

How to do (or not to do) . . .

Health impact assessment

LEONARD B LERER

Health Consulting Office, Medical Research Council, South Africa and Healthcare Management Initiative, INSEAD, France

There is growing concern about the environmental, social and health consequences of development projects. Environmental impact assessment (EIA), which aims to address this concern, is often conducted with little input from the health sector. Quantifying the health benefits and risks of a project or policy requires an innovative synthesis of socio-demographic, environmental health, epidemiological and health systems data. This article provides a simple framework for health impact assessment (HIA), a method for describing and measuring the impact of a project or policy on health and wellbeing, and designing appropriate interventions. The key components of HIA are: review of available data; research and identification of priority health issues through the use of rapid assessment methods; design of a health action plan with stakeholder consultation; implementation of interventions and the monitoring of long-term health impacts. HIA can assist in ensuring that development and policies are 'health promoting' and that the health sector plays a meaningful role in EIA.

Introduction

Environmental impact assessment (EIA) is an integral part of development. Most institutions will not finance infrastructure and projects without some assessment of their impact on the physical environment and surrounding communities. EIA has developed into a sophisticated strategic science and EIA methodology has been refined to examine potential social and health impacts and to provide decision support based on broader economic, national resource and societal considerations (McDonald and Brown 1995). In the public policy and international arena, inter-sectoral initiatives (such as those on climate change and biological diversity) invariably have health components. Industrialized countries, and particularly the European Union, have begun to consider the health implications of policies and their implementation (Scott-Samuel 1996). Less-developed nations, with limited institutional capacity, are forced to grapple with globalization, demographic transition, urbanization, environmental degradation and a lack of basic infrastructure for sustaining a healthy population (WHO and CEMP 1992). Health depends on society's capacity to manage the interaction between human activities and the environment. To ensure that development promotes rather than endangers health, comprehensive impact assessments are required to integrate health and ecological risk measurement with meaningful community consultation (World Bank 1994; Suter 1997).

What is health impact assessment?

Health impact assessment (HIA) is a method for describing and estimating the effects that a proposed project or policy may have on the health of a population (British Columbia

Ministry of Health 1995; Ratner et al. 1997). There is a growing body of literature and guidelines on HIA in areas such as water resources (Birley 1991; Konradsen et al. 1997), health determinants (British Columbia Ministry of Health 1995) and the environment (British Medical Association 1998). The World Bank, recognizing the need to integrate health into development planning, recently updated its *Environmental Assessment Sourcebook* with a revised health section (World Bank 1997). The World Bank update and other recent publications on HIA provide important background for anyone seeking to understand the evolution of this component of environmental assessment. Health hazard identification and health risk management are the salient features of currently published examples of HIA (Konradsen et al. 1997). Broadening the methodological options for HIA could permit more focus on the interaction between socio-demographic, environmental, economic and health system issues, and easier integration of health concerns into environmental management plans.

This article aims to augment the available literature by providing a practical framework for conducting HIA for infrastructure and development projects. The proposed approach is designed for circumstances where there is a paucity of information and severe time and cost constraints. HIA can be used in almost any situation where a project or policy has implications for health. Table 1 provides some examples of areas of activity where an HIA may be useful. Someone seeking to do a risk assessment on environmental contaminants (such as oestrogen-like compounds), looking at the impact of a large dam or designing health promotion programmes for urban redevelopment would have to consult specialized sources, some of which are contained in the list of internet addresses below.

Table 1. Applications of health impact assessment

Activity	Examples
'Traditional' project EIA	Large dams, mines, power plants, airports
Regional or local project EIA	Development corridors, urban redevelopment
'Cumulative' environmental assessment	Air/watershed management
'Sectoral' environmental assessment	Energy/water sector planning
'Policy' environmental assessment	Infrastructure planning
Economic policy/structural adjustment	Country level impacts/mitigation
International treaties	Climate/biodiversity
Special cases	Private sector/budget planning

Why do I need to know how to do HIA?

As most development projects have health consequences, the involvement of public health professionals in planning and implementation can ensure that the maximum health benefits are 'leveraged'. The World Health Organization (WHO), recognizing the need for development policies that promote rather than endanger health, and for mitigation measures to reduce negative environmental health impacts, advocates the inclusion of a health component in EIA (Cooper-Weil et al. 1990). It is often difficult for health personnel to be integrated into EIA teams, as environmental assessment specialists may see the role of public health as confined to specific diseases and health service issues. Health professionals, knowing little about the science of ecological risk assessment, may feel uncomfortable participating in the formal EIA process (Suter 1997).

The importance of HIA varies with the nature and location of a project. For example, a highway being built in a sparsely populated area would perhaps only require injury control input. A large dam situated in a densely populated subtropical country with high levels of vector-borne diseases and AIDS, will require expertise in areas including environmental health, health systems research and health promotion. In cases where infrastructure has a direct positive health impact, such as in water and sanitation provision, HIA can be used to design the most effective service level to ensure optimal health benefits and cost-recovery (Esrey 1996; *The Economist* 1998). HIA may be the best method of obtaining baseline data for long-term follow-up of the impact of large scale infrastructure and development on health (Hughes and Hunter 1970; Cooper-Weil et al. 1990).

HIA methodology can also be applied to the quantification of the health impacts of economic and social policies. The relationship between health status and macroeconomic factors is complex and it is often difficult to measure the health effects of economic activity in less-developed countries (WHO 1993; Sen 1994). The capacity to conduct rapid HIA of development projects and economic interventions, such as austerity measures and market liberalization, makes it possible to identify negative health consequences, particularly in vulnerable groups such as the ultra-poor, children and the disabled (Warford 1995).

Doing HIA – the important steps

As health issues are often first identified by environmental or social specialists during the community consultation phase, health professionals should participate in the initial planning and design (scoping) of an EIA. The first step in planning an HIA is to consider how the final output can contribute to 'health promoting development'. The HIA team often has multiple clients, including the EIA contractor, implementing agency, funders, government, local health authorities and the community. Every effort should be made to prevent the HIA report from being lost and forgotten in the copious EIA and project documentation, and early stakeholder participation may improve the chances of the health recommendations being seriously considered. There are four key steps in an HIA namely: *review, research, discussion and planning*, and finally, *implementation and monitoring*.

Review

A detailed and current review of all data pertaining to the project is the foundation of a good HIA and assists in identifying issues requiring further research. The review starts with a global perspective and thereafter moves onto local scientific literature, project documents and discussion with key informants. Where possible, original data should be critically re-analyzed, especially vital registration records. Documentary data should be supplemented with personal communication with local authorities, community leaders and health care providers. Electronic bibliographic databases such as MEDLINE and POPLINE assist in a literature review (McKee and Britton 1997), but the richest sources of health information are often unpublished reports and surveys conducted by the World Bank, World Health Organization, and various multilateral and local organizations. The review also provides the 'literature review' for the assessments contained in the research component of the HIA.

Research

The variety of projects requiring HIA make it difficult to prescribe a specific research method. In many cases, the HIA will be constrained by a lack of resources, time and the poor quality of available data. Based on a number of HIA projects conducted in Southern Africa, we have found that the best

approach is a series of small, rapid assessments. When faced with a large number of project-affected households, it may be necessary to use sampling techniques, and epidemiological expertise is required to ensure a sample size that permits some inference about health impacts. The research component can be divided into four assessments, namely socio-demographic, health determinants, health status and health systems. These assessments can then be integrated in a description of priority health issues for discussion and the design of a health action plan.

Socio-demographic assessment

The socio-demographic assessment provides a context for the HIA by describing the population at-risk. It focuses on the collation of available data on population demographics, socioeconomic indicators, geographical factors, agriculture, nutrition, infrastructure, transportation and macro-economic factors. Social and family structures should be described, and in large development projects attention will have to be paid to resettlement and migration trends. The socio-demographic assessment is largely reliant on secondary data provided by government and local authorities, development agencies, contractors and EIA social and economic specialists.

Health determinants assessment

Health determinants are the direct or indirect causes of a disease, condition or injury (Lerer et al. 1998). A health determinants assessment aims to quantify access to and quality of water and sanitation, food and fuel security, housing, pollution, public infrastructure, waste management and other factors that influence human health. This assessment can be expanded to include a simple 'health production index' for rapidly ascertaining, in longitudinal studies, whether a project has had a positive or negative impact on households. The index could include simple descriptions of the physical state of the home, access to and quality of water, sanitation and fuel, and some measure of household economic activity (Scudder 1993).

Health status assessment

Health status data are mainly descriptions (both numerical and qualitative) of morbidity and mortality due to diseases, conditions and injuries. Information about health status facilitates quantification of a health problem (Lerer et al. 1998). This can be calculated as the disease burden attributable to a particular disease, condition, injury or determinant (such as malnutrition or tobacco). The *1993 World Development Report* (World Bank 1993) and the Ad Hoc Committee on Health Research Relating to Future Intervention Options (WHO 1996) use the Disability Adjusted Life Year (DALY) as their principle measure of disease burden in populations. It is unlikely that HIA practitioners in less-developed countries will have sufficient data to use the DALY or even simpler composite indicators (Hyder et al. 1998).

The health status assessment aims to describe and quantify important diseases and conditions to assist in determining health needs and provide an unbiased baseline for assessing the long-term health impact of a project. The methodology

can be loosely based on rapid epidemiological studies (Smith 1989; Manderson and Aaby 1992; Anker et al. 1993) in order to succinctly and accurately describe a wide range of health indicators. These data can include the infant mortality rate, perinatal mortality rate, under-5 mortality rate, ranked cause of death, maternal mortality rate, rates of substance abuse including alcohol and smoking, HIV and STD prevalence, vector-borne and infectious disease prevalence, and non-communicable disease prevalence. Road-to-health cards can be used to provide a picture of nutrition and vaccination status. Available surveillance data should be collected on major groups at risk, including the very young, women, adolescents, the disabled and the elderly. Obtaining narrative accounts of recent conditions and health concerns (rapid anthropological assessment) may give a more fine-grained picture of issues requiring further investigation and action.

Health systems assessment

Development projects often influence the way in which health services are delivered and used by surrounding communities. If large numbers of people move to informal settlements in close proximity to a construction site, additional environmental and primary health care services may be required. Although generally focusing on occupational health and safety, contractors may provide sophisticated health services to nearby communities. Local health authorities may not be in a position to take over these facilities upon completion of construction.

An HIA should contain a good review of the health system in the project area in order to ensure that adequate facilities, personnel and pharmaceuticals are available. A number of methods are available for doing an assessment of a district health system (see 'Useful internet addresses'). Whilst it is outside the scope of this paper to describe the health economics approaches available, the health systems section of an HIA should at least contain a description and simple audit of current facilities in terms of location, size and service provision (hospitals, clinics and community health workers), human resources, pharmaceutical supplies and procurement and data systems. Service provision (such as maternal and child health, STD clinics, family planning, trauma and health promotion) should also be assessed. If not covered in the health status assessment, the most important outpatient conditions, reasons for hospital admission and age-stratified causes of death should be ranked. A more comprehensive health systems assessment can include measures of facility utilization, accessibility, process and quality of care (Anker et al. 1993). The assessment can conclude with a description of other health providers' care (such as traditional healers and birth attendants) and collaborative activities with non-governmental organizations and aid agencies.

Discussion and planning

A good HIA requires timely, continuous and iterative consultation with the stakeholders in order to ensure that there is support for the report and recommendations. Early results (priority health issues) should be presented and discussed, as this will assist in the design of a mitigation plan. It is often

difficult to enlist community participation, as project-affected groups are heterogeneous (Cummings 1998) and collaborative activities become even more difficult to initiate when resettlement and migration cause social disruption (Ferguson 1992; Suter 1997).

The HIA should contain a comprehensive health action plan based on the review, research and discussion previously described. The plan aims to ensure that negative health impacts are mitigated or reduced and to maximize the positive health impacts of development associated with the project or policy. The plan should be cognizant of the institutional, financial and political constraints that make intervention difficult. Expert input should be obtained, especially when planning control measures for diseases such as malaria and schistosomiasis.

The health action plan can be based on the main impact categories such as: disease control (including communicable and non-communicable disease, AIDS/STDs, childhood conditions and injury), environmental health (including water and

sanitation, housing and energy), health services (including personnel, facilities and equipment) and health promotion (mitigating negative impacts and reinforcing positive impacts). For each impact category, an implementation strategy can be designed using a scheme based on Logical Framework Analysis (LogFrame), a current management approach to project implementation (see Nancholas 1998). Figure 1 shows the structure of a health action plan and its application in malaria control for a mining project in Zambia. This HIA was conducted for a company planning to purchase an existing copper mine in an area with a high population density and endemic malaria.

Implementation and monitoring

The health action plan provides guidelines and time frames for implementation and key performance indicators for monitoring. Translating the plan into action (implementation) requires careful attention to budget design. Wherever possible, resources should be allocated for modest and sustainable improvements to existing health facilities and

BACKGROUND: Sub-Saharan Africa's (and Zambia's, in particular) formidable problems are the intractable bequests of history, geography and climate. Limited life-expectancy, poor health status and an inefficient health system are sectoral manifestations of these problems. *'International assistance for the tropics should turn away from general balance-of-payments support, and towards vastly larger international efforts to deal with tropical infectious disease and public health generally'* (Sachs 1997). Epidemiological data on malaria are provided in the HIA. Chloroquine resistance has an estimated prevalence of 35%. Data on drug resistance and current research is provided in the supporting documentation. Logistical, personnel and financial constraints preclude local authorities from playing a greater role in vector control.

RISKS: The mine currently operates in an endemic malaria area with associated high levels of morbidity and mortality. Improved mining operations will probably reduce breeding sites through better water resource management.

OBJECTIVES

Desirable Outcome: Sustainable and cost-effective elimination of malaria from areas of project operations.

Attainable Outcome: Improved malaria control.

INPUTS

Project: Malaria control 'package' (see tasks).

Other: Improved collaboration with government and aid agency malaria control programmes.

TASKS

Early diagnosis, prophylaxis and treatment of employees, promotion of personal protection including impregnated bednets, residual spraying, screens and mosquito coils.

Vector control programmes for surrounding areas including mine water resource management and draining of potential breeding sites.

PERFORMANCE INDICATORS

Improvement in biological and health indicators of malaria control.

CONSTRAINTS

Insufficient resources and barriers to collaboration between all the participants in malaria control.

Figure 1. Health action plan for malaria control for a mining project in Zambia

services. Health information systems should be strengthened in order to provide a long-term picture of the positive and negative health impacts of a project and to assist in the redesign of any mitigation measures. In order to ensure continued surveillance, important health indicators can be incorporated into the data system used for the general project monitoring.

Concluding comments

Infrastructure and development can improve health through the provision of services, the generation of employment and economic activity (Drummond and Stoddart 1995). However, rigorous impact assessment is required to avoid pitfalls such as environmental degradation, poverty exacerbation, social disruption and the spread of communicable diseases (Cooper-Weil 1992; Lerer and Yach 1994). EIA has developed beyond pure quantitative risk-measurement and now includes participatory approaches and strategic environmental management (Power and McCarty 1998). Existing models of hazards, exposures and outcomes, designed for environmental health challenges in the industrialized world (Thacker et al. 1996), may not be suitable for less-developed countries with limited surveillance and regulatory systems. Communities often have a different perception of the risks and benefits of projects to that of parties involved in project implementation (Vineis 1995; Wing 1998) and HIA may assist in ensuring that all the partners involved in development are in a better position to design health-promoting interventions. HIA offers a robust and exciting approach to any situation where health input may be required and assists in ensuring that health has its rightful place on the development and public policy agenda.

Useful internet addresses

Health Systems Trust – Rapid situation analysis for health services: <http://www.healthlink.org.za/hst/isds>
 The World Bank web pages and search engine – Sectoral impact assessment: <http://www.worldbank.org>
 Partnerships for Health Reform – Health and nutrition financing and sustainability for developing countries – health surveys: <http://www.phrproject.com>
 Health goals and health impact assessment: <http://www.hlth.gov.bc.ca>
 Advice on HIA for large infrastructure projects – Medical Research Council Health Consulting Office: <http://www.mrc.ac.za/consult/new.htm>

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Biography

Len Lerer, MB.Ch.B, DFM, M.Med (Path), B.Sc. Hons. (Epidemiology), MBA, is a senior consultant with the Health Consulting Office of the South African Medical Research Council. He specializes in health impact assessment for large infrastructure projects and health sector management consulting.

Correspondence: Dr L B Lerer, Healthcare Management Initiative, INSEAD, Boulevard de Coustance, 77305 Fontainebleau Cedex, France. E-mail: lblklb1@aol.com