30.09.2016 - Grugliasco
LIFE12 ENV/IT/000834 MED HISS

Health Impact Assessment in the LIFE MED HISS Project

Ennio Cadum

On behalf of MED HISS Working Group

Health Impact Assessment (HIA)

A combination of procedures, methods and tools by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population

WHO, European Centre for Health Policy. Gothenburg Consensus Paper, Health Impact Assessment- main concepts and suggested approach. Brussels, 1999.

World Health Organization

PIEMONTE Arpa Agenzia Regionale per la Protezione Ambientale

Why use HIA?

We have to think about the effects policies have on health, and in particular, how they can alter the health of *all* people in the population. Non-health sector proposals, where health is not the main objective, may have major effects on the health and well-being of people, particularly vulnerable groups.

World Health Organization

PIEMONTE Arpa Agenzia Regionale per la Protezione Ambientale

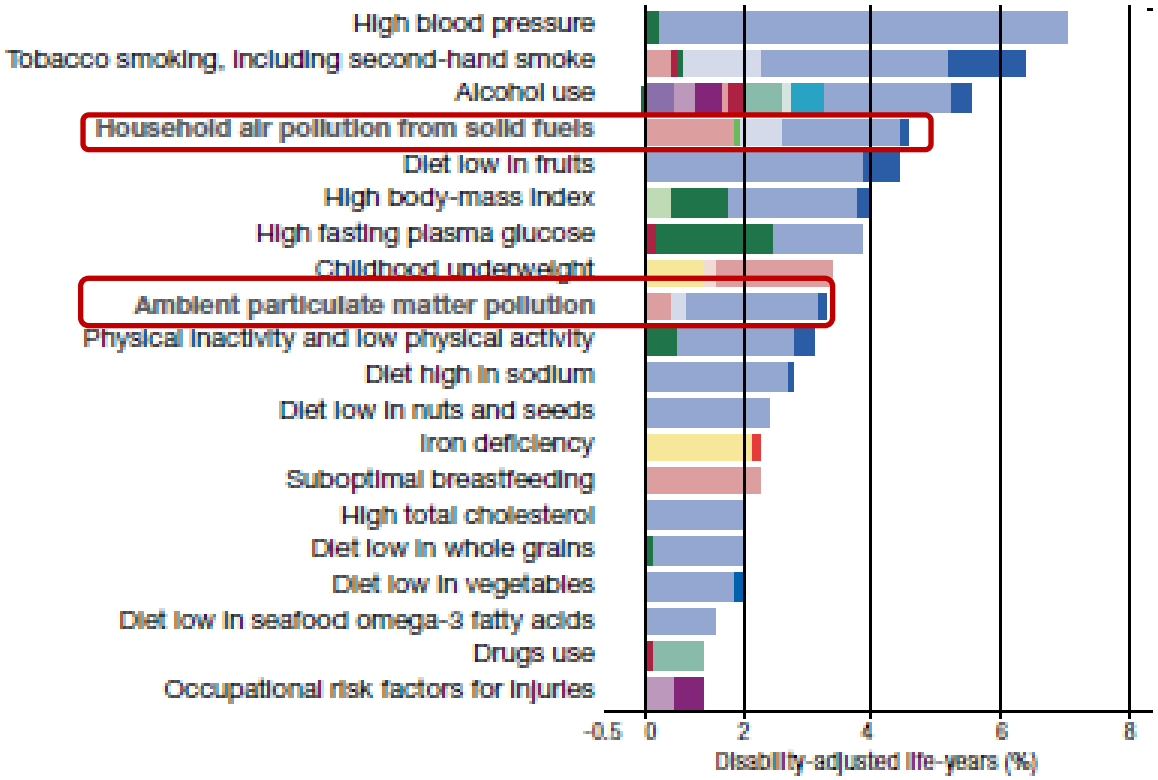
The purpose/function of HIA is to:

- Inform and influence the decision maker
- Help address inequalities in health.
- Promote joined-up working.
- Place public health on the agenda
- Reduce conflict between stakeholders
- Encourage sustainable development

World Health Organization

PIEMONTE Arpa Agenzia Regionale per la Protezione Ambientale

Figure 6. Burden of disease attributable to 20 leading risk factors in 2010, expressed as a percentage of global DALYs



Source: reprinted from The Lancet, Vol 380, Lim et al., A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Buren of Disease Study 2010, p. 2244, Elsevier Limited (2013), with permission from Elsevier.

The Health Impact of air pollution is huge

Air pollution is one of leading risk factors for health at population level

(GBD, 2010)

Background

Previous Health Impact Assessment of air pollution at National level in MED HISS Countries:

	Ref. Year	Population	Author(s)	Pollutant	RR for 10 μg/m^3	Attributable cases
France	1993	59.110.000	Kunzli et al Lancet 2000	PM10	1.043 (1.026-1.061)	~ 31.700
France	2007-2008	63,800,000	Pascal M. et al Sci Total Environ.2016	PM2.5	1.15 (1.05-1.25)	~ 15.750
France	2010	63.000.000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 17.000*
France	2012	63.600.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 43.400 *
Italy	2005	58,200,000	Ancona C et al VIIAS Project www.viias.it	PM2.5	1.07 (1.04-1.09)	~ 34.500
Italy	2010	60.500.000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 32.500*
Italy	2012	60.900.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 59.500*
Spain	2010	46,064,000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 14.000*
Spain	2012	46.200.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 25.500*
Slovenia	2010	2,069,000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 900*
Slovenia	2012	2.100.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 1.700*

* Counterfactual value for PM: 10

* Counterfactual value for PM: 0

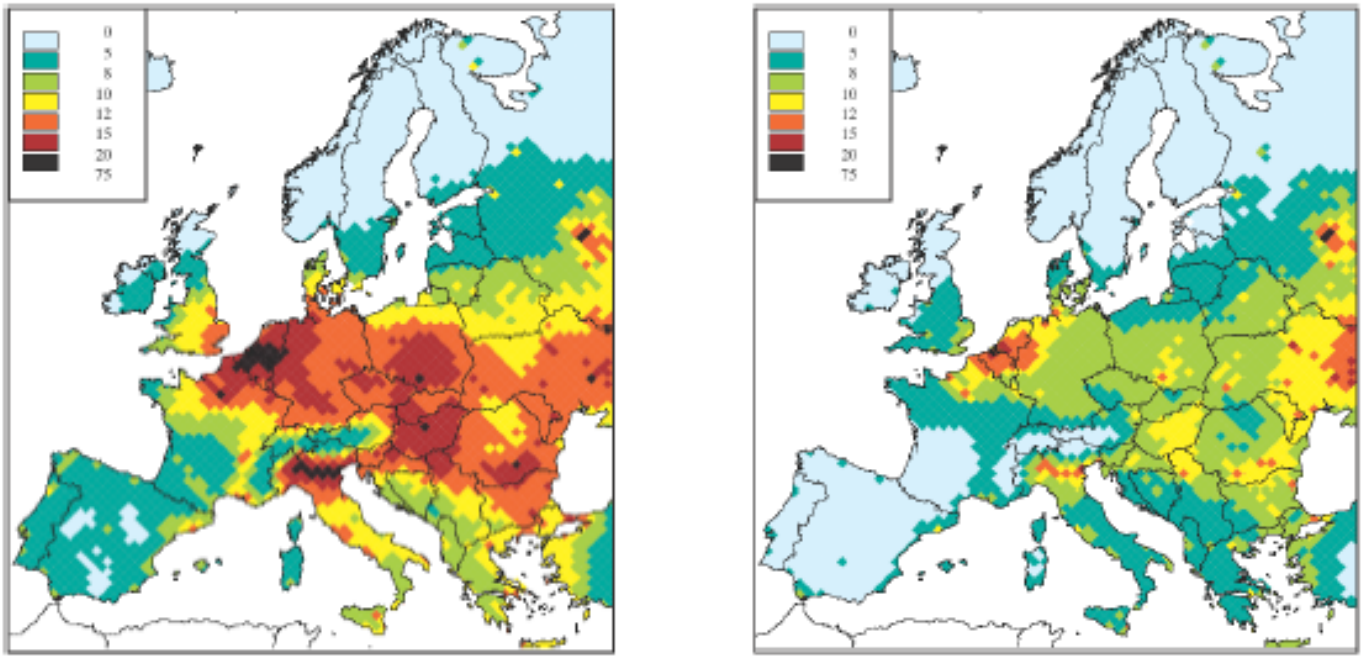
First HIAs in Europe

- Results presented at the third Conference of Ministries of Health and Environment, London 1999 (Kunzli et al, Lancet 2000).
- Attributable deaths among the adult population, 1996:
  - 31.700 in France
  - 5.600 in Austria
  - 3.300 in Svitzerland
- 1 years of life expectancy is the result of a reduction of 10 $\mu g/m^3$ di PM_{10} for a long term exposure (Brunekreef, Occup Environ Med 1997).

The CAFE (Clean Air for Europe) Study – 2005

CAFE Project (2005)

PM 2.5 Concentrations



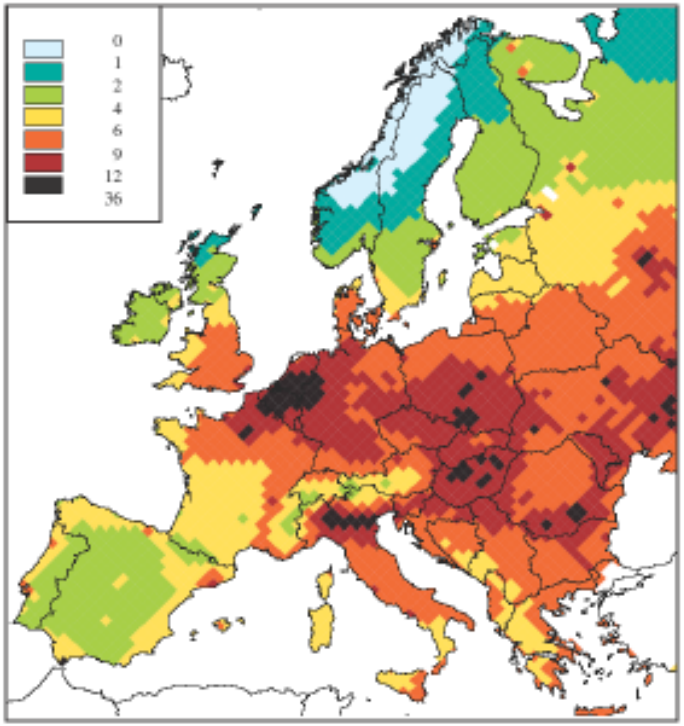
2000 2020

Grid-average concentrations, annual mean [µg/m³]
from known anthropogenic sources excluding sec. org. aerosols
Average of calculations for 1997, 1999, 2000 & 2003 meteorologies

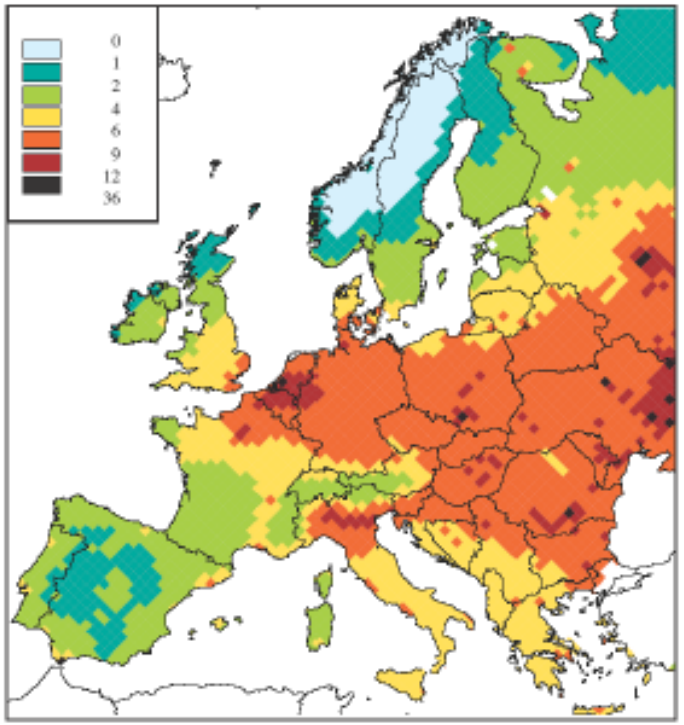
Source: MSC-W & CIAM

Months of years of life lost due to current PM2.5 levels

(Bertollini, WHO, 2005 –CAFE Study)



2000



2020

Loss of life expectancy in months

Source: EMEP & IIASA

Methods

Many methods now available (WHO, 2016):

- *Classical calculations*
- *Dedicated software*

Ambient air pollution health impact assessment tools with national scope.

Air Quality Benefits Assessment Tool (AQBAT). To obtain: contact Stan Judek (stan.judek@hc-sc.gc.ca).

AP2 (formerly APEEP). https://sites.google.com/site/nickmullershomepage/home/ap2-apeep-model-2.

Co-benefits Risk Assessment (COBRA) screening model. http://epa.gov/statelocalclimate/resources/cobra.html.

AirQ2.2. http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/activities/ tools-for-health-impact-assessment-of-air-quality-the-airq-2.2-software.

BenMAP - Benefits Mapping and Analysis Program (BenMAP) (US EPA, 2014)

Dedicated Softwares (*Health risk assessment of air pollution – general principles. Copenhagen: WHO Regional Office for Europe; 2016*).

User input needed to characterize exposure[1]	Emissions									Concentration
Spatial resolution	Regional			National			City			Any
Pollutant	$PM_{2.5}$	Ozone	Other	$PM_{2.5}$	Ozone	Other	$PM_{2.5}$	Ozone	Other	Any
AirCounts	SIM-Air	-	SIM-Air (PM_{10})	Co-benefits Calculator TM5-FASST EcoSense	Co-benefits Calculator TM5-FASST EcoSense	TM5-FASST (NO_x, SO_x) EcoSense (NO_x, SO_x, CO, heavy metals, dioxins, radio-nucleotides)	AirCounts™ SIM-Air Aphekom EcoSense	Aphekom EcoSense	SIM-Air (PM_{10}) EcoSense (NO_x, SO_x, CO, heavy metals, dioxins, radio-nucleotides)	BenMAP-CE AirQ2.2 IOMLIFET EVA EBD (no ozone)

1 Tools that read in emissions datasets are often considered "reduced-form" tools, as they can generate broad-scale estimates of the impact of air pollution from built-in relationships between emissions and the exposure metric (often concentrations) derived from externally conducted air quality model simulations. Tools that read in concentrations require the analyst to generate concentration datasets externally (either from air monitoring or air quality modelling simulations). One tool (GMAPS) reads in economic and climate indicators from a reduced-form econometric model and is not included in this table.

Methods for HIA

To calculate the impact of a pollutant it is necessary to know:

- **Air pollutant concentrations (in microg/m3) by grid**
- **Data on exposed population (N of people resident in any area by age and sex)**
- **Mortality or morbidity at the baseline (crude rates) in each area**
- **Concentration-response function (RR) –from literature**
- **Outcome in study**

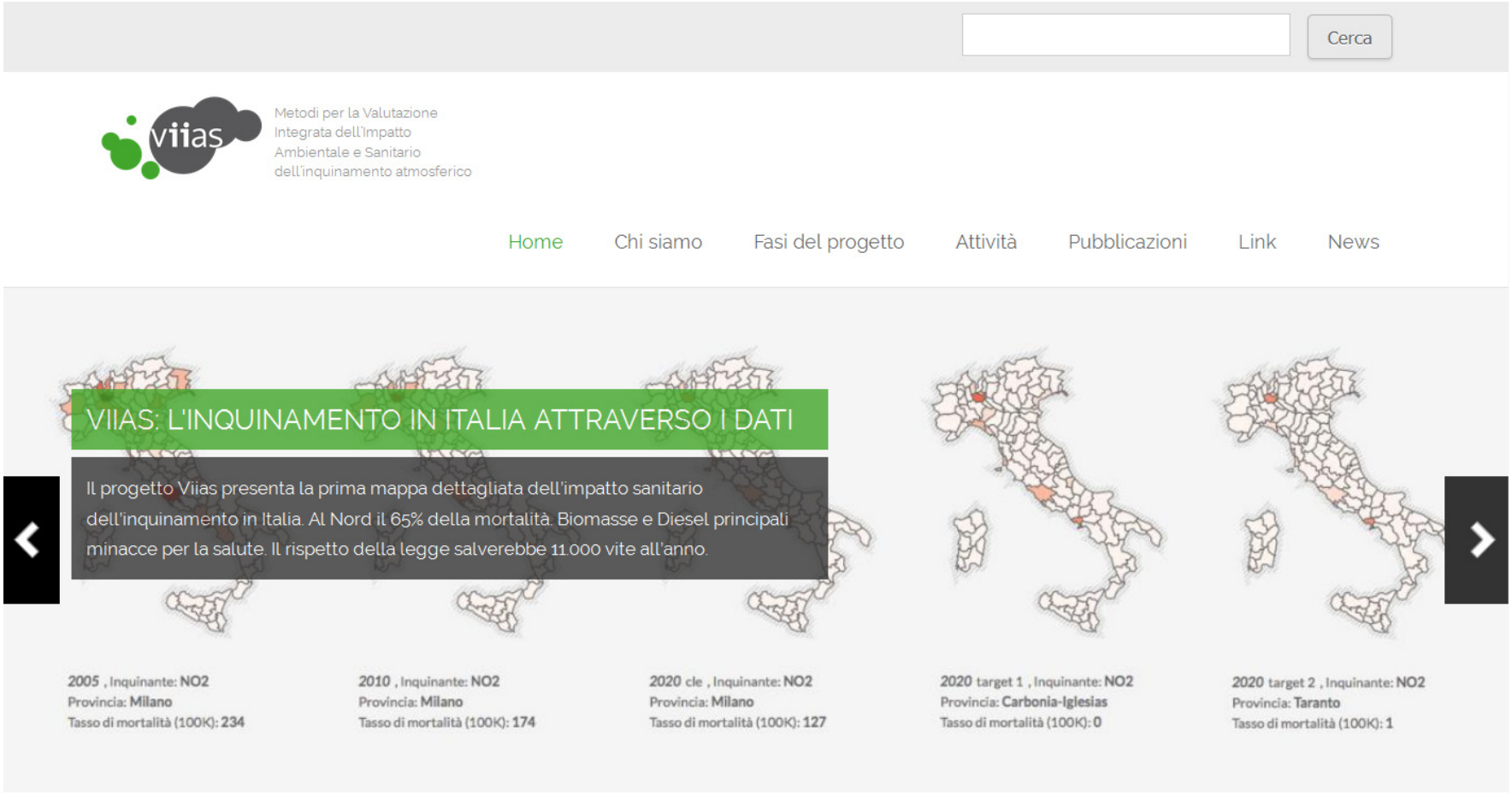
Courtesy by C. Ancona DEP Lazio

The Health Impact Assessment in MED HISS has followed the classical approach (already used in the VIIAS Italian Project)

- *Air pollution concentrations*
- *Population exposure*
- *Baseline mortality*
- *Concentration-response function (RR)*
- *Health Impact*

Courtesy by C. Ancona DEP Lazio

Previous HIA in Italy: the VIIAS Project (www.viias.it)



Results

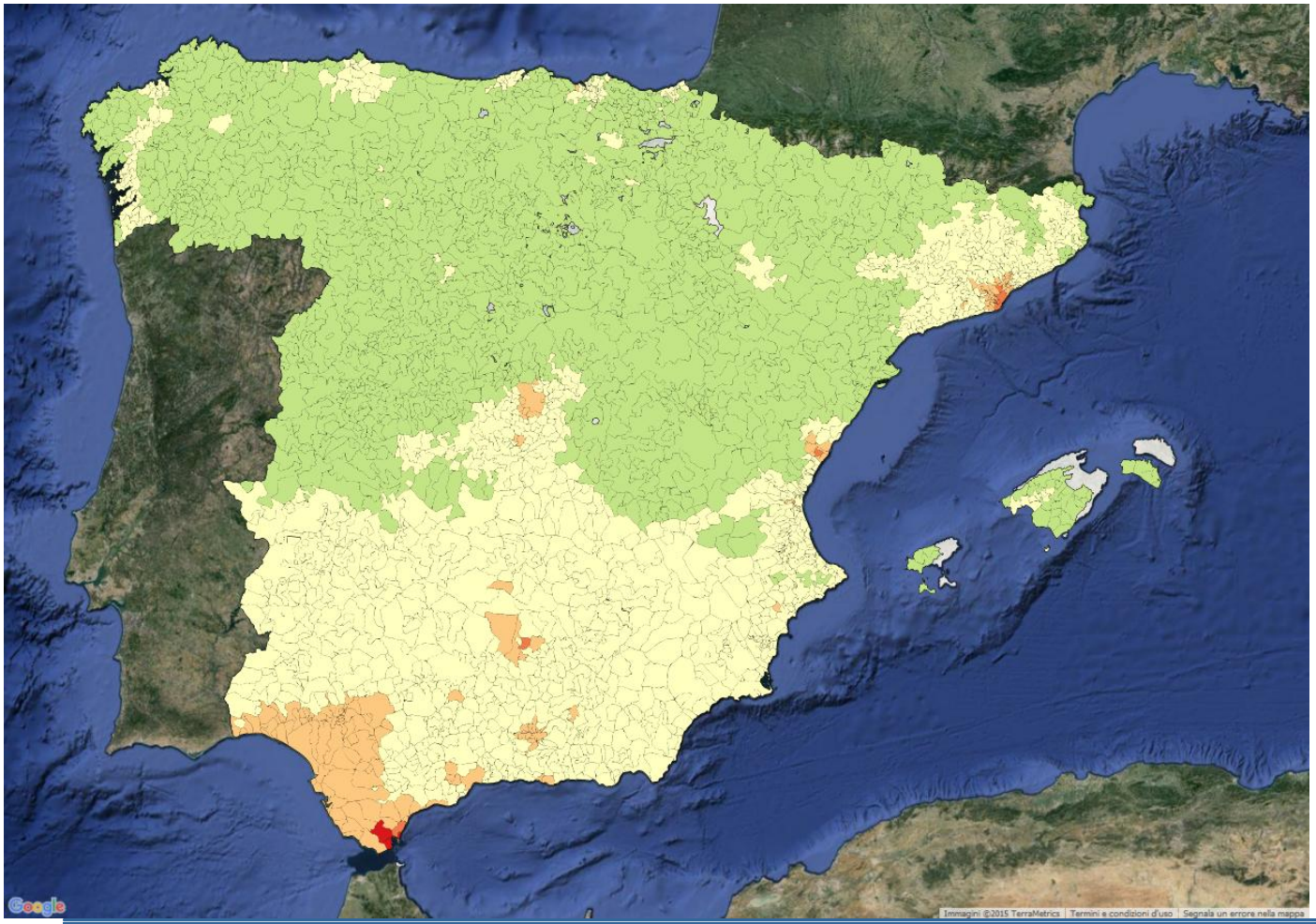
- ***Air pollution concentrations***
- ***Population exposure***
- ***Baseline mortality***
- ***Concentration-response function (RR)***
- ***Health Impact***

Air pollution concentrations

PM2.5 in Italy (2010) at municipal level

(MED HISS upscaled procedure)

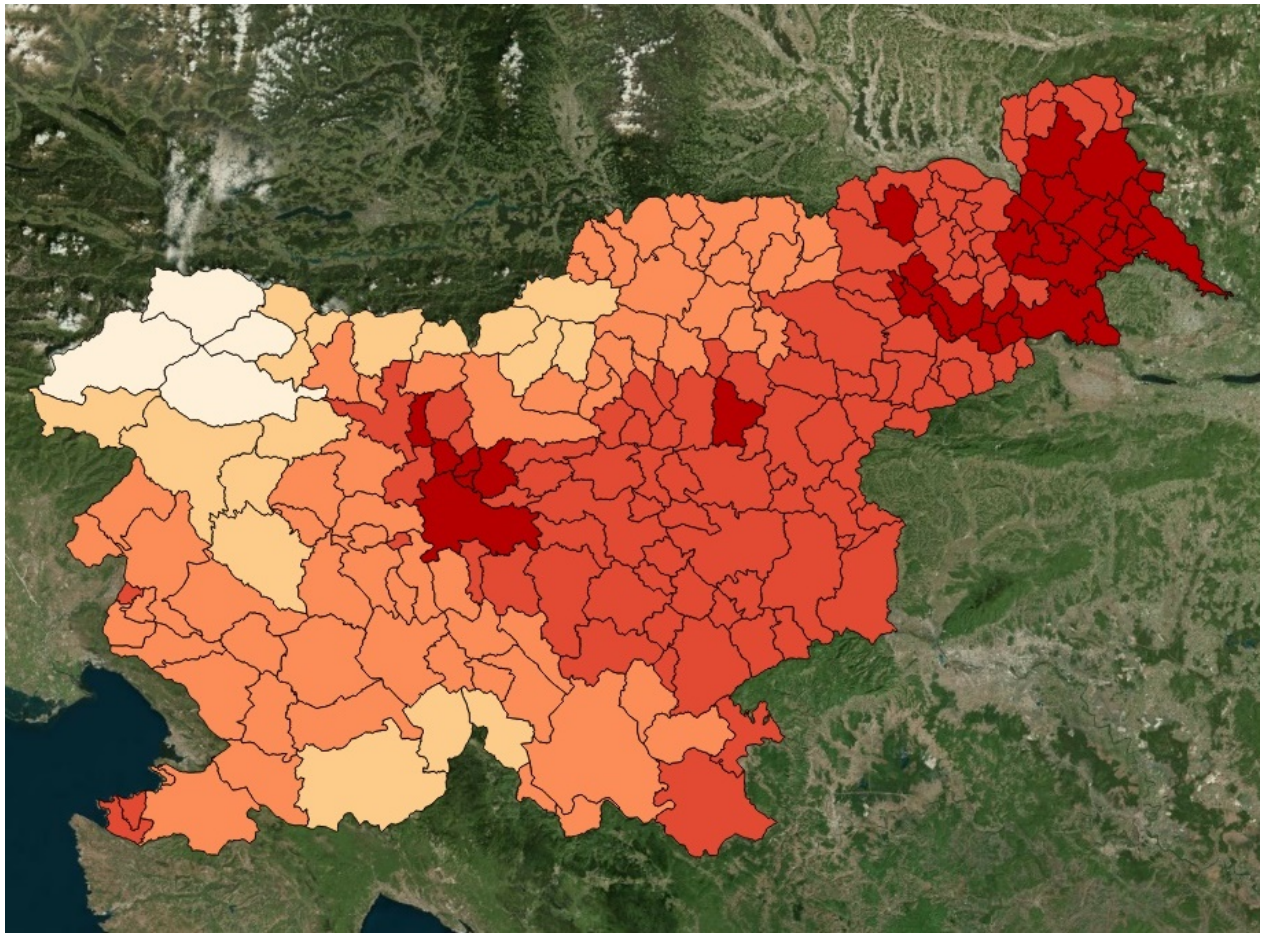
Air pollution concentrations



PM2.5 in Spain (2010) at municipal level

(MED HISS upscaled procedure)

Air pollution concentrations



PM2.5 in Slovenia (2011) at municipal level

(MED HISS upscaled procedure)

Results: Italy

- *Air pollution concentrations*
- ***Population exposure***
- *Baseline mortality*
- *Concentration-response function (RR)*
- *Health Impact*

PM2.5 in 2010 in Italy: mean concentration by area and difference from WHO limit (10mg/m3 MED HISS Project

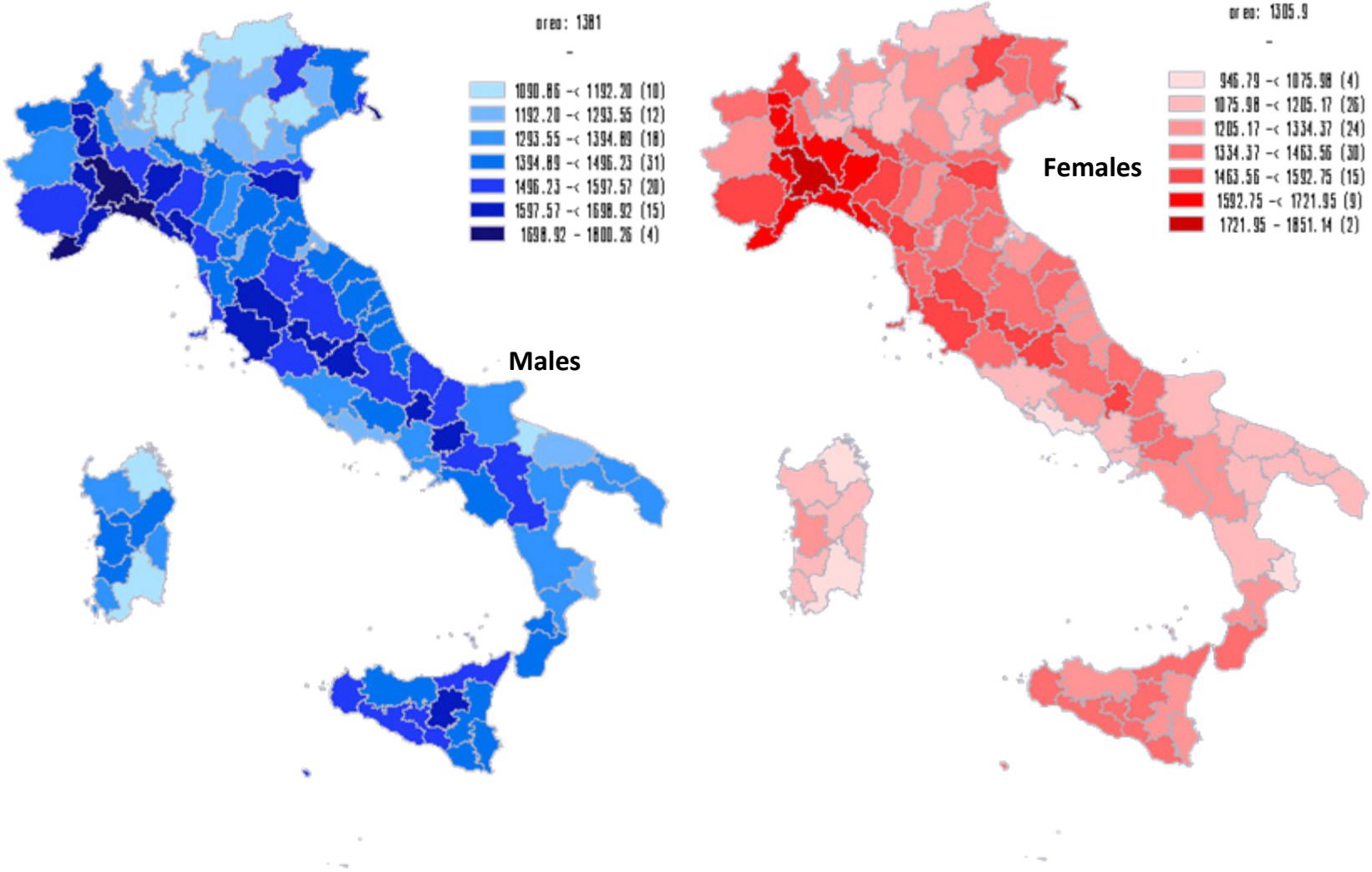
		PM 2.5 Mean exposure (μg/m³)	PM 2.5 Population weighted exposure (μg/m³)	Difference from WHO limit value (μg/m³)
	Italy	17,2	20,3	10,3
Geographic Area	North	19,1	23,4	13,4
	Center	16,2	19,4	9,4
	South	14,1	16,4	6,4
Macroarea	Urban	19,8	21,8	11,8
	Rural	17	18,8	8,8

PM 2.5 Counterfactual level: 10 μg/m³

Results: Italy

- *Air pollution concentrations*
- *Population exposure*
- *Baseline mortality*
- *Concentration-response function (RR)*
- *Health Impact*

Mortality Crude rates – Italy (Average period 2000-2010)



A cura di Demaria, ARPA Piemonte

Results: Italy

- *Air pollution concentrations*
- *Population exposure*
- *Baseline mortality*
- *Concentration-response function (RR)*
- *Health Impact*

Courtesy by C. Ancona DEP Lazio

Concentration-response functions (RR)

World Health Organization
REGIONAL OFFICE FOR Europe

Review of evidence on health aspects of air pollution – REVIHAAP Project

Technical Report

This publication arises from the project REVIHAAP and has received funding from the European Union.

World Health Organization
REGIONAL OFFICE FOR Europe

Health risks of air pollution in Europe – HRAPIE project

New emerging risks to health from air pollution – results from the survey of experts

By: Susann Henschel and Gabrielle Chan

This publication arises from the HRAPIE project and has received funding from the European Union.

Experts were asked to formulate a response to the following question: "*What concentration–response functions for key pollutants should be included in cost–benefit analysis supporting the revision of EU air quality policy?*".

HRAPIE (2013)

Table 1. CRFs recommended by the HRAPIE project

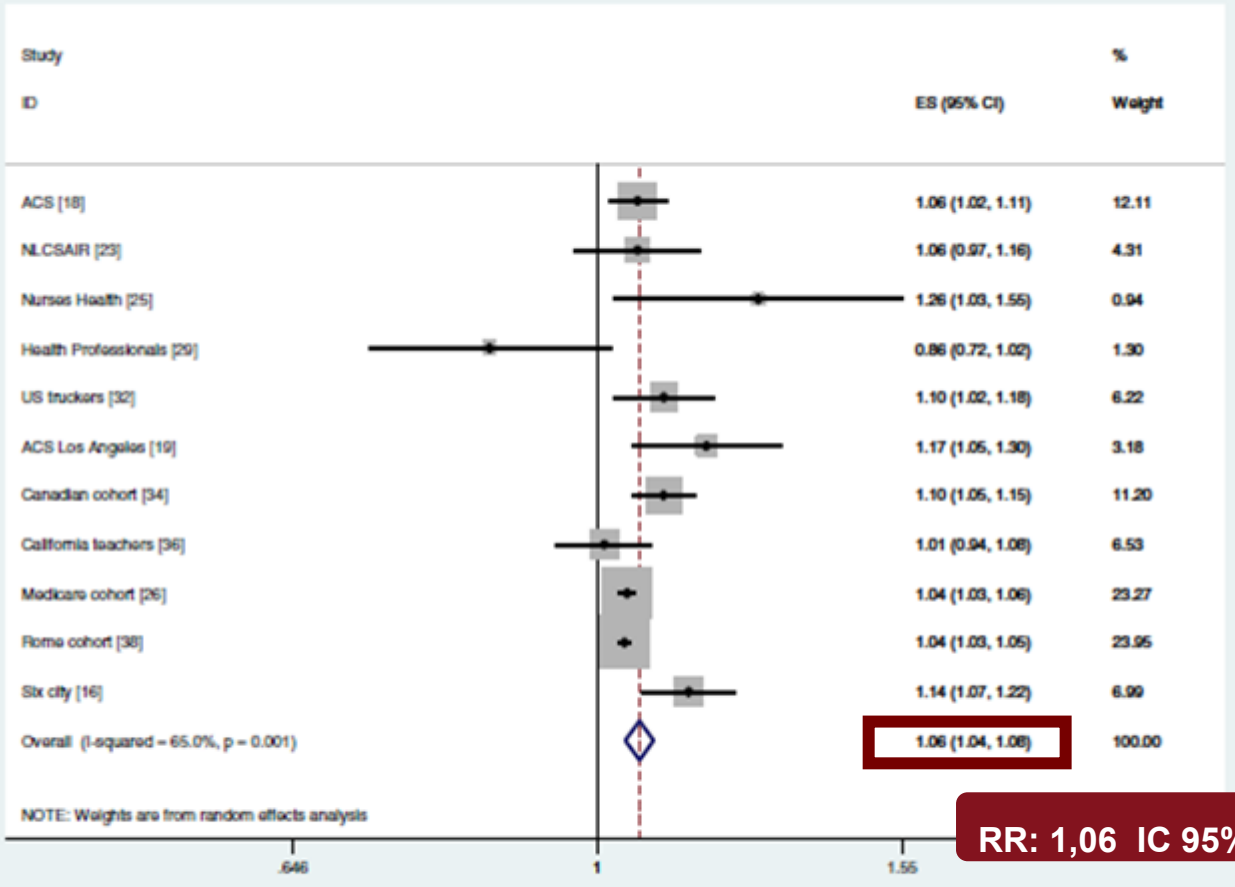
PM, long-term exposure

Pollutant metric	Health outcome	Group	RR (95% CI) per 10 µg/m³	Range of concentration	Source of background health data	Source of CRF	Comments
$PM_{2.5}$, annual mean	Mortality, all-cause (natural), age 30+ years	A*	1.062 (1.040–1.083)	All	European mortality database (MDB) (WHO, 2013c), rates for deaths from all natural causes (International Classification of Diseases, tenth revision (ICD-10) chapters I–XVIII, codes A–R) in each of the 53 countries of the WHO European Region, latest available data	Meta-analysis of 13 cohort studies with results: Hoek et al. (2013)	
$PM_{2.5}$, annual mean	Mortality, cerebrovascular disease (includes stroke), ischaemic heart disease, chronic obstructive pulmonary	A	Global Burden of Disease (GBD) 2010 study (IHME, 2013), supra-linear exponential decay saturation model (age-specific), linearized by the $PM_{2.5}$ expected in	All	European detailed mortality database (WHO, 2013d), ICD-10 codes cerebrovascular: I60–I63, I65–I67, I69.0–I69.3; ischaemic heart disease: I20–I25; COPD: J40–J44, J47; trachea, bronchus and lung cancer: C33–C34, D02.1–D02.2, D38.1	CRFs used in the GBD 2010 study	An alternative to all-cause mortality Both age-specific and all-age estimates to be calculated to assess the potential effect of age stratification

PM, short-term exposure

Pollutant metric	Health outcome	Group	RR (95% CI) per 10 µg/m³	Range of concentration	Source of background health data	Source of CRF	Comments
PM_{10}, annual mean	$PM_{2.5}$, daily mean	Mortality, all-cause, all ages	A	1.0123 (1.0045–1.0201)	All	MDB (WHO, 2013c)	APED meta-analysis of 12 single-city and one multicity studies	For information only: not proposed as an alternative to long-term $PM_{2.5}$ exposure The premature deaths attributed to short-term changes of $PM_{2.5}$ are already accounted for in estimating the effects of long-term exposure
	$PM_{2.5}$, daily mean	Hospital admissions, cardiovascular diseases (CVDs) (includes stroke), all ages	A*	1.0091 (1.0017–1.0166)	All	European hospital morbidity database (WHO, 2013f), ICD, ninth revision (ICD-9) codes 390-459; ICD-10 codes I00–I99	APED meta-analysis of four single-city and one multicity studies	

Meta-analysis by Hoek (2013) (in HRAPIE study)



RR: 1,06 IC 95%: 1,04-1,08

Figure 1 Meta-analysis of the association between $PM_{2.5}$ and all-cause mortality (Relative risk per 10 µg/m^3). Overall uses random effects.

Studies after 2013

ACS California subcohort **Jerrett, 2013**

73,711 subjects living in California, 1982 – 2000

National English cohort **Carey, 2013**

835,607 patients from general practice, 2003-2007

ESCAPE **Beelen 2014**

367,251 participants from 22 European cohorts, 1985-2008

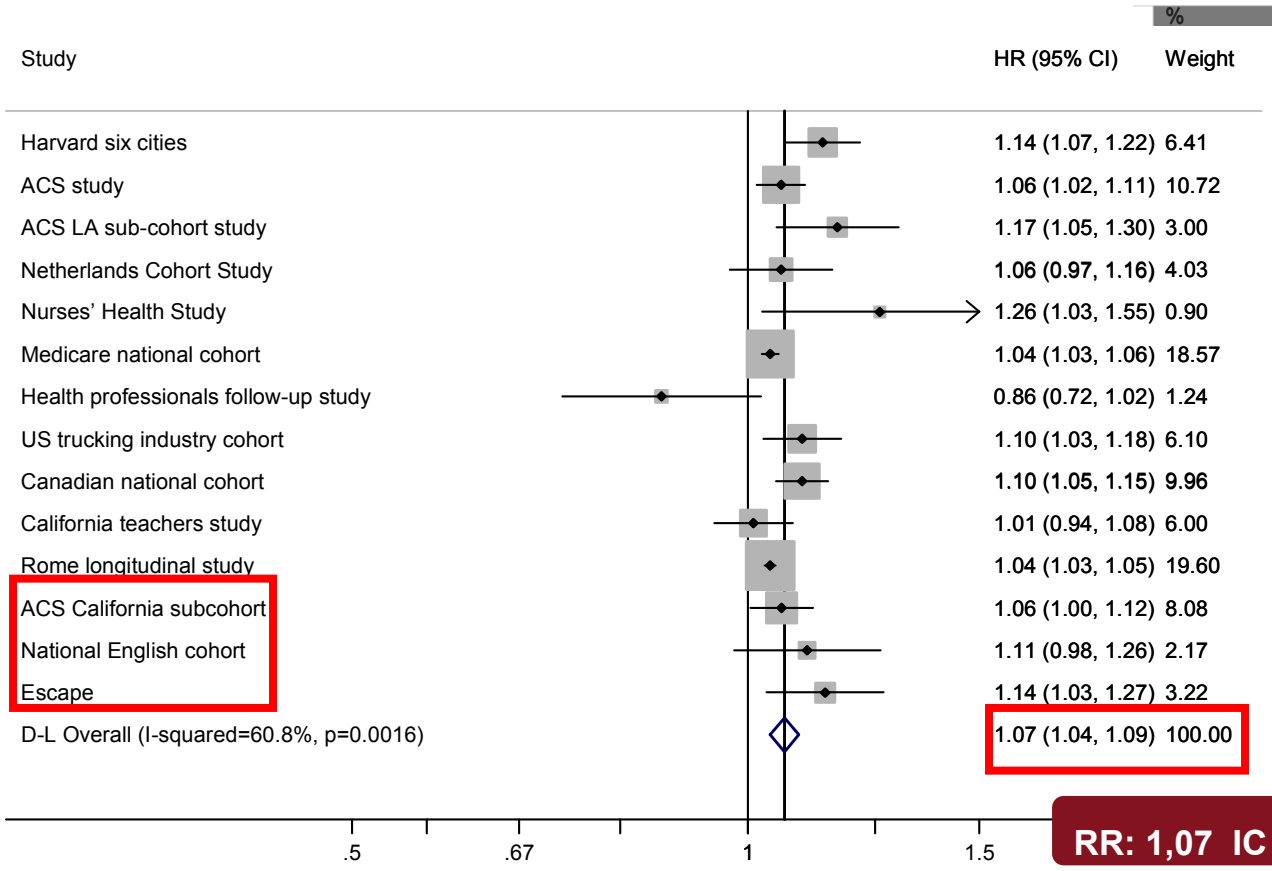
Updated WHO meta-analysis

World Health Organization Europe

WHO Expert Meeting: Methods and tools for assessing the health risks of air pollution at local, national and international level

Meeting report
Bonn, Germany, 12-13 May 2014

$PM_{2.5}$ (10 μg/m^3 increase) and Natural Mortality



RR: 1,07 IC 95%: 1,04-1,09

Relative Risks used in MED HISS Health Impact Assessment

Pollutant	Indicator	Cause	Age	Limits (WHO)	RR	Review
	Mortality	Natural causes			RR 1.07 (IC 95% 1.04-1.09)	(1)
		CVD diseases			RR 1.10 (IC 95% 1.05-1.15)	(1)
PM $_{2.5}$		Respiratory diseases	> 30	> 10 $\mu g/m^3$	RR 1.10 (IC 95% 0.98-1.24)	(1)
		K Lung			RR 1.09 (IC 95% 1.04-1.14)	(2)
	incidence	IHD			RR 1.26 (IC 95% 0.97-1.60)	(3)

REFERENCES

1. WHO Regional Office for Europe (2014). *WHO Expert Meeting: Methods and tools for assessing the health risks of air pollution at local, national and international level.* Meeting report Bonn, Germany, 12-13 May 2014, Copenhagen WHO Regional Office for Europe. Website: http://www.euro.who.int/__data/assets/pdf_file/0010/263629/WHO-Expert-Meeting-Methods-and-tools-for-assessing-the-health-risks-of-air-pollution-at-local,-national-and-international-level.pdf
2. Hamra GB, Guha N, Cohen A, Laden F, Raaschou-Nielsen O, Samet JM, Vineis P, Forastiere F, Saldiva P, Yorifuji T, Loomis D. *Outdoor particulate matter exposure and lung cancer: a systematic review and meta-analysis*. Environ Health Perspect. 2014 Sep;122(9):906-11. doi: 10.1289/ehp.1408092. Epub 2014 Jun 6. Erratum in: Environ Health Perspect. 2014 Sep;122(9):A236.
3. Cesaroni G, et al. *Long term exposure to ambient air pollution and incidence of acute coronary events: prospective cohort study and meta-analysis in 11 European cohorts from the ESCAPE Project.* BMJ. 2014 Jan 21;348:f7412. doi: 10.1136/bmj.f7412.

Linearity of dose-response curves

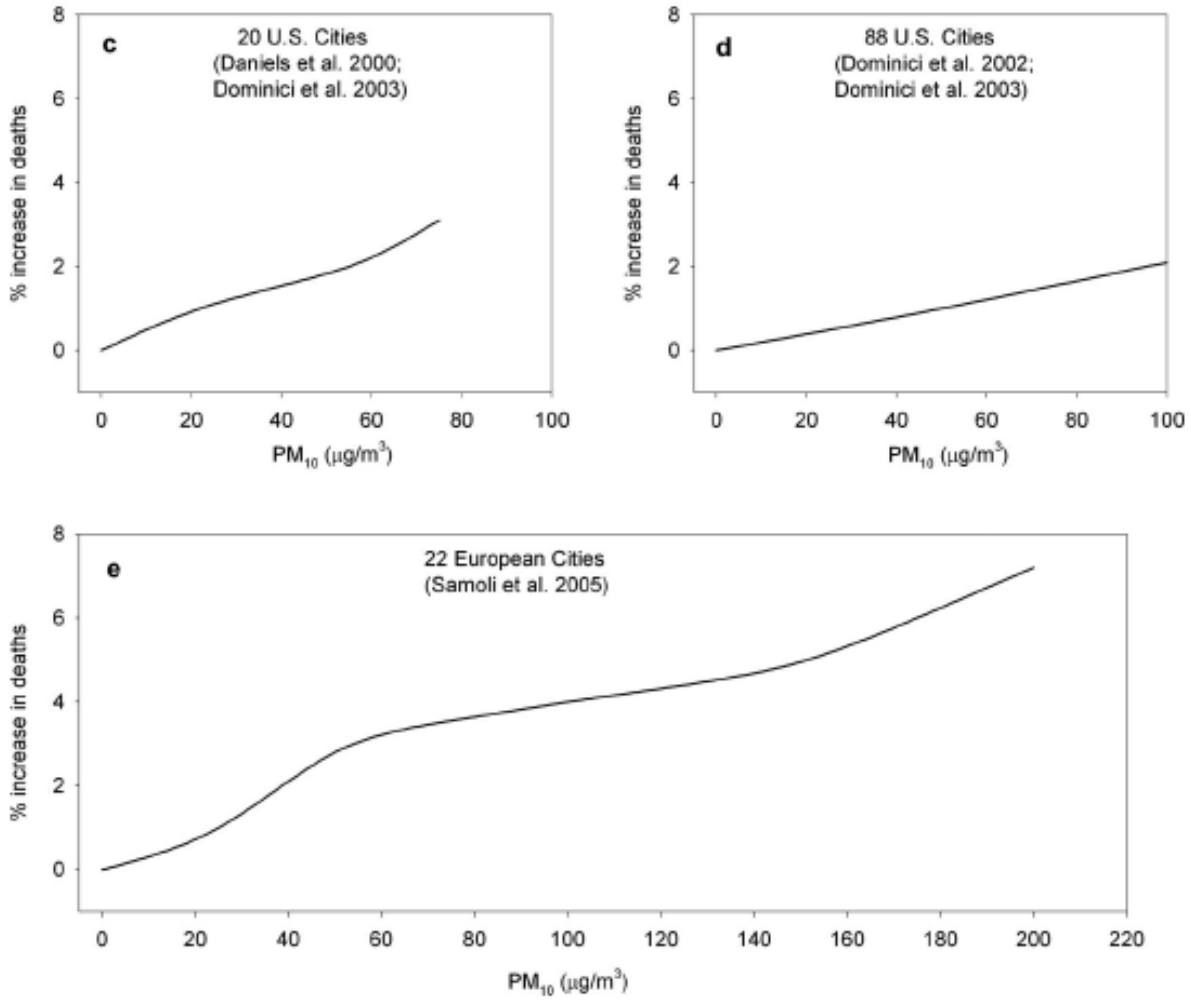


Figure 1. Selected concentration-response relationships estimated from various multicity daily time series mortality studies (approximate adaptations from original publications rescaled for comparison purposes).

Linearity of dose-response curves

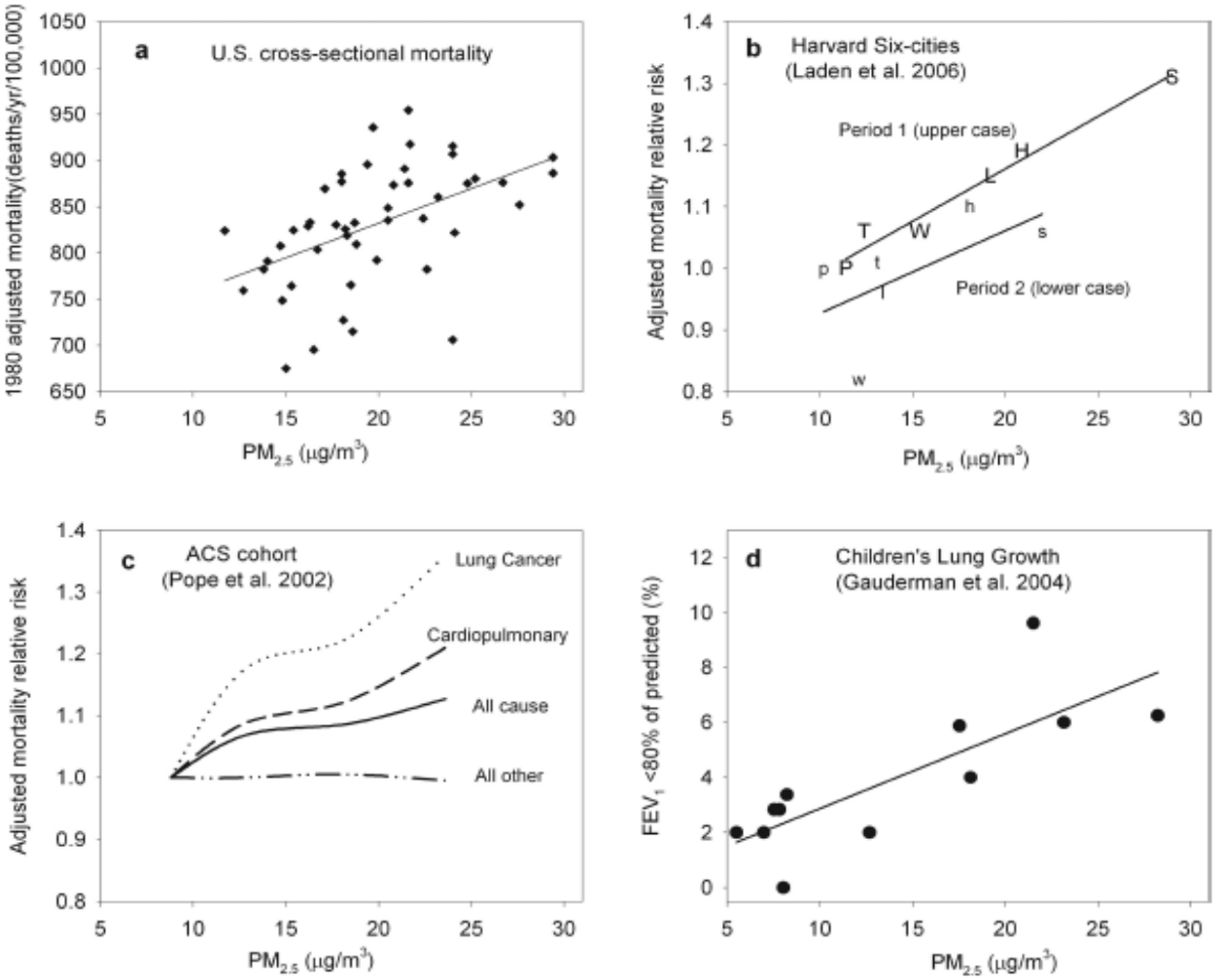
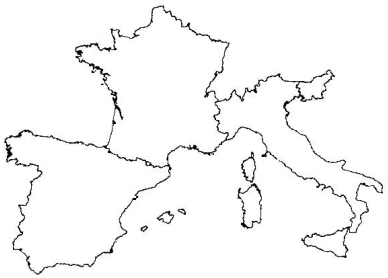


Figure 2. Selected concentration-response relationships estimated from various studies of long-term exposure (approximate adaptations from original publications rescaled for comparison purposes).

Valutazione di impatto sulla salute

(ITALIA)

Dati demografici

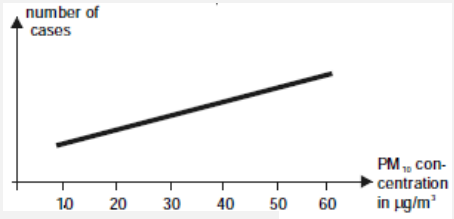


Concentrazione inquinanti

Esposizione della popolazione

Inquinamento

VIS Inquinamento: Approccio MED HISS



Curva dose risposta

Dati mortalità

Epidemiologia

Numero decessi

Risultati: Italia

- *Concentrazione inquinante*
- *Esposizione della Popolazione*
- *Mortalità per area*
- *Funzione dose-risposta (RR)*
- *Impatto sanitario*

Decessi attribuibili al PM 2.5 in Italia, per area 2010

D		Decessi attribuibili	95% I.C	% sul totale
	Italia	33533	20429-41368	7%
Area Geografica	Nord	20221	12396-24849	9%
	Centro	6344	3840-7858	5%
	Sud	6968	4193-8661	4%
Macroarea	Urbana	18977	11602-23360	11%
	Rurale	14556	8827-18008	4%

Relativa al livello controfattuale di PM 2.5 di 10 μg/m³

Anni di vita persi attribuibili al PM 2.5 in Italia, per area e sesso 2010

		YPLL	95% I.C	YPLL medi per decesso
	Italia	467.902	285.229 - 577.009	14.0
Gender				
	Maschi	229.383	139.797 - 282.913	14.2
	Femmine	238.519	145.432 - 294.096	13.7

Relativa al livello controfattuale di PM 2.5 di 10 μg/m³

Riduzione della speranza di vita dovuta alle concentrazioni di PM 2.5 in Italia, per area – 2010 (in mesi)

		Riduzione della speranza di vita (mesi)	95% I.C
	Italia	9,2	9,1-9,2
Area Geografica	Nord	11,6	11,6-11,8
	Centro	8,0	8,0-8,2
	Sud	5,3	5,3-5,4
Macroarea	Urbana	12,6	12,5-12,6
	Rurale	9,0	9,0-9,1
Sesso	Maschi	8,5	8,4-8,5
	Femmine	10,0	9,8-10,0

Relativa al livello controfattuale di PM 2.5 di 10 μg/m³

Riduzione della speranza di vita dovuta alle concentrazioni di PM 2.5 in Piemonte, per area – 2010 (in mesi)

	Riduzione della speranza di vita (mesi)	95% I.C
Regione Piemonte	9,6	9,6-9,6
Prov. Torino	9,1	9,1-9,2
Prov. Vercelli	9,6	9,5-9,6
Prov. Novara	13,2	13,2-13,3
Prov. Cuneo	7,4	7,4-7,4
Prov. Asti	12,0	12,0-12,1
Prov. Alessandria	12,2	12,1-12,2
Prov. Biella	8,0	8,0-8,2
Prov. Verbano-Cusio-Ossola	5,9	5,9-6,0
Torino Città	24,7	24,7-24,8

Relativa al livello controfattuale di PM 2.5 di 10 $\mu g/m^3$

Decessi attribuibili al PM 2.5 in Italia, per causa 2010

	RR (95% C.I.)	Eventi Attribuibili (95% C.I.)	YLPP (95% C.I.)
Cause Naturali	1.07 (1.04-1.09)	33533 (20429-41368)	467902 (285229-577009)
M.Cardiovascolari	1.10 (1.05-1.15)	19188 (10637-26117)	238362 (132263-324167)
M.Respiratorie	1.10 (0.98,1.24)	3066 (797-5665)	36676 (9569-67602)
Tumore polmone	1.09 (1.04,1.14)	2693 (1333-3786)	43908 (21743-61707)

Relativa al livello controfattuale di PM 2.5 di 10 $\mu g/m^3$

PrecedentiValutazioni nazionali di impatto nei Paesi MED HISS
Numero di decessi

	Ref. Year	Population	Author(s)	Pollutant	RR for 10 µg/m^3	Attributable cases
France	1993	59.110.000	Kunzli et al Lancet 2000	PM10	1.043 (1.026-1.061)	~ 31.700
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Spain	2010	46,064,000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 14.000*
Spain	2012	46.200.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 25.500*
Slovenia	2010	2,069,000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 900*
Slovenia	2012	2.100.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 1.700*

* Controfattuale per PM: 10

* Controfattuale per PM: 0

Attributable deaths to PM 2.5 concentrations in Italy, by area – 2010 MED HISS Project

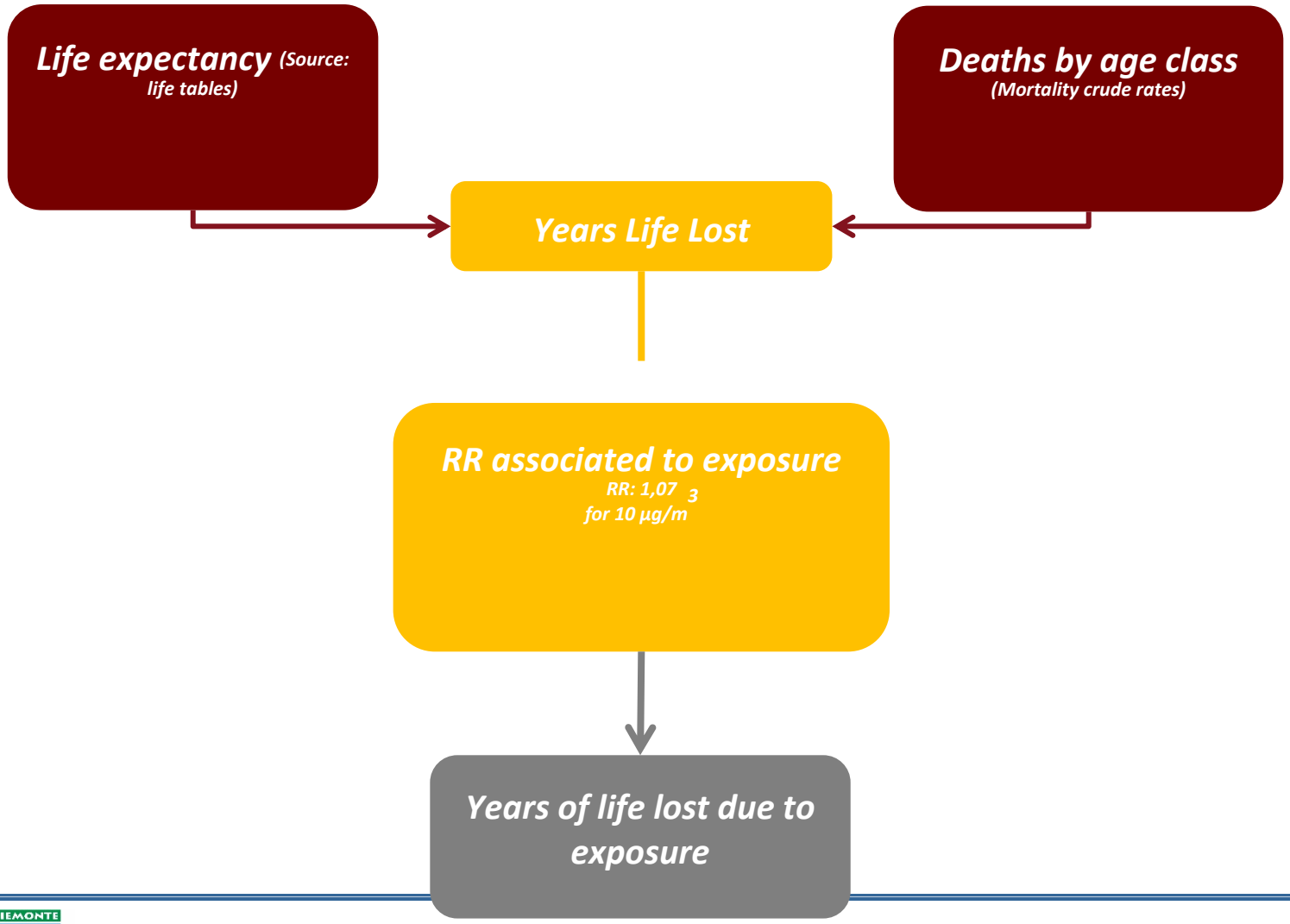
		Attributable deaths	95% I.C lower	% on total
	Italy	33533	20429-41368	7%
Geographic Area	North	20221	12396-24849	9%
	Center	6344	3840-7858	5%
	South	6968	4193-8661	4%
Macroarea	Urban	18977	11602-23360	11%
	Rural	14556	8827-18008	4%

Relative to PM 2.5 Counterfactual level: 10 μg/m³

Death counts or life years?

- With AR and background disease / mortality rates we can calculate the annual number of cases per year due to the exposure
- Concept difficult for deaths as death can only be postponed not prevented …..
- Years of life gained / lost (YPLL) may be more useful
- Reduction in Life Expectancy (at 30 years of age) is another common outcome in HIA

Years of life lost



Years of life lost Attributable to PM 2.5 concentrations in Italy, by gender – 2010 MED HISS Project

		YPLL	95% I.C	YPLL on average for each death
	Italy	467.902	285.229 - 577.009	14.0
Gender				
	Males	229.383	139.797 - 282.913	14.2
	Females	238.519	145.432 - 294.096	13.7

Relative to PM 2.5 Counterfactual level: 10 μg/m³

Life Expectany Loss due to PM 2.5 concentrations in Italy, by area – 2010 MED HISS Project (in months)

		Life Expectancy reduction (months)	L.E. 95% I.C
	Italy	9,2	9,1-9,2
Geographic Area	North	11,6	11,6-11,8
	Center	8,0	8,0-8,2
	South	5,3	5,3-5,4
Macroarea	Urban	12,6	12,5-12,6
	Rural	9,0	9,0-9,1
Gender	Males	8,5	8,4-8,5
	Females	10,0	9,8-10,0

Relative to PM 2.5
Counterfactual level: 10 μg/m³

Life Expectany Loss due to PM 2.5 concentrations in Piedmont region, by area – 2010 MED HISS Project (in months)

	Life Expectancy reduction (months)	L.E. 95% I.C
Piedmont Region	9,6	9,1-9,2
Prov. Torino	9,1	9,5-9,6
Prov. Vercelli	9,6	13,2-13,3
Prov. Novara	13,2	7,4-7,4
Prov. Cuneo	7,4	12,0-12,1
Prov. Asti	12,0	12,1-12,2
Prov. Alessandria	12,2	8,0-8,2
Prov. Biella	8,0	5,9-6,0
Prov. Verbano-Cusio-Ossola	5,9	9,6-9,6
Torino City	24,7	24,7-24,8

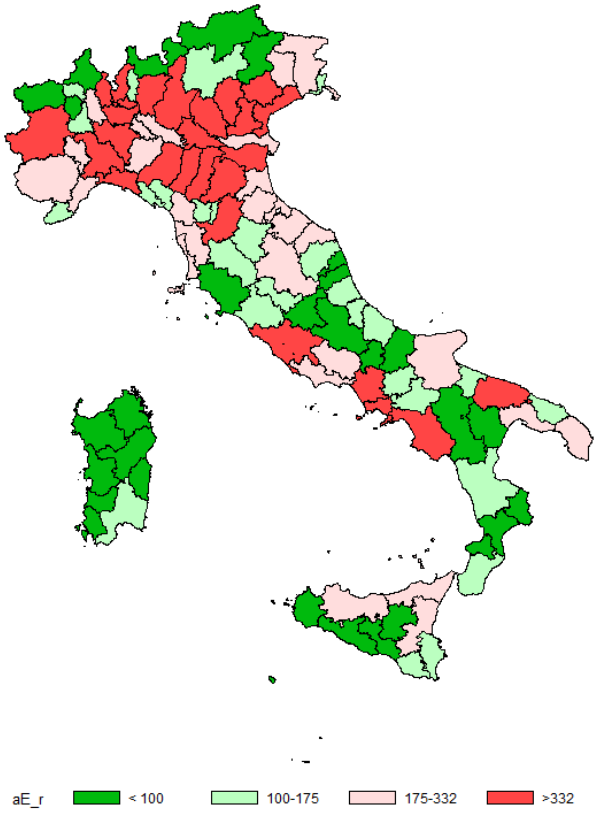
Relative to PM 2.5 Counterfactual level: 10 μg/m³

Attributable deaths to PM 2.5 concentrations in Italy, by cause – 2010 MED HISS Project

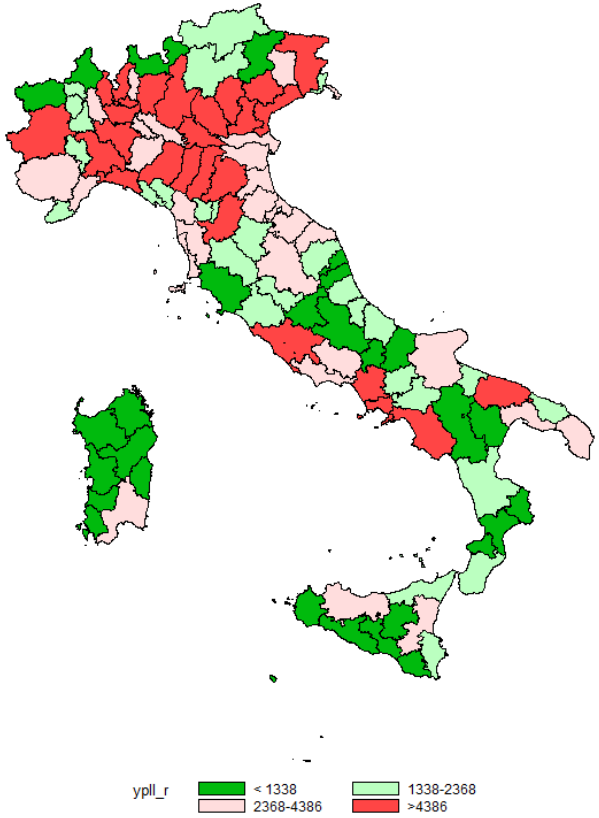
	RR (95% C.I.)	Attributable Events (95% C.I.)	YLPP (95% C.I.)
Natural causes	1.07 (1.04-1.09)	33533 (20429-41368)	467902 (285229-577009)
Cardiovascular diseases	1.10 (1.05-1.15)	19188 (10637-26117)	238362 (132263-324167)
Respiratory diseases	1.10 (0.98,1.24)	3066 (797-5665)	36676 (9569-67602)
Lung Cancer	1.09 (1.04,1.14)	2693 (1333-3786)	43908 (21743-61707)

Relative to PM 2.5 Counterfactual level: 10 μg/m³

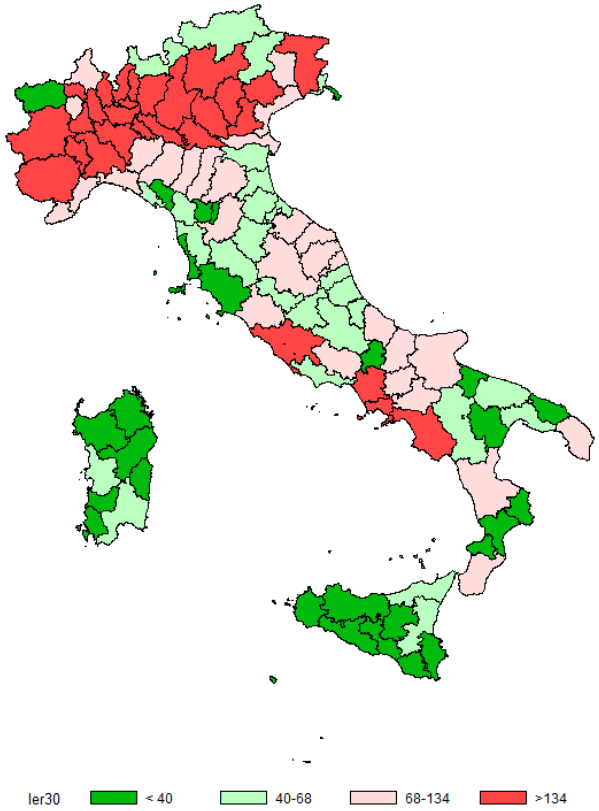
Absolute attributable deaths , by Province



Attributable YPLL , by Province



Life Expectancy loss , by Province



Health Impact Assessment of air pollution at National level in MED HISS Countries
Number of deaths

	Ref. Year	Population	Author(s)	Pollutant	RR for 10 μg/m^3	Attributable cases
France	1993	59.110.000	Kunzli et al Lancet 2000	PM10	1.043 (1.026-1.061)	~ 31.700
France	2007-2008	63,800,000	Pascal M. et al Sci Total Environ.2016	PM2.5	1.15 (1.05-1.25)	~ 15.750
France	2010	63.000.000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 17.000*
France	2012	63.600.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 43.400 *
Italy	2005	58,200,000	Ancona C et al VIIAS Project www.viias.it	PM2.5	1.07 (1.04-1.09)	~ 34.500
Italy	2010	60.500.000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 32.500*
Italy	2012	60.900.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 59.500*
Spain	2010	46,064,000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 14.000*
Spain	2012	46.200.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 25.500*
Slovenia	2010	2,069,000	WHO 2015	PM2.5	1.06 (1.04-1.08)	~ 900*
Slovenia	2012	2.100.000	EEA 2015	PM2.5	1.06 (1.04-1.08)	~ 1.700*

* Counterfactual value for PM: 10

* Counterfactual value for PM: 0


Grazie
Per l'attenzione