

INTRODUCTION

AssoArpa is the association of the regional and provincial Agencies for Environmental Protection in Italy. It was born in the late 90's to foster the growth of an agency system characterized by impartiality, scientific independence, managerial and programmatic uniformity, high quality and ability to intervene with high scientific and technical standards in the prevention and management of environment-related health risks.

This means contributing to a fair protection of the rights of all citizens to a healthy environment.

The environmental deterioration due to industrial processes or waste management is now an emergency for vast areas of the Country. Various diseases record a higher incidence in subjects exposed to environmental risks, with serious social and economic repercussions.

For this reason, AssoArpa and the National Agency for Regional Health Services (AGENAS) have signed an agreement that will involve the identification of initiatives to protect health. (you can view and download the agreement at page <http://www.arpae.fvg.it/cms/assoARPA/Attivit-di-AssoARPA.html>).

«ENVIRONMENT AND HEALTH» IN THE AGENCIES

Each Regional Environment Agency carries out environmental studies to tackle specific pollution-related health risks.

All agencies support the regional authorities in the assessment of the status of the environment and of the pressures acting on it. This support may involve applied research to evaluate the potential connections between environmental pressures and public health. Certain agencies have a specific structural conducting epidemiology surveys, e.g. traditional urban planning and health, waste and health, or pollens and health. Other agencies use specific approaches of health impact assessment, risk assessment or new exposure assessment methods.

In the boxes below three examples of studies on «environment and health» are shown, representing different geographical areas and environmental risks.

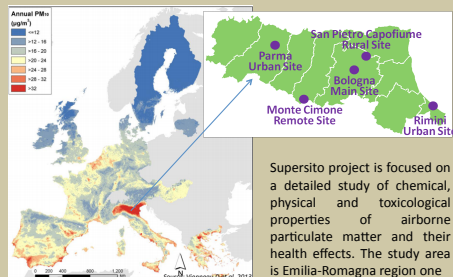
“The Supersite project”

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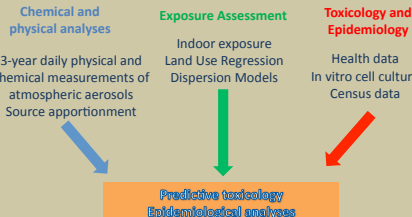


source:

http://www.arpae.it/pubblicazioni/Supersito/generale_2121.asp



Supersito project is focused on a detailed study of chemical, physical and toxicological properties of airborne particulate matter and their health effects. The study area is Emilia-Romagna region one of most polluted areas in Europe. The sampling sites are five located in areas with different characteristics (urban areas, rural site, remote site).



Chemical and physical analyses

A strong homogeneity at the regional scale in terms of spatial distribution of main chemical species (nitrate, sulfate, ammonium and carbonaceous fraction) in PM2.5 is observed;

Organic matter is the main component of PM2.5. In cold season biomass burning sources contribute for 30-50% of organics (10-30% of PM2.5 mass);

Primary emissions from vehicle traffic and crustal resuspension contribute for 10 – 25 % of the PM2.5 mass;

At least 10% of PM2.5 mass derives from agriculture due to Ammonia emission. Ammonium nitrate has a relevant role in the frequent winter peaks;

Particle number concentrations (d<100nm) are substantially different between urban and rural areas due to their different principal origin: traffic in urban site; spontaneous new particles formations (nucleation events) in rural site.

Exposure Assessment

Little horizontal and vertical variability of PM2.5 within urban areas; Strong variability of Ultrafine Particles, nitrogen dioxide and BTEX; Measurements at the front and rear of a building very similar to those found between high and low traffic areas;

Marked differences in relations to traffic proximity was found for some chemical species such as Elemental Carbon, Iron, Manganese and Tin; Indoor gradients similar to outdoor gradients.

Toxicology

Predictive toxicology use new approaches for reliable, reproducible, faster chemical hazard assessment and characterization; A combination of in vitro cell culture-based tests and transcriptomics were used to identify the toxicological profile of airborne samples and to predict the risk for adverse outcomes;

We were able to identify gene pathways related to specific adverse outcomes, which included auto-immune diseases and reproductive toxicity.

Epidemiology

We analyzed health outcomes in relation to different measures of aerosol (chemical composition, sources, dimensional fractions); The respiratory outcomes show the major associations with chemical species and particulate sources;

Organic carbon, potassium and calcium as well as traffic and biomass burning as sources of air pollution, appear to have a significant role in relation with mortality and morbidity.

“Assessment of cancer risk in proximity of an Iron Foundry”

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source:

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Was assessed the risk of lung cancer in people living near the iron foundry located within the city of Trieste, Northeastern Italy. Between 1995 and 2009, all incident cases of lung cancer and corresponding population were considered. A deposition model of the foundry-specific emissions of SO2 defined: “nearby”, “urban”, and “outlying” areas.



All incident cases of lung cancer (2096 men and 955 women) diagnosed during the period 1995–2009 in the resident population of Trieste were extracted from the population-based CR-FVG (<http://ci5.iarc.fr/>).

For the aims of this analysis, incidence data were disentangled by age (quintennial), sex, year of diagnosis, and histological subtype. The International Classification of Diseases, 10th edition, was used for lung cancer classification (C33–34). The International Classification of Diseases for Oncology, third version (ICD-O-3), was used for the classification of histologic subtypes: adenocarcinoma, squamous cell carcinoma, and other and unspecified morphologies. Cases diagnosed at autopsy only (159 men and 109 women) were included in the analyses.

Age-standardized incidence rates (ASRs) per 100,000 were calculated for the whole examined period—or for each calendar year from 1995 to 2009—in both sexes and two age groups (<75 and ≥75 years) according to risk area and histological subtypes. ASRs and their corresponding standard errors were calculated using SEER*Stat. Rate Ratios (RRs) and 95% confidence intervals (CI) were computed from the ASRs considering the urban area of Trieste as the reference category.

Risk Area	<75 Years				≥75 Years				All Ages			
	N	ASR-It	95% CI	RR	N	ASR-It	95% CI	RR	N	ASR-It	95% CI	RR
Urban	110	100.2	(8.6, 115)	1.00	22	447.3	(100.9, 889)	1.00	132	(124.2, 141)	(98.8–152)	1.00
Near the foundry (<800 m)	35	109.2	(3.6, 135)	(1.03–1.75)	23	447.3	(100.9, 889)	1.00	158	(149.6, 167)	(130.1–196)	1.53
Urban	160	74.1	(2.6, 138)	0.74	454	303.2	(59.3, 547)	1.00	615	(589, 641)	(516–714)	0.74
Outlying	249	65.3	(4.1, 108)	(0.71–1.03)	315	403.7	(88.3, 888)	(0.72–1.01)	564	(537, 591)	(457–671)	0.87

The computation of annual percent change (APC) of incidence rates was calculated for the whole 1995–2009 period. APCs were calculated in both sexes and by two age groups (<75 years and ≥75 years) according to risk area. APCs were estimated by fitting a linear regression line to the natural logarithm of annual incidence rates using calendar year as a regressor variable.

Risk Area	<75 Years		≥75 Years		All Ages	
	APC	(95% CI)	APC	(95% CI)	APC	(95% CI)
Urban	–1.9	(–6.8, +3.3)	–0.1	(–6.8, +7.1)	–2.2	(–7.4, +3.4)
Near the foundry (<800 m)	–3.2*	(–4.9, –1.5)	–1.2	(–3.7, +1.3)	–2.6*	(–3.9, –1.3)
Urban	–2.8*	(–5.5, –0.1)	–2.8	(–7.9, +1.6)	–1.9	(–4.6, +1.0)
Outlying	–2.8*	(–5.5, –0.1)	–2.8	(–7.9, +1.6)	–1.9	(–4.6, +1.0)

Notes: * Cases diagnosed at autopsy included. * Data from Friuli Venezia Giulia Cancer registry. * p < 0.05.

CONCLUSION

This observational study showed that residing within 800 meters from the coke oven of an iron foundry was associated with lung cancer risk in men aged <75, but not in women. Other factors might have modified and/or confounded the risk of lung cancer, including air pollution from other sources and occupational and smoking patterns.

“Assessment of Health Damage”

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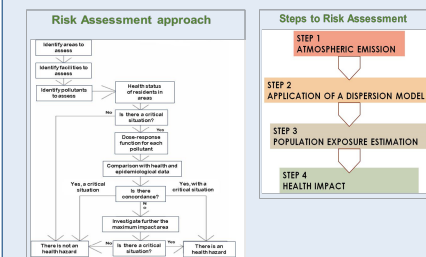
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<http://www.arpae.puglia.it/web/guest/vds>

The VDS (Italian acronym of “Assessment of Health Damage”) consists in the independent parallel evaluation of industry-related health outcomes (mortality, cancer registry, hospital discharge data) and risk assessment based on the EPA residual risk approach. Cancer and non-cancer risks for inhalation exposure are estimated for the exposed population. If there is an agreement between the two procedures, industries are required to reduce pollutant emissions.

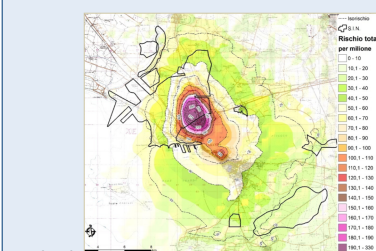
In Figure 1 the Risk Assessment approach to perform the VDS defined by the regional legislative act 21/2012 is described.

The steps to be followed to Risk Assessment are illustrated in Figure 2.



According to the legislative act, the Environmental Protection Agency of Apulia Region, in collaboration with the regional health institutions, carried out an integrated risk and impact assessment for inhalation exposure in two industrial areas classified as superfunds:

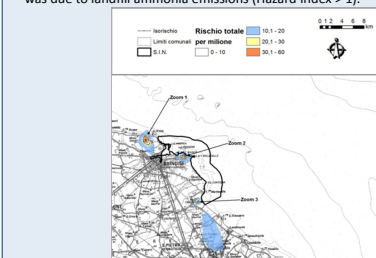
- Brindisi, characterized by a petrochemical complex and a large coal-fired power plant;
- Taranto, where the main industrial sources are the largest European integrated cycle steel plant, an oil refinery, a cement plant, two incinerators.



RESULTS

Taranto - Emission scenario in 2016. There is a remarkable excess of cancer risk mostly due to benzo(a)pyrene fugitive emissions of coke-oven batteries and a non-carcinogenic risk due sulfide hydrogen from the oil refinery.

Brindisi. The overall cancer risk was far below the fixed threshold: the maximum value of carcinogenic risk (30 per million) does not exceed the carcinogenic benchmark level of 1x10⁻⁴. An excess of non-carcinogenic risk was due to landfill ammonia emissions (Hazard Index > 1).



CONCLUSION

For the first time, the combined use of health-based approaches (both epidemiological and risk-assessment) was used in the context of IPPC.