# HE

# ADDITIONAL MATERIALS 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 Additional Materials 10.1 to 10.4

These Additional Materials were not formatted or 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

## **Additional Materials: All Analyses**

- 10.1 Ischemic heart disease
- 10.2 Coronary events
- 10.3 Stroke
- 10.4 Diabetes

## 10.1 Ischemic heart disease

Summary of meta-analysis incidence





All IHD studies are incidence studies unless indicated.

NO<sub>2</sub>

Primary meta-analysis

# NO<sub>2</sub> - IHD morbidity

Study	Study Name	Relative Risk	RR	95% -CI	Weight
Gan et al. 2011 Cesaroni et al. 2014 Katsoulis et al. 2014 Carey et al. 2016 Alexeeff et al. 2018	Vancouver Administrative ESCAPE EPIC Athens CPRD London KPNC Oakland	<u></u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u>−</u> <u></u>	0.96 1.03 - 1.10 0.97 1.07	[0.94; 0.99] [0.98; 1.09] [0.89; 1.35] [0.92; 1.03] [0.91: 1.26]	40.9% 25.8% 3.5% 24.3% 5.6%
<b>Random effects mode</b> Prediction interval Heterogeneity: $I^2 = 46\%$ ,	$\tau^2 = 0.0009, p = 0.12$	0.8 1 1.25 Relative Risk per 10 µg/m <sup>3</sup>	0.99	<b>[0.94; 1.05]</b> [0.89; 1.11]	100.0%

All fatal & non-fatal

Sensitivity analysis including all available outcomes

Study	Study Name	Relative Risk	RR	95% -CI
Fatal and non-fatal		1		
Gan et al. 2011	Vancouver Administrative		0.96	[0.94; 0.99]
Cesaroni et al. 2014	ESCAPE		1.03	[0.98; 1.09]
Katsoulis et al. 2014	EPIC Athens		1.10	[0.89; 1.35]
Carey et al. 2016	CPRD London		0.97	[0.92; 1.03]
Alexeeff et al. 2018	KPNC Oakland	<del>+•</del>	1.07	[0.91; 1.26]
Random effects mode		$\diamond$	0.99	[0.94; 1.05]
Heterogeneity: $I^2 = 46\%$ ,	$\tau^2 = 0.0009, p = 0.12$			
Fatal				
Gan et al. 2011	Vancouver Administrative		1.05	[1.01; 1.09]
Alexeeff et al. 2018	KPNC Oakland		- 1.13	[0.85; 1.50]
			-	
		• •	•	
		0.75 1	1.5	
		Relative Risk per 10 µg/m <sup>°</sup>		

#### Subgroup analysis - by region



Subgroup analysis - by traffic specificity



Study	Study Name	<b>Relative Risk</b>	RR	95% -CI
<b>High</b> Gan et al. 2011 Cesaroni et al. 2014 Katsoulis et al. 2014 Carey et al. 2016 <b>Random effects mode</b> Heterogeneity: $I^2 = 51\%$ , $\pi$	Vancouver Administrative ESCAPE EPIC Athens CPRD London	* * *	0.96 1.03 - 1.10 0.97 <b>0.99</b>	[0.94; 0.99] [0.98; 1.09] [0.89; 1.35] [0.92; 1.03] <b>[0.93; 1.05]</b>
<b>Moderate</b> Alexeeff et al. 2018	KPNC Oakland		1.07	[0.91; 1.26]
		0.8 1 1.25 Relative Risk per 10 µg/m <sup>3</sup>		

#### Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate.

#### NO2 - IHD morbidity by Risk of bias assessment on confounding



Subgroup analysis - by smoking adjustment

NO2 - IHD morbidity by smoking adjustment

Study	Study Name	Relative Risk	RR	95% -CI
Yes Cesaroni et al. 2014 Katsoulis et al. 2014 Carey et al. 2016 Alexeeff et al. 2018 <b>Random effects mod</b> Heterogeneity: $I^2 = 17\%$ ,	ESCAPE EPIC Athens CPRD London KPNC Oakland $\tau^2 = 0.0008, p = 0.31$		1.03 	[0.98; 1.09] [0.89; 1.35] [0.92; 1.03] [0.91; 1.26] <b>[0.94; 1.09]</b>
<b>No</b> Gan et al. 2011	Vancouver Administrative	<u></u>	0.96	[0.94; 0.99]
		0.8 1 1.25 Relative Risk per 10 μg/m <sup>3</sup>		

NOx

Primary meta-analysis

# NO<sub>x</sub> - IHD morbidity



All fatal & non-fatal

Subgroup analysis notes:

All are W. European general population incidence studies after 2008 controlling for individual smoking, high in traffic specificity and low or moderate in risk of bias.

#### EC

Primary meta-analysis

# EC - IHD morbidity



All fatal & non-fatal

Sensitivity analysis including all available fatality outcomes

Study	Study Name	Relative Risk	RR	95% -CI
Fatal and non-fatal				
Gan et al. 2011	Vancouver Administrative	÷.	1.01	[1.00; 1.02]
Cesaroni et al. 2014	ESCAPE	+	1.09	[0.98; 1.21]
Stockfelt et al. 2017	GOT-MON	<del>\</del>	1.02	[0.82; 1.28]
Stockfelt et al. 2017	PPS		0.95	[0.83; 1.08]
Alexeeff et al. 2018	KPNC Oakland	< i + · · · · · · · · · · · · · · · · · ·	→ 1.26	[0.79; 2.01]
Random effects mode	el	<b></b>	1.01	[0.99; 1.03]
Heterogeneity: $I^2 = 0\%$ , $\tau$	$e^2 = 0, p = 0.46$			
Eatol				
Capetal 2011	Vancouver Administrative	-	1.06	[1 03. 1 00]
	KPNC Oakland			[1.03, 1.09]
Alcheen et al. 2010	Ri No Galiand	I	1.70	[0.75, 5.00]
		1		
	0	.8 1 1.25	2	
		Relative Risk per 1 µg/m	3	

#### Subgroup analysis - by region

#### EC - IHD morbidity by Region

Study	Study Name		<b>Relative Risk</b>	RR	95% -CI
<b>North America</b> Gan et al. 2011 Alexeeff et al. 2018	Vancouver Administrative KPNC Oakland			1.01 — 1.26	[1.00; 1.02] [0.79; 2.01]
Western Europe Cesaroni et al. 2014 Stockfelt et al. 2017 Stockfelt et al. 2017 Random effects mode Heterogeneity: $I^2 = 20\%$ , $\pi$	ESCAPE GOT-MON PPS I <sup>2</sup> = 0.0024, <i>p</i> = 0.29		*	1.09 1.02 0.95 <b>1.03</b>	[0.98; 1.21] [0.82; 1.28] [0.83; 1.08] <b>[0.85; 1.24]</b>
		0.5	1	2	
			Relative Risk per 1 µg/m <sup>3</sup>	-	

Subgroup analysis - by traffic specificity

EC - IHD morbidity by Traffic Specificity



Subgroup analyses – by period: all are general population incidence studies after 2008

Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate.

#### EC - IHD morbidity by Risk of bias assessment on confounding



#### Subgroup analysis - by smoking adjustment

#### EC - IHD morbidity by smoking adjustment

Study	Study Name	Relative Risk	RR	95% -CI
Yes				
Cesaroni et al. 2014	ESCAPE		1.09	[0.98; 1.21]
Stockfelt et al. 2017	GOT-MON	*	1.02	[0.82; 1.28]
Stockfelt et al. 2017	PPS		0.95	[0.83; 1.08]
Alexeeff et al. 2018	KPNC Oakland 🗧	+ +	→ 1.26	[0.79; 2.01]
Random effects mode	el		1.04	[0.91; 1.18]
Heterogeneity: $I^2 = 5\%$ , $\tau$	$p^2 = 0.0021, p = 0.37$			
No				
Gan et al. 2011	Vancouver Administrative	+	1.01	[1.00; 1.02]
	-			
	I	1 1	1	
	0.0	3 1 1.25	2	
		Relative Risk per 1 µg/m <sup>3</sup>		

 $\mathbf{PM}_{10}$ 

Primary meta-analysis

## PM<sub>10</sub> - IHD morbidity



All fatal & non-fatal

Subgroup analysis notes:

All are W. European general population incidence studies.

Reporting only on combined fatal and non-fatal events.

All rated moderate for traffic specificity and controlled for individual smoking.

All rated low or moderate for risk of bias domains.

#### PM<sub>2.5</sub>

Primary meta-analysis

## PM<sub>2.5</sub> - IHD morbidity



All fatal and non-fatal

Subgroup analysis notes:

All cohorts after 2008.

All rated moderate traffic specificity.

Sensitivity analysis with all reported estimates

Study	Study Name	Relative Risk	RR	95% -CI
Fatal and non-fatal		1		
Gan et al. 2011	Vancouver Administrative	+	1.00	[0.94; 1.07]
Cesaroni et al. 2014	ESCAPE		1.13	[0.98; 1.30]
Stockfelt et al. 2017	GOT-MON		0.92	[0.61; 1.38]
Stockfelt et al. 2017	PPS		- 1.38	[1.08; 1.77]
Random effects mod	el		1.09	[0.86; 1.39]
Heterogeneity: $I^2 = 63\%$ ,	$\tau^2 = 0.0119, p = 0.04$			
Fatal				
Gan et al. 2011	Vancouver Administrative		1.03	[0.93; 1.15]
		I		
		0.75 1 1.5		
		Relative Risk per 5 µg/m <sup>3</sup>		

#### Subgroup analysis - by region



Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate.

Study Study Name **Relative Risk** RR 95% -CI Moderate Cesaroni et al. 2014 ESCAPE 1.13 [0.98; 1.30] Stockfelt et al. 2017 GOT-MON 0.92 [0.61; 1.38] Stockfelt et al. 2017 PPS 1.38 [1.08; 1.77] Random effects model 1.17 [0.79; 1.73] Heterogeneity:  $I^2 = 39\%$ ,  $\tau^2 = 0.0069$ , p = 0.19High Gan et al. 2011 1.00 [0.94; 1.07] Vancouver Administrative 0.75 1 1.5 Relative Risk per 5 µg/m<sup>3</sup>

 $\ensuremath{\mathsf{PM}_{2.5}}\xspace$  - IHD morbidity by Risk of bias assessment on confounding

## Subgroup analysis - by smoking adjustment

 $\mathsf{PM}_{\!2.5}$  - IHD morbidity by smoking adjustment

Study	Study Name	Relative Risk	RR	95% -CI
Yes				
Cesaroni et al. 2014	ESCAPE		1.13	[0.98; 1.30]
Stockfelt et al. 2017	GOT-MON		0.92	[0.61; 1.38]
Stockfelt et al. 2017	PPS		- 1.38	[1.08: 1.77]
Random effects mod	lel		- 1.17	[0.79; 1.73]
Heterogeneity: $I^2 = 39\%$	$p, \tau^2 = 0.0069, p = 0.19$			
No				
Gan et al. 2011	Vancouver Administrative	+	1.00	[0.94; 1.07]
		0.75 1 1.5		
		Relative Risk per 5 µg/m°		

Reference	Study Name			Categories	RR	95% CI
Hoffmann et al. 2006	HNR		-	 <150 vs. >150 m	1.75	[1.16, 2.62]
Gan et al. 2010	Vancouver Administrative		<b>├─-</b>	<50 from major road or <150m from highw ay vs. higher	1.29	[1.18, 1.41]
Carey et al. 2016	CPRD London	Þ	∎⊣	<100 vs. >250 m	1.02	[0.95, 1.09]
Carey et al. 2016	CPRD London	+	Н	100-250 vs. >250 m	1.00	[0.94, 1.07]
	υ.	.8 1	Relative Risk			

#### Distance measures - IHD morbidity

Hoffmann et al. 2006 is a cross-sectional study. All are general population cohorts.

Chapter 10 Additional Materials



#### Traffic Density measures - IHD morbidity

## **10.2 Coronary events**

Only sufficient studies to conduct meta-analysis for NO<sub>2</sub>.

#### NO<sub>2</sub>

Primary meta-analysis

All are fatal & nonfatal except for Grazuleviciene et al. 2004 and Roswall et al. 2017 which

## NO<sub>2</sub> - Coronary events

Study	Study Name	Relative Risk	RR	95% <i>-</i> CI	Weight
Grazuleviciene et al. 2004	Kaunas Men's Study	<u>_</u>	1.12	[1.00; 1.25]	11.4%
Rosenlund et al. 2006	SHEEP		1.00	[0.91; 1.09]	13.7%
Rosenlund et al. 2009	Stockholm County Case-Control	<u>+</u>	1.01	[1.00; 1.03]	20.4%
Carey et al. 2016	CPRD London		0.88	[0.79; 0.98]	12.4%
Roswall et al. 2017	DDCH		1.12	[1.05; 1.19]	16.9%
Alexeeff et al. 2018	KPNC Oakland		- 1.11	[0.90; 1.38]	5.3%
Bai et al. 2019	ONPHEC		1.01	[0.99; 1.04]	19.8%
Random effects model			1.03	[0.95; 1.11]	100.0%
Prediction interval				[0.86; 1.23]	
Heterogeneity: $I^2 = 71\%$ , $\tau^2$	= 0.0041. <i>p</i> < 0.01				
3, , , , ,		0.8 1 1.25			
		Relative Risk per 10 µg/m <sup>3</sup>			

are only nonfatal.

All coronary event studies are incidence studies unless indicated.

## Sensitivity analysis including all available outcomes

Study	Study Name	Relative Risk	RR	95% -CI
Fatal and non-fatal Rosenlund et al. 2006 Rosenlund et al. 2009 Carey et al. 2016 Alexeeff et al. 2018 Bai et al. 2019 Random effects model Heterogeneity: $J^2 = 50\%$ , $\tau^2$	SHEEP Stockholm County Case-Control CPRD London KPNC Oakland ONPHEC $^2 = < 0.0001, p = 0.09$		1.00 1.01 0.88 - 1.11 1.01 <b>1.01</b>	[0.91; 1.09] [1.00; 1.03] [0.79; 0.98] [0.90; 1.38] [0.99; 1.04] <b>[0.98; 1.04]</b>
<b>Fatal</b> Rosenlund et al. 2006 Rosenlund et al. 2009 Roswall et al. 2017 <b>Random effects model</b> Heterogeneity: <i>I</i> <sup>2</sup> = 69%, τ <sup>2</sup>	SHEEP Stockholm County Case-Control DDCH <sup>2</sup> = 0.0049, <i>p</i> = 0.04	*	1.15 1.07 - 1.25 - <b>1.13</b>	[0.99; 1.33] [1.05; 1.09] [1.10; 1.42] <b>[0.93; 1.38]</b>
Non-fatal Grazuleviciene et al. 2006 Rosenlund et al. 2009 Rosenlund et al. 2009 Roswall et al. 2017 Random effects model Heterogeneity: $J^2 = 86\%$ , $\tau$	4 Kaunas Men's Study SHEEP Stockholm County Case-Control DDCH <sup>2</sup> = 0.0051, <i>ρ</i> < 0.01		1.12 0.96 0.98 1.12 <b>1.04</b>	[1.00; 1.25] [0.87; 1.06] [0.96; 1.00] [1.05; 1.19] <b>[0.91; 1.18]</b>
		0.8 1 1.25 Relative Risk per 10 μg/m <sup>3</sup>		

Subgroup analysis - by traffic specificity

NO<sub>2</sub> - Coronary events by Traffic Specificity

Study	Study Name	Relative Risk	RR	95% -Cl
<b>High</b> Rosenlund et al. 2006 Rosenlund et al. 2009 Carey et al. 2016 Roswall et al. 2017 Bai et al. 2019 <b>Random effects model</b> Heterogeneity: $I^2 = 77\%$ , $\tau^2$	SHEEP Stockholm County Case-Control CPRD London DDCH ONPHEC = 0.0044, <i>p</i> < 0.01		1.00 1.01 0.88 1.12 1.01 <b>1.01</b>	[0.91; 1.09] [1.00; 1.03] [0.79; 0.98] [1.05; 1.19] [0.99; 1.04] <b>[0.91; 1.11]</b>
<b>Moderate</b> Grazuleviciene et al. 2004 Alexeeff et al. 2018	Kaunas Men's Study KPNC Oakland		1.12 - 1.11	[1.00; 1.25] [0.90; 1.38]
		0.8 1 1.25 Relative Risk per 10 μg/m <sup>3</sup>		

## Subgroup analysis - by publication year

#### NO<sub>2</sub> - Coronary events by publication year

Study	Study Name	<b>Relative Risk</b>	RR	95% -CI
<b>Before 2008</b> Grazuleviciene et al. 2004 Rosenlund et al. 2006	Kaunas Men's Study SHEEP	-+	1.12 1.00	[1.00; 1.25] [0.91; 1.09]
After 2008 Rosenlund et al. 2009 Carey et al. 2016 Roswall et al. 2017 Alexeeff et al. 2018 Bai et al. 2019 Random effects model Heterogeneity: $l^2$ = 78%, $\tau^2$	Stockholm County Case-Control CPRD London DDCH KPNC Oakland ONPHEC = 0.0056, p < 0.01	0.8 1 1.25 Relative Risk per 10 µg/m <sup>3</sup>	1.01 0.88 1.12 - 1.11 1.01 <b>1.02</b>	[1.00; 1.03] [0.79; 0.98] [1.05; 1.19] [0.90; 1.38] [0.99; 1.04] <b>[0.91; 1.14]</b>

Subgroup analysis - by region

Study	Study Name	Rel	ative Risk	RR	95% -CI
<b>North America</b> Alexeeff et al. 2018 Bai et al. 2019	KPNC Oakland ONPHEC	-	÷.	— 1.11 1.01	[0.90; 1.38] [0.99; 1.04]
Western Europe Rosenlund et al. 2006 Rosenlund et al. 2009 Carey et al. 2016 Roswall et al. 2017 Random effects model Heterogeneity: $l^2 = 83\%$ , $\tau^2$	SHEEP Stockholm County Case-Control CPRD London DDCH = 0.0071, <i>p</i> < 0.01		- - -	1.00 1.01 0.88 1.12 <b>1.00</b>	[0.91; 1.09] [1.00; 1.03] [0.79; 0.98] [1.05; 1.19] <b>[0.86; 1.17]</b>
Eastern Europe Grazuleviciene et al. 2004	Kaunas Men's Study	0.8 Relative F	1 1.25 Risk per 10 µg/m <sup>3</sup>	1.12	[1.00; 1.25]

#### Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate

NO2 - Coronary events by Risk of bias assessment on confounding

Study	Study Name	Relative Risk	RR	95% -CI
Low/Moderate Grazuleviciene et al. 2004	Kaunas Men's Study	<b></b> _	1.12	[1.00; 1.25]
Rosenlund et al. 2006	SHEEP		1.00	[0.91; 1.09]
Carey et al. 2016	CPRD London		0.88	[0.79; 0.98]
Roswall et al. 2017	DDCH		1.12	[1.05; 1.19]
Alexeeff et al. 2018	KPNC Oakland		- 1.11	[0.90; 1.38]
Bai et al. 2019	ONPHEC		1.01	[0.99; 1.04]
Random effects model			1.03	[0.94; 1.14]
Heterogeneity: $I^2 = 75\%$ , $\tau^2$	= 0.0060, <i>p</i> < 0.01			
<b>High</b> Rosenlund et al. 2009	Stockholm County Case-Control	÷	1.01	[1.00; 1.03]
		0.8 1 1.25 Relative Risk per 10 µg/m <sup>3</sup>		

NO2 - Coronary events by Risk of bias assessment on selection bias

Study	Study Name	Relative Risk	RR	95%-CI
Low				
Rosenlund et al. 2006	SHEEP	<u> </u>	1.00	[0.91; 1.09]
Rosenlund et al. 2009	Stockholm County Case-Control	<u>+</u>	1.01	[1.00; 1.03]
Carey et al. 2016	CPRD London		0.88	[0.79; 0.98]
Roswall et al. 2017	DDCH		1.12	[1.05; 1.19]
Alexeeff et al. 2018	KPNC Oakland		- 1.11	[0.90; 1.38]
Bai et al. 2019	ONPHEC		1.01	[0.99; 1.04]
Random effects model			1.02	[0.93; 1.10]
Heterogeneity: $I^2 = 72\%$ , $\tau^2$	= 0.0040, <i>p</i> < 0.01			
High			4.40	14 00 4 051
Grazuleviciene et al. 2004	Kaunas Men's Study		1.12	11.00; 1.25
		0.8 1 1.25		
		Relative Risk per 10 µg/m <sup>3</sup>		
Bai et al. 2019 <b>Random effects model</b> Heterogeneity: $I^2 = 72\%$ , $\tau^2$ <b>High</b> Grazuleviciene et al. 2004	ONPHEC = 0.0040, <i>p</i> < 0.01 Kaunas Men's Study	0.8 1 1.25 Relative Risk per 10 μg/m <sup>3</sup>	1.01 <b>1.02</b> 1.12	[0.99; 1.04] [ <b>0.93; 1.10]</b> [1.00: 1.25]

#### $\ensuremath{\text{NO}_2}\xspace$ - Coronary events by Risk of bias assessment on missing data



#### Subgroup analysis - by smoking adjustment



NO2 - Coronary events by smoking adjustment

Subgroup analysis - by study design

#### NO2 - Coronary events by study design

Study	Study Name	<b>Relative Risk</b>	RR	95% -CI
Case-controlGrazuleviciene et al. 2004Rosenlund et al. 2006Rosenlund et al. 2009Random effects modelHeterogeneity: $I^2 = 36\%$ , $\tau^2 =$	Kaunas Men's Study SHEEP Stockholm County Case-Control = < 0.0001, <i>p</i> = 0.21		1.12 1.00 1.01 <b>1.01</b>	[1.00; 1.25] [0.91; 1.09] [1.00; 1.03] <b>[0.97; 1.06]</b>
Cohort Carey et al. 2016 Roswall et al. 2017 Alexeeff et al. 2018 Bai et al. 2019 Random effects model Heterogeneity: $l^2 = 83\%$ , $\tau^2 =$	CPRD London DDCH KPNC Oakland ONPHEC = 0.0094, p < 0.01	0.8 1 1.25 Balating Biok page 10 up(x <sup>3</sup>	0.88 1.12 1.11 1.01 <b>1.02</b>	[0.79; 0.98] [1.05; 1.19] [0.90; 1.38] [0.99; 1.04] <b>[0.86; 1.21]</b>
		Relative Risk per 10 µg/m <sup>3</sup>		

Reference	Study Name	Event Fatality	Categories	RR	95% CI
Tonne et al. 2007	Worcester Heart Attack	Fatal and non-fatal	■ <100 vs. >100 m	1.04	[1.02, 1.06]
Kan et al. 2008	ARIC	Fatal and non-fatal	<150 vs. >150 m	1.09	[0.94, 1.26]
Hart et al. 2013	Nurses' Health	Fatal and non-fatal	<50 m to A3 or <100 m to A1/A2 road vs. higher	1.11	[1.01, 1.22]
Hart et al. 2014	Nurses' Health	Fatal	<49 vs. >500 m	1.24	[1.03, 1.49]
Hart et al. 2014	Nurses' Health	Fatal	• 50-199 vs. >500 m	1.07	[0.90, 1.27]
Hart et al. 2014	Nurses' Health	Fatal	• 200-499 vs. >500 m	1.06	[0.90, 1.25]
Hart et al. 2014	Nurses' Health	Non-fatal	<49 vs. >500 m	1.08	[0.96, 1.23]
Hart et al. 2014	Nurses' Health	Non-fatal	50-199 vs. >500 m	1.09	[0.98, 1.22]
Hart et al. 2014	Nurses' Health	Non-fatal	200-499 vs. >500 m	1.03	[0.92, 1.14]
Chum et al. 2015	Toronto Health Survey	Non-fatal	<100 vs >100 m	3.79	[2.25, 5.53]
Carey et al. 2016	CPRD London	Fatal and non-fatal	<100 vs. >250 m	0.96	[0.85, 1.07]
Carey et al. 2016	CPRD London	Fatal and non-fatal	⊢■→ 100-250 vs. >250 m	0.95	[0.87, 1.05]
Kulick et al. 2018	NOMAS	Fatal and non-fatal	<	1.00	[0.69, 1.44]
Kulick et al. 2018	NOMAS	Fatal and non-fatal		0.89	[0.63, 1.26]
Kulick et al. 2018	NOMAS	Fatal and non-fatal	200-400 vs. >400 m	0.98	[0.72, 1.33]
			0.8 1 2 Relative Risk		

#### Distance measures - Coronary events

Chum et al. 2015 is a cross-sectional study.

Reference	Study Name	Event Fatality		Increment/Categories	RR	95% CI
			1			
Hoffmann et al. 2015	HNR	Fatal and non-fatal	<b>⊢</b> →	5th-95th percentile	1.21	[0.91, 1.62]
Carey et al. 2016	CPRD London	Fatal and non-fatal	■	>100000 heavy vehicle-km/year vs. none	0.97	[0.86, 1.09]
Carey et al. 2016	CPRD London	Fatal and non-fatal		<100000 heavy vehicle-km/year vs. none	0.98	[0.90, 1.07]
			0.6 1 1.5 Relative Risk			

#### Traffic Density measures - Coronary events

Kan et al. 2008 not in plot because estimate was log-transformed.

### 10.3 Stroke

Summary of meta-analysis incidence



Footnote: The following increments were used:  $10 \ \mu g/m^3$  for NO<sub>2</sub>,  $20 \ \mu g/m^3$  for NO<sub>x</sub>,  $1 \ \mu g/m^3$  for EC,  $10 \ \mu g/m^3$  for PM<sub>10</sub> and  $5 \ \mu g/m^3$  for PM<sub>2.5</sub>. Effect estimates cannot be directly compared across the different traffic-related pollutants because the selected increments do not necessarily represent the same contrast in exposure.

All stroke studies are incidence studies unless indicated.

#### NO<sub>2</sub>

#### Primary meta-analysis

## NO<sub>2</sub> - Stroke



All were fatal and non-fatal

Sensitivity analysis including all available outcomes

Study	Study Name	F	Relative Risk	RR	95% -CI
<b>Fatal and non-fatal</b> Johnson et al. 2013 Katsoulis et al. 2014	Edmonton Stroke EPIC Athens		_ <del>_</del>	1.01 0.98	[0.94; 1.09] [0.71; 1.35]
Sørensen et al. 2014 Stafoggia et al. 2014	DDCH ESCAPE		+	1.08 0.99	[1.01; 1.16] [0.89 <sup>.</sup> 1.11]
Carey et al. 2016	CPRD London		<del>-</del>	0.88	[0.82; 0.95]
Dirgawati et al. 2018	HIMS			0.96	[0.79; 1.16] [0.85; 1.08]
Random effects mode Heterogeneity: $I^2 = 64\%$ ,	$\tau^2 = 0.0040, p = 0.01$		Î	0.98	[0.92; 1.05]
<b>Fatal</b> Sørensen et al. 2014 Alexeeff et al. 2018	DDCH KPNC Oakland			- 1.47	[1.21; 1.79] [0.90; 2.74]
Dirgawati et al. 2019 <b>Random effects mod</b> Heterogeneity: $I^2 = 77\%$ ,	HIMS el $\tau^2 = 0.0628, p = 0.01$			0.93 — 1.25	[0.72; 1.20] [ <b>0.61; 2.55]</b>
		0.5	1	2	



#### Subgroup analysis - by region



#### Subgroup analysis - by traffic specificity

#### NO<sub>2</sub> - Stroke by Traffic Specificity

Study	Study Name	Relative Risk	RR	95% -CI
High Johnson et al. 2013 Katsoulis et al. 2014 Sørensen et al. 2014 Stafoggia et al. 2014 Carey et al. 2016 Dirgawati et al. 2019 Random effects mod Heterogeneity: $I^2 = 70\%$ ,	Edmonton Stroke EPIC Athens DDCH ESCAPE CPRD London HIMS el $\tau^2 = 0.0045, p < 0.01$		1.01 0.98 1.08 0.99 0.88 0.96 <b>0.98</b>	[0.94; 1.09] [0.71; 1.35] [1.01; 1.16] [0.89; 1.11] [0.82; 0.95] [0.85; 1.08] <b>[0.91; 1.06]</b>
<b>Moderate</b> Alexeeff et al. 2018	KPNC Oakland	0.8 1 1.25 Relative Risk per 10 u/m <sup>3</sup>	0.96	[0.79; 1.16]

Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate.

Study	Study Name	Relative Risk	RR	95%-CI
Low/Moderate Katsoulis et al. 2014 Sørensen et al. 2014 Stafoggia et al. 2014 Carey et al. 2016 Alexeeff et al. 2018 Dirgawati et al. 2019 Random effects mode Heterogeneity: $1^2 = 69\%$ ,	EPIC Athens DDCH ESCAPE CPRD London KPNC Oakland HIMS $\tau^2 = 0.0050, p < 0.01$		0.98 1.08 0.99 0.88 0.96 0.96 <b>0.97</b>	[0.71; 1.35] [1.01; 1.16] [0.89; 1.11] [0.82; 0.95] [0.79; 1.16] [0.85; 1.08] <b>[0.90; 1.06]</b>
<b>High</b> Johnson et al. 2013	Edmonton Stroke	0.8 1 1.25	1.01	[0.94; 1.09]

NO<sub>2</sub> - Stroke by Risk of bias assessment on confounding

Relative Risk per 10 µg/m<sup>3</sup>

 $\mathrm{NO}_{\mathrm{2}}$  - Stroke by Risk of bias assessment on selection bias

Study	Study Name	Relative Risk	RR	95%-CI
Low Katsoulis et al. 2014 Sørensen et al. 2014 Stafoggia et al. 2014 Carey et al. 2016	EPIC Athens <sup>–</sup> DDCH ESCAPE CPRD London		0.98 1.08 0.99 0.88	[0.71; 1.35] [1.01; 1.16] [0.89; 1.11] [0.82; 0.95]
Alexeeff et al. 2018 Dirgawati et al. 2019 <b>Random effects mode</b> Heterogeneity: $l^2 = 69\%$ ,	KPNC Oakland HIMS $\tau^2 = 0.0050, p < 0.01$		0.96 0.96 <b>0.97</b>	[0.79; 1.16] [0.85; 1.08] <b>[0.90; 1.06]</b>
<b>High</b> Johnson et al. 2013	Edmonton Stroke	_ <u>+</u>	1.01	[0.94; 1.09]
		0.8 1 1.25 Relative Risk per 10 µg/m <sup>3</sup>		

#### Subgroup analysis - by smoking adjustment

NO2 - Stroke by smoking adjustment



#### Subgroup analysis - by study design

NO2 - Stroke by study design

Study	Study Name	Relative Risk	RR	95% -Cl
<b>Case-control</b> Johnson et al. 2013	Edmonton Stroke	- <u>Ļ</u>	1.01	[0.94; 1.09]
<b>Cohort</b> Katsoulis et al. 2014 Sørensen et al. 2014 Stafoggia et al. 2014 Carey et al. 2016 Alexeeff et al. 2018 Dirgawati et al. 2019 <b>Random effects mode</b> Heterogeneity: $I^2 = 69\%$ , $A$	EPIC Athens DDCH ESCAPE CPRD London KPNC Oakland HIMS $\tau^2 = 0.0050, p < 0.01$	0.8 1 1.25 Relative Risk per 10 µg/m <sup>3</sup>	0.98 1.08 0.99 0.88 0.96 0.96 <b>0.97</b>	[0.71; 1.35] [1.01; 1.16] [0.89; 1.11] [0.82; 0.95] [0.79; 1.16] [0.85; 1.08] <b>[0.90; 1.06]</b>

#### NOx

#### Primary meta-analysis



All are fatal & non-fatal except Oudin et al. 2011 which is only non-fatal.

Oudin et al. 2011 are estimates from a case-control study based on prevalent cases.

Sensitivity analysis including all available outcomes

Study	Study Name	<b>Relative Risk</b>	RR	95% -CI
<b>Fatal and non-fatal</b> Sørensen et al. 2014 Stafoggia et al. 2014 Korek et al. 2015 Carey et al. 2016	DDCH ESCAPE SDPP, SIXTY, SALT, SNAC-K CPRD London	 	1.02 0.98 1.20 0.90	[0.98; 1.07] [0.89; 1.07] [0.63; 2.27] [0.85; 0.96]
Stockfelt et al. 2017 Stockfelt et al. 2017 Dirgawati et al. 2019 <b>Random effects model</b> Heterogeneity: $I^2 = 57\%$ , $\tau^2$	GOT-MON PPS HIMS <sup>2</sup> = 0.0022, <i>p</i> = 0.03		1.04 1.04 1.00 <b>0.99</b>	[0.90; 1.20] [0.97; 1.12] [0.91; 1.09] <b>[0.94; 1.05]</b>
<b>Fatal</b> Sørensen et al. 2014 Dirgawati et al. 2019	DDCH HIMS		1.17 0.94	[1.05; 1.31] [0.77; 1.14]
<b>Non-fatal</b> Oudin et al. 2011	Scania Stroke -		0.86	[0.36; 2.06]
		0.5 1 2 Relative Risk per 20 µg/m <sup>3</sup>		

# NO<sub>x</sub> - Stroke

#### Subgroup analysis - by region



Subgroup analysis- by study design



• 0.86	[0.36; 2.06]
1.02 0.98 1.20 0.90 1.04 1.04 1.04 1.04 1.04 1.00 0.99 1.04 1.02 0.99 1.04 1.04 1.04 1.00 0.99	[0.98; 1.07] [0.89; 1.07] [0.63; 2.27] [0.85; 0.96] [0.90; 1.20] [0.97; 1.12] [0.91; 1.09] <b>[0.94; 1.05]</b>
-	1.02 0.98 1.20 0.90 1.04 1.04 1.04 1.04 1.00 0.99 1.04 1.02 0.90 1.04 1.02 0.90 1.04 1.02 0.90 1.04 1.02 0.98 1.20 0.98 1.20 0.98 1.20 0.98 1.20 0.98 1.20 0.98 1.20 0.98 1.20 0.98 1.20 0.99 1.04 1.04 1.04 1.04 1.04 1.04 1.04 1.04

Subgroup analysis notes:

All studies rated high for traffic specificity and control for individual smoking.

All studies rated low or moderate for risk of bias domains.

## EC

#### Primary meta-analysis

## EC - Stroke



All are fatal & non-fatal except Gan et al. 2012 which is only fatal.

Sensitivity analysis including all available outcomes

Study	Study Name	Pollutant	Relative Risk	RR	95%-CI
Fatal and non-fatal			1		
Stafoggia et al. 2014	ESCAPE	PM2.5 abs		1.07	[0.84; 1.36]
Stockfelt et al. 2017	GOT-MON	BC		1.20	[0.91; 1.57]
Stockfelt et al. 2017	PPS	BC		1.07	[0.92; 1.24]
Alexeeff et al. 2018	KPNC Oakland	BC	<b>← →                                   </b>	0.83	[0.47; 1.45]
Dirgawati et al. 2019	HIMS	PM2.5 abs		0.87	[0.74; 1.03]
Random effects mode	1		$\rightarrow$	1.02	[0.86; 1.20]
Heterogeneity: $I^2 = 30\%$ , a	$t^2 = 0.0068, p = 0.22$				
Fatal					
Gan et al. 2012	Vancouver Administrative	PM2.5 abs	-	1.04	[1.00; 1.08]
Alexeeff et al. 2018	KPNC Oakland	BC ·	< +	→ 0.68	[0.08; 5.83]
Dirgawati et al. 2019	HIMS	PM2.5 abs		0.72	[0.51; 1.03]
Random effects mode	1			0.90	[0.53; 1.55]
Heterogeneity: $I^2 = 50\%$ , a	$t^2 = 0.0454, p = 0.13$				
		l l			
		0.	5 1 2	2.5	
			Relative Risk per 1 µg/m <sup>3</sup>	5	

#### Subgroup analysis - by region



Subgroup analysis - by traffic specificity

EC- Stroke by Traffic Specificity



#### Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate





Subgroup analysis - by smoking adjustment

#### EC- Stroke by smoking adjustment



#### $\mathbf{PM}_{10}$

Primary meta-analysis

PM<sub>10</sub> - Stroke



All were fatal & non-fatal

Subgroup analysis notes:

There were no multiple outcomes per study.

All are W. European incidence cohorts that control for smoking and rated moderate for traffic specificity.

All were rated low or moderate for risk of bias domains.

#### PM<sub>2.5</sub>

Primary meta-analysis

## PM<sub>2.5</sub> - Stroke



All fatal & non-fatal

Sensitivity analysis with all reported estimates

Study	Study Name	Relative Risk	RR	95%-CI
Fatal and non-fatal				
Stafoggia et al. 2014	ESCAPE		1.19	[0.88; 1.61]
Stockfelt et al. 2017	GOT-MON	+ +	- 1.50	[0.90; 2.50]
Stockfelt et al. 2017	PPS		1.06	[0.78; 1.44]
Dirgawati et al. 2019	HIMS		1.01	[0.84; 1.21]
Random effects mode	el		1.08	[0.89; 1.32]
Heterogeneity: $I^2 = 0\%$ , $\tau$	$p^2 = 0, p = 0.48$			
Fatal				
Dirgawati et al. 2019	HIMS		0.71	[0.49; 1.02]
		0.5 1 2		

Relative Risk per 5 µg/m<sup>3</sup>

#### Subgroup analysis - by region

Study	Study Name	Relative Risk	RR	95%-CI
Western Europe Stafoggia et al. 2014 Stockfelt et al. 2017 Stockfelt et al. 2017 Random effects model Heterogeneity: $l^2 = 0\%$ , $\tau^2$	ESCAPE GOT-MON PPS = 0, <i>p</i> = 0.52		1.19 - 1.50 1.06 <b>1.17</b>	[0.88; 1.61] [0.90; 2.50] [0.78; 1.44] <b>[0.82; 1.67]</b>
Australia/New Zealand Dirgawati et al. 2019	HIMS	+	1.01	[0.84; 1.21]
		0.5 1 2 Relative Risk per 5 µg/m <sup>3</sup>		

Subgroup analysis notes:

All were cohort studies.

All studies were rated moderate for traffic specificity and all adjust for individual smoking.

All were rated low or moderate for risk of bias domains.

Reference	Study Name	Fatality		Categories	RR	95% CI
Andersen et al. 2012	DDCH	Non-fatal		<50 vs. >50 m	1.09	[0.94, 1.26]
Andersen et al. 2012	DDCH	Fatal	<b>├</b>	<50 vs. >50 m	1.17	[0.70, 1.98]
Carey et al. 2016	CPRD London	Fatal and non-fatal	■	<100 vs. >250 m	0.98	[0.86, 1.12]
Carey et al. 2016	CPRD London	Fatal and non-fatal	H <b>a</b> -H	100-250 vs. >250 m	1.02	[0.95, 1.10]
Kulick et al. 2018	NOMAS	Fatal and non-fatal	<b></b>	<100 vs. >400 m	1.42	[1.01, 2.02]
Kulick et al. 2018	NOMAS	Fatal and non-fatal	<b>⊢</b>	100-200 vs. >400 m	1.14	[0.81, 1.60]
Kulick et al. 2018	NOMAS	Fatal and non-fatal	<b>⊢</b> I	200-400 vs. >400 m	1.08	[0.80, 1.45]
				1		
			0.8 1 Relative Risk	2		

#### Distance measures - Stroke

Lazarevic et al. 2015 not in the plot because estimate was log-transformed.

Reference	Study Name	Fatality				Increment/Categories	RR	95% Cl
Andersen et al. 2012	DDCH	Non-fatal				per 1700 vehicle-km/day	1.02	[0.99, 1.04]
Andersen et al. 2012	DDCH	Fatal	<b>-</b>	<b>■</b>		per 1700 vehicle-km/day	0.99	[0.91, 1.09]
Stafoggia et al. 2014	ESCAPE	Fatal and non-fatal	H			per 4000 vehicle-km/day	1.02	[0.95, 1.10]
Hoffmann et al. 2015	HNR	Fatal and non-fatal		•		5th-95th percentile	1.06	[0.69, 1.64]
Carey et al. 2016	CPRD London	Fatal and non-fatal		•		>100000 heavy vehicle-km/year vs. none	1.00	[0.88, 1.15]
Carey et al. 2016	CPRD London	Fatal and non-fatal	F			<100000 heavy vehicle-km/year vs. none	1.02	[0.96, 1.11]
			0.6	1	1.5			
				Relative Risk				

#### Traffic Density measures - Stroke

## **10.4 Diabetes**





Footnote: The following increments were used:  $10 \ \mu g/m^3$  for NO<sub>2</sub>,  $20 \ \mu g/m^3$  for NO<sub>x</sub>,  $1 \ \mu g/m^3$  for EC,  $10 \ \mu g/m^3$  for PM<sub>10</sub> and  $5 \ \mu g/m^3$  for PM<sub>2.5</sub>. Effect estimates cannot be directly compared across the different traffic-related pollutants because the selected increments do not necessarily represent the same contrast in exposure.

#### NO<sub>2</sub> - incidence

#### Primary meta-analysis



#### NO<sub>2</sub> - Diabetes incidence

Subgroup analysis - by region





#### Subgroup analysis - by traffic specificity

#### NO2 - Diabetes incidence by Traffic Specificity



Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate.



#### NO2 - Diabetes incidence by Risk of bias assessment on confounding

#### $\mathrm{NO}_2$ - Diabetes incidence by Risk of bias assessment on selection bias



#### Subgroup analysis – by smoking adjustment

#### NO<sub>2</sub>- Diabetes incidence by smoking

Study	Study Name		Relative Risk	RR	95% -CI
Yes			1		
Kramer et al. 2010	SALIA			• → 1.26	[1.11; 1.44]
Andersen et al. 2012	DDCH		· · ·	1.08	[1.00; 1.17]
Coogan et al. 2016	BWHS	<del>&lt;</del> 1	4	0.94	[0.89; 1.00]
Eze et al. 2017	SAPALDIA	<del>~ :</del>		0.95	[0.77; 1.17]
Random effects mode	I -			1.05	[0.85; 1.31]
Heterogeneity: $I^2 = 85\%$ , $\tau$	z <sup>2</sup> = 0.0146, <i>p</i> < 0.01				
No					
Clark et al. 2017	British Columbia Diabetes Col	ort -	- -	1 00	IN 98-1 021
Bai et al 2018	ONPHEC		T 🖛	1.00	[1.07 1.02]
Renzi et al 2018	Rome Longitudinal		+	1.00	[1.00, 1.00]
Random effects mode	I			1 03	[0 92: 1 15]
Heterogeneity: $l^2 = 98\%$ T	$r^{2} = 0.0019 \ \mu < 0.01$				[0.02,0]
	- 0.0010, p < 0.01		1 1		
		0.9	1 1.1	1.4	
		Rela	ative Risk per 10	µg/m <sup>3</sup>	

## NO<sub>2</sub> - prevalence

Primary meta-analysis

# NO<sub>2</sub> - Diabetes prevalence

Study	Study Name	Relative Risk	RR	95% -CI	Weight
Eze et al. 2014	SAPALDIA	<del></del>	1.21	[1.05; 1.39]	11.9%
Lazarevic et al. 2015	ALSWH		1.06	[0.87; 1.29]	7.7%
O'Donovan et al. 2017	CHAMPIONS		1.10	[0.92; 1.32]	8.8%
Renzi et al. 2018	Rome Longitudinal	•	1.00	[1.00; 1.01]	26.0%
Riant et al. 2018	ELISABET		1.12	[0.81; 1.56]	3.5%
Howell et al. 2019	CANHEART	•	1.08	[1.07; 1.09]	26.0%
Yang et al. 2019	33 CCHS		1.20	[1.09; 1.33]	16.2%
Random effects mode	1	-	1.09	[1.02; 1.17]	100.0%
Prediction interval				[0.91; 1.31]	
Heterogeneity: $I^2 = 98\%$ ,	$t^2 = 0.0043, p < 0.01$				
- •		0.75 1 1.5			
		Relative Risk per 10 µg/m <sup>3</sup>			

Subgroup analysis notes:

All were studies after 2008.

All were cross sectional studies.

## Subgroup analysis - by region

Study	Study Name	Relative Risk	RR	95% -CI
<b>North America</b> Howell et al. 2019	CANHEART	•	1.08	[1.07; 1.09]
Western Europe Eze et al. 2014 O'Donovan et al. 2017 Renzi et al. 2018 Riant et al. 2018 Random effects model Heterogeneity: $I^2 = 64\%$ , $\tau$	SAPALDIA CHAMPIONS Rome Longitudinal ELISABET $^2$ = 0.0067, <i>p</i> = 0.04		1.21 1.10 1.00 1.12 <b>1.08</b>	[1.05; 1.39] [0.92; 1.32] [1.00; 1.01] [0.81; 1.56] <b>[0.94; 1.25]</b>
<b>Asia</b> Yang et al. 2019	33 CCHS		1.20	[1.09: 1.33]
<b>Australia/New Zealand</b> Lazarevic et al. 2015	ALSWH		1.06	[0.87; 1.29]
		0.75 1 1.5		

## $\ensuremath{\text{NO}_2}\xspace$ - Diabetes prevalence by region

Relative Risk per 10 µg/m<sup>3</sup>

#### Subgroup analysis - by traffic specificity

#### Subgroup analysis - by smoking adjustment

#### NO<sub>2</sub> - Diabetes prevalence by Traffic Specificity



#### Subgroup analysis - by risk of bias

#### NO<sub>2</sub>- Diabetes prevalence by smoking

Study	Study Name	<b>Relative Risk</b>	RR	95%-CI
Yes Eze et al. 2014 Lazarevic et al. 2015 O'Donovan et al. 2017 Riant et al. 2018 Yang et al. 2019 <b>Random effects model</b> Heterogeneity: $I^2 = 0\%$ , $\tau^2$	SAPALDIA ALSWH CHAMPIONS ELISABET 33 CCHS = 0, <i>p</i> = 0.74		<ul> <li>1.21</li> <li>1.06</li> <li>1.10</li> <li>1.12</li> <li>1.20</li> <li>1.17</li> </ul>	[1.05; 1.39] [0.87; 1.29] [0.92; 1.32] [0.81; 1.56] [1.09; 1.33] <b>[1.09; 1.25]</b>
<b>No</b> Renzi et al. 2018 Howell et al. 2019	Rome Longitudinal CANHEART	* =	1.00 1.08	[1.00; 1.01] [1.07; 1.09]
	ا 0.	.9 1 1.1 Relative Risk per 10 μg/m <sup>3</sup>	<b>1</b> .4	

Plots not shown for risk of bias domains if all studies were rated low or moderate.

NO2 - Diabetes prevalence by Risk of bias assessment on confounding



NO2 - Diabetes prevalence by Risk of bias assessment on missing data

1.21 + 1.10	[1.05; 1.39]
• 1.12 1.00 • 1.08	[0.92; 1.32] [0.81; 1.56] [1.00; 1.01] [1.07; 1.09]
> 1.00	[0.87, 1.29] [1.00; 1.15]
<del>- • 1</del> .20	[1.09; 1.33]
1	
1.5 r 10 ug/m <sup>3</sup>	
	→ 1.12 1.00 1.08 1.06 → 1.07 1.20 1.5 rr 10 µa/m <sup>3</sup>

#### NO<sub>x</sub> - Incidence

Primary meta-analysis



NO<sub>x</sub> - Diabetes incidence

Subgroup analyses notes:

Andersen et al. 2012 and Renzi et al. 2018 are W. European cohorts while the other two studies are N. American studies.

All are high traffic specificity studies.

#### Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate.

 $\ensuremath{\mathsf{NO}_{\mathsf{X}}}\xspace$  - Diabetes incidence by Risk of bias assessment on confounding



Subgroup analysis - by smoking adjustment



Study	Study Name	Relative Risk	RR	95%-CI
<b>Yes</b> Andersen et al. 2012 Coogan et al. 2012 Park et al. 2015 <b>Random effects mode</b>	DDCH BWHS MESA	<u> </u>	1.04 - 1.26 1.01 <b>1.07</b>	[1.00; 1.07] [1.07; 1.48] [0.93; 1.10] <b>[0.82; 1.40]</b>
Heterogeneity: $I^2 = 67\%$ ,	$\tau^2 = 0.0069, p = 0.05$			
Νο				
Renzi et al. 2018	Rome Longitudinal	in I	1.01	[1.00; 1.02]
		0.8 1 1.25		
		Relative Risk per 20 µg/m <sup>3</sup>		

#### EC - incidence

Primary meta-analysis



Subgroup analyses notes:

Clark et al. 2017 is a N. American cohort, while the other two studies are W. European studies.

All rated high in traffic specificity.

Only Kramer et al. 2010 controlled for smoking.

All rated low or moderate for risk of bias domains except for risk of bias confounding where two studies were rated high risk of bias (Clark et al. 2017 and Renzi et al. 2018).

#### PM<sub>10</sub> - Prevalence

Primary meta-analysis



## PM<sub>10</sub>- Diabetes prevalence

Subgroup analysis notes: All are W. European cross sectional studies.

All studies rated moderate in traffic specificity.

Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate.

PM<sub>10</sub> - Diabetes prevalence by Risk of bias assessment on confounding



Subgroup analysis - by smoking adjustment



Study	Study Name	<b>Relative Risk</b>	RR	95% -CI
Yes Eze et al. 2014 O'Donovan et al. 2017 Riant et al. 2018 Random effects model Heterogeneity: $I^2 = 0\%$ , $\tau^2$	SAPALDIA CHAMPIONS ELISABET		1.44 → 1.30 → 1.22 <b>1.43</b>	[1.21; 1.71] [0.54; 3.13] [0.48; 3.10] <b>[1.28; 1.59]</b>
<b>No</b> Renzi et al. 2018	Rome Longitudinal		0.99	[0.98; 1.00]
	Г О.:	5 1 2 Relative Risk per 10 µg/m <sup>3</sup>	3	

#### PM<sub>2.5</sub> - Incidence

Primary meta-analysis

#### Study Study Name **Relative Risk** RR 95%-CI Weight Park et al. 2015 MESA 4.0% 1.11 [0.76; 1.62] Weinmayr et al. 2015 HNR 1.16 [0.77; 1.75] 3.4% Clark et al. 2017 British Columbia Diabetes Cohort 1.10 [1.03; 1.17] 40.7% Renzi et al. 2018 Rome Longitudinal 1.00 [0.98; 1.02] 51.9% Random effects model 1.05 [0.96; 1.15] 100.0% Prediction interval [0.80; 1.37] Heterogeneity: $I^2 = 64\%$ , $\tau^2 = 0.0030$ , p = 0.04Г 5.7.5 1 1.5 Relative Risk per 5 μg/m<sup>3</sup>

PM<sub>2.5</sub> - Diabetes incidence

Subgroup analysis notes:

2 cohorts from N. America (Park et al. 2015 and Clark et al. 2017) and the other two studies from W. Europe.

All studies rated moderate in traffic specificity.

#### Subgroup analysis - by smoking adjustment

#### PM2.5 - Diabetes incidence by smoking adjustment



Subgroup analysis - by risk of bias

Plots not shown for risk of bias domains if all studies were rated low or moderate.



PM<sub>2.5</sub> - Diabetes incidence by Risk of bias assessment on confounding

#### PM<sub>2.5</sub> - Prevalence

Primary meta-analysis

## PM<sub>2.5</sub> - Diabetes prevalence



Subgroup analysis notes:

3 cohorts, of which 1 in N. America (Park et al. 2015) and 2 in W. Europe.

All PM<sub>2.5</sub> studies rated moderate in traffic specificity.

O'Donovan et al. 2017 did not control for smoking.

O'Donovan et al. 2017 was rated high risk of bias for confounding.

Reference	Study Name		Measure	Categories	RR	95% Cl
Kramer et al. 2010	SALIA	· · · · · · · · · · · · · · · · · · ·	Incidence	<100 vs. >100 m	2.54	[1.31, 4.91]
Kramer et al. 2010	SALIA	<b>⊢</b>	Incidence	<100 vs. >100 m	0.92	[0.58, 1.47]
Puett et al. 2011	Nurses' Health / Health Professionals Follow -Up	<b>■</b> 1	Incidence	0-49 vs. >200 m	1.11	[1.01, 1.23]
Puett et al. 2011	Nurses' Health / Health Professionals Follow -Up	⊧ <b></b> −1	Incidence	50-99 vs. >200 m	0.96	[0.63, 1.48]
Puett et al. 2011	Nurses' Health / Health Professionals Follow - Up	-	Incidence	100-199 vs. >200 m	0.96	[0.87, 1.06]
Andersen et al. 2012	DDCH	- <b>-</b>	Incidence	<50 vs. >50 m	1.07	[0.95, 1.21]
Park et al. 2015	MESA	⊨ <b>∎</b> -1	Incidence	<100 vs. >100 m	0.96	[0.80, 1.16]
Weinmayr et al. 2015	HNR		Incidence	<100 vs. 100-200 m	1.37	[1.04, 1.81]
Dijkema et al. 2011	Hoorn Diabetes Screening	⊢ <b>∎</b> H	Prevalence	2-74 vs. 220-1610 m	0.88	[0.70, 1.13]
Dijkema et al. 2011	Hoorn Diabetes Screening	H <b>→</b> ■→→	Prevalence	74-140 vs. 220-1610 m	1.17	[0.93, 1.48]
Dijkema et al. 2011	Hoorn Diabetes Screening	<b>⊢</b> - <b>■</b> 1	Prevalence	140-220 vs. 220-1610 m	1.12	[0.88, 1.42]
Park et al. 2015	MESA	F	Prevalence	<100 vs. >100 m	1.10	[0.91, 1.34]
		0 1 2 Relative Risk				

#### Distance measures - Diabetes morbidity

\*SALIA estimates correspond to low and high education, respectively.

Reference Study Name			Measure Increment/Categories		RR	95% CI	
Andersen et al. 2012	DDCH		Incidence	per 1200 vehicles km/day	1.02	[1.00, 1.04]	
Dijkema et al. 2011	Hoorn Diabetes Screening		Prevalence	882-2007 vs. 63-516 thousand vehicles/day	1.09	[0.85, 1.38]	
Dijkema et al. 2011	Hoorn Diabetes Screening		Prevalence	680-882 vs. 63-516 thousand vehicles/day	1.13	[0.89, 1.44]	
Dijkema et al. 2011	Hoorn Diabetes Screening		Prevalence	516-680 vs. 63-516 thousand vehicles/day	1.25	[0.99, 1.59]	
		1 I I 0.5 1 1.5					
		Relative Risk					

## Traffic Density measures - Diabetes morbidity