

La sorveglianza epidemiologica del mesotelioma: considerazioni sugli effetti attuali dell'esposizione ad amianto.

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Progetto Ambiente e Tumori, Padova, 1 maggio 2013

- L'insorgenza di tumori nell'uomo come conseguenza di “fattori di rischio” noti.
- “I fattori di rischio” costituiti da esposizioni a cancerogeni (agenti chimici e fisici); la rilevanza delle esposizioni nei luoghi di lavoro.
- L'amianto un cancerogeno certo, associato in maniera certa nell'uomo a tumori di alcune sedi: mesoteliomi, tumore del polmone, tumori della laringe, tumori dell'ovaio.
- Il Registro nazionale dei mesoteliomi; la rete dei Centri Operativi Regionali, il Registro regionale veneto dei casi di mesotelioma. Alcuni risultati.

The fraction of cancer attributable to lifestyle and environmental factors in the UK in 2010

Summary and conclusions

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This chapter summarises the results of the preceding sections, which estimate the fraction of cancers occurring in the UK in 2010 that can be attributed to sub-optimal, past exposures of 14 lifestyle and environmental risk factors. For each of 18 cancer types, we present the percentage of cases attributable to one or all of the risk factors considered (tobacco, alcohol, four elements of diet (consumption of meat, fruit and vegetables, fibre, and salt), overweight, lack of physical exercise, occupation, infections, radiation (ionising and solar), use of hormones, and reproductive history (breast feeding)). Exposure to less than optimum levels of the 14 factors was responsible for 42.7% of cancers in the UK in 2010 (45.3% in men, 40.1% in women) – a total of about 134 000 cases.

Tobacco smoking is by far the most important risk factor for cancer in the UK responsible for 60 000 cases (19.4% of all new cancer cases) in 2010. The relative importance of other exposures differs by sex. In men, deficient intake of fruits and vegetables (6.1%), occupational exposures (4.9%) and alcohol consumption (4.6%) are next in importance, while in women, it is overweight and obesity (because of the effect on breast cancer) – responsible for 6.9% of cancers, followed by infectious agents (3.7%). Population-attributable fractions provide a valuable quantitative appraisal of the impact of different factors in cancer causation, and are thus helpful in prioritising cancer control strategies. However, quantifying the likely impact of preventive interventions requires rather complex scenario modelling, including specification of realistically achievable population distributions of risk factors, and the timescale of change, as well as the latent periods between exposure and outcome, and the rate of change following modification in exposure level.

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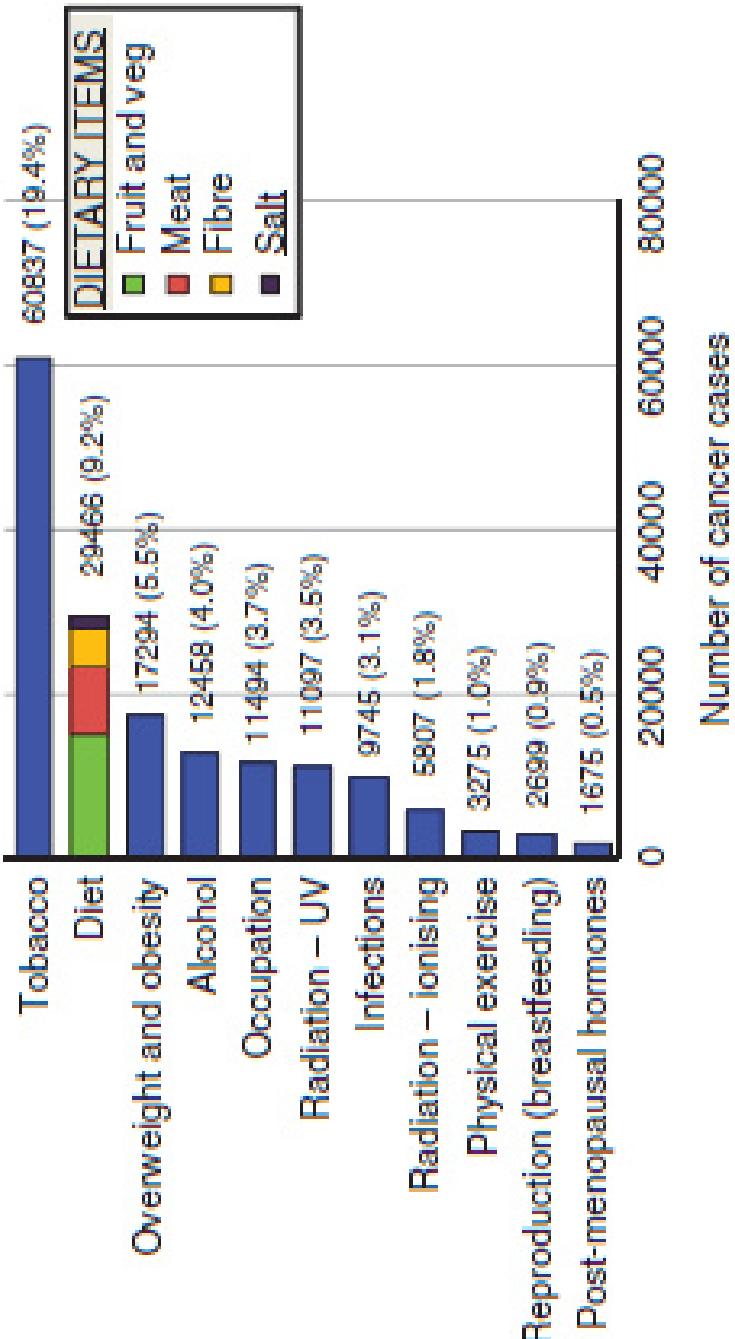


Figure 1 Number and percentage of cancer cases in the UK attributable to different exposures.

Frazione attribuibile (%) ai decessi per tumori lavorativi per alcune sedi nelle recenti stime relative alla Finlandia e alla Gran Bretagna

Fonte: E&P 2009; 33; 17-27 (Suppl.2)

SEDE	UOMINI		DONNE	
	GRAN BRETAGNA IARC 1	FINLANDIA IARC 1, 2A	IARC 1	GRAN BRETAGNA IARC 1, 2A
Vescica	1,3	11,6	14,2	0,6
Leucemia	0,3	2,7	18,5	0,5
Polmone	16,5	21,6	29	4,5
Mesotelioma	85-90	98	90	20-30
Tumori cutanei (esclusi i melanomi)	11,8	11,8	13,1	3
Seni nasali	34,1	64,3	24	10,8
Totali sulla mortalità	6	8	13,8	1
				1,5
				2,2

Stima dei decessi per tumori attribuibili al lavoro in Italia, sulla base delle stime UK

Sede anatomica	Frazione attribuibile Rushton, 2010	Decessi osservati (>25 anni) ITALIA, UOMINI, 2006	Decessi osservati (>25 anni) VENETO, UOMINI 2007	Decessi attribuibili al lavoro ITALIA	Decessi attribuibili al lavoro VENETO
<i>Tum. Nasofaringe</i>	11	140	192	15	n.c.
Tum. Esofago	3,3	1309	390	43	6
Tum. Stomaco	3	6241	187	12	
Tum. Fegato-Dotti	0,2	6288	586	13	1
Tum. Pancreas	0,02	4754	459	1	0,1
Tum. Naso-sinusali	46	88	40	n.c.	
Tum. Laringe	2,9	1576	120	46	3
Tum. Bronchi-Polmoni	21,1	25464	2078	5373	438
Tum. Osso-Cartilagine	0,04	248	0	n.c.	
<i>Melanoma (occhio)</i>	2,9	83	2	n.c.	
Tum. Cute (non melanomi)	7,1	263	19	n.c.	
Mesoteliomi (pleura, peritoneo)	97	895	868	n.c.	
<i>Sarcomi tessuti molli</i>	3,4	367	12	n.c.	
Tum. Rene	0,04	2306	1	n.c.	
Tum. Vescica	7,1	4137	239	294	17
Tum. Encefalo	0,5	1839	9	n.c.	
<i>Tum. Timide</i>	0,12	197	0	n.c.	
Linfoma non Hodgkin	2,1	2242	183	47	4
Leucemia	0,9	3006	229	27	2
<i>Sistema linfo-angiopatico</i>	0,004	7000	0	n.c.	
<i>Mieloma multiplo</i>	0,4	1432	6	n.c.	
Tumori totali	8,2	91.894	7779	7535	638 **

*totaale per le sole sedi indicate

Special Report: Policy

A review of human carcinogens—Part C: metals, arsenic, dusts, and fibres

In March, 2009, 27 scientists from eight countries met at the International Agency for Research on Cancer (IARC) to reassess the carcinogenicity of metals, arsenic, dusts, and fibres previously classified as "carcinogenic to humans" (Group 1) and to identify additional tumour sites and mechanisms of carcinogenesis (table). These assessments will be published as part C of Volume 100 of the IARC Monographs.

Inhalation is the primary route of exposure to arsenic in the workplace and happens in industries such as non-ferrous smelting, arsenic production, wood preservation, glass manufacturing, production and application of arsenic-based pesticides, and electronics. Non-occupational exposure to arsenic is mainly through food, except in areas with high levels of arsenic in the drinking water—eg, Taiwan, Bangladesh, West Bengal (India), northern Chile, and Cordoba Province (Argentina).¹ Epidemiological studies have shown that exposure to arsenic through inhalation or drinking-water

causes cancer of the lung, skin, and urinary bladder. Evidence suggests an association between exposure to arsenic in drinking water and the development of tumours at several other sites; however, various factors prevent a conclusion. Analytical studies have provided only limited information to support an association with kidney cancer, causes of liver cancer can be difficult to elucidate in groups that are high-risk for hepatitis B, and data on prostate cancer and arsenic exposure are not consistent between countries. Overall, the Working Group classified arsenic and inorganic arsenicals monomethylarsenic acid (MMA) and dimethylarsinic acid (DMA) as the active ingredients of some herbicides and are metabolites of inorganic arsenic. On the basis of sufficient evidence of cancer caused by DMA in experimental animals, and because MMA is extensively metabolised to DMA, both compounds are classified as "possibly carcinogenic

to humans" (Group 1). The organic arsenicals monomethylarsenic acid (MMA) and dimethylarsinic acid (DMA) are the active ingredients of some herbicides and are metabolites of inorganic arsenic. On the basis of sufficient evidence of cancer caused by DMA in experimental animals, and because MMA is extensively metabolised to DMA, both compounds are classified as "possibly carcinogenic

to humans" (Group 2B). Arsenobetaine and other organic arsenic compounds that are not metabolised in humans are "not classifiable" (Group 3).

The Working Group reaffirmed the classification of beryllium and its compounds, cadmium and its compounds, chromium (VI) compounds, and nickel compounds as "carcinogenic to humans" (Group 1). Studies involved complex occupational exposures to a metal and its compounds, making it impossible to separately assess their carcinogenicity.

Globally, an estimated 125 million people are still exposed to asbestos in the workplace.² Although asbestos has been banned or restricted in most of the industrialised world, its use is increasing in parts of Asia, South America, and the former Soviet Union.³ Naturally occurring sources of asbestos, its use in brake linings, and deterioration of asbestos-containing products all contribute to environmental exposure worldwide. Exposure may also come from fibres carried home on the clothing of asbestos workers.⁴

Group 1 agent
Tumour sites (or types) for which there is sufficient evidence in humans

	Tumour sites (or types) for which there is sufficient evidence in humans	Other sites with limited evidence in humans	Established mechanistic events
Arsenic and inorganic arsenic compounds	Lung, skin, urinary bladder	Kidney, liver, prostate	Cytotoxic DNA damage, genomic instability, aneuploidy, gene amplification, epigenetic effects, DNA repair inhibition leading to mutagenesis
Beryllium and beryllium compounds	Lung	..	Chromosomal aberrations, aneuploidy, DNA damage
Cadmium and cadmium compounds	Lung	Prostate, kidney	DNA repair inhibition, disturbance of tumour-suppressor protein leading to genomic instability
Chromium (VI) compounds	Lung	Nasal cavity and paranasal sinuses	Direct DNA damage after intracellular reduction to Cr(III); mutation, genomic instability, aneuploidy, cell transformation
Nickel compounds	Lung, nasal cavity, and paranasal sinuses	..	DNA damage, chromosome aberrations, genomic instability, micronuclei, DNA-repair inhibition, alteration of DNA methylation, histone modification
Asbestos (chrysotile, crocidolite, amosite, tremolite, actinolite, and arthurite/lilacite)	Lung, mesothelioma, larynx, oral pharynx, stomach	Colon, rectum, pharynx, stomach	Impaired fibre clearance leading to macrophage activation, inflammation, generation of reactive oxygen and nitrogen species, tissue injury, genotoxicity, aneuploidy and polyploidy, epigenetic alteration, activation of signalling pathways, resistance to apoptosis
Erythrite	Mesothelioma	..	Genotoxicity
Silica dust, crystalline in the form of quartz or cristobalite	Lung	..	Impaired particle clearance leading to macrophage activation and persistent inflammation
Leather dust	Nasal cavity and paranasal sinuses
Wood dust	Nasal cavity and paranasal sinuses, nasopharynx

Table: Metals, arsenic, dusts, and fibres assessed by the IARC Monograph Working Group



June 2-9, 2009
Panathinaiko
September 7-9, October 5-6, 2009
Athens, Greece
<http://monographs.iarc.fr>

Ipotetiche modifiche nella mortalità per tumore in relazione ai cambiamenti nell'esposizione per 5 sostanze. Fonte: JW Cherrie, Ann Occup Hyg 51: 653, 2007

Exposure to carcinogens in Great Britain

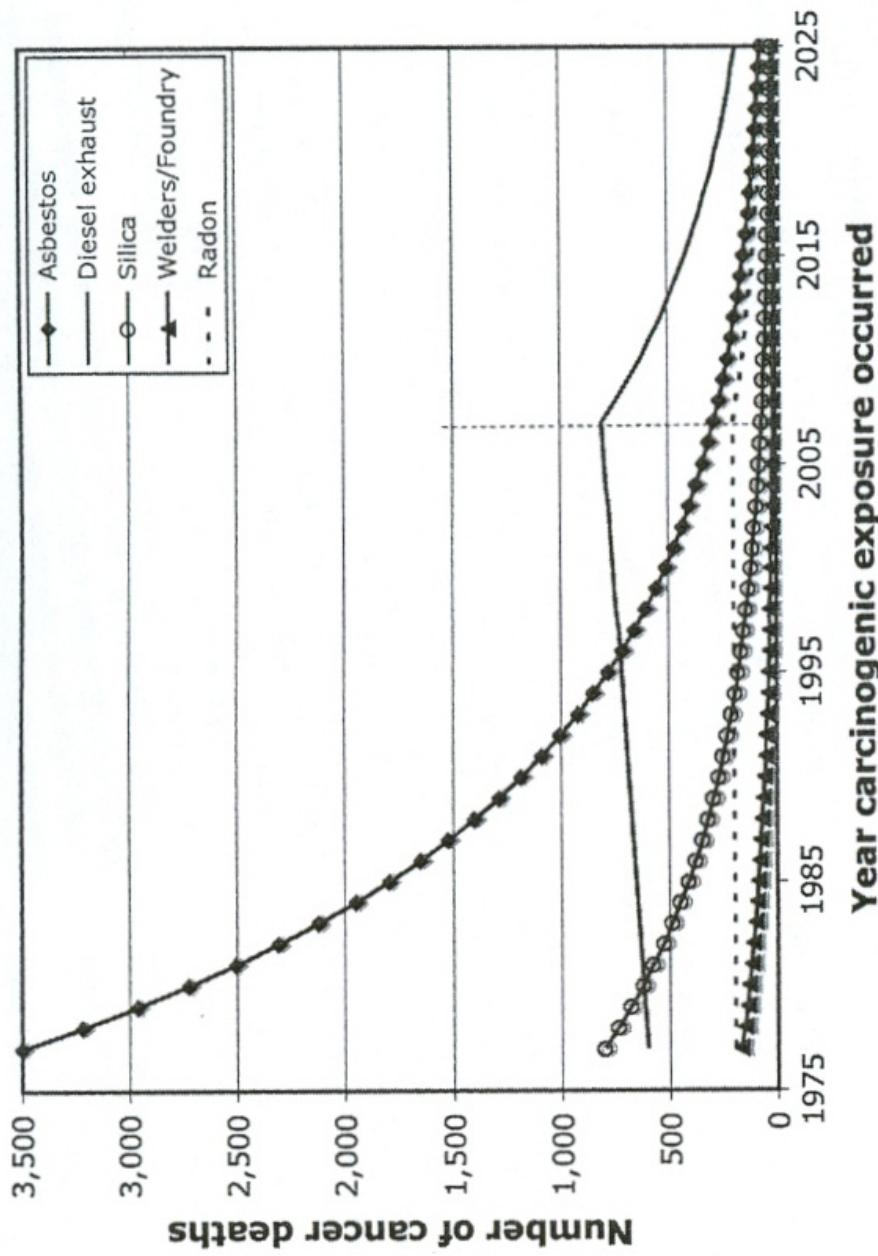


Fig. 5. Hypothetical changes in cancer mortality for five occupational carcinogens based on projected changes in exposure over time.

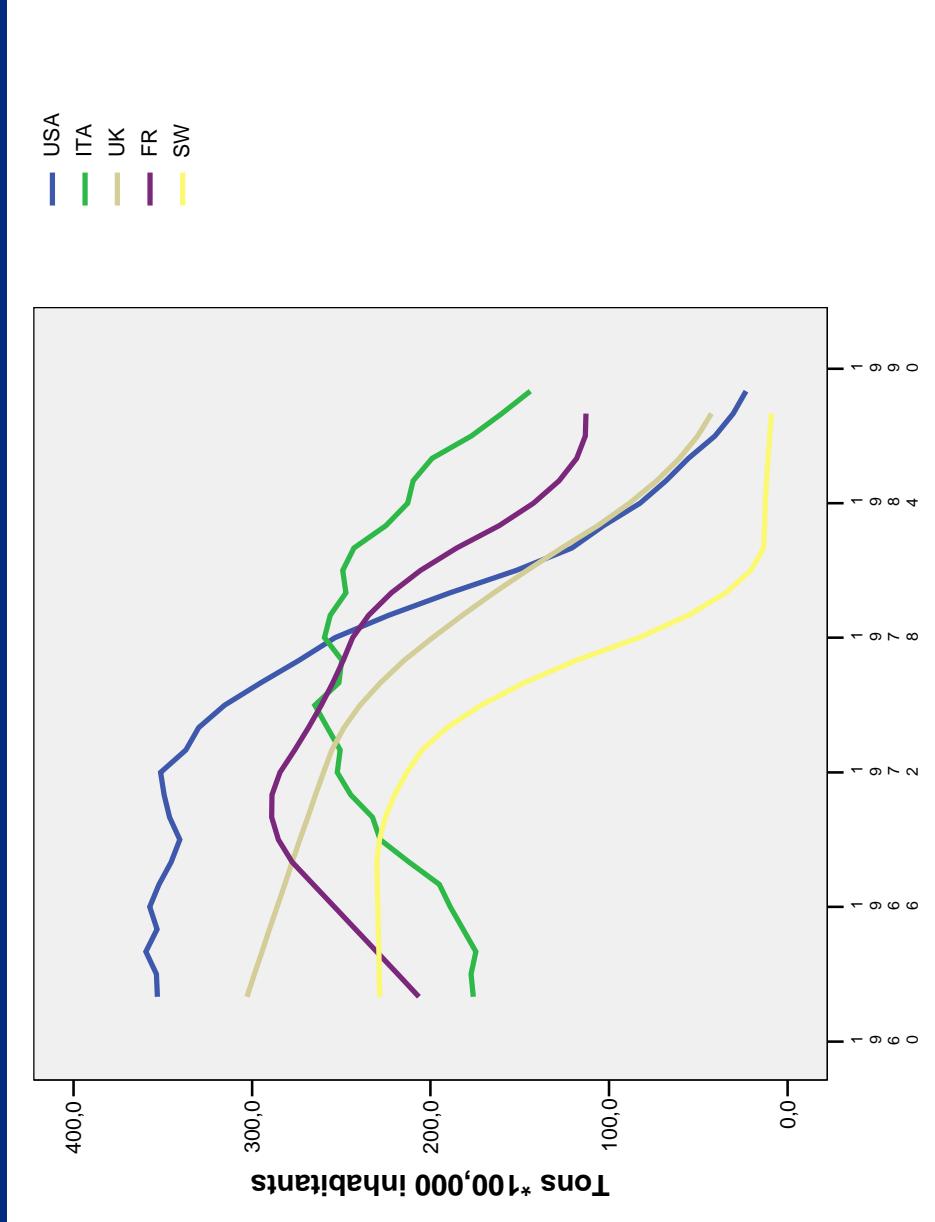
Table 2. Reported and extrapolated 15-year cumulative mortality of mesothelioma during 1994–2008 in 56 countries/entities with data for mesothelioma mortality and use of asbestos.

Country (abbreviation)	Cumulative use of asbestos, (tons), 1920–1970	Years with available data (n)	Reported cumulative mortality (cases)	Annual average of reported mortality (cases)	Extrapolated 15-year cumulative mortality (cases)
1 USA (USA)	21,840,583	7	17,062	2,437	36,561
2 UK (GBR)	4,829,517	7	13,239	1,891	28,369
3 Germany (DEU)	4,144,825	9	9,569	1,063	15,948
4 Japan (JPN)	3,210,349	14	11,212	801	12,013
5 France (FRA)	2,352,646	8	6,608	826	12,390
6 Canada (CAN)	1,955,347	5	1,603	321	4,809
7 Italy (ITA)	1,934,558	3	3,706	1,235	18,530
8 Australia (AUS)	1,152,776	8	3,747	468	7,026
9 Belgium (BEL)	1,110,214	3	467	156	2,335
10 Spain (ESP)	701,565	7	1,840	263	3,943
11 Poland (POL)	581,013	10	957	96	1,436
12 Brazil (BRA)	577,333	10	955	96	1,433
13 Romania (ROU)	550,799	10	581	58	872
14 Slovakia (SVK)	548,874	12	154	13	193
15 Denmark (DNK)	447,590	13	918	71	1,059
16 Mexico (MEX)	422,645	10	1,513	151	2,270
17 Sweden (SWE)	414,601	11	1,348	123	1,838
18 Netherlands (NLD)	411,989	13	5,141	395	5,932
19 Austria (AUT)	410,249	7	563	80	1,206
20 Argentina (ARG)	338,870	11	1,065	97	1,452
21 Finland (FIN)	299,695	13	970	75	1,119
22 Switzerland (CHE)	267,302	4	568	142	2,130
23 Republic of Korea (KOR)	244,802	12	339	28	424
24 Hungary (HUN)	235,442	13	451	35	520
25 South Africa (ZAF)	203,566	12	2,322	194	2,903
26 Colombia (COL)	196,345	9	323	36	538
27 Croatia (HRV)	165,011	14	547	39	586
28 Norway (NOR)	158,017	12	648	54	810
29 New Zealand (NZL)	147,197	7	513	73	1,099
30 Cyprus (CYP)	145,745	4	21	5	79
31 Czech Republic (CZE)	140,920	15	611	41	611

Park et al, Global magnitude of reported and unreported mesothelioma. Environ Health Perspect, 119: 514-518; 2011.

Consumption of raw asbestos in selected countries, includes Italy

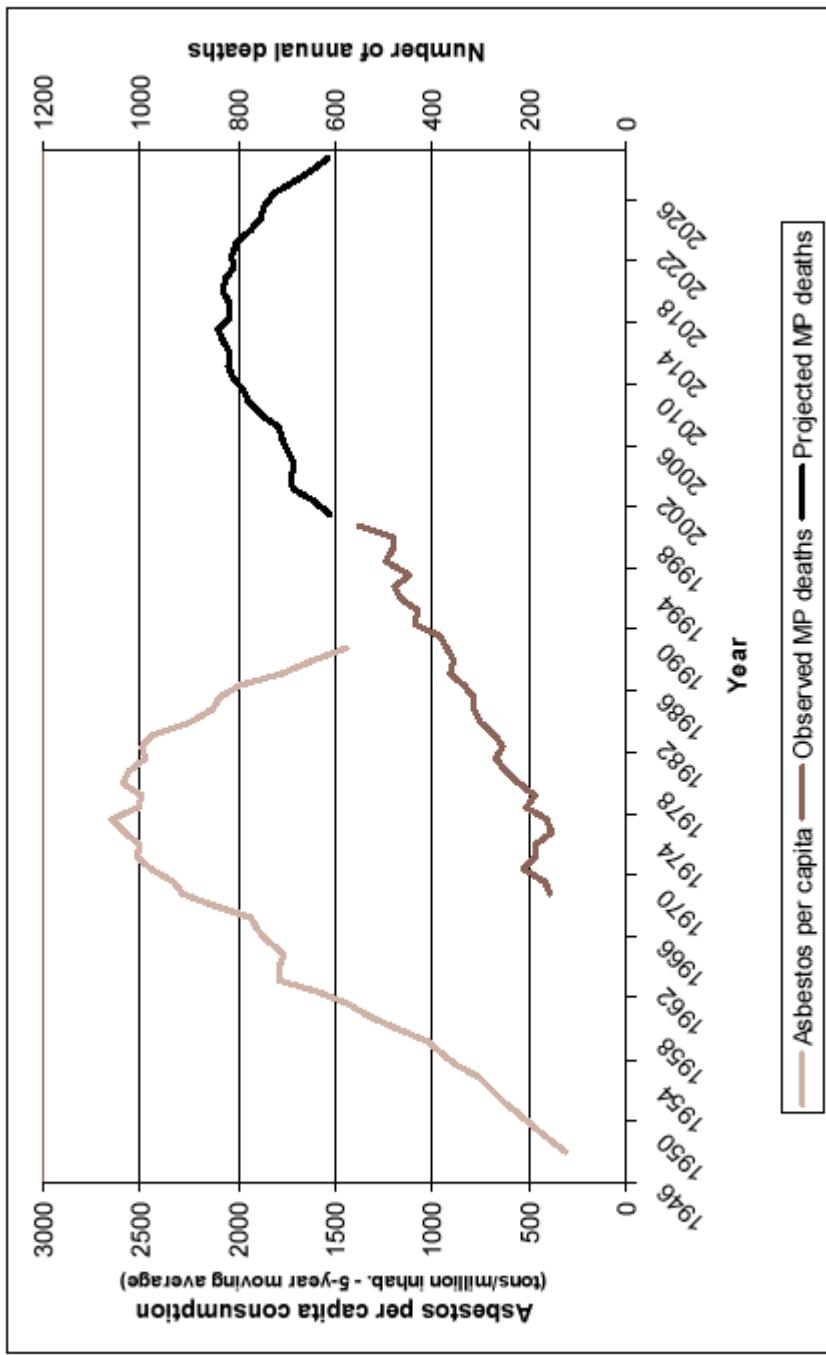
(Kg / pro capite; period 1960-1990)



Source: Marinaccio A et al. Italian National Mesothelioma Register. II Report. Ispesl, Roma 2006

CONSUMO DI AMIANTO E MORTALITA' PER TUMORE PRIMITIVO PLEURICO IN ITALIA

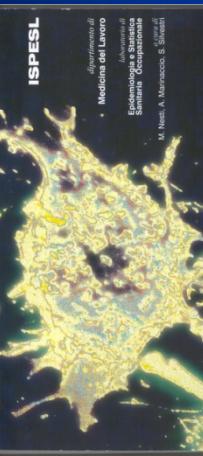
Figure 2. Italian raw asbestos per capita consumption (five-year moving average - tons per 1,000,000 inhabitants), observed (1969-1999) and predicted (2000-2029) pleural mesothelioma deaths¹ (MP) among men aged 25-89 years old in Italy.



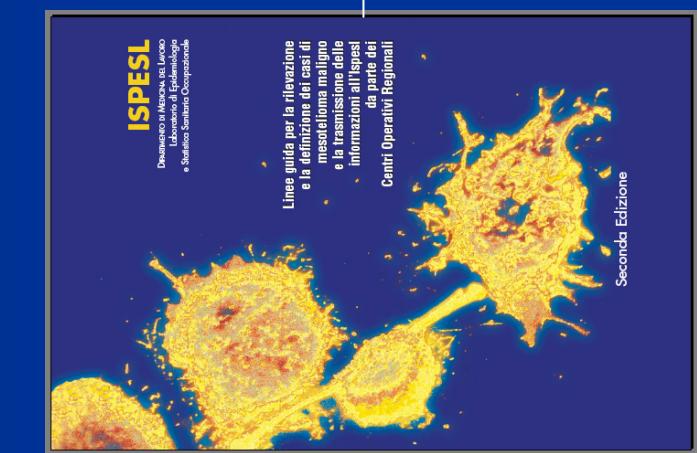
¹ Pleural mesothelioma deaths = pleural cancer deaths * 0.73.

Fonte: A. Marinaccio et al. International Journal of Cancer 115: 142-147, 2005

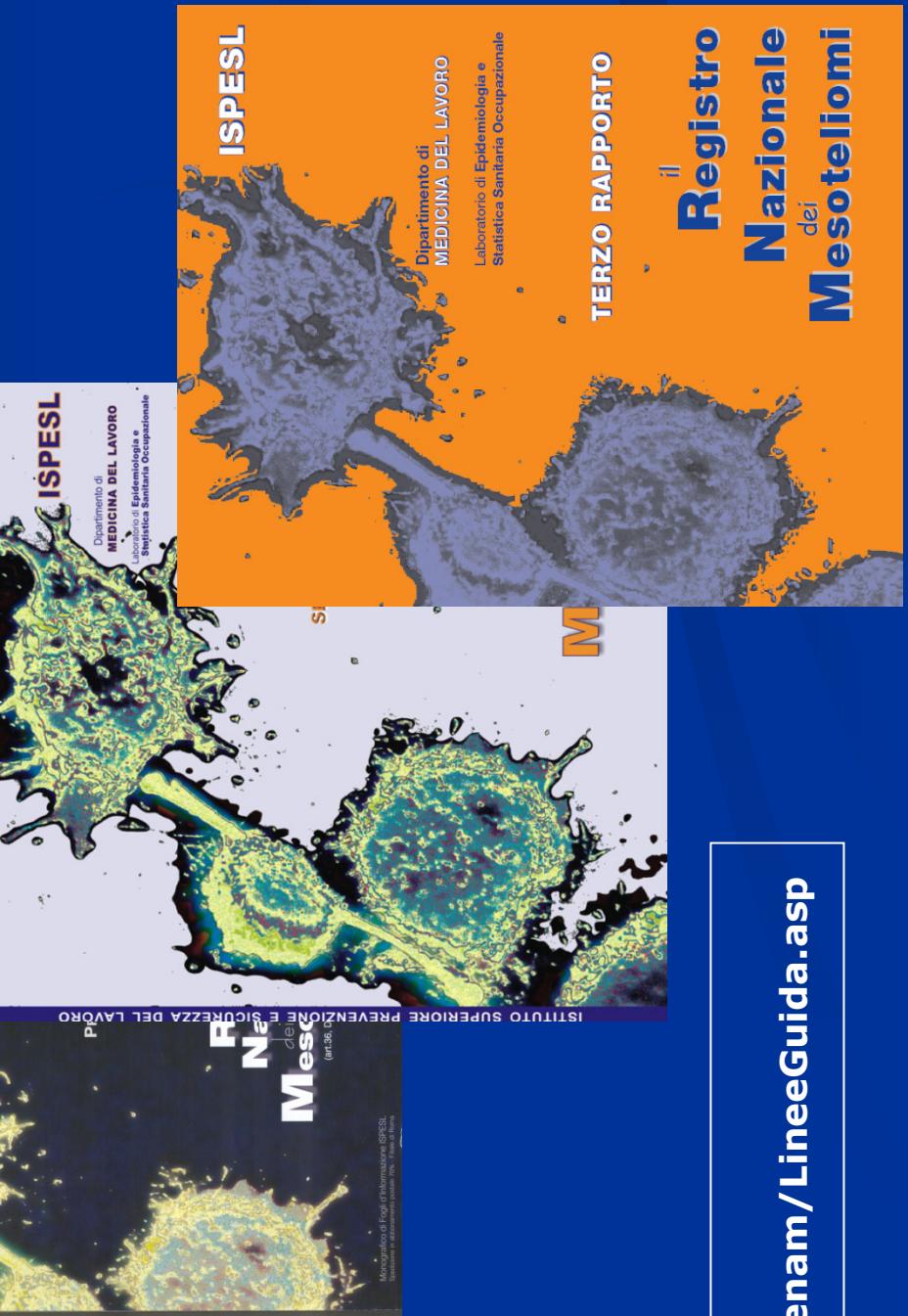
ReNaM: Previous publications and results



I, II, III Report
Download
www.ispesl.it/renam/Report.asp



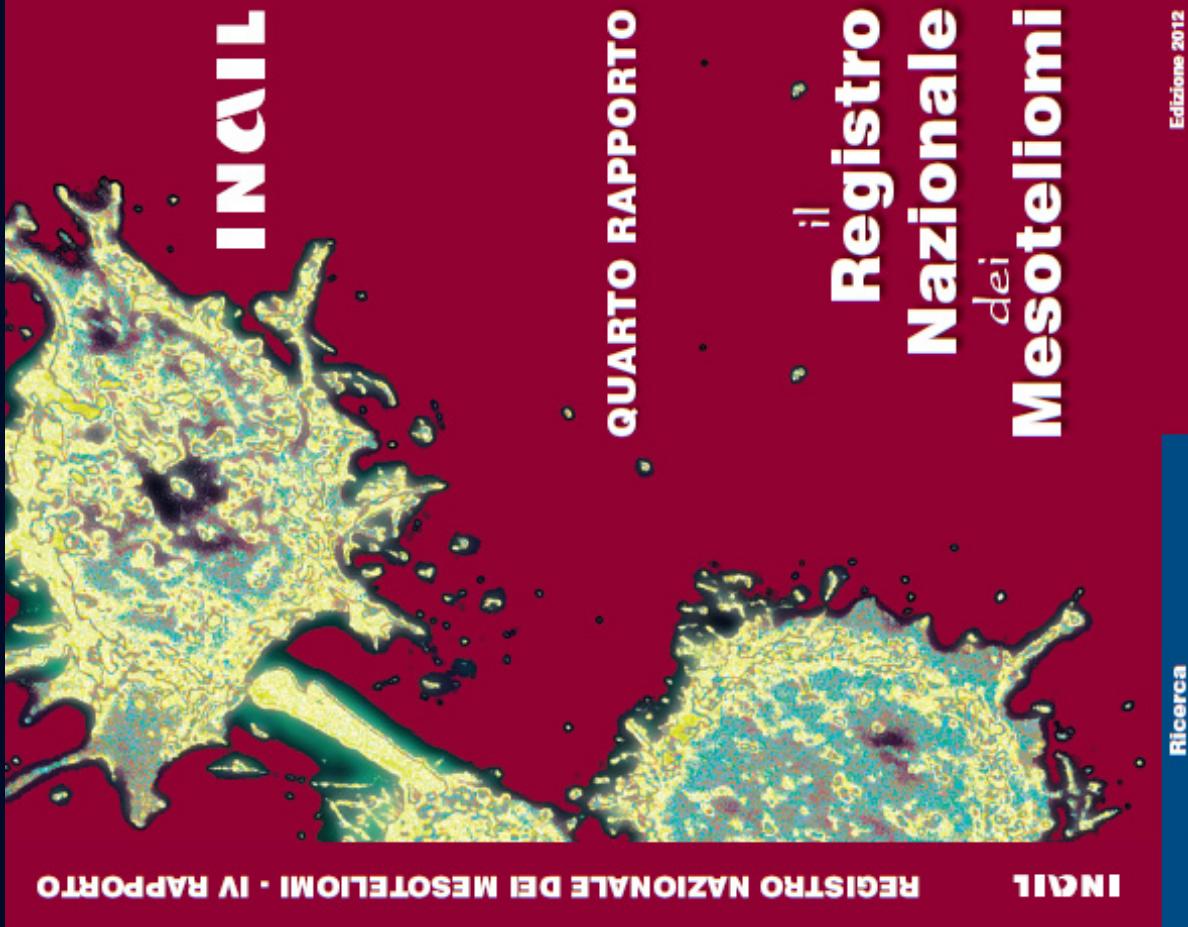
National Guidelines
<http://www.ispesl.it/renam/LineeGuida.asp>



TERZO RAPPORTO
Il Registro
Nazionale
dei
Mesoteliomi

Dipartimento di
MEDICINA DEL LAVORO
Laboratorio di Epidemiologia e
Statistica Sanitaria Occupazionale

Laboratorio di Epidemiologia e
Statistica Sanitaria Occupazionale

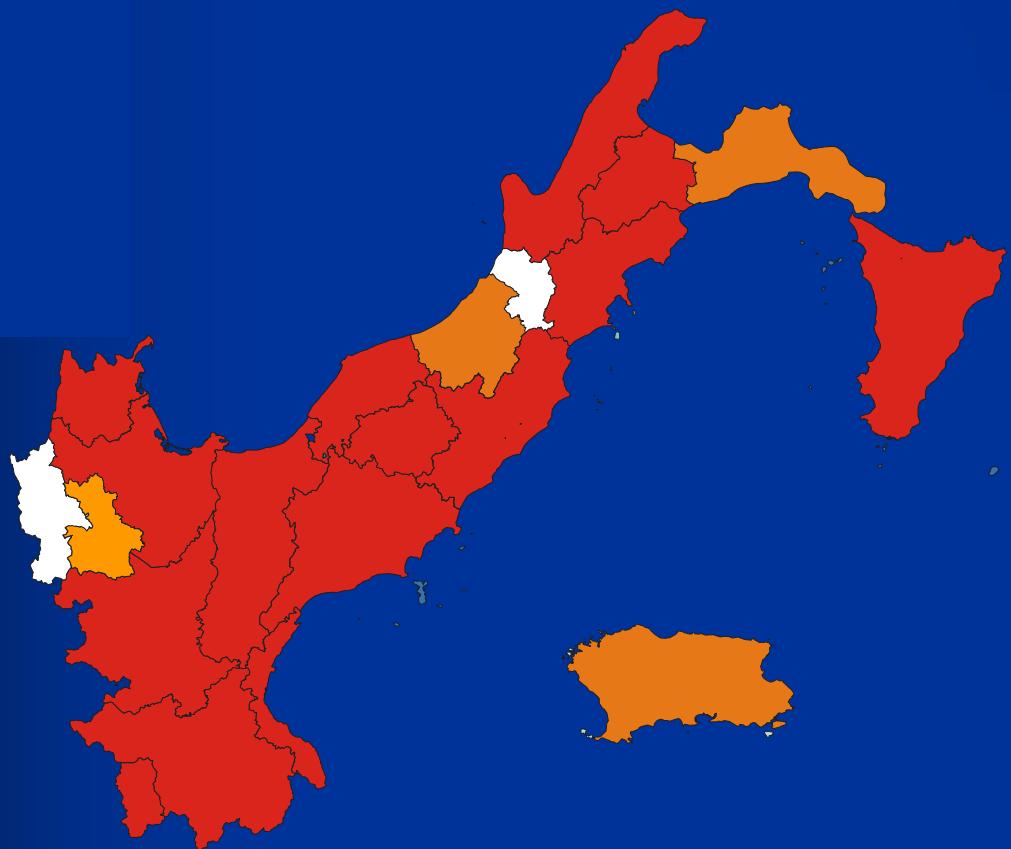


Edizione 2012

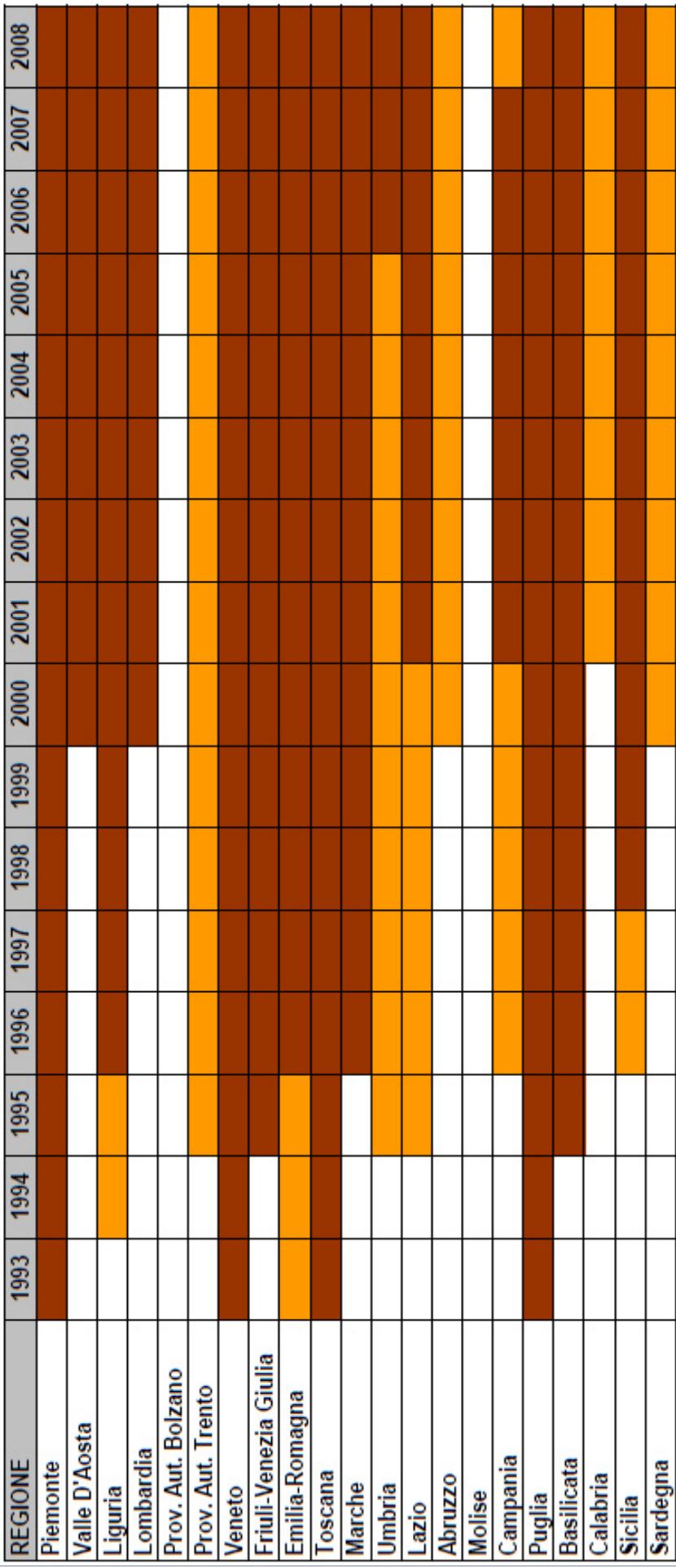
Ricerca

Registri regionali del mesotelioma in Italia al 2011 e loro performance

- COR che valutano l'incidenza (13 Regioni)
- COR non in grado di valutare l'incidenza (4)
- COR non ancora avviati (2)



ReNaM – Contributo dei Registri regionali per anno



Legenda



- Incidenza
- Incidenza non completa
- COR non avviati

- La rilevazione e approfondimento dei casi di mesotelioma è un obbligo di legge, che deriva dal recepimento di una Direttiva europea nella legislazione italiana.
- La legislazione italiana ha istituito il Registro nazionale dei Mesoteliomi , e attivato in ogni Regione un Centro Operativo Regionale (COR).
- La raccolta di dati sensibili al COR è autorizzata per legge.
- Esiste un obbligo di segnalazione di ogni nuovo caso, che è ancora più stringente (penalmente sanzionato) per casi insorti a causa di esposizioni dovute al lavoro.
- I mesoteliomi dovuti al lavoro sono considerati malattia professionale e coperti da assicurazione.

ReNaM – IV report

**Incidence rates
x 100,000**

■ Crude

■ Standardized

SITE	GENDER	Certain MM	Certain, probable, possible MM
Pleural	Men	3,16	3,84
	Women	1,12	1,45
Peritoneal	Men	0,23	0,26
	Women	0,11	0,12
Pericardic	Men	-	0,004
	Women	-	-
Tunica Vaginalis testis	Men	0,01	0,01

SEDE	GENDER	Certain MM	Certain, probable, possible MM
Pleural	Men	2,94	3,55
	Women	1,06	1,35
Peritoneal	Men	0,22	0,24
	Women	0,10	0,12
Pericardic	Men	-	0,003
	Women	-	-
Tunica Vaginalis testis	Men	0,01	0,01

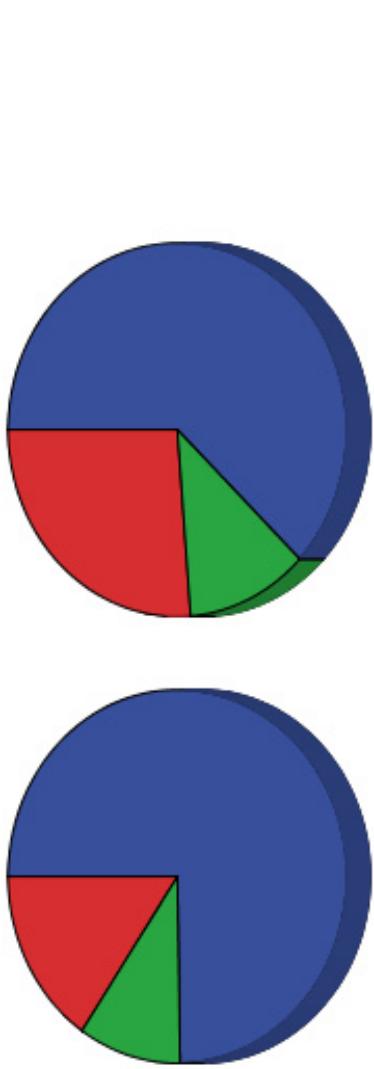
IV RAPPORTO: Modalità dell'intervista

Influenza delle modalità di intervista

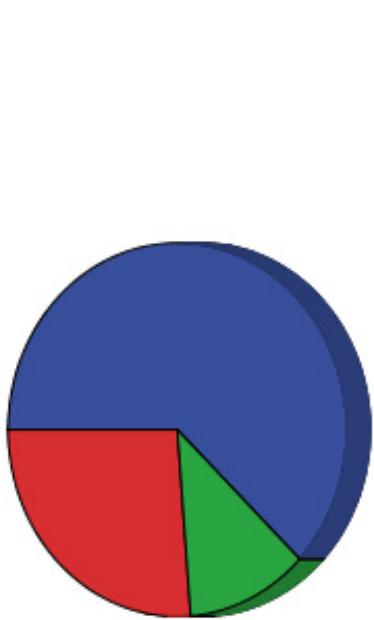
Percentuale dei MM senza esposizione ad amianto
19,7%
69% esposizione lavorativa

Calcolata sui soggetti intervistati direttamente:
14%
75% esposizione lavorativa

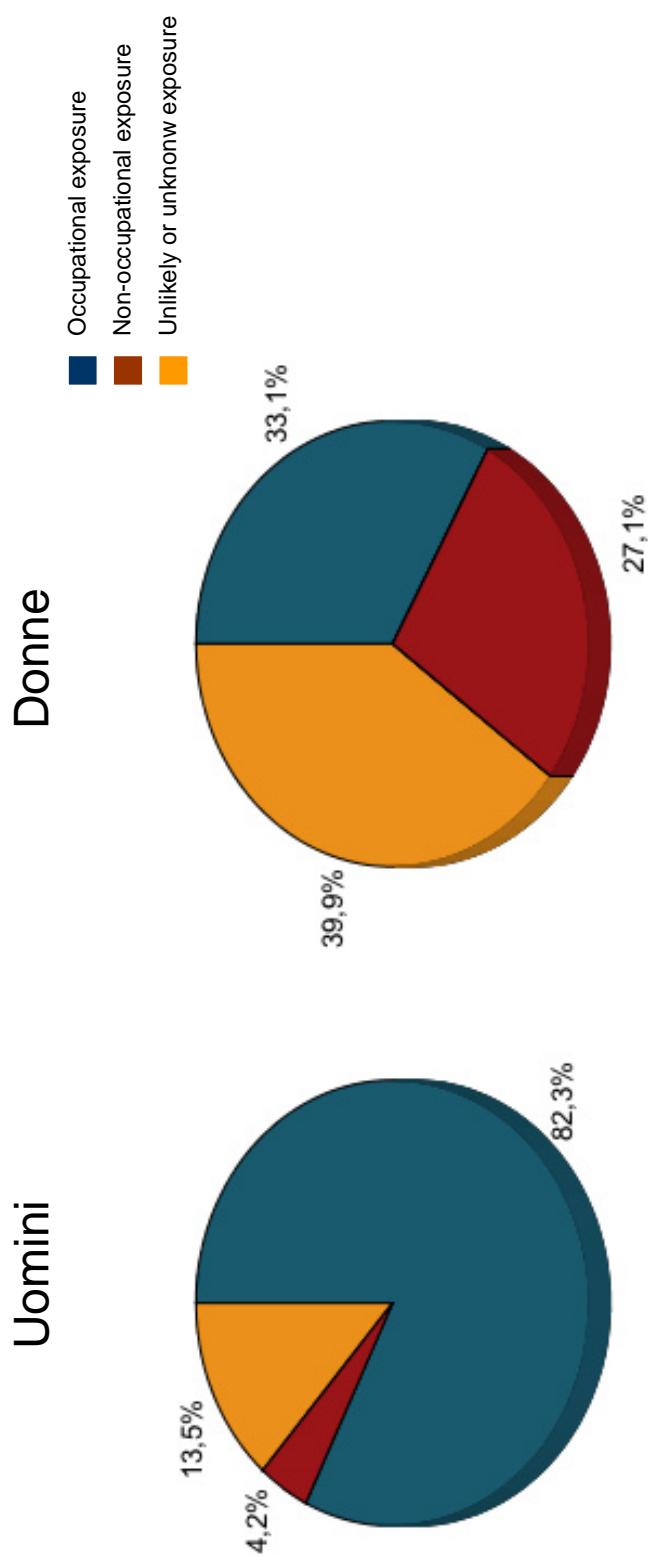
Intervista al soggetto



Intervista ad un parente



IV RAPPORTO: casi di MM per circostanza di esposizione e genere

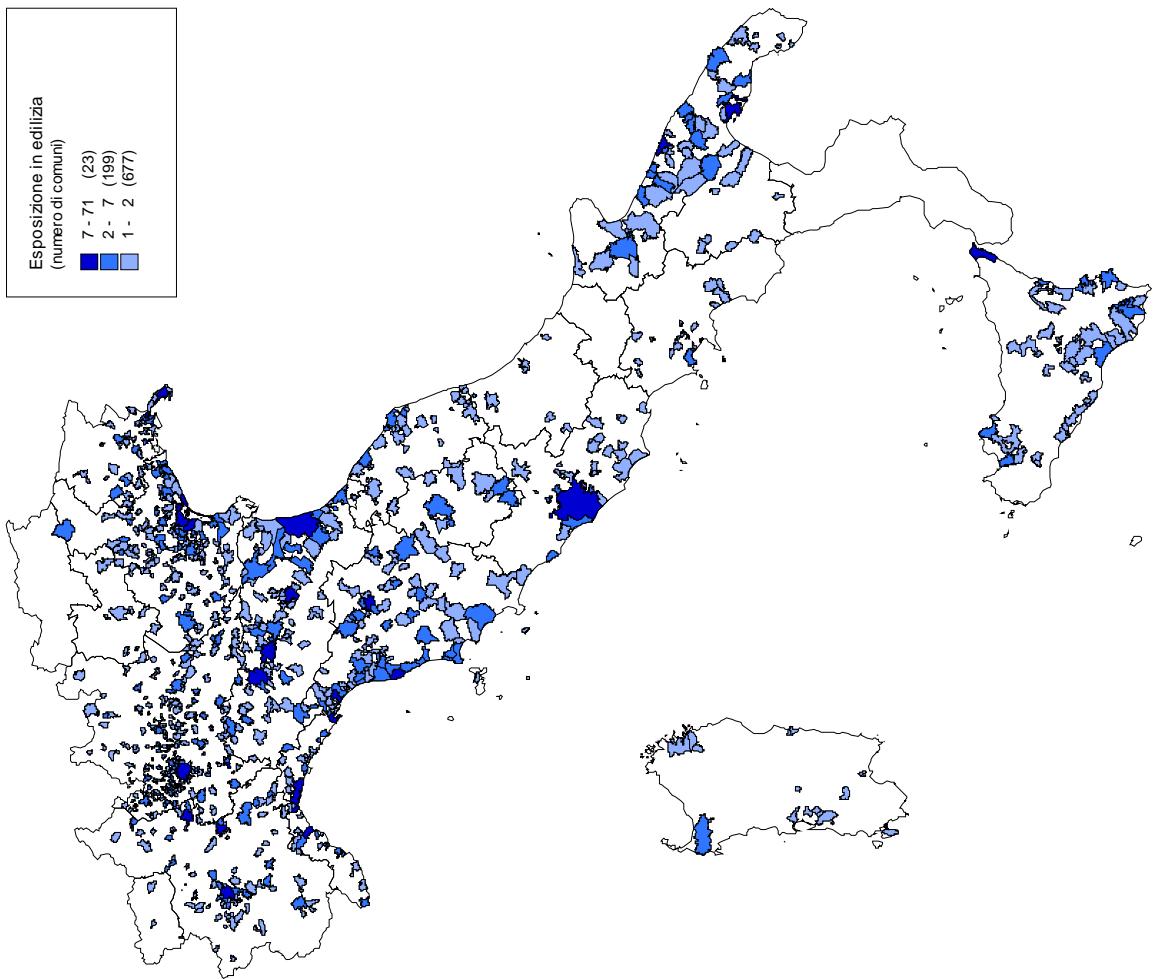


IV RAPPORTO

MM by municipality of
residence
(both genders):

**occupational exposures
to asbestos
among construction
workers**

Esposizione in edilizia (numero di comuni)
7 - 71 (23)
2 - 7 (199)
1 - 2 (677)



Non-occupational exposure to asbestos and malignant mesothelioma in the Italian National Registry of Mesotheliomas

Dario Mirabelli,¹ Domenica Cavone,² Enzo Merler,³ Valerio Gennaro,⁴ Antonio Romanelli,⁵ Carolina Mensi,⁶ Elisabetta Chellini,⁷ Carmela Nicita,⁸ Alessandro Marinaccio,⁹ Corrado Magnani,¹⁰ Marina Musti²

ABSTRACT

Background Malignant mesotheliomas are strictly related to asbestos, but in a proportion of cases no exposure can be recalled. Published estimates of this proportion have important variations. Historical and geographical differences in the fraction of cancer due to any given exposure are to be expected, but incomplete identification of non-occupational exposures may have played a role.

Methods To assess the role of non-occupational exposures in causing malignant mesotheliomas in Italy, the exposures of cases registered by the national mesothelioma registry (ReNaM) were examined. ReNaM started in 1993 in five regions and currently covers 98% of the Italian population. Information on occupational and non-occupational exposures of cases is collected whenever possible.

Results From 1993 to 2001 ReNaM registered 5173 malignant mesothelioma cases, and exposures were assessed in 3552 of them. 144 and 150 cases with exposures limited to environmental (living in the neighbourhood of an industrial or natural source of asbestos) or familial (living with a person occupationally exposed to asbestos) circumstances, respectively, were identified, accounting for 8.3% of all cases.

Conclusions Geographical variations in the proportion of cases due to non-occupational exposures may be explained by the past distribution of asbestos-using industries.

Rischio di MM per residenza limitrofa ad attività industriali fonte di esposizione.

1. Casale Monferrato (provincia di Alessandria), Eternit

Modeling Mesothelioma Risk Associated with Environmental Asbestos Exposure

Milena Maria Maule,¹ Corrado Magnani,^{2,3} Paola Dalmasso,⁴ Dario Mirabelli,^{1,3} Franco Merletti,^{1,3} and Annibale Biggeri⁵

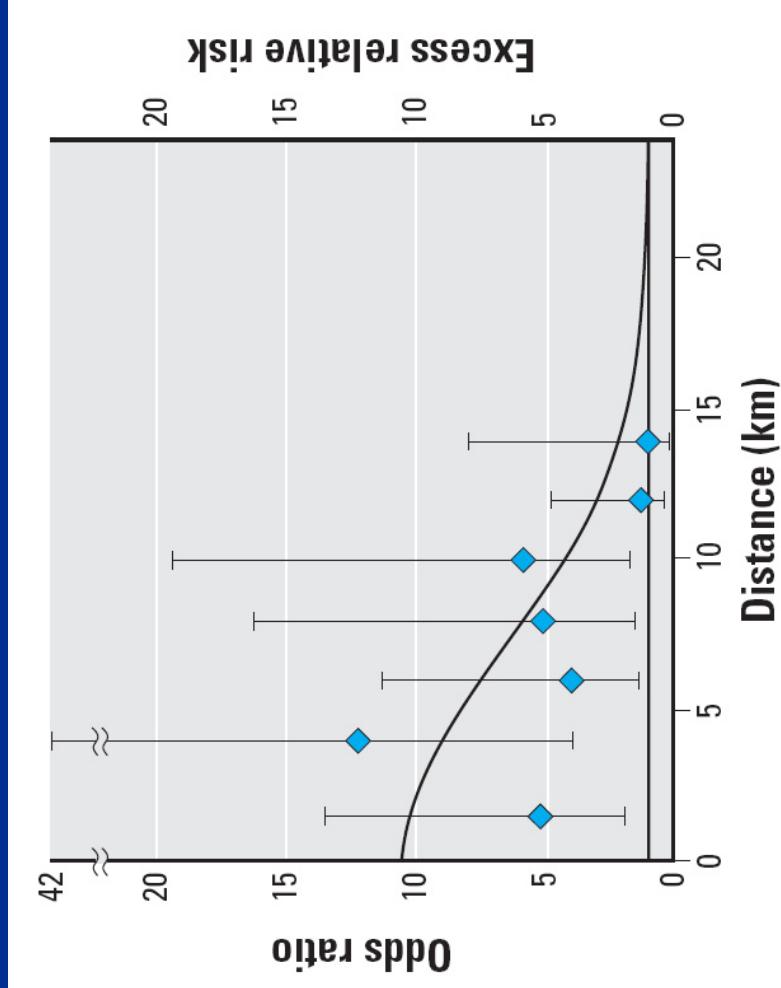
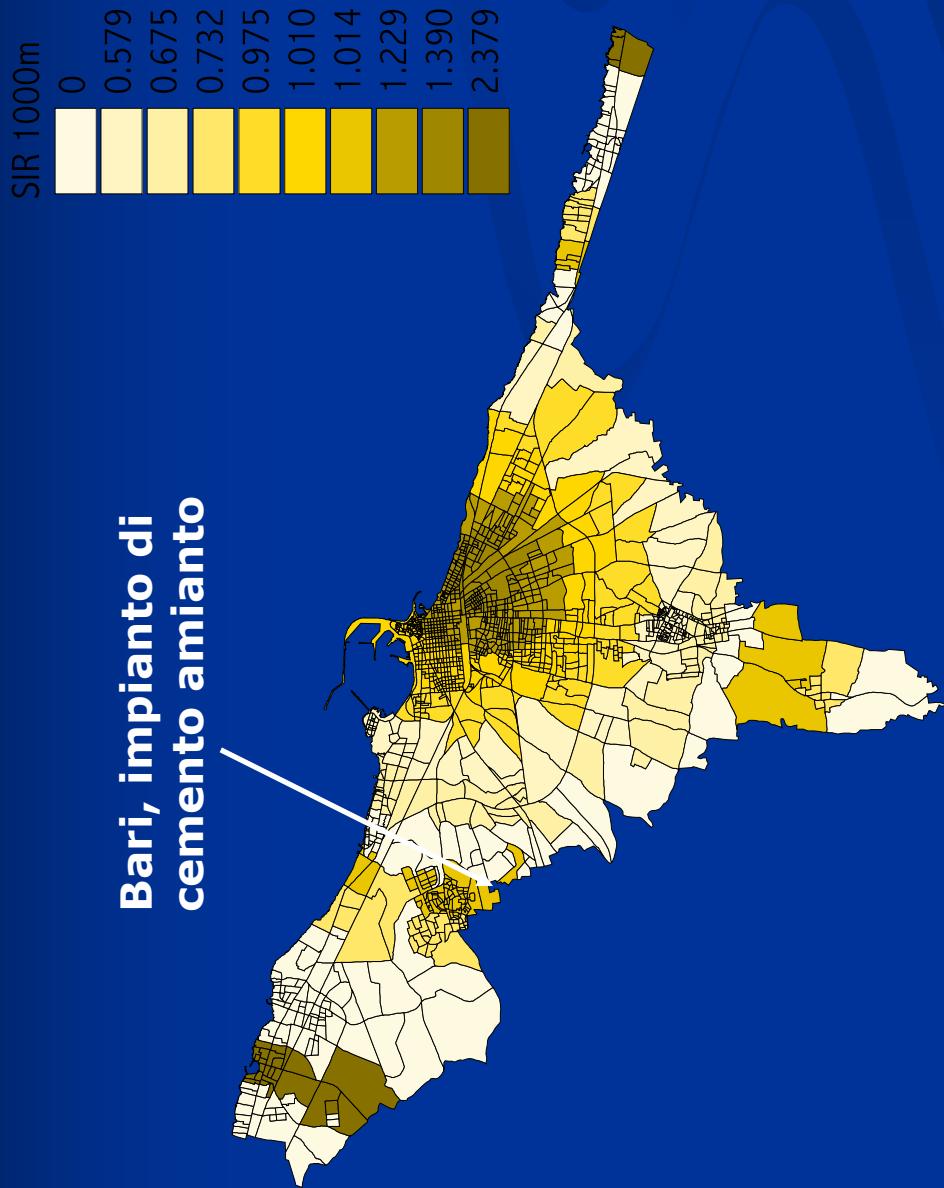


Figure 3. Risk of malignant mesothelioma of the pleura in Casale in relation to the distance of individuals' longest-held residence (after exclusion of

Rischio di MM per residenza limitrofa ad attività industriali fonte di esposizione.
2. Bari, Fibronit



Musti M et al. Assessment of risk of mesothelioma: the case of an asbestos-cement production plant in the city of Bari. Epidemiologia e prevenzione 27:277-84, 2003

Asbestos Fibre Burden in the Lungs of Patients with Mesothelioma Who Lived Near Asbestos-Cement Factories

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²*Unit of Cancer Epidemiology, University of Turin and CPO-Piemonte, 10126 Turin, Italy;* ³*Centre of*

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⁴*Apulia Mesothelioma Registry, Occupational Health Section B. Ramazzini, Department of Internal Medicine and Public Health, University of, Bari, 70121 Bari, Italy;* ⁵*Venetian Mesothelioma Registry, Occupational Health Unit, Local Health Authority, 35121 Padua, Italy*

Background: Epidemics of malignant mesothelioma are occurring among inhabitants of Casale Monferrato and Bari never employed in the local asbestos-cement (AC) factories. The mesothelioma risk increased with proximity of residence to both plants.

Objectives: To provide information on the intensity of environmental asbestos exposure, in the general population living around these factories, through the evaluation of the lung fibre burden in mesothelioma patients.

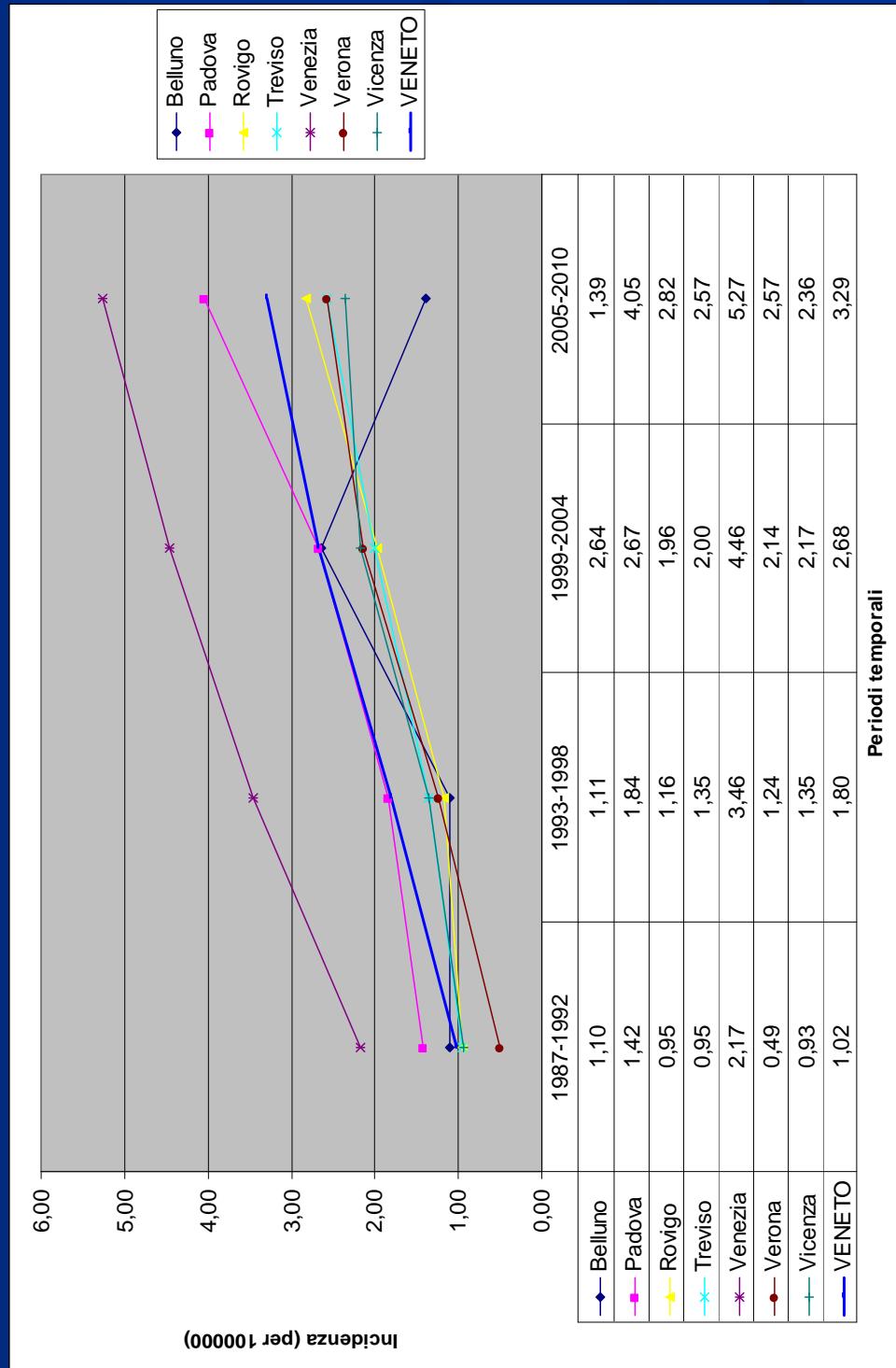
Methods: We analysed by a scanning electron microscope equipped with X-ray microanalysis wet (formalin-fixed) lung tissue samples from eight mesothelioma patients who lived in Casale Monferrato or Bari and underwent surgery. Their occupational and residential history was obtained during face-to-face interviews. Semi-quantitative and quantitative indices of cumulative environmental exposure to asbestos were computed, based on residential distance from the AC plants and duration of stay.

Results: The lung fibre burden ranged from 110 000 to 4 300 000 fibres per gram of dry lung (f/g) and was $>1\ 000\ 000\ \text{f/g}$ in three subjects. In four cases, only amphibole fibres were detected. Environmental exposures had ceased at least 10 years before samples were taken. No patient had other definite or probable asbestos exposures. A linear relationship was observed between the lung fibre burden and all three indices of environmental cumulative exposure to asbestos.

Conclusions: Environmental exposure to a mixture of asbestos fibres may lead to a high lung fibre burden of amphiboles years after exposure cessation. The epidemiological evidence of an increased mesothelioma risk for the general population of Casale Monferrato and Bari, associated with asbestos contamination of the living environment, is corroborated.

Registro regionale veneto dei casi di mesotelioma

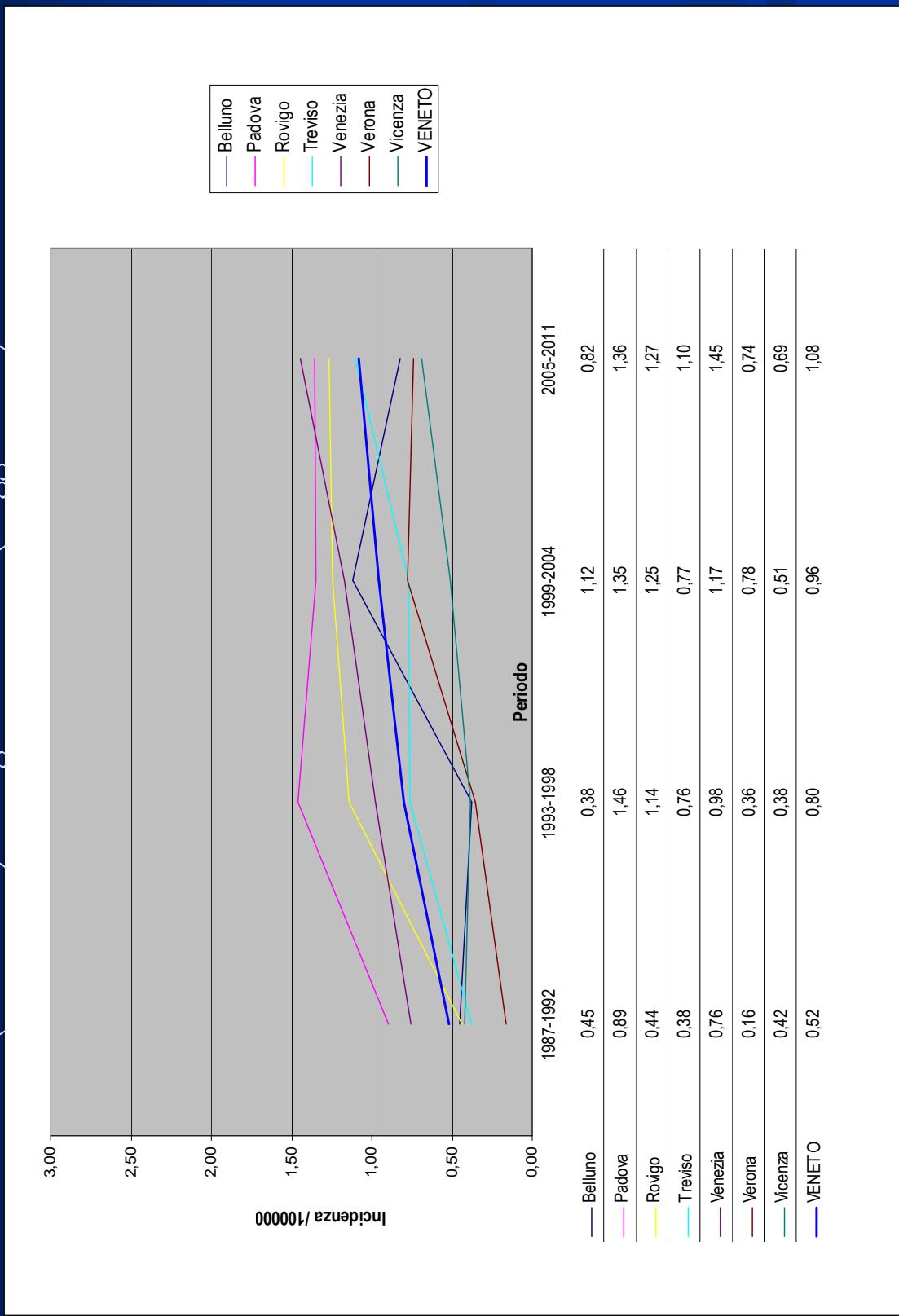
Andamento temporale del mesotelioma pleurico ($\times 100.000$) (casi certi, probabili) negli *uomini*
 (1987-2010) in Regione Veneto (maggio 2012)



* standard: popolazione italiana 2001; tassi $\times 100.000$

Registro regionale veneto dei casi di mesotelioma

Andamento temporale del mesotelioma pleurico ($\times 100.000$) (casi certi, probabili) nelle donne
(1987-2010) in Regione Veneto (maggio 2012)



* standard: popolazione italiana 2001; tassi $\times 100.000$

Registro regionale veneto dei casi di mesotelioma

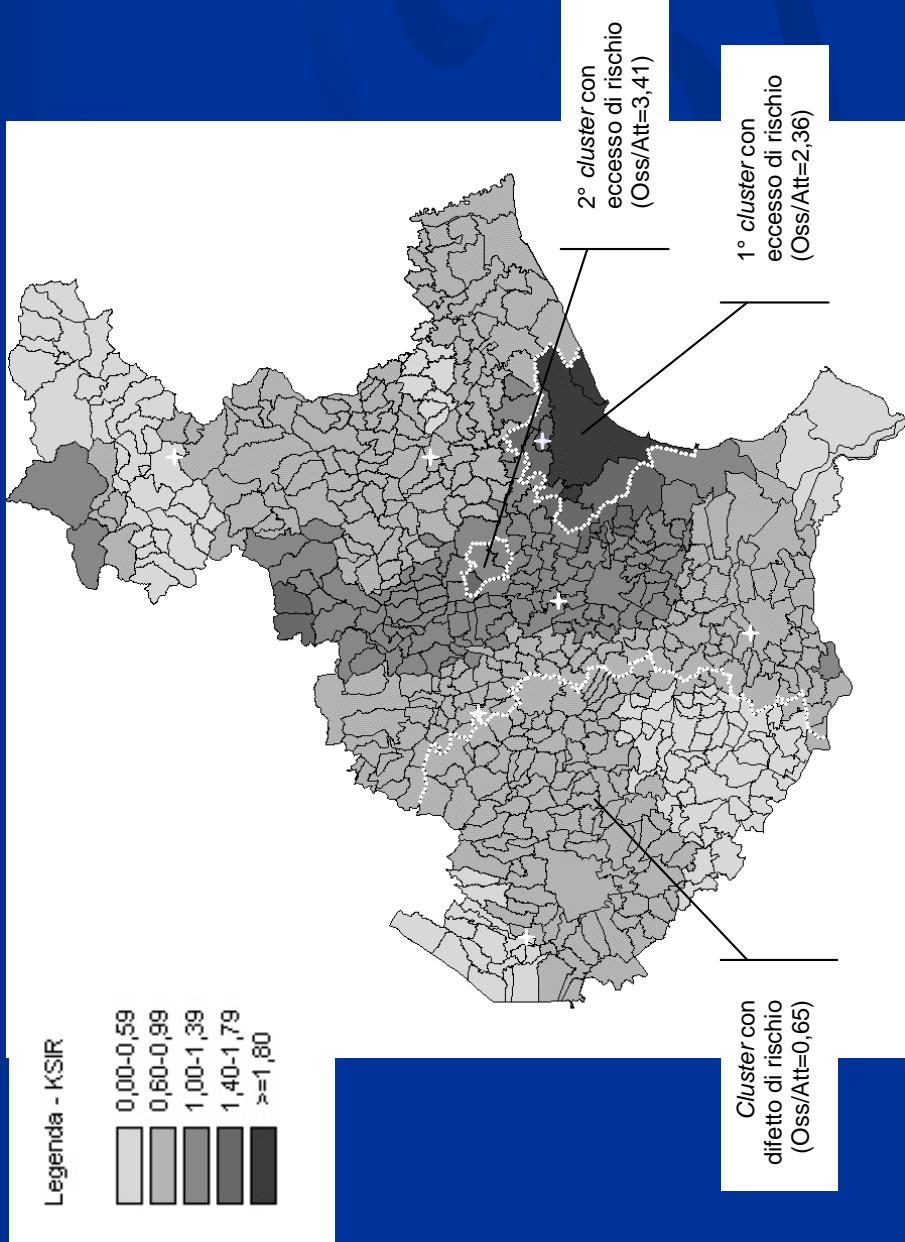
Circostanza di esposizione ad amianto nei casi di mesotelioma approfonditi.
Veneto, 1987 - 2012

Categorizzazione dell'esposizione ad amianto	M	N	%	N	F	%
1. Lavorativa certa	830	64%		52		11%
2. Lavorativa probabile	80	6%		19		4%
3. Lavorativa possibile	154	12%		71		15%
4. Familiare	16	1%		116		24%
5. Ambientale	36	3%		41		9%
6. Extralavorativa	9	1%		12		3%
7. Improbabile	8	1%		14		3%
8. Ignota	113	9%		104		22%
9. Da definire	54	4%		50		10%
1-2-3. Lavorativa	1064	82%		142	30%	
4-5-6. Familiare, ambientale, extralavorativa	61	5%		169	35%	
1-6. Esposizione ad amianto	1125	87%		311	65%	
Totale	1300	100%		479	100%	

Registro regionale veneto dei casi di mesotelioma ANALISI DEL RISCHIO DI MESOTELIOMA A LIVELLO COMUNALE IN VENETO PERIODO 1988-2002

Uomini - Incidenza

Fonte: S. Roberti et al. Epidemiol Prev 31: 309-316, 2007



KSIR: Stima Kernel del Rapporto Standardizzato di Incidenza

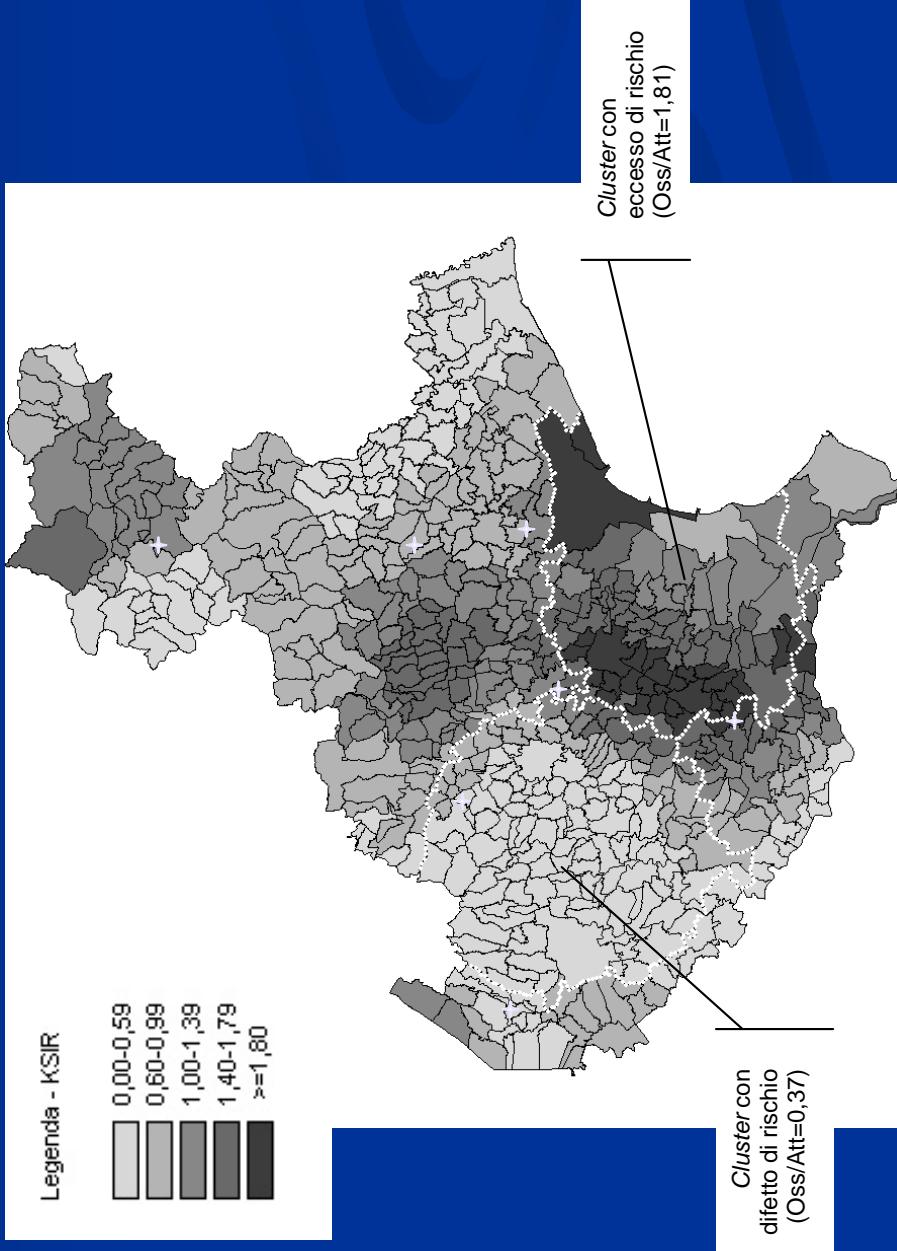
Registro regionale veneto dei casi di mesotelioma

ANALISI DEL RISCHIO DI MESOTELIOMA A LIVELLO COMUNALE IN VENETO

PERIODO 1988-2002

Donne - Incidenza

Fonte: S. Roberti et al. Epidemiol Prev 31: 309-316, 2007



KSIR: Stima Kernel del Rapporto Standardizzato di Incidenza

Registro regionale veneto dei casi di mesotelioma

Casi di mesotelioma con esposizione professionale, anni 1987 – 2012.
Settore lavorativo nel quale è avvenuta l'esposizione

SETTORI LAVORATIVI	CASI	Lavorativa certa		Lavorativa probabile		Lavorativa possibile		Ambientale e familiare	
		M	F	M	F	M	F	M	F
Edilizia civile e industriale	344	171	3	16	-	115	-	7	32
Costruzione e riparazione di mezzi ferroviari, trasporto su rotaria	194	116	2	13	-	11	-	25	27
Cantieristica navale (costruzione e riparazione)	129	84	-	18	-	8	-	6	13
Industria chimica	99	61	2	14	1	6	3	1	11
Produzione, commercio e utilizzo di cemento-amianto	81	44	12	1	-	3	-	7	14
Costruzione/manutenzione caldaie, addetti a fornì e caldaie	63	53	-	2	-	6	-	-	2
Costruzione e manutenzione di impianti industriali	74	63	-	8	-	1	-	-	2
Industria tessile	59	12	8	2	3	10	21	-	3
Industria di produzione dello zucchero	58	35	-	9	-	6	-	2	6
Movimentazione merci al porto	45	35	-	2	-	1	-	2	5
Settore Vetro	32	13	4	2	2	7	3	-	1
Attività di stiratura e riparazione ferri da stirto	28	4	4	1	2	2	12	-	3
Costruzione e riparazione auto - ferodi	28	24	-	1	-	2	-	-	1
Lavoro svolto all'estero (da impresa italiana)	27	22	-	2	-	3	-	-	-
Settore Alluminio	24	15	-	1	-	4	-	-	4
Settore Carta	19	12	-	1	1	2	2	-	1
Settore Ceramica	19	9	2	1	2	4	-	-	1
Settore Energia Elettrica	17	9	-	3	-	3	-	-	2
Settore Oro	16	8	4	-	3	1	-	-	-