

## REVIEW ARTICLE

# Health Impact Assessment as a Planning and Decision-making Tool

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## ABSTRACT

Health impact assessment (HIA) is a versatile planning and decision-making tool that has been applied in many situations but more so in environmental impact assessment (EIA). In many developed and developing countries, many development activities and projects are now subjected to EIA. HIA in urban planning although limited, is now being increasingly applied, whereby the planning of a city including its transportation system and corridors can have significant health implications on city dwellers. This paper discusses the usefulness of HIA as an impact assessment tool in various applications including in urban planning. The International Finance Corporation (IFC) has introduced a comprehensive HIA which includes health risk assessment (HRA). Environmental HRA is a standardized characterization of potential negative health impacts resulting from human exposures to dangerous agents or circumstances within the environment. HIA as a planning and decision-making tool will become more universal in its applications.

**Keywords:** Health impact assessment, Urban planning, Decision-making tool, Health risk assessment

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## INTRODUCTION

Health impact assessment (HIA) is a versatile planning and decision-making tool that has been applied in many situations but especially in the applications of environmental impact assessment (EIA), whereby the environmental impacts, including health impacts, of a development project are assessed before the project is allowed to commence construction and operation. The EnHealth Council stated that, "HIA is defined as the process of estimating the potential impact of a chemical, biological, physical or social agent on a specified human population system under a specific set of conditions and for a certain timeframe" (1 p. V).

According to the World Health Organization (WHO), "HIA is a combination of procedures, methods and tools by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population" (2 p. 1).

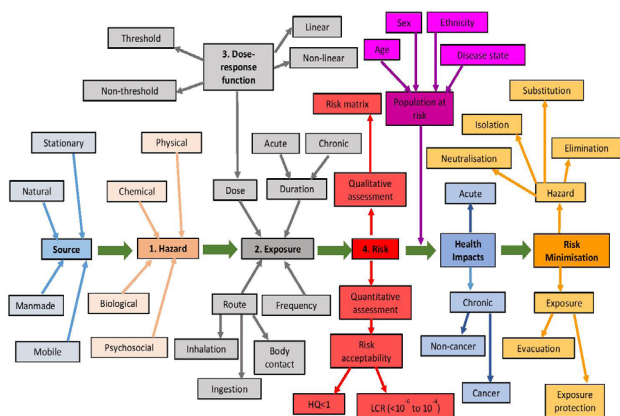
An example of a policy that can be subjected to HIA would be an energy or an agricultural policy of a nation. For example, the national guidelines on sustainable energy issued by the Malaysian National Energy Policy

1979 to ensure energy supplies that are efficient, secure and environmentally sustainable (3). The Policy adopted a four-fuel supply mix of hydropower, coal, gas and oil. Each of these fuel will undoubtedly has variable impacts on both the environment directly and human health indirectly by way of environmental destruction and pollution. Therefore, we could do an HIA on the consumption of these different fuel systems and how they impact human health. To our knowledge, this has not been carried out in Malaysia. However, there are provisions to conduct EIA and HIA for individual energy project, whether it is a gas or coal-fired thermal power plant or a hydroelectric dam. This would be an example of the conduct of a project HIA. Similarly, an HIA on a programme can also be carried out. This can be programmes like urban renewal or poverty eradication. Such programmes are designed to generate positive impacts. However, they can also generate negative impacts or consequences. Thus, HIA should be able to assess both the negative and positive impacts of a project, programme or policy.

## METHODS

This is essentially a review paper of HIA as a planning and decision-making tool. The authors did not engage in an extensive literature search and review. However, the first author is an HIA and HRA practitioner and consultant registered with the Department of Environment Malaysia. Therefore, he has access to the relevant literature related to these tools, both from Malaysia and internationally.

Thus, both publications and grey literature on the topics were used as references for this manuscript. The authors are also introducing a new health risk and impact assessment framework (Fig. 1) which has never been published before.



**Figure 1: Health Risk and Impact Assessment Framework**

### HIA AS A PLANNING TOOL

Many health impacts are secondary in nature in the sense that they emanate from other non-health related activities. Many health impacting issues are beyond the purview of the medical and health sector. For example, agriculture, food production and distribution, industrialisation, water supply, environmental pollution, waste generation and disposal are activities beyond the medical and health sector, which can have very serious implications on human health and survival. One way to bring these non-health activities or processes to within the health purview is to subject them to HIA. Only then will they be viewed and assessed through the health lens and perspective. If not, a seemingly high economic impact activity such as the development of a heavy industrial zone may end up with serious environmental pollution that can lead to both acute health effects like cardiorespiratory failure and death, as well as chronic health effects like cardiovascular, respiratory, kidney, liver and skin diseases and cancers. This will significantly increase the health cost for exposed individuals and the nation, offsetting whatever economic benefits that can be accrued from the project. In most cases, health cost is not usually factored into the overall project costs, thus making them look economically beneficial when the costs of unwanted health outcomes can be costly to the nation.

In many developed and developing countries, many of these development activities and projects are now subjected to a planning process called environmental impact assessment (EIA). The EIA process may or may not include a health study or consideration often called a health impact assessment (HIA). In some countries like Malaysia, HIA has become a mainstay of the EIA process and is required for many prescribed activities

or development projects (4). HIA is used to assess the health impacts throughout the entire life cycle of the proposed project, from its construction, to its operation and abandonment phases. The health impacts can emanate from the project’s activities, air emission, effluent discharge, hazardous and non-hazardous waste generation and disposal activities. This type of HIA are known as project HIA as opposed to programme or policy HIA.

HIA applications beyond EIA is limited even in the developed world. There has been applications of HIA in evaluation of health programmes such as in tobacco control and HIV/AIDS control programmes (5, 6). HIA is also now being increasingly applied in urban planning, whereby the planning of a city, including its transportation system and corridors can impact significantly on the health of city dwellers. HIA now supports the delivery of healthy and sustainable habitats in major urban centres of North America, Europe, Africa, Asia and Australasia. For example, one exemplary work of leading edge HIA in Europe was that of the London Healthy Urban Development Unit which investigated the links between health and urban planning, and has introduced HIA as a tool towards better healthy setting in London. Their financial model could be a global pioneer in evaluating the capital and income costs of health-care administrations for new housing projects and expansions of existing urban areas. Moreover, it spearheaded the utilisation of geographical information systems (GIS) to outline existing health, social, leisure and cultural facilities, and planned the location of new facilities to ensure that they are equally disseminated and available to all (7).

In Thailand, a pioneering HIA work by the Health Systems Research Unit showed that unplanned high-rise developments and poor urban planning in Chiang Mai and its Lanna Territory were changing the historical, cultural and spiritual significance of the area, which in turn was compromising the health and wellbeing of residents (7). Such work demonstrated the applicability and versatility of the HIA tool in urban planning and development. Rather than using HIA mainly to address individual project or activity, it should be applied in the wider context of planning. HIA in urban planning could for example be applied in urban masterplans and urban redevelopment projects.

Slotterback et al. (2010) assessed 3 HIA planning tools in 10 municipalities in a county in Minnesota, U.S.A. (8). The 3 tools assessed were a preliminary checklist utilized as a screening and scoping tool by individual planners and groups; a rapid assessment stakeholder workshop used as a participatory approach modelled after European examples, whereby stakeholders can participate in the recognition and assessment of health impacts; and a threshold analysis used as a data intensive HIA based on a review of research on connections

between the built environment and public health which utilizes GIS-based analyses of key health indicators. They concluded that HIA is potentially an important new tool in the planning toolkit. Strategic use of HIA to evaluate draft plans and inform plan updates and project redesigns can help raise awareness about health issues and focus planning on important human problems (6). Health and wellbeing considerations have had limited impact on urban design and planning. However, under the New Urban Agenda adopted by UN Habitat in 2016, one of the goals identified is to improve the health and well-being of city residents through the development of sustainable cities (9).

Making cities more healthy requires renewed approaches to planning, giving more emphasis on health and identification of a list of health based goals as shown in Table I. There are 8 spheres of health and each sphere has a set of objectives which must be met (7,12).

**Table I : Healthy urban planning objectives based on The Settlement Health Map**

Spheres of the Health Map	Objectives for Healthy Urban Planning
1. People	<ul style="list-style-type: none"> <li>• Providing for the needs of all groups in the population</li> <li>• Reducing health inequalities</li> </ul>
2. Lifestyle	<ul style="list-style-type: none"> <li>• Promoting active travel</li> <li>• Promoting physically active recreation</li> <li>• Facilitating healthy food choices</li> </ul>
3. Community	<ul style="list-style-type: none"> <li>• Facilitating social networks and social cohesion</li> <li>• Supporting a sense of local pride and cultural identity</li> <li>• Promoting a safe environment</li> </ul>
4. Economy	<ul style="list-style-type: none"> <li>• Promoting accessible job opportunities for all sections of the population</li> <li>• Encouraging a resilient and buoyant local economy</li> </ul>
5. Activities	<ul style="list-style-type: none"> <li>• Ensuring retail, educational, leisure, cultural and health facilities are accessible to all</li> <li>• Providing good quality facilities, responsive to local needs</li> </ul>
6. Built environment	<ul style="list-style-type: none"> <li>• Ensuring good quality and supply of housing</li> <li>• Promoting a green urban environment supporting mental well-being</li> <li>• Planning an aesthetically stimulating environment, with acceptable noise levels</li> </ul>
7. Natural environment	<ul style="list-style-type: none"> <li>• Promoting good air quality</li> <li>• Ensuring security and quality of water supply and sanitation</li> <li>• Ensuring soil conservation and quality</li> <li>• Reducing risk of environmental disaster</li> </ul>
8. Global ecosystem	<ul style="list-style-type: none"> <li>• Reducing transport-related greenhouse gas emissions</li> <li>• Reducing building-related greenhouse gas emissions</li> <li>• Promoting substitution of renewable energy for fossil fuel use</li> <li>• Adapting of the environment to climate change</li> </ul>

Source: (7).

In Malaysia, HIA has been proposed to be made a mandatory requirement in land use planning and development control to promote public health in the local authority (8,13). The outcome of HIA may provide a better direction for town planners on land-use decision making in a way that can promote and or improve the health of a community in the area.

## HIA GUIDELINES

HIA guidelines are available for various intents and purposes. Some are very general in nature while others are more specific. Its application will depend on the nature of the policy, programme or project to be assessed. There is no hard and fast rule about HIA, as each case will present its unique features, and the assessor will need to adapt the tool used for each case. One of the guidelines most referred to on HIA is that by the International Finance Corporation (IFC) of the World Bank Group (12). It stresses that an HIA should consider both negative and positive aspects of health. It should also try to identify health benefits that could be enhanced. HIA is applicable across different industrial sectors (such as agribusiness, infrastructure, extractive industries) and project settings (such as urban, rural, greenfield, brownfield) (13). It proposes 2 types of HIA; namely a rapid and comprehensive HIA. A rapid HIA requires less-intensive efforts. Typically, rapid HIA is further subdivided into desktop HIA and limited in-country HIA (12).

The IFC specifies that, "A desktop HIA is a qualitative internal review of the potential health impacts of a proposed project, so as to inform and comment on the design of the project. It is also useful to determine whether a more detailed review and further assessment of health impacts is required" (12, p. 11).

A limited in-country HIA is conducted when health-related data are readily available for assessment and therefore, no specific new data will need to be collected. The IFC also stated that, "Data sources may include peer-reviewed scientific and grey literature sourced from health-related agencies. Health-related data can also be gathered through workshops or discussions with key internal and external stakeholders. The results are normally incorporated into the social and environmental impact assessment (EIA), although the limited in-country HIA can also be a report by itself" (12, p. 11).

A comprehensive HIA comprises the 6 steps of screening; scoping; health risk assessment for assessing impacts; decision-making, establishing priorities and reporting; implementation and monitoring; and evaluation. A key feature of a comprehensive HIA which clearly defines it from a rapid HIA is stakeholder communication and consultation, in which this should be conducted at all steps, from screening through implementation and

monitoring (12).

We suggest that rapid and comprehensive HIA be formalised into urban project design and development to assist policy makers in planning urban development with minimised health impacts and maximised health benefits to urban dwellers. This will also help educate and sensitise urban project developers on the importance and benefits of a sustainable and healthy city.

In addition to the above statement, IFC also stated that, "A comprehensive HIA is usually meant for large and complex projects, especially when there will be resettlement or relocation of affected communities, or if a significant influx of persons is expected, regardless of whether it is a new project, a new project location, or a significant expansion of an existing facility. An important consideration in a comprehensive HIA is the need for some provision of new data collection in the potentially affected communities, to facilitate the prediction in changes to health determinants, associated health risks and outcomes. This data collection is typically done through a health questionnaire survey" (12, p. 9).

Fig. 2 shows the 3 considerations in choosing the right type of HIA based on the potential health impacts, project footprint and social sensitivity (12). When the potential health impacts are high, like when there is exposure to hazardous materials, resettlement or relocation of communities, related diseases are endemic, health system and infrastructure are poor, and there is stakeholders' concerns, then a higher level HIA is required.

On the project footprint, if existing knowledge on the project is lacking; project's physical area and number of people impacted are high; timescale of project is long; no precedence of similar project before; high complexity of the project in term of workforce size and country of origin, affects people's quality of life, results in population displacement, affects use of natural resources, access to health care, availability of food and housing; then a higher level of HIA is needed. On social sensitivity, projects which affect socioeconomic situation, conflict and human rights, population resettlement, impacts on

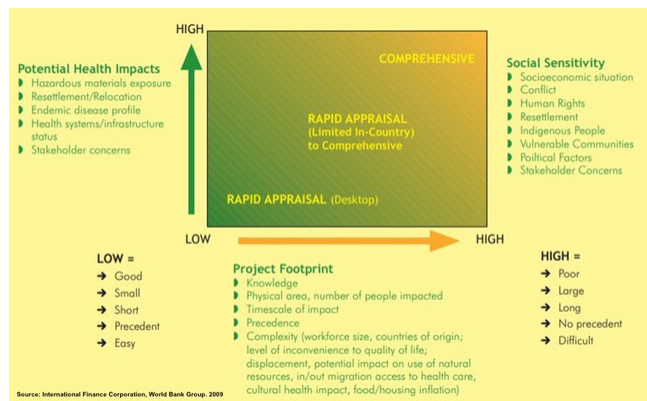


Figure 2: Selecting the right type of HIA

indigenous people and political concerns, then a higher level of HIA will be required.

### HEALTH RISK ASSESSMENT (HRA) IN HEALTH IMPACT ASSESSMENT (HIA)

Health Risk Assessment (HRA) is a part of Health Impact Assessment (HIA). According to Omen, "Environmental HRA is a systematic scientific characterization of potential adverse health effects resulting from human exposures to hazardous agents or situations in the environment" (14 p.11).

There can be qualitative or quantitative HRA. Omen also stated that, "Qualitative risk assessment is an inquiry process that utilizes and generates non-numerical data, understanding of a social or human problem, based on building a complex and holistic picture formed with words, reporting detailed views of informants and conducted in a natural setting" (14 p. 1).

Quantitative HRA is normally employed for assessment of chemical and physical hazards like ionizing radiation. Risk is assessed as non-carcinogenic and carcinogenic risk.

Fig. 1 shows the health risk and impact assessment framework. HRA comprises the 4 components of hazard identification [1], exposure assessment [2], dose-response relationship [3], and risk characterization [4], which are numbered accordingly in Fig. 1. A hazard can be either biological, chemical, physical or psychosocial in nature. A hazard will originate from a source, which can be natural or manmade, and stationary or mobile. In order for a health risk to be realized, there must be exposure, whereby a hazard has to come into contact with a new host. Therefore, even though a hazard may be present, without exposure, health risk will not be expressed.

The resulting health impacts can be in the form of acute or chronic health impacts. For chronic health impacts, it can be in the form of chronic non-cancer diseases or cancers. For non-carcinogenic risk, risk is considered acceptable when the hazard quotient (HQ) is less than 1. For carcinogenic risk, risk is acceptable when it is within the acceptable risk range of  $10^{-6}$  (1 in a million) to  $10^{-4}$  (1 in 10,000). Risk minimisation strategies can be applied to mitigate health impacts. The focus on risk minimisation will be on the hazard or exposure. Focus on the hazard includes elimination, substitution, isolation or neutralisation of the hazard, while focus on exposure relates to exposure protection or evacuation.

### CONCLUSION

Health impact assessment (HIA) is a versatile planning and decision-making tool that has been applied in many situations but more so in environmental impact



assessment (EIA) in the assessment of the health impacts of development projects. There is a need to expand its use further in assessing the health impacts of programmes and policies, but especially in the planning and designing of urban development projects and landuse. This paper proposes that policy makers should promote the use of HIA as an effective decision-making tool that can assist in the assessment and predictions of potential health impacts in development and urban planning. Thus, HIA would help decision makers in understanding health impacts in a broader perspective.

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