

# RAMAZZINI DAYS 2010

## Multicentre Mortality Study of Polluted Sites Of National Concern in Italy SENTIERI Project

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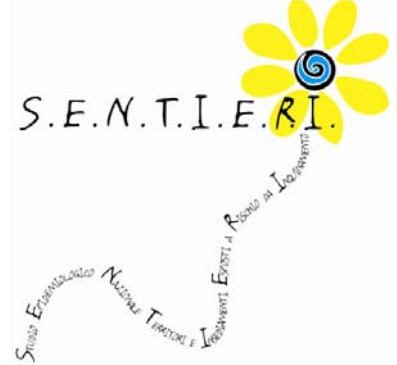
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## WHY SENTIERI PROJECT

About 250,000 sites in European Environment Agency-EEA member countries are defined as requiring clean up (<http://themes.eea.europa.eu/>)

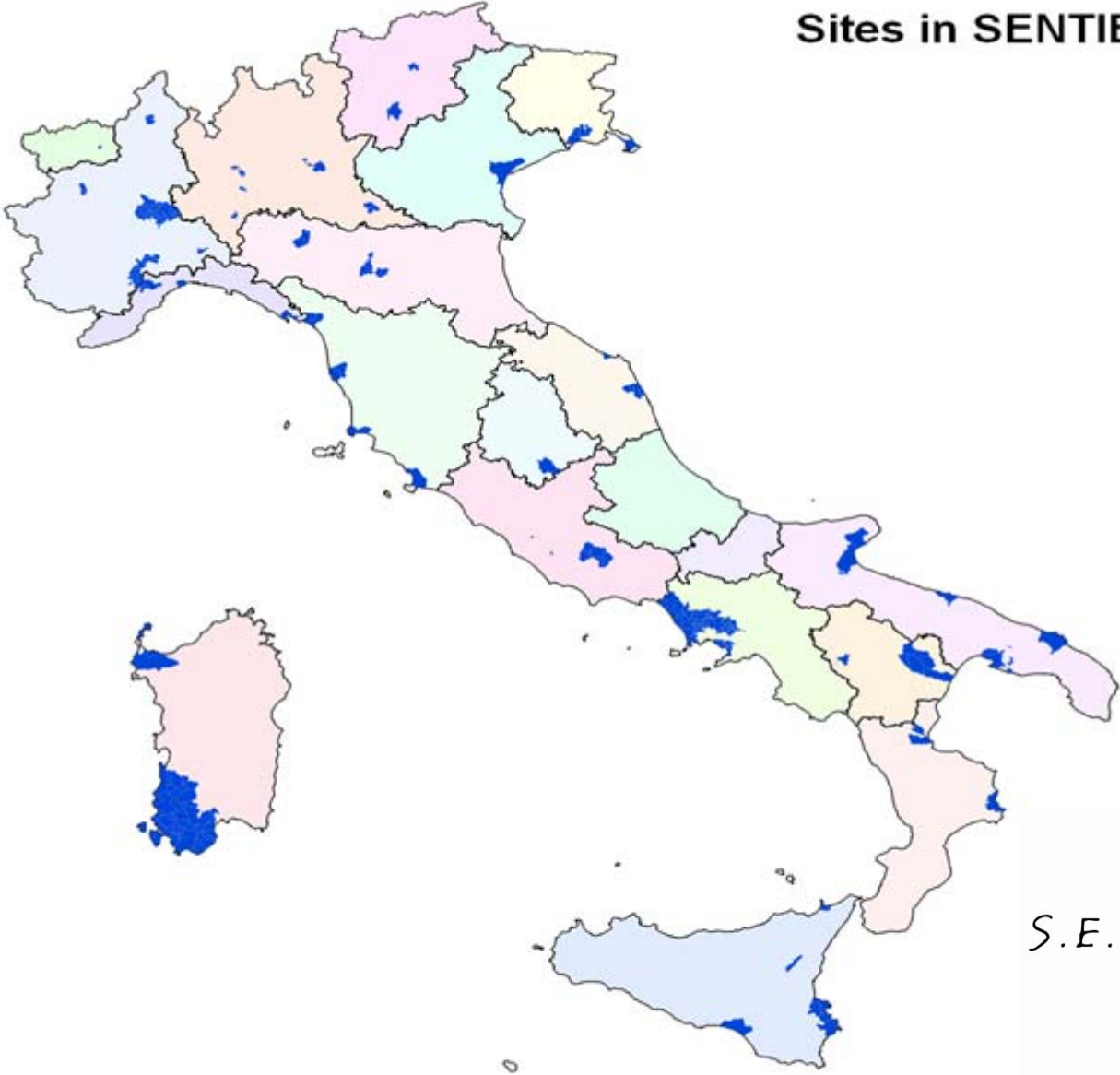
Thousands of these sites are located in Italy (Ministerial Decrees n. 486, 2001, and successive Decrees); 57 of them are "of national concern" because of a major impact of environmental pollution and the complexity of required remediation

### SENTIERI

Examines sources of environmental pollution in Italian polluted sites(IPS)

Describes health status of resident populations using mortality data

# Sites in SENTIERI



S.E.N.T.I.E.R.I.

STUDIO ETNOLOGICO NAZIONALE TERRITORI E  
INDAGANTI ESISTENTI A R. SCALZI DA INDIRIZZAMENTO

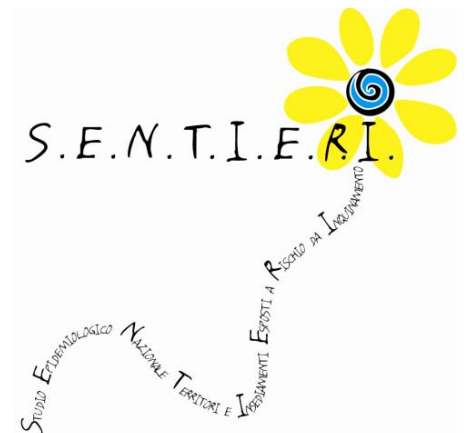
## SENTIERI - RATIONALE

Forty four sites fulfilling admissibility criteria, 298 municipalities, 5,534,492 inhabitants, about 10% of the total Italian population at 2001 census

Mortality study (63 causes of death, 1995-2002) for males and females

Standardised Mortality Ratio (SMR) and 90% Confidence Intervals using regional population for comparison, crude and adjusted for deprivation

*A priori* evaluation of the epidemiological evidence in terms of strength of causal association



## EXPOSURES FOR WHICH THE EPIDEMIOLOGICAL EVIDENCE WAS EVALUATED

### *Environmental exposures from polluted sites*

- coded as

**C** production of chemical substance/s,  
**P & R** petrochemical plant and/or refinery,  
**S** steel industry,  
**E** electric power plant,  
**M** mines/quarries,  
**HA** harbour area,  
**A** asbestos/other mineral fibers,  
**L** landfill,  
**I** incinerator - defined on the basis of the Decrees, can affect residents

## EXPOSURES FOR WHICH THE EPIDEMIOLOGICAL EVIDENCE WAS EVALUATED

### *Other exposures*

- air pollution, active and passive smoking, alcohol,
- occupational exposures and socioeconomic status
- ascertained health effects on the causes of death included in SENTIERI

# A *PRIORI* EVALUATION OF THE EPIDEMIOLOGICAL EVIDENCE IN SENTIERI PROJECT

## Aim

to classify each combination of cause of death and *exposure* in terms of strength of causal association

Bibliographic sources identified and classified according to hierarchical approach

- *primary* sources (e.g. environmental and occupational medicine textbooks, cancer epidemiology textbook, Monographs and Reports of international and national public health institutions)
- quantitative meta-analyses
- systematic reviews
- multicentre studies
- original articles of single studies

epo

EPIDEMIOLOGIA  
& PREVENZIONE

Rivista dell'Associazione  
Italiana di epidemiologia  
ANNO 34 (3) MAGGIO-GIUGNO 2010  
SUPPLEMENTO 1



S.E.N.T.I.E.R.I.

STUDIO EPIDEMIOLOGICO NAZIONALE TERRITORI E INSEDIAMENTI ESPOSTI A RISCHIO DA INQUINAMENTO

Studio Epidemiologico Nazionale dei Territori e degli Insediamenti  
Esposti a Rischio da Inquinamento (SENTIERI)

## Valutazione della evidenza epidemiologica

SENTIERI Project - Mortality study of residents in Italian polluted sites:

## Evaluation of the epidemiological evidence

A cura di:  
Roberta Pirastu  
Carla Ancona  
Ivano Iavarone  
Francesco Mitis  
Amerigo Zona  
Pietro Comba

EDIZIONI  
**i**nferenze



Ministero lavoro, salute, politiche sociali



SAPIENZA  
UNIVERSITÀ DI ROMA



Dipartimento di Epidemiologia  
ASL RME

*Evaluation of the epidemiological evidence of the association between specific causes and **environmental exposures** from IPS - Italian Polluted Sites*

<b>Cause of death</b>	<b>C</b>	<b>P &amp; R</b>	<b>S</b>	<b>TE</b>	<b>M</b>	<b>HA</b>	<b>A</b>	<b>L</b>	<b>I</b>
<b>All ages</b>									
All causes		I	I					I	
All m. neoplasms		I	I					I	I
M.n. lung	I	L	I	L	I	I	L	I	L
M.n.pleura		I	I	I	L	L	S		
M. n. lymphoematopoietic tissue	I	I	I	I			I	I	L
Dis. circulatory system		I						I	
Dis. respiratory system	L	L	L	L	I	L		I	I
Dis. Digestive system								I	
Dis. Genitourinary system	I								
Congenital anomalies	I	L						L	I
<b>0-1 year</b>									
All causes	I							I	I
Conditions originating in prenatal period	L	L			I			L	I
<b>0-14 years</b>									
All m. neoplasms	I							I	I
Leukemia	I	I						I	I
Asthma	L	L	L	L				I	I

S = sufficient; L = Limited; I = Inadequate; NA = not applicable

*SENTIERI: evaluation of the epidemiological evidence of the association between specific causes and air pollution, active and passive smoking, socioeconomic status, occupation*

Cause of death	Air pollution	Smoking active	Smoking passive	Alcohol	Socioeconomic status	Occupation
<b>All ages</b>						
All causes	S	S	S	S	S	I
All m. neoplasms		I	I	L	S	I
M.n. lung	S	S	S	I	S	S
M.n.pleura	L					S
M. n. lymphoematopoietic	I	S		I	I	
Dis. circulatory system	S	S	S	L	L	I
Dis. respiratory system	L onset S worsening	S onset & worsening	L onset & worsening	S	L	S
Dis. digestive system	I	L		S		
Dis. genitourinary						
Congenital anomalies	I		L	L	L	I
<b>0-1 year</b>						
All causes	S		I	NA	L	I
Conditions orig. in prenatal period	L		S	I	I	I
<b>0-14 years</b>						
All m. neoplasms	I		I	I		I
Leukemia	I		I	I	S	I
Asthma	L onset S worsening		S onset & worsening		L	

**SITES WITH ASCERTAINED PRESENCE OF ASBESTOS  
AND NO MENTION OF OTHER POLLUTANTS**

<b>Site</b>	<b>OBS</b>	<b>Std Rates (CI 90%)</b>	<b>SMR (CI 90%)</b>	<b>SMR DI (CI 90%)</b>	<b>Activities</b>
Emarese	-	-	-	-	asbestos quarry and dumping sites
Balangero	4	7.2 (2.5-18)	220 (75-504)	261 (89-596)	"
Broni	35	36 (26.5-49.4)	<b>1390</b> <b>(1028-1843)</b>	<b>1383</b> <b>(1022-1834)</b>	asbestos-cement factory
Casale Monferrato	268	30.3 (27.3-33.7)	<b>901</b> <b>(812-997)</b>	<b>864</b> <b>(779-956)</b>	"
Bari- Fibronit	66	2.9 (2.3-3.6)	<b>195</b> <b>(157-239)</b>	<b>167</b> <b>(135-205)</b>	"
Biancavilla	10	7.3 (3.9-13.1)	<b>495</b> <b>(269-840)</b>	<b>481</b> <b>(261-815)</b>	quarry *
<b>Italy</b>	<b>8484</b>	<b>1,9</b> <b>(1.9-2)</b>			

\* : the asbestiform fibre found in Biancavilla was classified as fluoro-edenite (*Gianfagna and Oberti, 2000*)

**SITES WITH ASCERTAINED PRESENCE OF ASBESTOS AND  
MENTION OF OTHER POLLUTANTS**

<b>Site</b>	<b>OBS</b>	<b>Std Rates (CI 90%)</b>	<b>SMR (CI 90%)</b>	<b>SMR DI (CI 90%)</b>	<b>Activities</b>
Val Basento industrial areas	-	-	-	-	Chemical industry, asbestos-cement plant, thermo-electric power plant
Vesuvio shoreline area	72	2.4 (2-3)	<b>169</b> <b>(137-205)</b>	<b>149</b> <b>(121-181)</b>	Railroad carriages production, naval dockyards, landfills
Massa Carrara	32	2.9 (2.1-3.9)	<b>177</b> <b>(129-237)</b>	<b>189</b> <b>(137-253)</b>	Pharmaceutical, petrochemical industries, steel foundry, quarries, incinerators, landfills, harbour
Pitelli	116	10.3 (8.8-12.1)	<b>169</b> <b>(144-198)</b>	<b>164</b> <b>(140-192)</b>	Arms industry, toxic waste dumping sites, thermo-electric power plant, naval dockyard
Priolo	39	3.4 (2.6-4.5)	<b>239</b> <b>(180-313)</b>	<b>241</b> <b>(181-314)</b>	Refineries, petrochemical plants, toxic waste dumping sites, asbestos-cement factory
Tito	-	-	-	-	Chemical industry, steel foundry
<b>Italy</b>	<b>8484</b>	<b>1,9</b> <b>(1.9-2)</b>			

**SITES WITH PROBABLE PRESENCE OF ASBESTOS**

**REFINERY (R); PETROCHEMICAL PLANT (P); STEEL FOUNDRY (F)**

<b>Site</b>	<b>OBS</b>	<b>Std Rates (CI 90%)</b>	<b>SMR (CI 90%)</b>	<b>SMR DI (CI 90%)</b>	<b>Activities</b>
Falconara	9	3.7 (1.9-6.6)	273 (142-477)	255 (133-446)	R
Gela	13	3.4 (1.9-6)	248 (147-394)	290 (172-462)	R, P
Mantova	13	2.3 (1.3-3.9)	91 (54-145)	91 (54-145)	R, P
Livorno	75	4.7 (3.8-5.7)	288 (236-349)	157 (128-190)	R
Milazzo	-	-	-	-	R, F
Sesto San Giovanni	12	1.1 (0.6-1.9)	49 (28-80)	49 (28-79)	F
Taranto	97	6.7 (5.6-8)	441 (370-522)	268 (225-317)	R, F
Trieste	131	5.8 (5-6.7)	166 (143-192)	147 (127-171)	R, F
Venezia–Porto Marghera	89	3.3 (2.7-4)	187 (156-223)	156 (130-186)	R, P
Porto Torres	7	0.9 (0.4-1.7)	72 (34-134)	65 (30-121)	P
Brindisi	16	2.9 (1.8-4.5)	184 (115-280)	110 (69-167)	P
Piombino	11	3 (1.7-5.5)	187 (105-310)	98 (55-162)	F
<b>Italy</b>	<b>8484</b>	<b>1,9 (1.9-2)</b>			

# SENTIERI PROJECT - CONCLUDING REMARKS 1

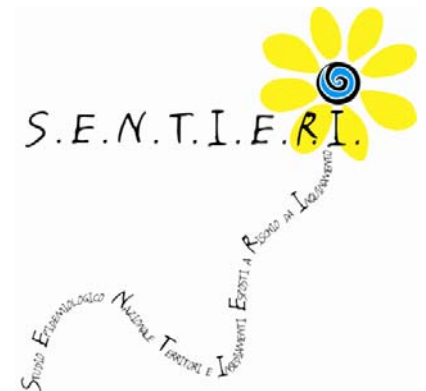
*A priori* epidemiological evidence evaluation allows

- to categorize the persuasiveness of etiological hypotheses in epidemiological studies of polluted sites
- increased confidence in inferring causality of the observed associations
- to contain the problems related to *post-hoc observations and multiple comparison*



## SENTIERI PROJECT - CONCLUDING REMARKS 2

- Mortality study in all contaminated sites located in one country adopting an *a priori* definition of contaminated site and an *a priori* evaluation of the epidemiological evidence of the association between *environmental exposure/s* and cause specific mortality
- Focus on the causes of death for which it is established or reasonably assumed an etiological role of the *environmental exposures*, also considering the potential etiologic effect of *other exposures*



## SENTIERI PROJECT - CONCLUDING REMARKS 3

- Contribution to priority setting in environmental remediation activities
- Contribution to evaluating long-term health benefits of clean-up interventions
- Cooperative actions for sharing criteria and protocols in the international setting



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