



APPENDICES AVAILABLE ON THE HEI WEBSITE

Special Report 23

Systematic Review and Meta-analysis of Selected Health Effects of Long-Term Exposure to Traffic-Related Air Pollution

HEI Panel on the Health Effects of Long-Term Exposure to Traffic-Related Air Pollution

Chapter 10: Traffic-Related Air Pollution and Cardiometabolic Outcomes

These Appendices were reviewed solely for spelling, grammar, and cross-references to the main text. They have not been formatted or fully edited by HEI. This document was part of the HEI Panel's review process.

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Chapter 10: Traffic-Related Air Pollution and Cardiometabolic Outcomes

Appendices: Additional Figures and Tables

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Appendix 10A: Ischemic Heart Disease

Table 10A-1. Noise-Adjusted Analyses in Ischemic Heart Disease Studies

Reference	Study Name	Pollutant	Increment	Effect Measure	Single Pollutant	Noise-Adjusted
Bodin 2016	Scania Public Health Cohort	NO _x	>30 vs. <10 µg/m ³	IRR	0.72 (0.39, 1.34) ^a	0.72 (0.39, 1.34) ^a
			20–30 vs. <10 µg/m ³		1.05 (0.83, 1.33) ^a	1.05 (0.83, 1.33) ^a
			10–20 vs. <10 µg/m ³		0.77 (0.65, 0.91) ^a	0.77 (0.65, 0.91) ^a
Cesaroni 2014	ESCAPE	PM ₁₀ mass	10 µg/m ³	HR	1.12 (1.01, 1.25)	1.14 (1.01, 1.31)
		PM _{2.5} mass	5 µg/m ³		1.13 (0.98, 1.30)	1.13 (0.95, 1.36)
Gan 2012	Vancouver Administrative	PM _{2.5} abs	0.97 1×10 ⁻⁵ /m	HR	1.06 (1.03, 1.09)	1.04 (1.01, 1.08)

HR = hazard ratio; IRR = incidence rate ratio.

^a The single pollutant results also corrected for noise; hence the two columns are similar.

Table 10A-2. Risk of Bias Assessment for Studies Included in Meta-Analysis: IHD

Reference	Study Name	Confounding	Selection Bias	Exposure Assessment	Outcome Measurement	Missing Data	Selective Reporting
Alexeeff 2018	KPNC Oakland	Mod	Low	Low	Mod	Low	Low
Carey 2016	CPRD London	Mod	Low	Low	Low	Low	Low
Cesaroni 2014	ESCAPE	Mod	Low	Mod	Low	Low	Low
Gan 2011	Vancouver Administrative	High	Low	Low	Low	Low	Low
Katsoulis 2014	EPIC Athens	Low	Low	Low	Mod	Low	Low
Stockfelt 2017	GOT-MON	Mod	Low	Low	Low	Low	Low
Stockfelt 2017	PPS	Mod	Low	Low	Low	Low	Low

Mod = moderate.

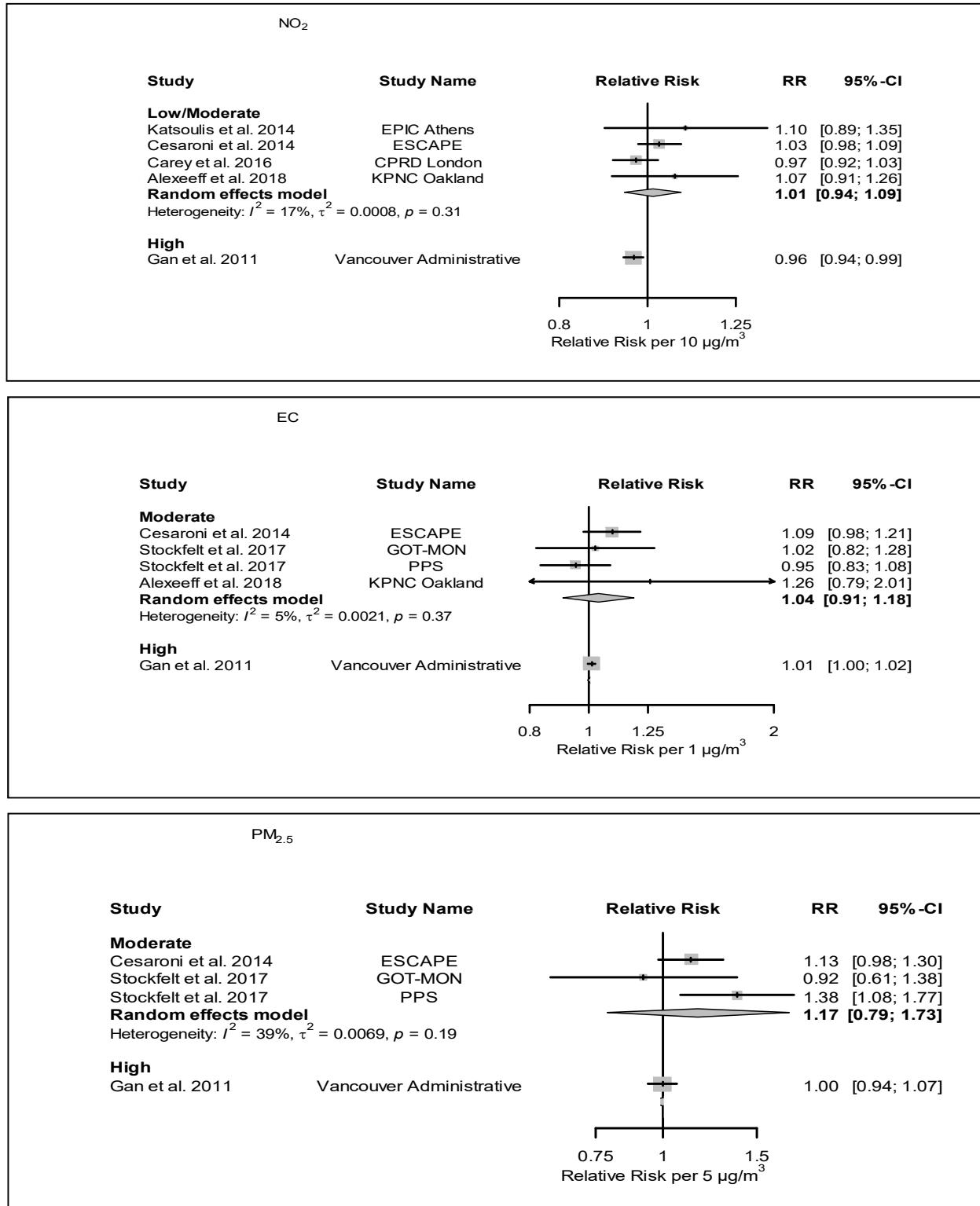
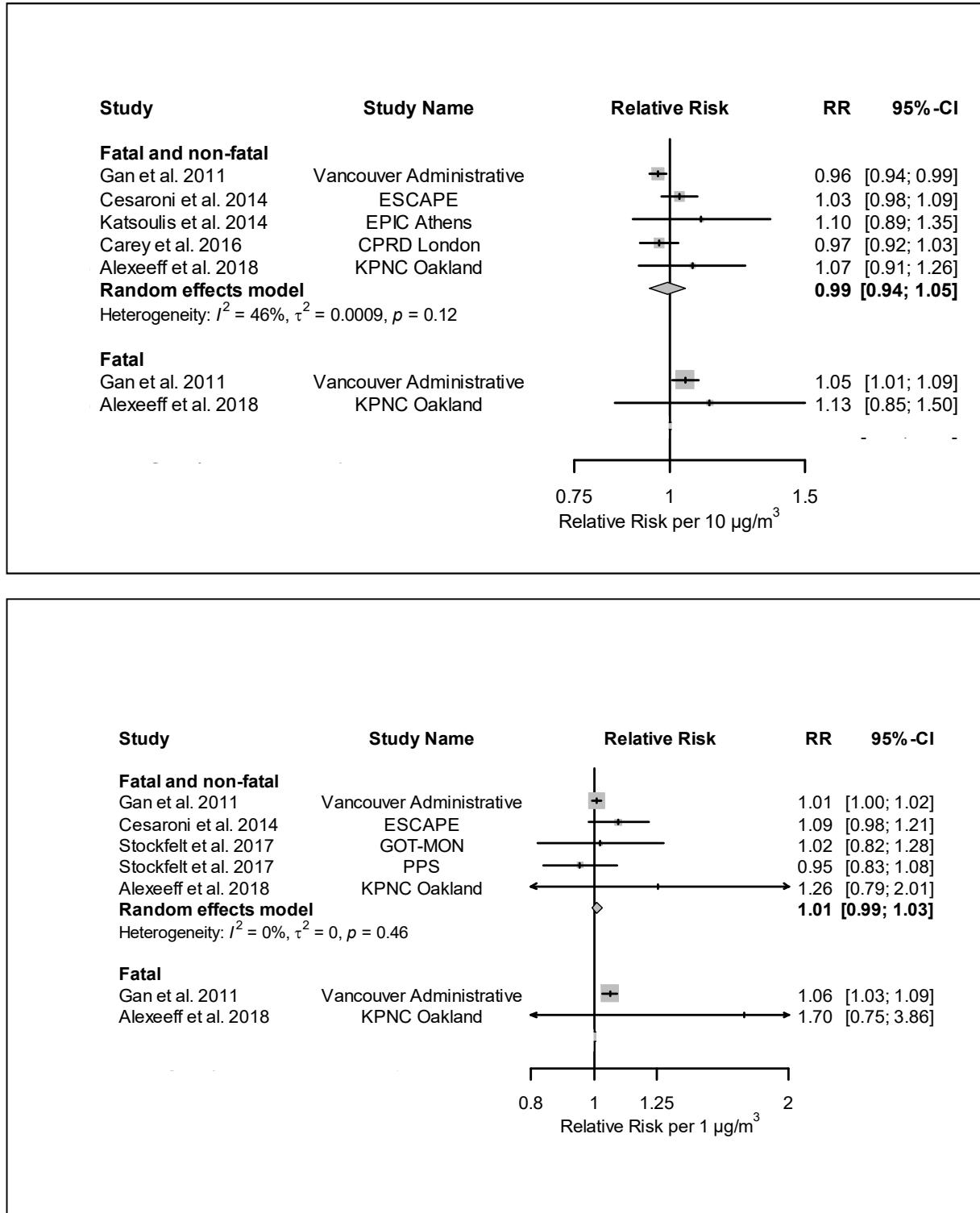


Figure 10A-1. Association between NO₂, EC, and PM_{2.5} and incidence of IHD: meta-analysis by risk of bias confounding.

Figure 10A-2. Association between NO₂ and EC and incidence of IHD: meta-analysis by fatality.

Appendix 10B: Coronary Events

Table 10B-1. Noise-Adjusted Analyses in Coronary Event Studies

Reference	Study Name	Pollutant	Increment	Effect measure	Single pollutant results	Noise adjusted
Bodin 2016	Scania Public Health Cohort	NO _x	10 µg/m ³	IRR	1.02 (0.86, 1.21) ^a	1.02 (0.86, 1.21) ^a
Chum 2015	Toronto Health Survey	Distance	<100 vs. >100 m	OR	3.79 (2.25, 5.53) ^{a,b}	3.79 (2.25, 5.53) ^{a,b}
Hoffmann 2015	HNR	Density	4,302 vehicle-km/day	HR	1.21 (0.91, 1.62)	1.19 (0.85, 1.68)
		PM ₁₀ mass	6.32 µg/m ³		1.12 (0.60, 2.11)	1.07 (0.56, 2.04)
		PM _{2.5} abs	0.98 1×10 ⁻⁵ /m		1.40 (0.87, 2.27)	1.37 (0.80, 2.36)
		PM _{2.5} mass	3.51 µg/m ³		1.06 (0.55, 2.07)	1.00 (0.51, 1.99)
		PM _{coarse} mass	5.26 µg/m ³		0.88 (0.49, 1.5)	0.84 (0.46, 1.52)
Roswall 2017	DDCH	NO ₂	7.1 µg/m ³	HR	1.17 (1.07, 1.28) (Fatal)	1.06 (0.94, 1.20)
			7 µg/m ³		1.08 (1.03, 1.12) (Non-fatal)	1.02 (0.96, 1.08)

HR = hazard ratio; IRR = incidence rate ratio; OR = odds ratio.

^a The single pollutant results also corrected for noise; hence the two columns are similar.

^b Prevalence measure.

Table 10B-2. Risk of Bias Assessment for Studies Included in Meta-Analysis: Coronary Events

Reference	Study Name	Confounding	Selection Bias	Exposure Assessment	Outcome Measurement	Missing Data	Selective Reporting
Alexeeff 2018	KPNC Oakland	Mod	Low	Low	Mod	Low	Low
Bai 2019	ONPHEC	Mod	Low	Mod	Low	Low	Low
Carey 2016	CPRD London	Mod	Low	Low	Low	Low	Low
Grazuleviciene 2004	Kaunas Men's Study	Low	High	Mod	Low	High	Low
Rosenlund 2006	SHEEP	Mod	Low	Low	Low	Mod	Low
Rosenlund 2009	Stockholm County Case-Control	High	Low	Low	Low	Low	Low
Roswall 2017	DDCH	Mod	Low	Low	Low	Low	Low

Mod = moderate.

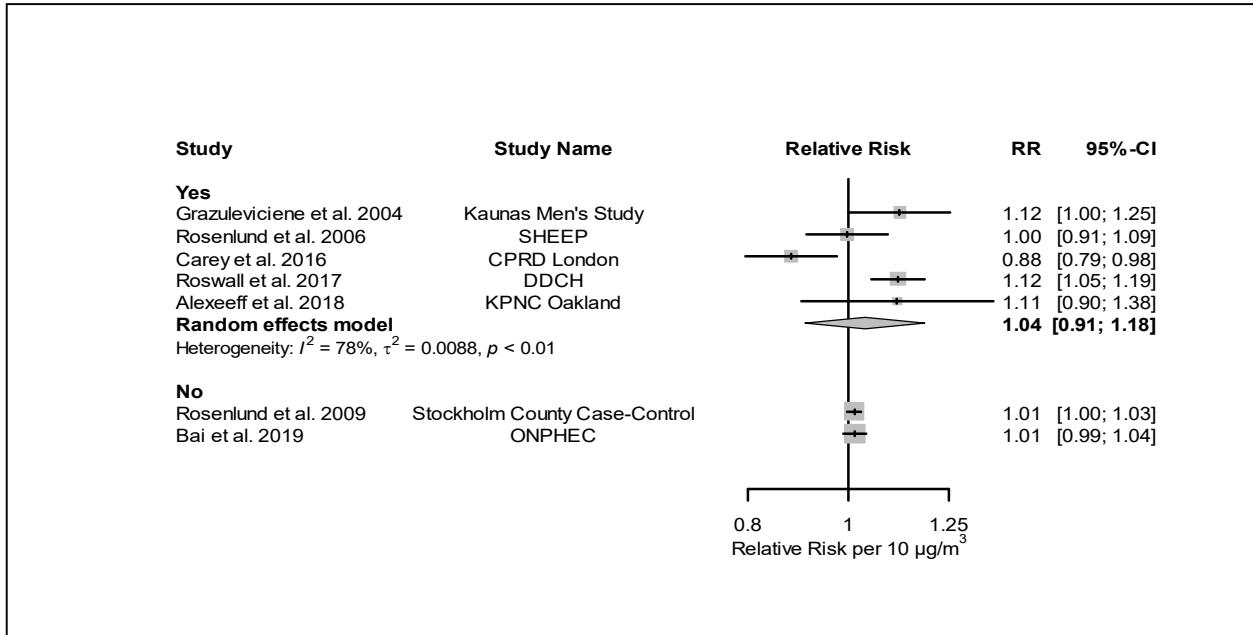
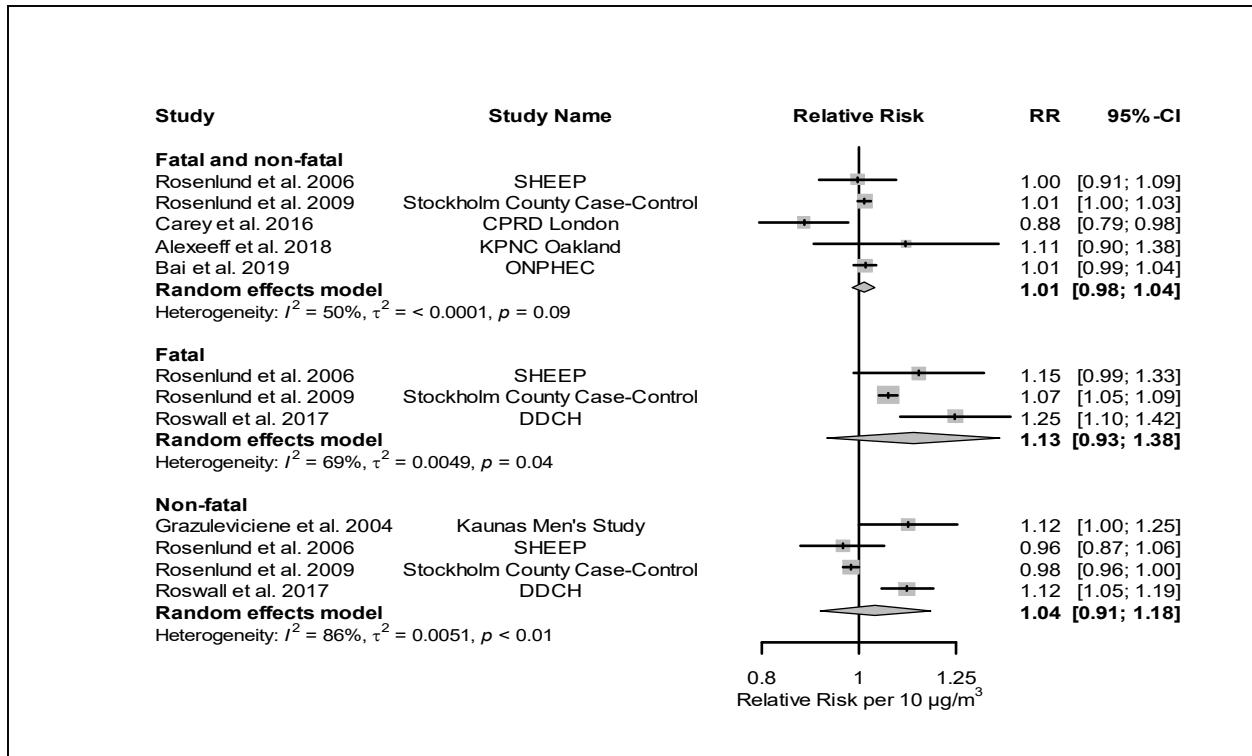


Figure 10B-1. Association between NO₂ and incidence of coronary events: meta-analysis by smoking adjustment.

Figure 10B-2. Association between NO_2 and incidence of coronary events: meta-analysis by fatality.

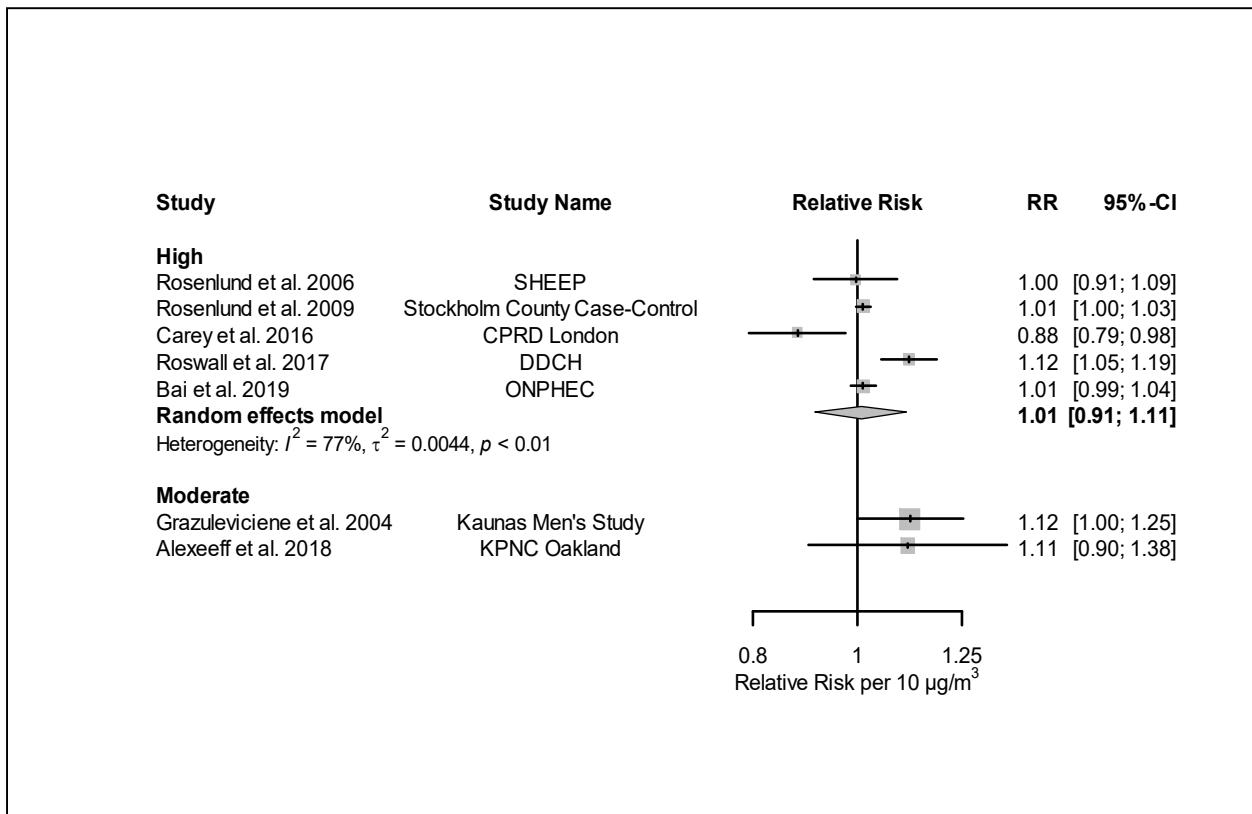


Figure 10B-3. Association between NO_2 and incidence of coronary events: meta-analysis by traffic specificity.

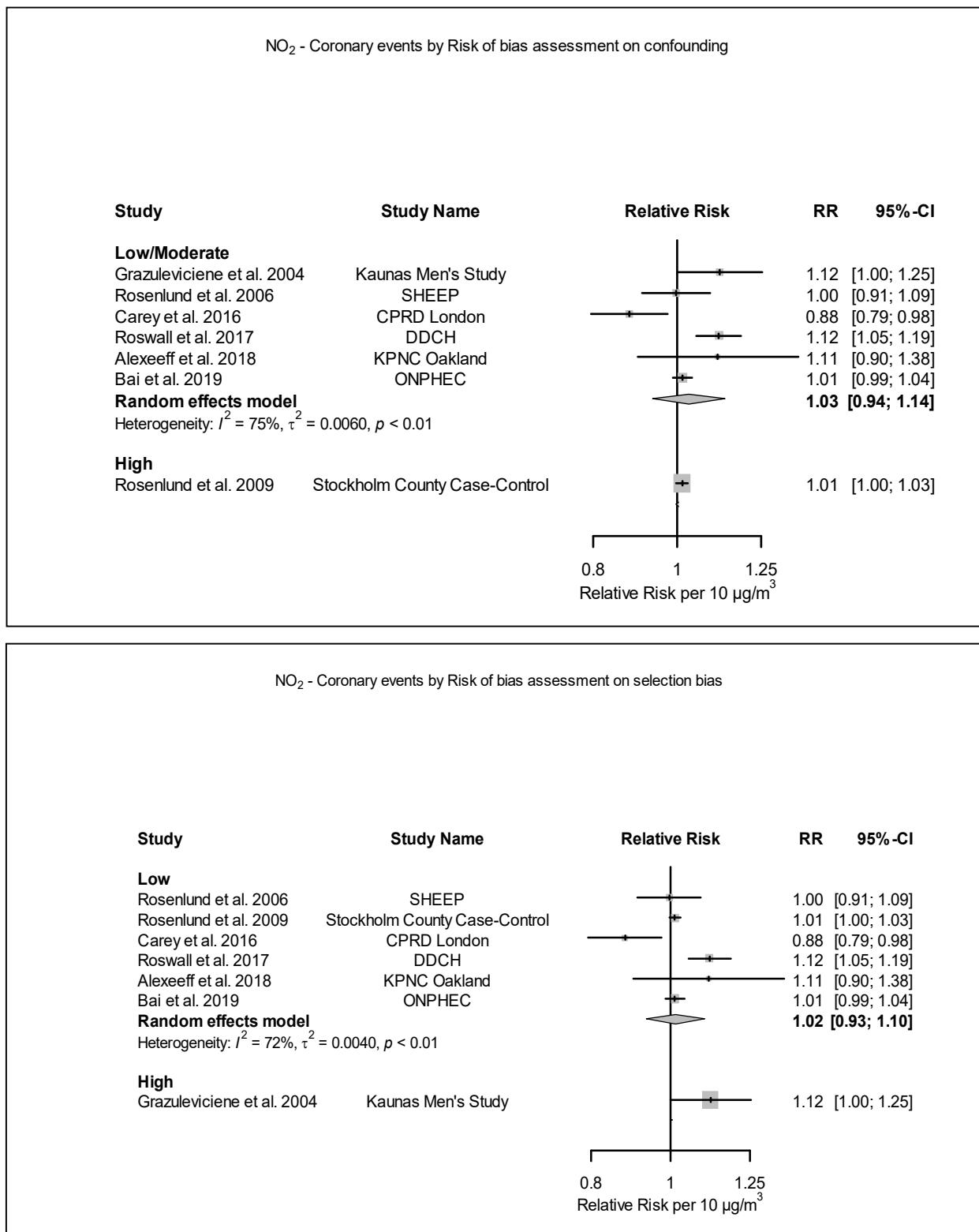


Figure 10B-4. Association between NO₂ and incidence of coronary events: meta-analysis by risk of bias confounding and selection bias.

Appendix 10C: Stroke

Table 10C-1. Noise-Adjusted Analyses in Stroke Studies

Reference	Study Name	Pollutant	Increment	Effect measure	Single pollutant	Noise adjusted
Gan 2012	Vancouver Administrative	PM _{2.5} abs	0.97 1×10 ⁻⁵ /m	HR	1.04 (1.00, 1.09)	1.03 (0.98, 1.09)
Hoffmann 2015	HNR	Density	4,302 vehicle-km/day	HR	1.06 (0.69, 1.64)	1.13 (0.69, 1.84)
		PM _{2.5} abs	0.98 1×10 ⁻⁵ /m		1.57 (0.86, 2.86)	1.86 (0.94, 3.66)
		PM ₁₀ mass	6.32 µg/m ³		2.38 (1.06, 5.35)	2.61 (1.13, 6.00)
		PM _{coarse} mass	5.26 µg/m ³		1.79 (0.72, 4.46)	1.92 (0.74, 4.98)
		PM _{2.5} mass	3.51 µg/m ³		2.90 (1.18, 7.12)	3.20 (1.26, 8.09)
Sørensen 2014	DDCH	NO ₂	10 µg/m ³	IRR	1.47 (1.21, 1.80)	1.90 (1.45, 2.47)
		NO _x	20 µg/m ³		1.17 (1.05, 1.31)	1.26 (1.1, 1.44)
Stafoggia 2014	ESCAPE	PM _{2.5} mass	5 µg/m ³	HR	1.25 (0.92, 1.71)	1.26 (0.89, 1.78)

HR = hazard ratio; IRR = incidence rate ratio.

Table 10C-2. Risk of Bias Assessment for Studies Included In Meta-Analysis: Stroke

Reference	Study Name	Confounding	Selection Bias	Exposure Assessment	Outcome Measurement	Missing Data	Selective Reporting
Alexeeff 2018	KPNC Oakland	Mod	Low	Low	Mod	Low	Low
Atkinson 2013	CPRD	Mod	Low	Low	Low	Low	Low
Carey 2016	CPRD London	Mod	Low	Low	Low	Low	Low
Dirgawati 2019	HIMS	Low	Low	Mod	Low	Low	Low
Gan 2012	Vancouver Administrative	High	Low	Low	Low	Low	Low
Johnson 2013	Edmonton Stroke	High	High	Low	Low	Low	Low
Katsoulis 2014	EPIC Athens	Low	Low	Low	Mod	Low	Low
Korek 2015	SDPP, SIXTY, SALT, SNAC-K	Low	Low	Low	Low	Low	Low
Oudin 2011	Scania Stroke	Low	Low	Low	Low	Low	Low
Sørensen 2014	DDCH	Low	Low	Low	Low	Low	Low
Stafoggia 2014	ESCAPE	Mod	Low	Mod	Low	Low	Low
Stockfelt 2017	GOT-MON	Mod	Low	Low	Low	Low	Low
Stockfelt 2017	PPS	Mod	Low	Low	Low	Low	Low

Mod = moderate.

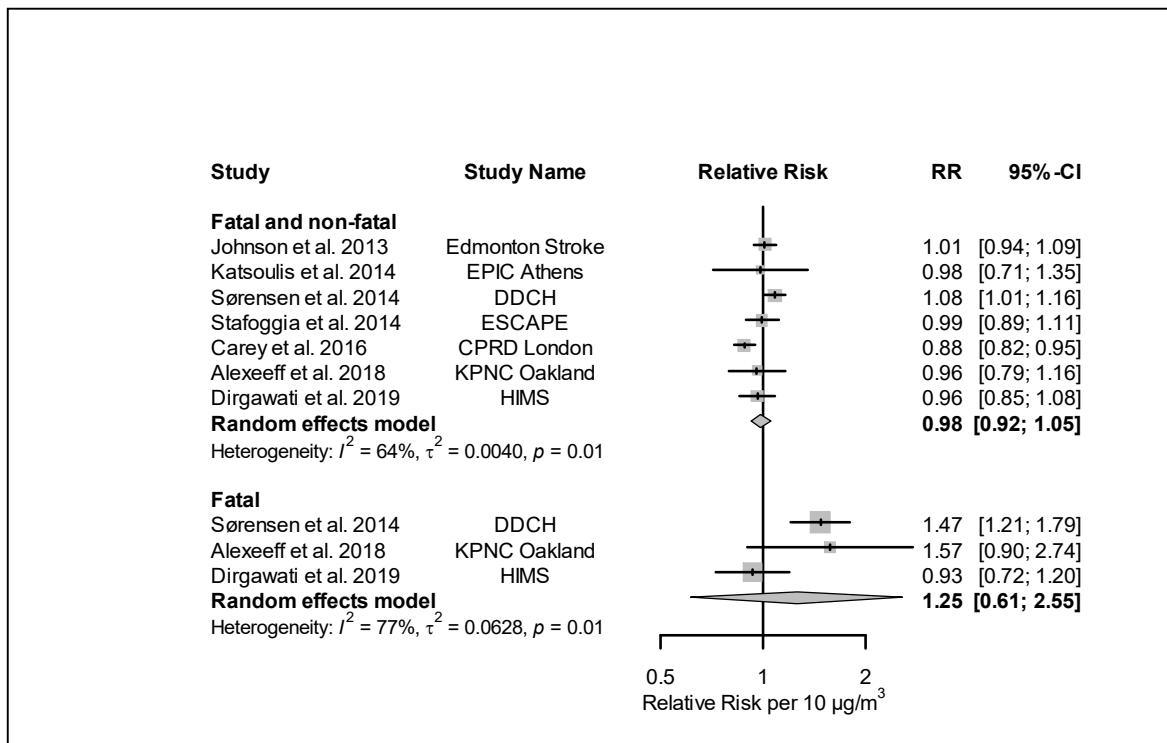


Figure 10C-1. Association between NO₂ and incidence of stroke: meta-analysis by fatality.

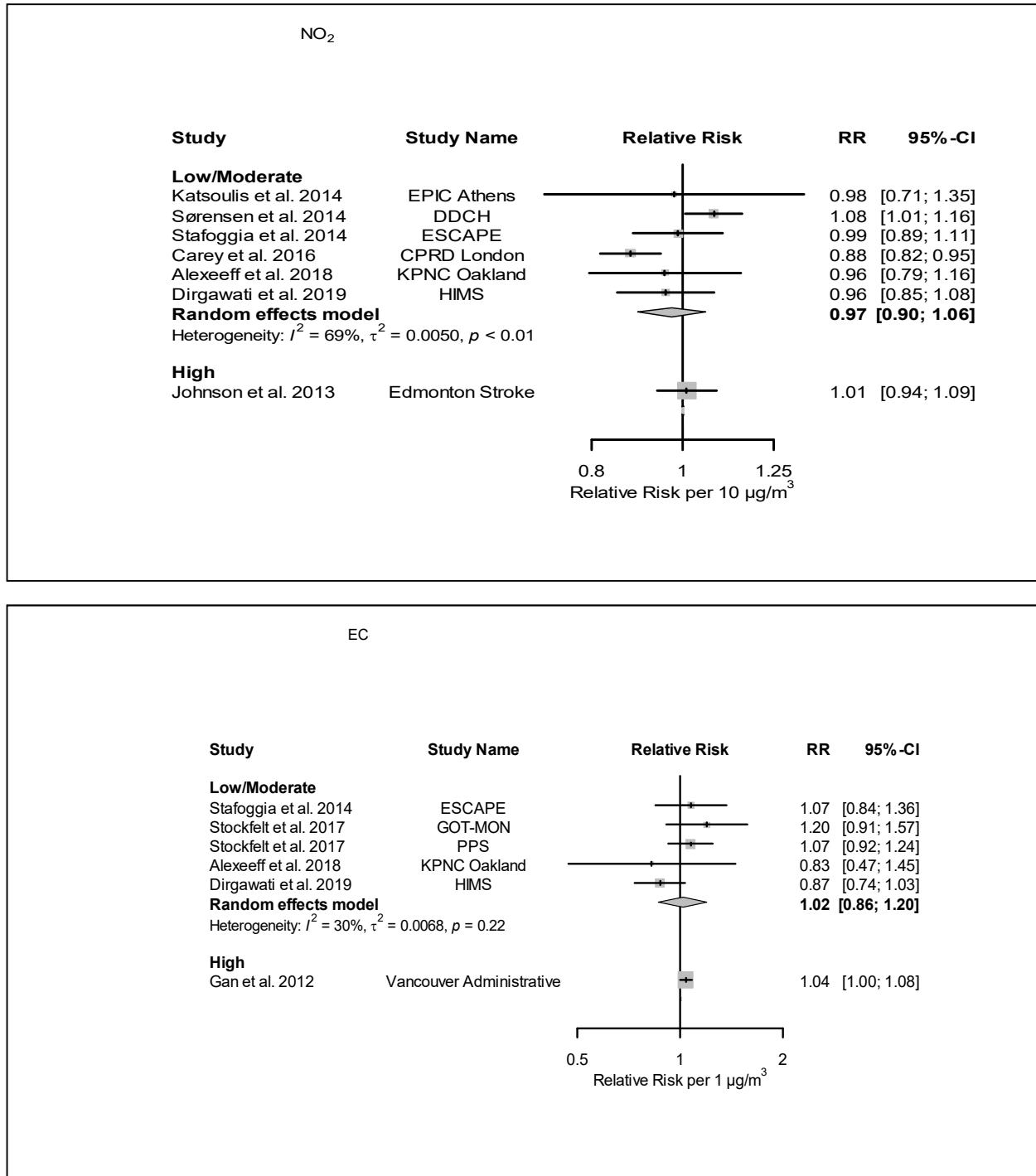


Figure 10C-2. Association between NO₂ and EC and incidence of stroke: meta-analysis by risk of bias confounding.

Appendix 10D: Diabetes**Table 10D-1.** Noise-Adjusted Analyses in Diabetes Studies.

Reference	Study Name	Pollutant	Incidence or prevalence	Effect measure	Increment	Single pollutant	Noise adjusted
Clark 2017	British Columbia Diabetes Cohort	NO	Incidence	OR	13.13 $\mu\text{g}/\text{m}^3$	1.04 (1.01, 1.05)	1.01 (1.00, 1.04)
		PM _{2.5} abs			0.9 1×10 ⁻⁵ /m	1.03 (1.01, 1.04)	1.01 (0.99, 1.03)
		PM _{2.5} mass			1.6 $\mu\text{g}/\text{m}^3$	1.03 (1.01, 1.05)	1.03 (1.02, 1.05)
Dzhambov 2016	Plovdiv Diabetes Survey	PM _{2.5} mass	Prevalence	OR	>25 vs. <25 $\mu\text{g}/\text{m}^3$	1.32 (0.28, 6.24) ^a	1.32 (0.28, 6.24) ^a
		PAH (BaP)			>6 vs. <6 ng/m ³	1.76 (0.52, 5.98) ^a	1.76 (0.52, 5.98) ^a
Eze 2014	SAPALDIA	NO ₂	Prevalence	OR	10 $\mu\text{g}/\text{m}^3$	1.21 (1.05, 1.39)	1.19 (1.03, 1.38)
		PM ₁₀ mass			10 $\mu\text{g}/\text{m}^3$	1.44 (1.21, 1.71)	1.40 (1.17, 1.67)
Eze 2017	SAPALDIA	NO ₂	Incidence	RR	15 $\mu\text{g}/\text{m}^3$	0.92 (0.67, 1.26)	0.86 (0.61, 1.22)
Renzi 2018	Rome Longitudinal	NO ₂	Incidence	HR	10 $\mu\text{g}/\text{m}^3$	1.00 (1.00, 1.01)	1.00 (0.99, 1.01)
			Prevalence	OR	10 $\mu\text{g}/\text{m}^3$	1.00 (1.00, 1.01)	1.01 (1.00, 1.02)
		NO _x	Incidence	HR	20 $\mu\text{g}/\text{m}^3$	1.01 (1.00, 1.01)	1.01 (1.00, 1.02)
			Prevalence	OR	20 $\mu\text{g}/\text{m}^3$	1.01 (1.00, 1.01)	1.02 (1.01, 1.02)
		PM _{2.5} abs	Incidence	HR	1 1×10 ⁻⁵ /m	1.00 (0.98, 1.02)	1.00 (0.98, 1.02)
			Prevalence	OR	1 1×10 ⁻⁵ /m	0.98 (0.96, 0.99)	0.98 (0.97, 1.00)

		PM ₁₀ mass	Incidence	HR	10 µg/m ³	1.00 (0.99, 1.02)	1.00 (0.98, 1.02)
			Prevalence	OR	10 µg/m ³	0.99 (0.98, 1.00)	1.00 (0.99, 1.02)
		PM _{coarse} mass	Incidence	HR	10 µg/m ³	0.99 (0.97, 1.02)	0.98 (0.95, 1.01)
			Prevalence	OR	10 µg/m ³	0.96 (0.94, 0.98)	0.97 (0.95, 0.99)
		PM _{2.5} mass	Incidence	HR	5 µg/m ³	1.00 (0.98, 1.02)	1.00 (0.97, 1.02)
			Prevalence	OR	5 µg/m ³	0.98 (0.96, 1.00)	0.92 (0.97, 1.01)

HR = hazard ratio; OR = odds ratio.

^a The single pollutant results also corrected for noise; hence the two columns are similar.

Table 10D-2. Risk of Bias Assessment for Studies Included in Meta-Analysis: Diabetes.

Reference	Study Name	Confounding	Selection Bias	Exposure Assessment	Outcome Measurement	Missing Data	Selective Reporting
Andersen 2012b	DDCH	Low	Low	Mod	Low	Low	Low
Bai 2018	ONPHEC	High	Low	Mod	Low	Low	Low
Clark 2017	British Columbia Diabetes Cohort	High	Low	Low	Low	Low	Low
Coogan 2012	BWHS	Mod	Low	Low	Mod	Low	Low
Coogan 2016	BWHS	Low	Low	Low	Mod	Mod	Low
Eze 2014	SAPALDIA	Low	Mod	Low	Low	Low	Low
Eze 2017	SAPALDIA	Low	High	Low	Low	Low	Low
Howell 2019	CANHEART	High	Low	Low	Low	Low	Low
Kramer 2010	SALIA	Mod	Low	Mod	Low	Mod	Low
Lazarevic 2015	ALSWH	Low	Mod	Low	Mod	Low	Low
O'Donovan 2017	CHAMPIONS	Low	Mod	Low	Low	Low	Low
Park 2015	MESA	Low	Low	Mod	Low	Low	Low
Renzi 2018	Rome Longitudinal	High	Low	Low	Low	Low	Low
Riant 2018	ELISABET	Low	Low	Low	Low	Low	Low
Weinmayr 2015	HNR	Low	Low	Low	Low	Low	Low
Yang 2019	33 CCHS	Low	Low	Low	Low	High	Low

Mod = moderate.

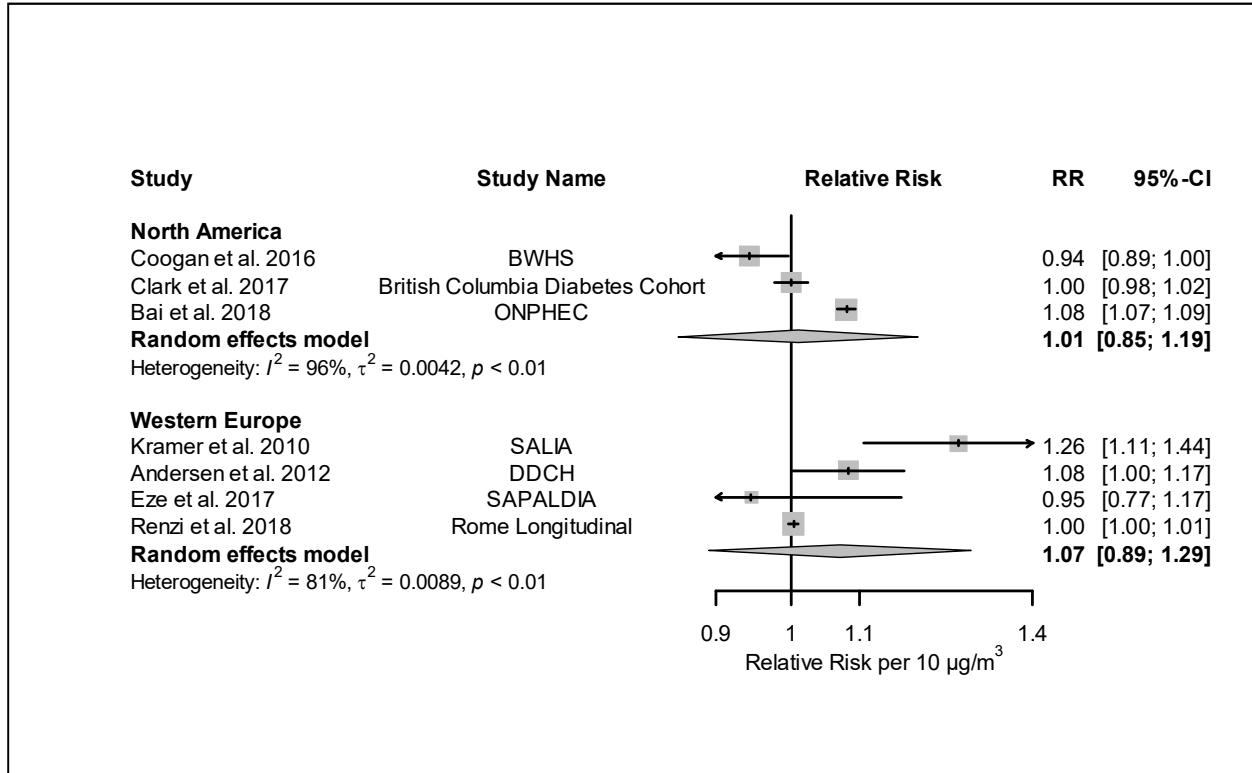


Figure 10D-1. Association between NO_2 and incidence of diabetes: meta-analysis by geographical region.

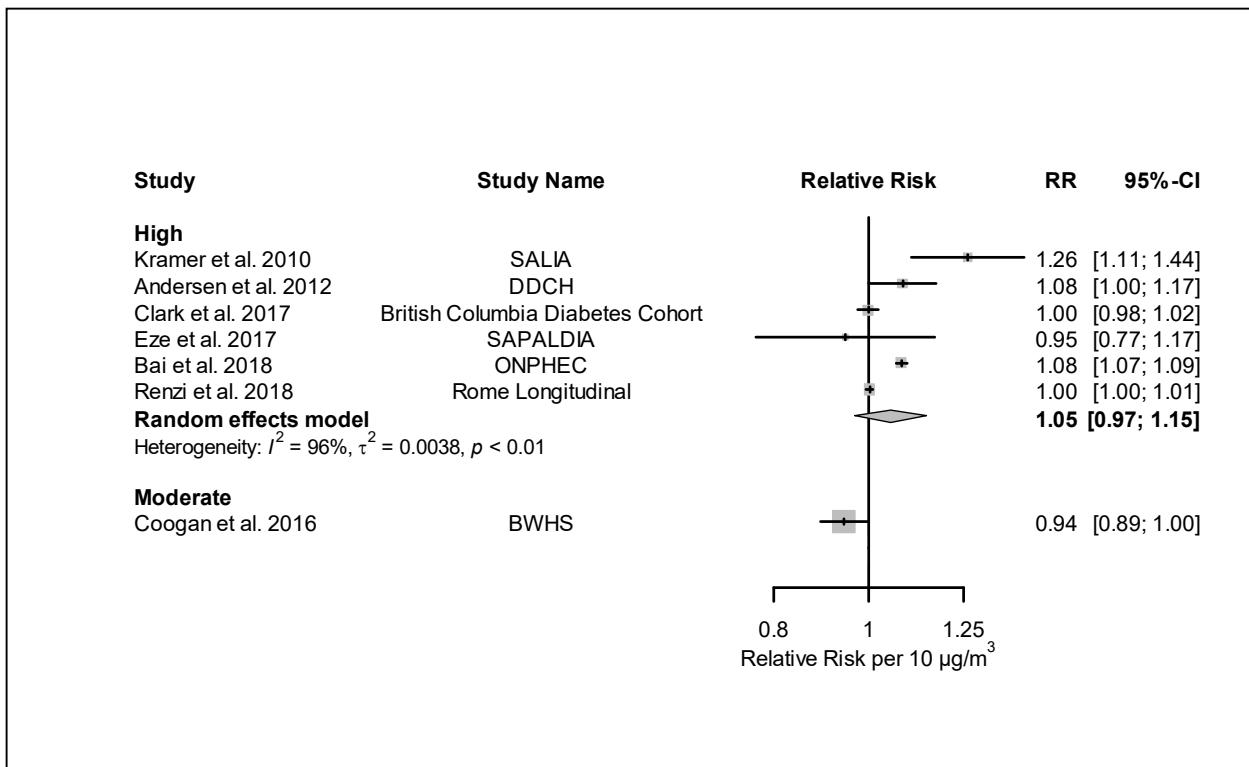


Figure 10D-2. Association between NO_2 and incidence of diabetes: meta-analysis by traffic specificity.

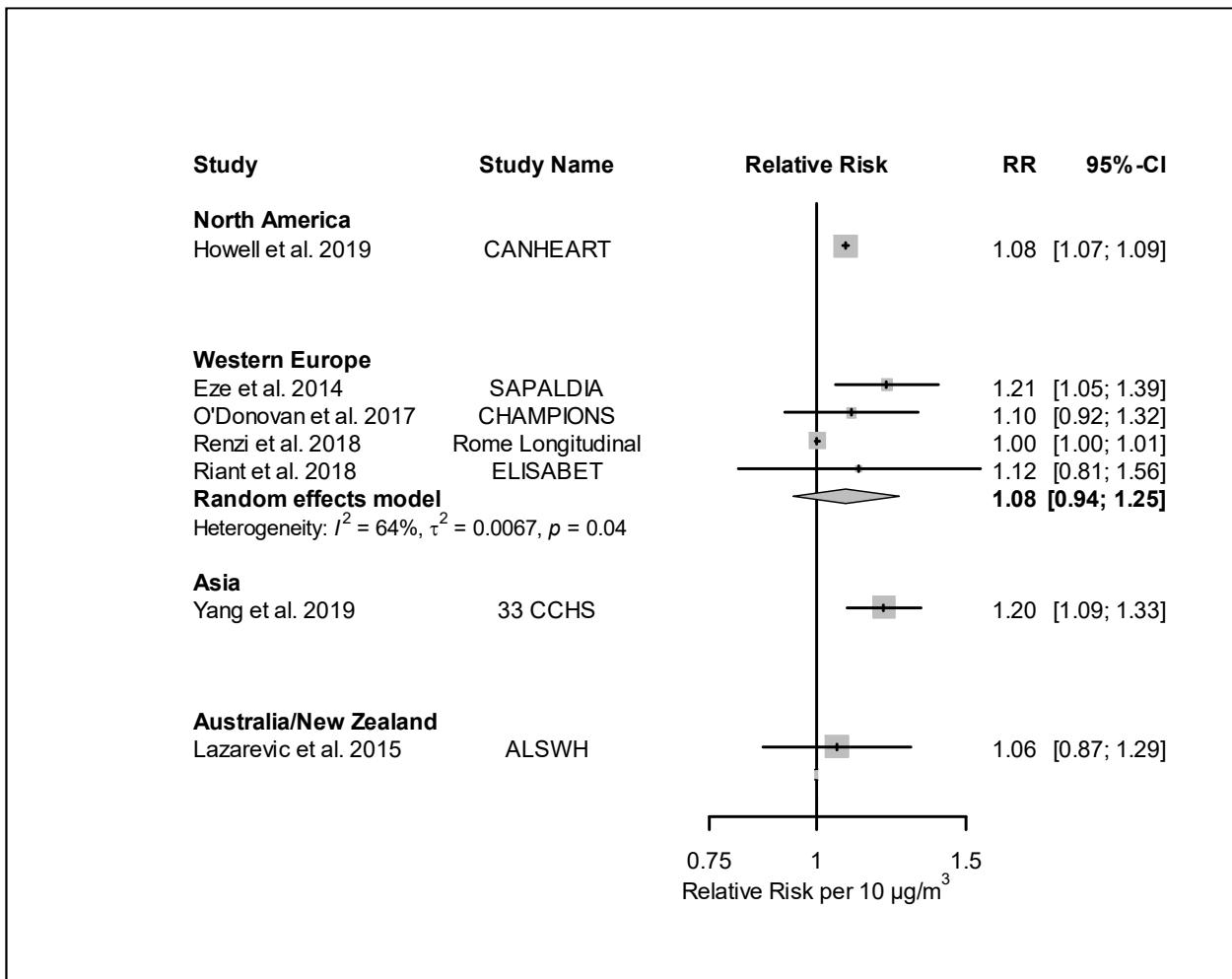


Figure 10D-3. Association between NO_2 and prevalence of diabetes: meta-analysis by geographical region.

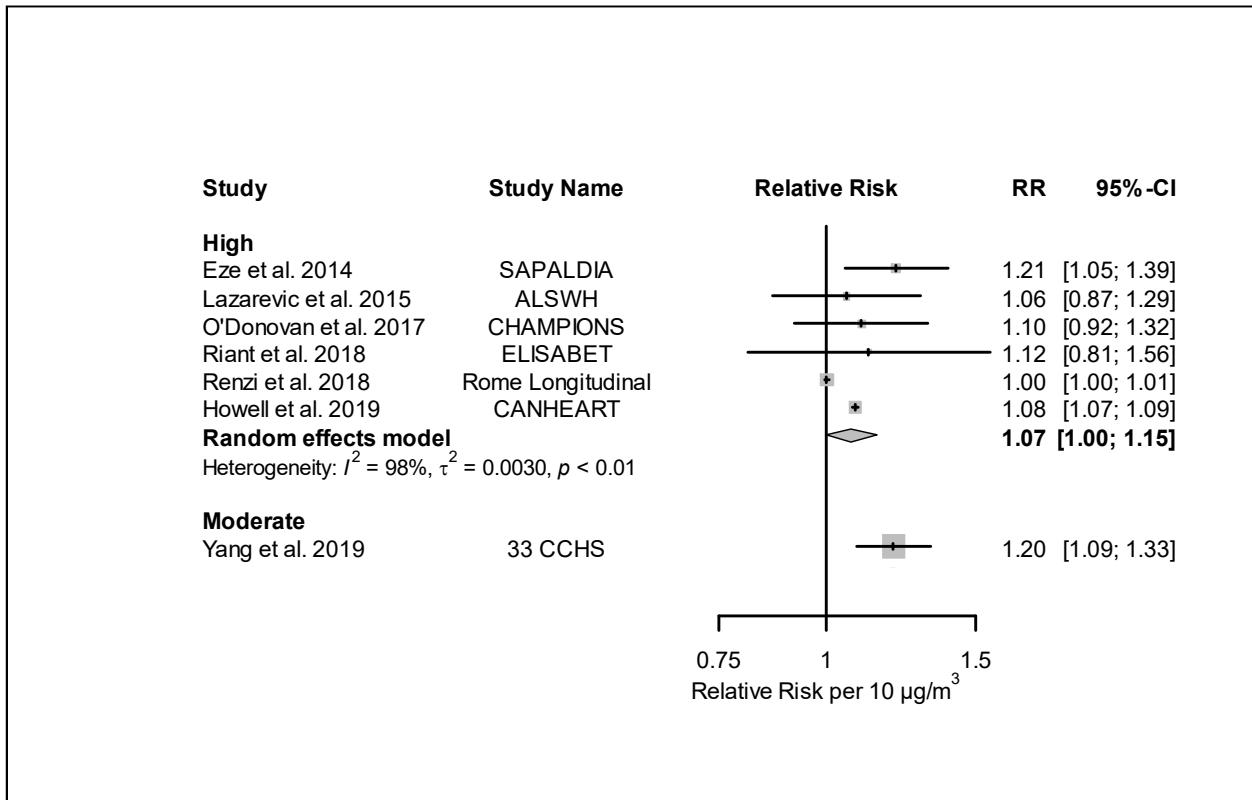


Figure 10D-4. Association between NO₂ and prevalence of diabetes: meta-analysis by traffic specificity.

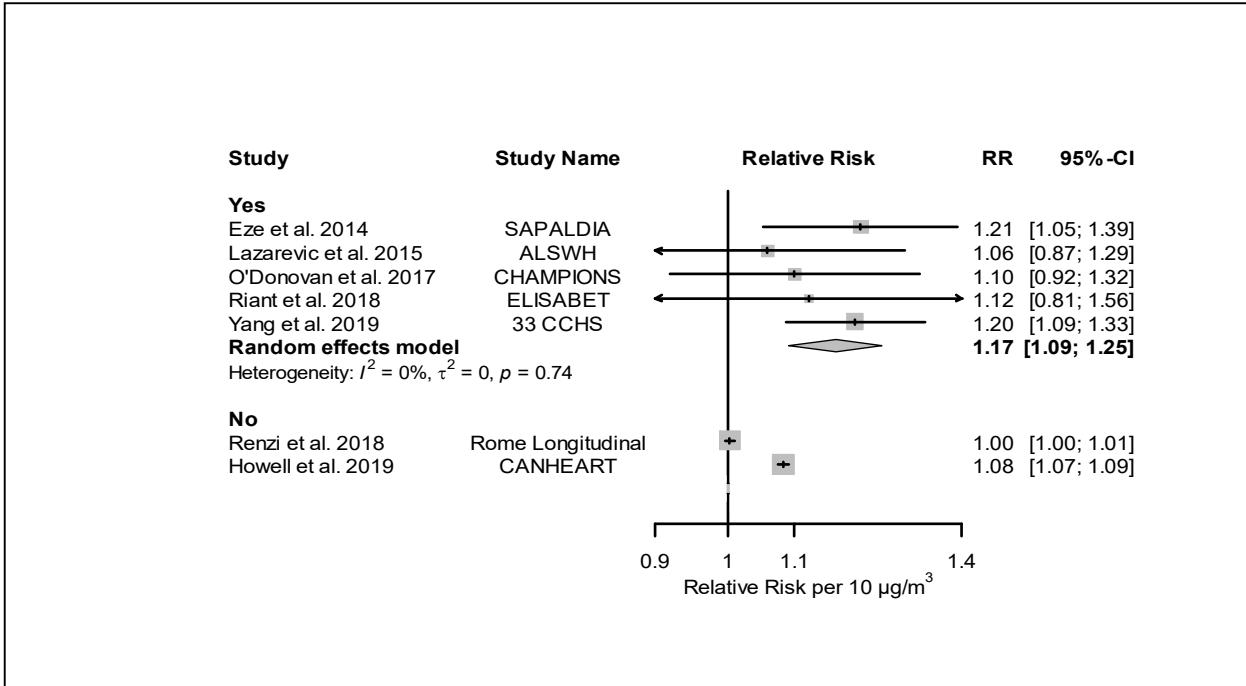


Figure 10D-5. Association between NO_2 and prevalence of diabetes: meta-analysis by smoking adjustment.

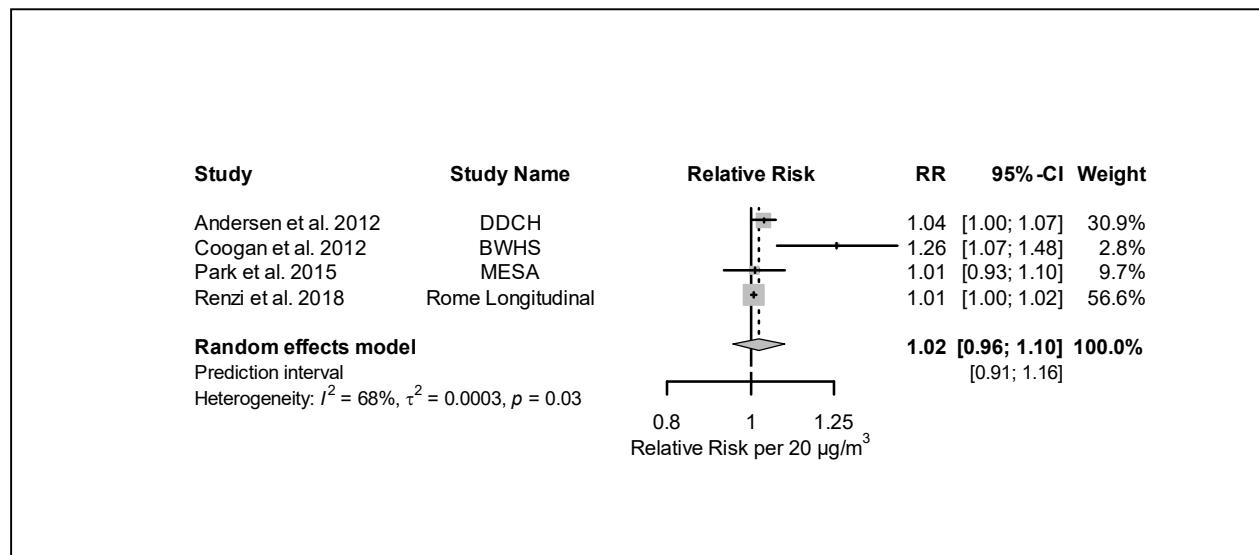


Figure 10D-6. Results of the primary meta-analysis of NO_x and incidence of diabetes.

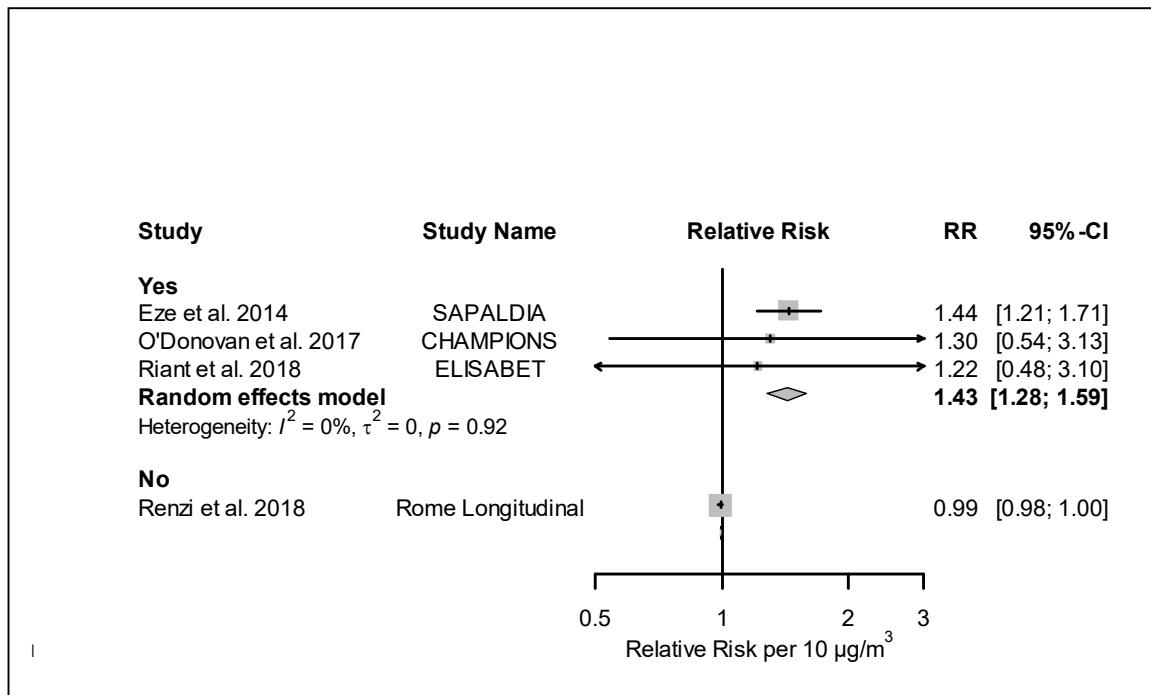


Figure 10D-7. Association between PM_{10} and prevalence of diabetes: meta-analysis by smoking adjustment.

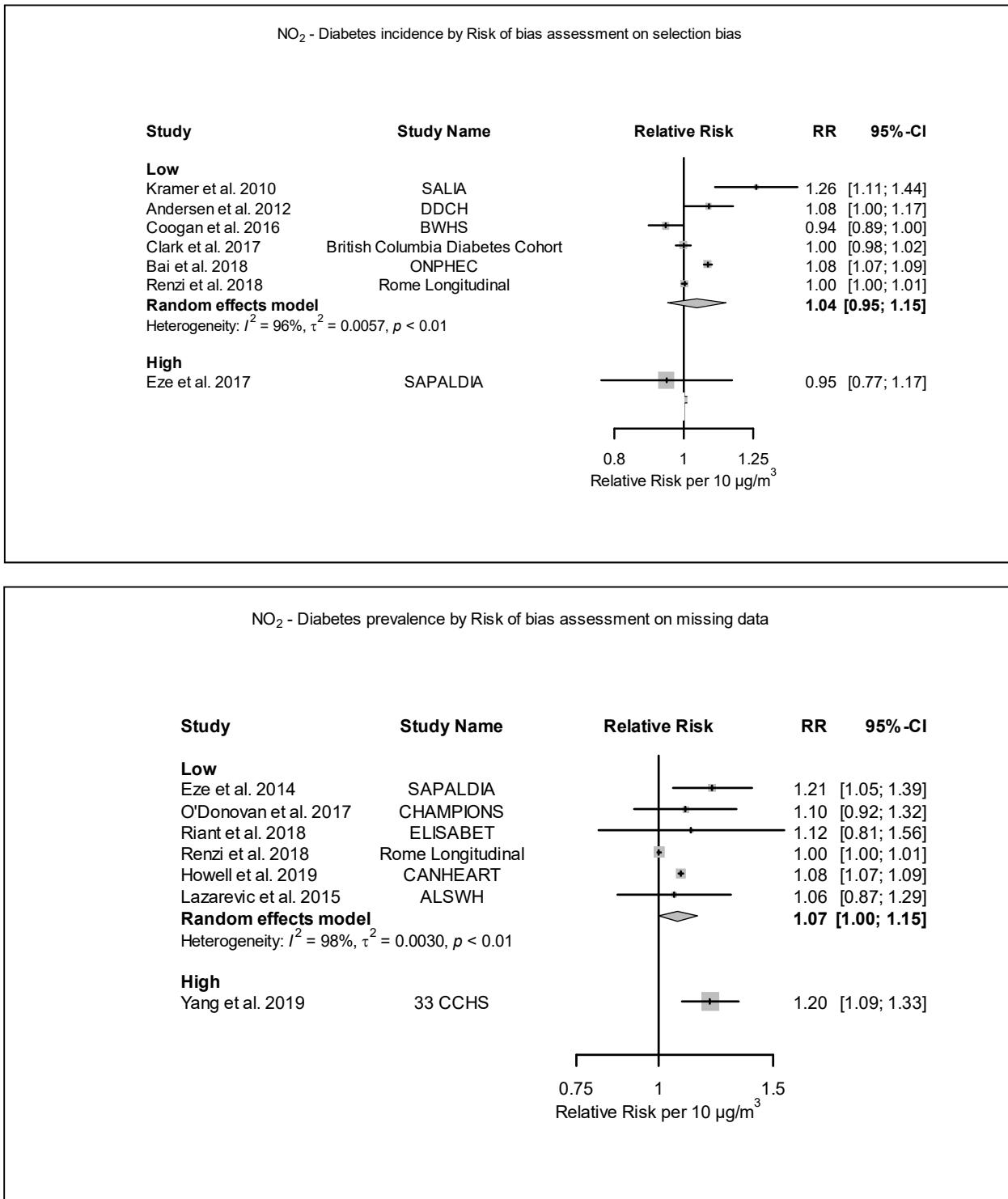


Figure 10D-8. Association between NO₂ and incidence or prevalence of diabetes: meta-analysis by risk of bias selection bias and missing data.

Appendix 10E: References for Studies Included in the Systematic Review of Cardiometabolic Outcomes

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