A guide to health impact assessments in the oil and gas industry
This Pocket Guide is a ‘quick-reference’ supplement to the IPIECA/OGP publication entitled A Guide to Health Impact Assessments. It provides a summary checklist of activities to consider when conducting health impact assessments in the oil and gas industry.
A Guide to Health Impact Assessments in the oil and gas industry

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This Guide to Health Impact Assessments in the Oil and Gas Industry is also available in PDF format on the IPIECA CD-ROM of the same title. Hyperlinks are included throughout the document to facilitate access to related information on the Internet, and to supporting documentation included on the CD-ROM. The hyperlinks are indicated in this printed version by way of the blue underlined text.
Purpose of this Guide

This Guide defines and outlines the purpose and value of Health Impact Assessments (HIAs) within the oil and gas industry. It aims to describe the overall HIA process as it is currently understood and practised. HIA is a useful and beneficial tool for business, communities and government policy makers. Experience within the oil and gas industry suggests that health is a critical issue both to the project workforce and the surrounding communities. The oil and gas industry faces a complex agenda that increasingly requires an evaluation of health, social and environmental impacts throughout all of its operations. This concern is often expressed in all phases of exploration, production, refining and marketing activities. Initially, the impact assessment focused on environmental performance; however, over the past several years, the 'license to operate' has encompassed both environmental and social performance. These issues are sometimes considered part of the overall corporate social responsibility movement. While health and safety issues have always received the highest priority for any project, the traditional focus was on worker health and safety within the geographical boundaries of a proposed project. Community health outreach programmes and assessments have frequently been performed but not considered a mandatory performance requirement. Within the context of environmental and social issues, the oil and gas industry is increasingly asked to address problems that, traditionally, are 'outside the fence line' and considered responsibilities of the host government. A similar evolution and expansion of assumed responsibilities for the industry has been advocated by many stakeholders in the international public health community. Oil and gas companies need to understand and consider the potential public health impact of their overall activities and projects on host societies in order to understand and address their responsibilities appropriately.

The practice of HIA is relatively new and rapidly developing, particularly in comparison to either the environmental or social impact assessment process for new or existing oil and gas projects. Therefore, health-specific HIA standards of practice and technical methodologies are less well defined and established. Within the HIA field, a significant difference between 'policy HIA' and 'project HIA' has developed. Policy level HIA could be developed for a specific industrial sector, e.g. extractive industries, by government and multilateral lending institutions like the World Bank. However, the purpose of this guidance document is to create a common understanding of the basic concerns, principles and practices of HIA for the oil and gas industry that would be relevant across a diversity of projects. In this publication, the term 'project HIA' includes both new proposed activities and existing operations.

The accompanying CD-ROM contains additional materials that provide greater detail and depth, particularly regarding the different steps in the overall HIA process.
What is Health Impact Assessment?

‘Health Impact Assessment’ is a compound term reflecting two different concepts—health and impact assessment. ‘Health’ is broadly defined by the World Health Organization (WHO) as a state of complete physical, mental and social well-being and not simply the absence of disease or infirmity. Within this context, health is considered as a resource for everyday life, not simply as the object of living. Health is characterized as a positive concept emphasizing social and personal resources as well as physical capabilities. ‘Impact Assessment’ describes the systematic analysis of the lasting or significant changes, positive or negative, intended or not, in people’s lives and the natural environment brought about by a given action or series of actions. The WHO/ECHP report Health Impact Assessment: main concepts and suggested approach (Gothenburg consensus paper, 1999) describes HIA as ‘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’. As currently practiced, two key characteristics define HIA: predicting the consequences of different options; and influencing and assisting decision makers. A comprehensive HIA is a participative and interactive process with a broad range of stakeholders at every level within the host society. In addition, health assessment, along with its environmental and social components, is increasingly considered by international stakeholders (for example non-governmental organizations (NGOs) and financial institutions) as an essential component of the overall impact assessment process. HIA can be used at any stage of the industry life cycle, whether this is new country entry, exploration and development, modification of an existing activity or closure of previous projects. HIA makes recommendations to mitigate impacts and enhance health opportunities as part of the planning process for health outreach programmes that extend beyond the fence line and into surrounding communities. This may include proposals for health outreach programmes or for other social programmes, for example, vocational training, local water projects, market gardens. All such programmes can provide health benefits.

HIA seeks to identify and estimate the lasting or significant changes of different actions on the health of a defined population. These changes can be positive or negative, intended or not, single or cumulative. Furthermore, the range of changes may or may not be evenly distributed across the population. The potential for uneven differences is a major concern for many HIA practitioners and is generally referred to as the ‘assessment of equity’. The overall mitigation strategy is further developed into an implementation plan that includes a long-term monitoring (surveillance) programme. The overall programme should be periodically evaluated and reviewed.

The HIA process contains many of the ideas and practices articulated by ‘strategic health management (SHM)’ a concept that has previously been embraced by the oil and gas industry in a 2000 OGP paper Strategic Health Management: Principles and guidelines for the oil and gas industry. SHM is a set of planning and coordination principles and activities that cover critical interactions over the life of a project. Typically a SHM exercise would be appropriate in a large multi-year project. Many SHM concepts are integrated into the broader
scope of HIA, although HIA is a separate process. SHM principles are nevertheless relevant in guiding the implementation of overall health plans developed within the general HIA framework, particularly for community outreach health programmes.

**When to carry out an HIA**

HIAs are one of several types of impact assessment considered in the oil and gas industry. Table 1 compares the HIA with several other common impact assessments. It is likely that there will be some overlap between different impact assessments, particularly between the health and social evaluations. Coordination with environmental and social impact assessment teams is therefore critical to avoid unnecessary duplication of community meetings and stakeholder sessions. Conversely, there is substantial synergy between certain aspects of the social and environmental assessments and the health impact analysis. For example, impacts of vector diseases are a cross-cutting issue between environmental, social and health. In subsequent sections, the linkages between health, environment and social evaluations will be further explored.

There are three possible time frames in which an HIA may be conducted:

- **prospective**;
- **concurrent** or surveillance; and
- **retrospective** or evaluation.

Some HIA practitioners feel that the terms ‘concurrent’ and ‘retrospective’ should no longer be attached to HIA since the ‘predictive’ or prospective aspect of the HIA is one of its defining characteristics. The terms ‘concurrent’ and ‘retrospective’ have been, and continue to be, widely used in the literature and are well understood, particularly from a classic epidemiological perspective. A **prospective** HIA considers some policy, programme or project that has not yet been implemented and

<table>
<thead>
<tr>
<th>HIA</th>
<th>EIA</th>
<th>SIA</th>
<th>ESIA</th>
<th>Strategic Impact Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Recommended, by the World Health Organization, EU, WB, UNEP, ILO, FAO.</td>
<td>- Often required by legislation</td>
<td>- Usually carried out voluntarily by the Company</td>
<td>- Often required by legislation</td>
<td>- Usually carried out voluntarily by Company</td>
</tr>
<tr>
<td>- Impact on health status, with the definition of health encompassing the state of complete physical, mental and social well-being. Health is determined by a multiplicity of factors including socio-economic and environmental factors.</td>
<td>- Impact on the environment (soil, air, water, wastes, fauna, flora and human activities)</td>
<td>- Impact on communities (including impacts on socio-economics, culture, religion, commitment, beliefs, values and organization)</td>
<td>- Impact on both environment and communities (but often restricted to socio-economic impacts). Health impacts are rarely detailed and often restricted to negative impacts.</td>
<td>- National and regional policy and impacts considered</td>
</tr>
<tr>
<td>- Community participation critical and integral part of the process</td>
<td>- Consultation phase often legislated</td>
<td>- Consultation required all through the process, and as a tool to collect baseline information</td>
<td>- Consultation phase often legislated</td>
<td>- Integrates health, social, environmental and policy issues</td>
</tr>
<tr>
<td>Usually project- and location-specific; starts during project conception, its results feed decisions in the design phase, implementation and throughout the project life cycle.</td>
<td></td>
<td></td>
<td></td>
<td>- Starts well in advance of plan or project execution</td>
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</table>

considers the potential consequences. Mitigation measures can be actively designed and implemented so that primary prevention is achieved. In a concurrent or surveillance assessment, the consequences are monitored as the project is implemented such that mitigation activity can be undertaken promptly. In a surveillance exercise, consequences are expected but their nature is uncertain. Early recognition of adverse impacts allows for timely intervention or secondary prevention. A retrospective or evaluation assessment looks at the consequences of a previously implemented policy, programme, project or unplanned event. Frequently a given activity may be too small to produce identifiable lasting or significant changes. However, if there are many small activities, the perceived total effect may create a major or cumulative impact. In response to this concern, there has been consideration for assessments to be carried out at national or regional levels—a process known as ‘strategic impact assessment’. Assessments at the strategic impact level often cover issues and concerns over which a potential project has relatively little control or influence.

What types of HIA are available?

There are two basic types of HIA that are currently performed:

- **Comprehensive HIA**: This approach consists of a detailed process that includes the basic elements of screening, scoping, stakeholder consultation, risk assessment, implementation and monitoring, quality assurance and verification. A comprehensive HIA is a time-intensive study that is suitable for large, complex and high profile projects. In the past, some HIA practitioners have argued for an ‘intermediate’ HIA; however, this term has largely been replaced by the rapid appraisal HIA concept.

- **Rapid appraisal HIA**: These are less intensive efforts and are often subdivided into ‘mini HIA’ and ‘desktop HIA’. A mini HIA uses information already available or easily accessible. New data collection is not considered, and this is a defining characteristic. Some type of limited workshop or discussion with key internal and external stakeholders is planned. Specific and relatively narrow boundaries or parameters are specified. A fully quantitative risk assessment exercise is not performed; however, a qualitative assessment is documented. A record for external release is developed. In contrast, a desktop HIA is internal to the organization and used to inform and comment on the proposal direction. Community or external stakeholder consideration is not performed and an external record is not developed. These descriptions are not meant to imply that flexibility and choice are not available. An HIA practitioner can exercise professional discretion and add, where appropriate, different

Examples of impacts on health include: respiratory disease risks from road dust; accident risks from increased traffic; STIs from informal overnight stops; and noise pollution.
Within the oil and gas industry there is the potential for an almost limitless range of projects to be proposed and eventually executed. The vast majority of projects will not require a comprehensive HIA. Rapid appraisal HIA will be suitable for many projects that involve minor or modest upgrades to existing production facilities. Similarly, the majority of marketing and individual retail operations are unlikely to require a comprehensive HIA. However, if environmental and/or social impact assessments are considered as part of the proposed project preparation a comprehensive HIA is also appropriate. Large oil field developments, pipelines, liquid natural gas (LNG) facilities, chemical plants and refineries are major capital investments that would be appropriate projects for a more comprehensive HIA.

Scope of a comprehensive HIA

Given the broad definition of ‘health’, HIAs have potentially extremely wide scope and latitude. The underlying philosophical model of the HIA often drives the scope of the HIA. The two basic models are biomedical and social or socio-environmental. The biomedical model of health focuses on disease and illness and related causal mechanisms. In contrast, the socio-environmental model tends to focus on the broader factors or determinants that contribute to health and well-being. Health determinants are the personal, social, cultural, economic and environmental factors that influence the health status of individuals or defined populations. Examples include age, sex, genetic factors, air, water, housing conditions, income, employment and education. There is a continuous spectrum between a pure biomedical and socio-environmental assessment model. Policy level HIA tends to utilize a broadly defined socio-environmental model where significant emphasis is placed on determinants of community health such as poverty and income. In contrast, project level HIA is more narrowly focused on specific health outcomes, for example potential project-attributable changes in disease-specific rates for, say, malaria or sexually transmitted infections. Many HIA practitioners try to capture some elements of both the biomedical and socio-environmental methodology. For example, the WHO socio-environmental approach considers six general health issues, namely: communicable diseases; non-communicable diseases; accidents and injuries; malnutrition; psychosocial disorders; and social well-being. Table 2 illustrates the potential scope of this approach.

This model is useful since it includes both general disease categories and health

<table>
<thead>
<tr>
<th>Health issue</th>
<th>Example</th>
<th>Knowledge base</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicable diseases</td>
<td>Vector-borne</td>
<td>Large, reliable</td>
</tr>
<tr>
<td>Non-communicable diseases</td>
<td>Pesticide exposure</td>
<td>Reliable, generalizable</td>
</tr>
<tr>
<td>Accidents and injuries</td>
<td>Construction and traffic-related</td>
<td>Reliable, some statistics</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>Vitamin A deficiency</td>
<td>Variable, potentially quantifiable</td>
</tr>
<tr>
<td>Psychosocial disorder</td>
<td>Substance abuse</td>
<td>Poor reliability, cultural variation</td>
</tr>
<tr>
<td>Social well-being</td>
<td>Quality of life, equity</td>
<td>Variable reliability</td>
</tr>
</tbody>
</table>
determinants. However, this approach does not necessarily capture the impacts, positive and negative, that can occur across broad sectors such as housing, sanitation and transportation. In contrast, the World Bank has developed the scope of HIA for sub-Saharan Africa and other low Human Development Index (HDI) settings within the context of environmental health. From this perspective, there is a clear differentiation between the traditional definition of ‘public health’, with its disease-specific focus, and the broader definition of ‘environmental health’, which encompasses the ‘human living environment’ and emphasizes primary prevention through interventions in housing, sanitation, solid waste control, water, food, transportation and communication. The World Bank approach and scope emphasizes the potential linkages between infrastructure-related activities and overall environmental health. Sectors defined by the World Bank are: housing; water and food; transportation; and communication and information management.

The World Bank approach represents a shift from the traditional disease-specific focus towards an examination of the relationships between overall disease burden and infrastructure impacts. For example, the assessment of potential malaria impacts is an important consideration for many projects. However, a cross-sectoral examination that combines and integrates the broader potential adverse and beneficial effects of non-health sectors, e.g. transportation, housing and urban development, can conceivably accomplish more than an assessment focused only on the immediate project workforce. In the World Bank system, the scope of the HIA shifts from a disease-specific morbidity, mortality and disability towards a broader consideration of the sectoral linkages between the proposed project and environmental health. This integration of health and infrastructure is compatible with the design and execution of large, capital intensive oil and gas projects in low HDI settings. In addition, the World Bank environmental health approach tends to mirror many of the requirements and considerations found in their environmental and social guidance documents.

The WHO has also developed a similar methodology known as the assessment of the environmental burden of disease (EBD). Data developed for both the WHO EBD and the World Bank environmental health linkage methods indicate that approximately 25–33 per cent of the global burden of disease can be attributed to environmental risk factors. Key considerations in these types of analyses are two questions: ‘What will be included as an environmental risk factor?’ and ‘What is meant by ‘disease’?’ In terms of health, the definition of environmental risk factor has largely excluded behavioural and lifestyle factors including diet, smoking, alcohol, sexual practices and genetic risk factors. Similarly, the focus on ‘disease’ is directed towards the environmental component of the total burden of disease, not of the total burden of ill health. These relatively restrictive definitions of environmental risk factor and disease are appropriate, and are commonly used in the estimation of EBD and in ‘environmental linkage’ literature. However, from an HIA perspective, these definitions may be too narrow and could miss some of the potential impacts that oil and gas projects could have on the social determinants of health, in particular those related to lifestyle factors including nutrition, smoking,
alcohol and sexual behaviour. In addition, issues surrounding the role of host country health infrastructure and capacity, referred to as ‘health systems’ should be considered.

The World Bank has estimated that deficiencies in a low HDI country’s health care system could account for approximately 18 per cent of the overall burden of disease. Other published literature supports the observation that human resource staffing and skill levels correlate significantly with health outcomes and health systems performance, and are a major social determinant of the overall burden of disease. The combination of both EBD and health systems deficiencies could account for approximately 50 per cent of the overall burden of disease.

For many large and complex oil and gas projects, particularly those in low HDI settings, some of the EBD and sectoral linkage concepts can be incorporated into a project-level HIA framework by defining broad health areas of concern that consider both social and biomedical determinants of health. A potential set of critical health areas of concern (HAOC) is shown in Box 1.

<table>
<thead>
<tr>
<th>Box 1 Basic health areas of concern</th>
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<tbody>
<tr>
<td><strong>Respiratory infections</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to: acute respiratory infections (ARIs—bacterial and viral); pneumonias; tuberculosis (TB)</td>
</tr>
<tr>
<td><strong>Vector-related disease</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to: malaria; typhus; dengue</td>
</tr>
<tr>
<td><strong>Sexually transmitted infections (STIs)</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to: HIV/AIDS; genital ulcer disease; syphilis; gonorrhea; chlamydia; hepatitis B</td>
</tr>
<tr>
<td><strong>Soil and water borne disease</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to: soil transmitted helminths (STH); leptospirosis; schistosomiasis; melioidosis; cholera</td>
</tr>
<tr>
<td><strong>Food and nutrition-related issues</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to: stunting; wasting; micro-nutrient deficiencies; changes in agricultural practices; gastroenteritis (bacterial and viral); and food safety</td>
</tr>
<tr>
<td><strong>Accidents and injuries</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to: traffic and road related incidents; construction (home and project related); and drowning</td>
</tr>
<tr>
<td><strong>Exposure to potentially hazardous materials</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to: pesticides; inorganic and organic fertilizers; road dusts; air pollution (indoor and outdoor related to vehicles, cooking, heating or other forms of combustion/incineration); landfill refuse or incineration ash; any other project related solvents, paints, oils or cleaning agents; etc.</td>
</tr>
<tr>
<td><strong>Psychosocial</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to: relocation; violence; security concerns; substance abuse (drug, alcohol, smoking); depression; and communal social cohesion</td>
</tr>
<tr>
<td><strong>Cultural health practices</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to, the role of traditional medical providers, indigenous medicines and unique cultural or ethnic health practices</td>
</tr>
<tr>
<td><strong>Health systems infrastructure and capacity</strong></td>
</tr>
<tr>
<td>• Including, but not exclusive to: physical infrastructure; staffing levels and technical capabilities of health care facilities at local, district and provincial levels</td>
</tr>
<tr>
<td>• Including, but not exclusive to, coordination and alignment of a project with existing national and provincial level health programmes, for example malaria, TB, HIV/AIDS</td>
</tr>
</tbody>
</table>
The use of the HAOC approach more clearly integrates certain key aspects of the HIA into a framework that is commonly used by both the environmental and social assessment process. This overall integration is important so that the HIA is viewed as an integral and essential part of the overall impact assessment process.

**Benefits**

A well-executed HIA can prevent new project delays by anticipating, soliciting and appropriately incorporating stakeholder concerns and suggestions into the overall project design. Similarly, existing operations can also benefit by the timely assessment and evaluation of a broad range of impacts. One of the key benefits of the HIA process for stakeholders is the awareness that health is a relevant and significant cross-cutting issue. Additional benefits include:

- **Identifying factors, positive or negative, that may otherwise not have been adequately assessed.** This process allows for timely project design and modifications in a cost-effective manner.
- **Quantifying the positive and negative impacts more precisely than would have otherwise been done.**
- **Clarifying the potential elements of policy trade-offs.** The HIA can become an effective risk management tool for all stakeholders.
- **Describing the potential interactions and relationships among the different environmental health areas and sectors.**
- **Allowing a clearer analysis of potential mitigation strategies for negative effects or enhancement of positive benefits.**
- **Making the overall project decision process more transparent for key stakeholders.**
- **Providing a structured environment for stakeholder input and engagement in both new projects and existing operations.** This allows for early input into the overall decision-making processes.
- **Building consensus within stakeholder communities so that mutual trust is developed and enhanced during all phases of project development, construction, operations and decommissioning.**
- **Securing funding from financial and aid institutions.** Many financial institutions such as the International Finance Corporation (IFC) and the major development banks have specific requirements for the management of health issues.
- **Specifying responsibilities between the project sponsors and the host government.** The HIA can be a vehicle for documenting and delineating the roles, responsibilities and issues that are relevant for the host government, local communities and the project sponsor. The HIA can assist in understanding the wider health issues and trends that may already be occurring in the host country or community.
- **Establishing an accurate and appropriate baseline for future comparison during the development, operation and eventual closure of a project.**
- **Enhancing project benefits:** the HIA can help provide the basis for large- and small-scale investment and development plans in the health sector and other areas (for example, education) for the benefit of the overall community.
- **Contributing to overall health systems capacity, infrastructure and development including preservation of traditional health providers and culturally important practices.**
The HIA process

There have been many descriptions of the HIA process in published literature. Many companies in the oil and gas industry already have a framework for performing an HIA. International agencies and many national governments have published detailed guidelines covering HIA execution and practice, although these guidelines have largely been implemented in high HDI settings. While there can be differences between the HIA guidelines formulated by individual companies, governments or agencies, there are generally many common elements across all of the available processes (see Figure 1).

Scoping

Scoping is generally a process for outlining the range and types of hazards and beneficial impacts. The overall types and categories of questions that must be addressed are defined at this stage. For example, it is vital to:
- consider which phases of a project should be assessed (for example, construction, operation, decommissioning);
- determine who is at risk during the different phases of a project (for example, construction workers, contractors, employees, community residents); and
- assess which related activities are under consideration (for example, movement of product and/or feedstock, secondary immigration and development such as squatter camps).

![Figure 1 The HIA process](image-url)
The output of the scoping exercise can be used as a basis for formally developing a set of terms of reference (TOR). Either internal or external consultants, or a combination of both, can use the TOR.

**Stakeholder communication and consultation**

This is a process of mutual dialogue and information exchange between the project and stakeholders, i.e. those individuals and groups that are affected by, or express an interest in, the project. Stakeholders can include individuals and groups, including local and international NGOs, at all levels of society, including the project-affected communities.

Stakeholder communication has evolved rapidly into a systematic process that is incorporated into the overall impact assessment strategy such that an active and integrated communication process has become an essential part of both environmental and social evaluations. Since the communication process is two-way, the project and stakeholder perspectives, concerns and needs can be fully developed and expressed through a formal Stakeholder Steering Committee. The communication process is not just a one-way exercise in information dissemination; it includes consultation, active feedback and participation. Ideally, the optimal timing for initiating a stakeholder communication programme would be as early as possible in the overall business project development cycle. However, such a programme should be carefully considered and planned in a coordinated and systematic fashion that is responsive to overall business objectives.

**Risk assessment or appraisal**

Risk assessment includes the key set of activities that investigates, appraises and qualitatively or quantitatively ranks the impacts that the project is likely to have on the health of the defined population. A crucial part of the risk assessment process is determining the spectrum of potential impacts, their relative importance and at what level they are expected to occur. Impacts can occur singly or in combination at an individual, household, community/village, population, organizational (NGOs) and institutional level. The assessment needs to consider the advantages and disadvantages of concentrating on one level versus another. It may be difficult to develop the database necessary to assess all levels or key units simultaneously. Clearly defining the unit of assessment is critical since it can help focus studies and concentrate resources as well as facilitate understanding of the linkages that exist between the different levels. As part of the risk assessment process it is important to consider the strength of cause-and-effect relationships and to assess, either qualitatively or quantitatively, the likelihood of potential impacts. One of the benefits of the risk assessment process is that it can facilitate the ranking of impacts so that they can be addressed in a priority fashion.

The investigation phase of the assessment consists of several steps that are related to gathering objective evidence and data.

**Evaluating data**

Existing sources of information must be collected, collated and evaluated for accuracy,
relevance and completeness. The data usually consists of both qualitative and quantitative information. Literature reviews, academic or NGO studies, and official or government records or surveys may exist. An overall appraisal of the available data is critical. The criteria for judging and assessing the trustworthiness of information are well established and are commonly considered at two levels:

i. Conventional scientific level, i.e. internal validity (proof of causal relationship); external validity (degree to which findings can be applied to other contexts or groups); reliability (degree of reproducibility in the same or similar situation); and objectivity (lack of bias).

ii. Social participatory level, i.e. length and depth of engagement; persistent and parallel observations; cross checking; expressions of differences among stakeholders; research diaries; and field notes and observations.

After the weight and trustworthiness of the data have been assessed and documented, a data-gap analysis should be performed to determine whether the collection of new data may be required. Data collection should be coordinated with the efforts of the social and environmental assessments.

Baseline data

Before new data are collected, a series of relevant study questions should be carefully formulated. Data must be collected in a culturally sensitive and ethical manner with a clear understanding of how the data will be utilized in the HIA (for example in impact clarification or characterization, or for baseline definition for subsequent monitoring activities).

There are a wide variety of evidence and data-collection methods that can be selectively employed, including:

- focused stakeholder interviews and discussions;
- key informant questionnaires and surveys of knowledge, attitudes, beliefs and practices;
- objective health screening surveys for certain diseases or conditions, e.g. malaria, micronutritional deficiencies;
- health needs assessments;
- demographic and health surveys; and
- food consumption and nutrition surveys.

The overall data establishes the baseline from which estimated and actual project impacts on workers and the community can be measured.

**Baseline data collection can include health surveys.**

**Ranking impacts: sociological, epidemiological and toxicological approaches**

The determination of relative importance can be made qualitatively, semi-quantitatively or quantitatively. The general approaches to ranking potential impacts are derived from three disciplines: sociology, epidemiology and toxicology.

The socio-environmental approach tends to be broader and qualitative in nature and assumes a holistic definition of health. The broader perspective places significant importance on stakeholder concerns and has a greater focus on a qualitative or semi-quantitative assessment of the interaction of determinants or modifying factors of health. In addition, equity issues are extremely important. An equity assessment means that the potential
impacts within the target population are analysed in terms of gender, age, ethnic background and socio-economic status. In this context, ‘equity’ actually has a negative connotation and is generally used to convey presumed unfair or unjust differences. Equity considerations can provide important input into the overall decision-making process where mitigation strategies for adverse health impacts are formulated. The sociological or socio-environmental approach can be used to generate qualitative, semi-quantitative or fully quantitative rankings. Qualitative rankings are performed by expert judgment using a basic ‘no effect’, ‘low’, ‘medium’ or ‘high’ impact categorization system. This type of ranking can be transformed into semi-quantitative information by assigning a numerical value for each impact category, for example: 0 = no effect; 1 = low, etc. In addition, descriptive or diagrammatic presentations can be included.

Many quantitative epidemiological models and approaches are available that can be used according to the availability of input data. Some of the commonly used models and methods are:

- **PREVENT**: uses epidemiological data to predict the population effects of health promotion interventions.
- **POHEM** (Population Health Model): longitudinal microsimulation model of health and disease that allows alternative health interventions to be compared while considering the effects of disease interactions.
- **Global Burden of Disease** (GBD) and **Comparative Risk Assessment** (CRA): largely developed by WHO, the GBD provides comparable, valid and reliable epidemiological information on a wide range of diseases, injuries and risk factors. The prevalence of risk factor exposure and hazard size has been determined so that population-attributable fractions are estimated: attributable fractions can be combined with incidence rates in the target population in order to calculate annual numbers of cases. The calculated cases are then converted into disability adjusted life years (‘DALYs’) or quality adjusted life years (‘QALYs’) by estimates of severity and duration.

CRA is a systematic counterfactual approach to estimating health gaps (i.e. changes in health expectancy) which are causally attributable to a risk factor or group of risk factors. A counterfactual exposure is an alternative exposure distribution used as a baseline for estimating the burden of disease caused by the exposure distribution of interest.

- **ARMADA** (age-related morbidity and death analysis): developed to compare baseline disease rates (for example mortality and morbidity) in a defined population with the effects due to implementation of a specific economic development. ARMADA was specifically developed for use in HIA.
- **Disease-specific models**: Certain infectious diseases like malaria, schistosomiasis and STIs including HIV/AIDS have been characterized by dynamic and static transmission and amplification mathematical models; the effects of different prevention strategies have also been studied and modelled, for example the ‘AVERT’ simulation package for HIV/AIDS.

The toxicological ranking procedure is generally quantitative and follows a methodology that was published in 1983 by the US National Academy of Sciences and extensively developed by the US Environmental Protection agency (US EPA). The US EPA quantitative risk assessment methods have been distributed and used worldwide for more than 15 years. There are four components to this approach: **hazard identification** (identification of the potential agents or sources); **exposure assessment** (estimation of the magnitude, frequency and duration of exposure including
calculation of exposure point concentrations); dose- or exposure-response assessment (consideration of the relationship between quantity of exposure or amount absorbed and an outcome effect); and risk characterization (calculation of the risk to the individual or population, attributable to the defined exposure). The toxicological model follows this basic sequence:

Source ➔ Exposure ➔ Dose ➔ Health effect

i. **Source**: the project is the assumed overall source; sources must be defined and specified, for example air emissions, water discharges, etc.

ii. **Exposure**: a source releases potentially hazardous materials that move through the environment to a defined location known as the exposure point; at the exposure point a concentration is defined and the probabilities of exposure for the target population are assigned.

iii. **Dose**: a concentration-response or dose-response relationship exists or can be defined, i.e., disease or adverse outcome per unit of exposure.

iv. **Health effect**: the concentration or exposure-response relationship is applied to the population at risk.

The WHO has largely adopted this strategy in its approach to the assessment of the 'environmental burden of disease' (EBD), and has endorsed a framework known as DPSEEA (pronounced ‘deepsea’) for this purpose. The components of the DPSEEA framework are:

- Driving force (developmental)
- Pressure (distal cause—after the fact)
- State (proximal cause—the triggering cause)
- Exposure (physical/pathophysiological cause)
- Effect (outcome)
- Action

DPSEEA is a hierarchical model that describes the interactions of specified causes on health outcomes from environmental or related behavioural conditions. DPSEEA can be used quantitatively if numerical functions are assigned to the various proposed linkages. In this configuration, a ‘causal web’ is constructed and serves as the framework for an EBD assessment. If this approach is used to study the impact of policies on the exposure variable and subsequent change in the predicted disease burden, then it is also known as a Policy/Risk Assessment Model (PRAM).

All of these approaches—sociological, epidemiological and toxicological—have strengths and weaknesses. A highly quantitative output requires a significant level of baseline data that may either not exist or be difficult to obtain easily and reliably.

**Decision making**

Decision making considers the rankings arising from the risk assessment and develops a written health action plan (HAP) in order to potentially mitigate identified impacts. Mitigation is a systematic process to avoid, reduce, remedy or even compensate for potentially negative impacts. The HAP considers: the types of health protection processes that may be required; the availability of different mitigation strategies; timelines of mitigation strategies; the availability of interim measures or modifications; local capacity to absorb the proposed mitigation strategies; and the cost/benefit of the proposed action.

Impacts are often categorized as:

- insignificant, no effect, positive benefit;
- significant but mitigable; and
- significant but not mitigable.

Some type of system that transparently defines ‘significance’, ‘insignificance’ and ‘mitigation’ should be considered. Significance criteria or hierarchies are often developed and consider these types of inputs:

- legal requirements (national, international);
- lender requirements (safeguard standards and requirements);
Mitigation strategies

One of the most important benefits of the entire HIA process is the identification of problems that could be potentially avoided by focused primary design changes. An example of this strategy would be selective rerouting of a pipeline in order to avoid impacts to certain local populations. From a health perspective, this can be considered primary prevention of potential effects. Similarly, secondary prevention strategies can be utilized to reduce impacts at both a defined geographical location and/or to a given population. Tertiary prevention or overt treatment (remedy) is the third level of mitigation that can be employed. Remedy interventions may include restoration or repair to essential needs like water wells or vegetable gardens. Finally, when there is irrevocable loss or damage some type of compensation may be appropriate. Compensation strategies are often employed in both the social and environmental action plans. Therefore, careful and consistent coordination is essential.

Implementation and monitoring

Implementation

After an action or decision plan is created it is still necessary to decide how the mitigation strategy will be implemented and monitored. If adverse consequences are predicted during the risk assessment, it is likely that their nature, size and timing will be uncertain. A surveillance plan that can capture early effects and unanticipated consequences is appropriate.

Defining responsibilities

One of the most critical aspects of the implementation plan is the division of responsibilities between the project and the host government at local, regional and even national levels. Specific and detailed division of responsibility must be considered and articulated. An analysis of local, regional and national health infrastructure and management capacity is a key consideration during the risk assessment. If there are systematic weaknesses in the host country health systems then capacity considerations will become one of the most important issues. Capacity building is a long and slow process. Close coordination and training of host resources require long-term planning and commitment. The absorptive capacity of host institutions, at all levels, is often the limiting factor for successful implementation of the mitigation strategy. Primary and secondary prevention strategies are more likely to be successfully implemented particularly where local capacity is weak. This assignment of responsibility includes project contractors since day-to-day responsibility is often devolved to prime contractors, particularly during the construction phase of a project. Contractor responsibilities can be assigned by requiring specific and detailed health implementation plans from each major contractor. These types of issues need to be anticipated early in the project so that the proper contract vehicles can be developed and...
unplanned budget overruns avoided. Proper staffing levels also require careful consideration since projects frequently underestimate the time and staffing levels required for implementation and monitoring.

**Monitoring**

Monitoring (also referred to as surveillance) is a critical component of the overall implementation plan. For a large and geographically diverse project—for example oil field development and pipeline construction—a formal system of monitoring should be considered. A monitoring or surveillance system is designed to ensure that progress is satisfactory and, in particular, will capture unanticipated effects or provide an early warning system that problems, either singly or cumulative, are occurring at the population level. Local or even regional sentinel surveillance systems (SSS) can be developed for large and complex projects. In a project with diverse geography and distinct population groups it may be appropriate to consider some type of SSS. To some degree, the effectiveness of a SSS is dependent on an accurate characterization of the pre-project baseline status for key indicator variables. The identification and assessment of cumulative impacts is a difficult and uncertain process. A different version of the SSS known as a Demographic Surveillance System (DSS) has

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**Box 2 HIA guiding principles**

HIA is a new and rapidly evolving field, and the number of projects for which some type of HIA process is required is increasing rapidly. Because of the intensity of interest and activity, there is often subtle confusion in terminology, together with real and substantial differences in overall approaches, performance and execution. However, this state of affairs is changing, driven by a combination of international stakeholder involvement, international institutions (for example the World Bank and International Finance Corporation (IFC)) and staff pressure within internal company Health Safety and Environment (HSE) departments. For a successful process, the following key principles apply:

- Choose the overall HIA level, policy, project or both.
- Choose the appropriate type of HIA—rapid appraisal or comprehensive.
- Routinely integrate some level (rapid appraisal or comprehensive) of the HIA process into the overall project development process.
- Carefully consider and design the scope of the assessment so that it is realistic and achievable.
- Define and document appropriate baseline conditions.
- Stakeholder consultation and communication is critical and such a programme should be carefully planned and implemented where appropriate.
- A well-executed and documented qualitative or semi-quantitative ranking system is more realistic than an overly uncertain and theoretical attempt at quantification.
- Certain high profile diseases like malaria, tuberculosis and HIV/AIDS may require separate intensive evaluation and assessment.
- A realistic implementation plan should be developed that recognizes host country capacity constraints but still clearly defines roles, responsibilities and accountability.
- For large and high profile projects that are likely to impact multiple communities, a well-designed surveillance and monitoring system is appropriate so that early awareness of novel or unexpected impacts is available.
- Senior management commitment to the process is critical.
- National and international sensitivities to certain topics addressed must be recognized. This includes recognizing that the analysis may include potential issues that may adversely reflect on the existing conditions in certain cultures or communities.
been designed to capture long-term trends across large populations. Formal DSS sites are currently operating in many locations across Asia and sub-Saharan Africa in a structure known as the In Depth Network.

The implementation plan should also consider specifying target completion goals for specific activities over specific phases of the project, for example construction, operations and decommissioning. These completion targets provide a clear and transparent scorecard both for project management and stakeholders.

**Evaluation and verification of performance and effectiveness**

Evaluation and verification of performance and effectiveness is one of the most important and often overlooked steps in the entire HIA process. A system for determining that implementation has been accomplished and is achieving the intended results should be considered. As part of the implementation planning process, target milestones are often created, for example vaccination rates, malaria incidence rates, etc. Auditing against these target goals and objectives can be readily performed. In order to foster a better sense of transparency with stakeholders, the use of external, independent auditors should be considered, although many companies have their own rigorous and well-designed internal assessment systems. Contractor health performance should also be verified and assessed for effectiveness and compliance with the plan.

**Resourcing**

Many oil and gas companies have large and sophisticated medical, environmental and safety departments capable of successfully carrying out a comprehensive HIA. However, for some projects, some level of specialty consulting support may still be required. In addition, external consultants or an independent review process may help identify gaps or other issues not fully considered by an internal team and enhance validity and transparency. For some extremely high profile projects, appointment of an independent advisory board may be appropriate, particularly where cultural sensitivities may conflict with the need to thoroughly assess certain diseases, for example HIV/AIDS.

**Cost and time management**

Costs are largely a function of scope, schedule and final deliverable report. Clear terms of reference are a key tool for managing both internal and external consultant costs. The adequacy of baseline data is one of the most important considerations. New data collection takes time and money and is often an iterative process generating frequent travel and *per diem* costs. In many areas of the world the available support infrastructure is weak so that survey and health data collection is a difficult and slow process. The time required to complete a comprehensive HIA will depend on the scope of the project, availability of adequate baseline data and the complexity of the stakeholder engagement and consultation process.
Further reading

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<thead>
<tr>
<th>Reference</th>
<th>Areas covered</th>
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Further reading

<table>
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<tr>
<th>Reference</th>
<th>Areas covered</th>
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<tr>
<td><strong>Glossary</strong> of HIA terms</td>
<td>A glossary of HIA terminology published by the World Health Organization. Also available on the WHO website at <a href="http://www.who.int/hia/about/glos/en/">www.who.int/hia/about/glos/en/</a>.</td>
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<tr>
<td><strong>Additional OGP/IPIECA reference material:</strong></td>
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<tr>
<td>IPIECA <em>Guide to Social Impact Assessment</em>; and OGP guides on Environmental Impact Assessment, Strategic Health Management and Blood-borne Pathogens</td>
<td>Overview guides to SIA, EIA and SHM for the oil and gas industry</td>
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List of acronyms

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<tr>
<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>ARI</td>
<td>Acute Respiratory Infections</td>
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<td>ARMADA</td>
<td>Age Related Morbidity and Death Analysis</td>
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<td>CRA</td>
<td>Comparative Risk Assessment</td>
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<td>DALY</td>
<td>Disability Adjusted Life Years</td>
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<td>DPSEEAA</td>
<td>Driving Force Pressure State Exposure Effect Action Model</td>
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<td>DSS</td>
<td>Demographic Surveillance System</td>
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<td>EBD</td>
<td>Environmental Burden of Disease</td>
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<td>ECHP</td>
<td>WHO European Centre for Health Policy</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>ESIA</td>
<td>Environmental Social Impact Assessment</td>
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<td>GBD</td>
<td>Global Burden of Disease</td>
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<td>HAOC</td>
<td>Health Area of Concern</td>
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<td>HAP</td>
<td>Health Action Plan</td>
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<td>HDI</td>
<td>Human Development Index</td>
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<td>HIA</td>
<td>Health Impact Assessment</td>
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<tr>
<td>HIV/AIDS</td>
<td>Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome</td>
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<td>LNG</td>
<td>Liquid Natural Gas</td>
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<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>OGP</td>
<td>International Association of Oil &amp; Gas Producers</td>
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<td>POHEM</td>
<td>Population Health Model</td>
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<tr>
<td>QALY</td>
<td>Quality Adjusted Life Years</td>
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<td>SHM</td>
<td>Strategic Health Management</td>
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<td>SIA</td>
<td>Social Impact Assessment</td>
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<td>SSS</td>
<td>Sentinel Surveillance System</td>
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<td>STH</td>
<td>Soil Transmitted Helminths</td>
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<td>STI</td>
<td>Sexually Transmitted Infection</td>
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<td>TB</td>
<td>Tuberculosis</td>
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<tr>
<td>TOR</td>
<td>Terms of Reference</td>
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<td>US EPA</td>
<td>United States Environmental Protection Agency</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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A ‘Guide to Health Impact Assessments’ on CD-ROM

This document is also included on the attached CD-ROM in PDF format. The file includes links to related information throughout the document, to other files on the CD-ROM and to resources on the Internet. The links are represented in this printed version by the blue underlined text.

†Requires Acrobat Reader™ — available from the Adobe website: www.adobe.com/products/acrobat/readstep2.html
* Web browser and Internet connection required
The OGP/IPIECA Membership

**Company members**

ADNOC
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Amerada Hess
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BG Group
BP Billiton
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BP
Cairn Energy
Chevron
CNOOC
ConocoPhillips
DONG
Denerco Oil
Encana
ENI
ExxonMobil
GNPOC
Halliburton
Hellenic Petroleum
Hocol
Hunt Oil Company
Hydro
Japan Oil, Gas & Metals National Corporation
Kuwait Oil Company
Kuwait Petroleum Corporation
Merik Oil og Gas AS
Marathon Oil
Nexen
NOC Libya
OXO
OMV
Papuan Oil Search
PetroCanada
Petrobras
PDVSA
PEMEX
PDO
Petronas/Petronas Carigali
Pemex
Premier Oil
PTT EP
Qatar Petroleum
RaGas
Repsol YPF
Saudi Aramco
Shell International Exploration & Production
Sonatrach
Statoil
TNK-BP Management
Total
Tullow Oil
Woodside Energy

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American Petroleum Institute
ARPEL
ASSOMINERARIA
Canadian Association of Petroleum Producers
Canadian Petroleum Products Institute
CONCAWE
Energy Institute
European Petroleum Industry Association
Institut Français du Pétrole
IADC
IIOOA
M-I Swaco
NOGEPA
OLF
PAJ
RECSO
Schlumberger
South African Petroleum Industry Association
UKOOA
WEG
World Petroleum Congress

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**International Association of Oil & Gas Producers (OGP)**

OGP represents the upstream oil and gas industry before international organizations including the International Maritime Organization, the United Nations Environment Programme (UNEP) Regional Seas Conventions and other groups under the UN umbrella. At the regional level, OGP is the industry representative to the European Commission and Parliament and the OSPAR Commission for the North East Atlantic. Equally important is OGP’s role in promulgating best practices, particularly in the areas of health, safety, the environment and social responsibility.

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**International Petroleum Industry Environmental Conservation Association (IPIECA)**

The International Petroleum Industry Environmental Conservation Association (IPIECA) is comprised of oil and gas companies and associations from around the world. Founded in 1974 following the establishment of the United Nations Environment Programme (UNEP), IPIECA provides one of the industry’s principal channels of communication with the United Nations. IPIECA is the single global association representing both the upstream and downstream oil and gas industry on key global social and environmental issues including: oil spill preparedness and response; global climate change; health; fuel quality; biodiversity; and social responsibility.