

Appendices

Appendix 1: Negative binomial regression results of the associations between area deprivation and the impacts of COVID-19 (outbreaks and deaths) on care home residents across England.

	(1)	(2)	(3)	(4)	(5)	(6)
	Number of outbreaks (IDAOPi)	Number of outbreaks (IMD extent)	COVID-19 related deaths (IDAOPi)	COVID-19 related deaths (IMD extent)	All cause deaths (IDAOPi)	All cause deaths (IMD extent)
IDAOPi (quartiles)						
1	(Reference)		(Reference)		(Reference)	
2	-0.106* (0.063)		0.065 (0.072)		0.073** (0.037)	
3	-0.014 (0.077)		0.195** (0.080)		0.086** (0.043)	
4	-0.006 (0.084)		0.210** (0.089)		0.071 (0.052)	
IMD extent (quartiles)						
1		(Reference)		(Reference)		(Reference)
2		-0.065 (0.068)		0.078 (0.073)		0.047 (0.037)
3		-0.062 (0.070)		0.040 (0.067)		0.045 (0.037)
4		0.030 (0.069)		0.149** (0.075)		0.046 (0.042)
Number of beds	0.000 (0.000)	0.000 (0.000)	(Offset variable)	(Offset variable)	(Offset variable)	(Offset variable)
Number of care homes	(Offset variable)	(Offset variable)	-0.007*** (0.001)	-0.007*** (0.001)	-0.003*** (0.000)	-0.003*** (0.000)
Population density	0.003** (0.001)	0.004*** (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.002** (0.001)	-0.002** (0.001)
Black and minority population	-0.003 (0.002)	-0.003 (0.002)	0.002 (0.002)	0.003 (0.002)	0.002* (0.001)	0.002** (0.001)
Number of people above 65	-0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000*** (0.000)
Number of outbreaks			0.011*** (0.002)	0.011*** (0.002)	0.004*** (0.001)	0.004*** (0.001)
Obs.	149	149	149	149	149	149

Results are estimated using negative binomial regressions due to significant evidence ($p < 0.05$) of over-dispersion in all three outcomes. Standard errors are estimated using the Huber-White sandwich estimator and presented in parenthesis. IDAOPi = Income Deprivation Affecting Older People Index; IMD = Indices of Multiple Deprivation.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix 2: Negative binomial regression results with number of care homes and beds included as control (rather than offset) variables.

	(1) Number of outbreaks (IDAOPI)	(2) Number of outbreaks (IMD extent)	(3) COVID-19 related deaths (IDAOPI)	(4) COVID-19 related deaths (IMD extent)	(5) All cause deaths (IDAOPI)	(6) All cause deaths (IMD extent)
IDAOPi (quartiles)						
1	(Reference)		(Reference)		(Reference)	
2	0.065 (0.075)		0.040 (0.094)		0.079 (0.081)	
3	0.084 (0.088)		0.246** (0.099)		0.155* (0.085)	
4	0.059 (0.114)		0.263** (0.131)		0.130 (0.118)	
IMD extent (quartiles)						
1		(Reference)		(Reference)		(Reference)
2		0.016 (0.071)		0.041 (0.093)		0.027 (0.074)
3		0.078 (0.081)		0.071 (0.093)		0.084 (0.077)
4		0.086 (0.081)		0.249*** (0.096)		0.141* (0.080)
Number of beds	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	0.000* (0.000)
Number of care homes	-0.002 (0.001)	-0.002 (0.001)	-0.006*** (0.002)	-0.006*** (0.001)	-0.003** (0.001)	-0.003** (0.001)
Population density	-0.004*** (0.001)	-0.004*** (0.001)	-0.008*** (0.002)	-0.007*** (0.002)	-0.008*** (0.002)	-0.008*** (0.002)
Black and minority population	0.002 (0.003)	0.002 (0.003)	-0.002 (0.003)	-0.000 (0.003)	-0.001 (0.002)	-0.000 (0.003)
Number of people above 65	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Number of outbreaks			0.017*** (0.003)	0.017*** (0.003)	0.008*** (0.003)	0.008*** (0.002)
Obs.	149	149	149	149	149	149

Results are estimated using negative binomial regressions due to significant evidence ($p < 0.05$) of over-dispersion in all three outcomes. Standard errors are estimated using the Huber-White sandwich estimator and presented in parenthesis. IDAOPI = Income Deprivation Affecting Older People Index; IMD = Indices of Multiple Deprivation.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix 3: Replicated results using Poisson models with robust standard errors on the raw continuous deprivation indicators.

	(1) Number of outbreaks (IDAOPI)	(2) Number of outbreaks (IMD extent)	(3) COVID-19 related deaths (IDAOPI)	(4) COVID-19 related deaths (IMD extent)	(5) All cause deaths (IDAOPI)	(6) All cause deaths (IMD extent)
IDAOPIScore	-0.167 (0.628)		1.378** (0.558)		0.296 (0.325)	
IMD2019Extent		0.095 (0.159)		0.393*** (0.144)		0.087 (0.083)
Number of beds	0.000 (0.000)	0.000 (0.000)	(Offset variable)	(Offset variable)	(Offset variable)	(Offset variable)
Number of care homes	(Offset variable)	(Offset variable)	-0.005*** (0.001)	-0.005*** (0.001)	-0.002*** (0.000)	-0.002*** (0.000)
Population density	0.003 (0.002)	0.002 (0.002)	-0.002 (0.001)	-0.000 (0.001)	-0.002* (0.001)	-0.001* (0.001)
Black and minority population	-0.000 (0.003)	-0.000 (0.002)	0.001 (0.002)	0.002 (0.002)	0.002 (0.001)	0.002 (0.001)
Number of people above 65	-0.000* (0.000)	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000*** (0.000)
Number of outbreaks			0.008*** (0.002)	0.008*** (0.002)	0.003*** (0.001)	0.002*** (0.001)
Obs.	149	149	149	149	149	149
Pseudo R ²	0.046	0.047	0.302	0.305	0.169	0.170

Results are estimated using Poisson models with robust standard errors estimated using the Huber-White sandwich estimator. Standard errors are presented in parenthesis.

IDAOPIScore = Income Deprivation Affecting Older People Index; IMD = Indices of Multiple Deprivation.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Figure A1: Development in number of COVID-19 related deaths among care home residents over time.

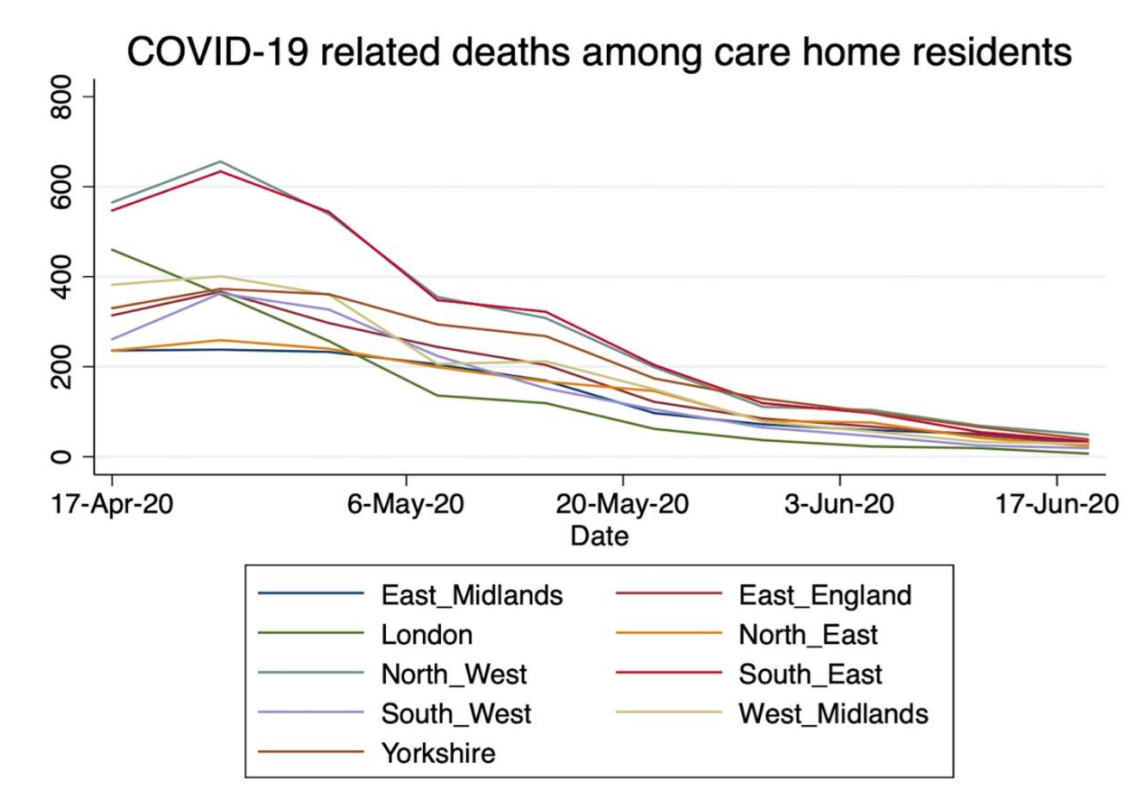


Figure A2: Development in number of COVID-19 care home outbreaks over time.