

Supplementary Material: A spatio-temporal model to estimate life expectancy and to detect unusual trends at the local authority level in England

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Table S1: : Local authorities with a low life expectancy for their deprivation level for females under the model with deprivation index at 2010. The areas detected under the model with deprivation index at 2019 are a subset (in bold). We present the posterior probability under the two models.

Local Authority	Year	IMD2010		IMD2019	
		Decile	Pr($\omega_{it}>0.95$)	Decile	Pr($\omega_{it}>0.95$)
Blackpool	2017	D1	0.976	D1	0.912
Blackpool	2018	D1	0.959	D1	0.871
Bradford	2013	D1	0.981	D1	0.941
Kingston upon Hull, City of	2014	D1	0.951	D1	0.881
Kingston upon Hull, City of	2015	D1	0.972	D1	0.914
Kingston upon Hull, City of	2017	D1	0.997	D1	0.977
Kingston upon Hull, City of	2018	D1	0.981	D1	0.915
Manchester	2014	D1	0.960	D1	0.894
Oldham	2014	D1	0.980	D1	0.949
Stoke-on-Trent	2017	D1	0.980	D1	0.913
Stoke-on-Trent	2018	D1	1.000	D1	0.999
Tameside	2018	D1	0.993	D1	0.969
Wolverhampton	2017	D1	0.961	D1	0.864
Wolverhampton	2018	D1	0.991	D1	0.941
Leeds	2013	D3	0.999	D2	0.997
Leeds	2015	D3	0.981	D2	0.958
Leeds	2018	D3	1.000	D2	1.000
Newcastle upon Tyne	2015	D2	0.974	D2	0.951
Mansfield	2017	D2	0.962	D2	0.919
Plymouth	2017	D3	0.986	D2	0.970
King's Lynn and West Norfolk	2017	D3	0.951	D3	0.922
Medway	2014	D3	0.952	D3	0.930
Derby	2018	D4	0.954	D3	0.956
County Durham	2013	D3	0.989	D4	0.978
Cornwall inc Isles of Scilly	2013	D3	0.956	D4	0.923
Cornwall inc Isles of Scilly	2016	D3	0.974	D4	0.964
North Tyneside	2017	D4	0.954	D4	0.925
Breckland	2015	D5	0.956	D5	0.912
Stockport	2013	D5	0.967	D5	0.942
Bournemouth, Christchurch and Poole	2015	D3	0.998	D6	0.996
Bournemouth, Christchurch and Poole	2016	D3	0.959	D6	0.941
Bournemouth, Christchurch and Poole	2017	D3	0.975	D6	0.963
Colchester	2014	D7	0.959	D6	0.925
Colchester	2017	D7	0.970	D6	0.939
East Riding of Yorkshire	2012	D7	0.967	D7	0.931

Epping Forest	2014	D7	0.955	D7	0.905
Dorset Council	2016	D7	0.982	D7	0.946
North Somerset	2015	D7	0.967	D7	0.920
Chelmsford	2017	D6	0.965	D8	0.908
Sutton	2014	D6	0.974	D8	0.954
Tonbridge and Malling	2018	D8	0.954	D8	0.889
Stroud	2013	D8	0.977	D9	0.954
Stroud	2017	D8	0.952	D9	0.932
Harrogate	2014	D9	0.951	D9	0.901

Table S2: Local authorities with a low life expectancy for their deprivation level for males under the model with deprivation index at 2010. The areas detected under the model with deprivation index at 2019 are a subset (in bold). We present the posterior probability under the two models.

Local Authority	Year	IMD2010		IMD2019	
		Decile	$\Pr(\omega_{it}>0.95)$	Decile	$\Pr(\omega_{it}>0.95)$
Middlesbrough	2014	D1	0.962	D1	0.944
Middlesbrough	2017	D1	0.989	D1	0.976
Blackpool	2015	D1	0.993	D1	0.985
Blackpool	2018	D1	0.952	D1	0.896
Kingston upon Hull, City of	2016	D1	0.955	D1	0.892
Kingston upon Hull, City of	2017	D1	1.000	D1	0.998
Leicester	2015	D1	0.953	D1	0.902
Leicester	2017	D1	0.960	D1	0.891
Manchester	2014	D1	0.970	D1	0.933
Stoke-on-Trent	2018	D1	0.974	D1	0.918
South Tyneside	2018	D2	0.967	D1	0.945
Birmingham	2014	D1	1.000	D1	0.996
Walsall	2015	D2	0.970	D1	0.933
Walsall	2017	D2	0.974	D1	0.920
Wolverhampton	2018	D1	0.995	D1	0.978
Bradford	2016	D1	0.965	D1	0.870
Leeds	2015	D3	0.980	D2	0.985
Newcastle upon Tyne	2014	D2	0.967	D2	0.970
Southampton	2013	D3	0.974	D2	0.977
Tendring	2017	D3	0.961	D2	0.967
Bristol, City of	2013	D3	0.975	D3	0.985
Bristol, City of	2018	D3	0.977	D3	0.990
Cornwall inc Isles of Scilly	2018	D3	0.995	D4	0.993
Ashford	2018	D6	0.957	D5	0.958
Breckland	2018	D6	0.995	D5	0.995
Hillingdon	2018	D4	0.951	D5	0.959
Cherwell	2014	D8	0.952	D7	0.942
Dorset Council	2016	D7	0.963	D7	0.965
Teignbridge	2012	D6	0.965	D7	0.964
Stroud	2016	D8	0.975	D9	0.976
Bath and North East					
Somerset	2016	D9	0.966	D9	0.967

Mortality rates for the detected areas under the main model and comparison against the corresponding decile (IMD2019), females

Figure S1: Kingston upon Hull, females

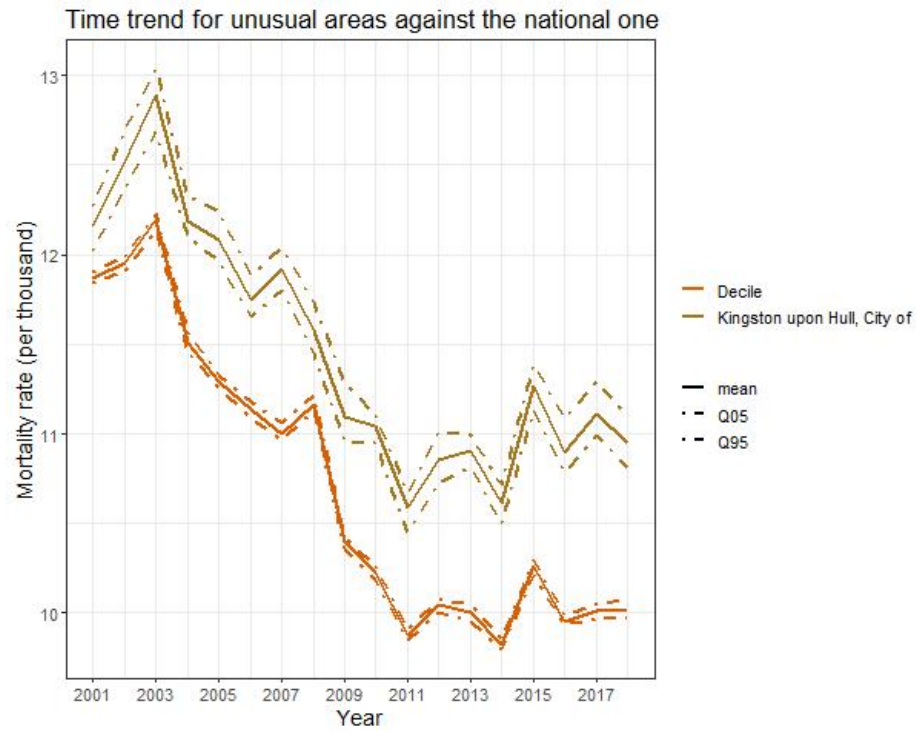


Figure S2: Stoke-on-Trent, females

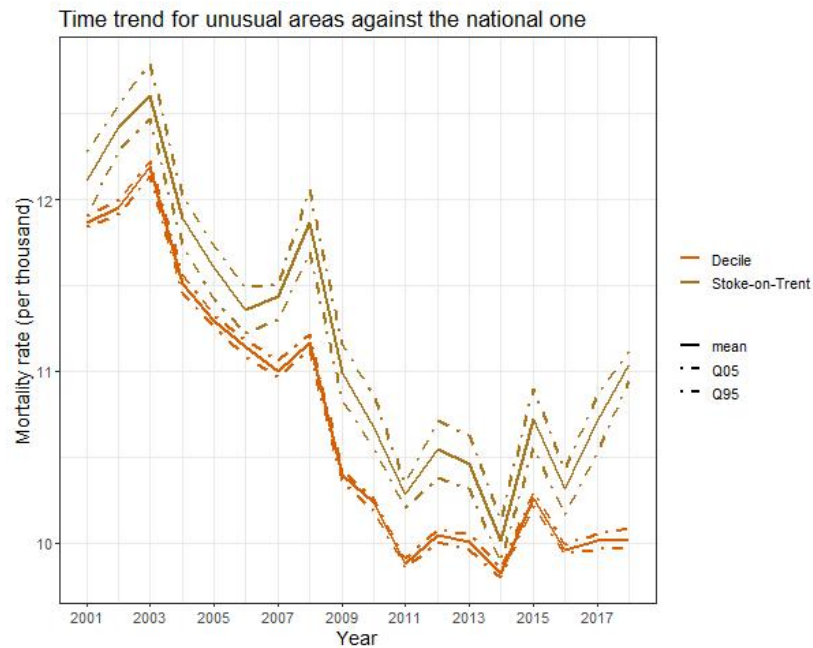


Figure S3: Tameside, females

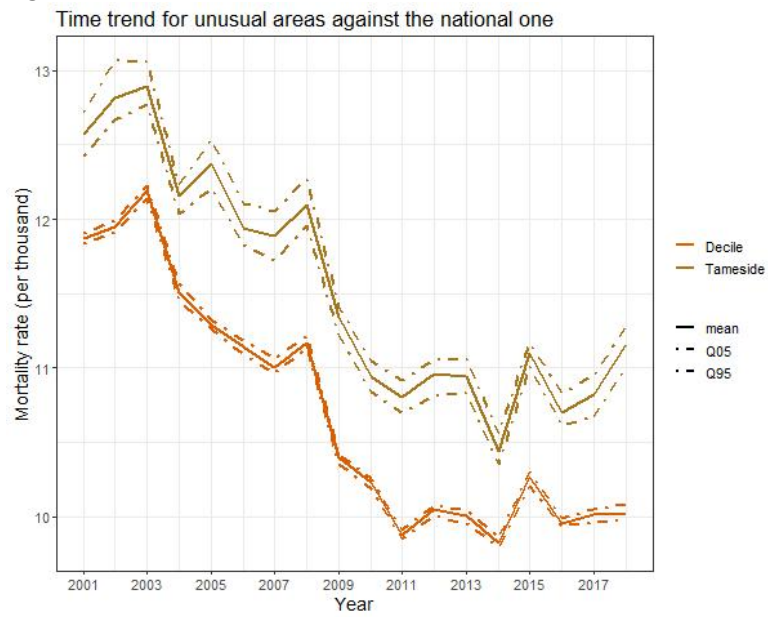


Figure S4: Newcastle upon Tyne, females

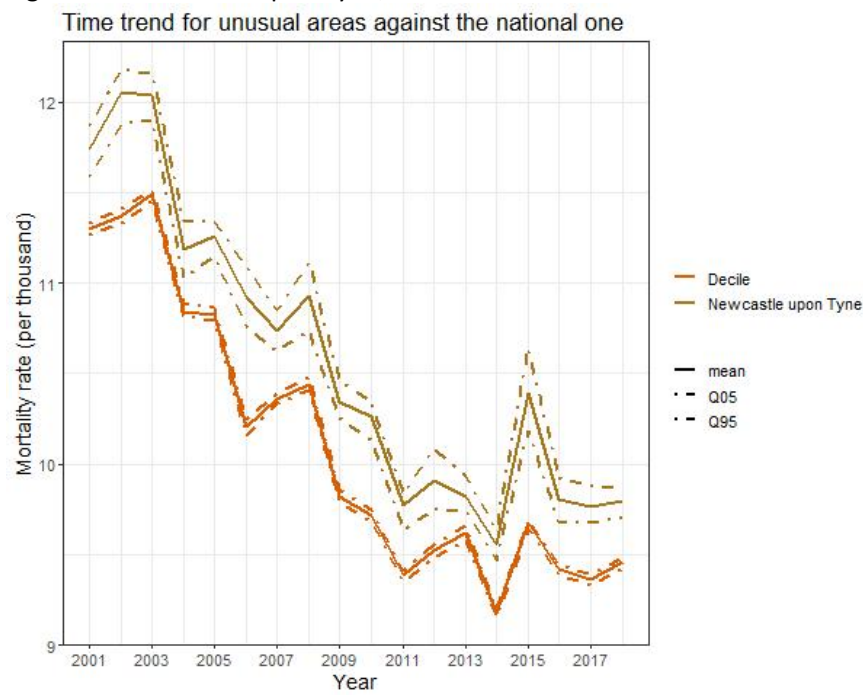


Figure S5: Plymouth, females

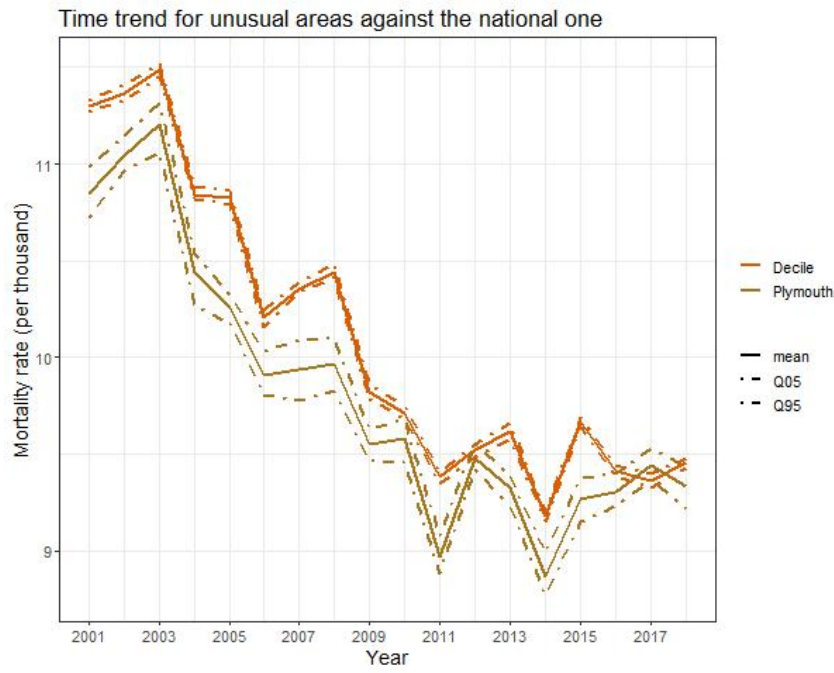


Figure S6: Leeds, females

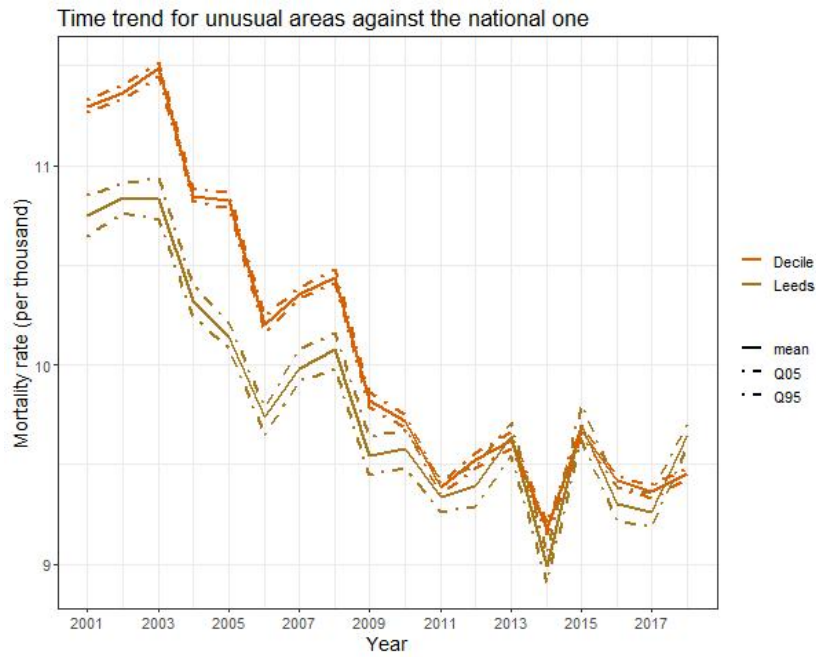


Figure S7: Derby, females

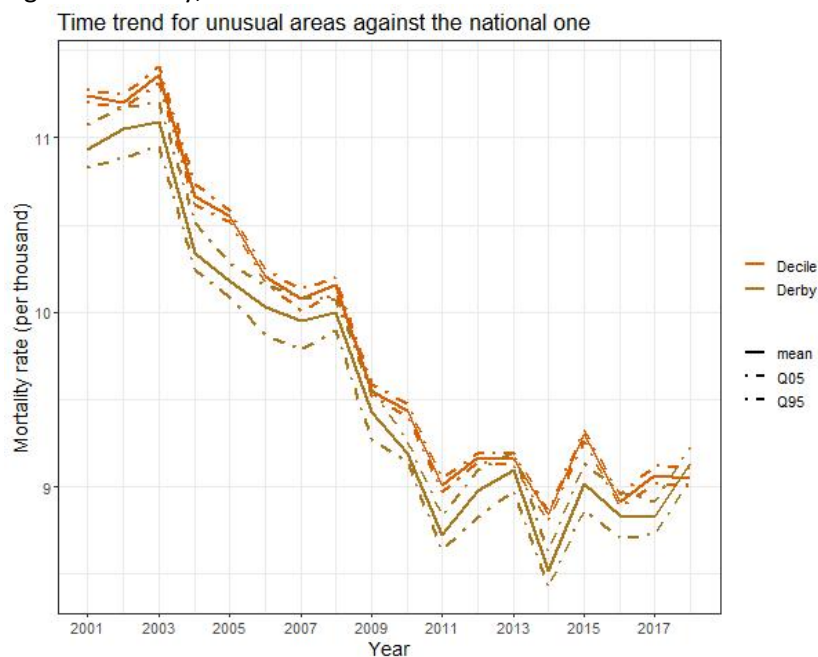


Figure S8: County Durham, females

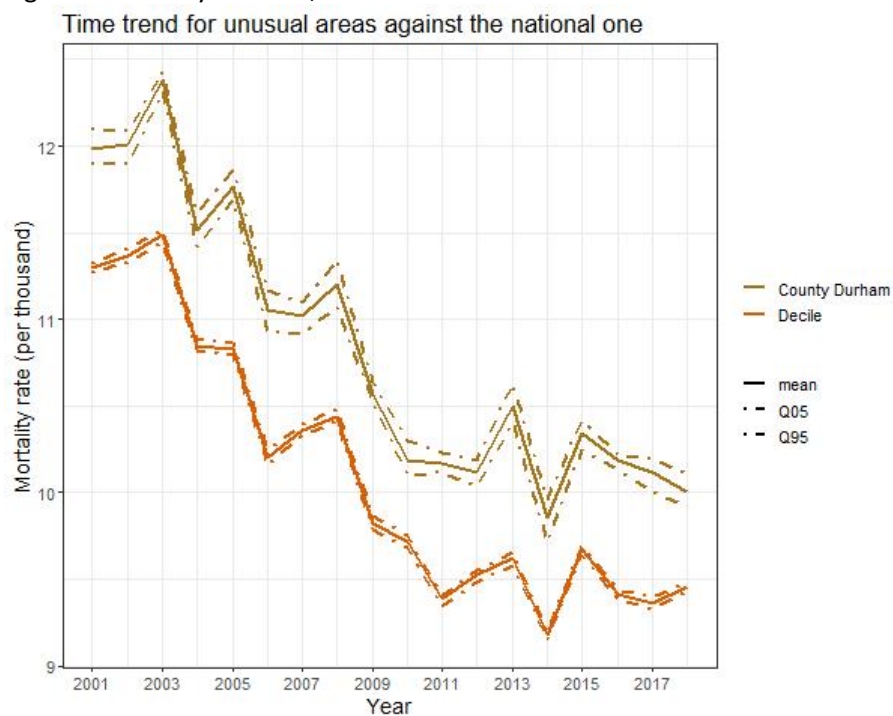


Figure S9: Cornwall including the Isles of Scilly, females
Time trend for unusual areas against the national one

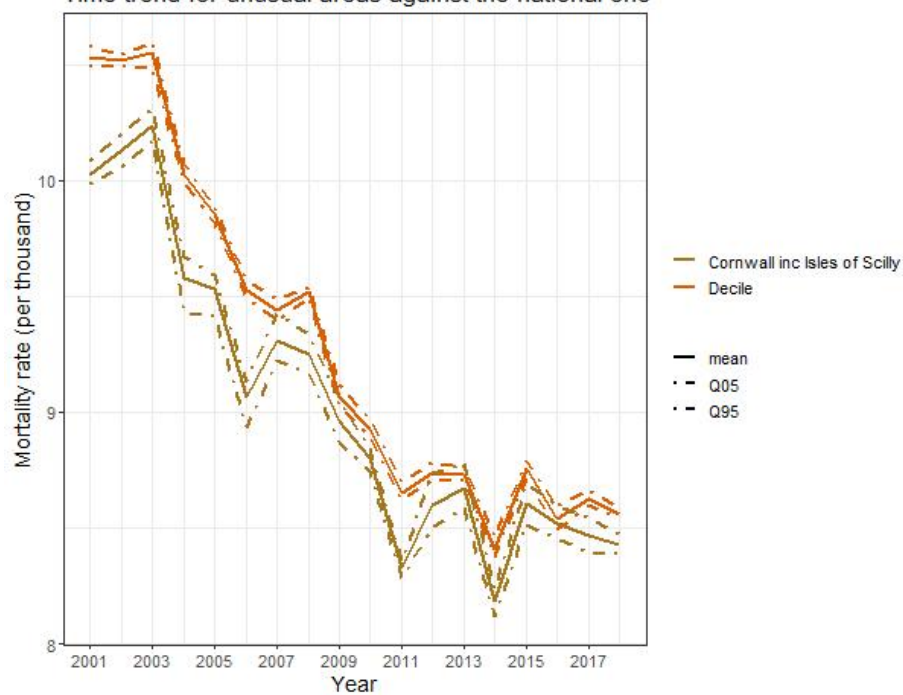


Figure S10: Bournemouth, Christchurch and Poole, Females
Time trend for unusual areas against the national one

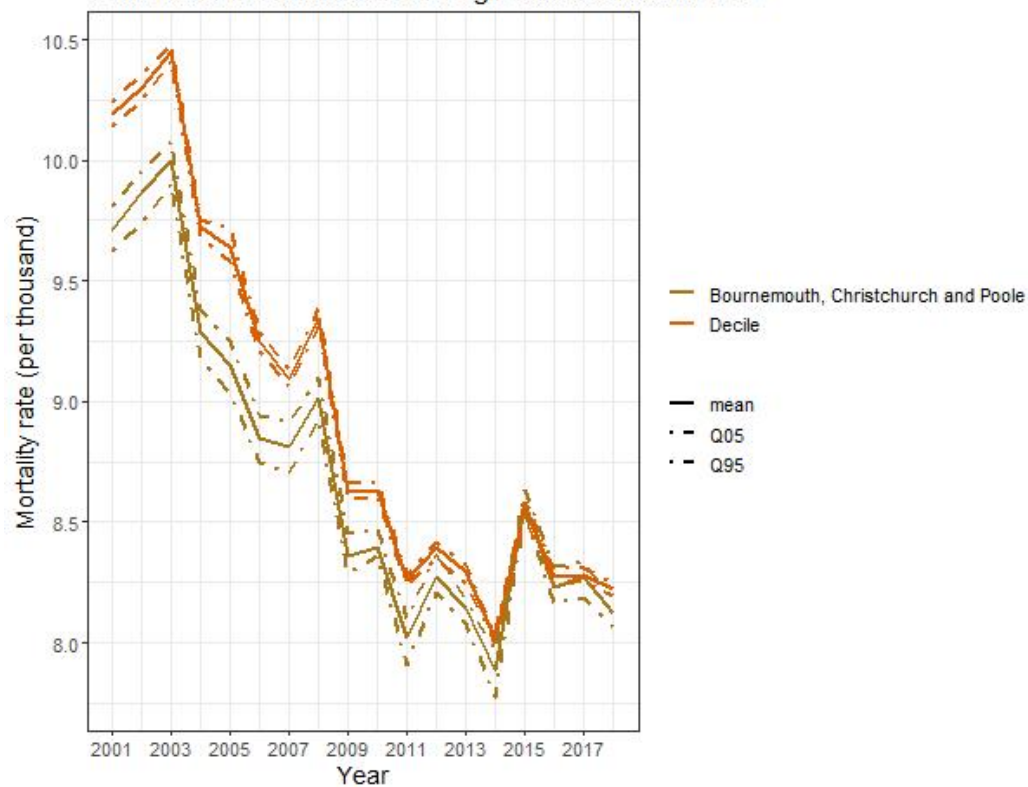


Figure S11: Stroud, females

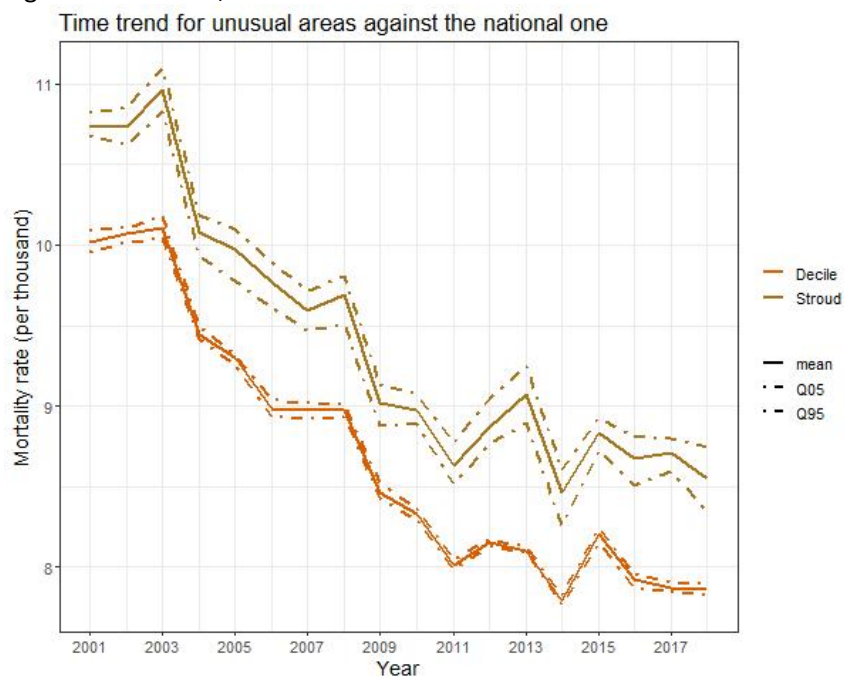
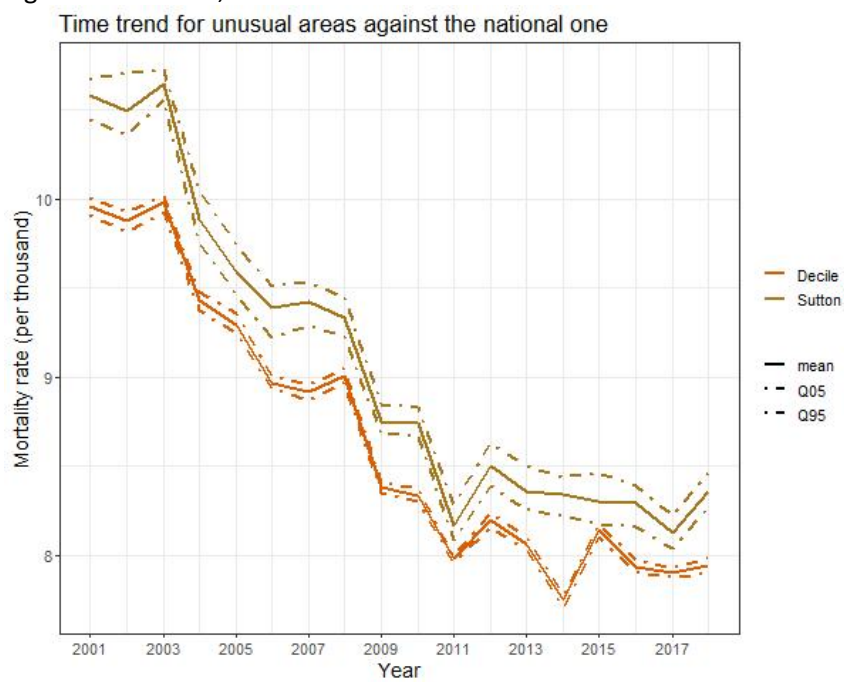


Figure S12: Sutton, females



Mortality rates for the detected areas under the main model and comparison against the corresponding decile (IMD2019), males

Figure S13: Middlesbrough, males

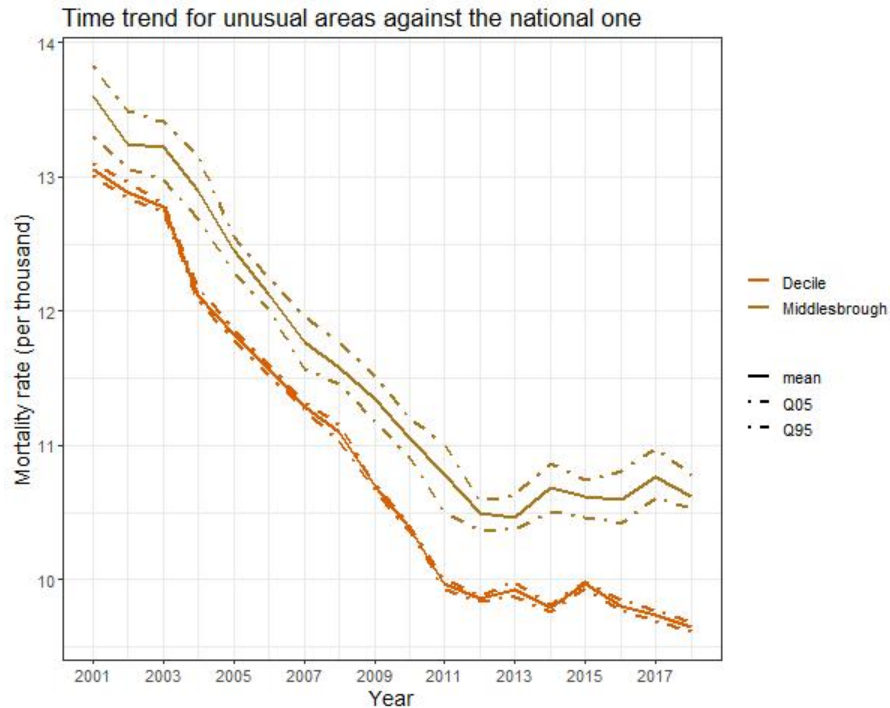


Figure S14: Wolverhampton, males

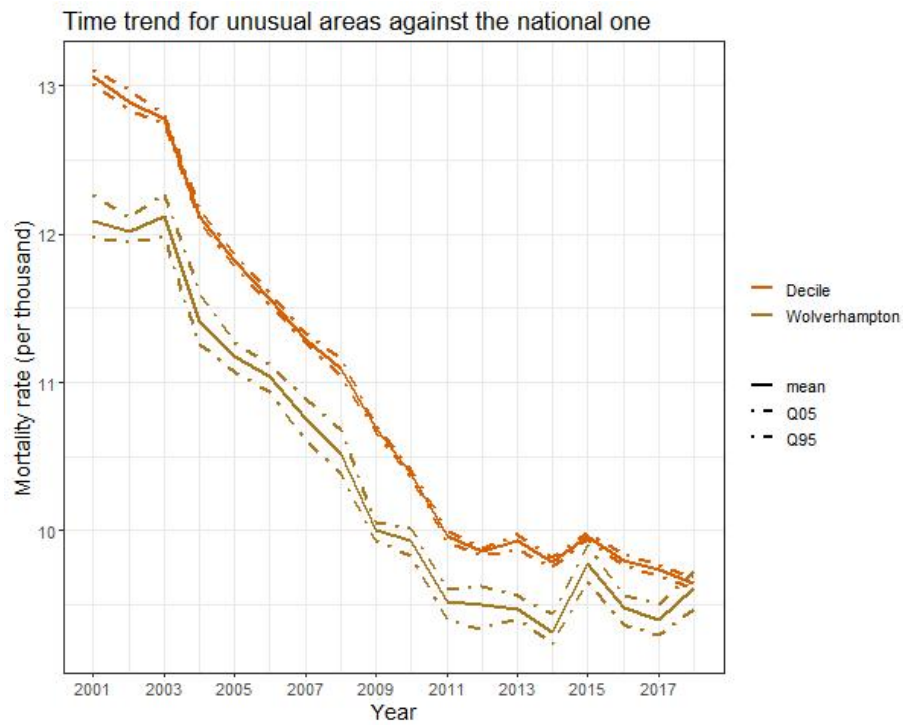


Figure S15: Kingston upon Hull, males

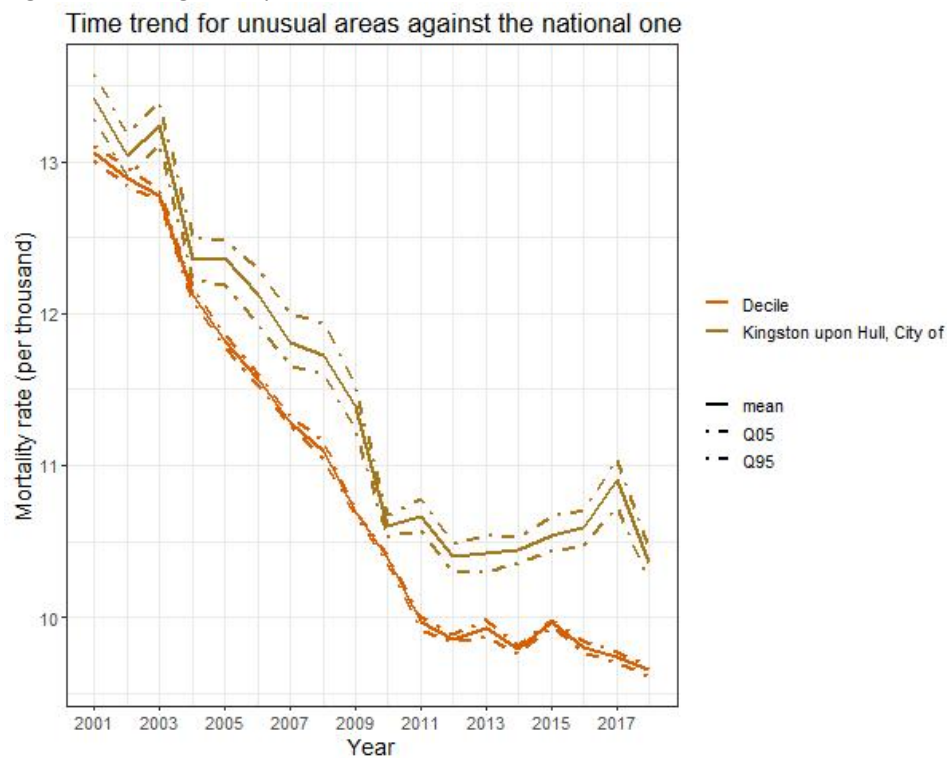


Figure S16: Birmingham, males

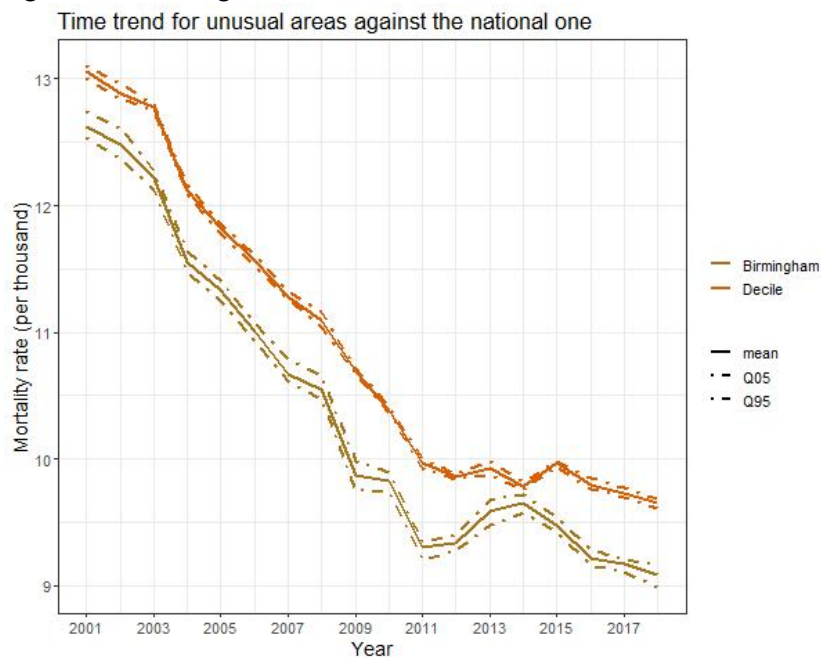


Figure S17: Tendring, males

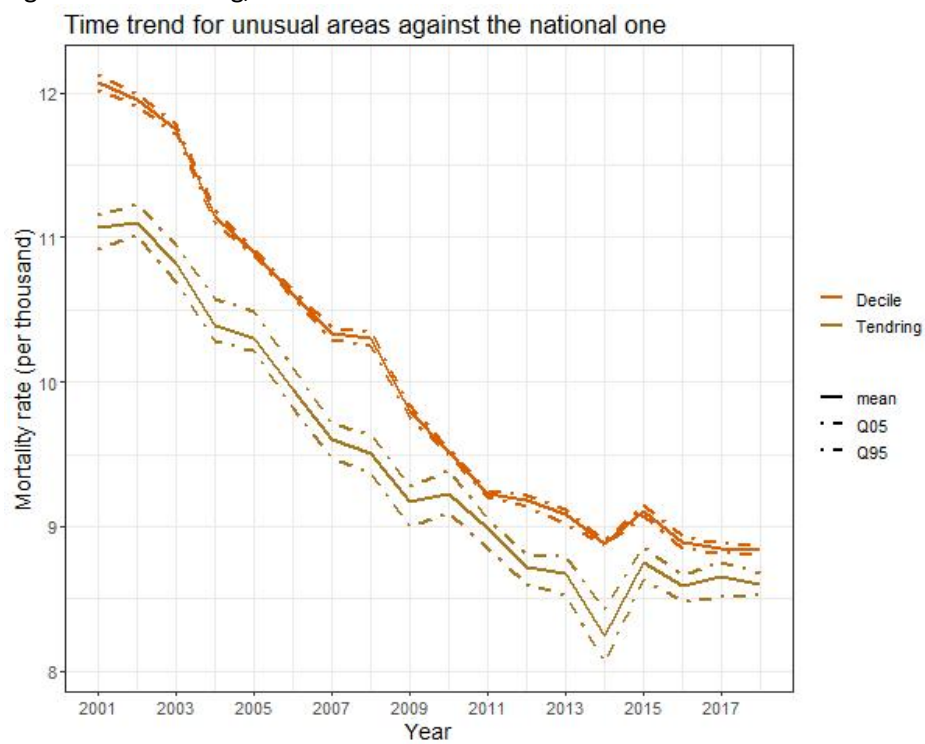


Figure S18: Leeds, males

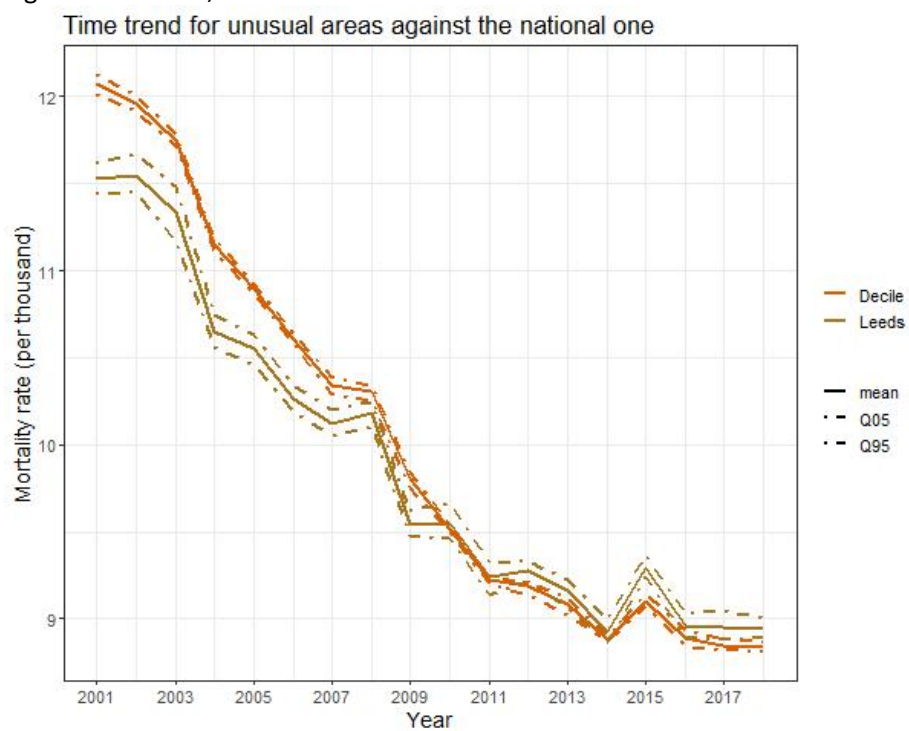


Figure S19: Newcastle upon Tyne, males

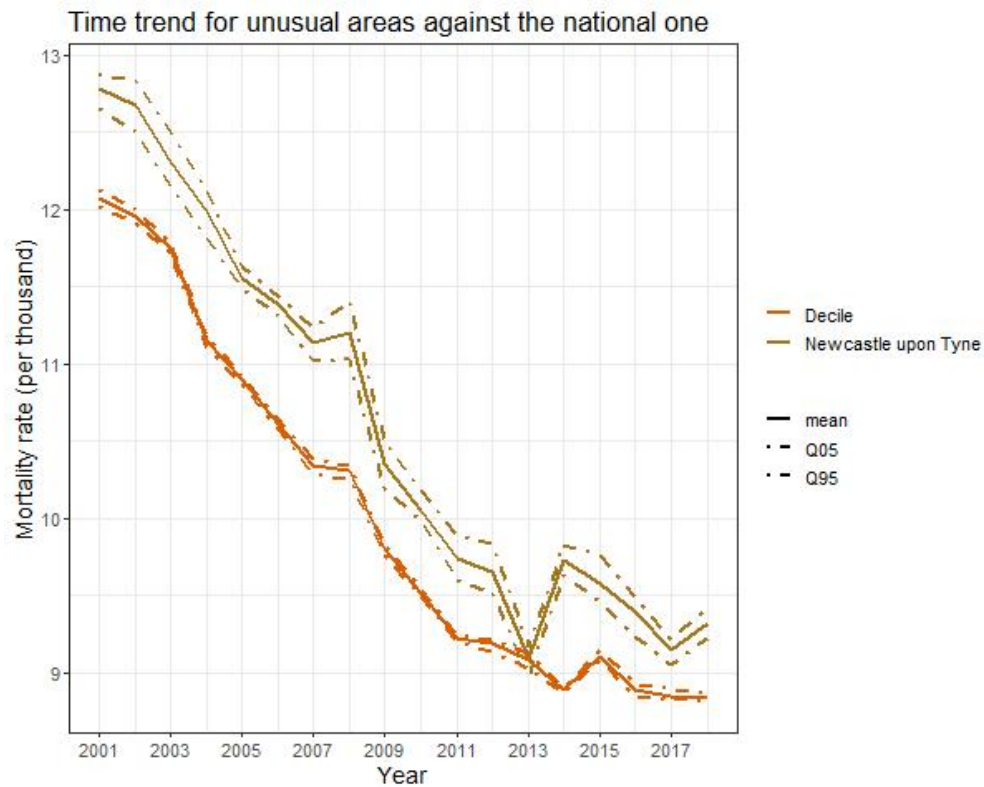


Figure S20: Southampton, males

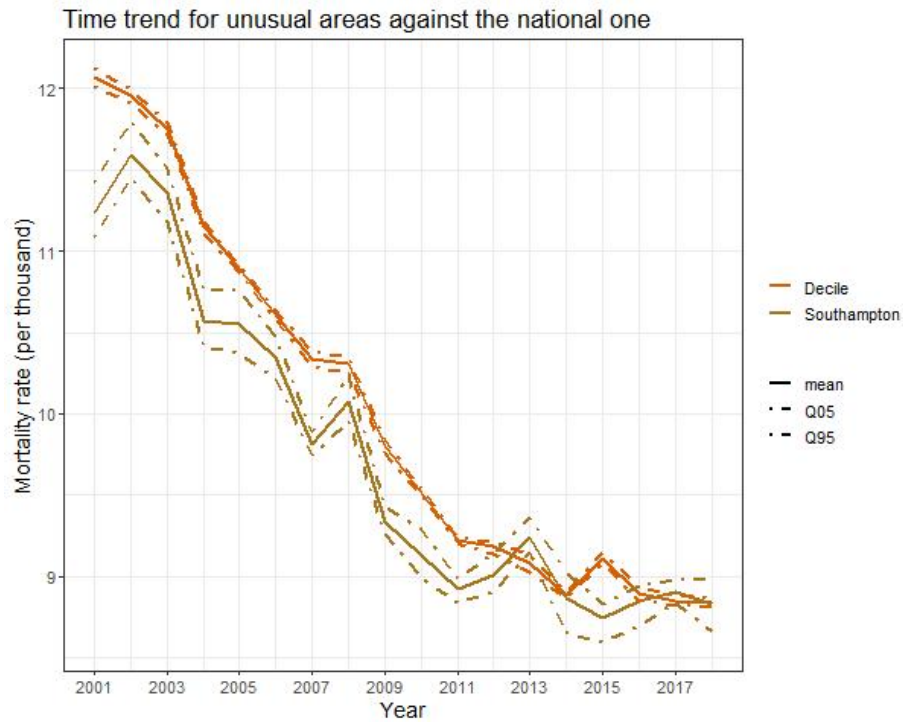


Figure S21: Bristol, males

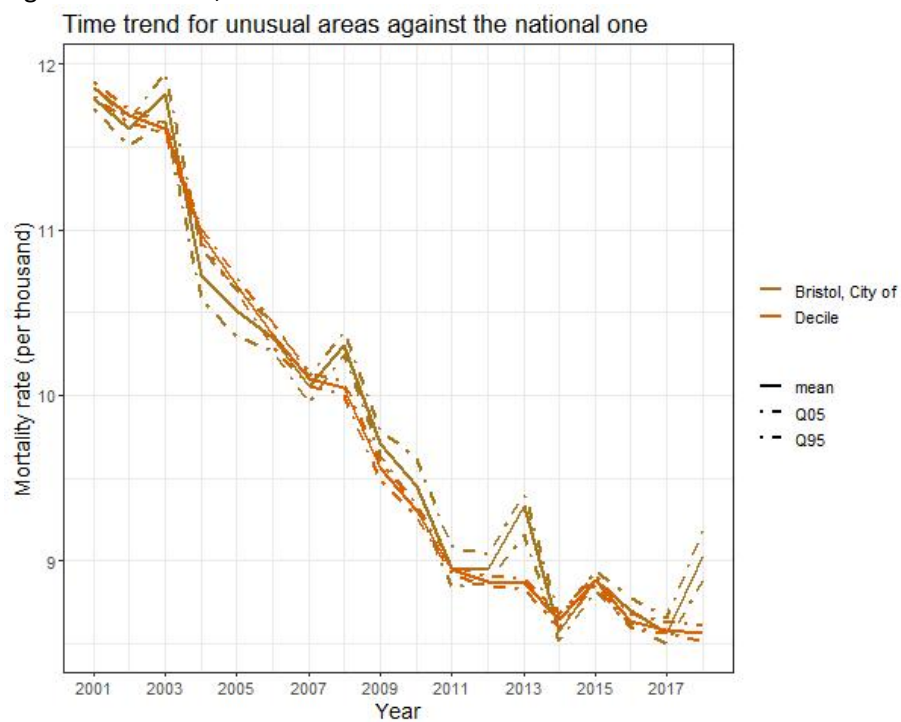


Figure S22: Cornwall including Isles of Scilly, males

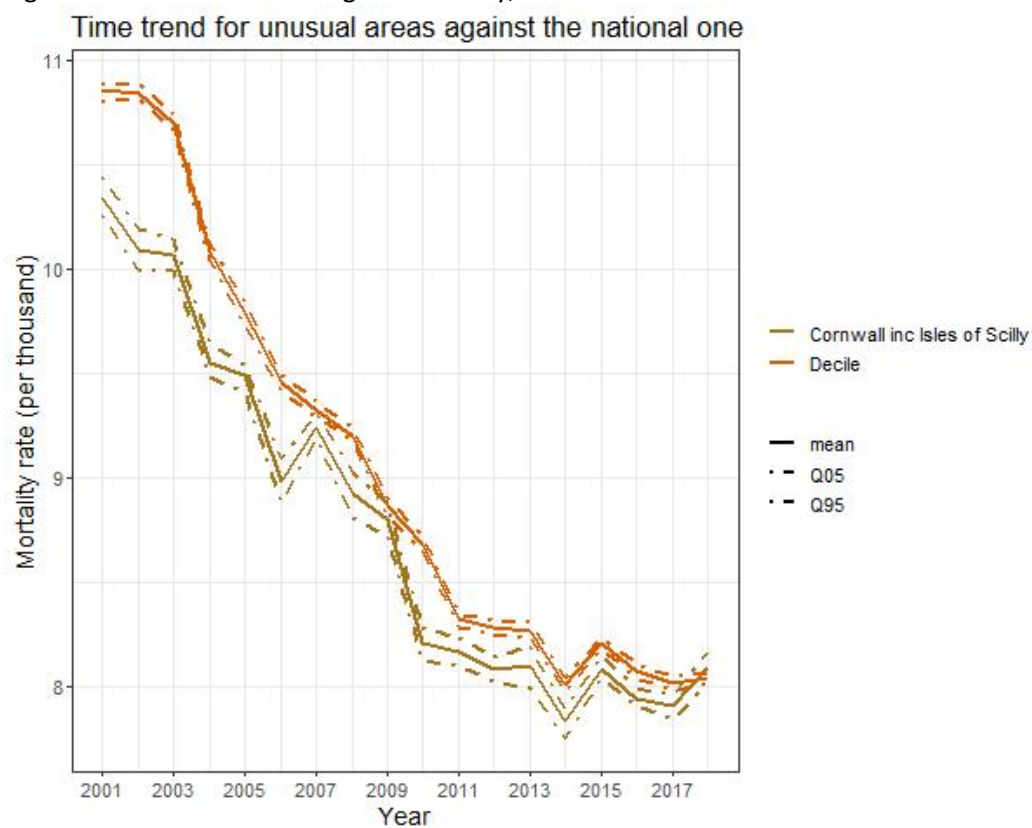


Figure S23: Breckland, males

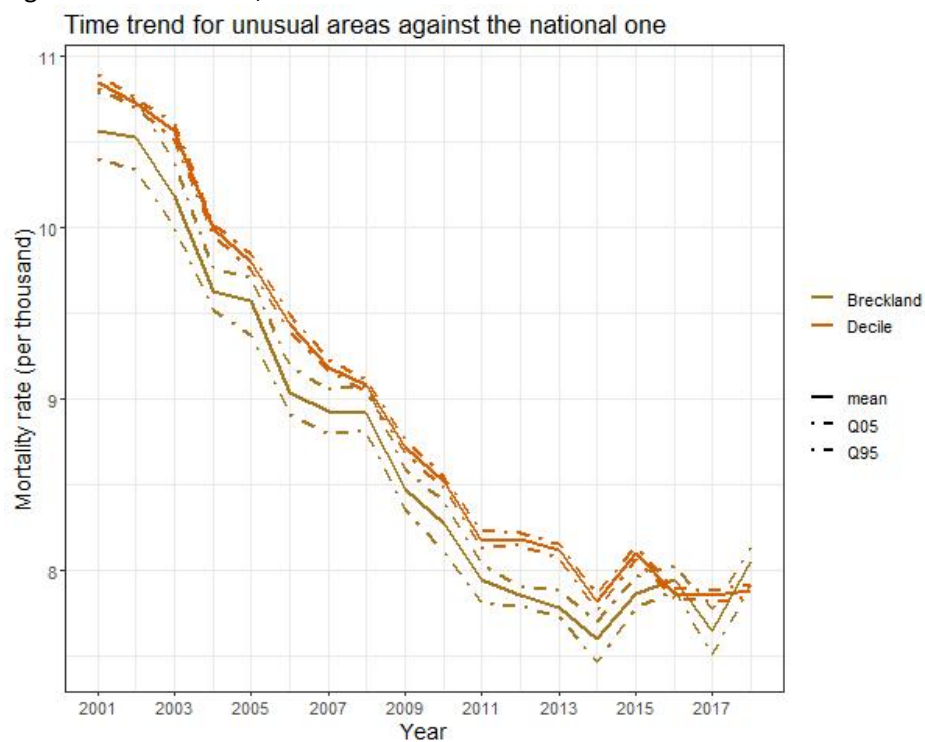


Figure S24: Ashford, males

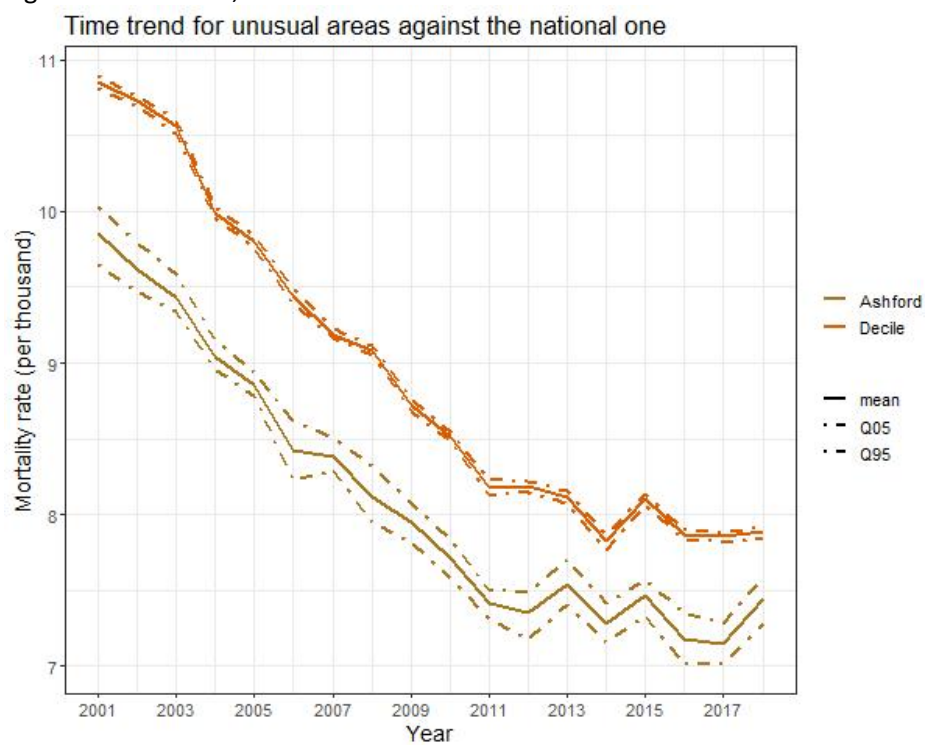


Figure S25: Hillingdon, males

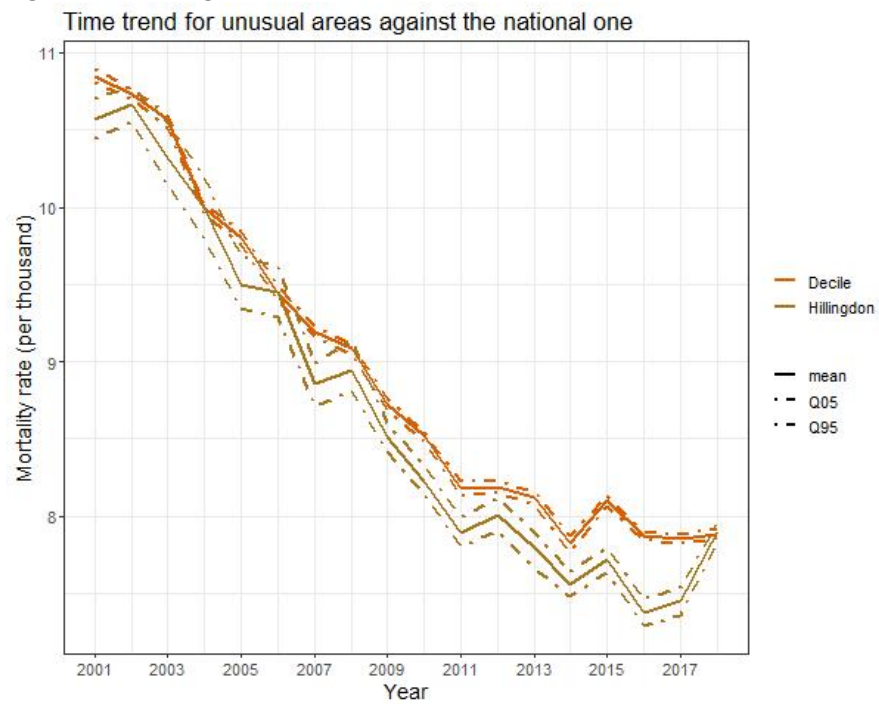


Figure S26: Cheshire West and Chester, males

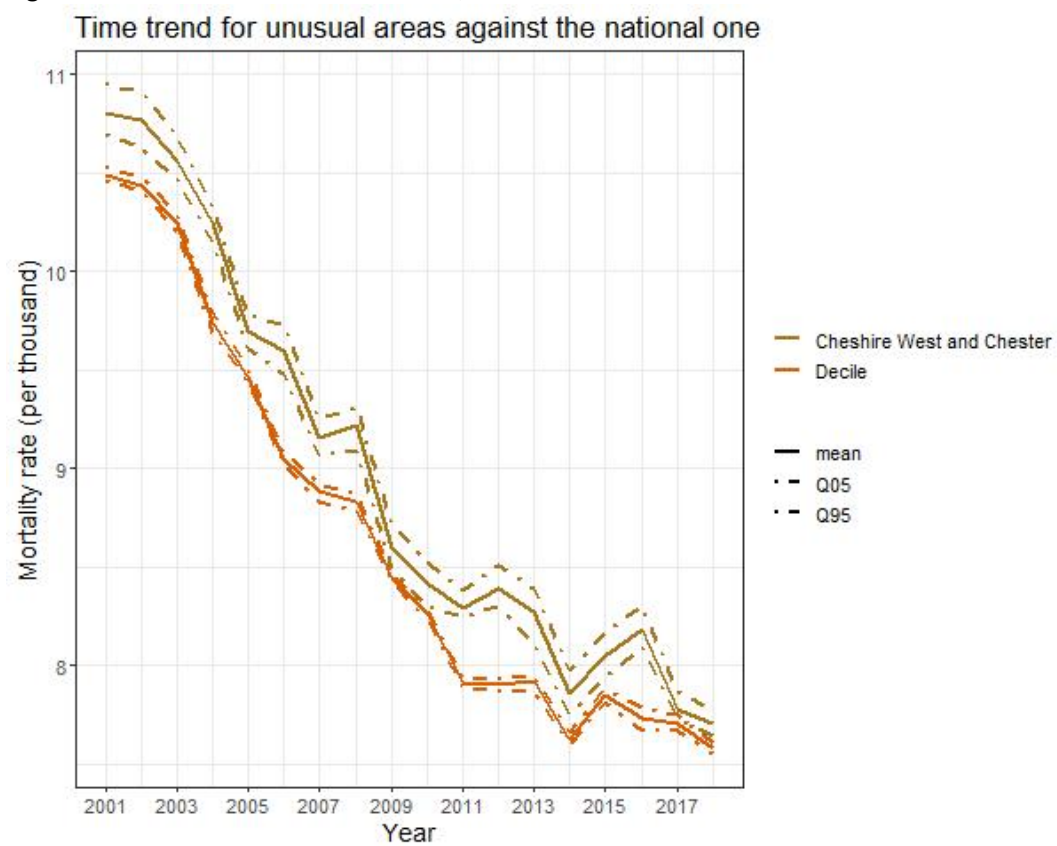


Figure S27: Dorset council, males

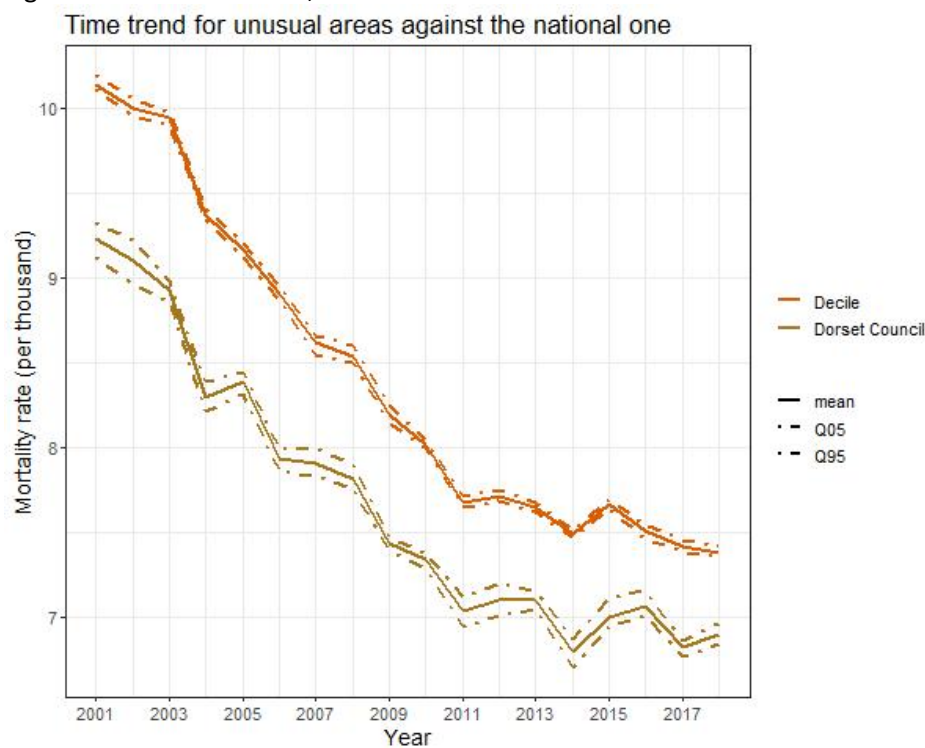


Figure S28: Teignbridge, males

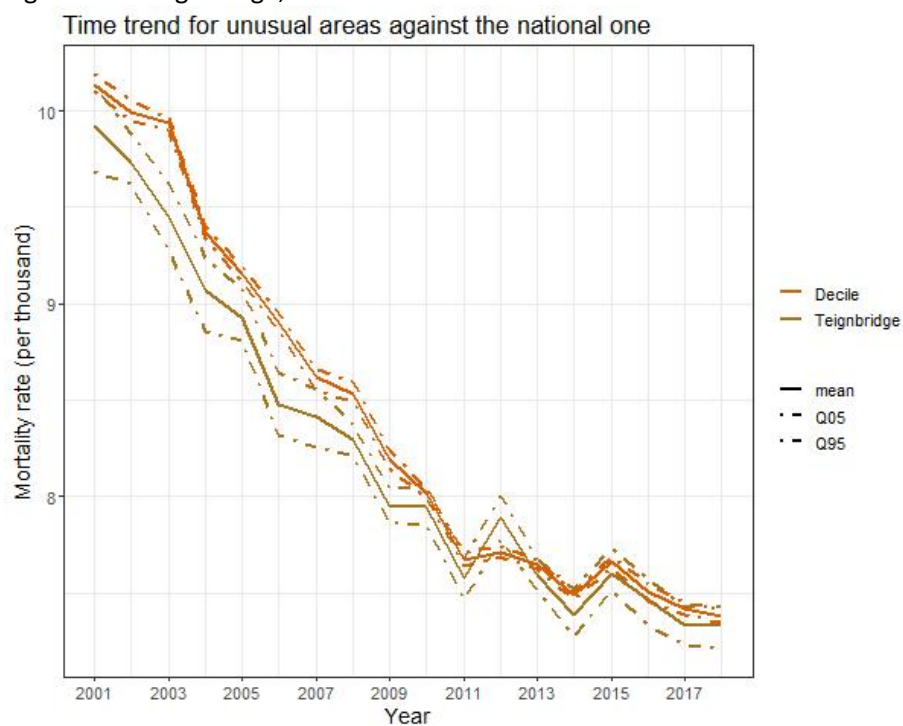


Figure S29: Stroud, males

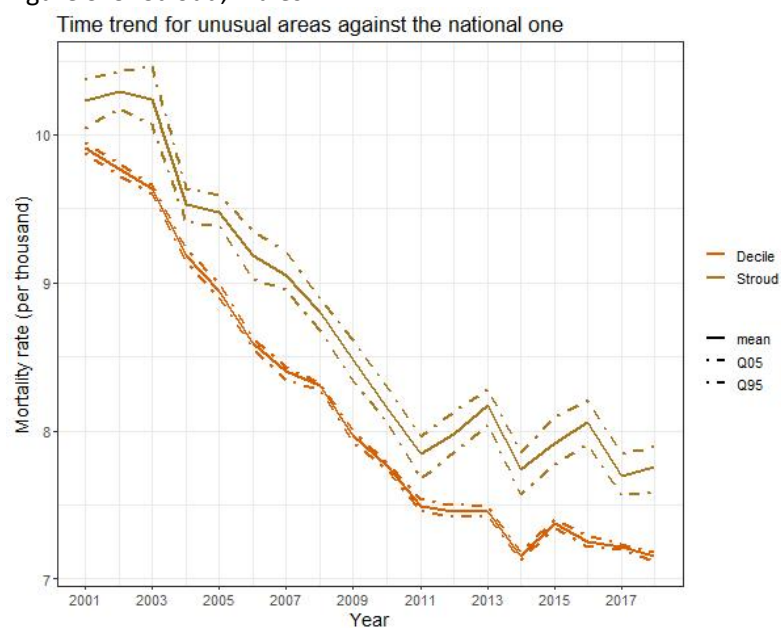


Figure S30: Bath and North East Somerset, males

