

Supplementary Material of paper entitled:

**Predictors of lung cancer risk: an ecological study using mortality and
environmental data by municipalities in Italy**

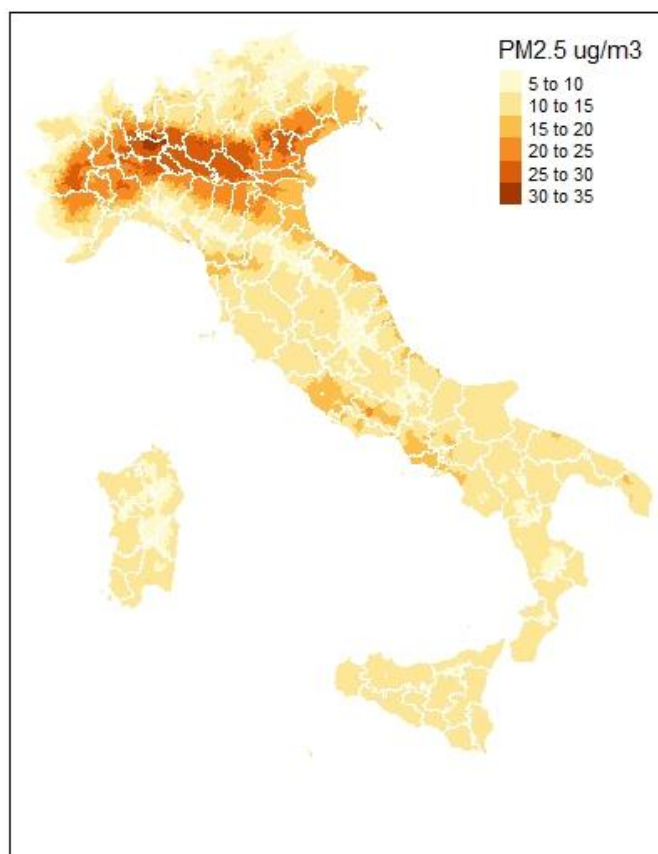


Figure S1. Mean concentration of PM_{2.5}. Provinces borders are shown as white lines. 2006-2015 data.

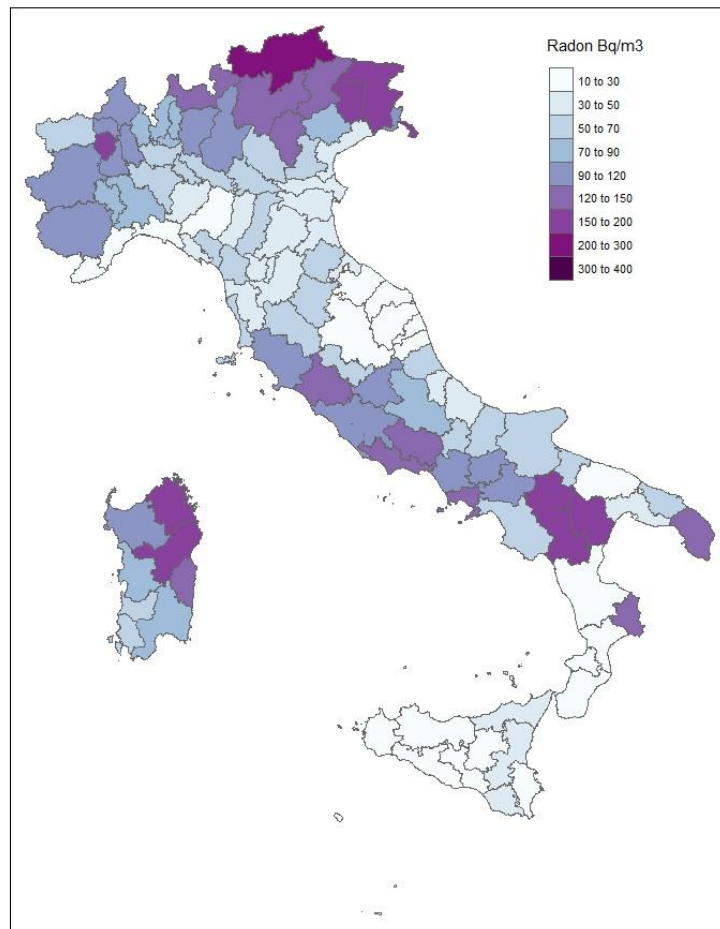


Figure S2. Mean concentration of Radon. Provinces borders are shown as black lines.

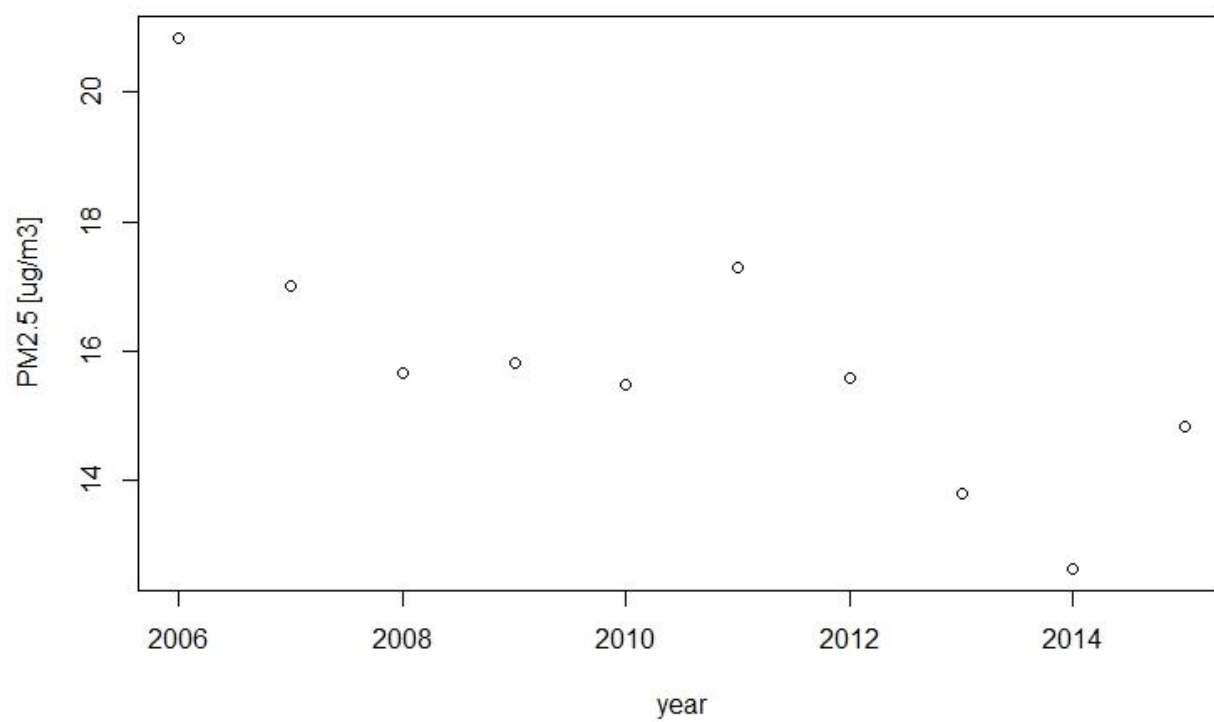


Figure S3. Time series of yearly mean nationwide PM_{2.5} concentration.

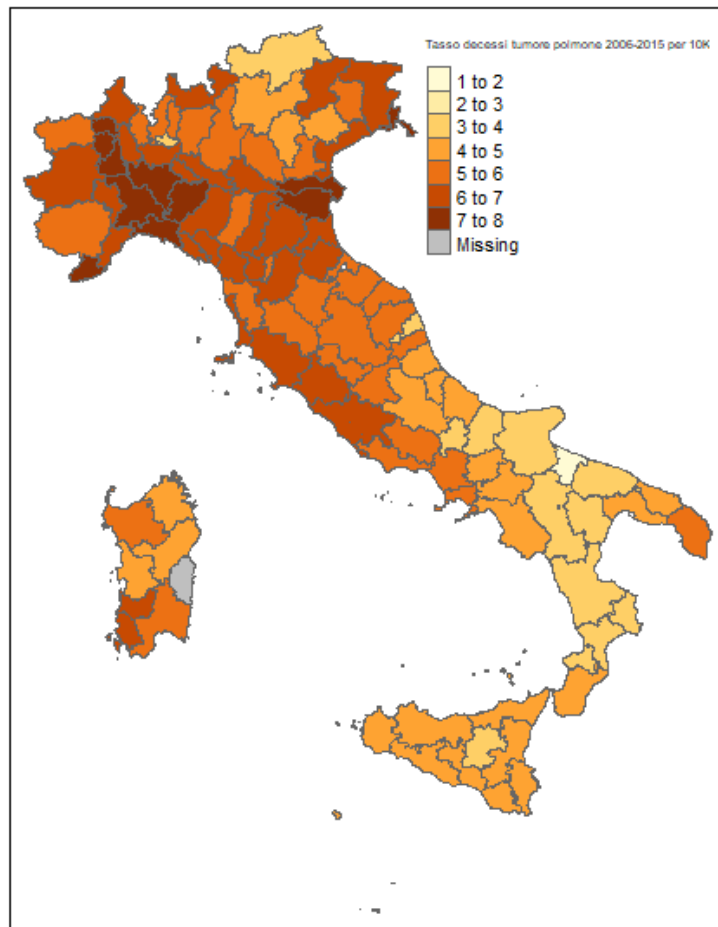


Figure S4. LC mortality rate per 100k persons by Province. 2006-2015 data.

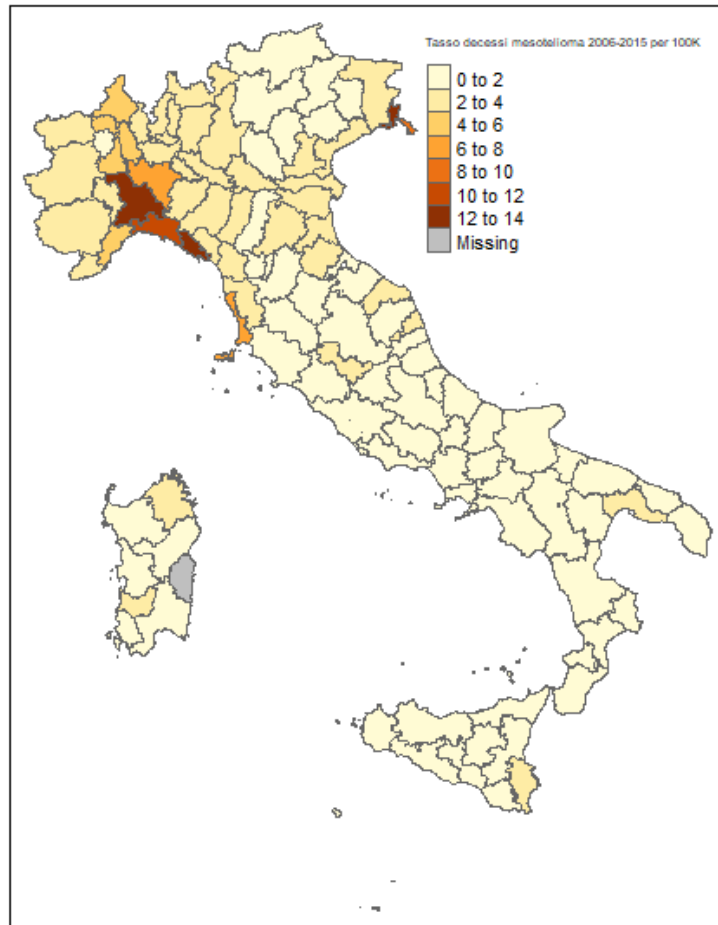


Figure S5. Mesothelioma mortality rate per 100k persons by Province. 2006-2015 data.

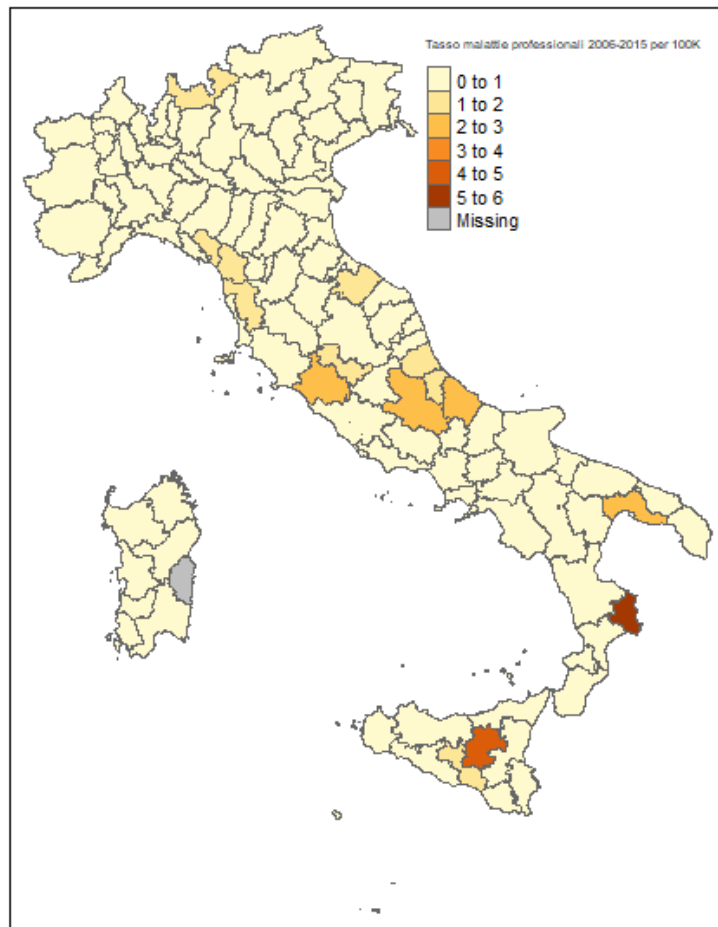


Figure S6. Occupational respiratory disease rate per 100k persons by Province. 2006-2015 data.

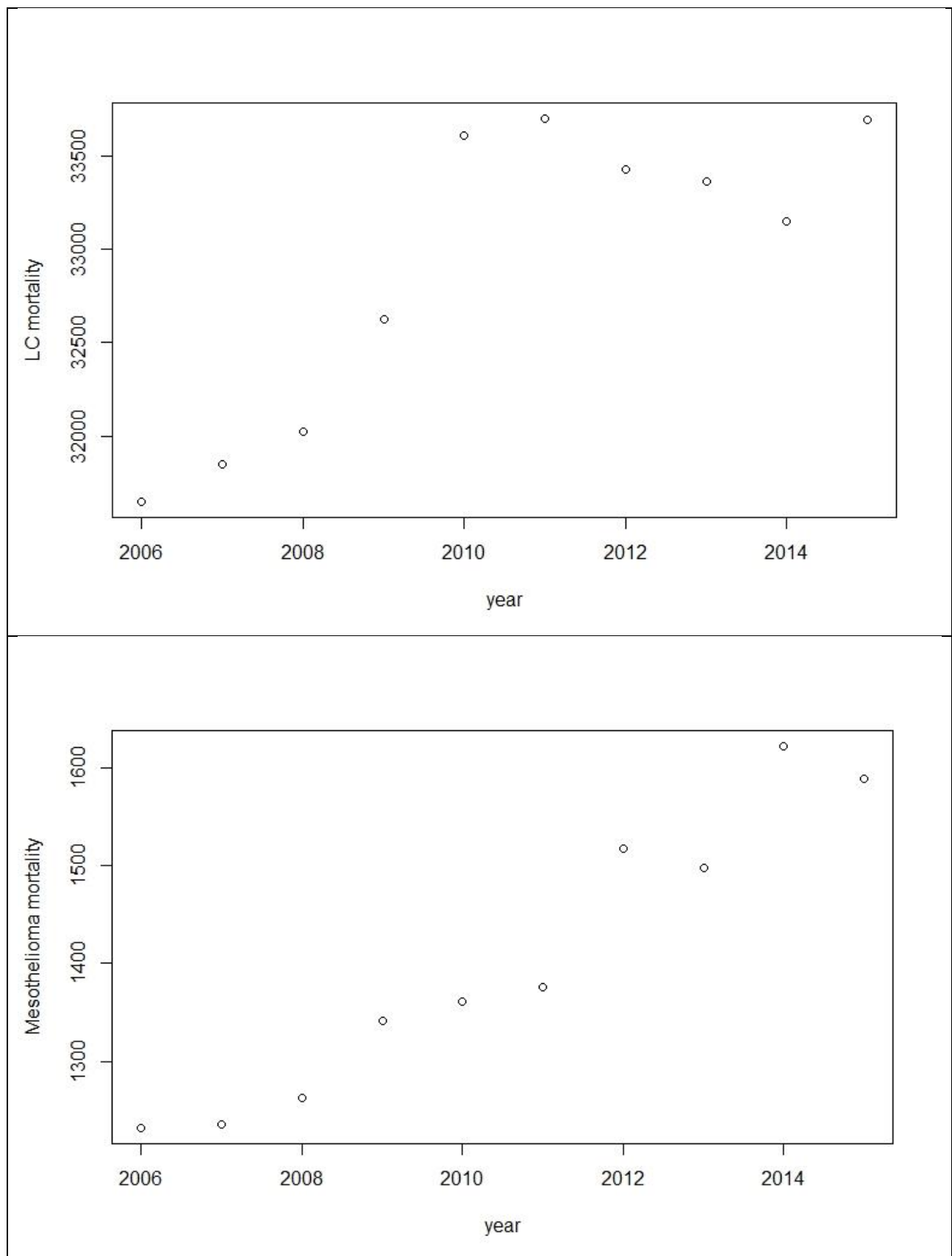


Figure S7. Time series of total lung cancer cases (top) and mesothelioma cases (bottom) occurring at national level during years 2006-2015.

Table S1. Increment Risk [%] (95% CI) of lung cancer (LC) mortality by Deprivation and Urbanization. 2006-2015.

Predictor	Beta	STD	IR% (95% CI)
Deprivation			
<i>Male</i>			
very rich			0
rich	0.0479	0.0095	4.90 (2.97, 6.87)
medium	0.0793	0.0104	8.25 (6.07, 10.48)
deprived	0.0889	0.0118	9.30 (6.80, 11.86)
very deprived	0.1708	0.0135	18.62 (15.52, 21.80)
<i>Female</i>			
very rich			0
rich	0.0177	0.0165	1.78 (-1.46, 5.13) ns
medium	-0.0153	0.0185	-1.52 (-5.02, 2.11) ns
deprived	-0.0946	0.0256	-9.03 (-13.48, -4.35)
very deprived	-0.1901	0.0271	-17.31 (-21.58, -12.81)
Urbanization			
<i>Male</i>			
low			0
low-medium	0.0301	0.0177	3.06 (-0.45, 6.69) ns
medium	0.0878	0.0168	9.17 (5.63, 12.83)
medium-high	0.1041	0.0169	10.97 (7.36, 14.70)
high	0.1142	0.0179	12.10 (8.24, 16.09)
<i>Female</i>			
low			0
low-medium	0.0232	0.0302	2.35 (-3.54, 8.59) ns
medium	0.1217	0.0301	12.94 (6.47, 19.81)
medium-high	0.1676	0.0285	18.25 (11.83, 25.03)
high	0.3034	0.0311	35.45 (27.45, 43.95)

- ns: statistically not significant estimate

Table S2. Full model for LC death counts. Males, years 2006-2015, parameter estimates. In bold the statistically significant parameters.

Variable	Coef	SE(robust)	z	P(> z)	Lower Bound (95% CI)	Upper Bound (95% CI)
<i>Year</i>						
2007	-0.0031	0.0113	-0.27	0.784	-0.0252	0.0190
2008	-0.0094	0.0118	-0.8	0.426	-0.0325	0.0137
2009	0.0007	0.0115	0.06	0.95	-0.0217	0.0232
2010	-0.0294	0.0120	-2.46	0.014	-0.0529	-0.0060
2011	-0.0263	0.0104	-2.53	0.011	-0.0466	-0.0059
2012	-0.0280	0.0118	-2.37	0.018	-0.0511	-0.0048
2013	-0.0308	0.0128	-2.41	0.016	-0.0558	-0.0058
2014	-0.0299	0.0145	-2.06	0.039	-0.0584	-0.0015
2015	-0.0253	0.0120	-2.1	0.035	-0.0488	-0.0017
<i>TOccupResp</i>	0.0015	0.0323	0.05	0.962	-0.0619	0.0649
<i>TOccupResp</i>	0.0997	0.0982	1.02	0.31	-0.0928	0.2922
<i>TMesothelioma</i>	-0.0195	0.0191	-1.02	0.307	-0.0569	0.0179
<i>TMesothelioma</i>	0.3088	0.0498	6.2	0	0.2113	0.4064
<i>TIschemHeart</i>	0.0004	0.0032	0.11	0.91	-0.0058	0.0065
<i>TischemHeart</i>	0.0225	0.0078	2.89	0.004	0.0072	0.0378
<i>TCopd</i>	-0.0102	0.0052	-1.95	0.051	-0.0204	0.0000
<i>TCopd</i>	0.0189	0.0146	1.29	0.196	-0.0098	0.0476
<i>pm_{2.5}</i>	-0.0013	0.0012	-1.06	0.291	-0.0038	0.0011
<i>pm_{2.5}</i>	0.0129	0.0015	8.39	0	0.0099	0.0160
<i>Urbanization</i>						
2	0.0301	0.0177	1.7	0.089	-0.0045	0.0647
3	0.0878	0.0168	5.22	0	0.0548	0.1207
4	0.1040	0.0169	6.16	0	0.0710	0.1371
5	0.1142	0.0179	6.39	0	0.0792	0.1492
<i>Deprivation</i>						
2	0.0479	0.0095	5.05	0	0.0293	0.0665
3	0.0793	0.0104	7.62	0	0.0589	0.0997
4	0.0889	0.0118	7.53	0	0.0658	0.1121
5	0.1708	0.0135	12.65	0	0.1443	0.1973
<i>Radon</i>						
[50,100)	0.0404	0.0086	4.69	0	0.0235	0.0573
[100,150)	0.1653	0.0119	13.9	0	0.1420	0.1886
[150,300)	0.0241	0.0163	1.48	0.14	-0.0079	0.0561
[300+)	-0.0856	0.0587	-1.46	0.145	-0.2006	0.0294

Table S3. Full model for LC death counts. Females, years 2006-2015, parameter estimates. In bold the statistically significant parameters.

Variable	Coef	SE(robust)	z	P(> z)	Lower Bound (95% CI)	Upper Bound (95% CI)
<i>Year</i>						
2007	-0.0225	0.0209	-1.08	0.2800	-0.0635	0.0184
2008	-0.0177	0.0216	-0.82	0.4140	-0.0601	0.0247
2009	-0.0209	0.0210	-0.99	0.3200	-0.0621	0.0203
2010	-0.0335	0.0217	-1.55	0.1220	-0.0759	0.0090
2011	-0.0269	0.0190	-1.41	0.1570	-0.0641	0.0104
2012	-0.0334	0.0211	-1.58	0.1140	-0.0749	0.0080
2013	-0.0213	0.0231	-0.92	0.3570	-0.0666	0.0240
2014	-0.0309	0.0260	-1.18	0.2360	-0.0819	0.0202
2015	-0.0269	0.0214	-1.26	0.2080	-0.0689	0.0150
<i>TOccupResp</i>	0.2395	0.1798	1.33	0.1830	-0.1129	0.5920
<i>TOccupResp</i>	-1.3478	0.6946	-1.94	0.0520	-2.7091	0.0135
<i>TMesothelioma</i>	-0.0881	0.0604	-1.46	0.1450	-0.2064	0.0303
<i>TMesothelioma</i>	0.4669	0.1224	3.81	0	0.2269	0.7068
<i>TIschemHeart</i>	-0.0004	0.0055	-0.07	0.9480	-0.0112	0.0104
<i>TischemHeart</i>	0.0536	0.0119	4.49	0.0000	0.0302	0.0770
<i>TCopd</i>	0.0062	0.0108	0.58	0.5640	-0.0149	0.0274
<i>TCopd</i>	0.2203	0.0317	6.96	0.0000	0.1582	0.2823
<i>pm_{2.5}</i>	-0.0015	0.0023	-0.65	0.5150	-0.0059	0.0030
<i>pm_{2.5}</i>	0.0154	0.0027	5.65	0.0000	0.0101	0.0208
<i>Urbanization</i>						
2	0.0232	0.0302	0.77	0.4420	-0.0360	0.0824
3	0.1217	0.0301	4.04	0.0000	0.0627	0.1807
4	0.1676	0.0285	5.89	0.0000	0.1118	0.2234
5	0.3035	0.0311	9.77	0.0000	0.2426	0.3644
<i>Deprivation</i>						
2	0.0177	0.0165	1.07	0.2840	-0.0147	0.0501
3	-0.0154	0.0185	-0.83	0.4050	-0.0516	0.0208
4	-0.0947	0.0256	-3.7	0.0000	-0.1448	-0.0445
5	-0.1901	0.0271	-7.02	0.0000	-0.2432	-0.1371
<i>Radon</i>						
[50,100)	-0.0027	0.0180	-0.15	0.88	-0.0380	0.0325
[100,150)	0.0973	0.0223	4.37	0.0000	0.0537	0.1410
[150,300)	0.0998	0.0288	3.47	0.0010	0.0434	0.1562
[300+)	0.1549	0.0962	1.61	0.1070	-0.0336	0.3435

Table S4. Reduced model for LC death counts. Males, years 2006-2015, parameter estimates. In bold the statistically significant parameters.

Variable	Coef	SE(robust)	z	P(> z)	Lower Bound (95% CI)	Upper Bound (95% CI)
<i>Year</i>						
2007	0.0022	0.0099	0.22	0.827	-0.0172	0.0215
2008	-0.0028	0.0098	-0.28	0.778	-0.0219	0.0164
2009	0.0064	0.0099	0.65	0.514	-0.0129	0.0257
2010	-0.0229	0.0099	-2.32	0.02	-0.0423	-0.0036
2011	-0.0226	0.0097	-2.33	0.02	-0.0415	-0.0036
2012	-0.0215	0.0098	-2.2	0.028	-0.0408	-0.0023
2013	-0.0221	0.0098	-2.26	0.024	-0.0414	-0.0029
2014	-0.0193	0.0100	-1.92	0.055	-0.0389	0.0004
2015	-0.0186	0.0099	-1.87	0.062	-0.0381	0.0009
<i>TMesothelioma</i>	0.2896	0.0464	6.25	0	0.1987	0.3805
<i>TOccupResp</i>	0.1011	0.0946	1.07	0.285	-0.0843	0.2865
<i>TCopd</i>	0.0089	0.0138	0.65	0.516	-0.0181	0.0359
<i>TischemHeart</i>	0.0229	0.0072	3.17	0.002	0.0087	0.0370
<i>pm_{2.5}</i>	0.0116	0.0009	12.89	0	0.0099	0.0134
<i>Urbanization</i>						
2	0.0301	0.0177	1.7	0.089	-0.0045	0.0648
3	0.0878	0.0168	5.22	0	0.0548	0.1207
4	0.1041	0.0169	6.16	0	0.0710	0.1371
5	0.1142	0.0179	6.39	0	0.0792	0.1492
<i>Deprivation</i>						
2	0.0479	0.0095	5.04	0	0.0293	0.0665
3	0.0793	0.0104	7.62	0	0.0589	0.0997
4	0.0889	0.0118	7.53	0	0.0658	0.1121
5	0.1708	0.0135	12.65	0	0.1443	0.1972
<i>Radon</i>						
[50,100)	0.0404	0.0086	4.68	0	0.0235	0.0573
[100,150)	0.1653	0.0119	13.9	0	0.1420	0.1887
[150,300)	0.0241	0.0163	1.48	0.139	-0.0079	0.0561
[300+)	-0.0856	0.0587	-1.46	0.145	-0.2005	0.0294

Table S5. Reduced model for LC death counts. Females, years 2006-2015, parameter estimates. In bold the statistically significant parameters.

Variable	Coef	SE(robust)	z	P(> z)	Lower Bound (95% CI)	Upper Bound (95% CI)
<i>Year</i>						
2007	-0.0170	0.0187	-0.91	0.363	-0.0537	0.0197
2008	-0.0103	0.0184	-0.56	0.576	-0.0462	0.0257
2009	-0.0141	0.0184	-0.76	0.445	-0.0501	0.0220
2010	-0.0260	0.0182	-1.43	0.153	-0.0617	0.0097
2011	-0.0229	0.0179	-1.28	0.202	-0.0580	0.0123
2012	-0.0261	0.0180	-1.45	0.148	-0.0614	0.0092
2013	-0.0118	0.0181	-0.65	0.514	-0.0473	0.0237
2014	-0.0189	0.0180	-1.05	0.293	-0.0542	0.0164
2015	-0.0193	0.0177	-1.09	0.277	-0.0539	0.0154
<i>TMesothelioma</i>	0.3835	0.1118	3.43	0.001	0.1643	0.6027
<i>TOccupResp</i>	-1.0502	0.6718	-1.56	0.118	-2.3669	0.2664
<i>TCopd</i>	0.2264	0.0298	7.6	0	0.1680	0.2847
<i>TischemHeart</i>	0.0532	0.0109	4.89	0	0.0319	0.0746
<i>pm_{2.5}</i>	0.0139	0.0015	9.04	0	0.0109	0.0170
<i>Urbanization</i>						
2	0.0232	0.0302	0.77	0.442	-0.0360	0.0824
3	0.1217	0.0301	4.04	0	0.0627	0.1807
4	0.1676	0.0285	5.89	0	0.1118	0.2234
5	0.3034	0.0311	9.77	0	0.2425	0.3643
<i>Deprivation</i>						
2	0.0177	0.0165	1.07	0.285	-0.0147	0.0501
3	-0.0153	0.0185	-0.83	0.406	-0.0515	0.0209
4	-0.0946	0.0256	-3.7	0	-0.1448	-0.0445
5	-0.1901	0.0271	-7.02	0	-0.2432	-0.1370
<i>Radon</i>						
[50,100)	-0.0027	0.0180	-0.15	0.88	-0.0380	0.0325
[100,150)	0.0974	0.0223	4.37	0	0.0537	0.1411
[150,300)	0.0998	0.0288	3.47	0.001	0.0434	0.1562
[300+)	0.1549	0.0962	1.61	0.107	-0.0336	0.3434