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 11: Traffic-Related Air Pollution and Mortality

Additional Materials 11.1 to 11.7

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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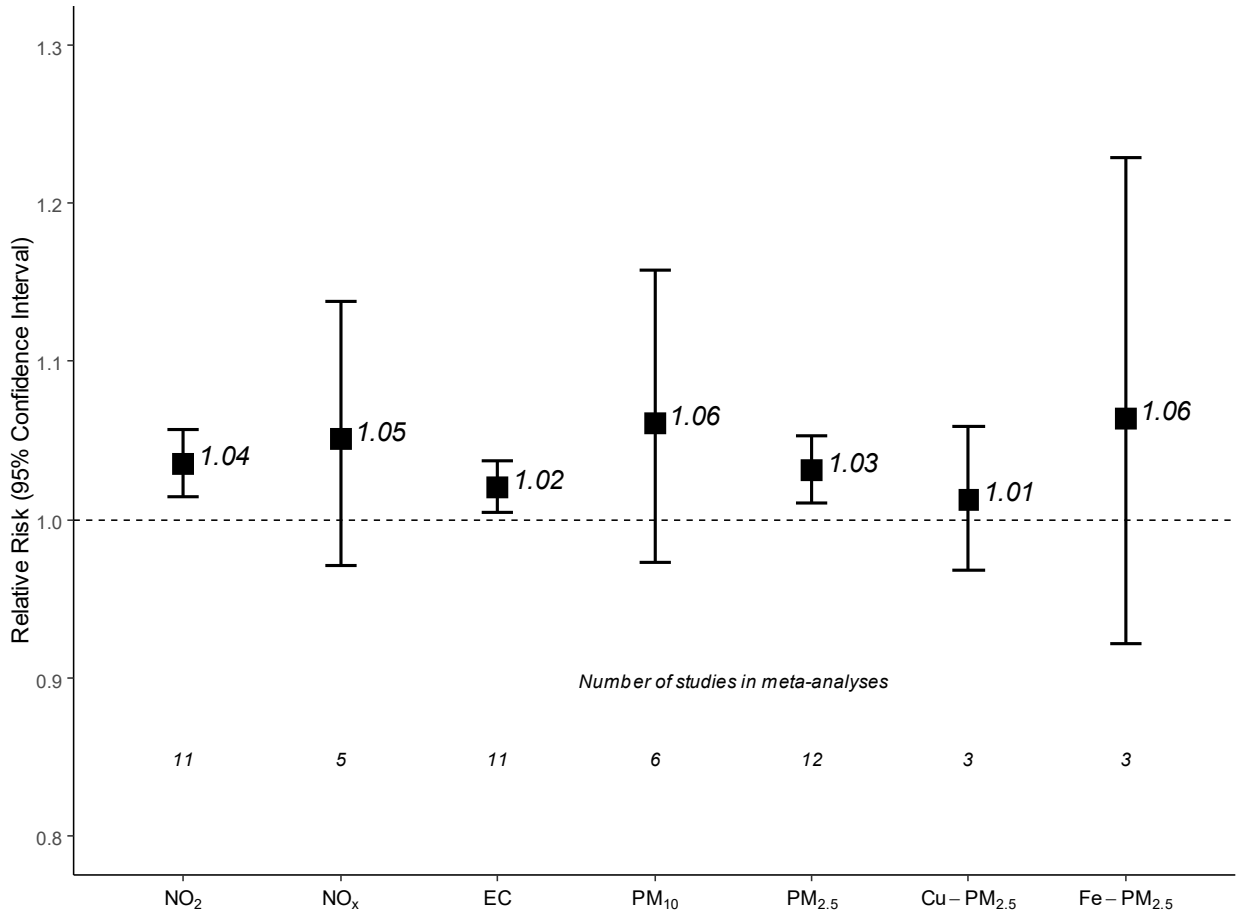
Chapter 11: Traffic-Related Air Pollution and Mortality

Additional Materials: All Analyses

11.1 All-cause Mortality

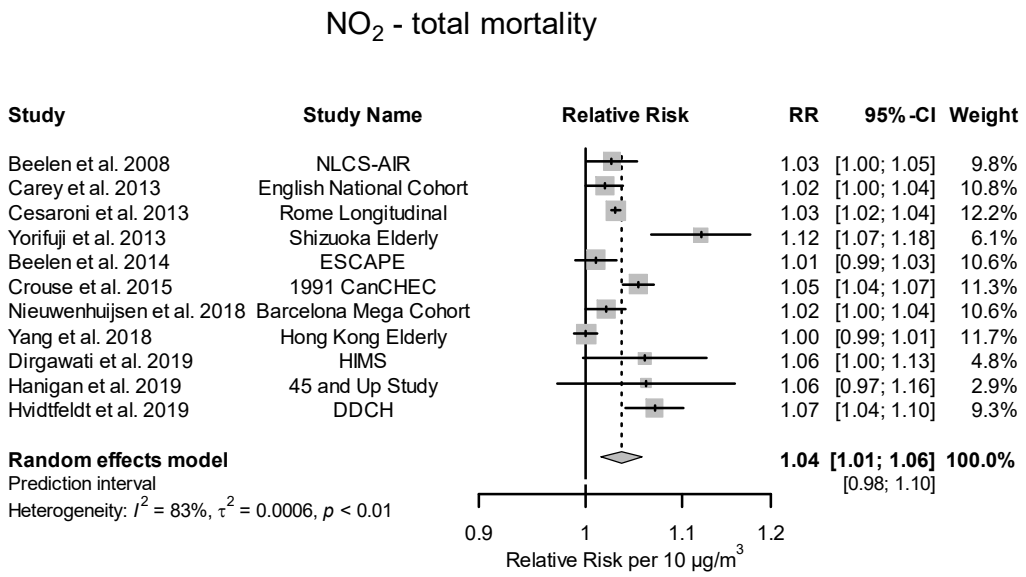
Summary of meta-analysis



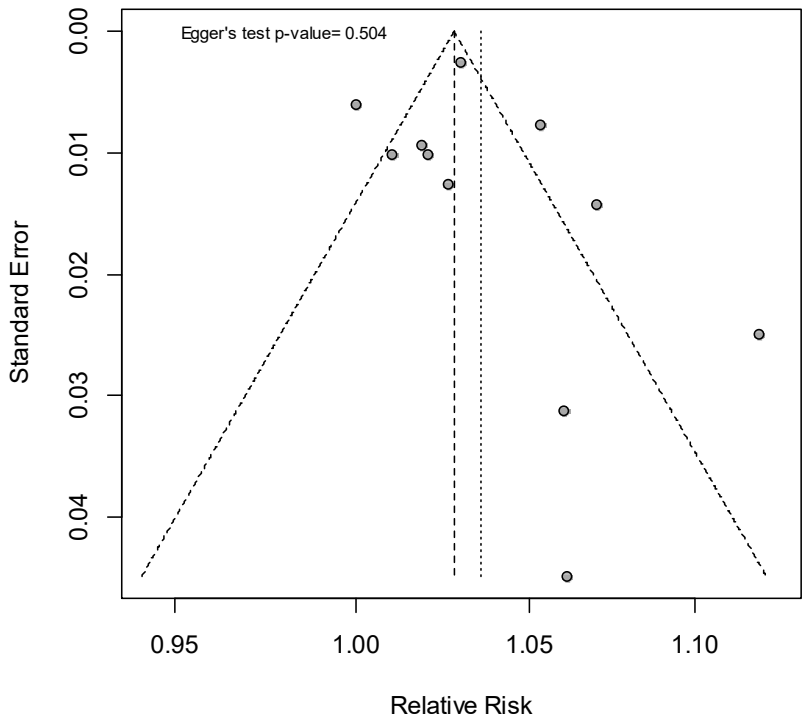
Footnote: The following increments were used: 10 µg/m^3 for NO_2, 20 µg/m^3 for NO_x, 1 µg/m^3 for EC, 10 µg/m^3 for PM_{10}, 5 µg/m^3 for $PM_{2.5}$, 5 ng/m^3 for Cu and 500 ng/m^3 for Fe. Effect estimates cannot be directly compared across the different traffic-related pollutants because the selected increments do not necessarily represent the same contrast in exposure.

NO_2

Primary meta-analysis

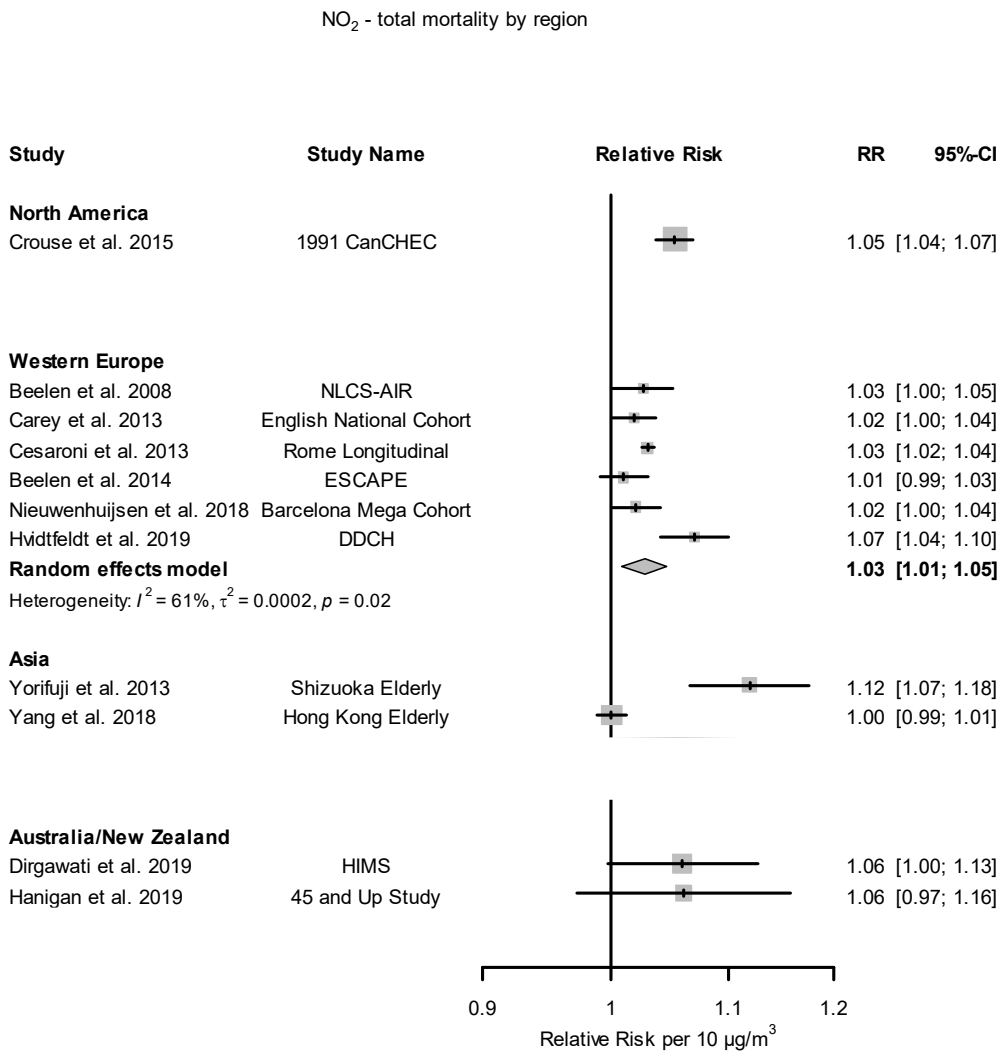


Publication bias

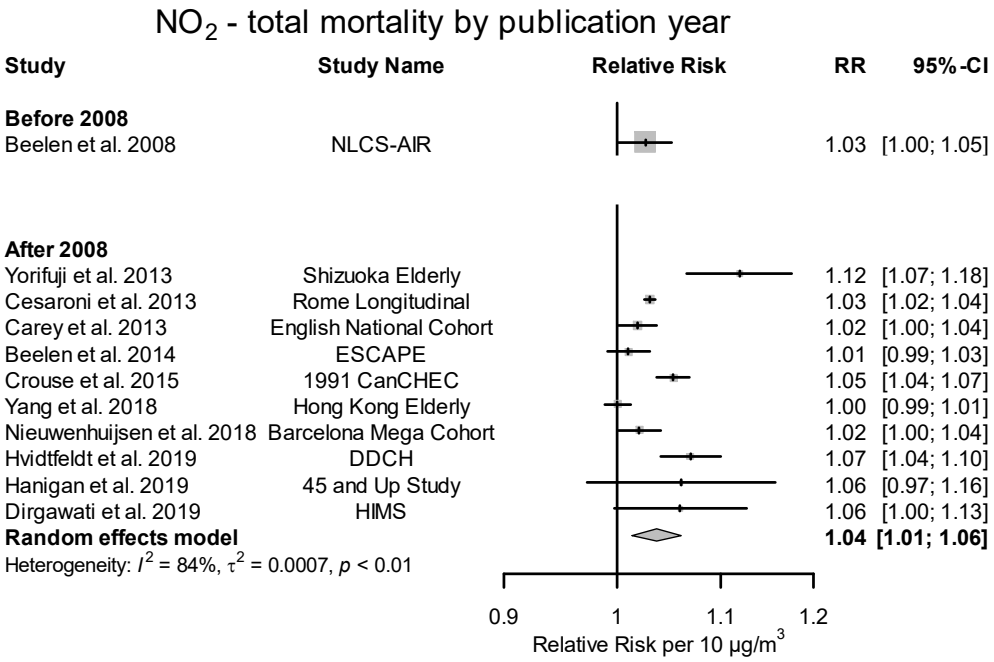


Footnote: The vertical lines in the funnel plots represent the pooled fixed and random effect estimates. The vertical dashed line in the middle of the funnel shows the fixed effect estimate. As the Panel applied a random-effects model, the funnel plot also presents the random-effects estimate with the dotted line.

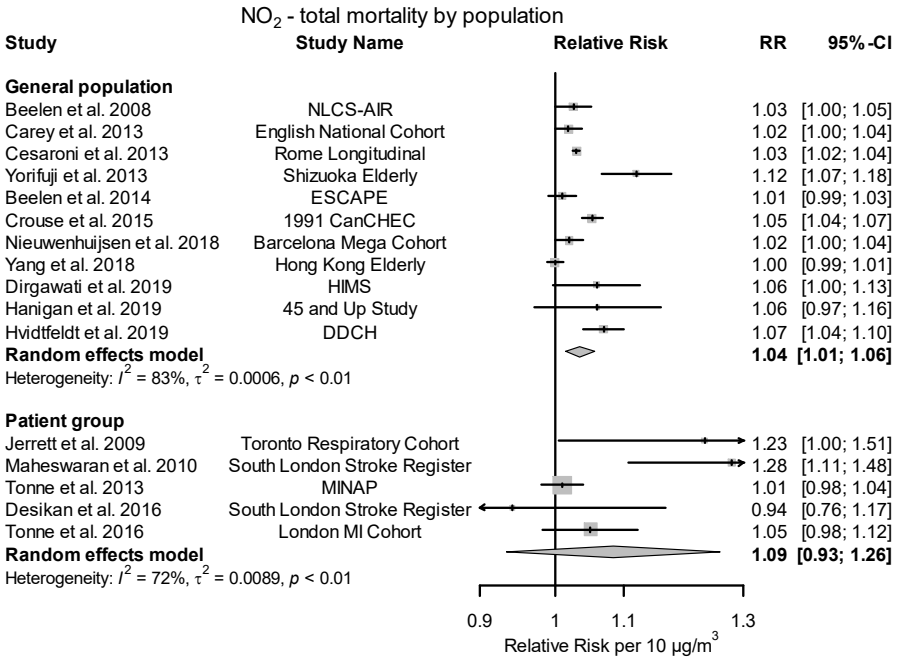
Subgroup analysis - by region



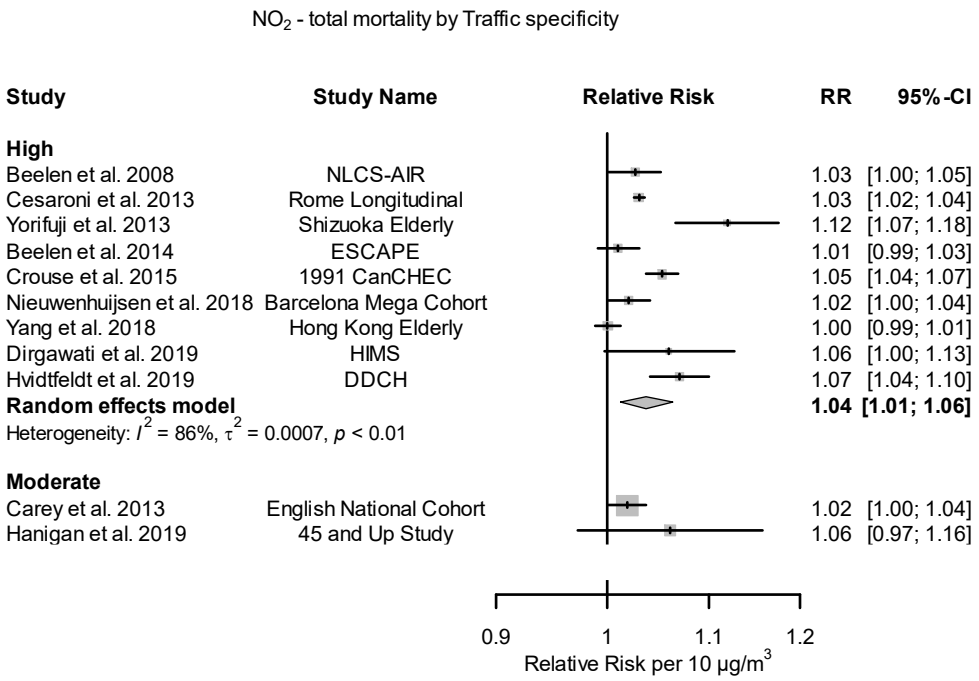
Subgroup analysis - by publication year



By general population/patient group



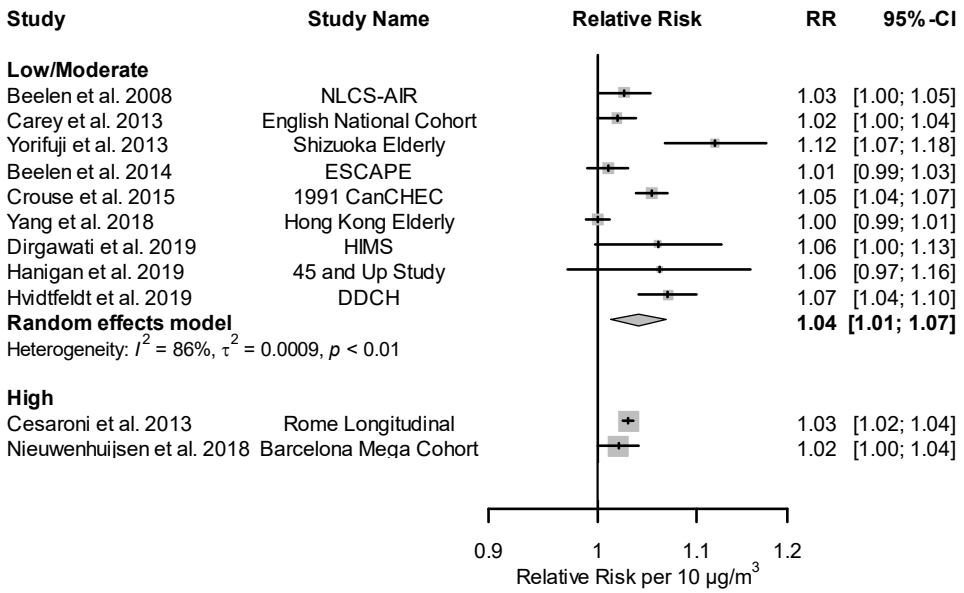
Subgroup analysis - by traffic specificity



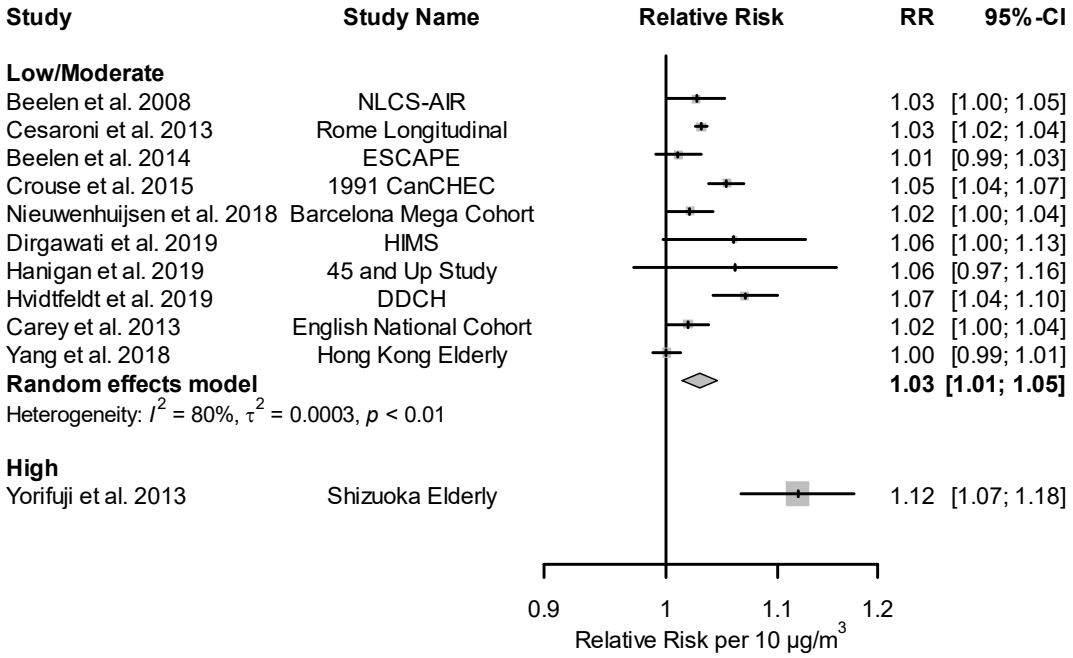
Subgroup analysis - by risk of bias

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

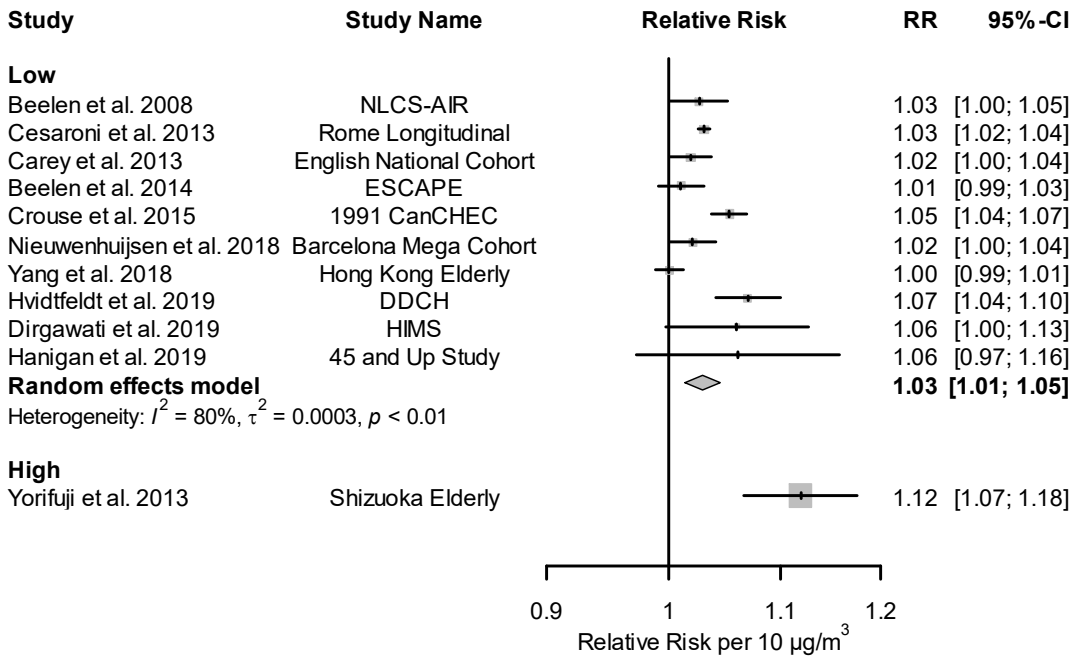
NO_2 - total mortality by Risk of bias assessment on confounding



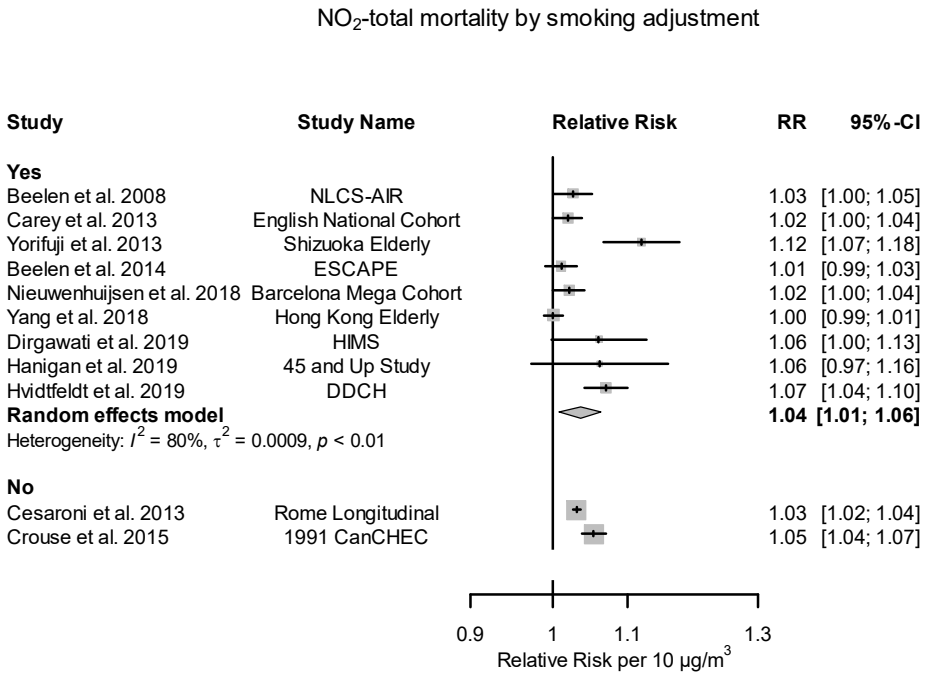
NO_2 - total mortality by Risk of bias assessment on selection bias



NO_2 - total mortality by Risk of bias assessment on missing data

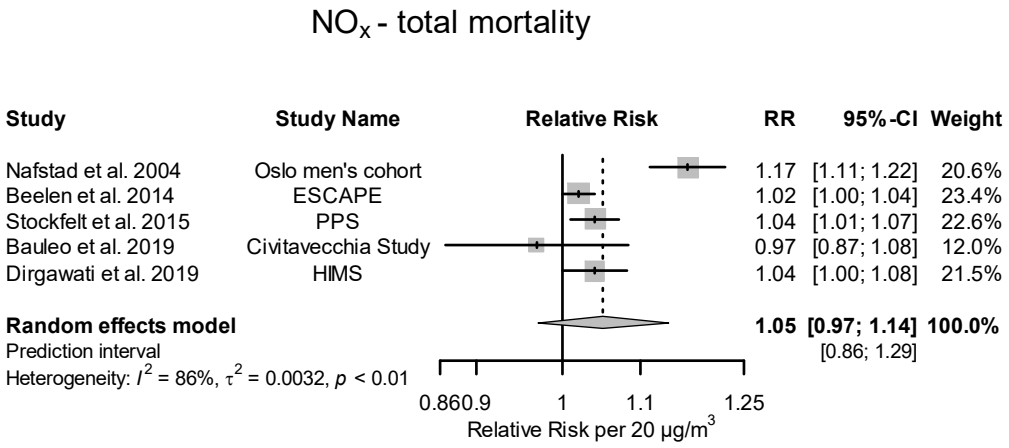


Subgroup analysis - by smoking adjustment



NO_x

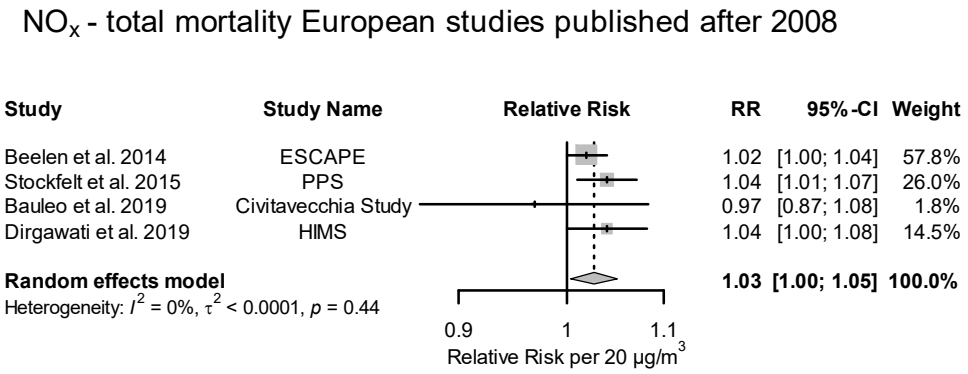
Primary meta-analysis



Publication bias

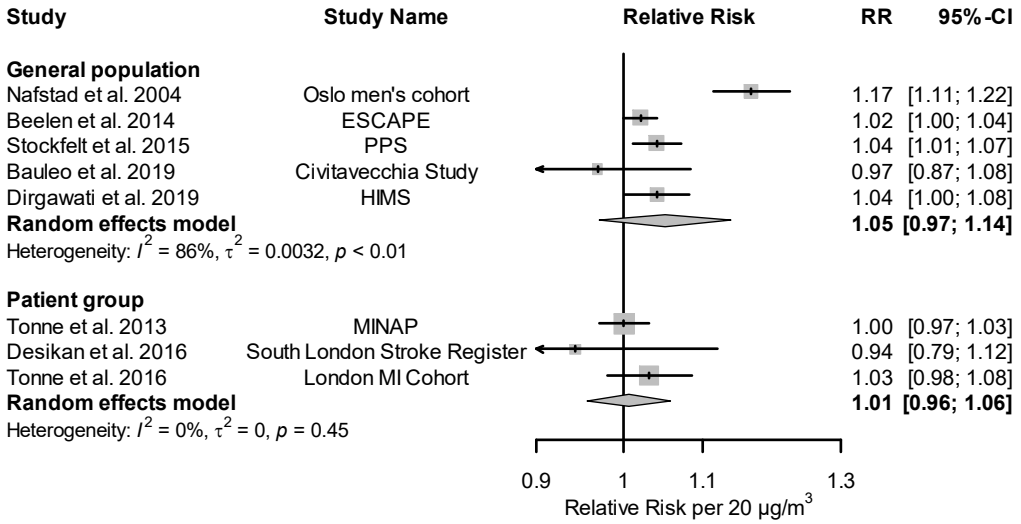
According to the protocol publication bias investigation only when sufficient number of studies, eg >10. Here N=5.

Subgroup analysis – by period



Notes: All studies published after 2008 come from Western Europe (hence the analysis' results by year or region are the same).

By general population/patient group

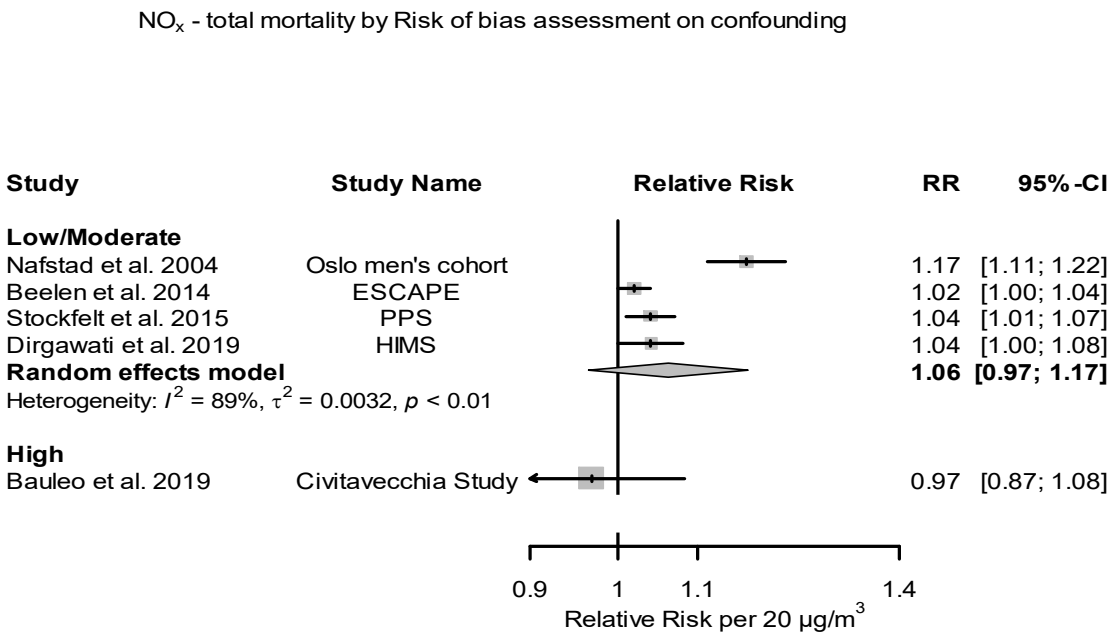


Subgroup analysis - by traffic specificity

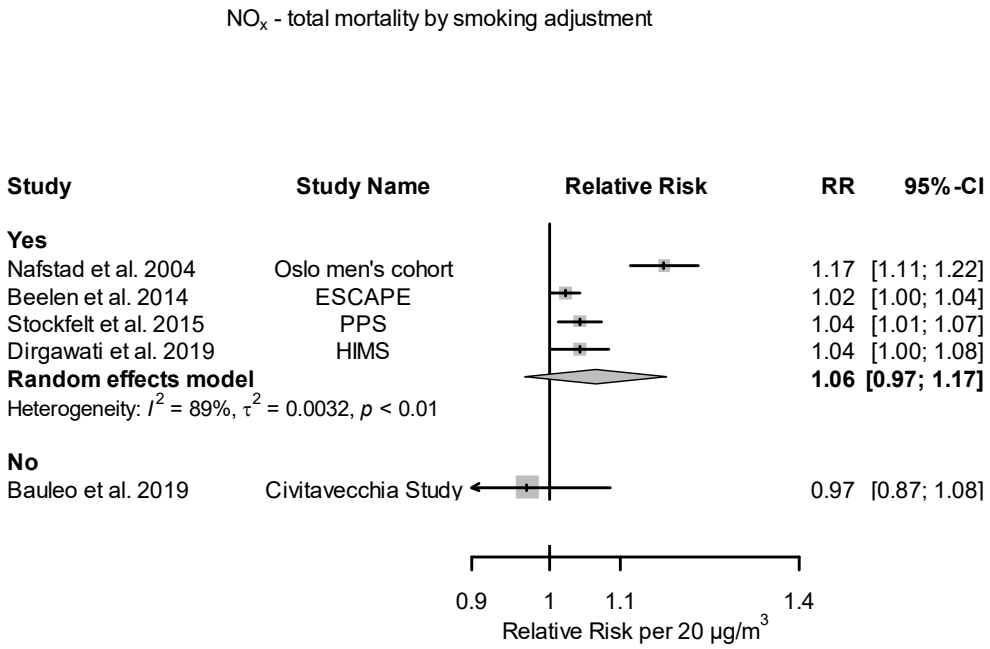
All high traffic specificity

Subgroup analysis – by risk of bias

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

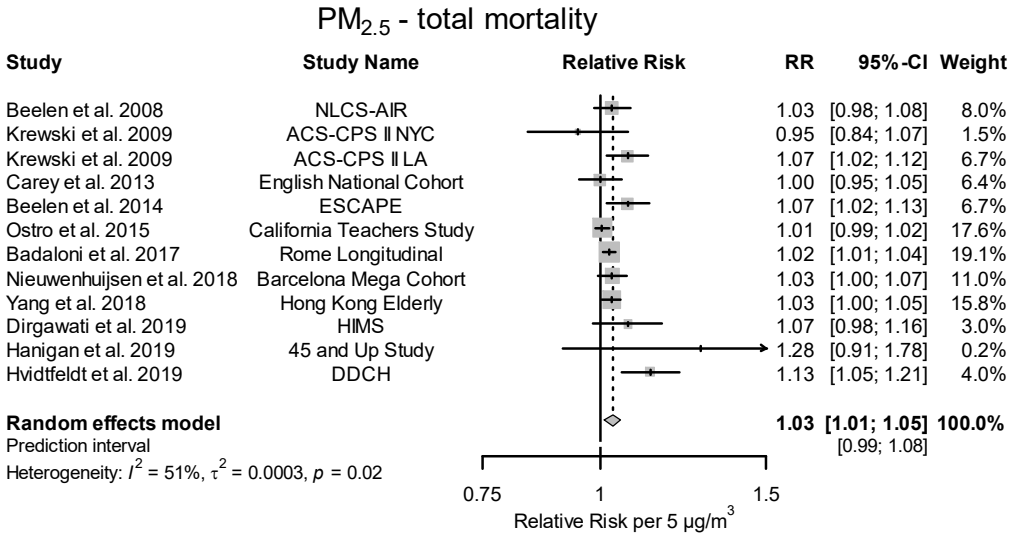


Subgroup analysis - by smoking adjustment

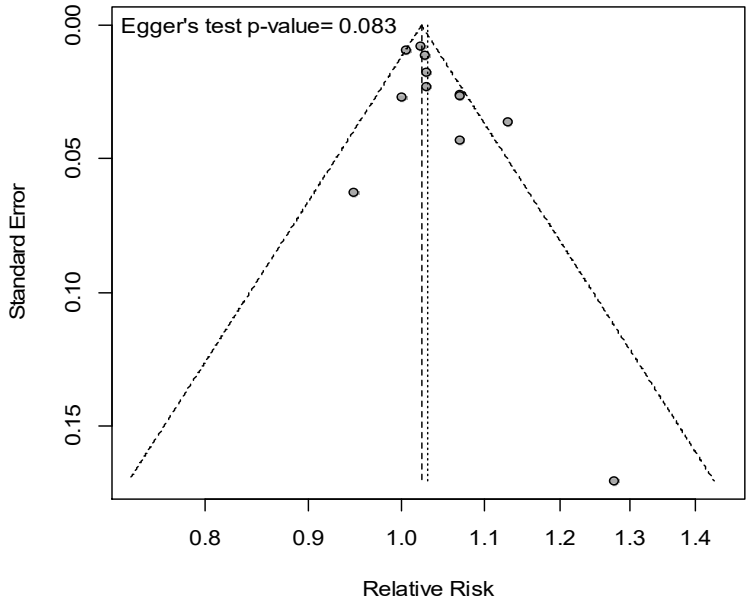


$PM_{2.5}$

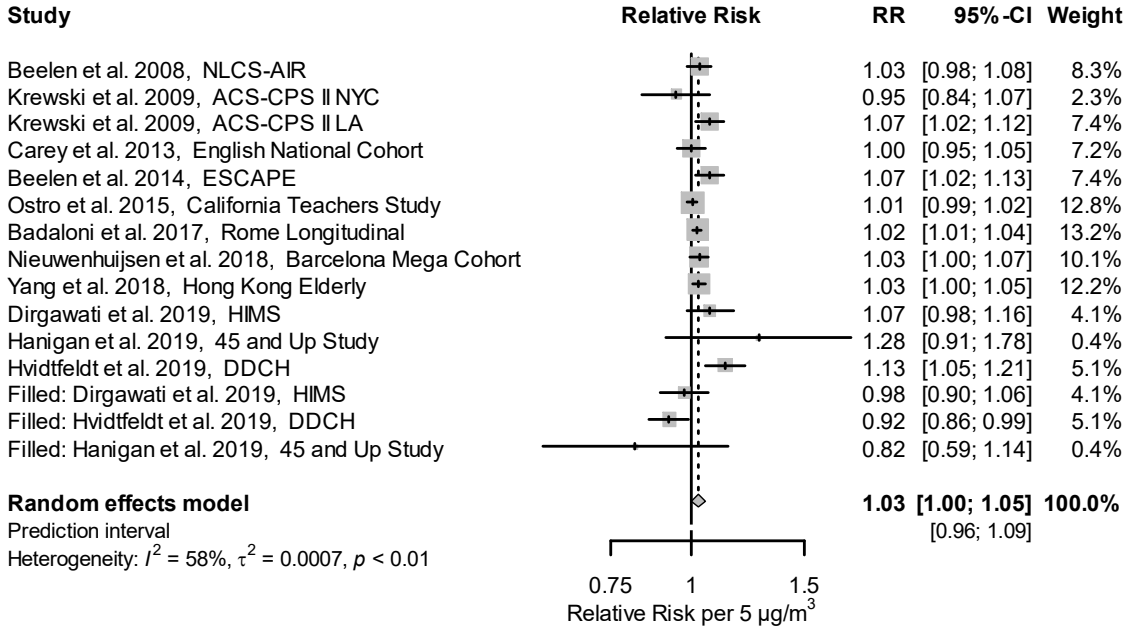
Primary meta-analysis

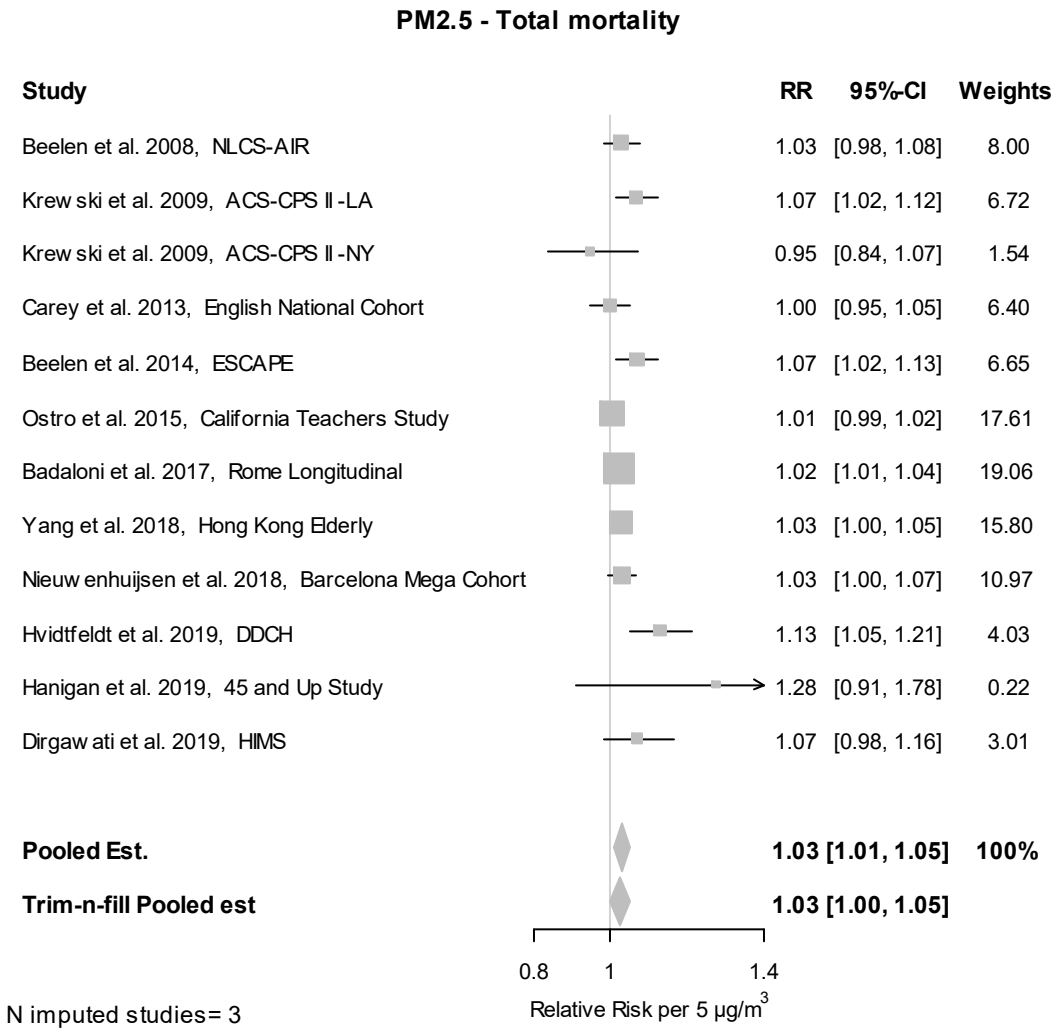


Publication bias

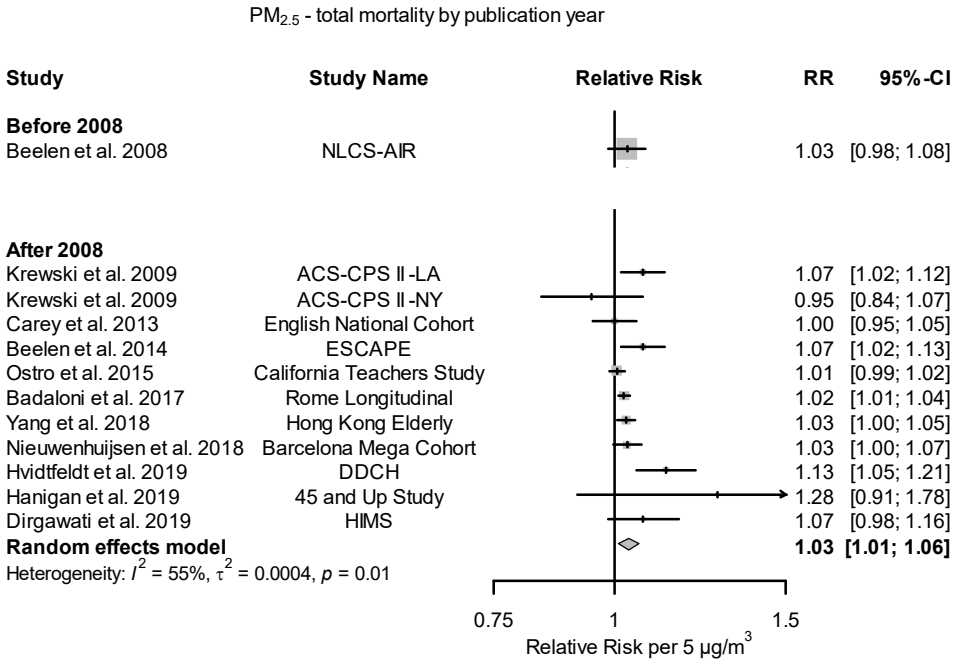


Footnote: The vertical lines in the funnel plots represent the pooled fixed and random effect estimates. The vertical dashed line in the middle of the funnel shows the fixed effect estimate. As the Panel applied a random-effects model, the funnel plot also presents the random-effects estimate with the dotted line.

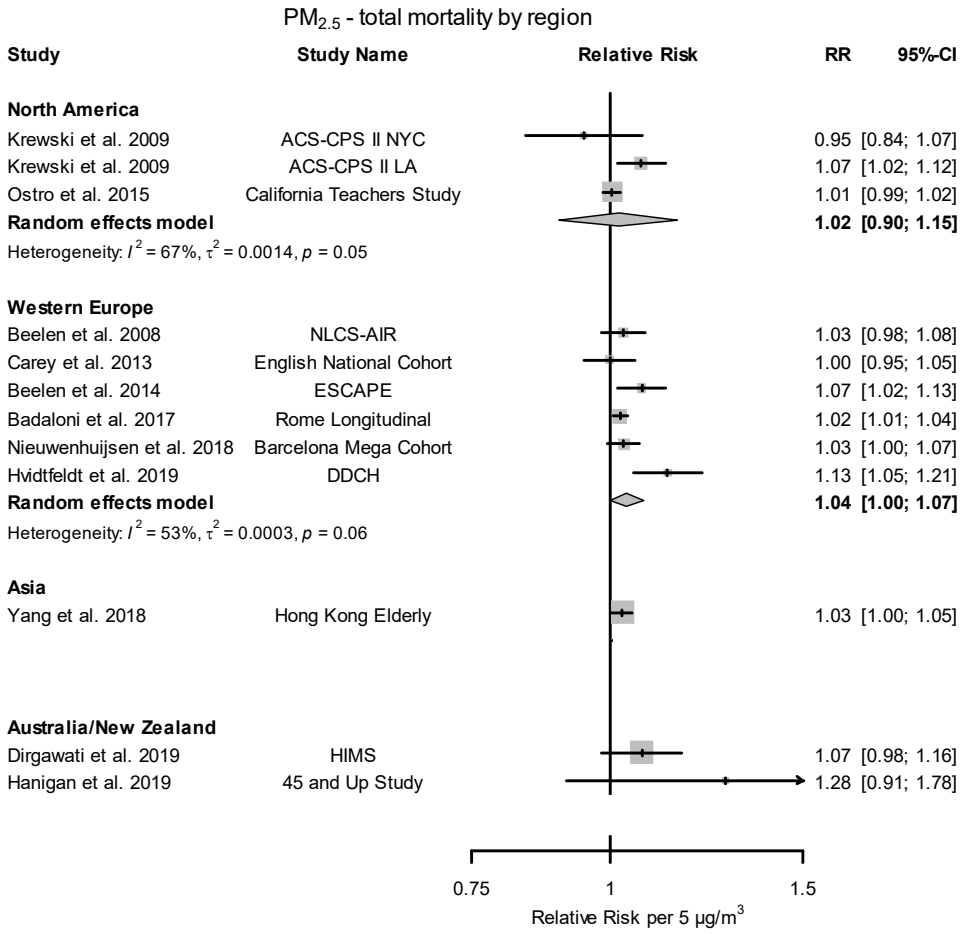

Study
Relative Risk
RR
95%-CI
Weight
Beelen et al. 2008, NLCS-AIR 1.03 [0.98; 1.08] 8.3%
Krewski et al. 2009, ACS-CPS II NYC 0.95 [0.84; 1.07] 2.3%
Krewski et al. 2009, ACS-CPS II LA 1.07 [1.02; 1.12] 7.4%
Carey et al. 2013, English National Cohort 1.00 [0.95; 1.05] 7.2%
Beelen et al. 2014, ESCAPE 1.07 [1.02; 1.13] 7.4%
Ostro et al. 2015, California Teachers Study 1.01 [0.99; 1.02] 12.8%
Badaloni et al. 2017, Rome Longitudinal 1.02 [1.01; 1.04] 13.2%
Nieuwenhuijsen et al. 2018, Barcelona Mega Cohort 1.03 [1.00; 1.07] 10.1%
Yang et al. 2018, Hong Kong Elderly 1.03 [1.00; 1.05] 12.2%
Dirgawati et al. 2019, HIMS 1.07 [0.98; 1.16] 4.1%
Hanigan et al. 2019, 45 and Up Study 1.28 [0.91; 1.78] 0.4%
Hvidtfeldt et al. 2019, DDCH 1.13 [1.05; 1.21] 5.1%
Filled: Dirgawati et al. 2019, HIMS 0.98 [0.90; 1.06] 4.1%
Filled: Hvidtfeldt et al. 2019, DDCH 0.92 [0.86; 0.99] 5.1%
Filled: Hanigan et al. 2019, 45 and Up Study 0.82 [0.59; 1.14] 0.4%
Random effects model 1.03 [1.00; 1.05] 100.0%
Prediction interval [0.96; 1.09]
Heterogeneity: I^2 = 58%, τ^2 = 0.0007, p < 0.01
0.75
1
1.5
Relative Risk per 5 µg/m^3


PM2.5 - Total mortality
Study
RR
95%-CI
Weights
Beelen et al. 2008, NLCS-AIR 1.03 [0.98, 1.08] 8.00
Krewski et al. 2009, ACS-CPS II-LA 1.07 [1.02, 1.12] 6.72
Krewski et al. 2009, ACS-CPS II-NY 0.95 [0.84, 1.07] 1.54
Carey et al. 2013, English National Cohort 1.00 [0.95, 1.05] 6.40
Beelen et al. 2014, ESCAPE 1.07 [1.02, 1.13] 6.65
Ostro et al. 2015, California Teachers Study 1.01 [0.99, 1.02] 17.61
Badaloni et al. 2017, Rome Longitudinal 1.02 [1.01, 1.04] 19.06
Yang et al. 2018, Hong Kong Elderly 1.03 [1.00, 1.05] 15.80
Nieuwenhuijsen et al. 2018, Barcelona Mega Cohort 1.03 [1.00, 1.07] 10.97
Hvidtfeldt et al. 2019, DDCH 1.13 [1.05, 1.21] 4.03
Hanigan et al. 2019, 45 and Up Study 1.28 [0.91, 1.78] 0.22
Dirgawati et al. 2019, HIMS 1.07 [0.98, 1.16] 3.01
Pooled Est. 1.03 [1.01, 1.05] 100%
Trim-n-fill Pooled est 1.03 [1.00, 1.05]
0.8
1
1.4
Relative Risk per 5 µg/m3
N imputed studies= 3

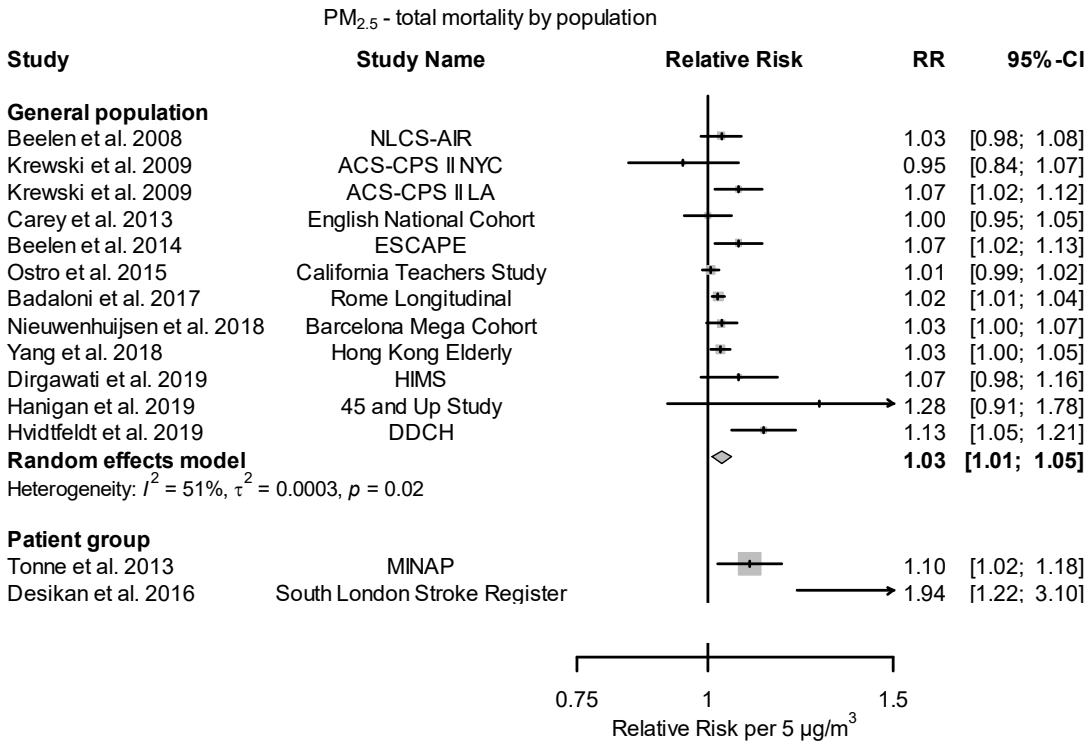
Subgroup analysis - by publication year



Subgroup analysis - by region



By general population/patient group

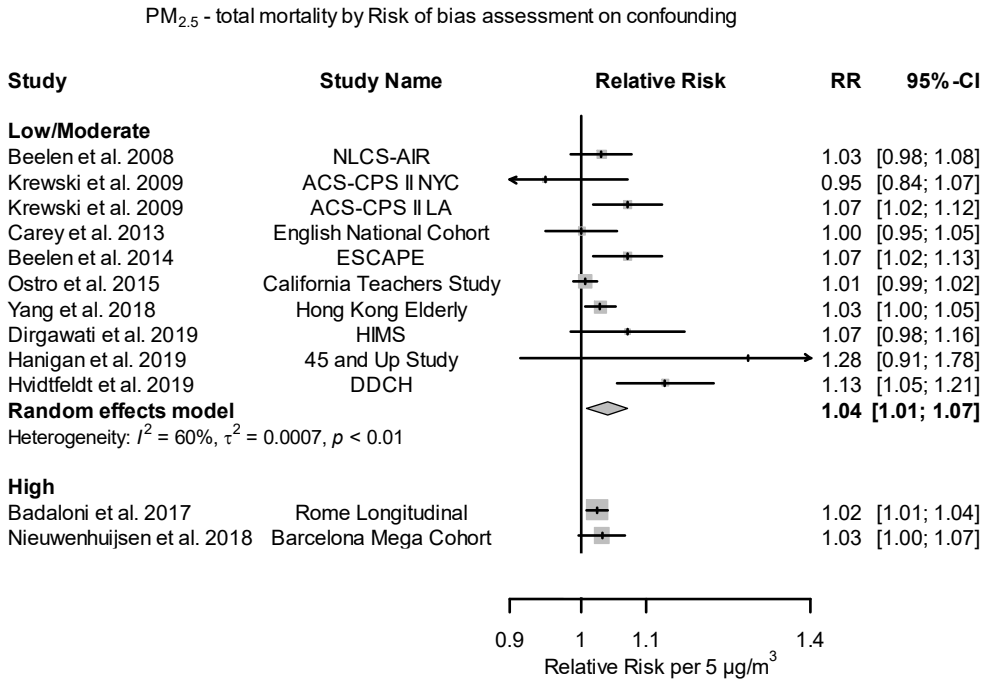


Subgroup analysis - by traffic specificity

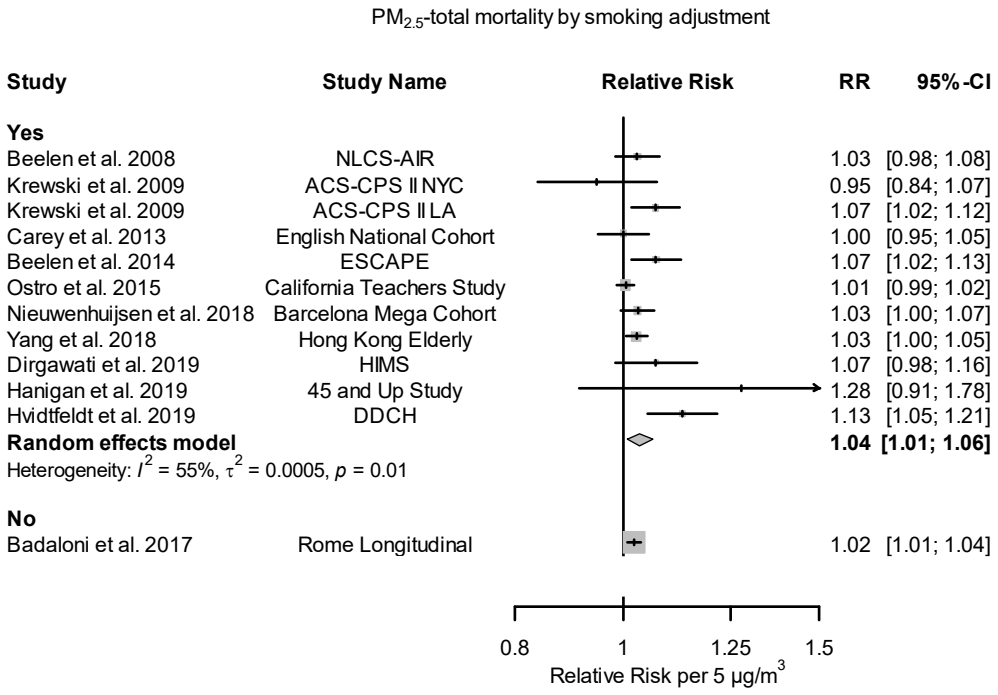
All studies rated moderate

Subgroup analysis - by risk of bias

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

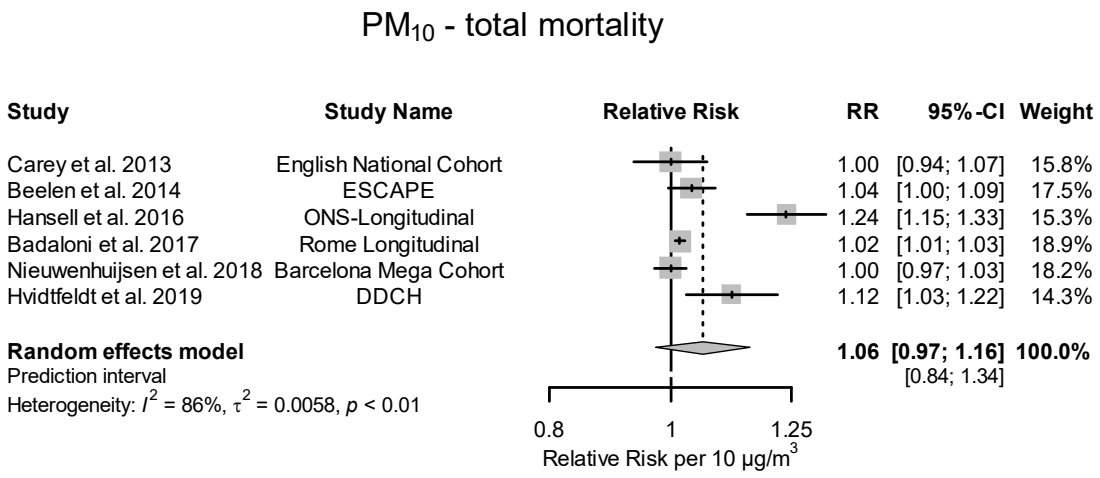


Subgroup analysis - by smoking adjustment



PM_{10}

Primary meta-analysis



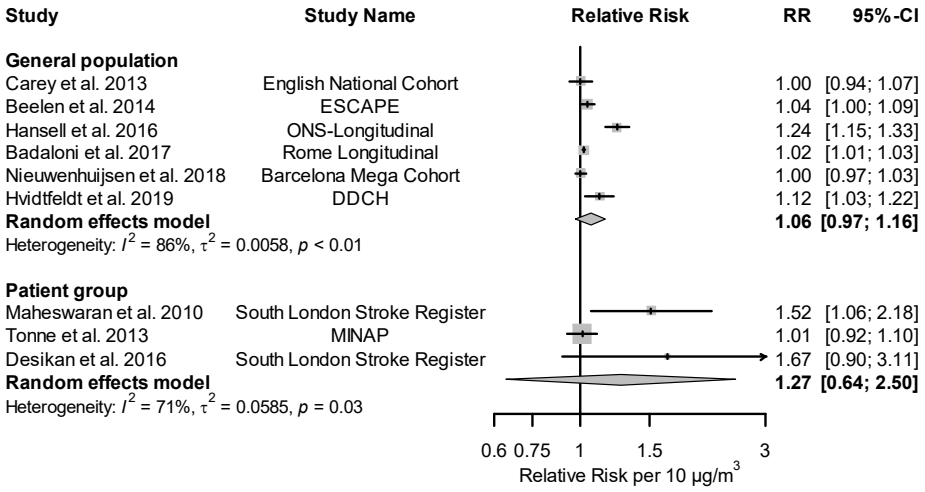
Publication bias

Six studies are too few to test publication bias

Subgroup analysis - by region

All are European studies conducted after 2009

By general population/patient group



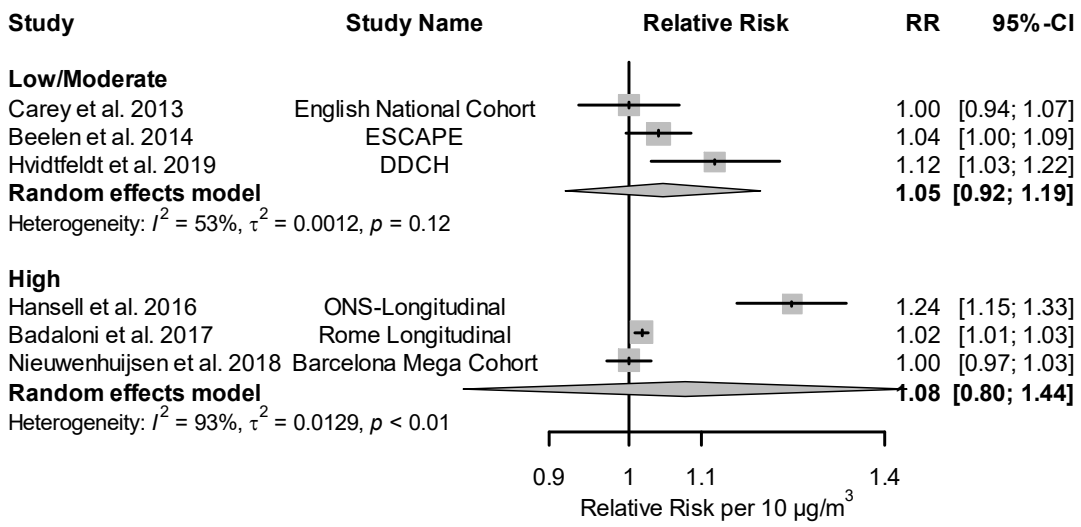
Subgroup analysis - by traffic specificity

All studies rated moderate

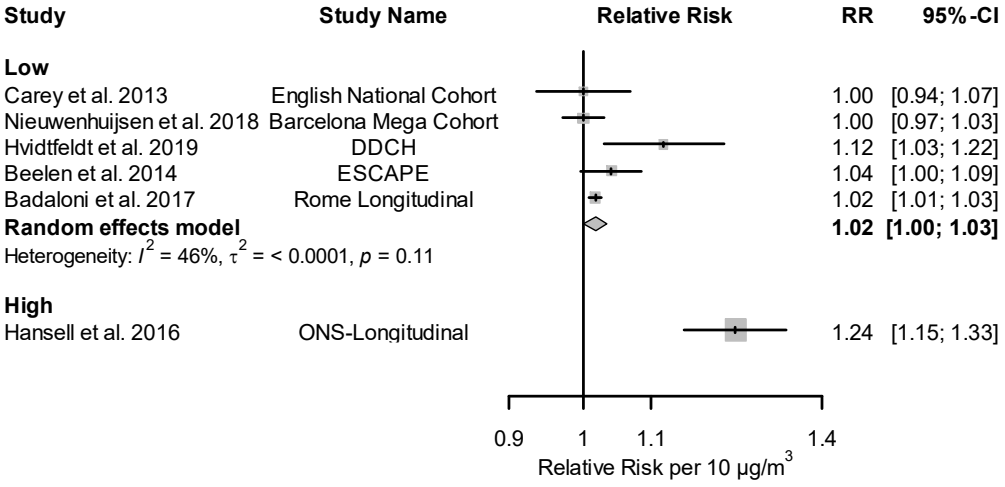
Subgroup analysis - by risk of bias

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

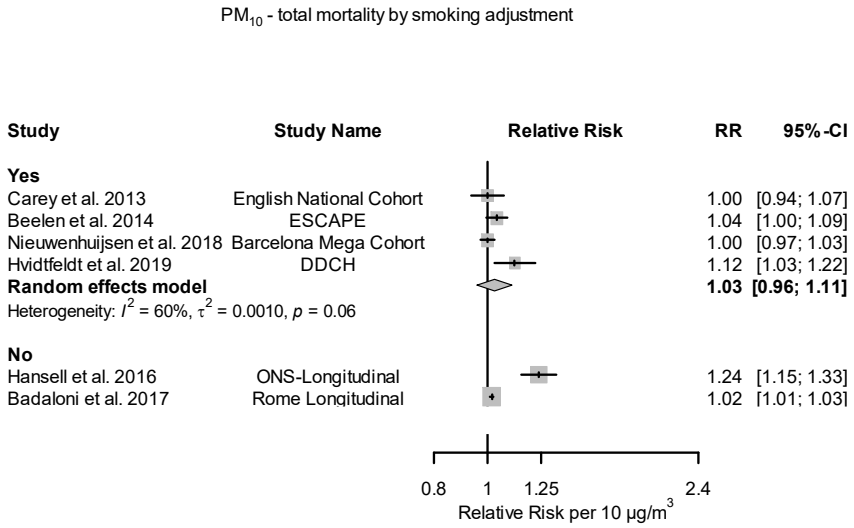
PM_{10} - total mortality by Risk of bias assessment on confounding



PM_{10} - total mortality by Risk of bias assessment on missing data

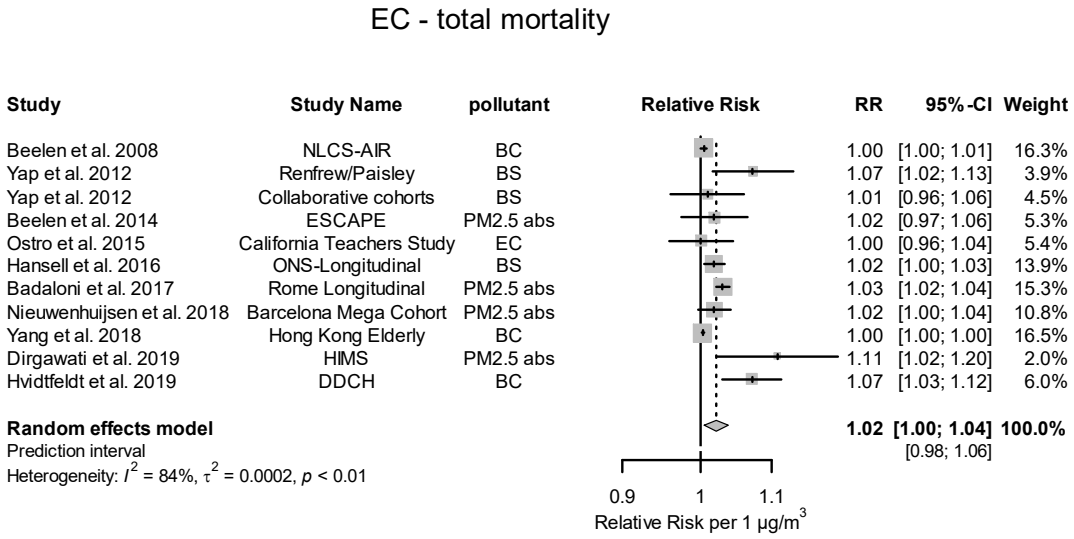


Subgroup analysis - by smoking adjustment

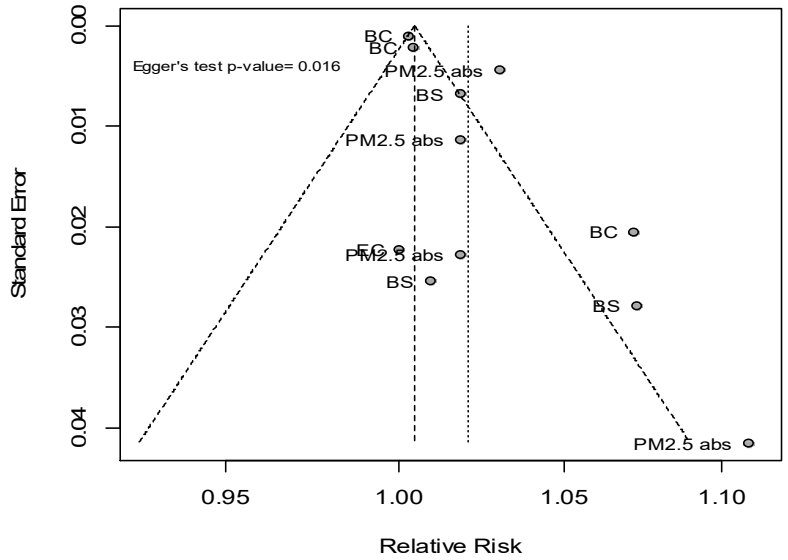


EC

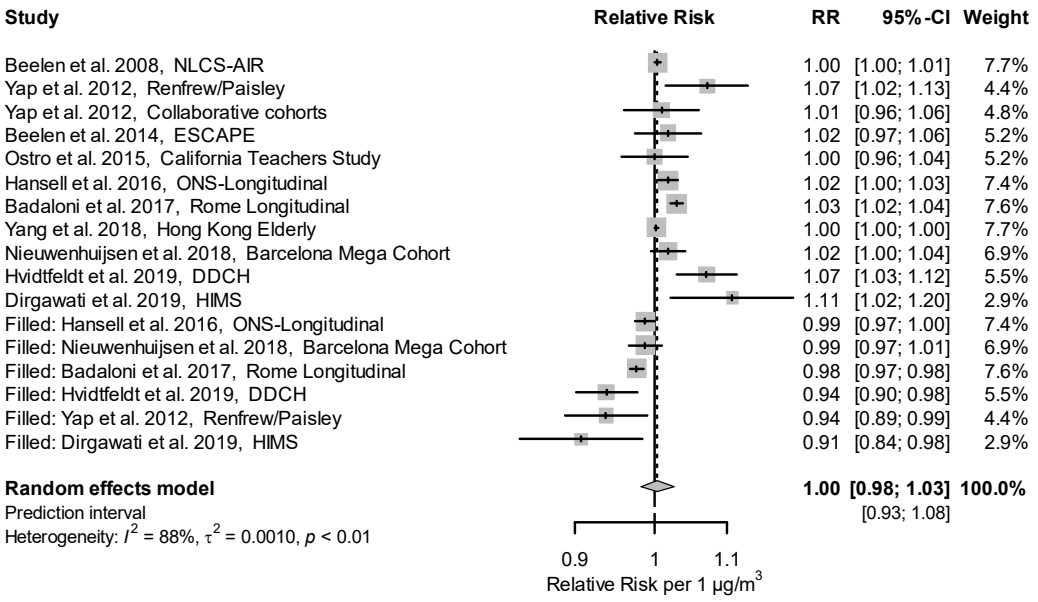
Primary meta-analysis

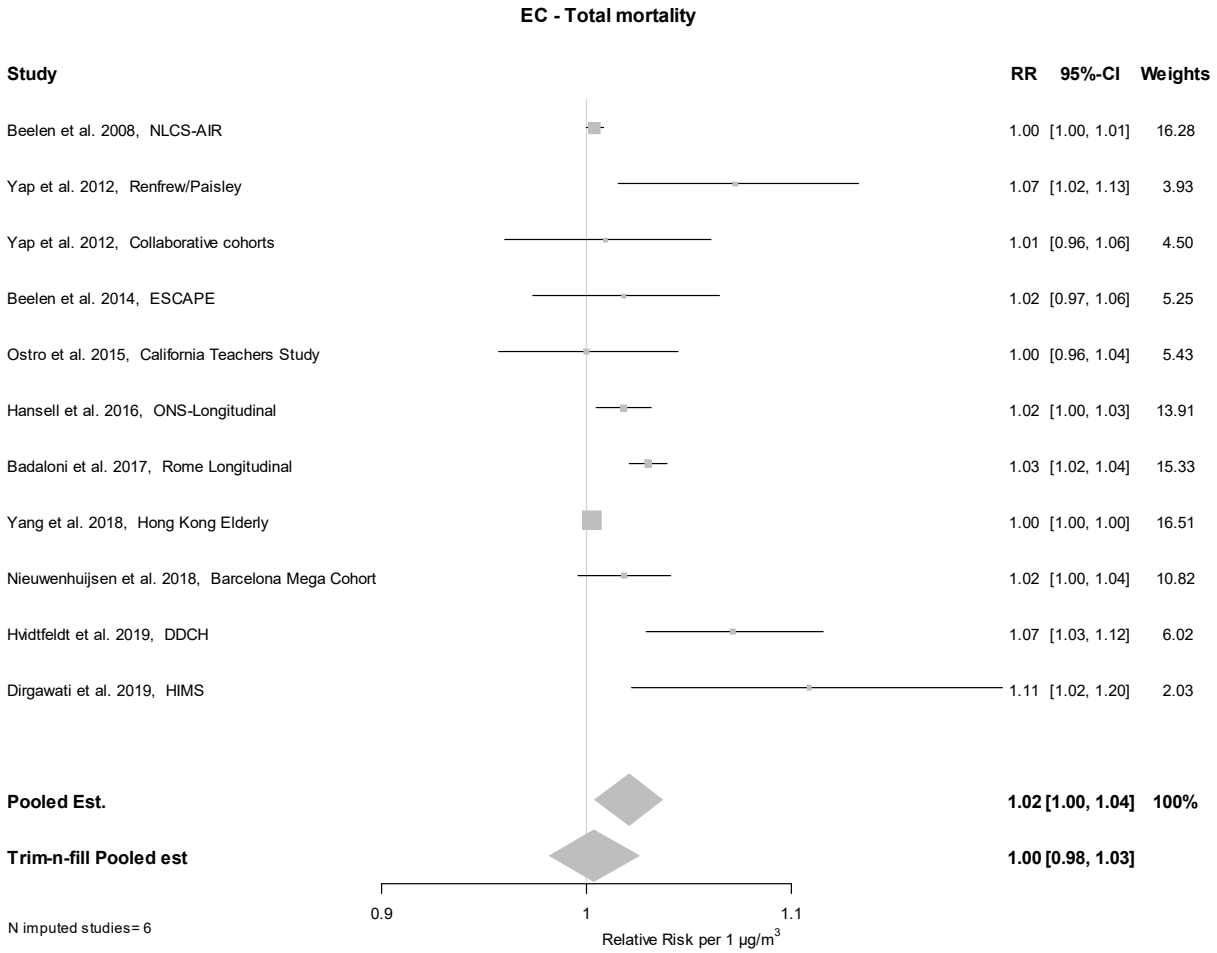


Publication bias

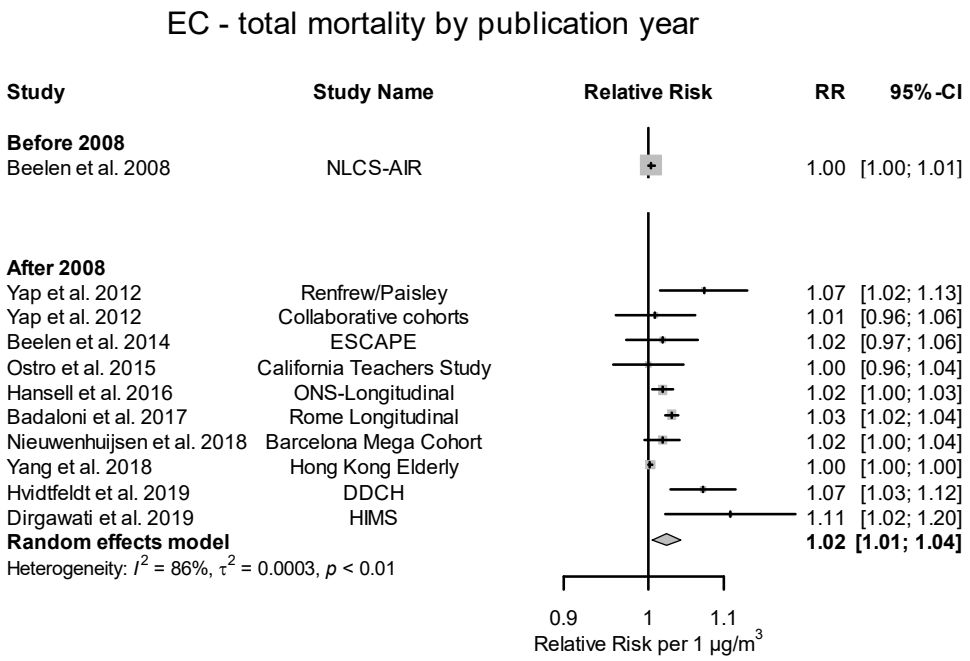


Footnote: The vertical lines in the funnel plots represent the pooled fixed and random effect estimates. The vertical dashed line in the middle of the funnel shows the fixed effect estimate. As the Panel applied a random-effects model, the funnel plot also presents the random-effects estimate with the dotted line.

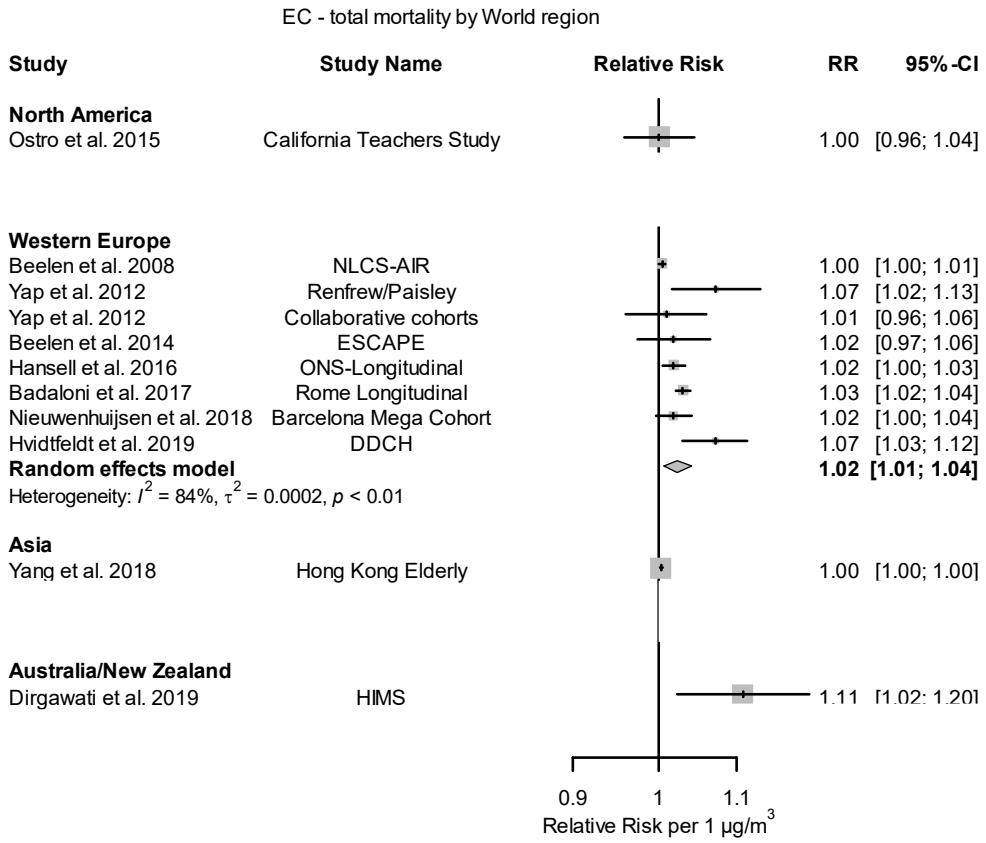

Study
Relative Risk
RR 95%-CI Weight
Beelen et al. 2008, NLCS-AIR 1.00 [1.00; 1.01] 7.7%
Yap et al. 2012, Renfrew/Paisley 1.07 [1.02; 1.13] 4.4%
Yap et al. 2012, Collaborative cohorts 1.01 [0.96; 1.06] 4.8%
Beelen et al. 2014, ESCAPE 1.02 [0.97; 1.06] 5.2%
Ostro et al. 2015, California Teachers Study 1.00 [0.96; 1.04] 5.2%
Hansell et al. 2016, ONS-Longitudinal 1.02 [1.00; 1.03] 7.4%
Badaloni et al. 2017, Rome Longitudinal 1.03 [1.02; 1.04] 7.6%
Yang et al. 2018, Hong Kong Elderly 1.00 [1.00; 1.00] 7.7%
Nieuwenhuijsen et al. 2018, Barcelona Mega Cohort 1.02 [1.00; 1.04] 6.9%
Hvidtfeldt et al. 2019, DDCH 1.07 [1.03; 1.12] 5.5%
Dirgawati et al. 2019, HIMS 1.11 [1.02; 1.20] 2.9%
Filled: Hansell et al. 2016, ONS-Longitudinal 0.99 [0.97; 1.00] 7.4%
Filled: Nieuwenhuijsen et al. 2018, Barcelona Mega Cohort 0.99 [0.97; 1.01] 6.9%
Filled: Badaloni et al. 2017, Rome Longitudinal 0.98 [0.97; 0.98] 7.6%
Filled: Hvidtfeldt et al. 2019, DDCH 0.94 [0.90; 0.98] 5.5%
Filled: Yap et al. 2012, Renfrew/Paisley 0.94 [0.89; 0.99] 4.4%
Filled: Dirgawati et al. 2019, HIMS 0.91 [0.84; 0.98] 2.9%
Random effects model 1.00 [0.98; 1.03] 100.0%
Prediction interval [0.93; 1.08]
Heterogeneity: I^2 = 88%, τ^2 = 0.0010, p < 0.01
0.9
1
1.1
Relative Risk per 1 µg/m^3


EC - Total mortality
Study
RR 95%-CI Weights
Beelen et al. 2008, NLCS-AIR 1.00 [1.00, 1.01] 16.28
Yap et al. 2012, Renfrew/Paisley 1.07 [1.02, 1.13] 3.93
Yap et al. 2012, Collaborative cohorts 1.01 [0.96, 1.06] 4.50
Beelen et al. 2014, ESCAPE 1.02 [0.97, 1.06] 5.25
Ostro et al. 2015, California Teachers Study 1.00 [0.96, 1.04] 5.43
Hansell et al. 2016, ONS-Longitudinal 1.02 [1.00, 1.03] 13.91
Badaloni et al. 2017, Rome Longitudinal 1.03 [1.02, 1.04] 15.33
Yang et al. 2018, Hong Kong Elderly 1.00 [1.00, 1.00] 16.51
Nieuwenhuijsen et al. 2018, Barcelona Mega Cohort 1.02 [1.00, 1.04] 10.82
Hvidtfeldt et al. 2019, DDCH 1.07 [1.03, 1.12] 6.02
Dirgawati et al. 2019, HIMS 1.11 [1.02, 1.20] 2.03
Pooled Est. 1.02 [1.00, 1.04] 100%
Trim-n-fill Pooled est 1.00 [0.98, 1.03]
0.9
1
1.1
N imputed studies= 6
Relative Risk per 1 µg/m^3

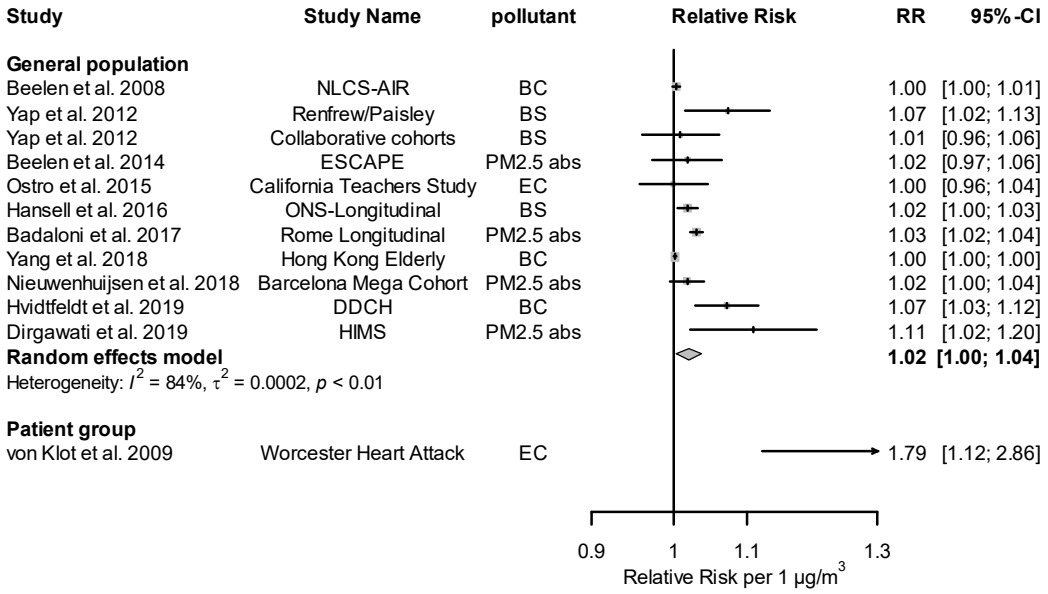
Sub-group analysis - by publication year



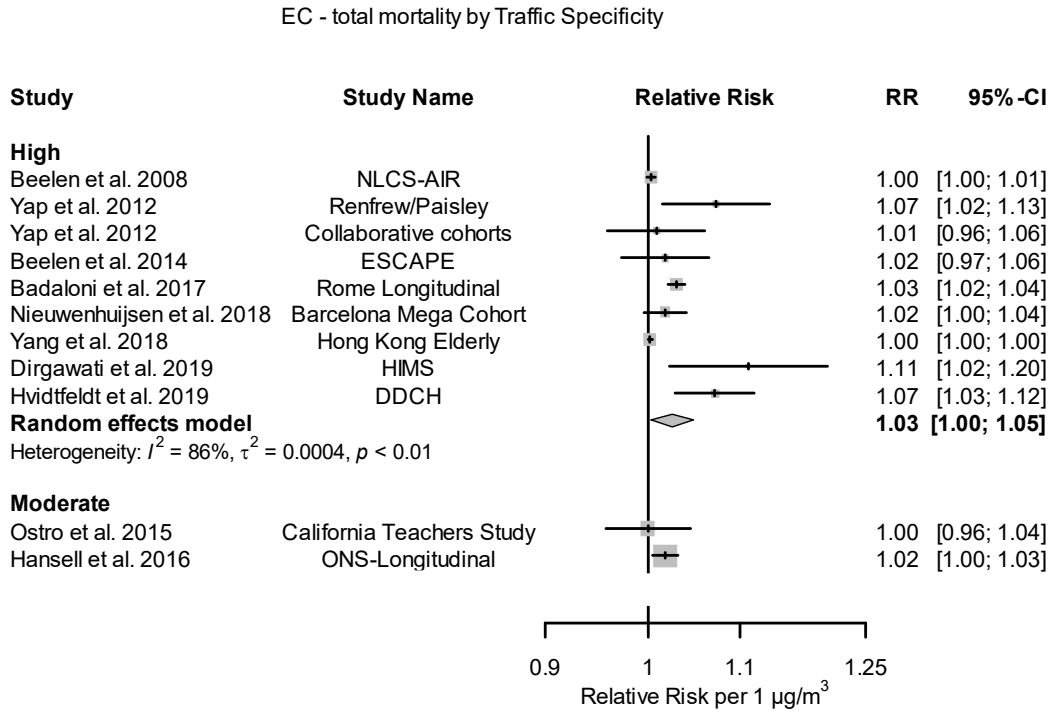
Subgroup analysis - by region



By general population/patient group



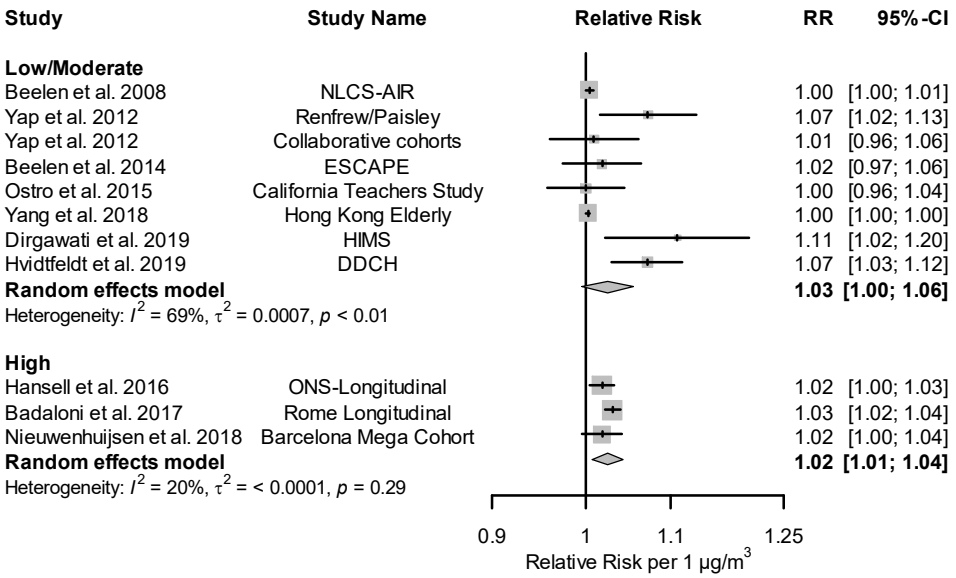
Subgroup analysis - by traffic specificity



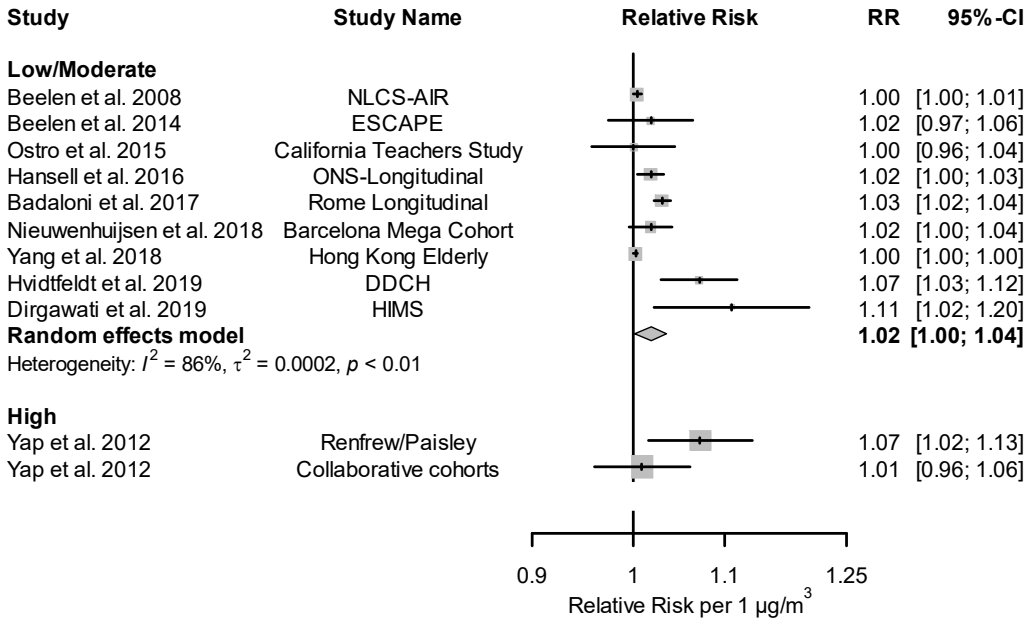
Subgroup analysis - By risk of bias

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

EC - total mortality by Risk of bias assessment on confounding

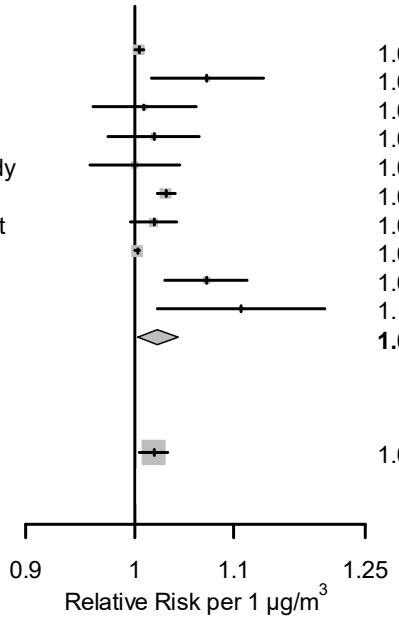


EC - total mortality by Risk of bias assessment on exposure assessment

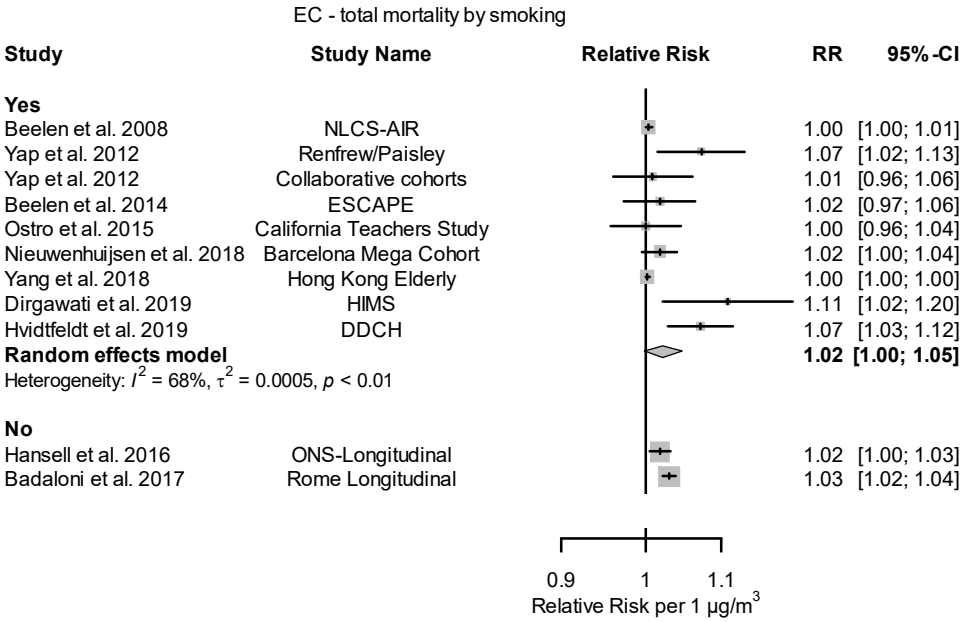


EC - total mortality by Risk of bias assessment on missing data

Study	Study Name	RR	95%-CI
Low			
Beelen et al. 2008	NLCS-AIR	1.00	[1.00; 1.01]
Yap et al. 2012	Renfrew/Paisley	1.07	[1.02; 1.13]
Yap et al. 2012	Collaborative cohorts	1.01	[0.96; 1.06]
Beelen et al. 2014	ESCAPE	1.02	[0.97; 1.06]
Ostro et al. 2015	California Teachers Study	1.00	[0.96; 1.04]
Badaloni et al. 2017	Rome Longitudinal	1.03	[1.02; 1.04]
Nieuwenhuijsen et al. 2018	Barcelona Mega Cohort	1.02	[1.00; 1.04]
Yang et al. 2018	Hong Kong Elderly	1.00	[1.00; 1.00]
Hvidtfeldt et al. 2019	DDCH	1.07	[1.03; 1.12]
Dirgawati et al. 2019	HIMS	1.11	[1.02; 1.20]
Random effects model		**1.02**	**[1.00; 1.04]**
Heterogeneity: I^2 = 85%, τ^2 = 0.0003, p < 0.01			
High			
Hansell et al. 2016	ONS-Longitudinal	1.02	[1.00; 1.03]

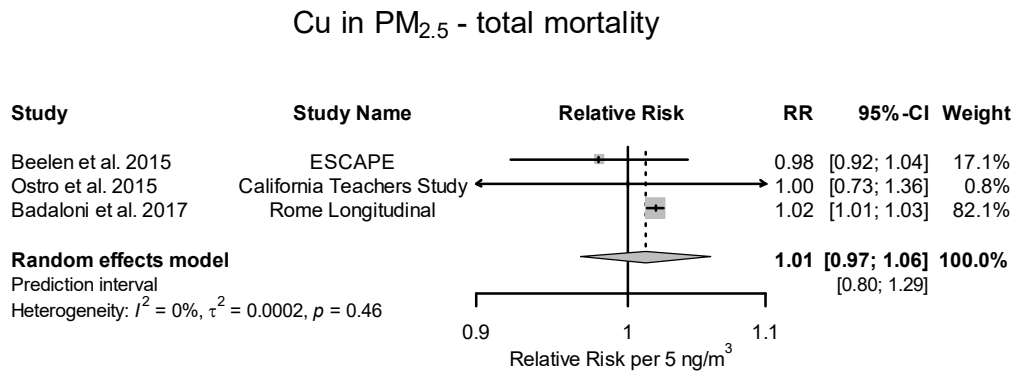


Subgroup analysis - by smoking adjustment

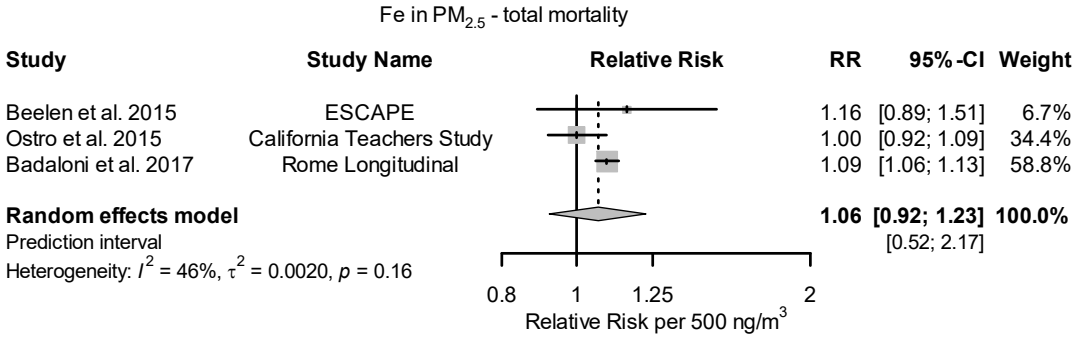


$PM_{2.5}$ components

Primary meta-analysis - copper in $PM_{2.5}$



Primary meta-analysis – iron in $PM_{2.5}$



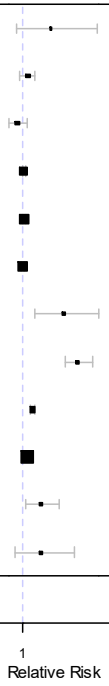
$PM_{2.5}$ components - traffic specificity and risk of bias and smoking adjustment

For traffic specificity Ostro et al. 2015 rated moderate and in risk of bias exposure assessment.
For risk of bias Badaloni et al. 2017 rated high in confounding risk of bias for Both Cu and Fe.
Badaloni et al. 2017 is an administrative cohort and not controlling for smoking.

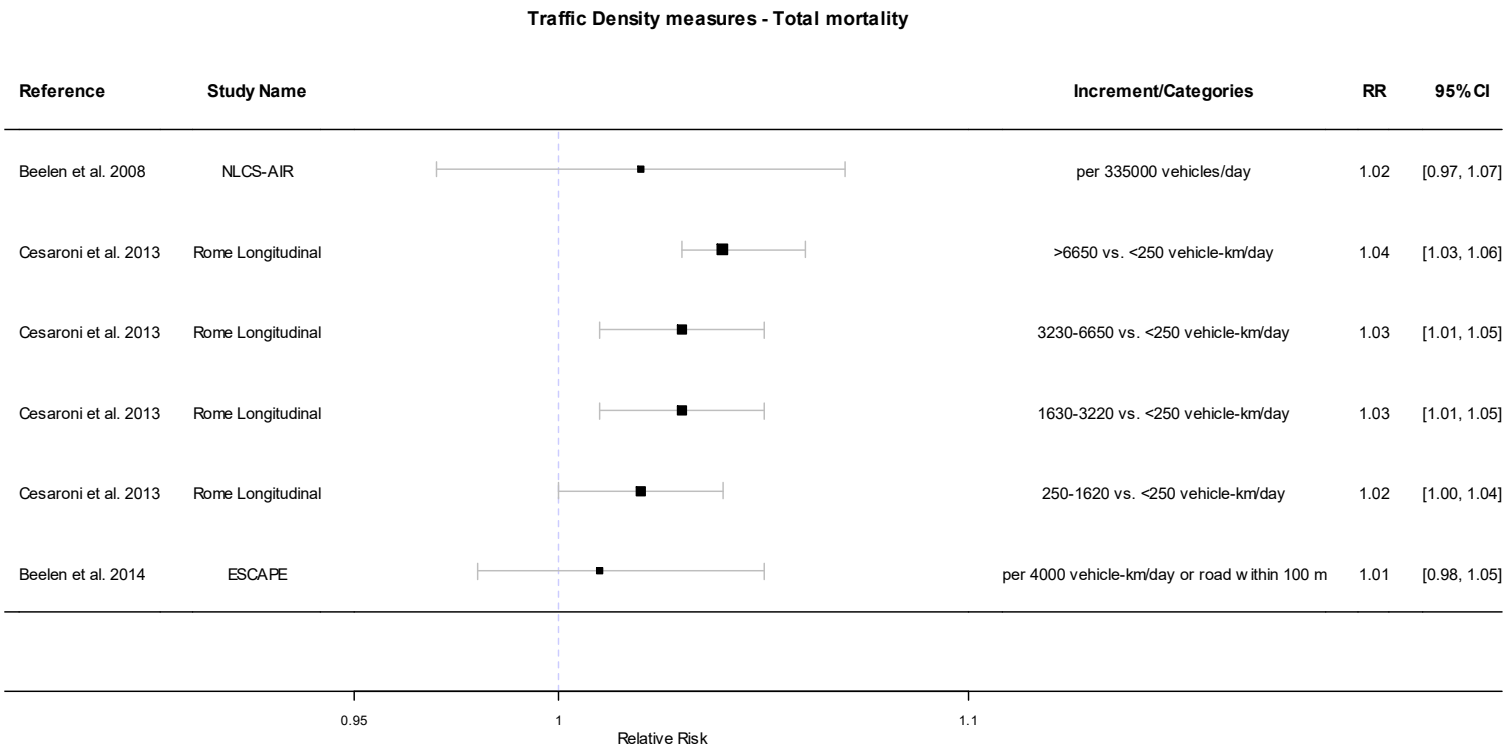
Distance measures

Distance measures - Total mortality

Reference	Study Name	Population	Categories	RR	95% CI
Gehring et al. 2006	SALIA	General population	<50 vs. >50 m	1.29	[0.93, 1.78]
Beelen et al. 2008	NLCS-AIR	General population	<100 m to highway or <50 m to major road vs. higher	1.05	[0.97, 1.12]
Raaschou-Nielsen et al. 2012	DDCH	General population	<50 vs. >50 m	0.94	[0.85, 1.05]
Cesaroni et al. 2013	Rome Longitudinal	General population	50-100 vs. >250 m	1.01	[0.99, 1.03]
Cesaroni et al. 2013	Rome Longitudinal	General population	100-150 vs. >250 m	1.01	[0.99, 1.02]
Cesaroni et al. 2013	Rome Longitudinal	General population	150-250 vs. >250 m	0.99	[0.98, 1.01]
Heinrich et al. 2013	SALIA	General population	<50 vs. >50 m	1.42	[1.12, 1.79]
Cakmak et al. 2019	1991 CanCHEC	General population	<475 vs. >1583 m	1.57	[1.44, 1.72]
Cakmak et al. 2019	1991 CanCHEC	General population	475-1152 vs. >1583 m	1.10	[1.07, 1.13]
Cakmak et al. 2019	1991 CanCHEC	General population	1152-1583 vs. >1583 m	1.04	[1.03, 1.05]
Finkelstein et al. 2004	Hamilton Pulmonary Cohort	Patient group	<50 m from major road or <100 m from highway vs. higher	1.18	[1.02, 1.38]
Jerrett et al. 2009	Toronto Respiratory Cohort	Patient group	<50 m from major road or <100 m from highway vs. higher	1.19	[0.92, 1.53]

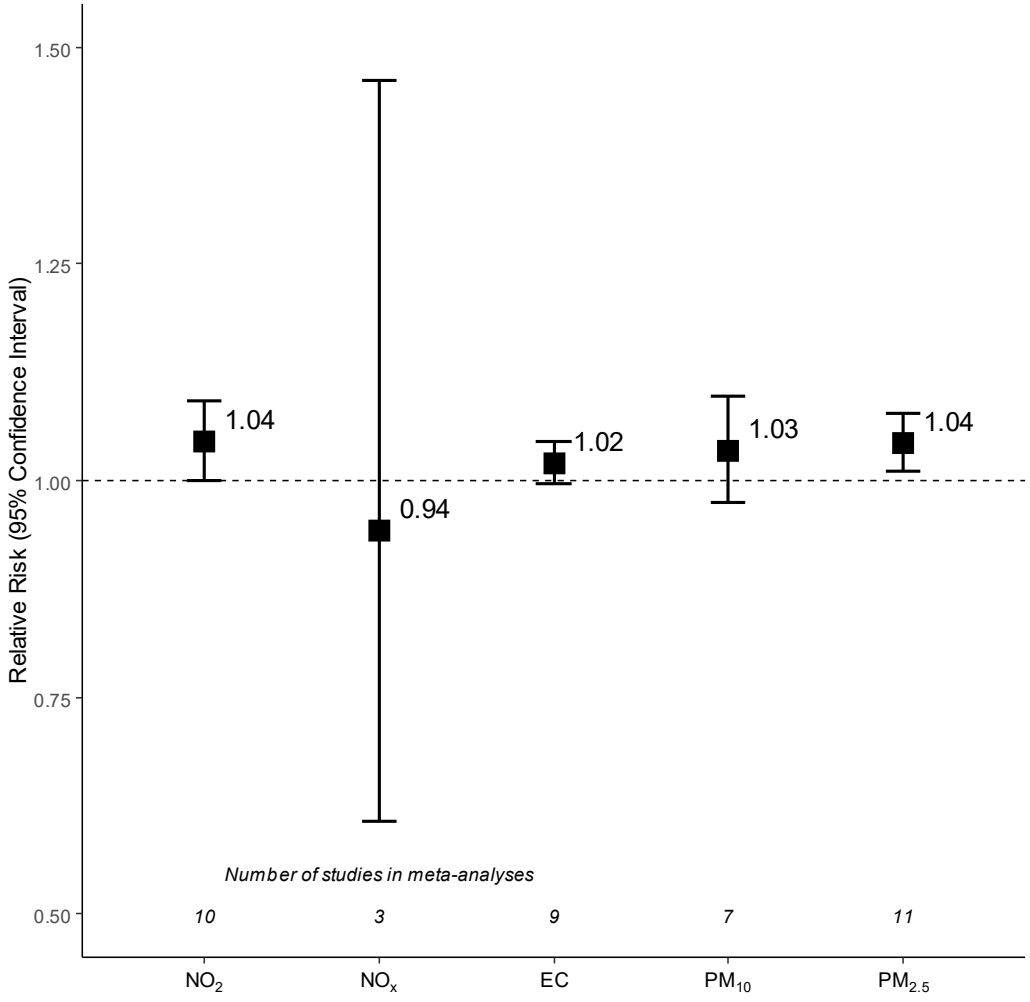


Density measures



11.2 Circulatory mortality

Summary of meta-analysis

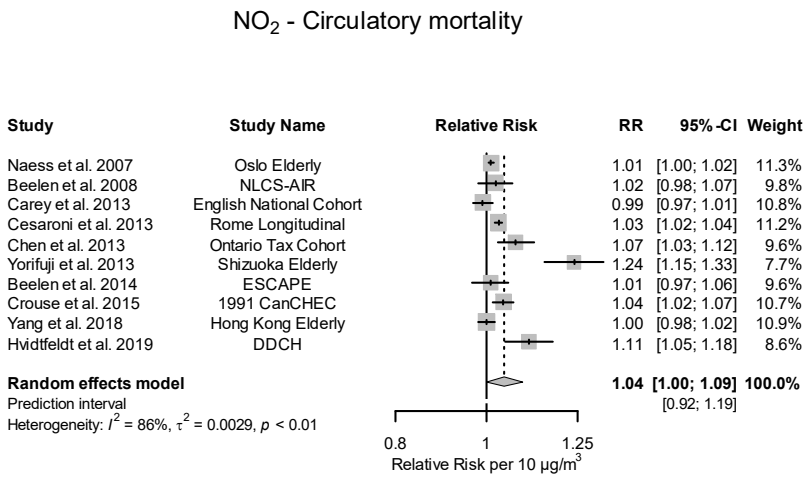


Footnote: The following increments were used: 10 µg/m^3 for NO_2, 20 µg/m^3 for NO_x, 1 µg/m^3 for EC, 10 µg/m^3 for PM_{10} and 5 µg/m^3 for $PM_{2.5}$. Effect estimates cannot be directly compared across the different traffic-related pollutants because the selected increments do not necessarily represent the same contrast in exposure.

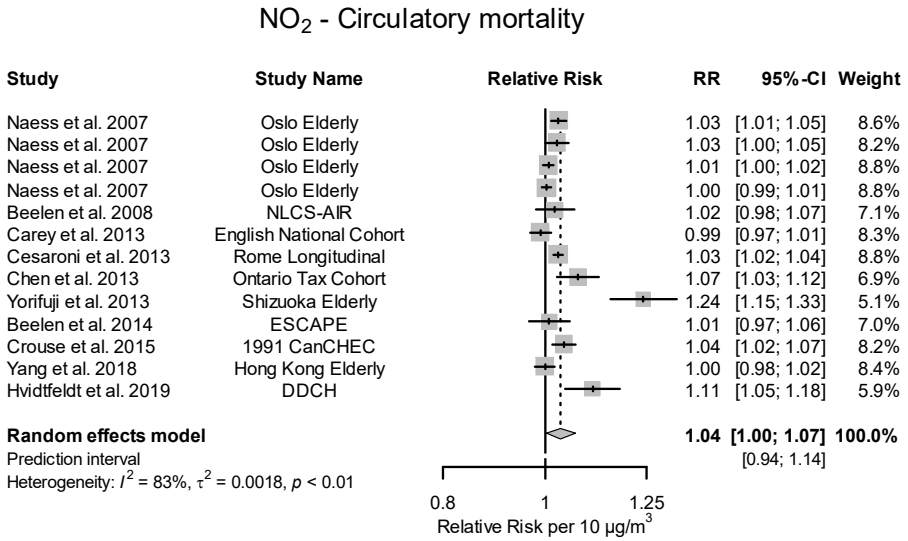
NO_2

Primary meta-analysis

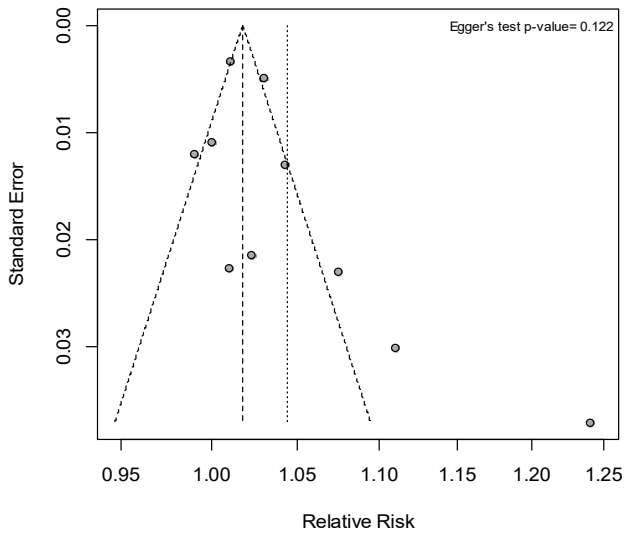
All are cohorts



Sensitivity analysis without combining Naess et al. 2007

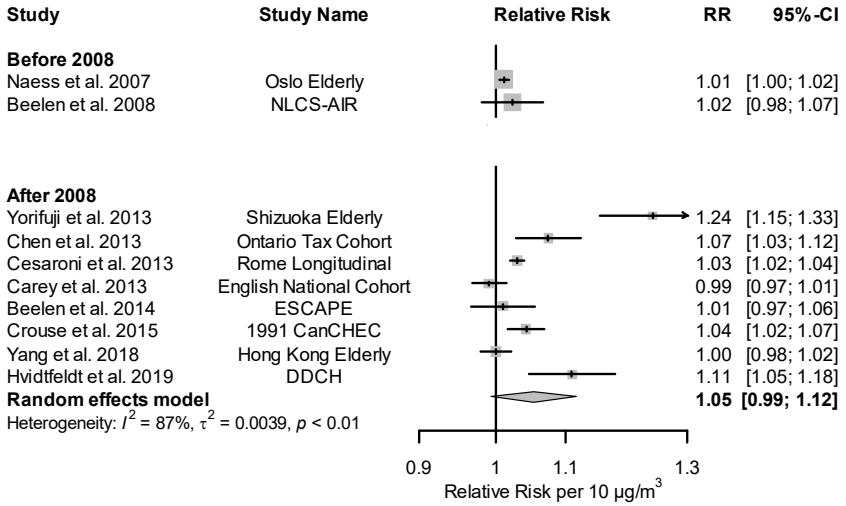


Publication bias

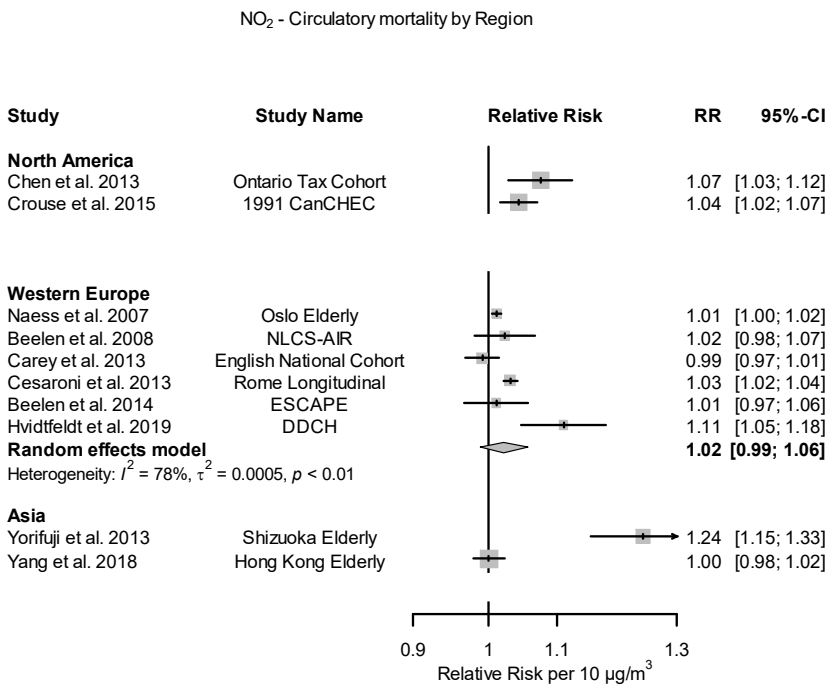


Footnote: The vertical lines in the funnel plots represent the pooled fixed and random effect estimates. The vertical dashed line in the middle of the funnel shows the fixed effect estimate. As the Panel applied a random-effects model, the funnel plot also presents the random-effects estimate with the dotted line.

Sub-group analysis - by study period

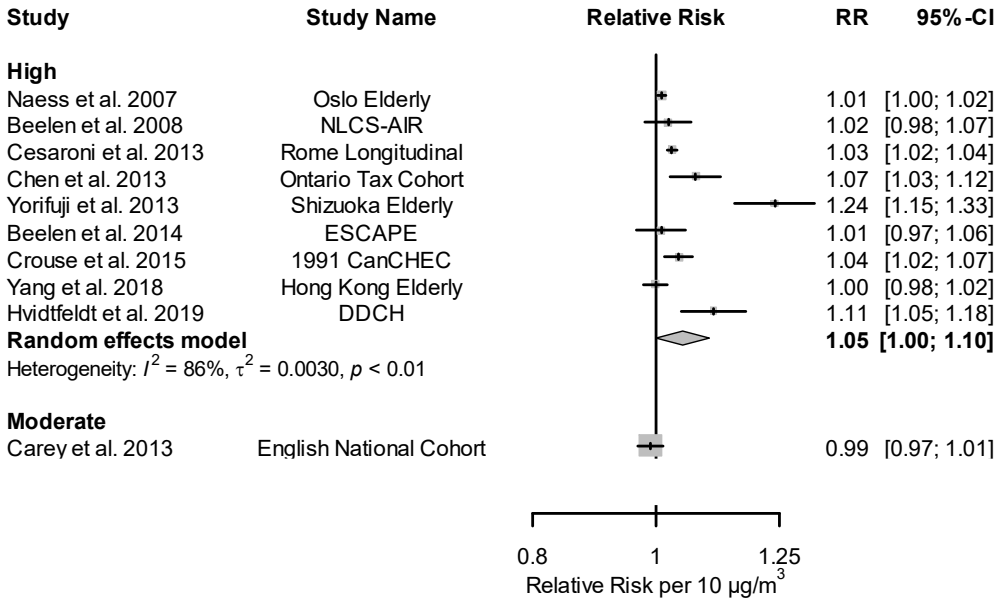


Sub-group analysis - by region



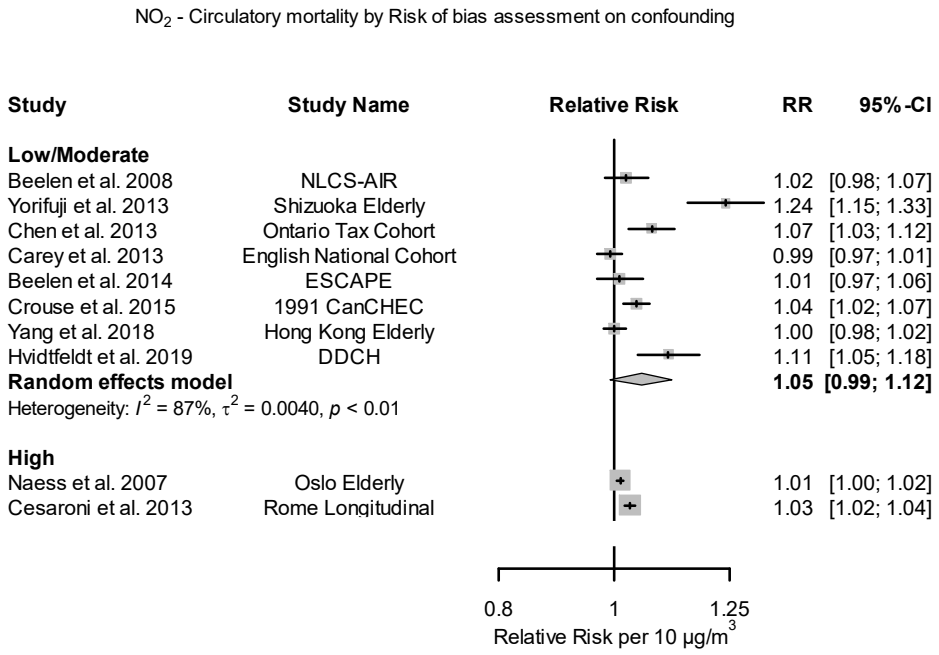
Sub-group analysis - by traffic specificity

NO_2 - Circulatory mortality by Traffic Specificity

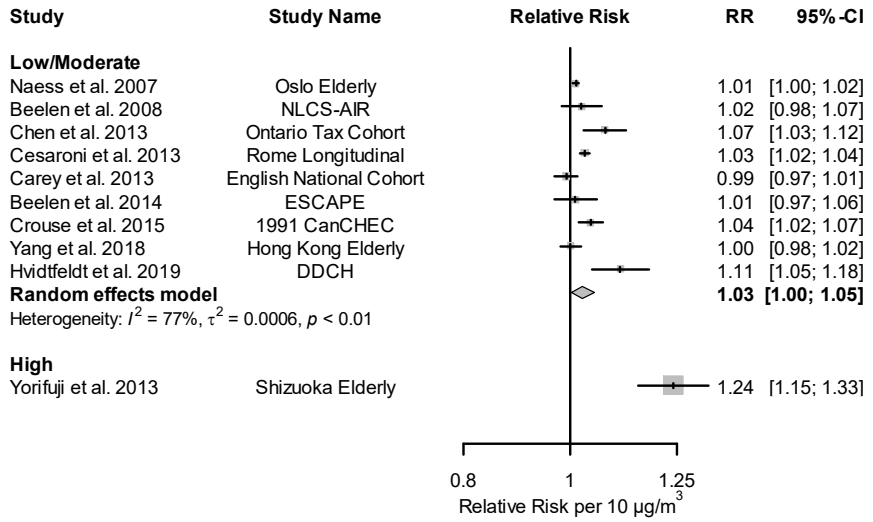


Subgroup analysis - by risk of bias

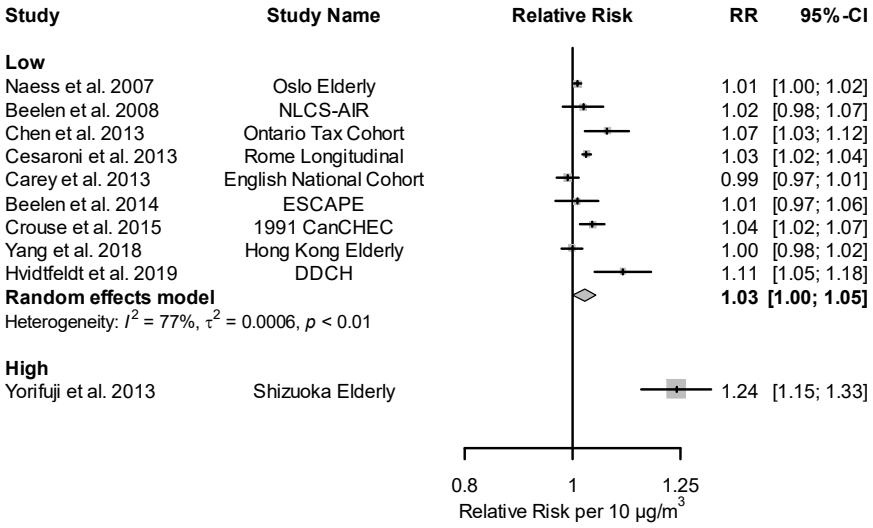
Plots not shown for risk of bias domains if all studies were rated low or moderate



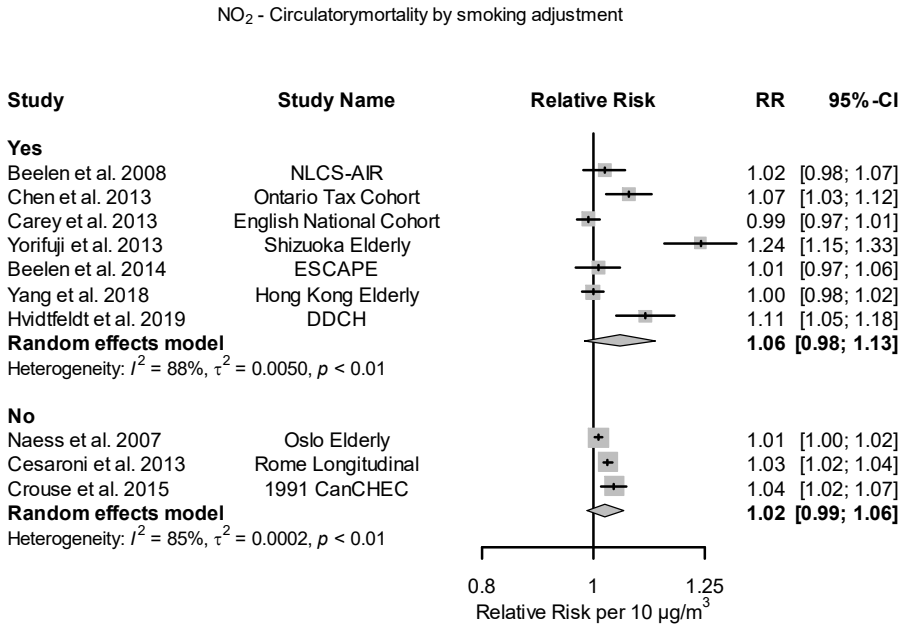
NO_2 - Circulatory mortality by Risk of bias assessment on selection bias



NO_2 - Circulatorymortality by Risk of bias assessment on missing data

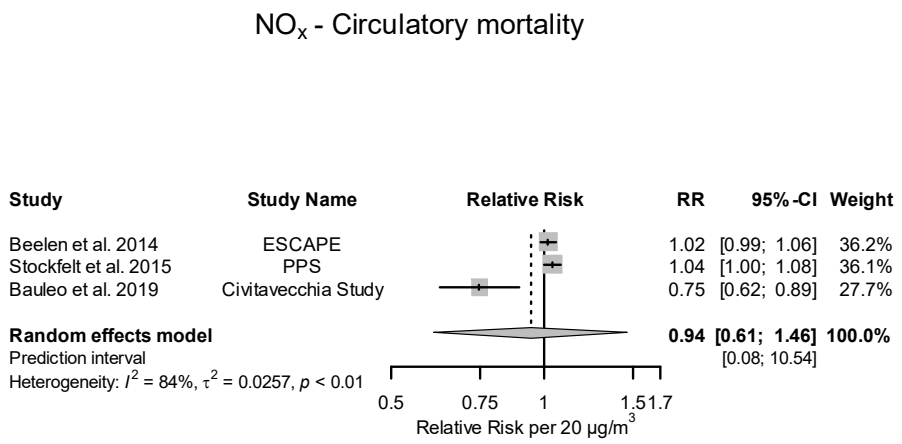


Subgroup analysis - by smoking adjustment



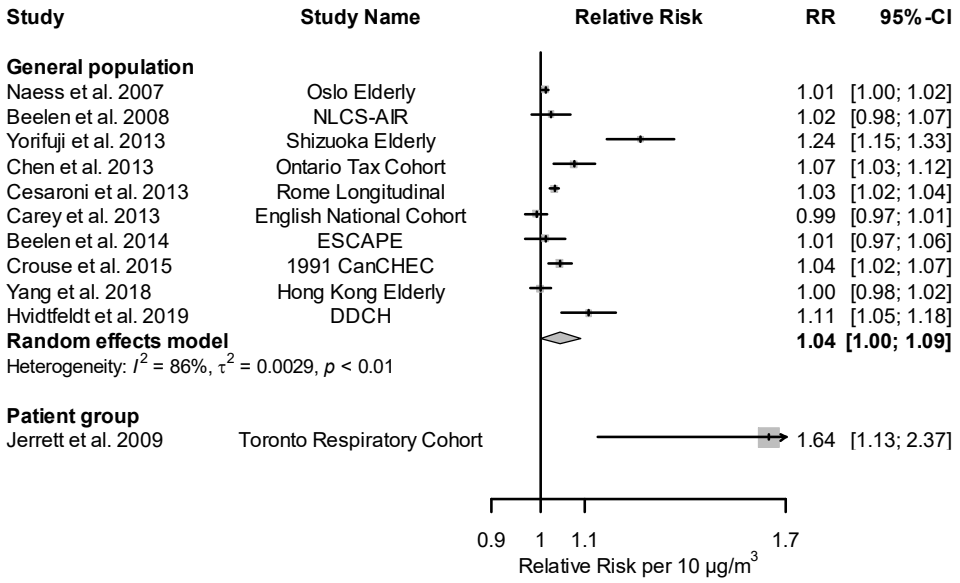
NO_x

Primary meta-analysis



All are Western European cohorts after 2008

By general population/patient group



Subgroup analysis notes:

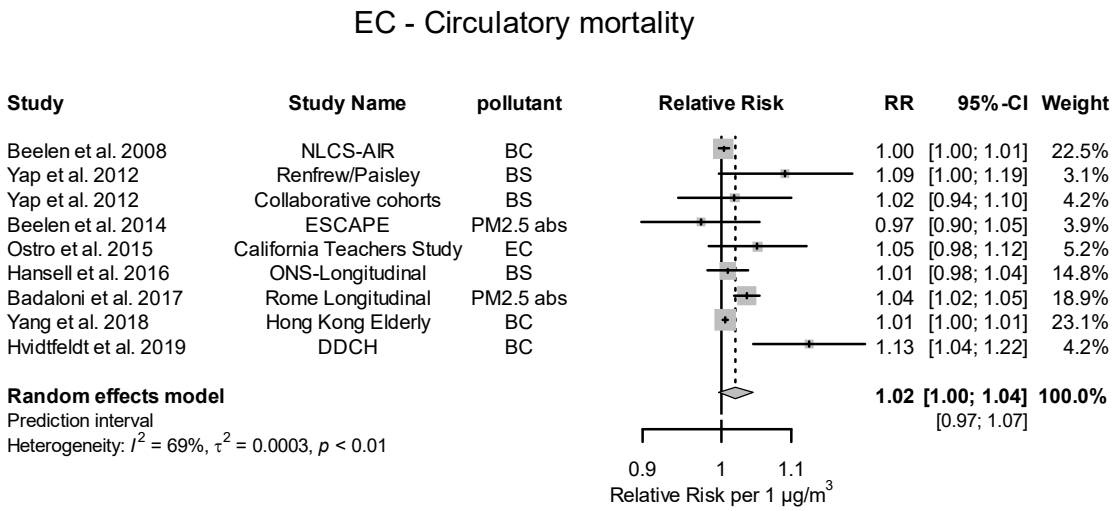
All are high traffic specificity

For risk of bias: all domains low except: Beelen et al 2014 and Bauleo et al 2019 are rated moderate for exposure assessment. Bauleo et al 2019 is also rated high risk of bias for confounding.

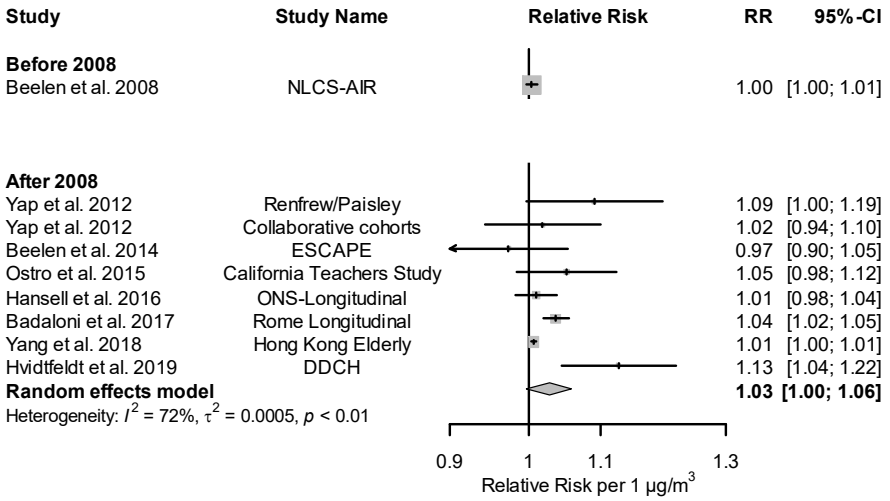
For smoking adjustment: Bauleo et al 2019 doesn't control for smoking.

EC

Primary meta-analysis

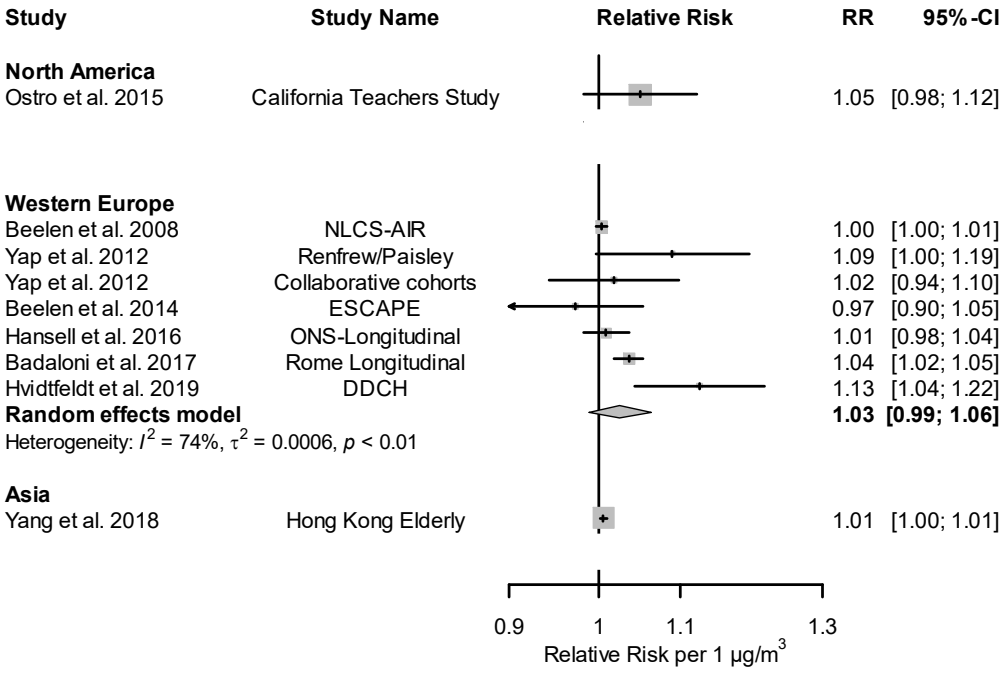


Subgroup analysis – by publication year



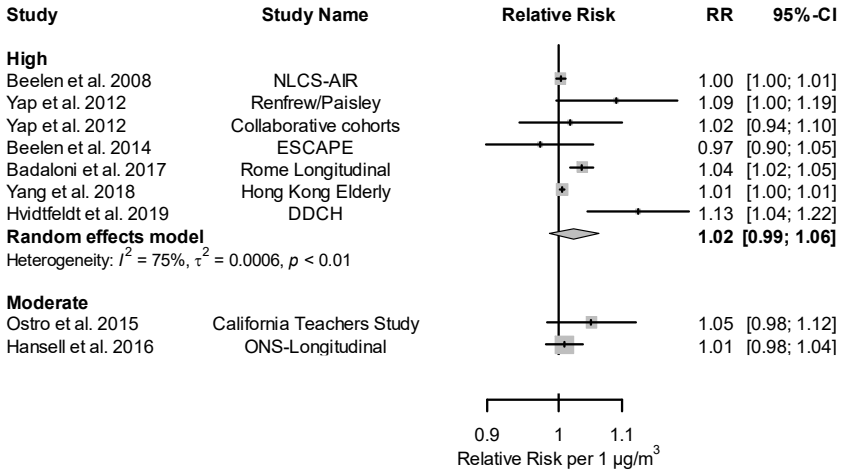
Subgroup analysis - by region

EC - Circulatory mortality by Region



Subgroup analysis - by traffic specificity

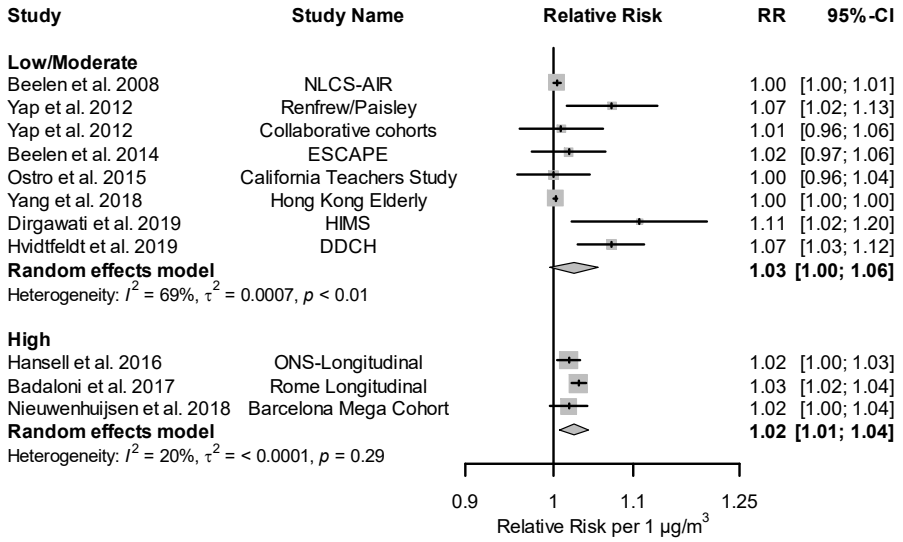
EC - Circulatory mortality by Traffic Specificity



Subgroup analysis - by risk of bias

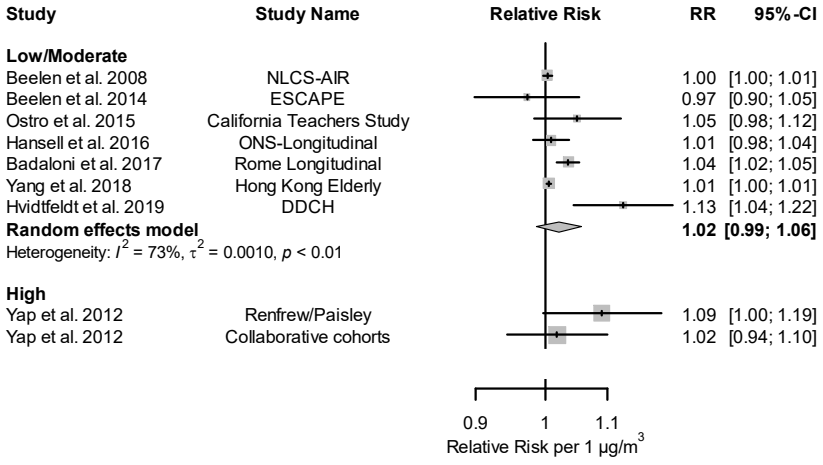
Plots not shown for risk of bias domains if all studies were rated low or moderate

EC - total mortality by Risk of bias assessment on confounding

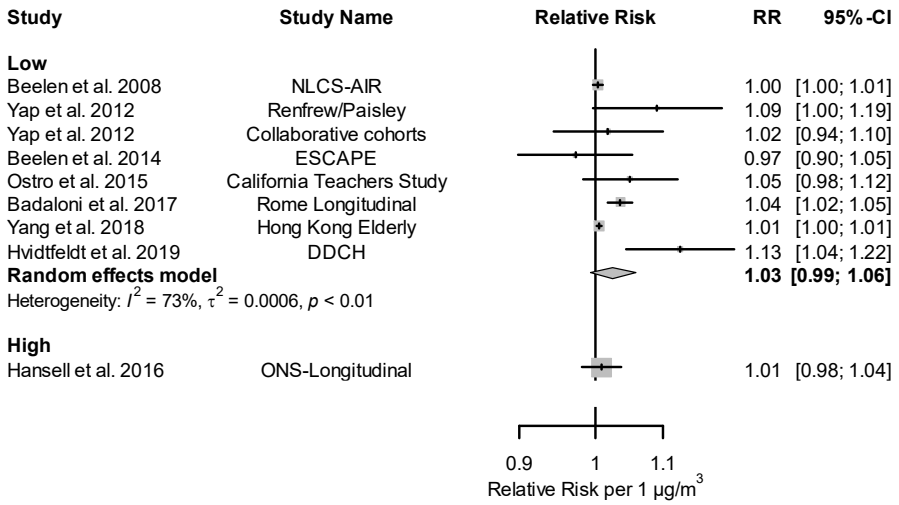


Note: For low/moderate vs high risk of bias confounding t^2 estimated by EB as REML did not converge

EC - Circulatory mortality by Risk of bias assessment on exposure assessment

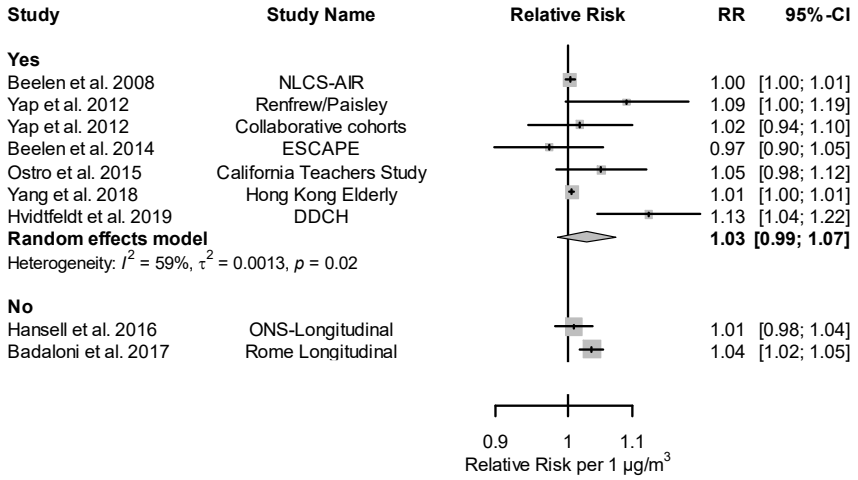


EC - Circulatory mortality by Risk of bias assessment on missing data



Subgroup analysis - by smoking adjustment

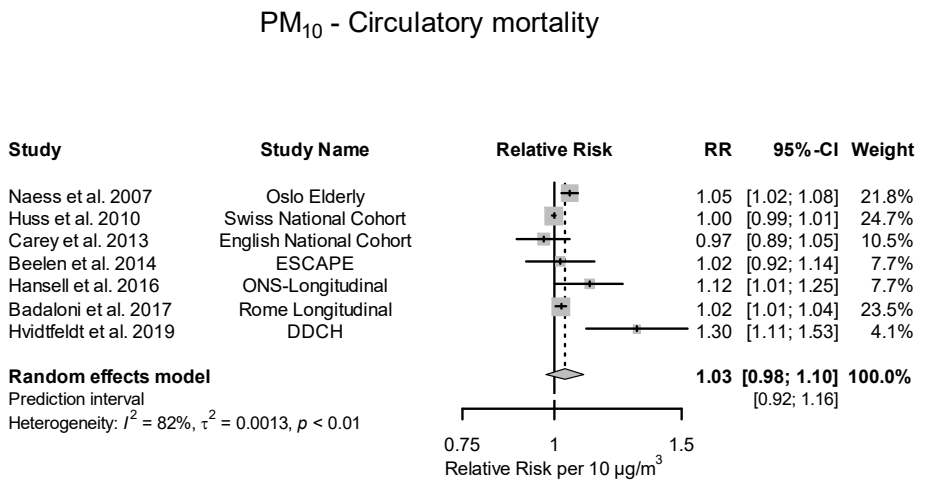
EC - Circulatory mortality by smoking adjustment



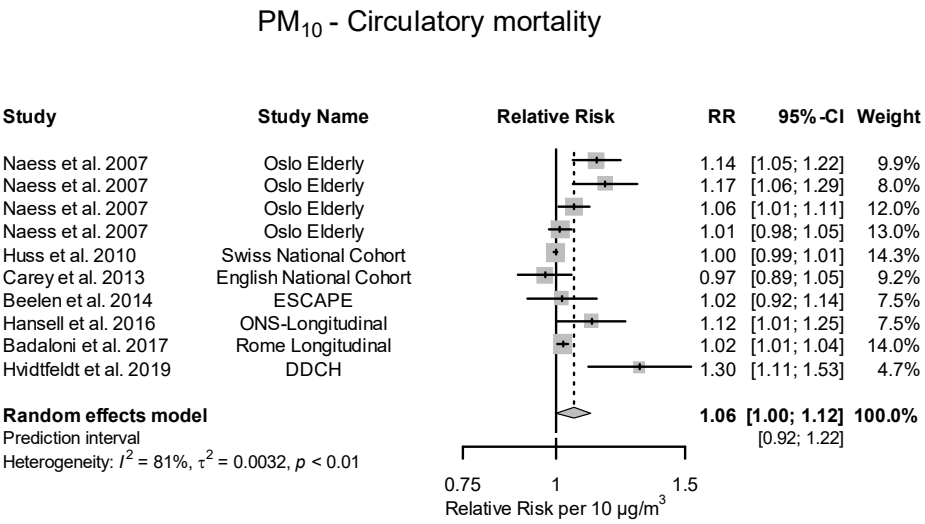
Note: For smoking adjustment t^2 estimated by EB as REML did not converge

PM_{10}

Primary meta-analysis



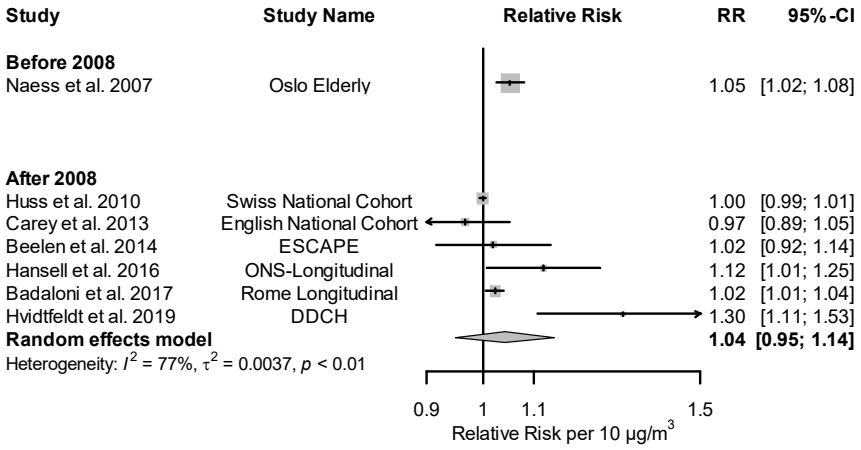
Sensitivity analysis without combining strata in Naess et al. 2007



Subgroup analysis – by region

All were W. European cohort studies in the general population

Subgroup analysis - by publication year



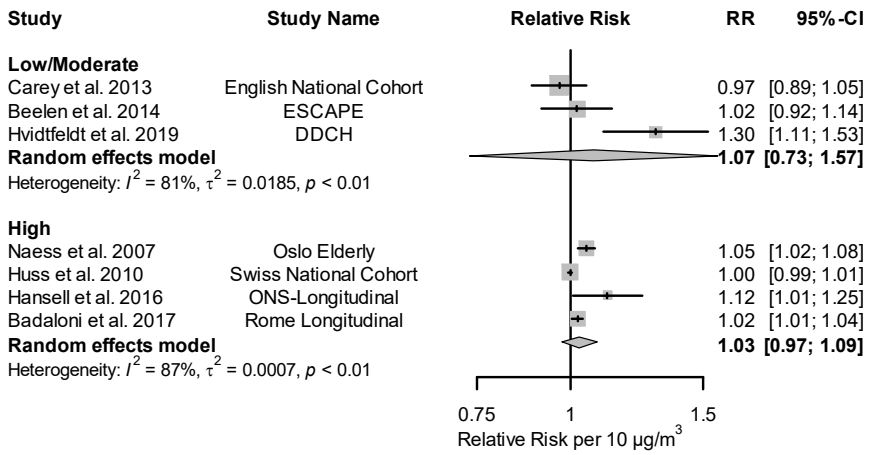
Subgroup analysis - by traffic specificity

All studies rated moderate

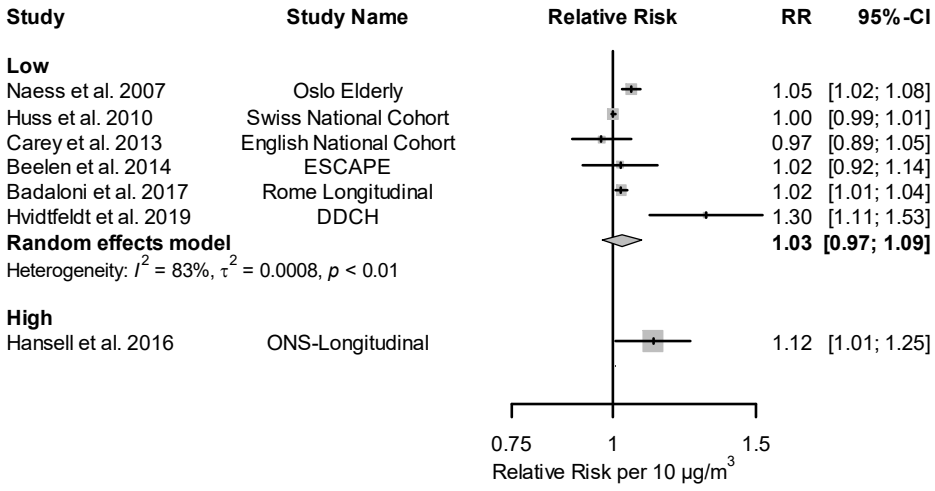
Subgroup analysis - by risk of bias

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

PM_{10} - Circulatory mortality by Risk of bias assessment on confounding

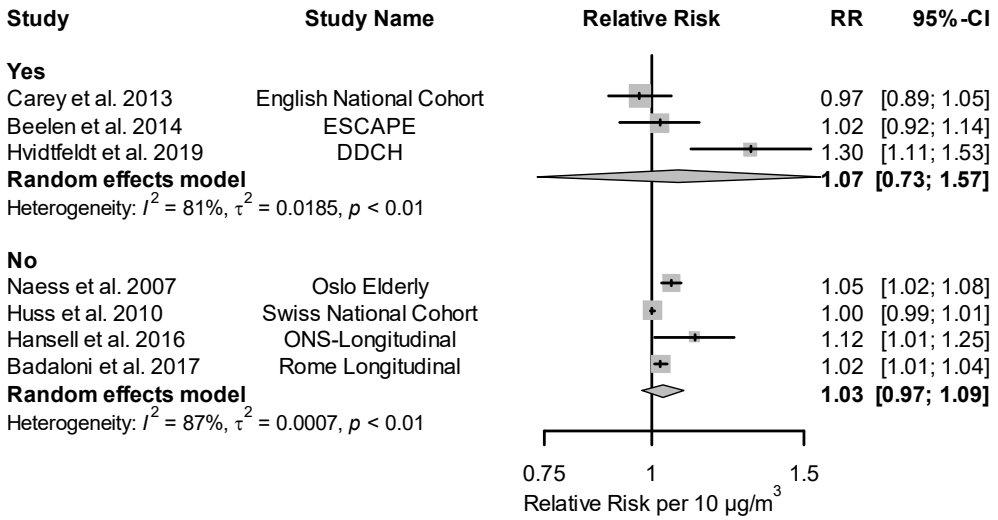


PM_{10} - Circulatorymortality by Risk of bias assessment on missing data



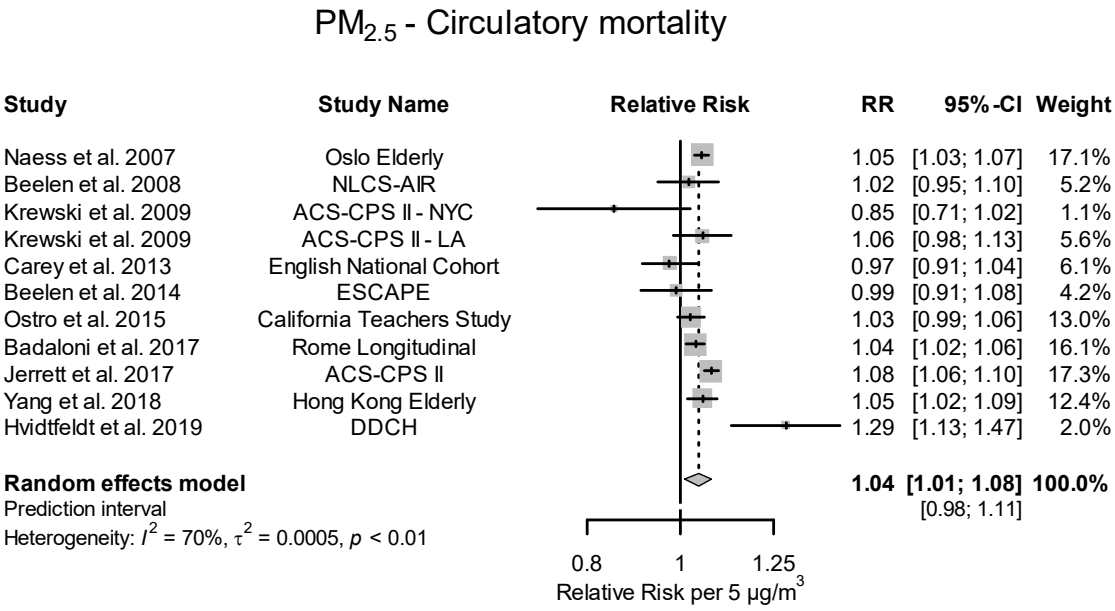
Subgroup analysis - by smoking adjustment

PM_{10} - Circulatorymortality by smoking adjustment



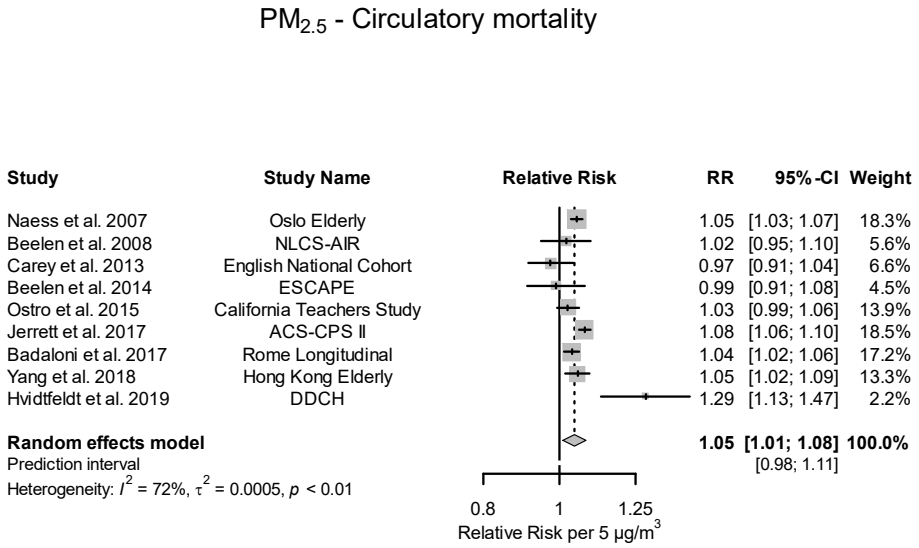
$PM_{2.5}$

Primary meta-analysis

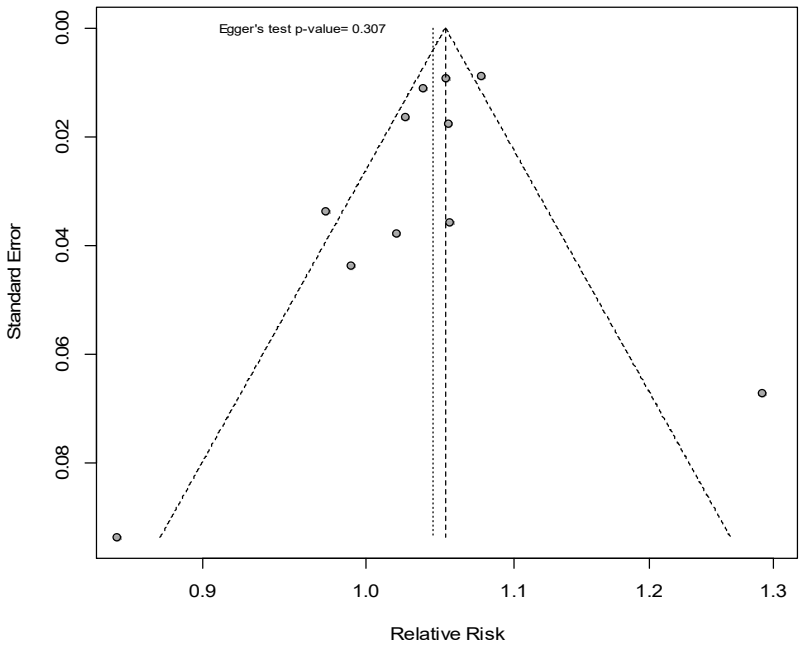


Sensitivity analysis

Excluding Krewski estimates for NYC and LA ACS as part of the Jerrett et al 2017 study

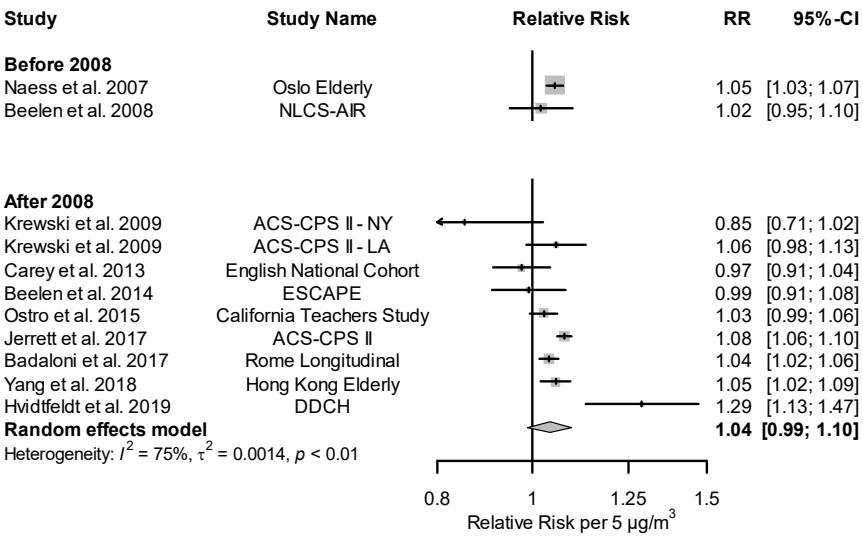


Publication bias

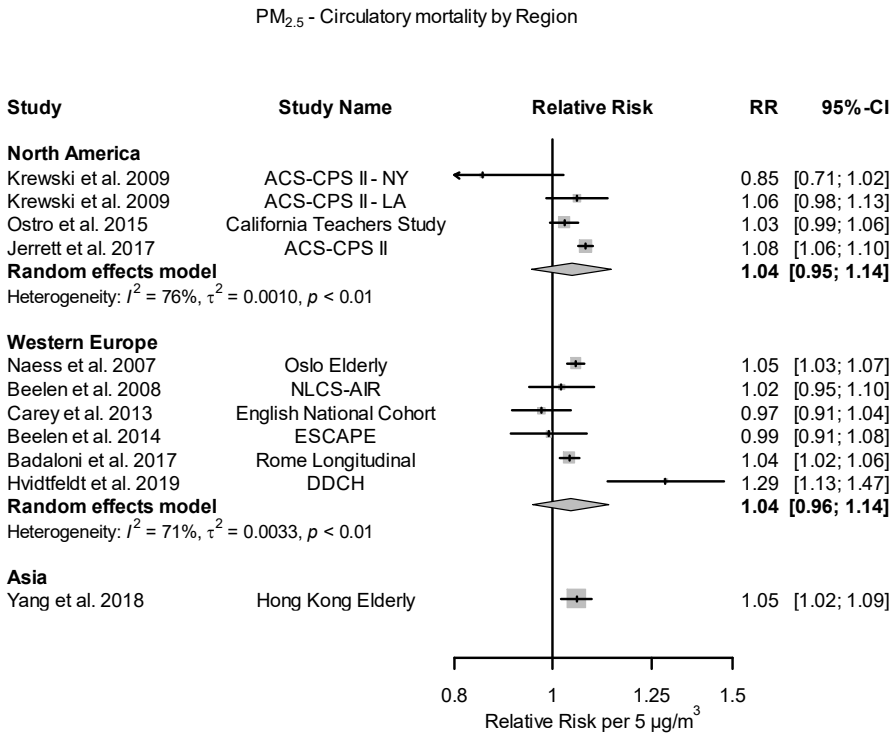


Footnote: The vertical lines in the funnel plots represent the pooled fixed and random effect estimates. The vertical dashed line in the middle of the funnel shows the fixed effect estimate. As the Panel applied a random-effects model, the funnel plot also presents the random-effects estimate with the dotted line.

Subgroup analysis – by publication year



Subgroup analysis - by region

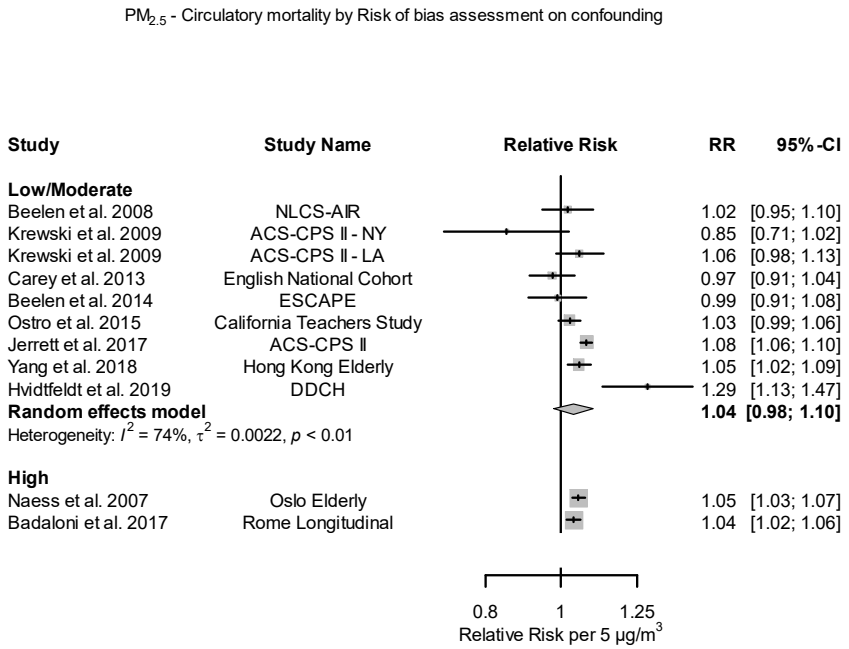


Subgroup analysis - by traffic specificity

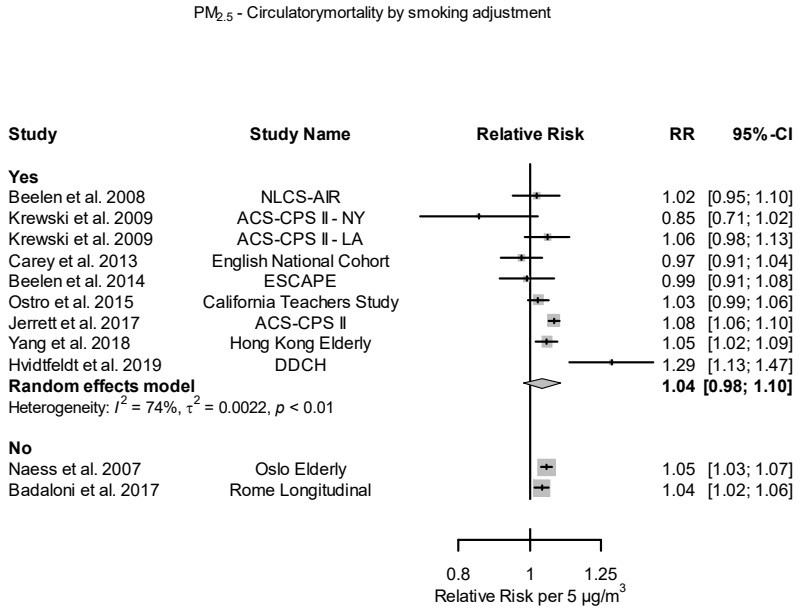
All rated moderate

Subgroup analysis - by risk of bias

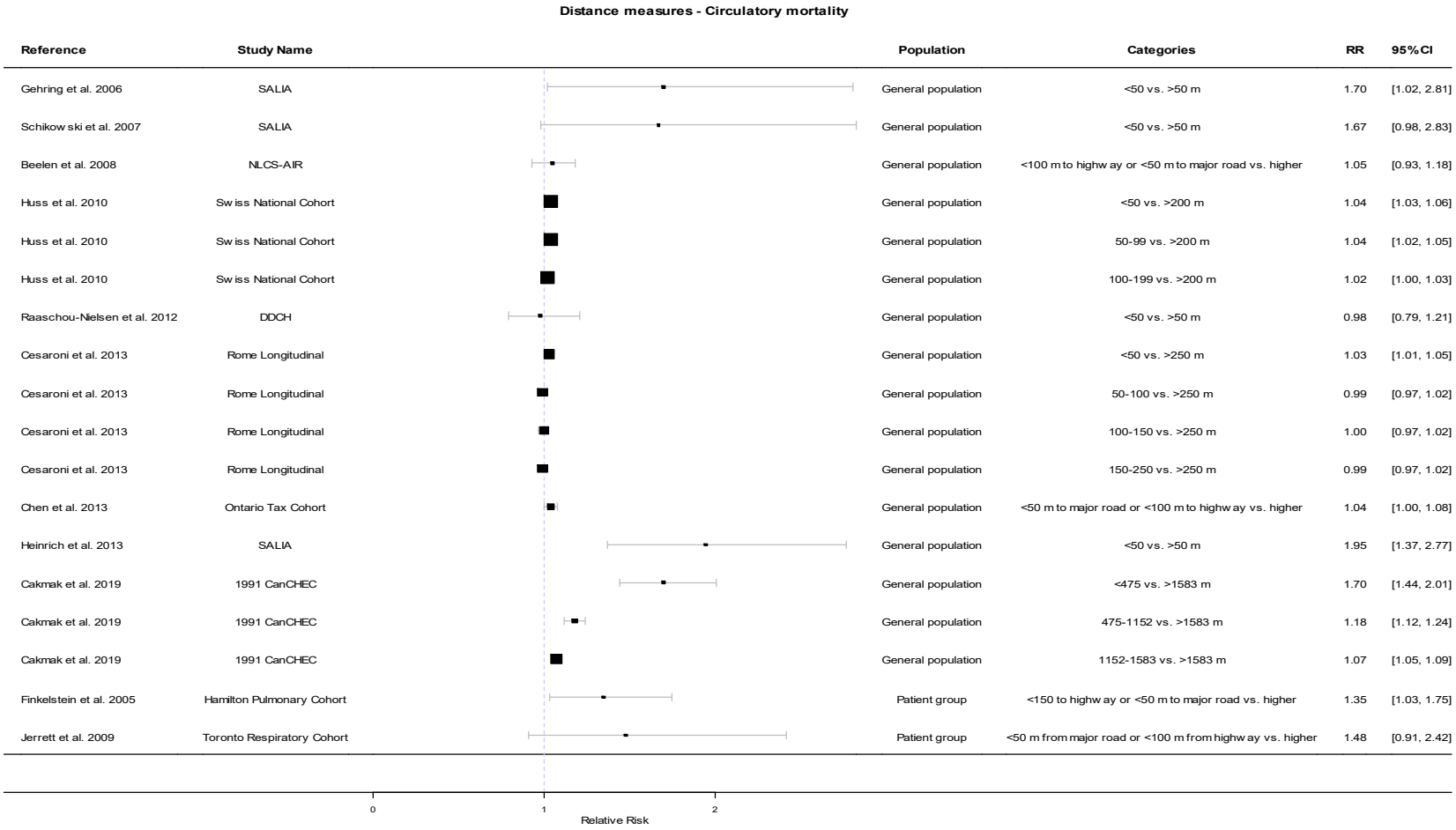
Plots not shown for risk of bias domains if all studies were rated low or moderate



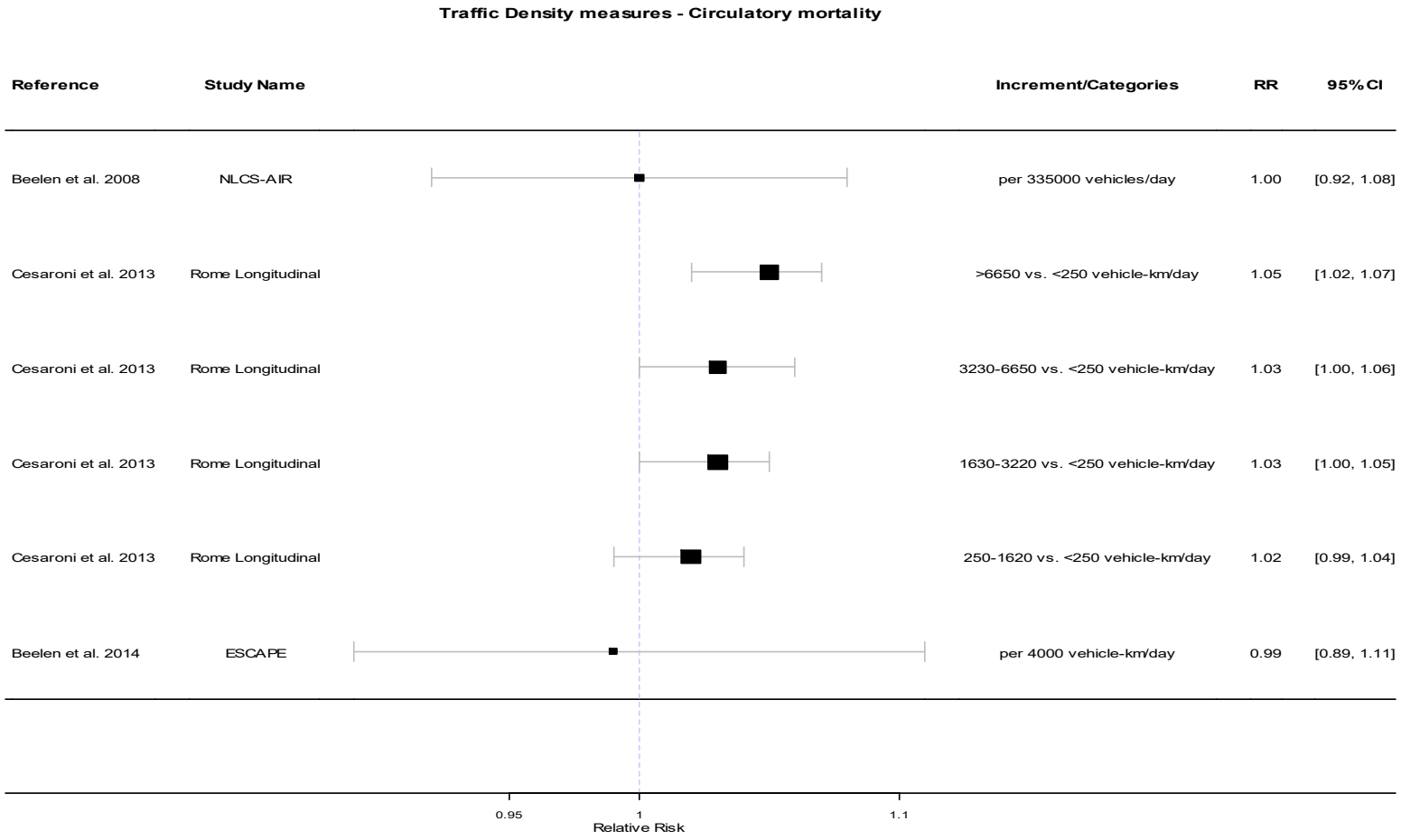
Subgroup analysis - by smoking adjustment



Distance measures

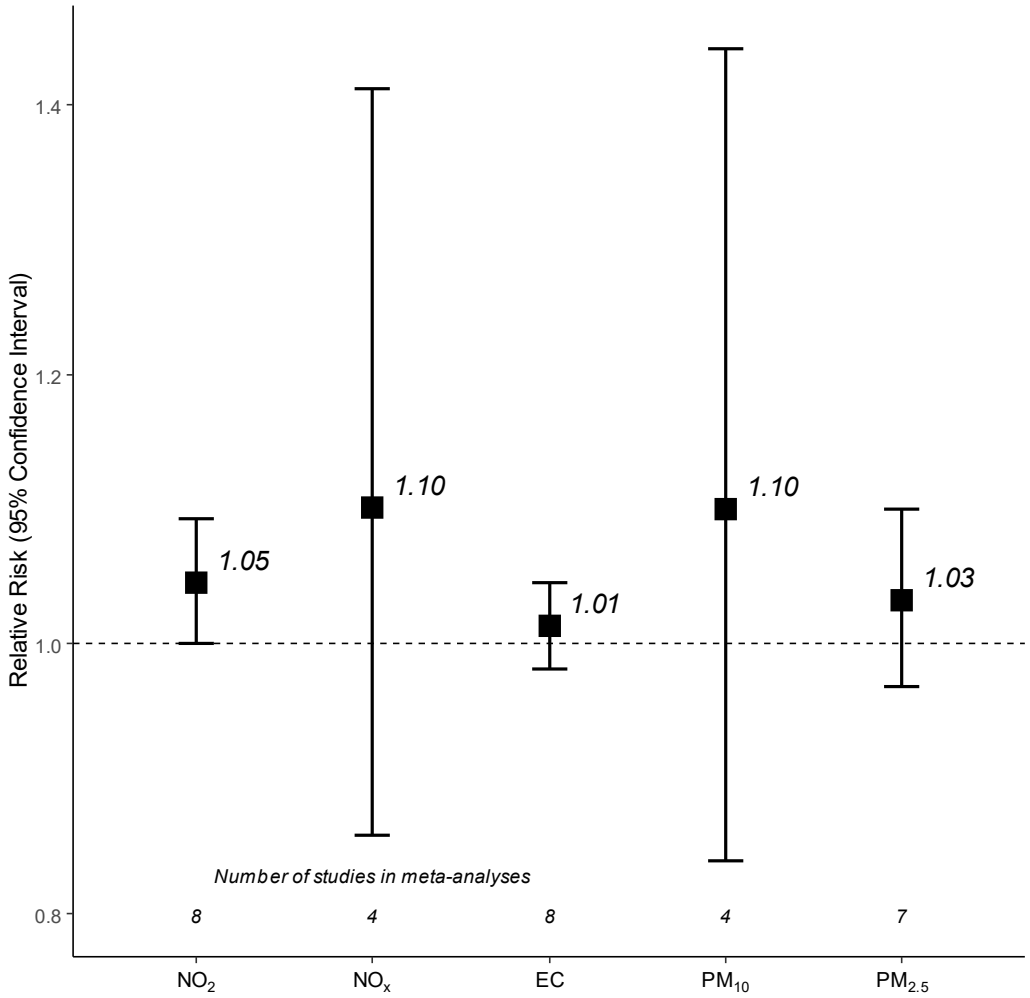


Density measures



11.3 Respiratory mortality

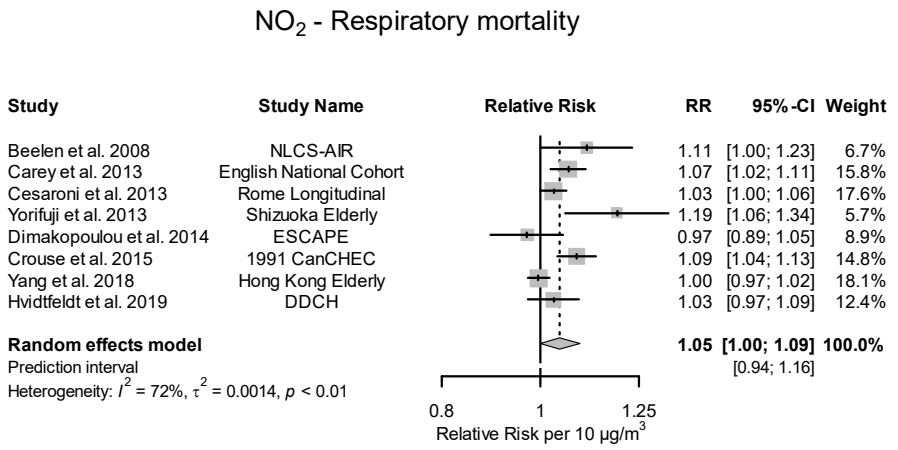
Summary of meta-analysis



Footnote: The following increments were used: 10 µg/m^3 for NO_2, 20 µg/m^3 for NO_x, 1 µg/m^3 for EC, 10 µg/m^3 for PM_{10} and 5 µg/m^3 for $PM_{2.5}$. 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.

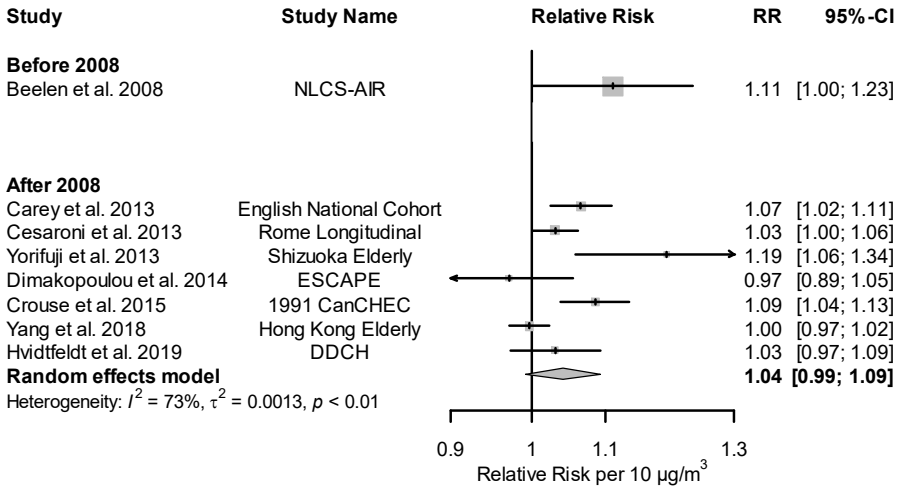
NO_2

Primary meta-analysis

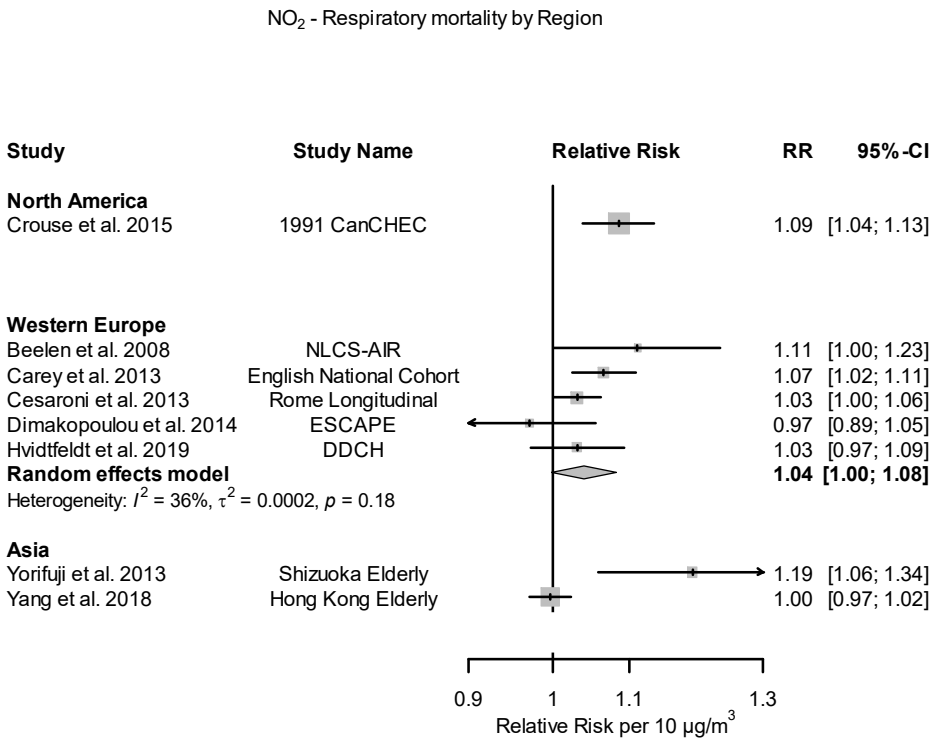


Subgroup analysis - all are cohorts

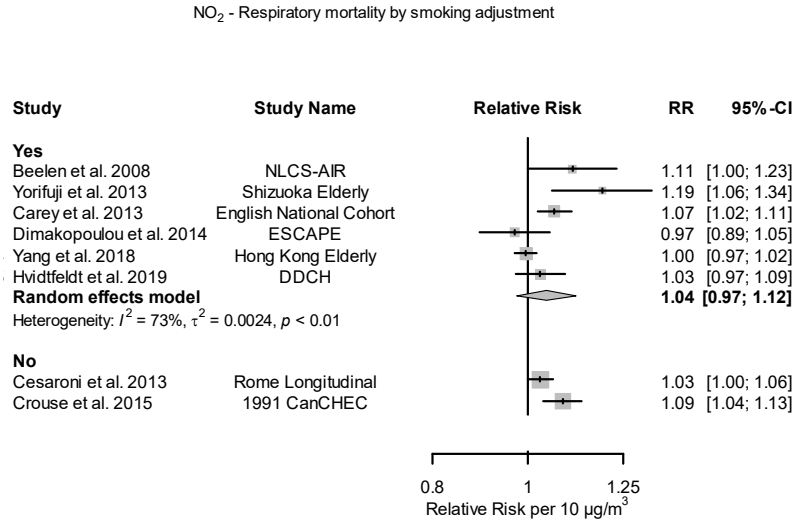
Subgroup analysis - by study period



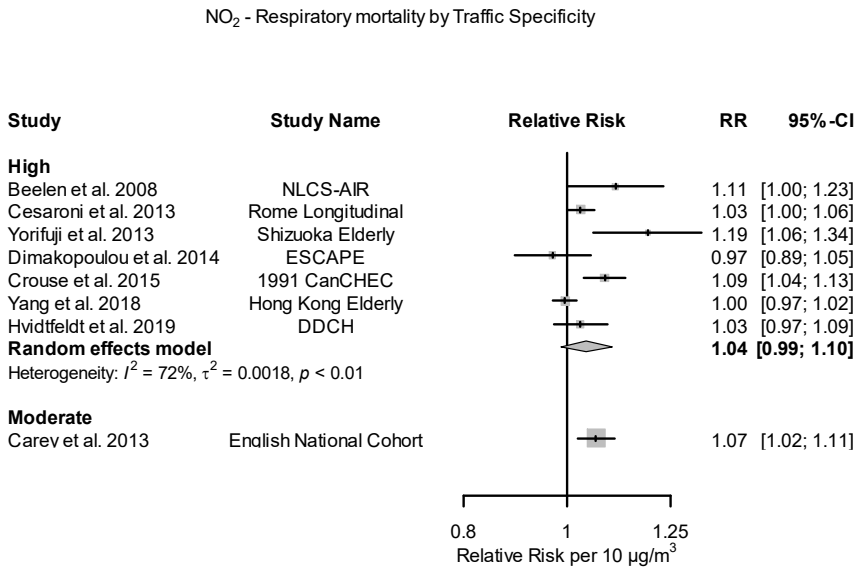
Subgroup analysis - by region



Subgroup analysis - by smoking adjustment



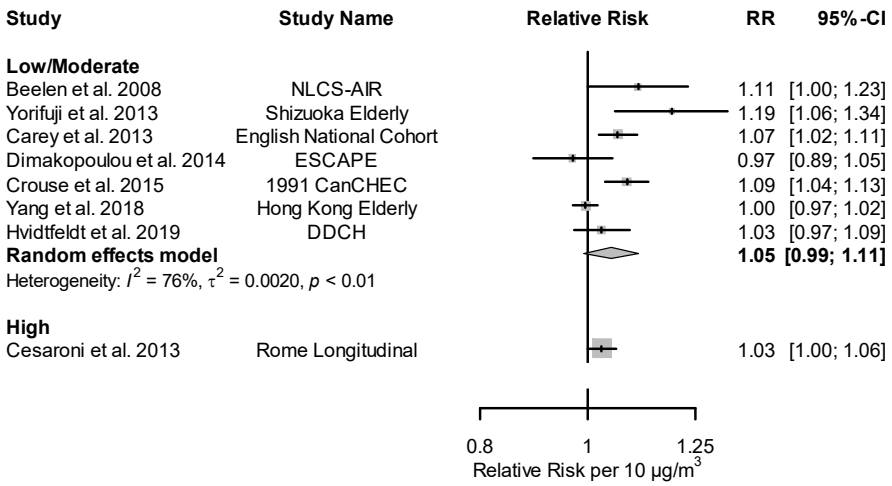
Subgroup analysis - by traffic specificity



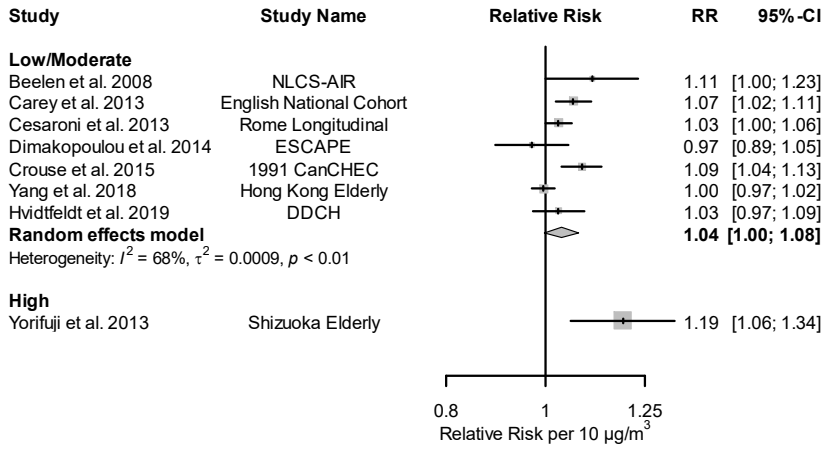
Subgroup analysis - by risk of bias

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

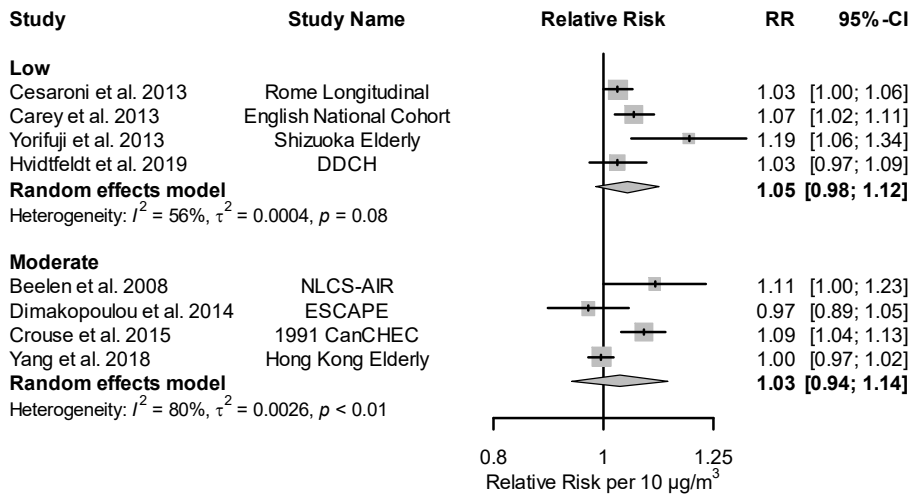
NO_2 - Respiratory mortality by Risk of bias assessment on confounding



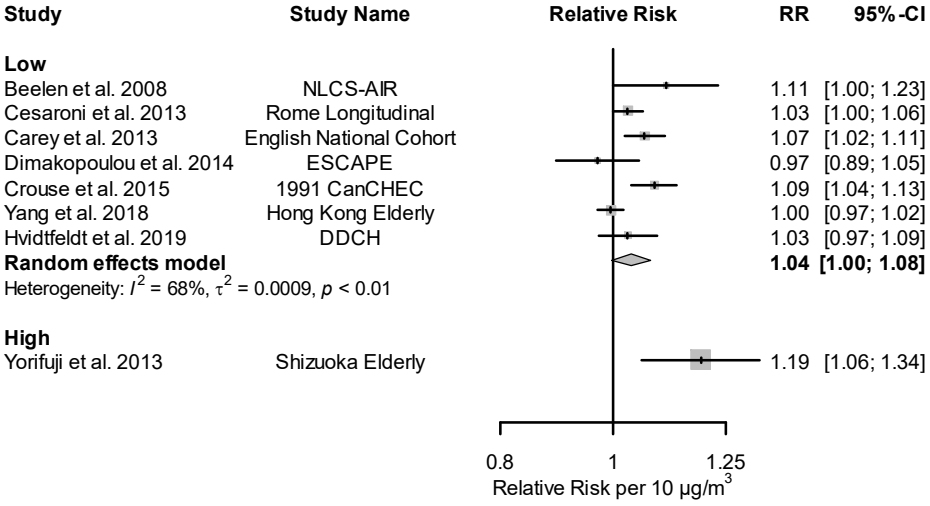
NO_2 - Respiratory mortality by Risk of bias assessment on selection bias



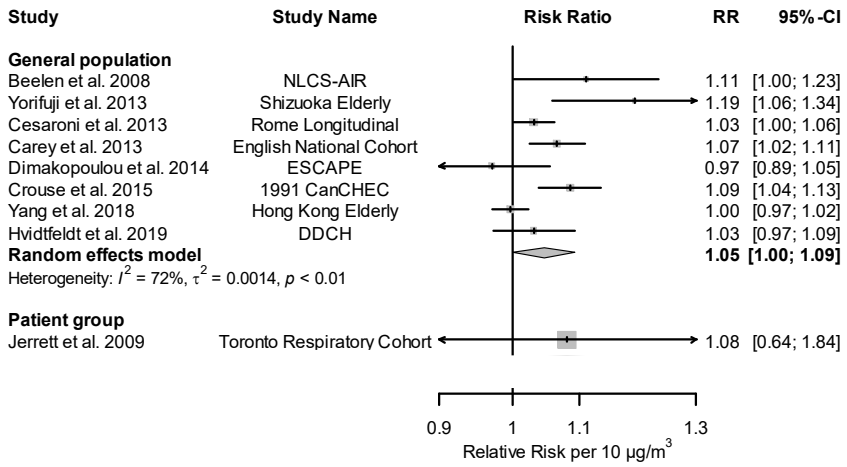
NO_2 - Respiratory mortality by Risk of bias assessment on exposure assessment



NO_2 - Respiratory mortality by Risk of bias assessment on missing data

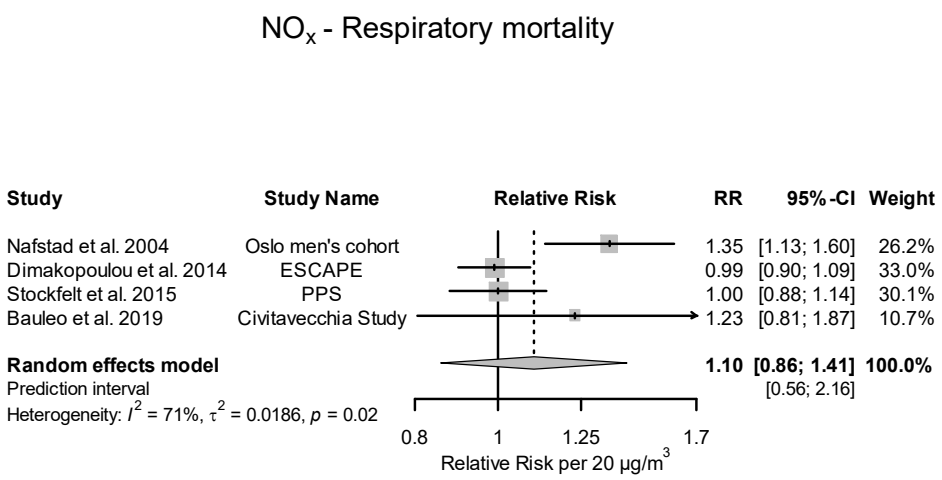


By general population/patient group



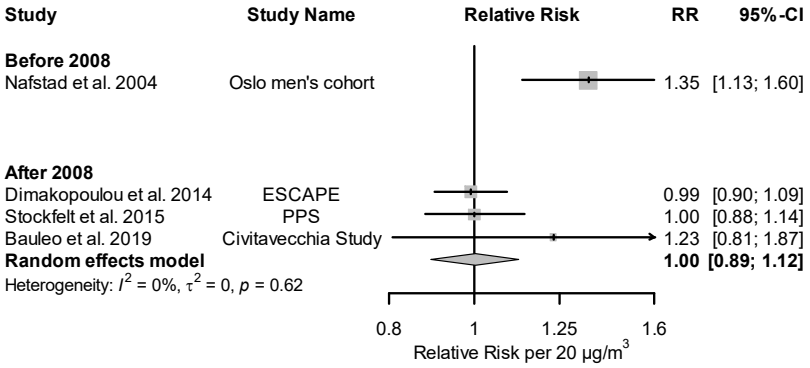
NO_x

Primary meta-analysis -All are Western European cohorts after 2008

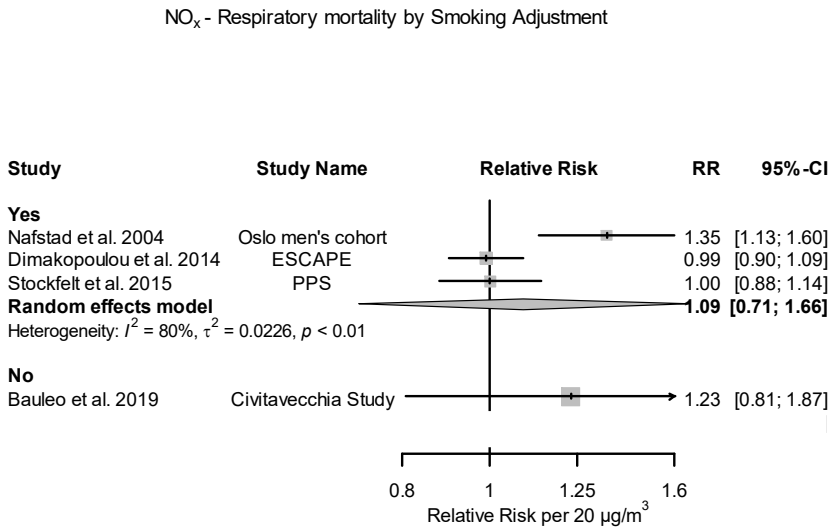


Subgroup analysis - All are W. European cohorts in the general population

Subgroup analysis - by study period



Subgroup analysis - by smoking adjustment

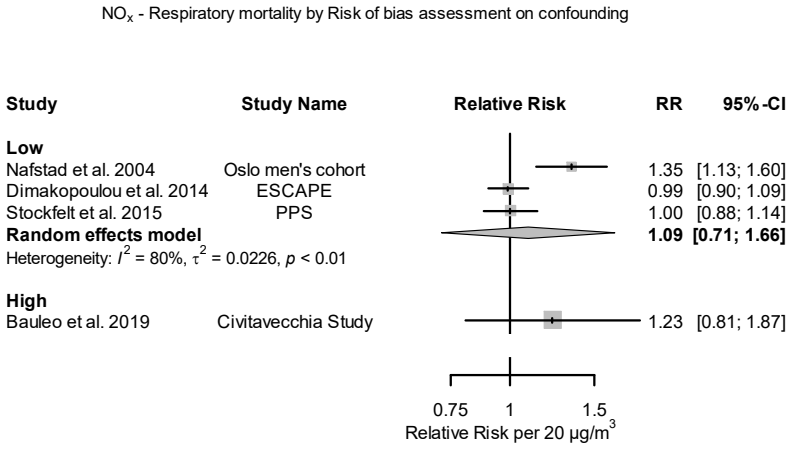


Subgroup analysis - by traffic specificity

All rated high

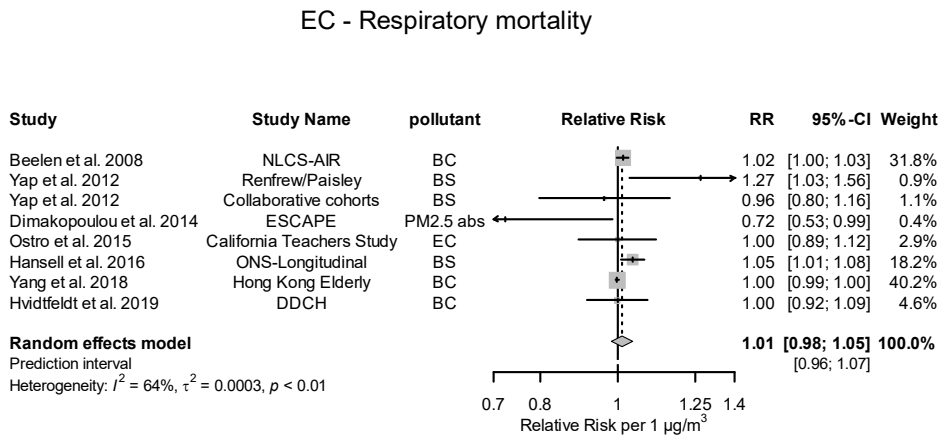
Subgroup analysis - By risk of bias

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

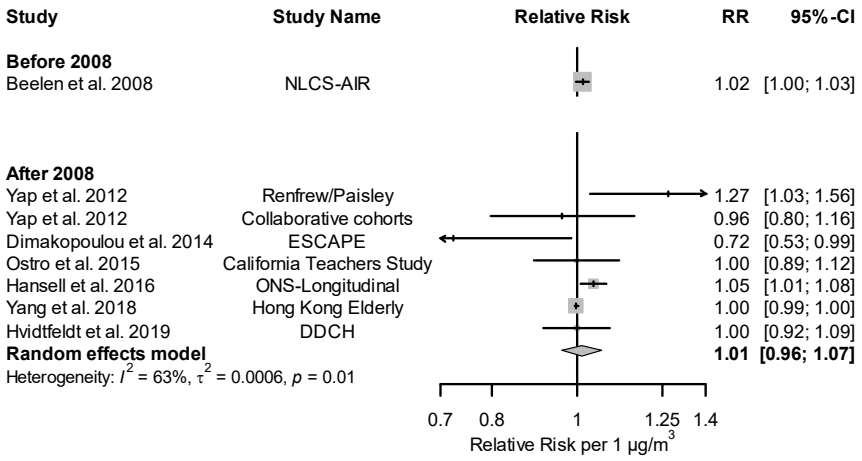


EC

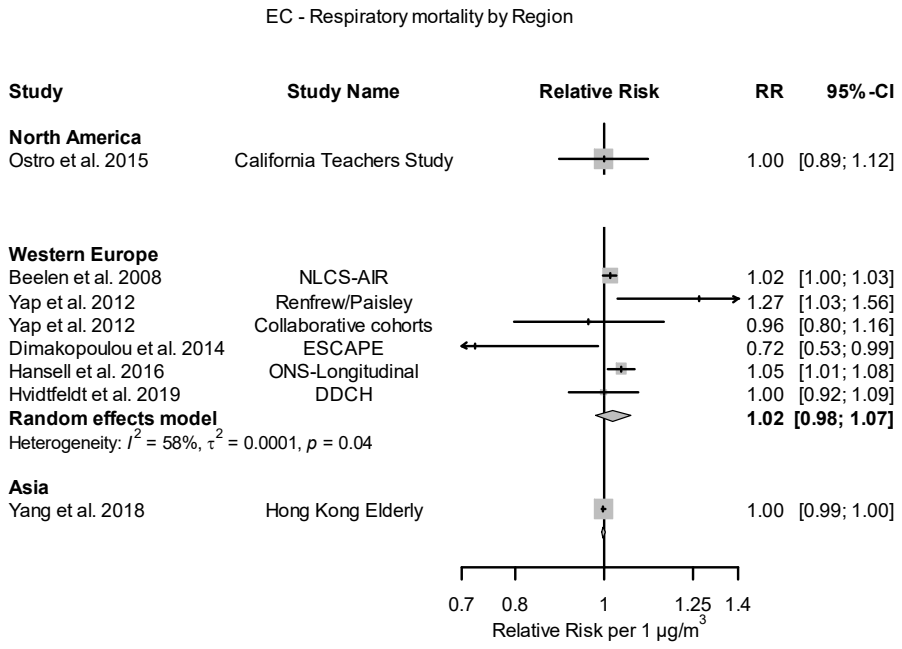
Primary meta-analysis



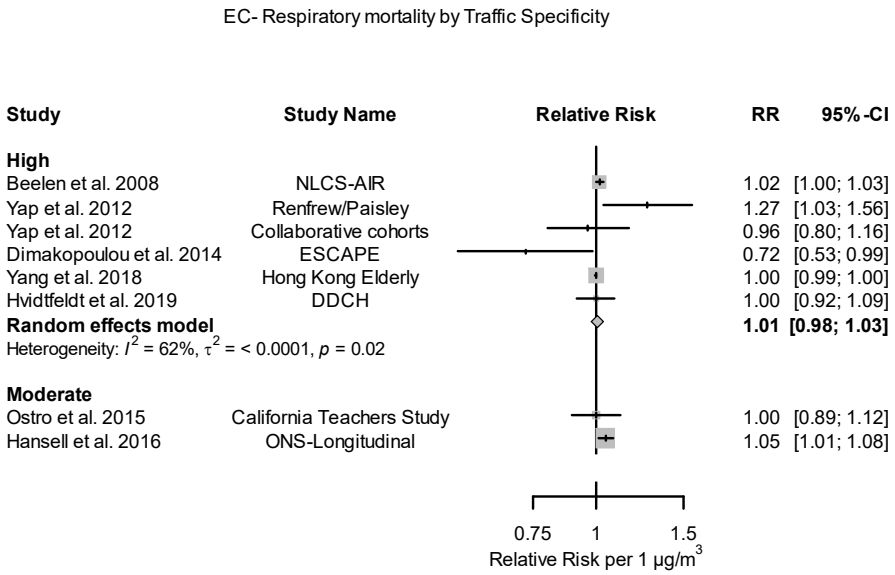
Subgroup analysis – by publication year



Subgroup analysis – by region



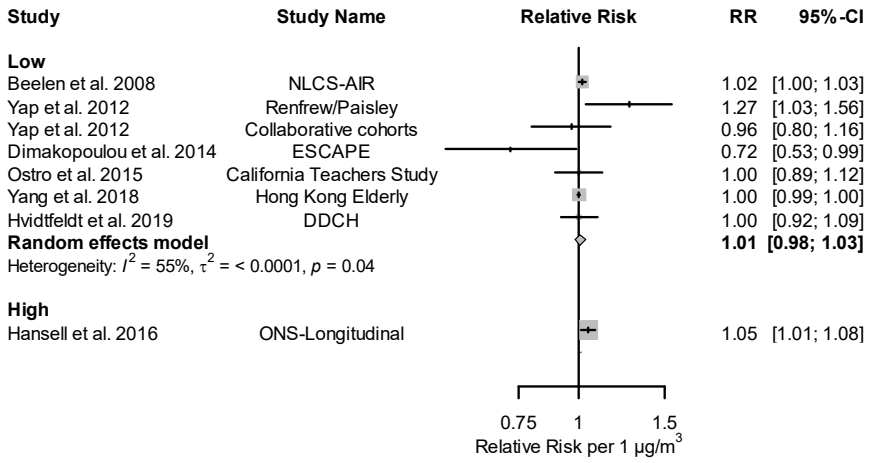
Subgroup analysis – by traffic specificity



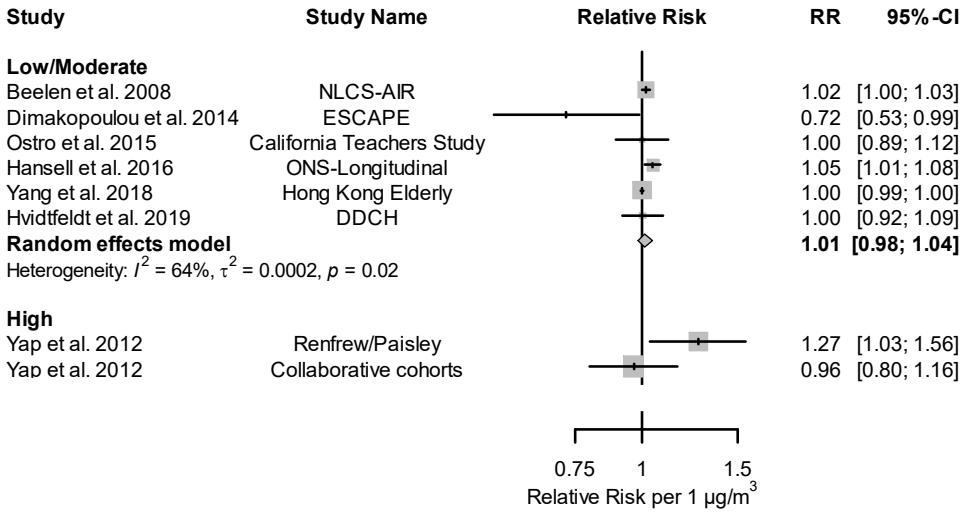
Subgroup analysis – by risk of bias

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

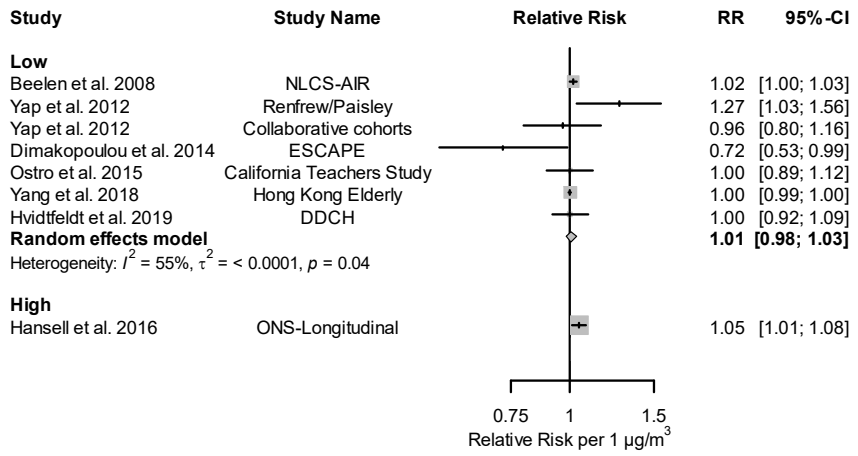
EC- Respiratory mortality by Risk of bias assessment on confounding



EC- Respiratory mortality by Risk of bias assessment on selection bias

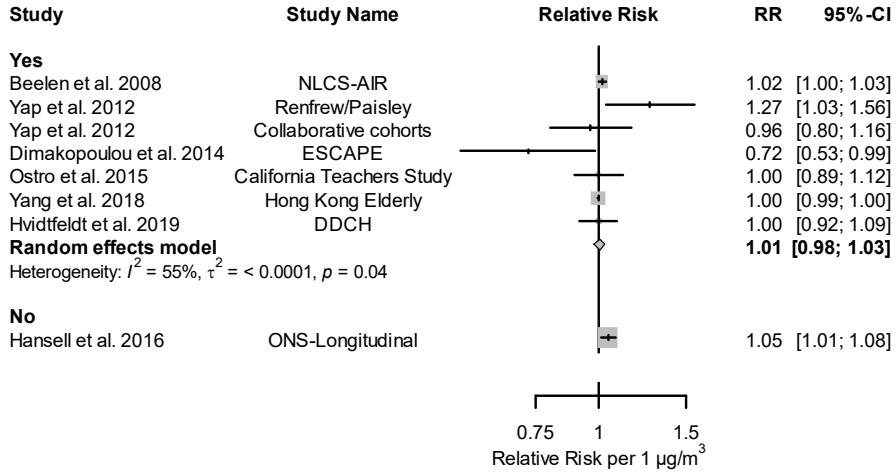


EC- Respiratory mortality by Risk of bias assessment on missing data



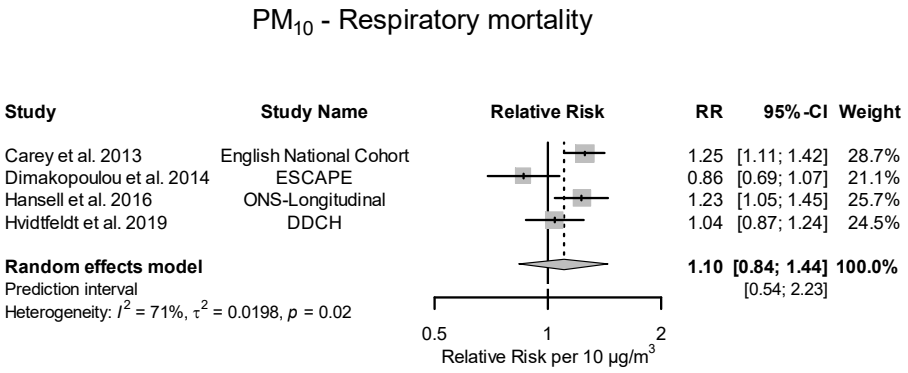
Subgroup analysis – by smoking adjustment

EC- Respiratory mortality by smoking adjustment



PM_{10}

Primary meta-analysis



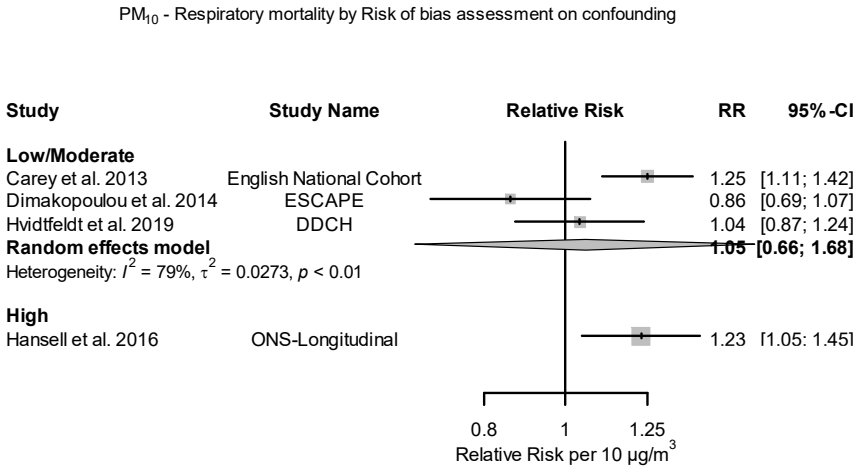
Sub-group analyses notes:

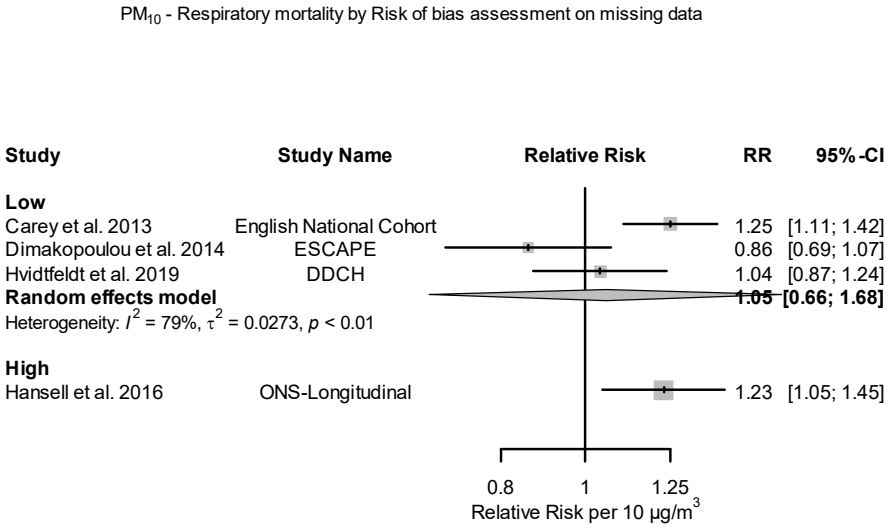
All are Western European cohorts after 2008 in the general population

By traffic specificity: all are rated moderate

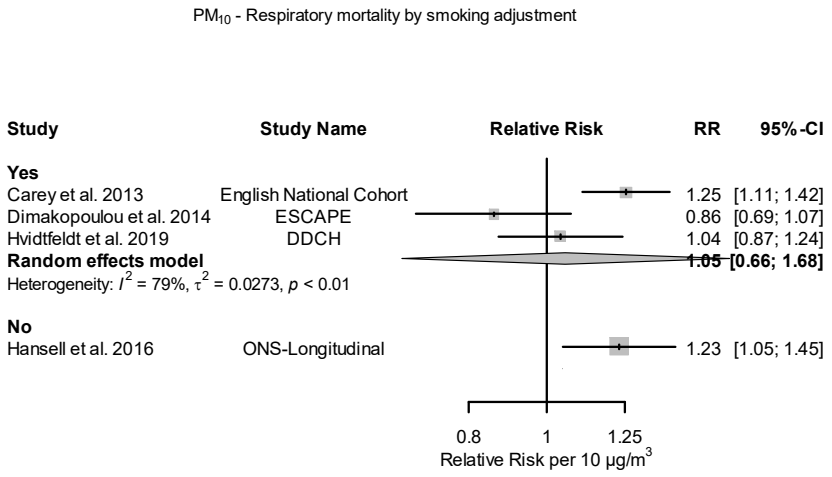
Subgroup analysis – by risk of bias

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



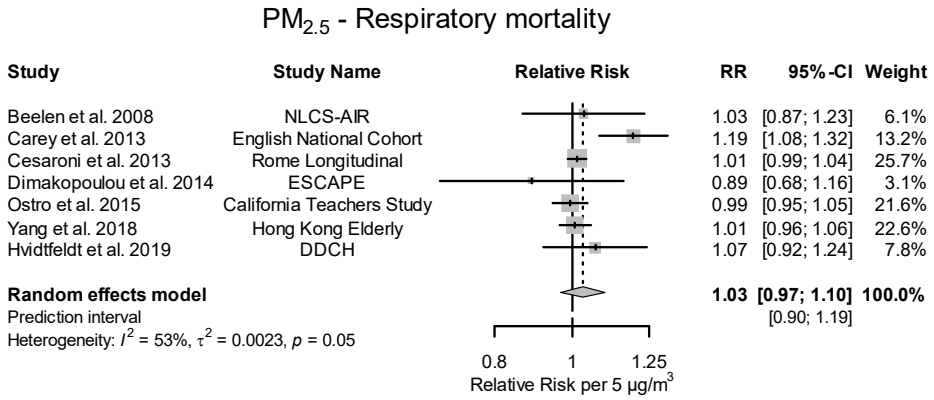


Subgroup analysis – by smoking adjustment

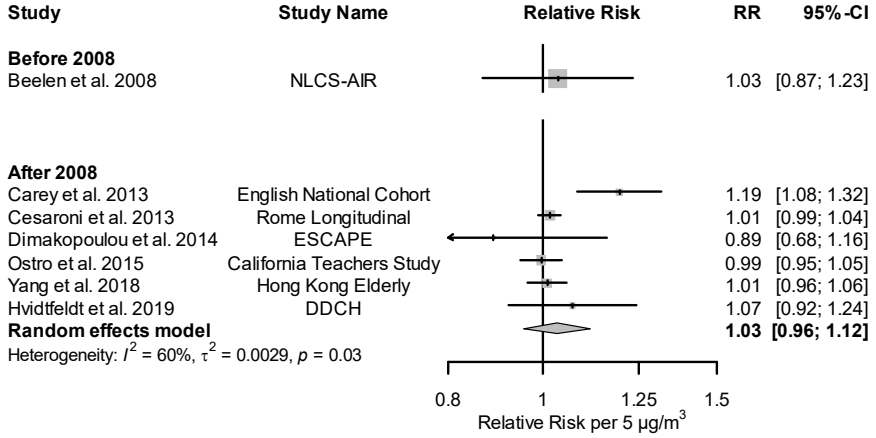


$PM_{2.5}$

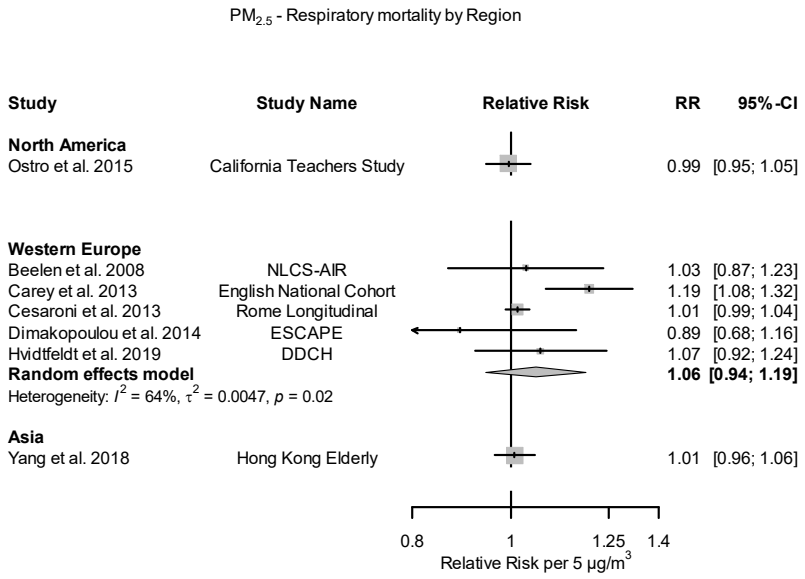
Primary meta-analysis



Subgroup analysis – by publication year



Subgroup analysis – by region

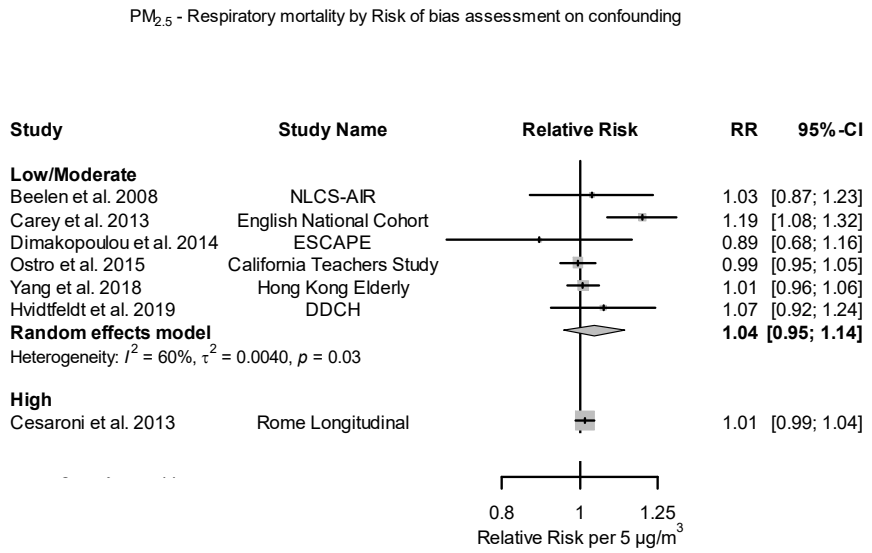


Subgroup analysis – by traffic specificity

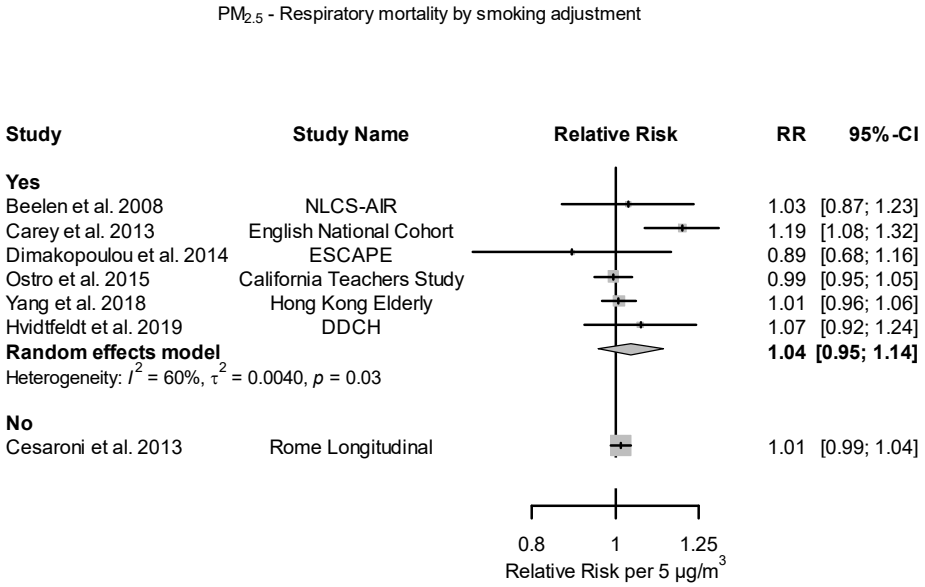
All rated moderate

Subgroup analysis – by risk of bias

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



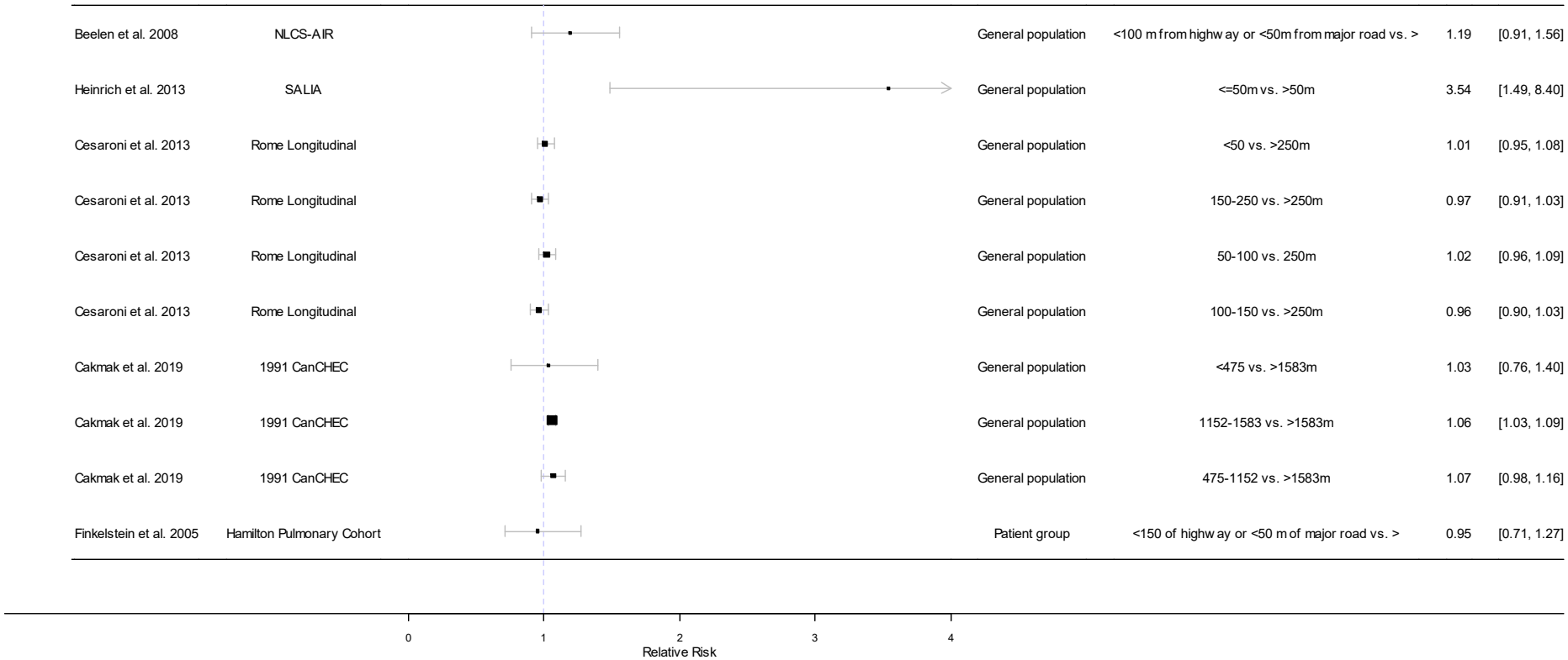
Subgroup analysis – by smoking adjustment



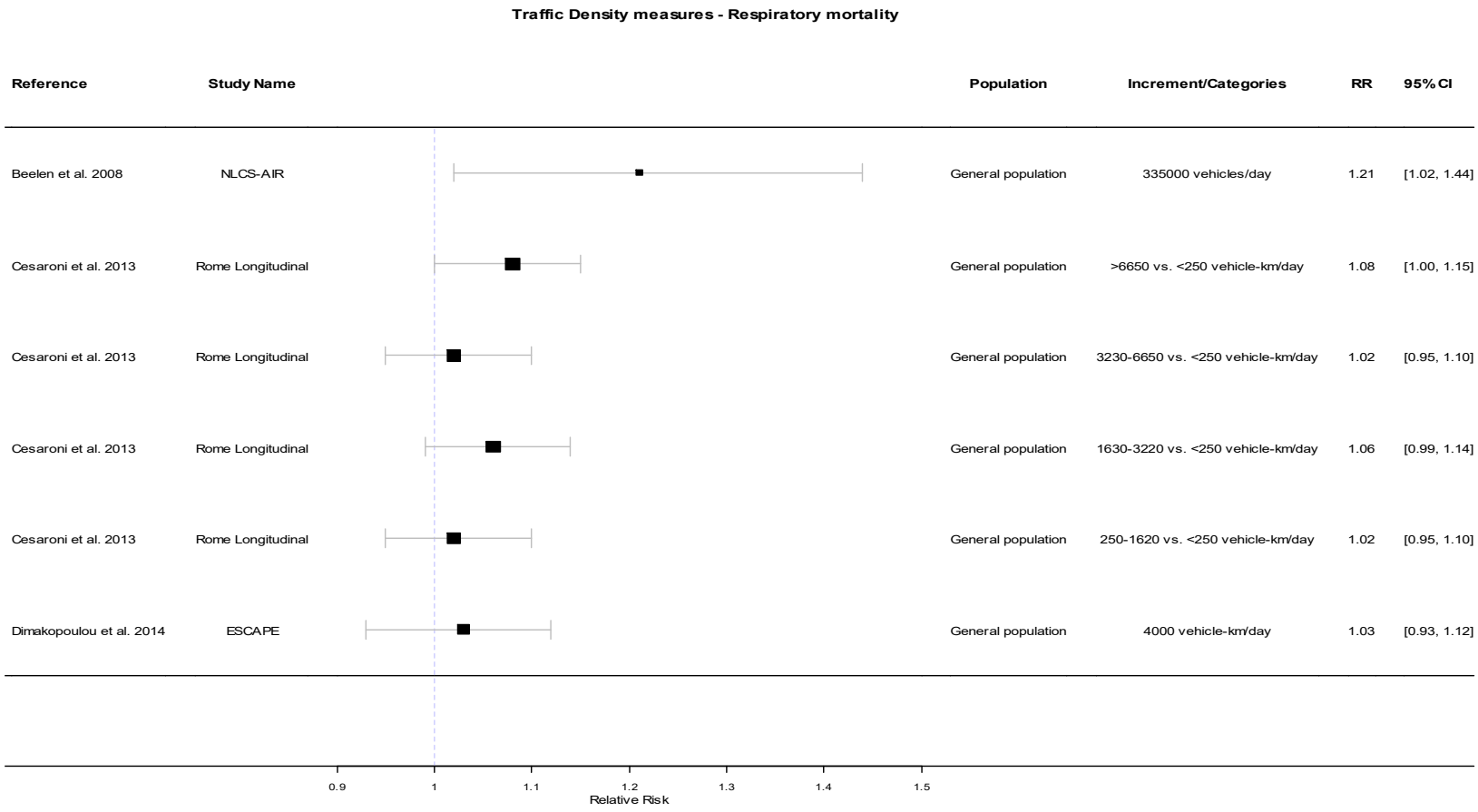
Distance measures

Distance measures - Respiratory mortality

Reference	Study Name	Population	Categories	RR	95% CI
Beelen et al. 2008	NLCS-AIR	General population	<100 m from highway or <50m from major road vs. >	1.19	[0.91, 1.56]
Heinrich et al. 2013	SALIA	General population	<=50m vs. >50m	3.54	[1.49, 8.40]
Cesaroni et al. 2013	Rome Longitudinal	General population	<50 vs. >250m	1.01	[0.95, 1.08]
Cesaroni et al. 2013	Rome Longitudinal	General population	150-250 vs. >250m	0.97	[0.91, 1.03]
Cesaroni et al. 2013	Rome Longitudinal	General population	50-100 vs. 250m	1.02	[0.96, 1.09]
Cesaroni et al. 2013	Rome Longitudinal	General population	100-150 vs. >250m	0.96	[0.90, 1.03]
Cakmak et al. 2019	1991 CanCHEC	General population	<475 vs. >1583m	1.03	[0.76, 1.40]
Cakmak et al. 2019	1991 CanCHEC	General population	1152-1583 vs. >1583m	1.06	[1.03, 1.09]
Cakmak et al. 2019	1991 CanCHEC	General population	475-1152 vs. >1583m	1.07	[0.98, 1.16]
Finkelstein et al. 2005	Hamilton Pulmonary Cohort	Patient group	<150 of highway or <50 m of major road vs. >	0.95	[0.71, 1.27]

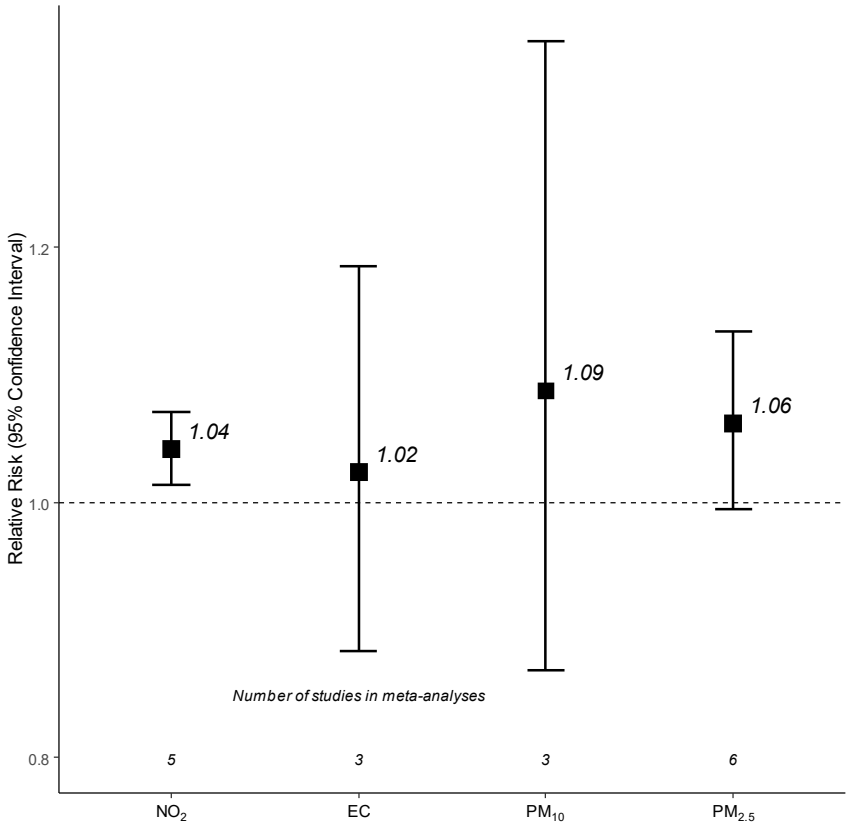


Density measures



11.4 Lung Cancer mortality

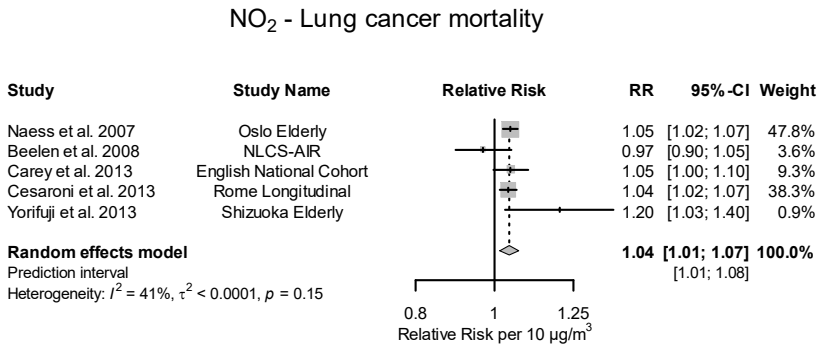
Summary of meta-analysis



Footnote: The following increments were used: 10 µg/m^3 for NO_2, 1 µg/m^3 for EC, 10 µg/m^3 for PM_{10} and 5 µg/m^3 for $PM_{2.5}$. 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_2

Primary meta-analysis

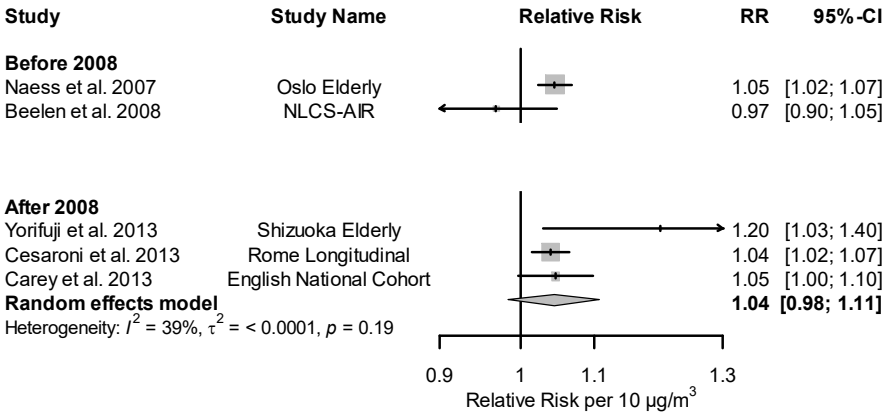


Note: combining 4 stratified estimates from Naess et al. 2007

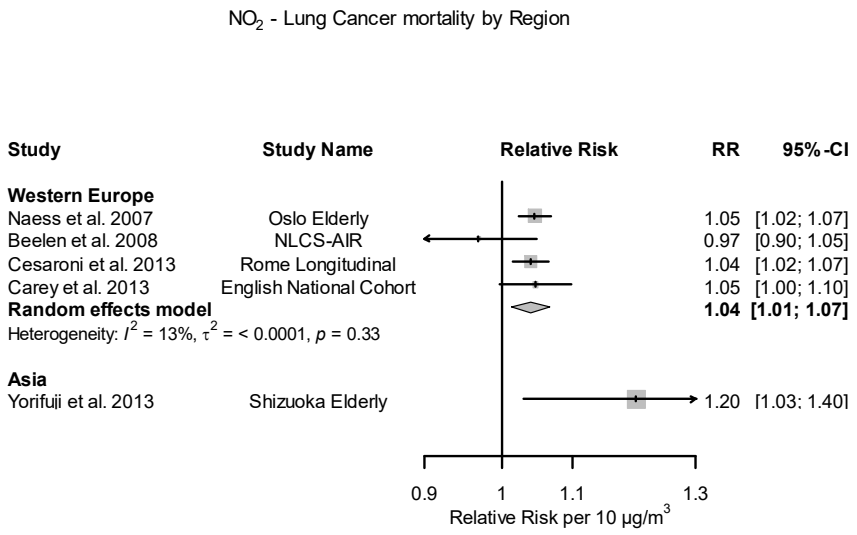
Subgroup analysis

All are cohorts

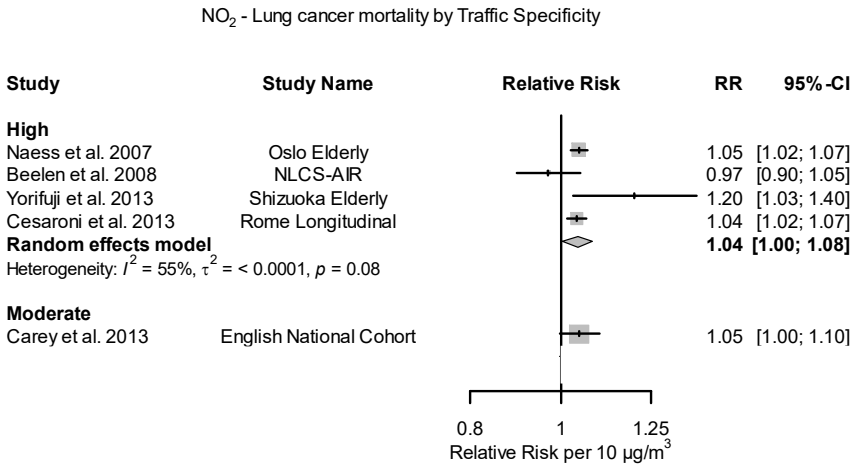
Subgroup analysis - by study period



Subgroup analysis - by region

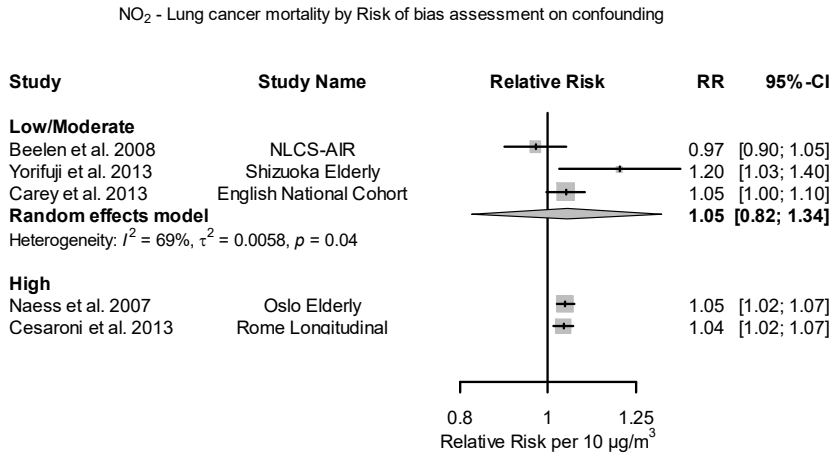


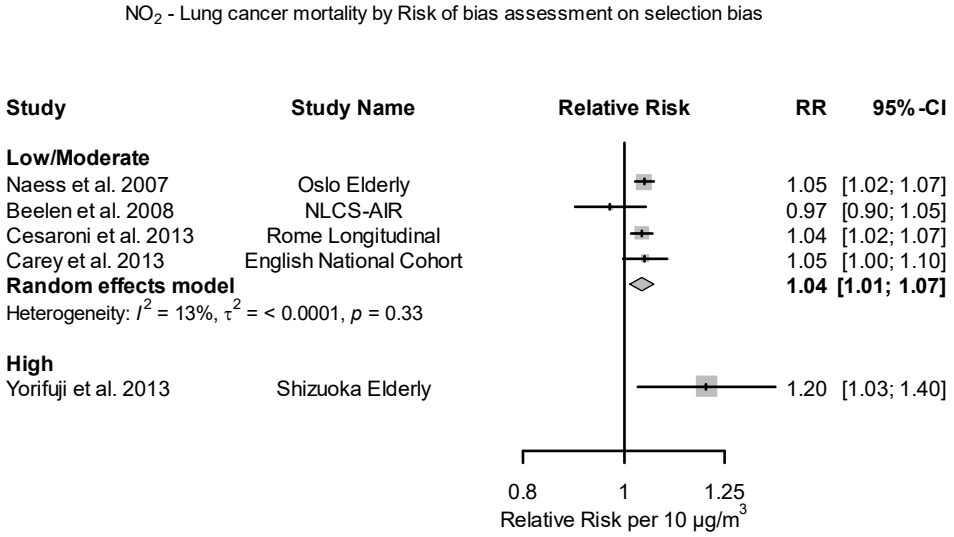
Subgroup analysis - by traffic specificity

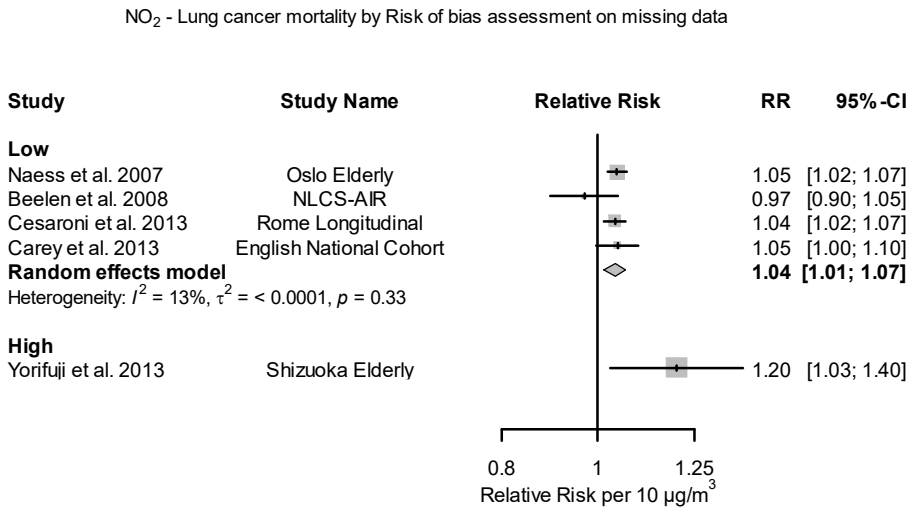


Subgroup analysis - By risk of bias

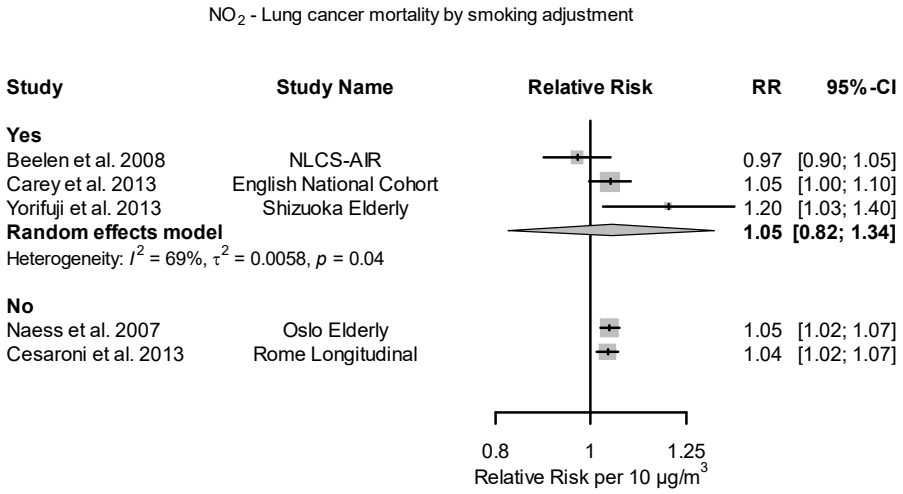
Plots not shown for risk of bias domains if all studies were rated low or moderate





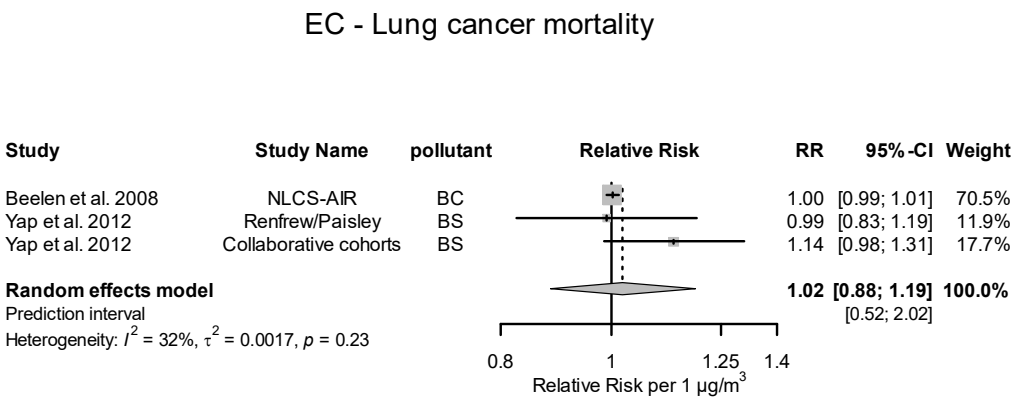


Subgroup analysis - by smoking adjustment



EC

Primary meta-analysis



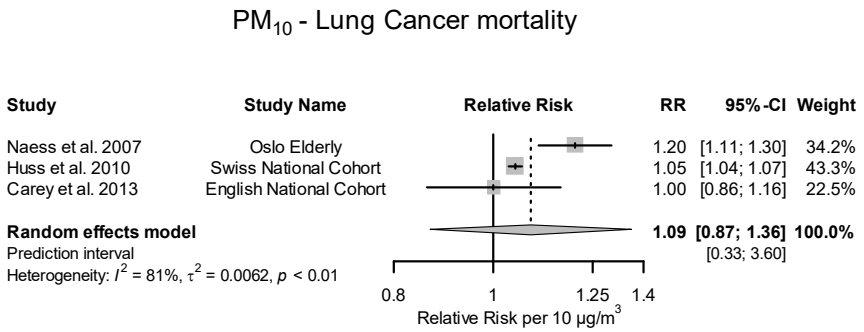
Subgroup analysis notes:

All 3 are W. European cohorts with individual co-variate data.

All are high traffic specificity, controlling for smoking and rated low risk of bias for all domains except for exposure assessment where Beelen et al. 2008 rated moderate and the other two studies high.

PM_{10}

Primary meta-analysis



Subgroup analysis notes:

All 3 are W. European cohorts

All are high traffic specificity and rated low risk of bias for all domains except for confounding where Carey et al. 2013 rated moderate and the other 2 high, and selection bias where Carey et al. 2013 rated moderate.

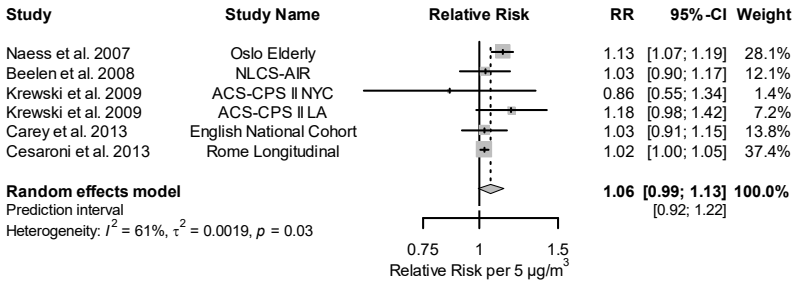
Only Carey et al. 2013 controls for smoking.

$PM_{2.5}$

Primary meta-analysis

Subgroup analysis

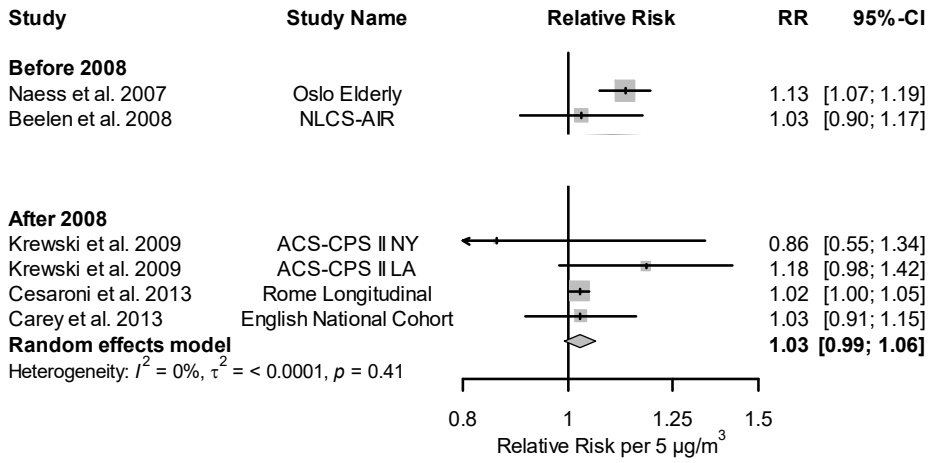
$PM_{2.5}$ - Lung cancer mortality



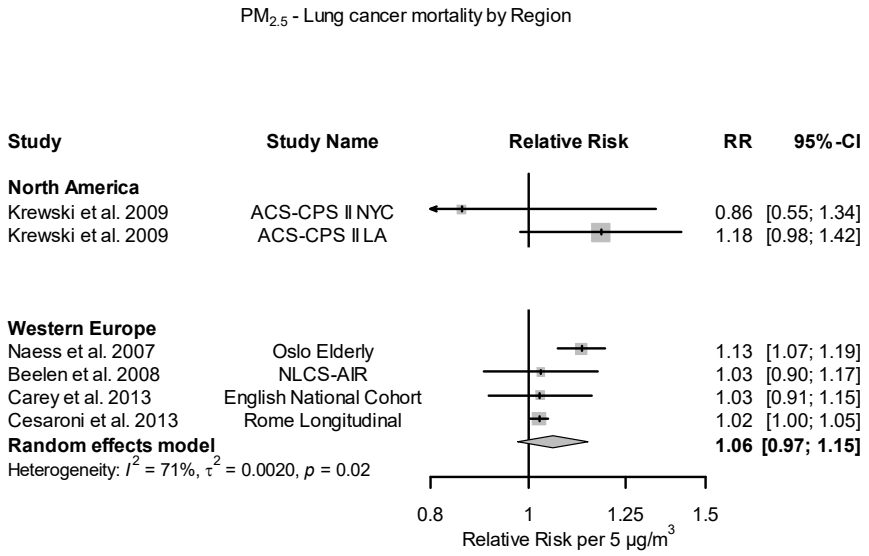
All are general population cohorts

Subgroup analysis - by study period

$PM_{2.5}$ - Lung cancer mortality by publication year



Subgroup analysis - by region

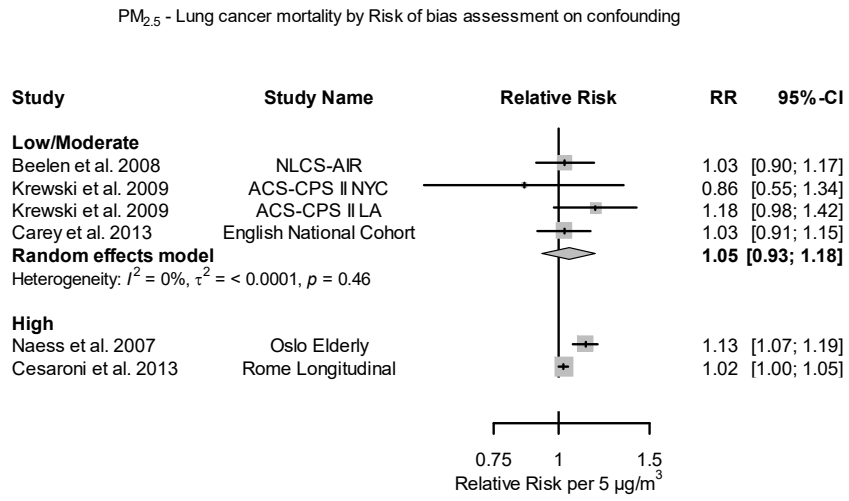


Subgroup analysis - by traffic specificity

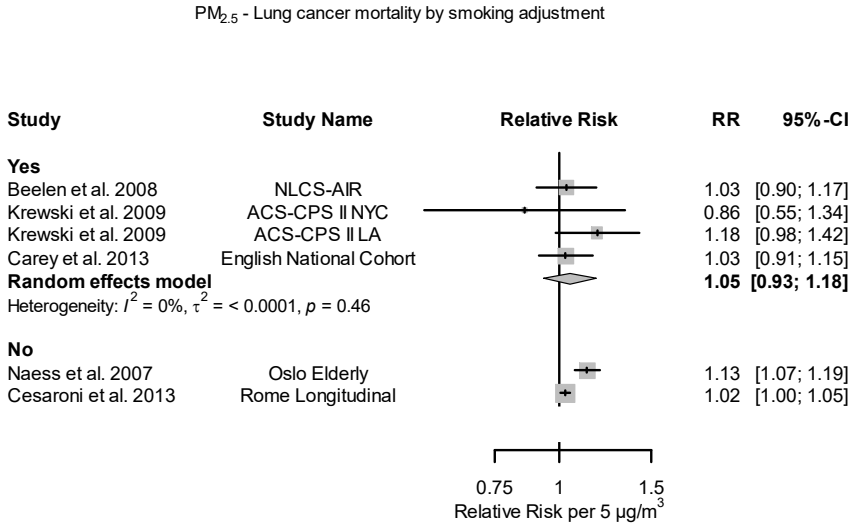
All rated moderate

Subgroup analysis – by risk of bias

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



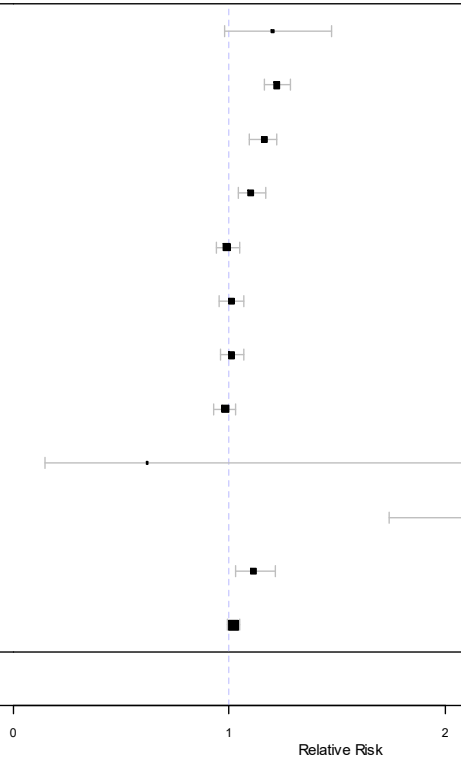
Subgroup analysis - by smoking adjustment



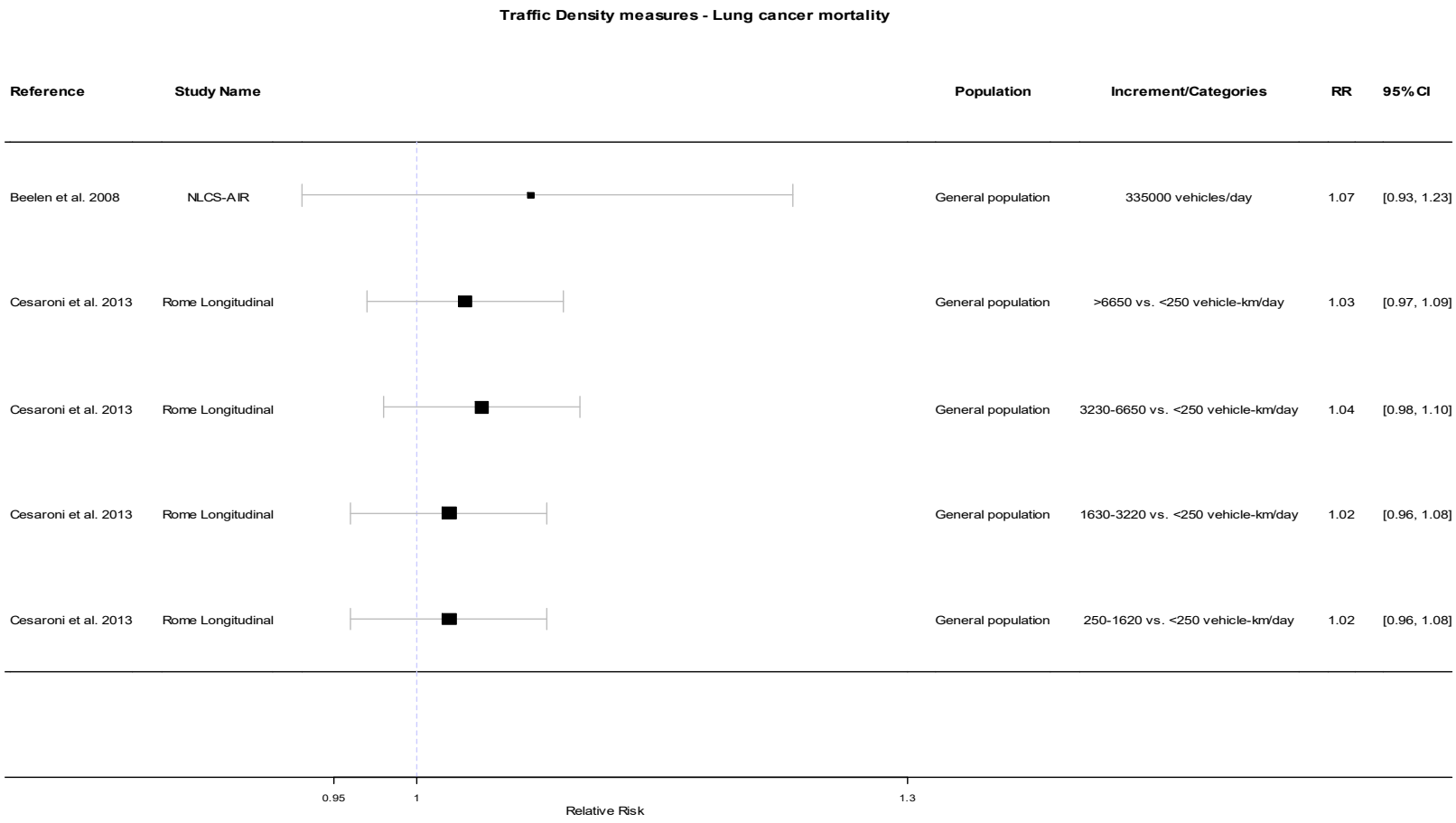
Distance measures

Distance measures - Lung Cancer mortality

Reference	Study Name	Population	Categories	RR	95% CI
Beelen et al. 2008	NLCS-AIR	General population	<100 m from highway or <50m from major road vs. >	1.20	[0.98, 1.47]
Huss et al. 2010	Swiss National Cohort	General population	<50 vs. >200	1.22	[1.16, 1.28]
Huss et al. 2010	Swiss National Cohort	General population	50-99 vs. >200	1.16	[1.09, 1.22]
Huss et al. 2010	Swiss National Cohort	General population	100-199 vs. >200	1.10	[1.04, 1.17]
Cesaroni et al. 2013	Rome Longitudinal	General population	<50 vs. >250m	0.99	[0.94, 1.05]
Cesaroni et al. 2013	Rome Longitudinal	General population	50-100 vs. >250m	1.01	[0.95, 1.07]
Cesaroni et al. 2013	Rome Longitudinal	General population	100-150 vs. >250m	1.01	[0.96, 1.07]
Cesaroni et al. 2013	Rome Longitudinal	General population	150-250 vs. >250m	0.98	[0.93, 1.03]
Heinrich et al. 2013	SALIA	General population	<=50m vs. >50m	0.62	[0.15, 2.60]
Cakmak et al. 2019	1991 CanCHEC	General population	<475 vs. >1583m	2.30	[1.74, 3.03]
Cakmak et al. 2019	1991 CanCHEC	General population	475-1152 vs. >1583m	1.11	[1.03, 1.21]
Cakmak et al. 2019	1991 CanCHEC	General population	1152-1583 vs. >1583m	1.02	[0.99, 1.05]

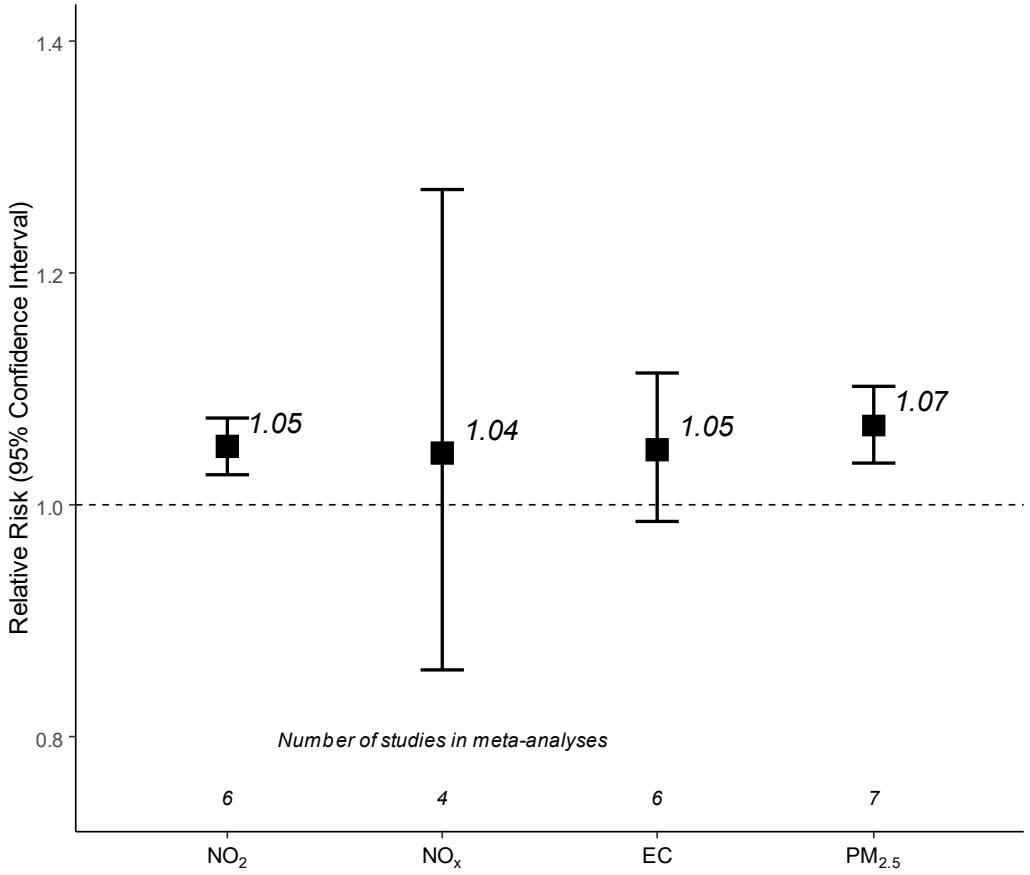


Density measures



11.5 Ischemic heart disease mortality

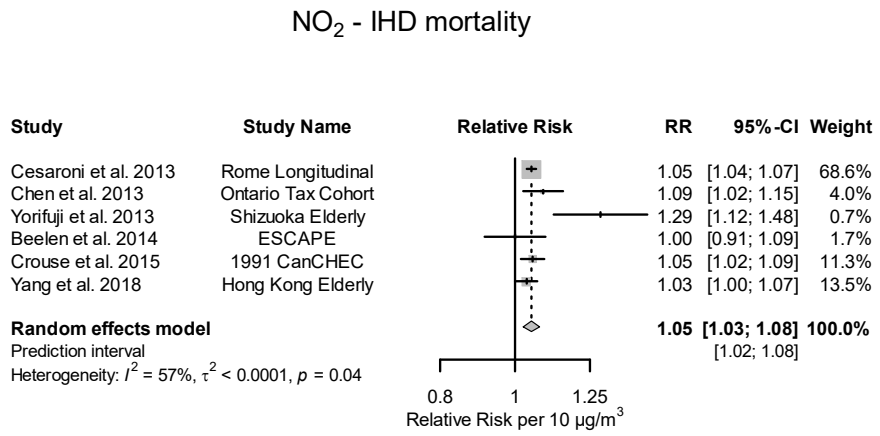
Summary of meta-analysis



Footnote: The following increments were used: 10 µg/m^3 for NO_2, 20 µg/m^3 for NO_x, 1 µg/m^3 for EC and 5 µg/m^3 for $PM_{2.5}$. 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.

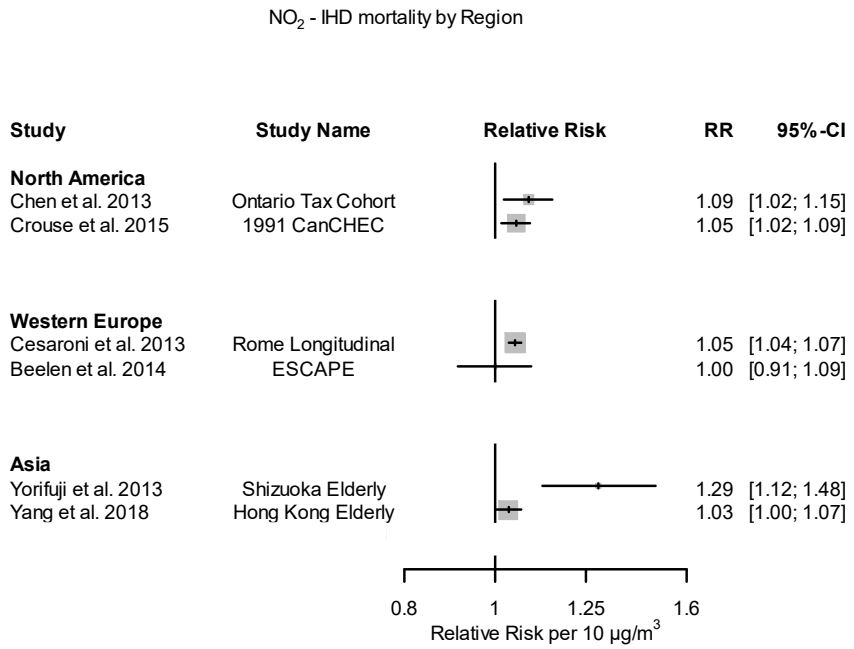
NO_2

Primary meta-analysis



Subgroup analysis - All are general population cohorts after 2008

Subgroup analysis - by region



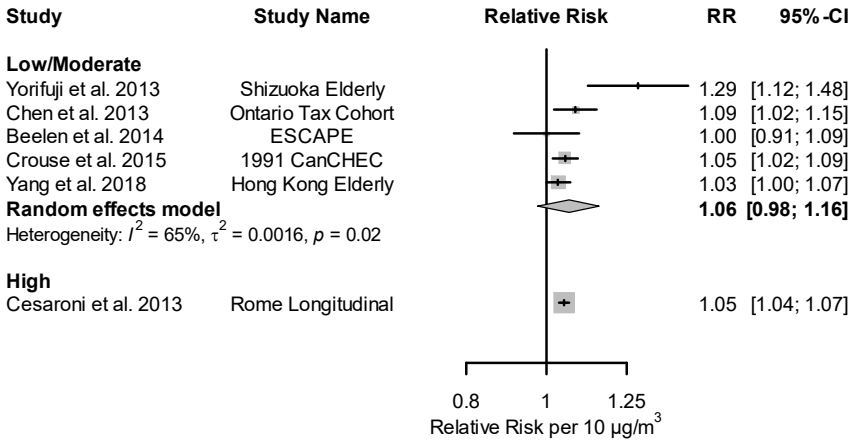
Subgroup analysis - by traffic specificity

All high traffic specificity

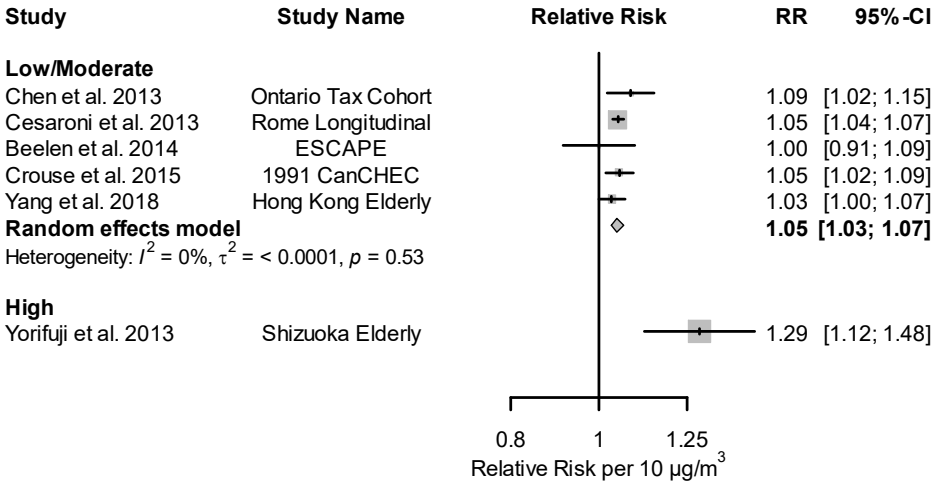
Subgroup analysis - by risk of bias

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

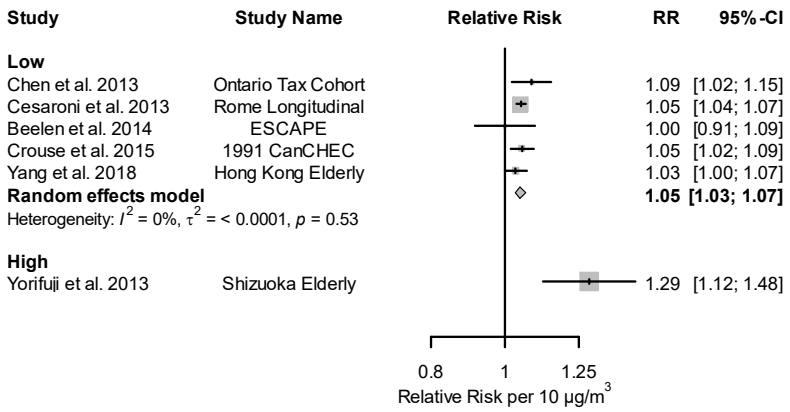
NO_2 - IHD mortality by Risk of bias assessment on confounding



NO_2 - IHD mortality by Risk of bias assessment on selection bias

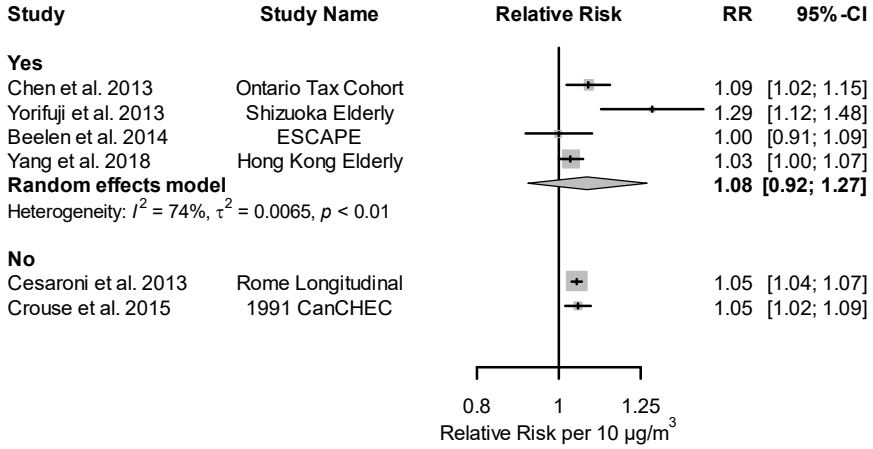


NO_2 - IHD mortality by Risk of bias assessment on missing data



Subgroup analysis - by smoking adjustment

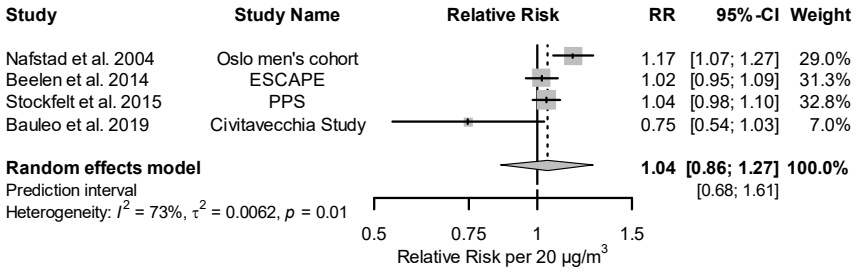
NO_2 - IHD mortality by smoking adjustment



NO_x

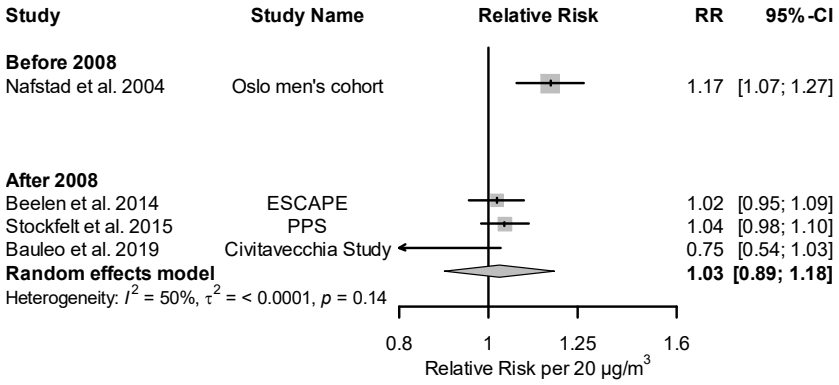
Primary meta-analysis-all are W. European general population cohorts.

NO_x - IHD mortality

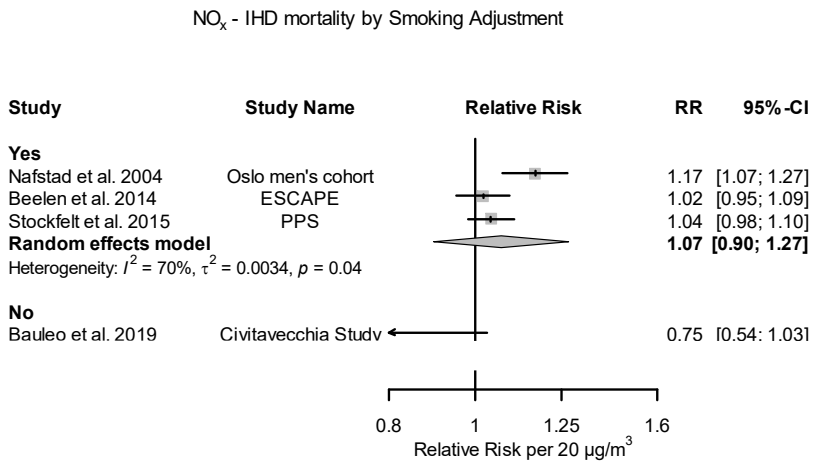


Subgroup analysis – by publication year

NO_x - IHD mortality by publication year



Subgroup analysis - by smoking adjustment

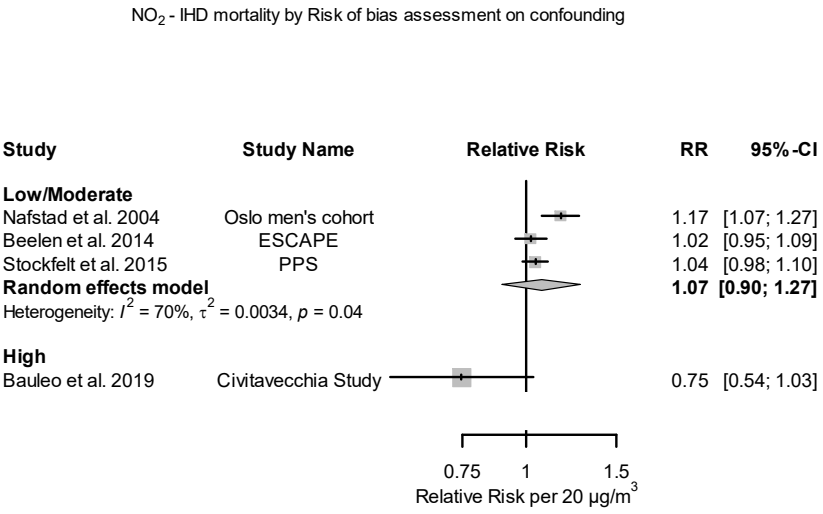


Subgroup analysis - by traffic specificity

All are rated high

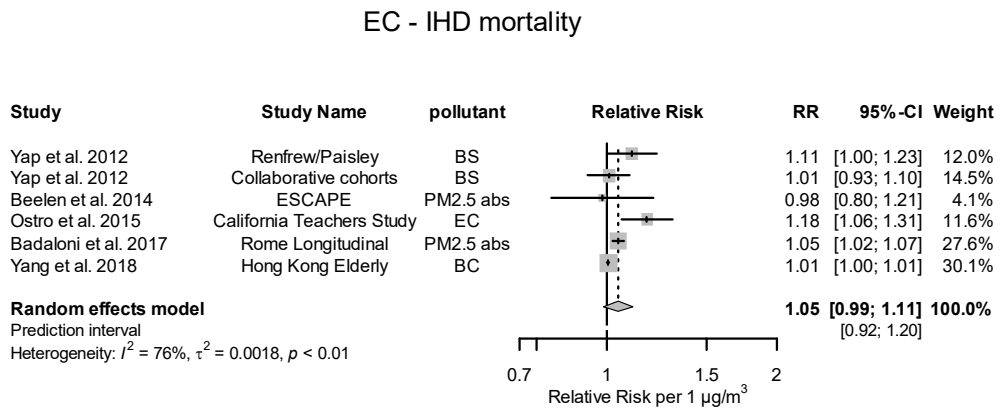
Subgroup analysis - by risk of bias

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



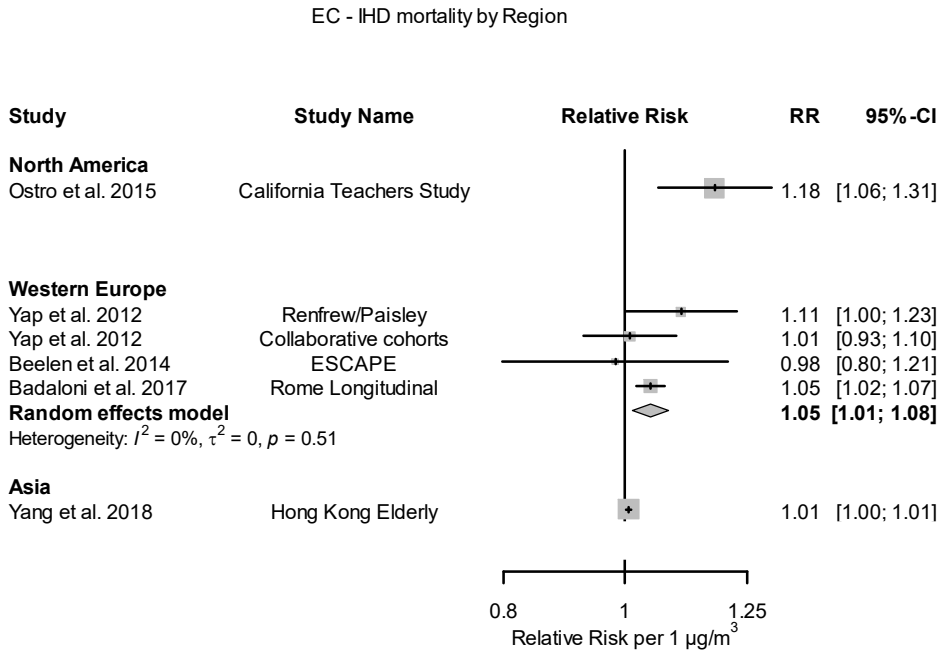
EC

Primary meta-analysis

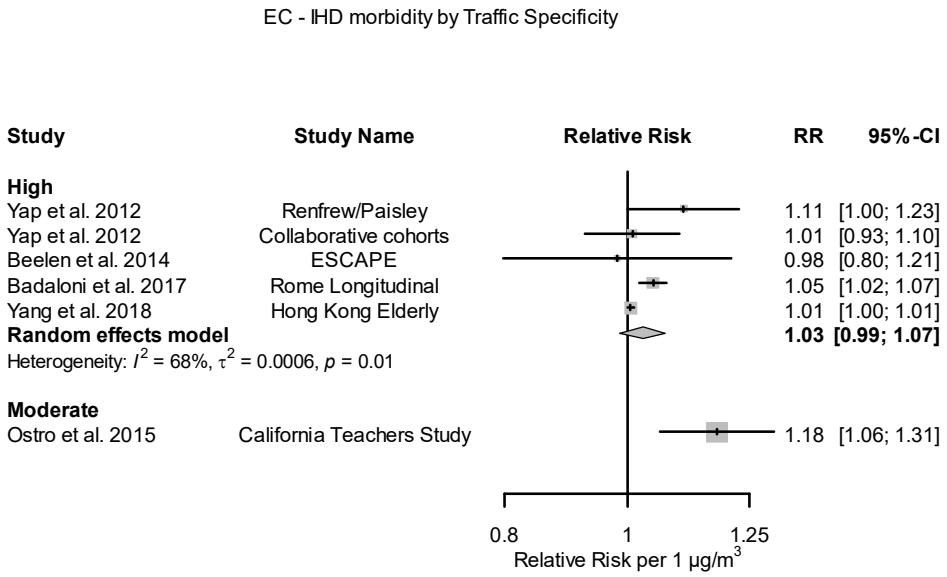


All are general population cohorts after 2008

Subgroup analysis – by region



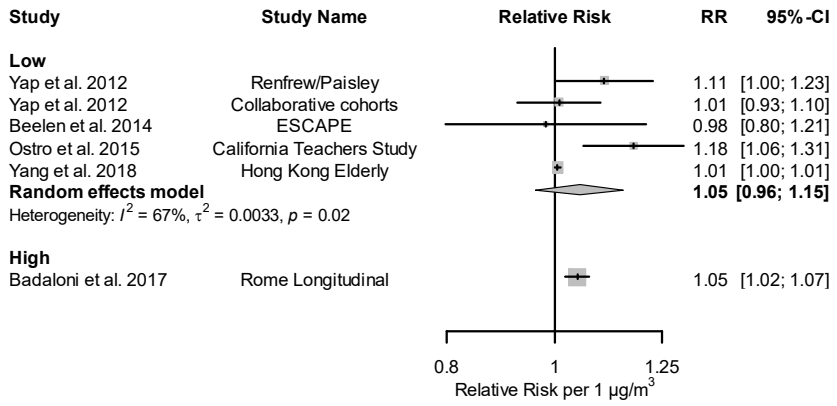
Subgroup analysis - by traffic specificity



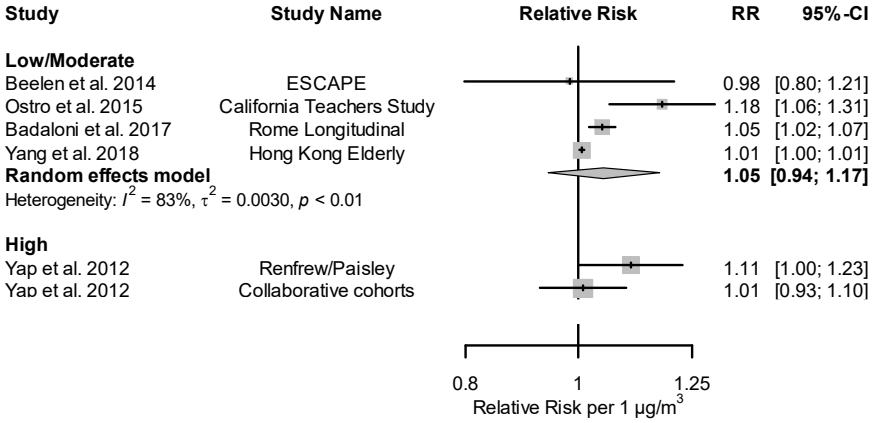
Subgroup analysis - by risk of bias

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

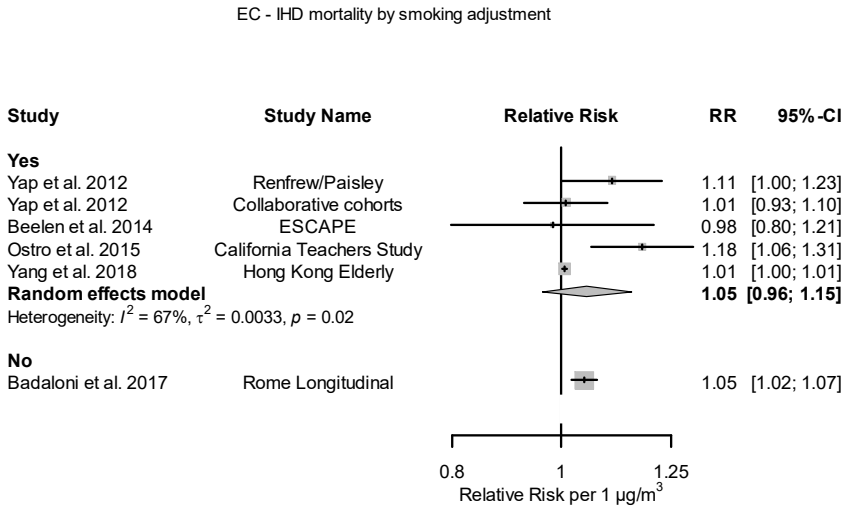
EC - IHD mortality by Risk of bias assessment on confounding



EC - IHD mortality by Risk of bias assessment on exposure assessment

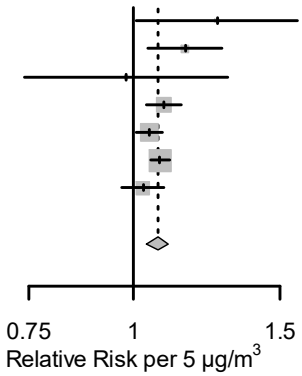


Subgroup analysis - by smoking adjustment



$PM_{2.5}$

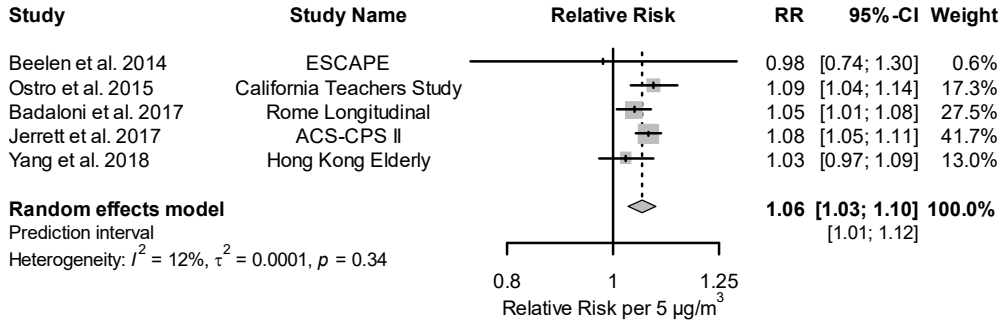
Primary meta-analysis



All are general population cohorts

Sensitivity analysis

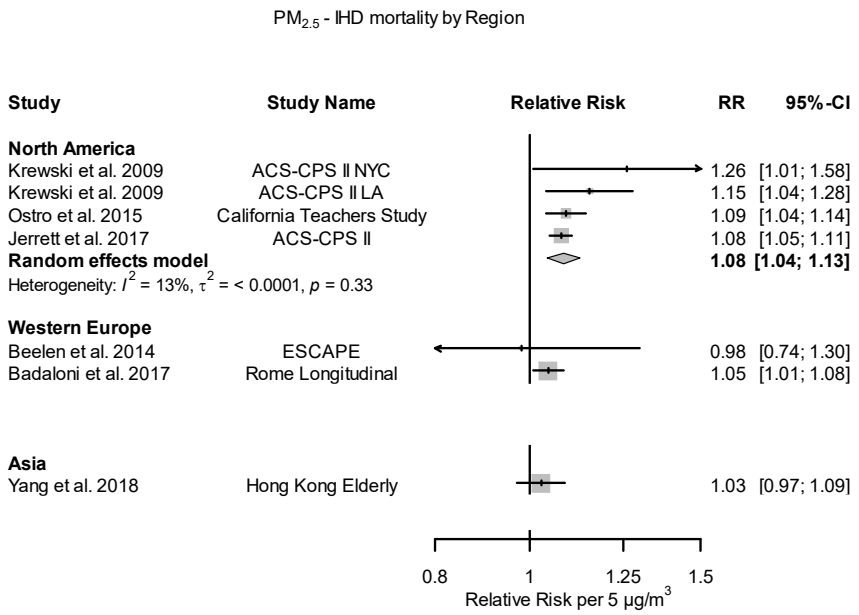
Excluding Krewski estimates for NYC and LA ACS because of Jerrett et al. 2017



Subgroup analysis

All are general population cohorts published after 2008

Subgroup analysis - by region

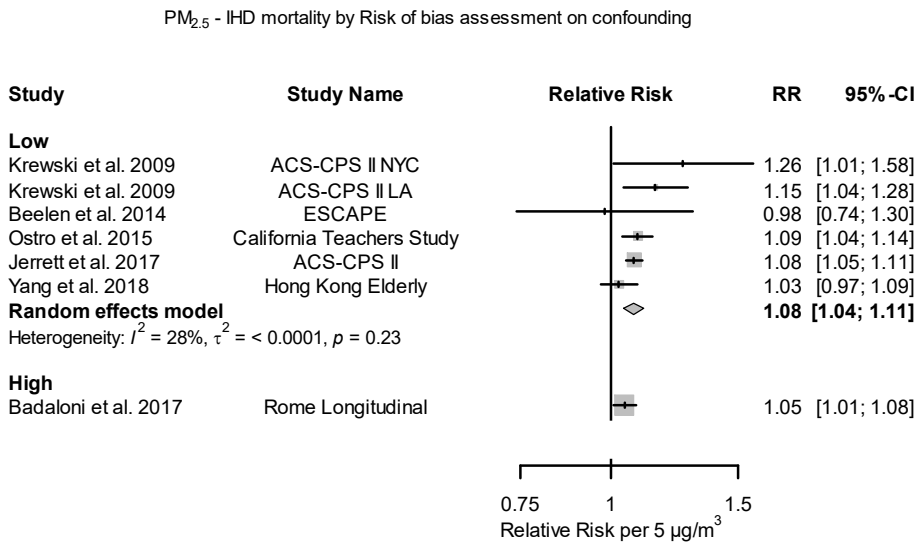


Subgroup analysis - by traffic specificity

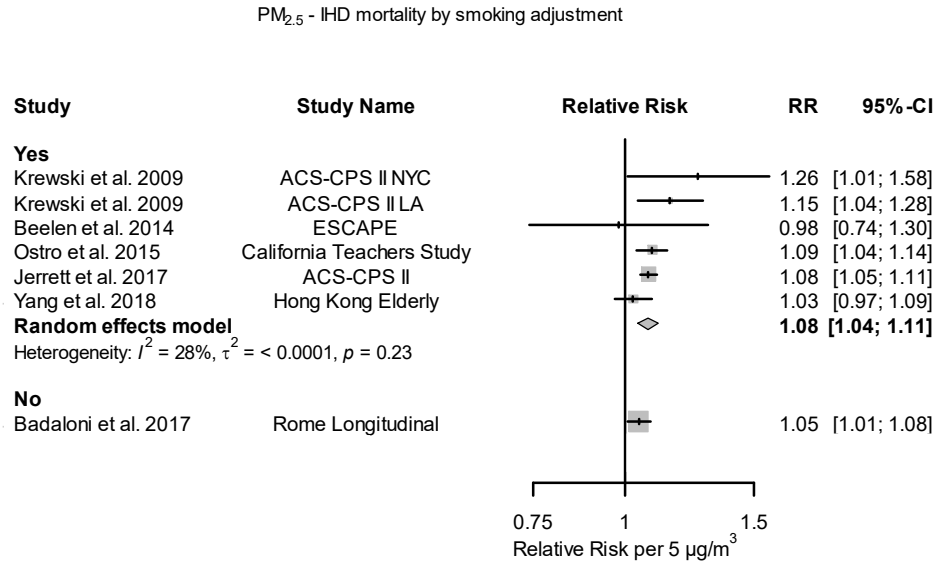
All are rated moderate

Subgroup analysis - by risk of bias

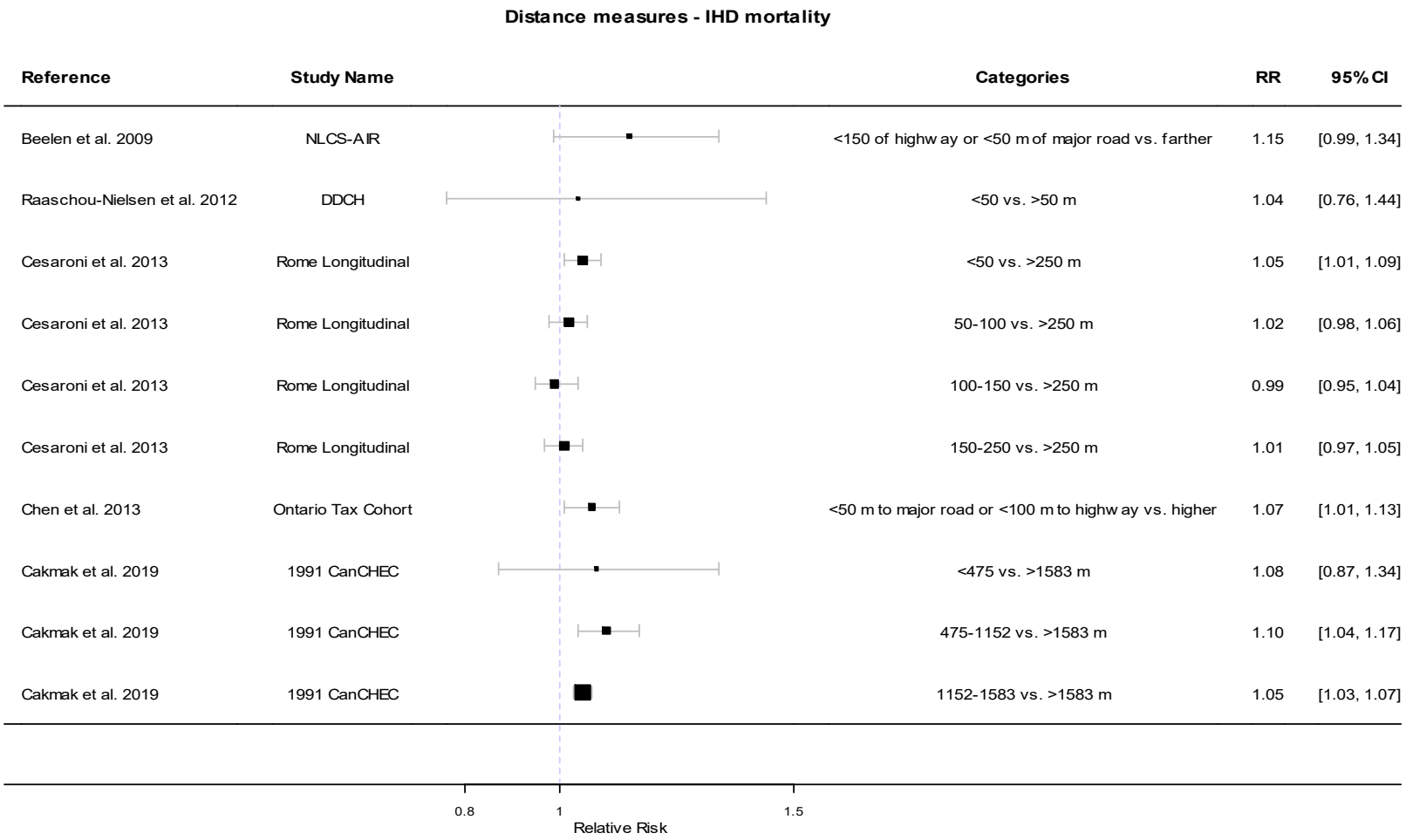
Plots not shown for risk of bias domains if all studies were rated low or moderate



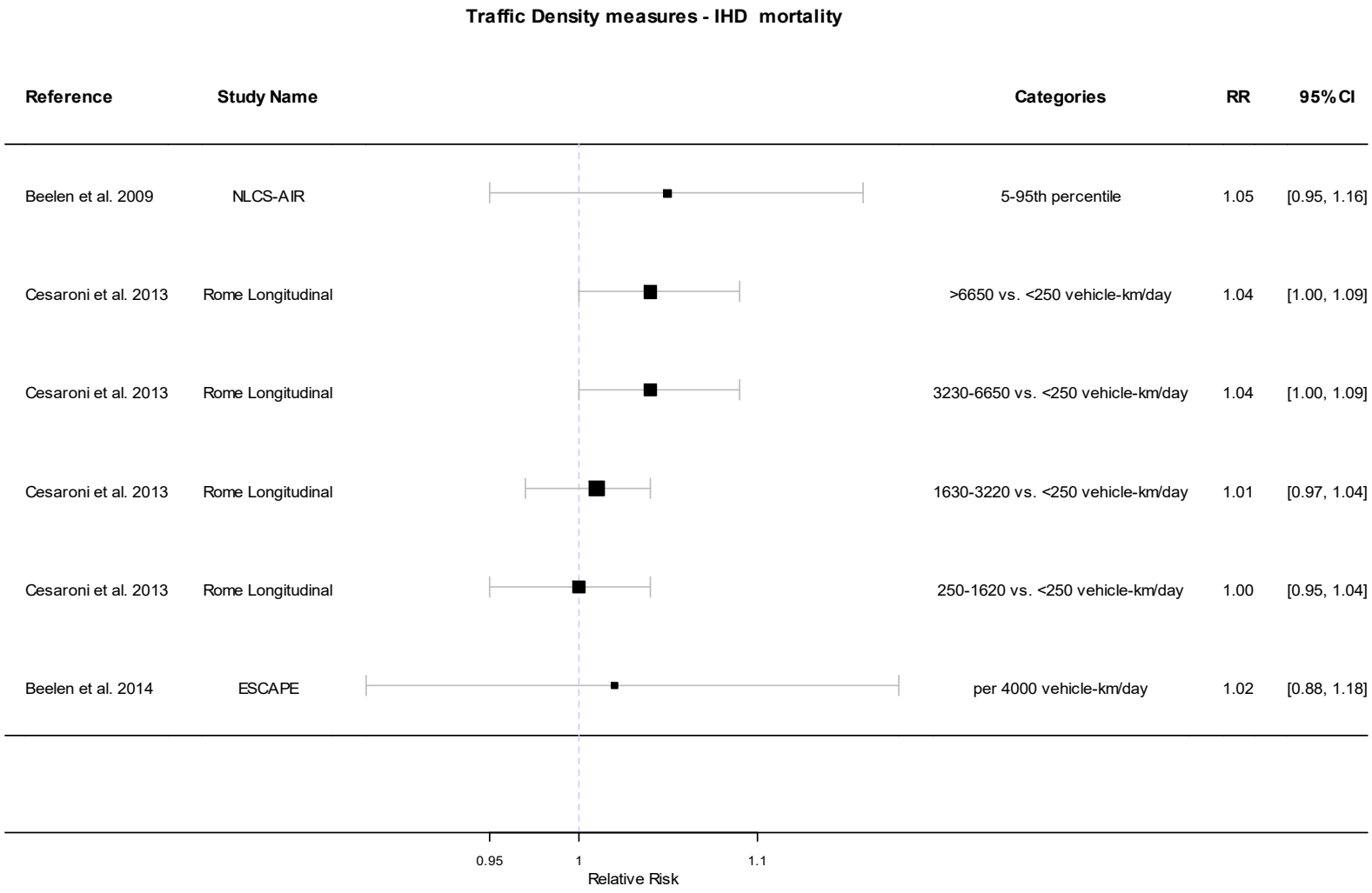
Subgroup analysis – by smoking adjustment



Distance measures

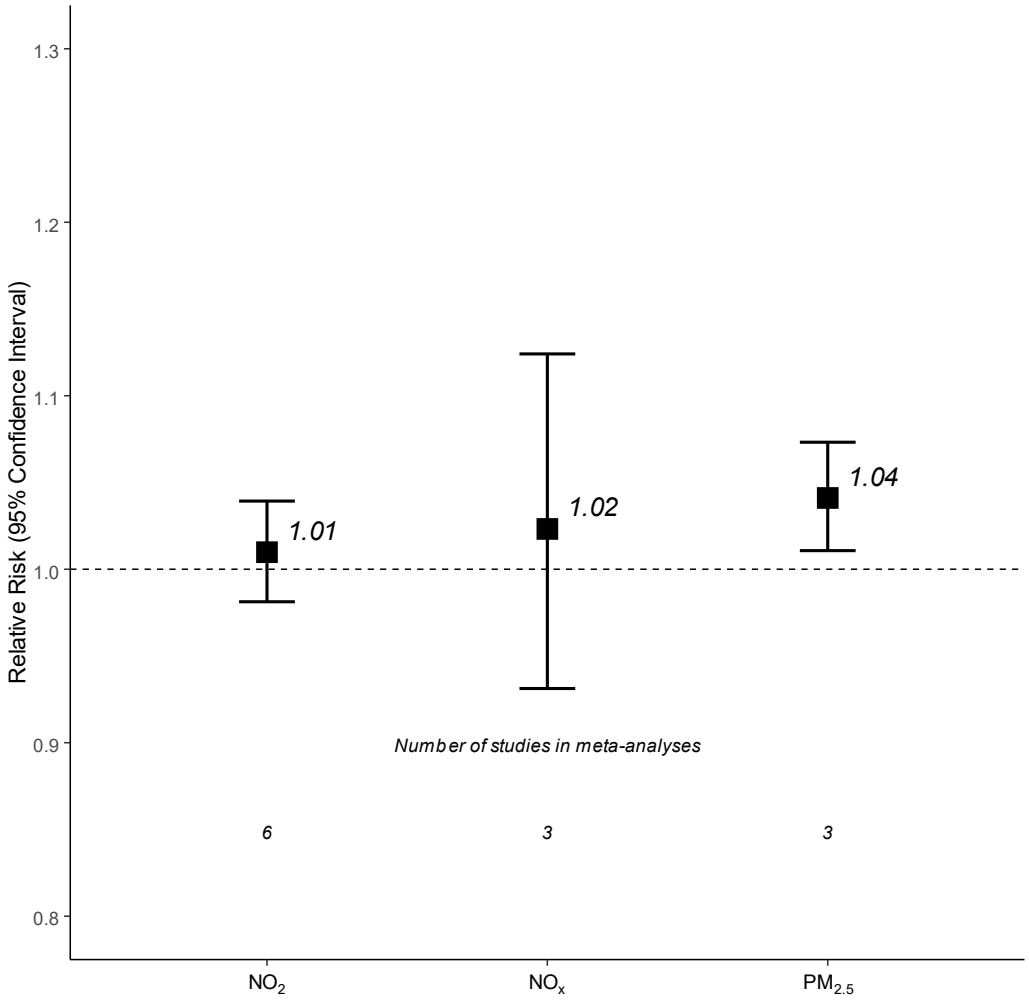


Density measures



11.6 Stroke mortality

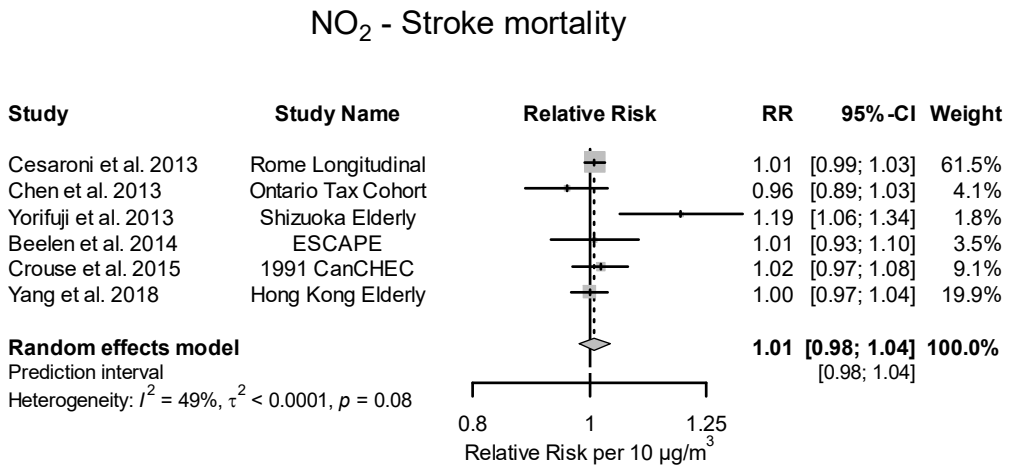
Summary of meta-analysis



Footnote: The following increments were used: 10 µg/m^3 for NO_2, 20 µg/m^3 for NO_x and 5 µg/m^3 for $PM_{2.5}$. 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_2

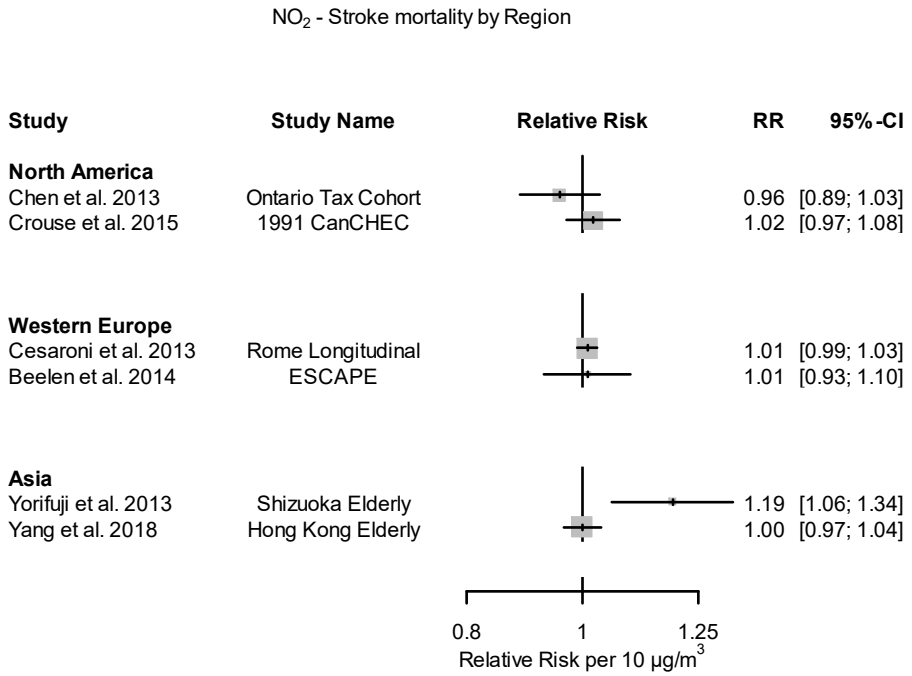
Primary meta-analysis



Subgroup analysis

All are general population cohorts after 2008

Subgroup analysis - by region



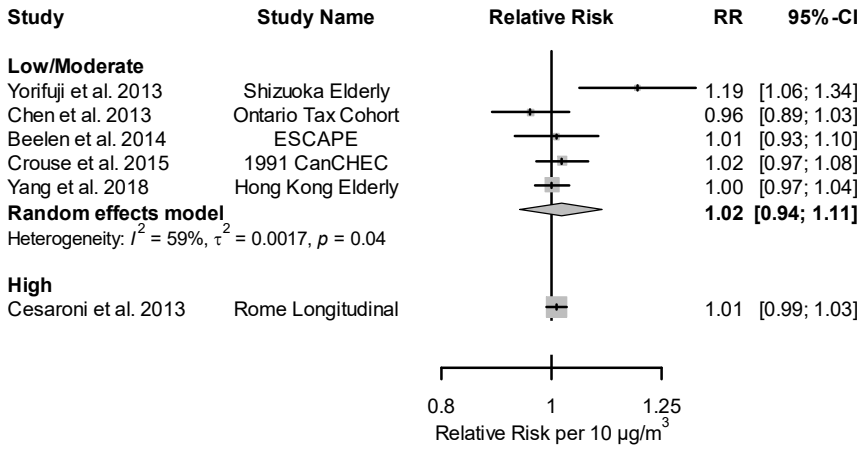
Subgroup analysis - by traffic specificity

All rated high

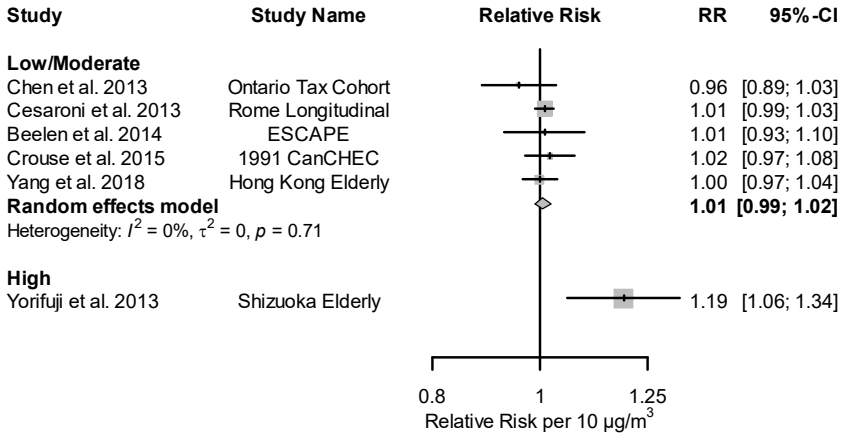
Subgroup analysis - by risk of bias

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

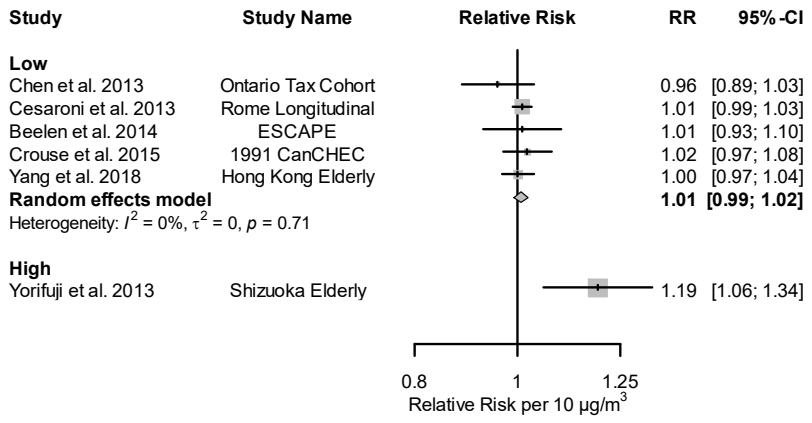
NO_2 - Stroke mortality by Risk of bias assessment on confounding



NO_2 - Stroke mortality by Risk of bias assessment on selection bias

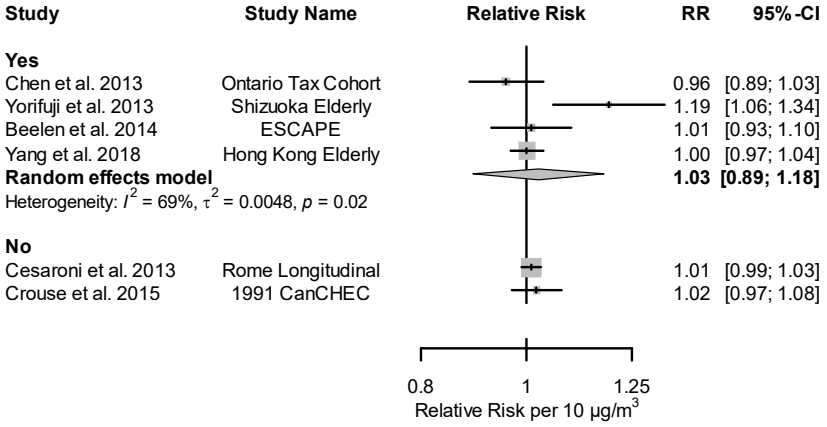


NO_2 - Stroke mortality by Risk of bias assessment on missing data



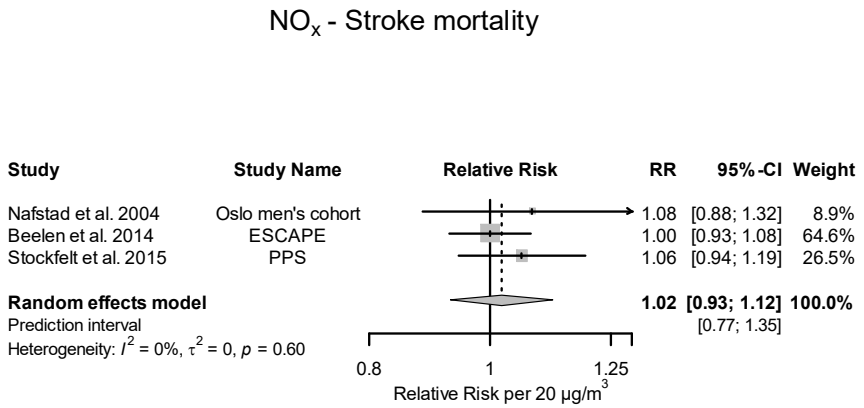
By smoking adjustment

NO_2 - Stroke mortality by smoking adjustment



NO_x

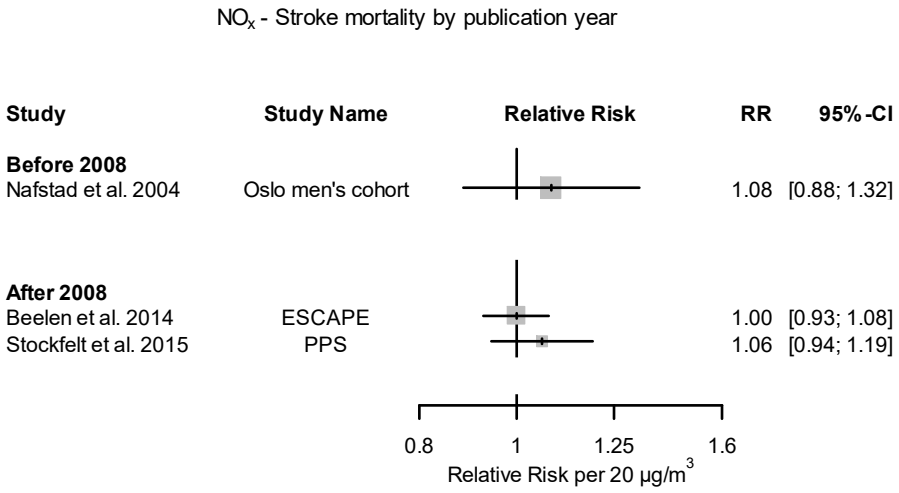
Primary meta-analysis-all are W. European general population cohorts.



Subgroup analysis notes:

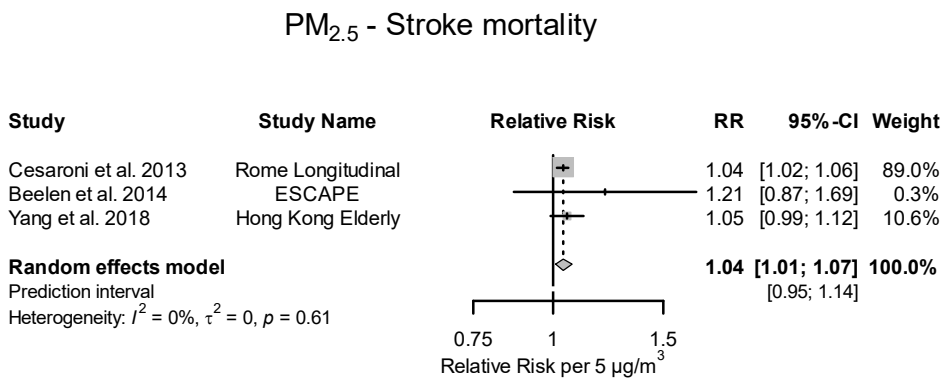
All are W. European general population cohorts that rated high in traffic specificity and all controlling for smoking. Furthermore risk of bias plots not shown because all studies were rated low or moderate

Subgroup analysis - by publication year



$PM_{2.5}$

Primary meta-analysis



Sub-group analysis notes:

All are general population cohorts published after 2008 (2 in W. Europe, 1 Asia)

All rated moderate in traffic specificity.

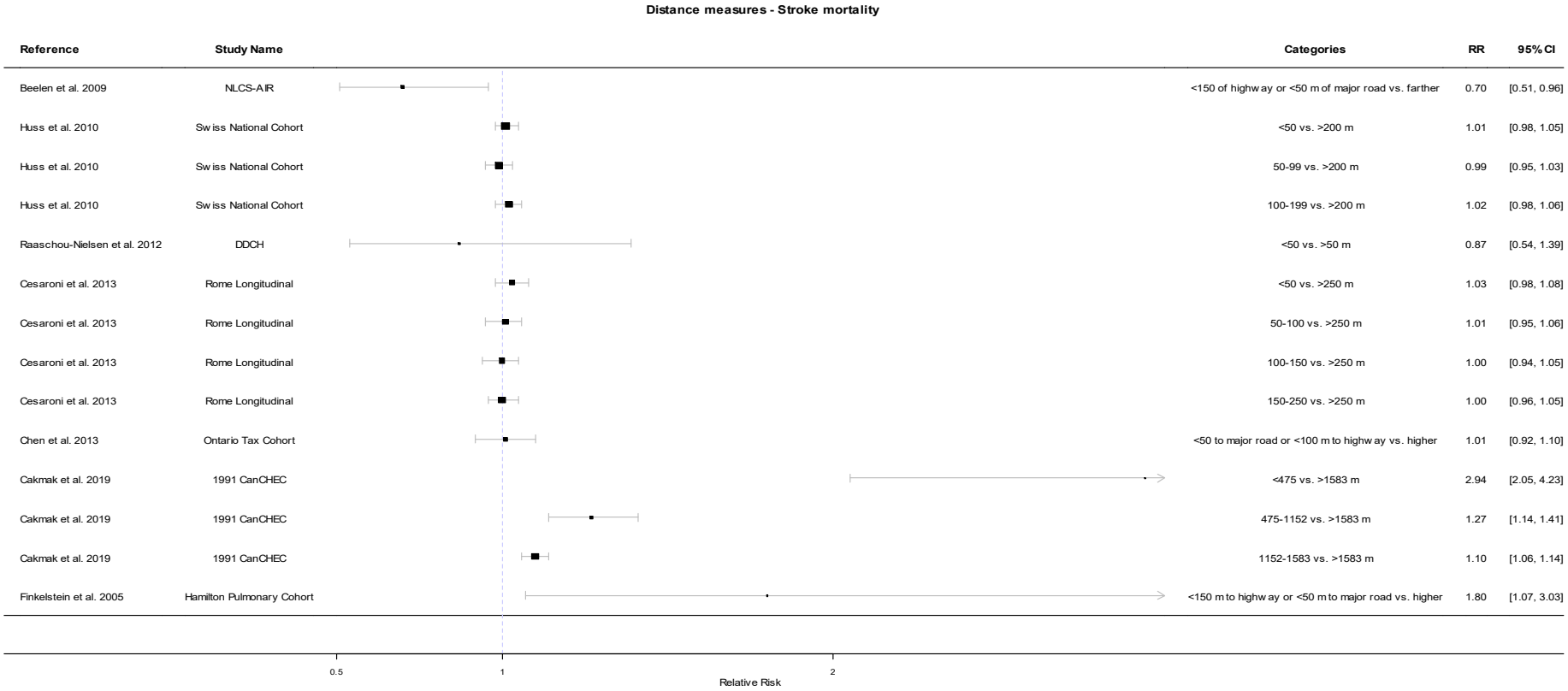
Cesaroni et al. 2013 does not control for smoking

For risk of bias:
Confounding: Cesaroni et al. 2013 rated high in confounding the other two studies low

Selection bias: Cesaroni et al. 2013 and Beelen et al. 2014 rated low in selection bias, Yang et al. 2018 moderate

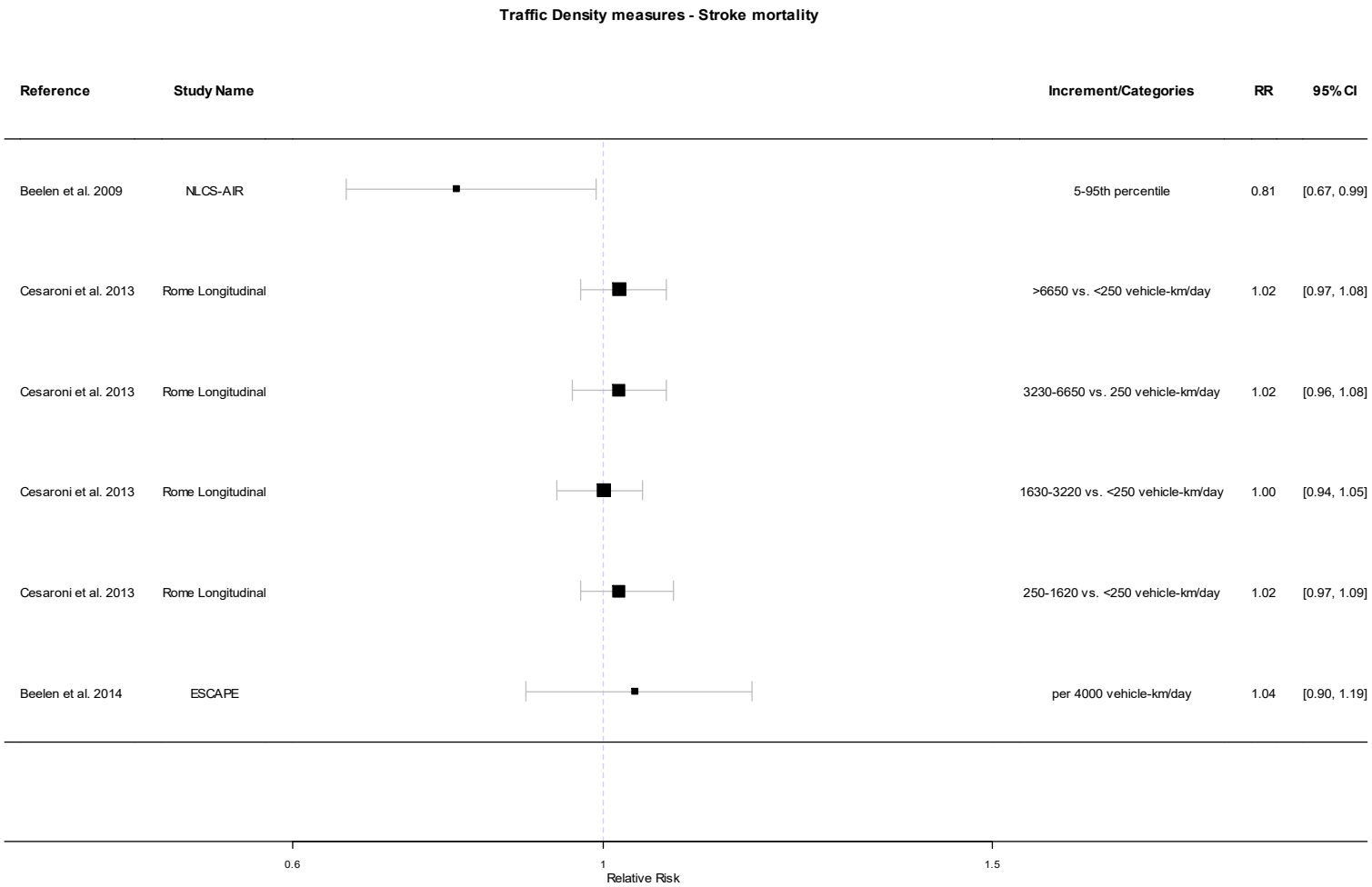
Exposure assessment: Cesaroni et al. 2013 rated low in exposure assessment, while the other two studies rated moderate

Distance measures



Finkelstein et al 2005 is a patients' cohort.

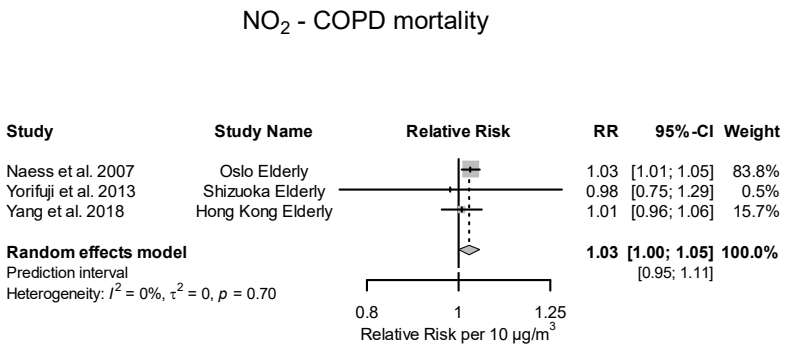
Density measures



11.7 Chronic obstructive pulmonary disease mortality

NO_2

Primary meta-analysis



Subgroup analysis notes:

All were general population cohorts

By region: 2 Asian and 1 European cohort

By traffic specificity: all high

By smoking adjustment: Naess et al. 2007 does not control for smoking

By risk of bias: low except for the following:

Confounding: high for Naess et al. 2007

Selection bias: high for Yorifuji et al. 2013, moderate for Yang et al. 2018 and low for Naess et al. 2007

Exposure assessment: moderate only for Yang et al. 2018

Missing data: High for Yorifuji et al. 2013

Distance measures