

**New Results on Health Effects at Low Air Pollution Levels  
in 28 million participants across Europe Informing  
Europe's Air Quality Policies, 12 October 2021**



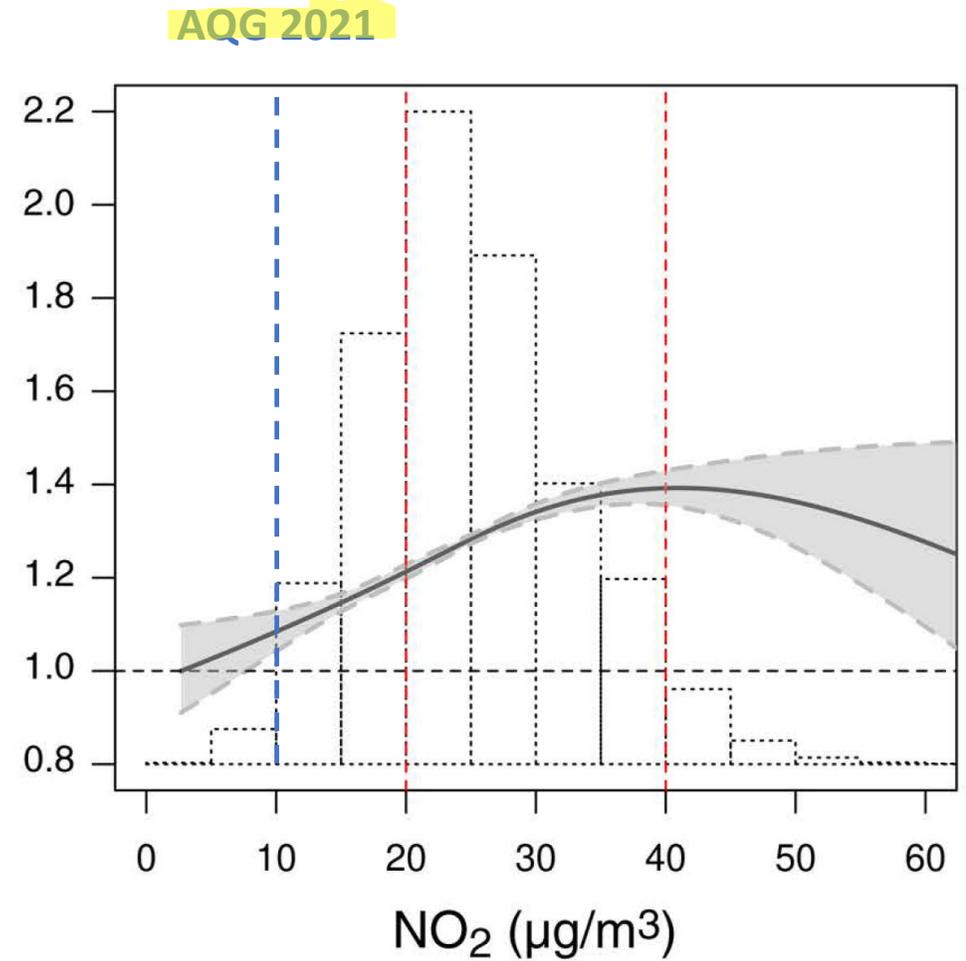
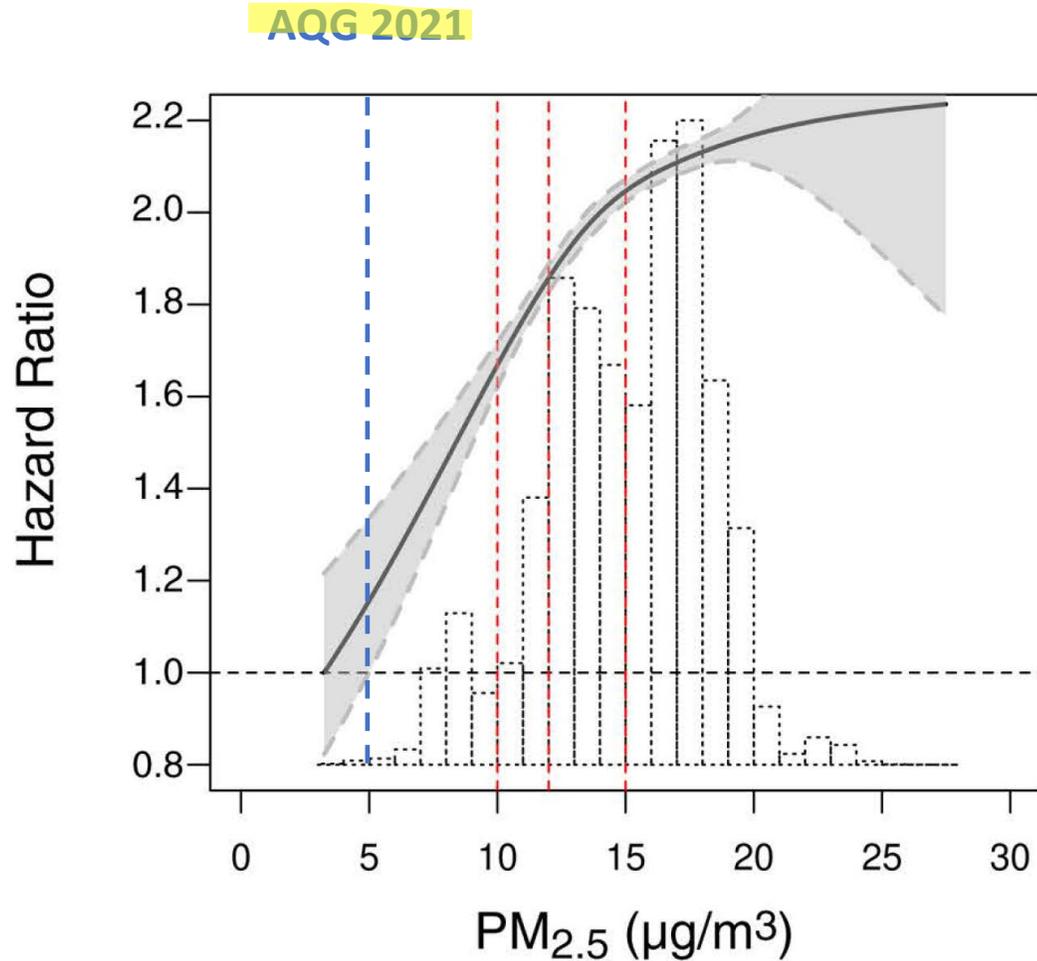
# **What are the risk assessment and policy decisions to be informed?**

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# Association of all natural cause mortality to PM2.5 and NO2 in pooled cohorts of ELAPSE study: *Comparison to the New WHO AQGs*



## Comparison of Findings for Natural-Cause Mortality with the Canadian and U.S. HEI-Funded Studies, ESCAPE, and Recent Systematic Reviews

Study	HR (95% CI) PM <sub>2.5</sub> per 10 µg/m <sup>3</sup>	HR (95% CI) NO <sub>2</sub> per 10 µg/m <sup>3</sup>
ELAPSE pooled cohort	1.28 (1.22, 1.33)	1.09 (1.07, 1.10)
– back-extrapolation of exposure	1.10 – 1.12	1.12 - 1.16
ELAPSE administrative cohorts	1.11 (1.04, 1.17)	1.04 (1.02, 1.07)
MAPLE CanCHEC	1.053 (1.041, 1.065)	1.004 (1.002, 1.006)
MAPLE CCHS	1.11 (1.04, 1.18)	1.024 (1.016, 1.040)
MEDICARE	1.084 (1.081, 1.086)	NA
ESCAPE	1.14 (1.04, 1.26)	1.01 (0.99, 1.03)
Pope et al. 2020 *	1.08 (1.06, 1.11)	
Chen and Hoek 2020 *	1.08 (1.06, 1.09)	
Huangfu and Atkinson 2020*		1.02 (1.01, 1.04)

NA = not applicable. \* Systematic review

*From Tables 9 and 30 of Brunekreef et al, HEI 2021*



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New Zealand resident population, (census cohort, 2 223 507 adults) followed 2013-2016.

Long term exposure to air pollution, mortality and morbidity in New Zealand: Cohort study



Simon Hales<sup>a,\*</sup>, June Atkinson<sup>a</sup>, Jayne Metcalfe<sup>b</sup>, Gerda Kuschel<sup>b</sup>, Alistair Woodward<sup>c</sup>

Mean PM<sub>2.5</sub>: 6.5 µg/m<sup>3</sup>  
and NO<sub>2</sub>: 7.6 µg/m<sup>3</sup>

All natural cause mortality: Effect estimates for:	Single-pollutant model*	Two-pollutant model (fully adjusted)	
		With NO <sub>2</sub>	With PM <sub>2.5</sub>
PM <sub>2.5</sub> per 10 µg/m <sup>3</sup>	1.20	1.105 (1.065, 1.145)	
NO <sub>2</sub> per 10 µg/m <sup>3</sup>	1.09		1.097 (1.074 1.120)

\* Adjusted for age, sex, ethnicity, income, education, smoking

# HR for all natural cause mortality: results of two pollutant analysis in ELAPSE study

	Pollutant	Single Pollutant HR (95% CI)	HR (95% CI) Adjusted for PM <sub>2.5</sub>	HR (95% CI) Adjusted for NO <sub>2</sub>	HR (95% CI) Adjusted for BC
Pooled cohorts	PM <sub>2.5</sub> <sup>(a)</sup>	1.130 (1.106, 1.155)	NA	1.083 (1.054, 1.113)	1.092 (1.062, 1.123)
	NO <sub>2</sub>	1.086 (1.070, 1.102)	1.050 (1.031, 1.070)	NA	1.074 (1.038, 1.112)
	BC	1.081 (1.065, 1.098)	1.039 (1.019, 1.060)	1.012 (0.977, 1.048)	NA
7 Administrative cohorts	PM <sub>2.5</sub> <sup>(a)</sup>	1.053 (1.021, 1.085)	NA	1.003 (0.982, 1.025)	1.021 (0.997, 1.046)
	NO <sub>2</sub>	1.044 (1.019, 1.069)	1.042 (1.02, 1.065)	NA	1.041 (1.009, 1.073)
	BC	1.039 (1.018, 1.059)	1.03 (1.012, 1.049)	1.004 (0.985, 1.022)	NA

(a) HR per 5 µg/m<sup>3</sup>

# Conclusions

- ELAPSE results fully support policies aiming at 2021 AQG levels for PM2.5 and NO2.
- Health Impact Assessment:
  - CRF from meta-analysis of all available studies is a justified approach in view of the observed heterogeneity of results (also in ELAPSE);
  - RR (CRF slope) at low PM2.5 concentrations might be greater than for higher levels;
  - ELAPSE results support HIA including both PM2.5 and NO2. The use of HRs from 2-pollutant models might prevent double-counting of combined exposure effects;
  - Accumulated new evidence calls for updating recommendations on CRF for HIA, e.g. exploring heterogeneity and shapes of CRFs.
- To improve assessment of specific role of BC as an (additional?) indicator of pollutant of health relevance, studies where sources BC and NOx are not the same are necessary. (*see Good Practice Statements on BC in AQG 2021*).