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## Health impact assessment in industrial contaminated sites: Systematic review (COST Action IS1408)

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**INTRODUCTION:** Industrially contaminated sites (ICSs) pose a serious risk to human health. The methodologies and practices of health impact assessment (HIA) at ICSs are very heterogeneous and rarely applied at best. There is an urgent need to identify and summarize available methods for human risk assessment and health impact assessment within the COST Action IS1408 Industrially Contaminated Sites and Health Network (ICSHNet). This paper identifies an initial list of review papers based on a systematic literature search in Pubmed and Web of Science. We also aim to identify different terminologies and methods and tools used or that are usable for HIA in ICSs.

**METHOD:** We systematically searched PubMed and Web of Science up until April 10th, 2017 for HIA at ICSs. The initial core search query was "(polluted site OR contaminated site OR industr\* OR manufactor\*) AND (health impact assessment) NOT (food industry OR safety) AND (review)". The resulting list of articles was screened for coverage of HIA at ICSs.

**RESULTS:** The original search yielding 25 PubMed and 62 Web of science articles was screened down to 9 articles, which were included in the final analysis. The results indicate different terminology of HIA in ICSs. From a methodological point of view, a commonly used tools is the use of geographical information systems and modelling systems for assessing the spread of air pollution.

List of identified review papers on health impact assessments at industrially contaminated sites (PubMed & WoS, 2017).

Author	Citations	Terminology	Methods
Reviews (of quantitative assessments)			
1 Forastiere F et al., 2011	34	HIA	Attributable cases estimated based on modelled exposures
2 Morra P et al., 2009	12	EHHRA	Quantitative risk characterization using GIS methods

Tools and approaches			
3 Winkler MS et al., 2012	12	HIA	Geographical information visualization
Qualitative assessments			
4 Kryzanowski JA et al., 2011	33	EIA	Conceptual life course and social determinants health model
Reviews and system analysis			
5 Drewry J et al., 2017	65	HIA, EIA	Review of environmental and health impact assessment methods
6 Chanchang C et al., 2016	15	EHIA; EIA; HIA	Environmental and health impact characteristics for ports
7 Solomon GM et al., 2016	77	HIA	ERA, BOD, biomonitoring, conceptual community-based modelling
8 Caneghem van J et al., 2010	38		Comparison of toxicity characterization of air pollutants
9 Pires A et al., 2010	349	LCA, EIA, SEA, SoEA, SA	Review/summary of analysis methods
Total	635		

HIA: health impact assessment; E(H)IA: environmental (and health) impact assessment; ERA: ecological risk assessment; BOD: burden of disease; EHHRA: environmental and human health risk assessment; LCA: life cycle assessment; SEA: strategic environmental assessment; SoEA: socioeconomic assessment; SA: sustainable assessment

**CONCLUSION:** Quantitative health impact assessments have been reported for a limited number of sites while reviews on conceptual approaches point out clearly the need of such estimates. It is necessary to clarify the terminology and update the list of identified methods and tools for HIA to include various conceptual domains and vocabularies. Only a small number of previous reviews were found.

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**Keywords:** health impact assessments, industrially contaminated sites, methods, systematic review, COST Action IS1408



## **Health risk and health impact of European industrially contaminated sites: Current practices (COST Action IS1408)**

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**INTRODUCTION:** Industrialization, poor environmental management practices and accidents are responsible for contamination of the environment. Across Europe, hundreds of thousands of contaminated sites have been listed and potentially threaten human health. In response to these environmental challenges, the COST Action IS1408 Industrially Contaminated Sites and Health Network (ICSHNet – [www.icsynet.eu](http://www.icsynet.eu)) was established. The objectives of this work are (i) to collect information on case studies conducted in the participating countries; (ii) evaluate them in relation to health impact and health risk assessments, and (iii) identify further information needs.

**METHOD:** To establish an overview of existing activities within the network, the participating countries were invited to provide published/reported case studies on health assessments of industrially contaminated sites with national relevance. In total, 27 studies were suggested by 14 out of 33 ICSHNet countries. Nine studies were excluded from the analyses (5 articles could not be located, 2 natural contamination, 2 environmental exposure assessment), leading to 18 articles included in the analyses (Table 1).

**RESULTS:** Epidemiological approaches to evaluate the health risks from industrially contaminated sites were relatively well represented. Only two articles reporting health impact assessment, indicating that either application of HIA methods or reporting of them may be limited. There is a clear need to supplement the method identification work by reviewing the scientific literature.

Table 1. Summary of case studies of national importance identified within the COST Action IS1408

Case study designs	#	Exposures / Industries	Population	Endpoints
Case-control, personal exposures	6	Pb, Tri & tetrachloroethane, Asbestos, Incinerator, Cadmium, Mining	60 - 21 517	Blood level, cancer, pregnancy outcomes, Mesothelioma, neuropsychological development, genotoxicity
Ecological cohort	8	Sawmill, landfill, incinerator,	400 - 855	Cancer, mortality, hospital

studies (ref. pop. elsewhere)		refinery plant, petrochemical industry, industrial complex, coal mining	559	admissions, birth outcomes
Occupational studies with exposure matrices	2	Iron, Asbestos	459	COPD, Mesothelioma
Biomonitoring without HIA	2	Industrial complex	?-1718-?	None
HIA	2	Arsenic, PAHs	?	Cancer

Note: 2 studies [id 2, 10] included in two categories. HIA: Health impact assessment

**CONCLUSION:** Epidemiology seems to be the most common method used on the assessment of health risks of industrially contaminated site. Health impact and risk assessment seems not to be reported regularly. The identified case studies need to be supplemented with results of a systematic review of available literature on methods used in health assessment of industrially contaminated sites.

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**Keywords:** health risk assessment, health impact assessments, industrially contaminated sites, epidemiological approaches, COST Action IS1408