

Supplementary Data

Table S1 – Summary of air (NO₂, PM_{2.5}, PM_{2.5} Traffic, O₃) and noise (L_{night}) pollutants by traffic volume and major road distance

Traffic exposure	Level	N		NO ₂	PM _{2.5}	PM _{2.5} (Traffic)	O ₃	L _{night}
Vehicle km Driven*	None within 100m	74,913	Mean ±SD	35.8 ±4.6	15.5 ±0.6	1.3 ±0.3	38.8 ±3.4	49.9 ±1.2
	Low within 50-100m	15,995	Mean ±SD	36.5 ±5.0	15.6 ±0.7	1.3 ±0.4	38.3 ±3.7	50.3 ±1.4
	Low within 50m	23,243	Mean ±SD	38.5 ±5.9	15.9 ±0.8	1.6 ±0.5	37.3 ±4.1	57.2 ±4.8
	High within 50-100m	10,400	Mean ±SD	39.6 ±5.9	16.1 ±0.8	1.7 ±0.5	36.3 ±4.1	52.2 ±3.1
	High within 50m	6,427	Mean ±SD	45.6 ±7.3	17.0 ±1.0	2.6 ±0.8	33.2 ±4.3	62.6 ±5.9
Distance(m) to major road†	>250m	59,825	Mean ±SD	35.2 ±4.7	15.4 ±0.7	1.2 ±0.3	39.3 ±3.5	50.9 ±3.3
	100-250m	43,386	Mean ±SD	37.7 ±5.1	15.8 ±0.7	1.4 ±0.4	37.5 ±3.6	51.2 ±3.2
	50-100m	14,708	Mean ±SD	39.4 ±6.0	16.0 ±0.8	1.7 ±0.5	36.5 ±4.1	52.5 ±3.8
	0-50m	12,609	Mean ±SD	41.9 ±7.2	16.5 ±1.0	2.1 ±0.8	35.4 ±4.5	60.4 ±5.7

* >100,000km driven annually by heavy vehicles (see methods) was defined as High Volume, <100,000km defined as Low Volume.

† - Major road defined as top quartile of heavy vehicle intensity

Table S2 – Hazard ratios for dementia during 2005-2011 for an inter-quartile change in NO₂, PM_{2.5} and L_{night} by different approaches of accounting for practice clustering

Exposure	Change	HR (95% CI)	HR (95% CI)	HR ^{3c} (95% CI)
		Stratified by practice	Practice fitted as fixed effect	Mean practice exposure level fitted
NO ₂	Individual level change (+7.47 µg/m ³)	1.08 (0.92-1.26)	1.08 (0.88-1.33)	1.07 (0.88-1.32)
	Practice mean level* (+7.47 µg/m ³)	–	–	1.10 (0.84-1.32)
PM _{2.5}	Individual level change (+0.95 µg/m ³)	1.03 (0.97-1.10)	1.03 (0.96-1.11)	1.03 (0.96-1.11)
	Practice mean level* (+0.95 µg/m ³)	–	–	1.12 (0.90-1.38)
L _{night}	Individual level change (+2.68 dB)	1.01 (0.99-1.04)	1.01 (0.99-1.04)	1.02 (0.99-1.04)
	Practice mean level* (+2.68 dB)	–	–	1.42 (1.03-1.96)

All models adjust for age, gender, ethnicity, smoking & BMI. In the non-stratified models, robust standard errors accounting for the clustering by practice are also fitted.
 * - Practice mean level is fitted alongside individual level to directly obtain within and between practice estimates (see Begg et al. Separation of individual-level and cluster-level covariate effects in regression analysis of correlated data. *StatMed.* 2003;22(16):2591-602).

Table S3 – Hazard ratios from Figure 1

Exposure	Category / IQR Change	HR² (95% CI)
NO₂ (µg/m³)	0-31.9	1 (Reference)
	>31.9-35.2	1.01 (0.85-1.19)
	>35.2-37.5	0.97 (0.80-1.19)
	>37.5-41.5	1.10 (0.89-1.35)
	>41.5	1.40 (1.12-1.74)
PM_{2.5} (µg/m³)	0-15.1	1 (Reference)
	>15.1-15.4	0.97 (0.82-1.15)
	>15.4-15.7	1.02 (0.84-1.23)
	>15.7-16.3	1.09 (0.90-1.33)
	>16.3	1.20 (0.97-1.49)
PM_{2.5} Traffic (µg/m³)	0-1.04	1 (Reference)
	>1.04-1.22	1.07 (0.91-1.26)
	>1.22-1.42	1.02 (0.85-1.22)
	>1.42-1.75	1.06 (0.88-1.27)
	>1.75	1.26 (1.04-1.54)
O₃ (µg/m³)	0-34.7	1 (Reference)
	>34.7-37.3	0.81 (0.68-0.96)
	>37.3-39.1	0.72 (0.59-0.87)
	>39.1-41.8	0.70 (0.57-0.86)
	>41.8	0.72 (0.57-0.90)
Vehicle km Driven*	None within 100m	1 (Reference)
	Low within 50-100m	1.01 (0.89-1.15)
	Low within 50m	1.06 (0.95-1.19)
	High within 50-100m	0.98 (0.83-1.15)
	High within 50m	1.10 (0.90-1.35)
Distance(m) to major road†	>250m	1 (Reference)
	100-250m	1.05 (0.95-1.16)
	50-100m	0.98 (0.84-1.13)
	0-50m	1.09 (0.94-1.26)
L_{night} (dB)	0-49.4	1 (Reference)
	>49.4-49.6	1.05 (0.91-1.20)
	>49.6-50.3	1.04 (0.90-1.19)
	>50.3-53.8	1.00 (0.87-1.15)
	>53.8	1.09 (0.95-1.25)

^a HR²: Cox model with practice fitted as shared-frailty. Adjusted for age, gender, ethnicity, smoking, alcohol consumption, BMI & IMD.