

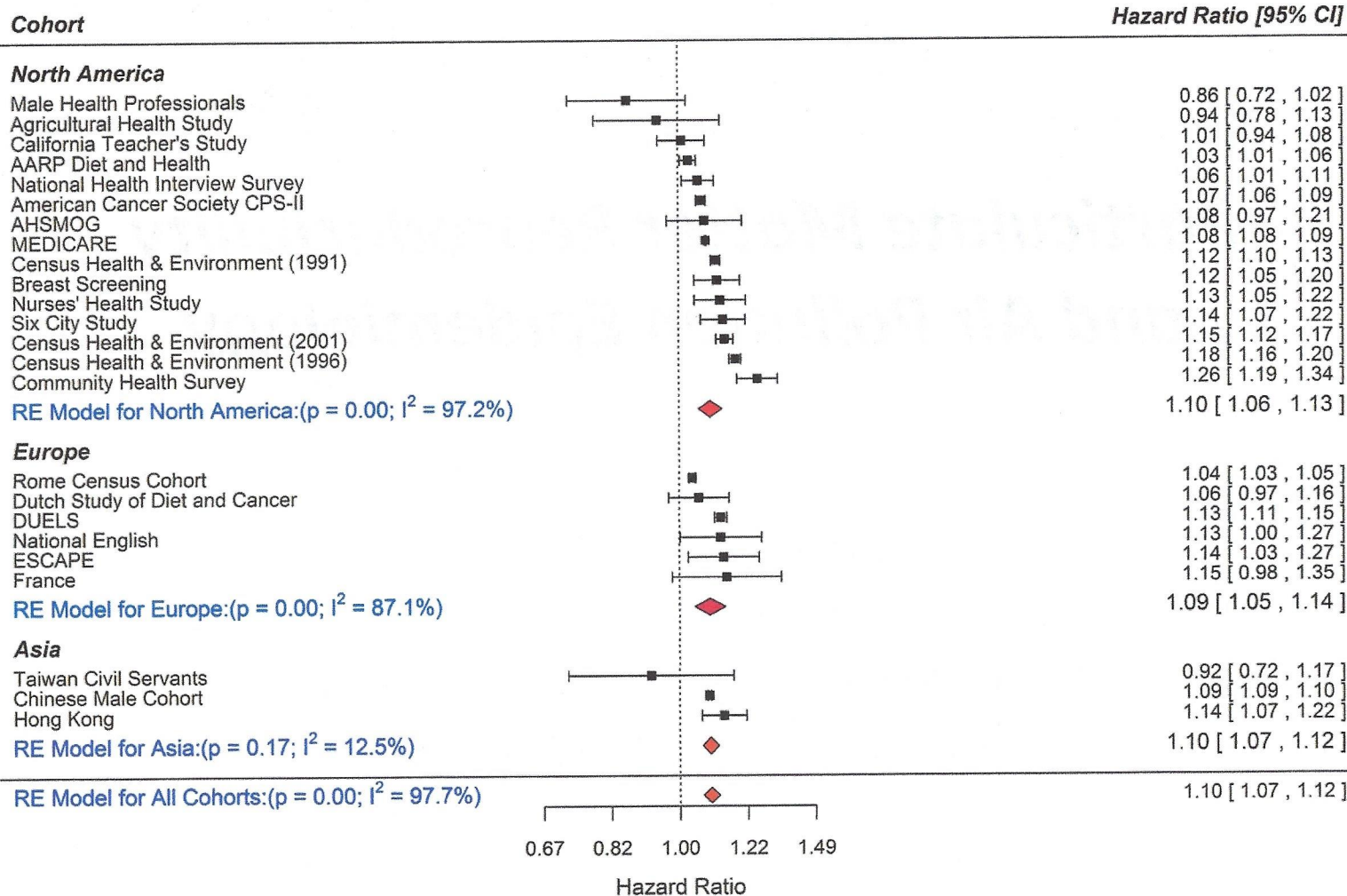
***Particulate Matter Reproducibility
and Air Pollution Epidemiology***

Richard T. Burnett, Ph.D.

Health Canada

Health Effects Institute 2018 Annual
Conference, Chicago, USA

Global Cohorts of Ambient Fine Particulate Matter and Non-Accidental Mortality



Meta-Analysis for PM2.5 Total Deaths 061118.xls

HEI 2018 Annual Conference: April 30, 2018 3:15 PM Session "Can We Rely on Environmental Health Research?"
 Presentation by Richard T. Burnett Slide 12 "Global Cohorts of Ambient Fine Particulate Matter and Non-Accidental Mortality"
<http://healtheffects.org/annual-conference>

Original Burnett Slide 12 : North America RRs as Presented by Burnett on April 30, 2018 (RRs assumed to be correct)

Male Health Professionals	0.860	0.720	1.020	-0.15082	0.08885	126.663	-19.1036
Agricultural Health Study	0.940	0.780	1.130	-0.06188	0.09456	111.835	-6.9198
California Teachers Study	1.010	0.940	1.080	0.00995	0.03542	797.196	7.9324
AARP Diet and Health	1.030	1.010	1.060	0.02956	0.01233	6581.788	194.5498
National Health Interview Survey	1.060	1.010	1.110	0.05827	0.02408	1724.007	100.4560
American Cancer Society CPS-II	1.070	1.060	1.090	0.06766	0.00712	19728.323	1334.7917
AHSMOG	1.080	0.970	1.210	0.07696	0.05640	314.394	24.1961
MEDICARE	1.080	1.080	1.090	0.07696	0.00235	180894.541	13921.8322
Census Health & Environment (1991)	1.120	1.100	1.130	0.11333	0.00686	21223.986	2405.2865
Breast Screening	1.120	1.050	1.200	0.11333	0.03406	861.798	97.6664
Nurses' Health Study	1.130	1.050	1.220	0.12222	0.03828	682.399	83.4012
Six City Study	1.140	1.070	1.220	0.13103	0.03347	892.804	116.9825
Census Health & Environment (2001)	1.150	1.120	1.170	0.13976	0.01114	8055.733	1125.8848
Census Health & Environment (1996)	1.180	1.160	1.200	0.16551	0.00865	13370.048	2212.9361
Community Health Survey	1.260	1.190	1.340	0.23111	0.03028	1090.313	251.9842
Weighted Average--Fifteen Cohorts (Meta-Analysis by Burnett)	1.100	1.060	1.130	0.08521	0.00197	256455.828	21851.876
Weighted Average--Fifteen Cohorts (Meta-Analysis by Enstrom)	1.089	1.086	1.092	0.08527	0.00140	512784.994	43722.857

Partial Burnett Slide 12: Canada Studies as Presented Burnett on April 30, 2018 (RRs assumed to be correct)

Census Health & Environment (1991)	1.120	1.100	1.130	0.11333	0.00686	21223.986	2405.2865
Breast Screening	1.120	1.050	1.200	0.11333	0.03406	861.798	97.6664
Census Health & Environment (2001)	1.150	1.120	1.170	0.13976	0.01114	8055.733	1125.8848
Census Health & Environment (1996)	1.180	1.160	1.200	0.16551	0.00865	13370.048	2212.9361
Community Health Survey	1.260	1.190	1.340	0.23111	0.03028	1090.313	251.9842
Weighted Average--Five Studies	1.146	1.136	1.157	0.13663	0.00474	44601.879	6093.758

Meta-Analysis for PM2.5 Total Deaths 061118.xls

Modified Burnett Slide 12: US Studies limited to most recent follow-up period as tabulated by Enstrom 6-11-18

Medicare (2008) included rather than Medicare (2017)--both Medicare Studies are not properly adjusted for confounders, particularly smoking

Veterans' Study	Vets	1986-1996	0.890	0.850	0.950	-0.11653	0.02837	1242.117	-144.7486
Medicare (2008) [Medicare (2017) omitted]	MCAPS	2000-2005	1.044	1.032	1.057	0.04306	0.00611	26820.541	1154.8788
ACS Cancer Prevention Study II	CPS II	1999-2000	1.014	0.980	1.049	0.01390	0.01736	3319.274	46.1475
Nurses' Health Study	HNHS	1992-2002	1.260	1.020	1.540	0.23111	0.10510	90.536	20.9239
Health Professionals FU Study	HHPS	1989-2002	0.860	0.720	1.020	-0.15082	0.08885	126.663	-19.1036
Harvard Six Cities Study	H6CS	2000-2009	1.190	0.910	1.550	0.17395	0.13586	54.178	9.4245
Agricultural Health Study	AHS	1993-2009	0.950	0.760	1.200	-0.05129	0.11652	73.654	-3.7780
NIH-AAPR Diet and Health Study	NIH-AARP	2000-2009	1.025	1.000	1.049	0.02469	0.01220	6714.880	165.8079
National Health Interview Survey	NHIS	1997-2011	1.030	0.990	1.080	0.02956	0.02220	2029.645	59.9939
Weighted Average--Nine Cohorts			1.032	1.022	1.042	0.03186	0.00497	40471.488	1289.546

Modified Burnett Slide 12: US Studies limited to most recent follow-up period as tabulated by Enstrom 6-11-18

Medicare (2008) and Medicare (2017) are both omitted because they are not properly adjusted for confounders, particularly smoking

Veterans' Study	Vets	1986-1996	0.890	0.850	0.950	-0.11653	0.02837	1242.117	-144.7486
ACS Cancer Prevention Study II	CPS II	1999-2000	1.014	0.980	1.049	0.01390	0.01736	3319.274	46.1475
Nurses' Health Study	HNHS	1992-2002	1.260	1.020	1.540	0.23111	0.10510	90.536	20.9239
Health Professionals FU Study	HHPS	1989-2002	0.860	0.720	1.020	-0.15082	0.08885	126.663	-19.1036
Harvard Six Cities Study	H6CS	2000-2009	1.190	0.910	1.550	0.17395	0.13586	54.178	9.4245
Agricultural Health Study	AHS	1993-2009	0.950	0.760	1.200	-0.05129	0.11652	73.654	-3.7780
NIH-AAPR Diet and Health Study	NIH-AARP	2000-2009	1.025	1.000	1.049	0.02469	0.01220	6714.880	165.8079
National Health Interview Survey	NHIS	1997-2011	1.030	0.990	1.080	0.02956	0.02220	2029.645	59.9939
Weighted Average--Eight Cohorts			1.010	0.993	1.027	0.00987	0.00856	13650.947	134.668

Six California Cohorts as tabulated by JEE 6-11-18

Adventist Health Study SMOG	CA AHSMOG	1977-1992	1.000	0.950	1.050	0.00000	0.02553	1534.078	0.0000
CA ACS Cancer Prevention Study I	CA CPS I	1983-2002	0.997	0.978	1.016	-0.00300	0.00972	10575.237	-31.7734
Medicare Air Pollution Cohort Study	MCAPS 'West'	2000-2005	0.989	0.970	1.008	-0.01106	0.00980	10406.164	-115.1020
CA ACS Cancer Prevention Study II	CA CPS II	1982-2000	0.968	0.916	1.022	-0.03252	0.02793	1281.565	-41.6806
California Teachers Study	CA Teachers	2001-2007	1.010	0.980	1.050	0.00995	0.01760	3228.224	32.1219
CA NIH-AARP Diet and Health Study	CA NIH-AARP	2000-2009	1.017	0.990	1.040	0.01686	0.01257	6329.779	106.7018
Weighted Average--Six Cohorts			0.999	0.988	1.009	-0.00149	0.00548	33355.046	-49.732

HEI 2018 Annual Conference: April 30, 2018 3:15 PM Session "Can We Rely on Environmental Health Research?"
 Presentation by Richard T. Burnett Slide 12 "Global Cohorts of Ambient Fine Particulate Matter and Non-Accidental Mortality"
<http://healtheffects.org/annual-conference>

Original Burnett Slide 12 : North America RRs as Presented by Burnett on April 30, 2018 (RRs assumed to be correct)

Male Health Professionals	0.860	0.720	1.020	-0.15082	0.08885	126.663	-19.1036
Agricultural Health Study	0.940	0.780	1.130	-0.06188	0.09456	111.835	-6.9198
California Teachers Study	1.010	0.940	1.080	0.00995	0.03542	797.196	7.9324
AARP Diet and Health	1.030	1.010	1.060	0.02956	0.01233	6581.788	194.5498
National Health Interview Survey	1.060	1.010	1.110	0.05827	0.02408	1724.007	100.4560
American Cancer Society CPS-II	1.070	1.060	1.090	0.06766	0.00712	19728.323	1334.7917
AHSMOG	1.080	0.970	1.210	0.07696	0.05640	314.394	24.1961
MEDICARE	1.080	1.080	1.090	0.07696	0.00235	180894.541	13921.8322
Census Health & Environment (1991)	1.120	1.100	1.130	0.11333	0.00686	21223.986	2405.2865
Breast Screening	1.120	1.050	1.200	0.11333	0.03406	861.798	97.6664
Nurses' Health Study	1.130	1.050	1.220	0.12222	0.03828	682.399	83.4012
Six City Study	1.140	1.070	1.220	0.13103	0.03347	892.804	116.9825
Census Health & Environment (2001)	1.150	1.120	1.170	0.13976	0.01114	8055.733	1125.8848
Census Health & Environment (1996)	1.180	1.160	1.200	0.16551	0.00865	13370.048	2212.9361
Community Health Survey	1.260	1.190	1.340	0.23111	0.03028	1090.313	251.9842
Weighted Average--Fifteen Cohorts (Meta-Analysis by Burnett)	1.100	1.060	1.130	0.08521	0.00197	256455.828	21851.876
Weighted Average--Fifteen Cohorts (Meta-Analysis by Enstrom)	1.089	1.086	1.092	0.08527	0.00140	512784.994	43722.857

Partial Burnett Slide 12: Canada Studies as Presented Burnett on April 30, 2018 (RRs assumed to be correct)

Census Health & Environment (1991)	1.120	1.100	1.130	0.11333	0.00686	21223.986	2405.2865
Breast Screening	1.120	1.050	1.200	0.11333	0.03406	861.798	97.6664
Census Health & Environment (2001)	1.150	1.120	1.170	0.13976	0.01114	8055.733	1125.8848
Census Health & Environment (1996)	1.180	1.160	1.200	0.16551	0.00865	13370.048	2212.9361
Community Health Survey	1.260	1.190	1.340	0.23111	0.03028	1090.313	251.9842
Weighted Average--Five Studies	1.146	1.136	1.157	0.13663	0.00474	44601.879	6093.758

Modified Burnett Slide 12: US Studies limited to most recent follow-up period as tabulated by Enstrom 6-11-18
 Medicare (2008) included rather than Medicare (2017)--both Medicare Studies are not properly adjusted for confounders, particularly smoking

Veterans' Study	Vets	1986-1996	0.890	0.850	0.950	-0.11653	0.02837	1242.117	-144.7486	Lipfert & WashU & EPRI	32 Clinics in 28 States & PR	Lipfert 2000 Table 6 [see Enstrom 2005 Table 10]
Medicare (2008) [Medicare (2017) omitted]	MCAPS	2000-2005	1.044	1.032	1.057	0.04306	0.00611	26820.541	1154.8788	JHU SPH	668 Counties in 50 US States	Zeger 2008 Table 3
ACS Cancer Prevention Study II	CPS II	1999-2000	1.014	0.980	1.049	0.01390	0.01736	3319.274	46.1475	BYU & ACS & HEI & H TH Chan SPH	58 US Metro Areas	Krewski 2009 Table 34
Nurses' Health Study	HNHS	1992-2002	1.260	1.020	1.540	0.23111	0.10510	90.536	20.9239	USoCar SPH & H TH Chan SPH	13 NE & MidWestern States	Puett 2009 Table 3
Health Professionals FU Study	HPPS	1989-2002	0.860	0.720	1.020	-0.15082	0.08885	126.663	-19.1036	USoCar SPH & H TH Chan SPH	13 NE & MidWestern States	Puett 2011 Table 2
Harvard Six Cities Study	H6CS	2000-2009	1.190	0.910	1.550	0.17395	0.13586	54.178	9.4245	H TH Chan SPH	6 Eastern & MidWestern Cities	Lepeule 2012 Table 2
Agricultural Health Study	AHS	1993-2009	0.950	0.760	1.200	-0.05129	0.11652	73.654	-3.7780	Health Canada & NIEHS	NC & IA	Weichenthal 2015 Table 2
NIH-AARP Diet and Health Study	NIH-AARP	2000-2009	1.025	1.000	1.049	0.02469	0.01220	6714.880	165.8079	NYU & UCB & NCI	6 States & 2 Metro Areas	Thurston 2016 Table 2 & Figure 3
National Health Interview Survey	NHIS	1997-2011	1.030	0.990	1.080	0.02956	0.02220	2029.645	59.9939	NCHS/CDC & NCEH/CDC	Representative US Sample	Parker 2018 Table 3
Weighted Average--Nine Cohorts			1.032	1.022	1.042	0.03186	0.00497	40471.488	1289.546			

Modified Burnett Slide 12: US Studies limited to most recent follow-up period as tabulated by Enstrom 6-11-18
 Medicare (2008) and Medicare (2017) are both omitted because they are not properly adjusted for confounders, particularly smoking

Veterans' Study	Vets	1986-1996	0.890	0.850	0.950	-0.11653	0.02837	1242.117	-144.7486	Lipfert & WashU & EPRI	32 Clinics in 28 States & PR	Lipfert 2000 Table 6 [see Enstrom 2005 Table 10]
ACS Cancer Prevention Study II	CPS II	1999-2000	1.014	0.980	1.049	0.01390	0.01736	3319.274	46.1475	BYU & ACS & HEI & H TH Chan SPH	50 US Metro Areas in 32 States	Krewski 2009 Table 34
Nurses' Health Study	HNHS	1992-2002	1.260	1.020	1.540	0.23111	0.10510	90.536	20.9239	USoCar SPH & H TH Chan SPH	13 NE & MidWestern States	Puett 2009 Table 3
Health Professionals FU Study	HPPS	1989-2002	0.860	0.720	1.020	-0.15082	0.08885	126.663	-19.1036	USoCar SPH & H TH Chan SPH	13 NE & MidWestern States	Puett 2011 Table 2
Harvard Six Cities Study	H6CS	2000-2009	1.190	0.910	1.550	0.17395	0.13586	54.178	9.4245	H TH Chan SPH	6 Eastern & MidWestern Cities	Lepeule 2012 Table 2
Agricultural Health Study	AHS	1993-2009	0.950	0.760	1.200	-0.05129	0.11652	73.654	-3.7780	Health Canada & NIEHS	NC & IA	Weichenthal 2015 Table 2
NIH-AARP Diet and Health Study	NIH-AARP	2000-2009	1.025	1.000	1.049	0.02469	0.01220	6714.880	165.8079	NYU & UCB & NCI	6 States & 2 Metro Areas	Thurston 2016 Table 2 & Figure 3
National Health Interview Survey	NHIS	1997-2011	1.030	0.990	1.080	0.02956	0.02220	2029.645	59.9939	NCHS/CDC & NCEH/CDC	Representative US Sample	Parker 2018 Table 3
Weighted Average--Eight Cohorts			1.010	0.993	1.027	0.00987	0.00856	13650.947	134.668			

Six California Cohorts as tabulated by JEE 6-11-18

Adventist Health Study SMOG	CA AHSMOG	1977-1992	1.000	0.950	1.050	0.00000	0.02553	1534.078	0.0000	LLU	3 Air Basins in CA	McDonnell 2000 Table 3 & Text
CA ACS Cancer Prevention Study I	CA CPS I	1983-2002	0.997	0.978	1.016	-0.00300	0.00972	10575.237	-31.7734	UCLA	25 Counties in CA	Enstrom 2005 Table 7
Medicare Air Pollution Cohort Study	MCAPS 'West'	2000-2005	0.989	0.970	1.008	-0.01106	0.00980	10406.164	-115.1020	JHU SPH	US 'West' (CA + OR + WA)	Zeger 2008 Table 3
CA ACS Cancer Prevention Study II	CA CPS II	1982-2000	0.968	0.916	1.022	-0.03252	0.02793	1281.565	-41.6806	HEI & U Ottawa	7 Metro Areas in CA	Krewski 2010 Table 1
California Teachers Study	CA Teachers	2001-2007	1.010	0.980	1.050	0.00995	0.01760	3228.224	32.1219	OEHA & UCD & UCB & COH	58 Counties in CA	Ostro 2015 Table S3
CA NIH-AARP Diet and Health Study	CA NIH-AARP	2000-2009	1.017	0.990	1.040	0.01686	0.01257	6329.779	106.7018	NYU & UCB & NCI	58 Counties in CA	Thurston 2016 Table 2 & Figure 3
Weighted Average--Six Cohorts			0.999	0.988	1.009	-0.00149	0.00548	33355.046	-49.732			