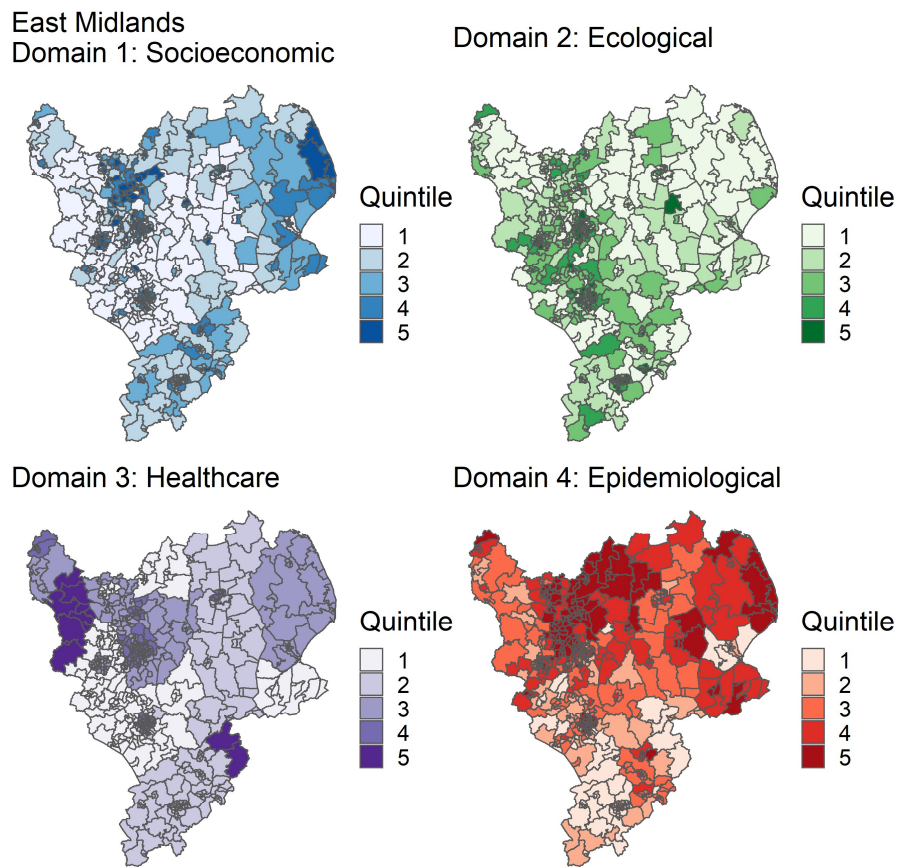


Figure S6. Distribution of quintiles of each subdomain of the static socio-ecological COVID-19 vulnerability index (SEVI) across the West Midlands of England.

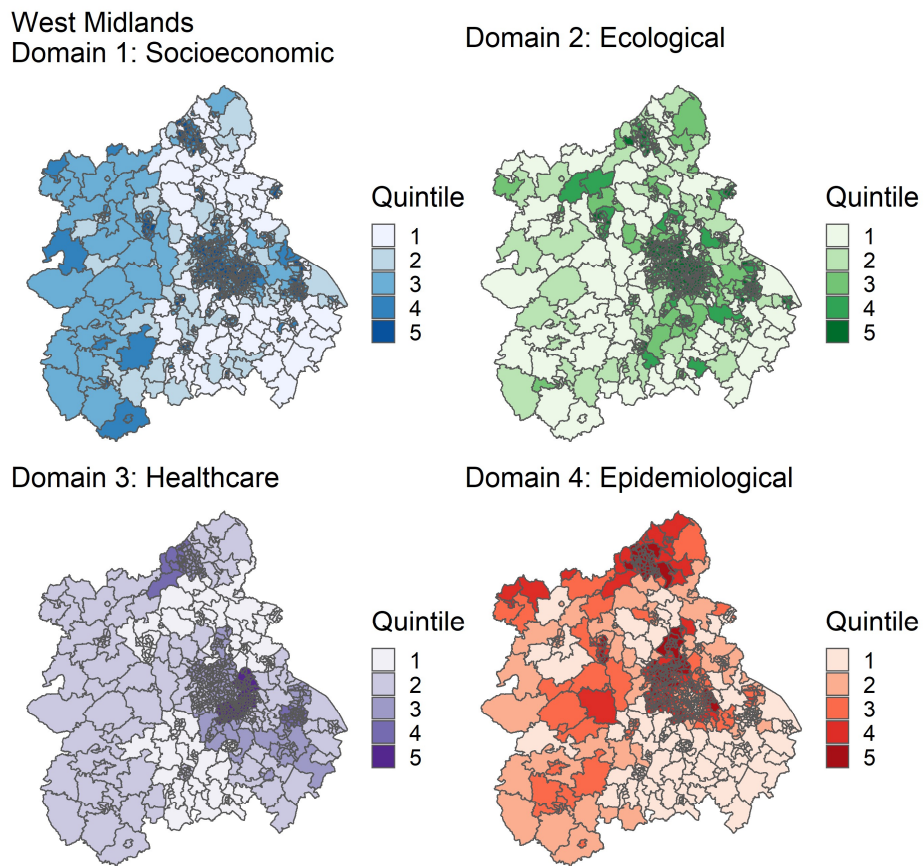


Figure S7. Distribution of quintiles of each subdomain of the static socio-ecological COVID-19 vulnerability index (SEVI) across the East of England.

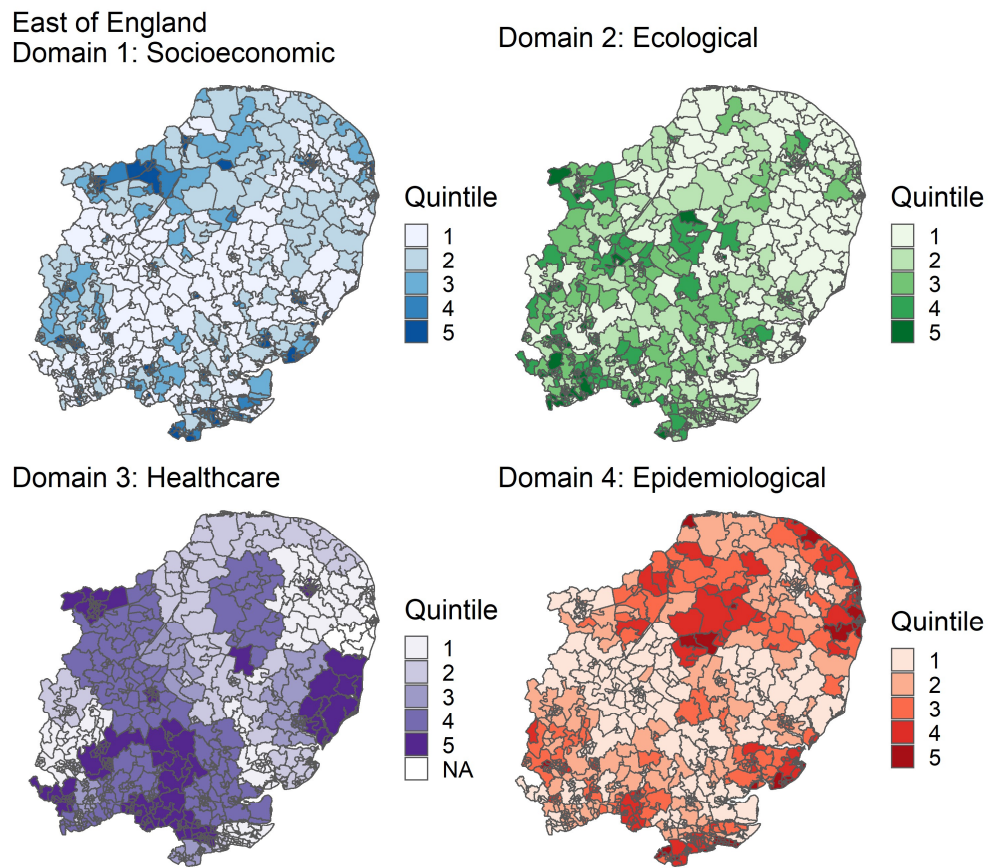


Figure S8. Distribution of quintiles of each subdomain of the static socio-ecological COVID-19 vulnerability index (SEVI) across the North West of England.

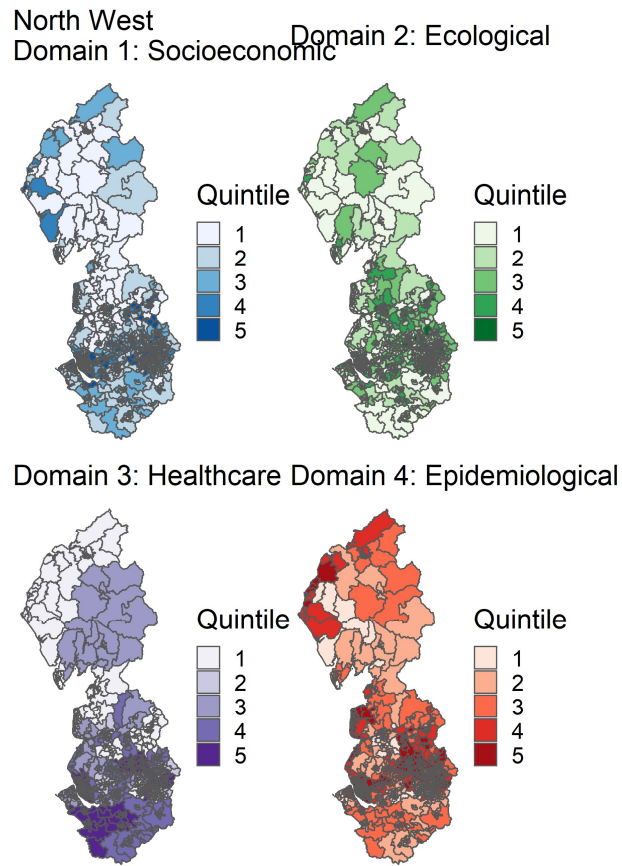
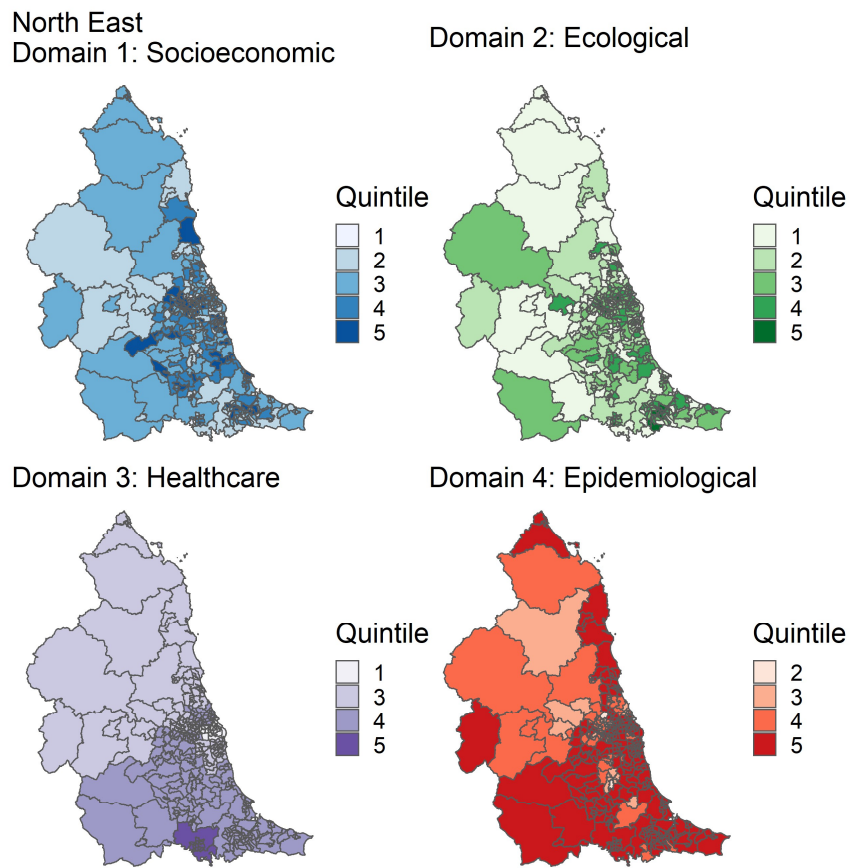


Figure S9. Distribution of quintiles of each subdomain of the static socio-ecological COVID-19 vulnerability index (SEVI) across the North East of England.



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