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## INTERNATIONAL WORKSHOP ADVANCES IN CLEANER PRODUCTION

“INTEGRATING CLEANER PRODUCTION INTO SUSTAINABILITY STRATEGIES”

## The Role of Health in Impact Assessment and Related Initiatives: A Literature Review

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### Abstract

Health Impact Assessment (HIA) is widely unstructured in their scope and procedures. Besides, it lacks regulation in several countries. However, health impacts of projects and plans are assuming increasing relevance and are claimed as critical in traditional Environmental Impact Assessment (EIA) and similar types of assessment. This paper investigates the role of health in EIA and in other variety of assessment in which human health is directly or indirectly related. A literature review in *Web of Knowledge* data basis enabled to recover 46 studies related to HIA, EIA and respective correlations. These studies were classified in 10 categories accordingly the main subject presented. For each category, a content analysis were performed aimed at identify the role assumed by health. It was found that: (i) when EIA is central, health assumes secondary function, usually associated to harm from exposure (category 1); (ii) when the main subject regards to EIA framework, health is a variable in EIA structure (2) or health assessment is embedded in EIA (8); health plays central and communitary characteristics when EIA is assumed as integrated to social aspects (3); health tends to be quantified and analytically deployed when Risk Assessment is central (4); health is considered an asset when practical assessment is addressed to integration purposes (5); in HIA, health assumes a pluralistic role due the wide scope it undergoes (6), but it can be uplifted from the traditional toxicological/epidemiological approaches to social ones (7); in infrastructure projects, HIA embraces governance issues (9) and in combined HIA and RA frameworks, health is regarded as management subject (10).

**Keywords:** *Health Impact Assessment. Environmental Impact Assessment. Health. Risk Assessment.*

### 1. Introduction

Human health and wellbeing are widely recognized as the ultimate reason of every impact assessment program addressed to preserve ecological, social and economic conditions in the search of balance among these factors (Cole *et al.*, 2004). A rising expression of this relevance is given by the emergence of Health Impact Assessment (HIA), “an evolving practice, now widely used in Europe, Canada and Australia to evaluate the social, economic and environmental impacts of plans, projects and programs for the purpose of promoting population health” (Cornburn and Bhatia, 2007: 324). However, it is also known that HIA is still in its infancy, and lacks mandatory rules and consolidated frames for a robust implementation (Cornburn and Bhatia, 2007; Mindellet *et al.*, 2008). That is why Risk Assessment (RA), developed since the 50’s of the last century, and Environmental Impact Assessment (EIA), since the 70’s, still occupy a key role in the analysis of health issues for projects. Both deal with the central idea of environmental conditions and human exposure to hazard agents taking health

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protection as a desired outcome. However, RA and EIA do not necessarily frame health in full integration with their respective main subject of assessment. While RA involves the measure of the likelihood and severity of a harm (Zelenakova and Zvijakova, 2011), EIA is traditionally focused on natural environmental assessment, and pays little attention to health promotion (Demidova and Cherp, 2005) as envisaged by HIA. Both RA and EIA usually embrace health at most from toxicological or epidemiological point of view (Cole *et al.*, 2004), what make them miss the transits between characterization of natural environment and measures necessary to prevent human harms from a wide point of view (Lattemann and E-Habr, 2009), which includes social health determinants (Uttinger *et al.*, 2005) and jointly understanding of human and nature complexes chains of causation-effects. This paper investigates the role of health in EIA and in other variety of assessment in which human health is directly or indirectly related. It is presented as follows: in the second section, the Method is explained; in the third, Results are presented; the fourth section is addressed to Discussion and Conclusion.

## 2. Method

In order to understand what is the role of health in EIA and similar types of assessment, declared in scientific literature, a qualitative approach (Creswell, 1994) was adopted. This type of research fits into situations where the questions are wide opened and few studies has been developed about the problematic situation. There were performed four systematic searches in *Web of Knowledge* regarding EIA and health. In the first one there were employed the expressions "Health Impact Assessment" for the title and "Environmental Impact Assessment" for the topic. This type of search is justified because it enables to highlight HIA studies as central whilerelated to EIA. In the second search there were inputted the expressions "Health Impact Assessment", "Environmental Impact Assessment" and "Integration", all for topic. The objective was to equal HIA, EIA and integration regarding their relevance. The third search employed the same expressions of the first one, with both expressions in topic, with a similar structural objective of the previous one. Finally, in the fourth search there were inputted the terms "social determinants" (title), "health" (title), and "Environmental Impact Assessment" (topic), with the aim to check out studies that highlight social aspects of health related to EIA. This last search was included in the investigation because of the increasing number of recent studies that frame health assessment in a social, pluralistic dimension (Kemmer, 2004, 2005; Putters, 2005; Erlanger *et al.*, 2008; Harris-Roxas and Harris, 2010; Harris and Spickett, 2010; Morgan, 2010). We then aggregated the search results in 10 categories, accordingly the main subject delivered.

## 3. Results

The set of the four searches delivered 46 valid results. From the first one, it was possible to recover 15 studies; from the second one, 9 - after the elimination of doubled results. From the third search, after the disregard of invalid (not related and repeated) studies, it was possible to get 21 results, and from the fourth, just one article was found. The 46 studies were then grouped according to their main subject - identified through title and abstract reading. This procedure enabled to detach ten categories for the relationship between HIA and EIA, represented in Table 1.

It is possible to realize that EIA (1) and HIA (6) categories contain most of the studies - 13 and 9, respectively. We can relate one to another because they represent the main subject of the inquiry. Categories 2 (EIA framework) and 7 (Health Assessment model/framework) are also correspondent in such way. Other similarities related to main approach issue are noticed for 3 (Integrated EIA) and 8 (HIA in EIA) categories; for 4 (EIA and health - risk and safety assessment) and 10 (Risk and health) categories; and for 5 (Human Health in EIA) and 9 (Health in project assessment) categories. In the following subsections there are shown the core meanings found for health in each category, so it is possible to find the role assumed by health in EIA and related studies.

### 3.1 EIA-focused studies

In the 13 results found for EIA as central subject, health is assumed as part of the impact assessment. It was necessary abstracting each EIA field in order to better isolate the role of health in the set of these studies. In some of these cases, health relies on the category of environmental health (Xing and Lifeng, 2007, Latterman and El-Habr, 2009, Li *et al.*, 2010, Sreeba and Padmalal, 2011), so health assumes an indivisible role regarding the environment, which means that what is assessed is

the screened natural environmental health rather than the human health itself. Negative impacts on health are dominant in these analysis (El Naqa, 2005, Iyer and Mastorakis, 2005, Sokolova and Fernández-Caballero, 2009, Li *et al.*, 2010, Ramanaka and Rao, 2010, Sreeba and Padmalal, 2011, Zelenakova and Zvijakova, 2011). Preventive view (avoidance of health harms) is indicated twice (Kabbashiet *al.*, 2006, Tu and Lee, 2010). There are only two studies which consider health beyond physical aspects, as a mental and emotional asset (Kabbashiet *al.*, 2006) and as a public asset addressed to wellbeing (Al-Damkhiet *al.*, 2008). Therefore, in the case of EIA-focused studies, health is still entangled to natural environmental aspects that can offer harm under human exposure to them.

### 3.2 EIA framework-focused study

There was identified one study on EIA framework related to health. Rosenberg *et al.* (2001) refer to health in the context of workplace while both preventable and already performed risk. Health is considered analyzable in relationship to potential technological and organizational changes in workplaces, at individual and community levels, in qualitative and quantitative ways. Therefore, the assessment of health comprises a dynamic task in which patterns of risk distribution are weighted at individual and community levels, under the view of plural stakeholders. It indicates a multilevel and multiperspective role for health.

### 3.3 Integrated EIA studies

In this type of study, represented in the present search by the article of Kwiatkowski and Ooi's (2003), health is indissociable from other aspects of assessment as social and environmental ones. Health is therefore comprised as a whole set of values enabled by the inputs of scientific and lay knowledge, gathered in complex systemic assessment.

### 3.4 EIA and health assessment studies focused on risk and safety

The common subject of health studies focused on risk and safety is the analytical procedures they hold. Although health assessment is recognized as difficult to carry out under risk and safety views due the complexity behind (Tu and Lee, 2008), toxicological and epidemiological understanding of health are dominant in such perspective. Health is what can be obtained by avoiding exposure to harmful agents (Snary, 2002). In other perspective, these studies focus on health loss, so the approach on health is often through negative effects brought by physical components of environment under adverse condition. Health is what remains after the result of dangerous exposure, rather than what should be promoted. This entails detailed analysis of the quality of each physical environmental component (air, water, soil etc) under instrumental quantitative methods (Snary *et al.*, 2002, Yong *et al.*, 2002, Bobylev, 2004, Hadjimitsiset *al.*, 2005, Robu and Macoveanu, 2005) because in such way it is understood that what happens to the environment will be mirrored in human health. Therefore, health assumes a complementary role regarding natural environment except that for human health risk pathways and endpoints are clearer than for environmental health (Zhang *et al.*, 2010).

### 3.5 Human health in EIA studies

The main complain of authors that focus their studies on human health in EIA regards to the lack of full horizontal coverage in the scope. They argue that health should be a practical issue reaching also monitoring and follow up stages of assessment besides pre-stages already covered (Bronson and Noble, 2006, Noble and Bronson, 2006). Health has the role to provide well-being (Noble and Bronson, 2005, Bronson and Noble, 2006, Harris *et al.*, 2009), but it is not identified as performed, especially because causal pathways between exposure and health effects are missing, and it is also valid for social determinants of health (Harris *et al.*, 2009). Health is understood as a matter of planning and therefore must have their outcomes previously defined (Noble and Bronson, 2005).

### 3.6 HIA-focused studies

In such studies, health is claimed as result of intersectorial collaboration between institutions and professionals in preventive perspective, as health promotion (Caussy *et al.*, 2003, Cornburn and Bhatia, 2007). Kemm (2004) sees the activity of health assessment as bridge building between institutions, therefore health receives a multilevel and multidisciplinary status. He also advocates the role of social

learning underpinning health (Kemmer, 2005), in a similar way of Cornburn and Bhatia (2007), that put health role on social networks performance and on learning by doing. In HIA studies for excellence, health is closely addressed to sustainability because researchers attempt to gather economic, social and environmental aspects with the same weight (Cornburn and Bhatia, 2007, Kang *et al.*, 2011). Health is also an outcome of negotiation between parts (Thriene, 2003), and is mainly integrated in policies, programs and projects (Cole *et al.*, 2004). Also in HIA studies health is closely attached to urban environmental planning and developing (Kang *et al.*, 2011), and suffers from operational limitation because of methodology lacking (Signorelli *et al.*, 2011), especially when behavioral issues come to the scenery of assessment (Bhatia and Seto, 2011).

### 3.7 Health Assessment framework studies

Studies that propose to frame HIA present a plural definition for health, although these definitions are not always direct, but given as effects of actions, plans, programs and policies. From the literature review it was possible to identify Gibbons *et al.* (2007) and Mindellet *al.* (2008) researches on HIA frameworks. In the first case, health is understood as transdisciplinary endeavour that goes deeper in both socio-behavioral and biomolecular sciences. Gibbons *et al.* (2007) state health as a result of constantly modified impacts, therefore an uniform meaning for health is missing. Mindellet *al.* (2008) argue that although a plurality of HIA frames have been assumed, the view of health which was firstly employed in EIA still has significant influence on how health is understood, with the difference that positive impacts, linked to health promotion, has been incorporated to recent HIA frames.

### 3.8 HIA in EIA studies

When HIA is seen under EIA structure, health concept is framed to the same EIA's steps: screening, scoping, appraisal, reporting, monitoring/evaluation (Hengpraprom and Sithisarankul, 2011). Once more health is reduced to main physical determinants, and authors highlight the difficulties and lack of experience of practitioners on how to assess links between environmental and health issues themselves. Monitoring phase receives special attention because it is the attempt of assurance that health variables will be followed up after project implementation. Therefore, through her own variables that unfold over time, health is a concept that can be often rethought.

### 3.9 Health in project assessment studies

Inter-institutional relationships play a relevant role for defining the way health is framed by stakeholders involved in development projects and in project assessment (Thriene, 2004). When health is in context of regional or local planning (as urban planning), usually there are attempts to match health profile of affected communities and priority health areas (Uttinger *et al.*, 2005), so the conception of health lies between these two ways. Although traditional view of physical determinants is still present in this context (Guet *al.*, 2007), several factors concur to bring difficulties for an unified concept of health: different understanding by stakeholders, plurality of governance and institutional arrangements, and difficulties to get a close comprehensiveness on how to set boundaries for health assessment (Carmichael *et al.*, 2012).

### 3.10 Risk and health-focused studies

When risk is the prevalent aspect towards health assessment, health assumes the role of safety, as hazardous identification and prevention for productivity assuring (Dooley *et al.*, 2003). However, when RA and EIA are not properly integrated, health impacts are difficult to assess, so this integration is the basis for stating health as safety (Demidova and Cherp, 2005). Under this same view, other studies give value to health impact quantification as a way to better manage risks (Topuzet *al.*, 2011), because valuing also allows to calculate financial expenditures and health capacity of the system (Spickett *et al.*, 2012). So in this type of studies, health is conceived as a quantifiable asset in order to assure safety conditions.

Category	Author(s)
1 EIA	1.1 El-Naqa (2005), 1.2 Kabbashi <i>et al.</i> (2006), 1.3 Stergiadou (2007), 1.4 Xing and Lifeng (2007), 1.5 Al-Damkhi <i>et al.</i> (2008), 1.6 Iyer and Mastorakis (2009), 1.7 Lattemann and El-Habr (2009), 1.8 Sokolova and Fernández-Caballero (2009), 1.9 Li <i>et al.</i> (2010), 1.10 Ramana and Rao (2010), 1.11 Tu and Lee (2010), 1.12 Sreeba and Padmalal (2011), 1.13 Zelenakova and Zvijakova (2011)
2 EIA framework	2.1 Rosenberg <i>et al.</i> (2001)
3 Integrated EIA	3.1 Kwiatkowski and Ooi (2003)
4 EIA and health (risk and safety) assessment	4.1 Snary (2002), 4.2 Yong <i>et al.</i> (2002), 4.3 Bobylev (2004), 4.4 Hadjimitsis <i>et al.</i> (2005), 4.5 Robu and Macoveanu (2005), 4.6 Tu and Lee (2008), 4.7 Zhang <i>et al.</i> (2010)
5 Human health in EIA	5.1 Bronson and Noble (2006), 5.2 Noble and Bronson (2005), 5.3 Noble and Bronson (2006), 5.4 Harris <i>et al.</i> (2009)
6 HIA	6.1 Caussy <i>et al.</i> (2003), 6.2 Thriene (2003), 6.3 Cole <i>et al.</i> (2004), 6.4 Kemm (2004), 6.5 Kemm (2005), 6.6 Cornburn and Bhatia (2007), 6.7 Bhatia and Seto (2011), 6.8 Kang <i>et al.</i> (2011), 6.9 Signorelli <i>et al.</i> (2011)
7 Health Assessment model/framework	7.1 Gibbons <i>et al.</i> (2007), 7.2 Mindell <i>et al.</i> (2008)
8 HIA in EIA	8.1 Hengpraprom and Sithisarankul (2011)
9 Health in project assessment	9.1 Thriene (2004), 9.2 Utzinger <i>et al.</i> (2005), 9.3 Gu <i>et al.</i> (2007), 9.4 Carmichael <i>et al.</i> (2012)
10 Risk and health	10.1 Dooley <i>et al.</i> (2003), 10.2 Demidova and Cherp (2005), 10.3 Topuz <i>et al.</i> (2011), 10.4 Spickett <i>et al.</i> (2012)

Table 1 - Categories of studies retrieved from literature review

#### 4. Conclusions

While EIA is well established in structure, HIA plays for the opposite situation. It is widely unstructured in scope and procedures, besides it is not mandatory in several countries. In this paper we explored the role of health in EIA and similar types of assessment, taking in account the main subject regarded for assessment. Through a systematic literature review, we investigated health in different contexts of studies related to EIA, HIA, RA and alike. It was possible to gather 46 studies and classify them in ten categories according to the main subject of assessment.

Over this classification, it can be highlighted a plural meaning for health, depending on the main subject of assessment. When the main subject are EIA studies, health is closely linked to the physical aspects of the environment, and social ones are almost always disregarded. When the main subject is an EIA framework, health assumes as individual as collective perspective, therefore presenting changing meaning. In integrated EIA studies, health is represented in a multiperspective level, and it can be understood as both scientific and lay knowledge performing together the integral concept of health.

When EIA and health assessment studies are addressed to risk issues, health is conceived under a negative view, as health loss. So, health it is what remains after the result of dangerous exposures. When human health is focused in EIA studies, health is more a matter of planning, so a preventive perspective of health takes place. In HIA studies by excellence, health is the result of intersectorial

collaboration between institutions and professionals – it is a matter of collective learning that involves mainly social aspects. HIA framework studies bring a plural definition for health, as a transdisciplinary view. When HIA goes inside EIA, health concept follows the EIA scheme, and then physical determinants of health back to scenery. In the case of health in project assessment studies, the concept of health lies between individual and communitary scopes – therefore it is difficult to have a single understanding for health – it slips between the physical and the social determinants, embracing variants as behavioral aspects that can regard to both individuals and groups. Finally, in risk and health studies, health means safety, and quantitative methods take a special place.

From this classification and the content analysis of health in impact assessment and in similar assessment literature, it is possible to conclude that health has no single meaning, and it gets diverse, and embraces a mixed type of knowledge, as wider the scope gets, and the more addressed to well-being it goes.

This analysis is not conclusive, but rather represents a type of exploratory research that can be enriched with a broader number of studies to be further assessed. It is recommended to perform future investigation over health assessment theme taking in account the context of urban studies in which health is a practically mandatory issue due the complexities that arise as result of several overlapped determinants.

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