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Acronyms

ADHSS  Alaska Department of Health and Social Services
ANTHC  Alaska Native Tribal Health Consortium
ATDSR  Agency for Toxic Substances and Disease Registry
BOEMRE  Bureau of Ocean Energy Management, Regulation and Enforcement
CDC    U.S. Centers for Disease Control
CFR    Code of Federal Regulations
CHAP   Community Health Aide Program
DSS    Demographic Surveillance Systems
DHSS   Department of Health and Social Services
DNR    Alaska Department of Natural Resources
EA     Environmental Assessment
EIA    Environmental Impact Assessment
EIS    Environmental Impact Statement
EPA    Environmental Protection Agency
HEC    Health Effects Categories
HIA    Health Impact Assessment
ICMM   International Council on Mining and Metals
IPIECA  International Petroleum Industry Environmental and Conservation Association
IFC    International Finance Corporation
IGAP   Indian Environmental General Assistance Program (EPA)
KPI    Key Performance Indicator
NEPA   National Environmental Policy Act of 1969, as Amended
NGO    Non-Governmental Organization
PAC    Potentially Affected Communities
SDH    Social Determinants of Health
SIA    Social Impact Assessment
STI    Sexually Transmitted Infection
Introduction

What is Health Impact Assessment (HIA)?

HIA is a structured planning and decision-making process for analyzing the potential positive and negative impacts of programs, projects, and policies on public health.

The HIA process has several key characteristics:
- A focus on a specific policy, program, or project proposal
- A comprehensive consideration of potential health impacts
- A population-based perspective that considers multiple dimensions of health
- A multidisciplinary approach that uses information from many different health sectors and allied technical fields, e.g., environmental and socio-economics.
- The flexibility to allow use in a variety of settings.
- Although this HIA toolkit focuses on how to evaluate health impacts from large natural resource development projects, it can also guide evaluation of public policies and programs and other types of development activity. Certain sections of this toolkit may be useful to those who conduct environmental (EIA) and social impact assessments (SIA).

In Alaska, the HIA may be:
(i) A stand-alone document,
(ii) Integrated within a separate SIA,
(iii) Part of an integrated environmental, social and health impact assessment (ESHIA).
(iv) An appendix to an ESHIA with key technical sections summarized and integrated into the appropriate chapters.

Alaska law does not require an HIA for major resource development projects, new programs, or policies. Nevertheless, there is a recent trend among federal agencies to promote the inclusion of an HIA as part of the environmental impact process under the National Environmental Policy Act (NEPA). This trend has generated both an interest in HIAs and a corresponding concern about proper HIA methodology. The goal of this toolkit is to inform the production of appropriate HIAs when they are initiated by a government agency or a stakeholder. “Government agency” refers to federal, state, local or tribal. A stakeholder could be a non-governmental organization (NGO) or other advocacy group.

The Alaska HIA Guidance provides technical information; however, it is not a set of regulatory or legal requirements.

Government agencies may include federal, state, local and tribal.
Why perform Health Impact Assessments for Alaskan Projects?
Many Alaskan projects occur on a very large scale. The potential for impacts on health outcomes is affected by the local environmental, cultural, and social living conditions.

Alaska’s unique environmental, cultural, social and health settings vary by region. Even within a single region there can be highly divergent rural and urban socio-cultural structures, seasonal variability in regional demographic composition, stark differences in rural and urban economic realities, and a variety of region-specific subsistence lifestyles that depend on very specialized techniques for harvesting indigenous flora and fauna. It is widely accepted that individual and community health outcomes are influenced by these living conditions and by a combination of individual factors, such as heredity and personal behavior. These living conditions and choices are sometimes referred to as social determinants of health (SDH) in public health research.

Large development projects – such as oil and gas development, large mines, and transportation projects – may contain features that affect many SDH. Decisions based on appropriate health information can help maximize the potential benefits for communities and minimize unanticipated harms.

Alaska has a unique and complex environmental and social setting that interacts with and influences health outcomes.

What is the history of HIA in Alaska?
Historically, HIA has been practiced mostly in Western Europe and has focused on assessing government-initiated policies and programs. A limited number of HIAs have been performed on large industrial projects, particularly in the resource development sector (i.e., oil & gas, mining, and energy projects). These industrial HIAs have primarily occurred in the developing world.

In the United States, HIA practice remains limited even though there is a growing “HIA movement.” HIAs have been completed in the U.S. for urban development projects and public policies, but few HIAs exist for resource development projects on the scale encountered in Alaska.

An increasing number of large natural resource development projects in Alaska have produced requests for an HIA. The earliest HIAs in the state were related to an extension of the Red Dog Mine and a federal permit for the National Petroleum Reserve Alaska (NPR-A). These HIAs revealed the importance of health considerations in project permitting and they revealed the need for technical guidance to support future HIAs in the state.

On September 8th – 10th, 2008, the Alaska Native Tribal Health Consortium (ANTHC), State of Alaska Department of Health and Social Services (DHSS), and U.S. Centers for Disease Control and Prevention (CDC) jointly hosted a workshop on HIA in Anchorage, Alaska. ANTHC staff, state regulatory agencies and DHSS staff, University of Alaska health researchers, and federal health and regulatory agencies active in Alaska natural...
resource development attended. At the conclusion of this workshop, attendees were invited to participate in a working group, which convened regularly to guide the development of this HIA guidance document (aka the “Alaska HIA Toolkit”). A wide variety of scientific literature and HIA guidance documents were reviewed, including the International Finance Corporation (IFC) “HIA Toolkit”, which is a template for several sections of this guidance. Where needed, the working group included sections on Alaska-specific concerns, such as subsistence nutrition and stakeholder engagement.

To meet an operational need to maintain and update the HIA toolkit and coordinate the working group, the DHSS and the Alaska Department of Natural Resources (DNR) volunteered to accept a leadership role by jointly funding an HIA program. This program has been developed to ensure that the health and safety of all Alaskans is carefully considered during the permitting process for large resource development projects in the state. DHSS maintains the Alaska HIA Toolkit and provides the most current version on the department website. While DHSS and DNR have committed significant resources in order to serve in this organizational leadership role, the HIA program relies on full participation from all partners affected by any given HIA.

The Alaska HIA Guidance has been developed by a collaborative technical work group that involved federal, state, local and tribal health organizations.

The State of Alaska has designated the DHSS as its technical lead for HIAs.

How does HIA integrate with the NEPA process?

HIA occurs alongside all the other components of the NEPA process. The HIA team may conduct baseline research that can include field studies. Once a specific project plan is released, the formal HIA document process can begin.

Procedurally, the State of Alaska HIA program creates a “stand-alone” HIA. This document can be used by those writing the overall Environmental Impact Statement (EIS) as the technical basis for the health sections in the “affected environment,” “environmental consequences” and “alternatives including proposed action” chapters. The HIA program also helps the EIS authors to fact-check and coordinate the health input with other critical sections (e.g., transportation, socio-economics, subsistence, etc). The HIA team may be involved from the earliest stages in screening and scoping meetings with members of the environmental, social, and economic impact teams to provide an opportunity for health input into the creation of “alternatives.” There is no separate set of meetings or agendas for HIA, but the HIA may be integrated as completely as possible into the NEPA process.
How does HIA overlap with Economic and Social Impact Analyses?

Because human health depends on a web of economic, social, and personal issues, there will be overlap between an HIA and the typical environmental (EIA) and social impact assessments (SIA). Whenever possible, this toolkit provides practical solutions to prevent duplicative efforts. Two obvious areas of overlap are the analysis of (i) Social Determinants of Health (SDH), and (ii) release of potential contaminants of concern. Both of these areas will be analyzed in subsequent sections of the guidance. While the HIA will discuss features of the SIA or EIA relevant to health (e.g. change in income, change in cultural cohesion), it will only rate human health impacts and will rely on research performed by other subject matter specialists (e.g. economic trends, subsistence practices and cultural cohesion, social and demographic changes). For example, the HIA team would rate the risk of a change in access to health care relative to changes in healthcare infrastructure promoted by economic growth. The HIA team would rely on the economic analysis to quantify and rate the likelihood of economic growth.

What are the objectives of this HIA Toolkit?

- To present methodologies for assessing the potential community health impacts of resource development projects in the State of Alaska.
- To help HIA programs or independent practitioners develop a scope of work and/or specific work plans when asked to conduct an HIA.
- To allow the inclusion of human health impacts during the social and environmental impact assessment process.
- To define the roles and responsibilities of project proponents in the overall health impact process.
- To provide broadly accepted, technical, good practice information that could be used for a variety of projects covered under existing State of Alaska and federal requirements.

What are the limitations of this toolkit?

- The toolkit does not address “inside the fence” occupational health issues such as workplace safety or various occupational exposures, since these issues are governed by rigorous state and federal laws. The toolkit does address “cross-over issues”: workplace policies and practices (e.g., work schedules that potentially affect subsistence activities, drug/alcohol testing and counseling) that could potentially affect household- and community-level health outcomes.
- The toolkit currently focuses on resource development projects as opposed to general policy or program impact assessment. The toolkit is a living document and will be continuously upgraded and enhanced in subsequent releases in order to cover emerging issues and topics.
- This toolkit is designed to be used in conjunction with existing regulatory or planning processes and is not intended to replace or supersede established protocols.
Alaska HIA Guidance has a defined set of objectives but also important limitations.

Who is the intended audience of the HIA Toolkit?

The guidance is primarily intended as a technical resource for HIA practitioners. Nevertheless, focus group meetings revealed that the HIA toolkit helped a variety of interested readers and potential stakeholders to understand and participate in the HIA process. This includes federal and state regulatory agencies; local, state, tribal, and federal health agencies; non-governmental entities considered stakeholders in the outcome of a permitting process; project proponents; and members of the public with health concerns surrounding a particular project. Even though many proponents are experienced with HIA through their work in other regions of the world, this guidance will help inform their thinking about potential health impacts in the Alaskan context. Similarly, communities can use this guidance as both an information source and as a mechanism for actively participating in the HIA process.

About This Document

Section 1 addresses a general background of the overall HIA practice. The critical role that the State of Alaska and the relevant tribal health organizations play in the overall process is described. General definitions of the different types of impacts (direct, indirect and cumulative) within a health analysis are discussed.

Section 2 discusses how to decide whether to conduct an HIA. Some of the critical project features that can potentially produce health impacts are presented.

Section 3 describes the different types of HIAs. This section also discusses how to determine which type of HIA is appropriate for a given project. How the HIA fits into the overall EIA and SIA processes is also presented.

Section 4 describes key health effect categories. These categories are similar to the environmental health areas (EHAs) concept that is widely discussed in the published international HIA literature. Health effects categories are a key framework for organizing and analyzing the most likely types of potential impacts from a project. “Alaska-specific health effects” were developed as part of the collaborative work group effort.

Section 5 describes the scoping process for HIA, including developing an appropriate work plan.

Section 6 is concerned with baseline data issues, particularly issues related to community surveys. The profound and ongoing baseline demographic shifts that are occurring in rural and urban Alaska are reviewed. The implications for positive or negative health impacts are considered. Available databases are presented along with their strengths and limitations.
Section 7 considers the important role of health-specific stakeholder engagement. Advanced planning with the environmental and social teams is essential to avoid duplication of effort.

Section 8 is focused on assessing and ranking health impacts and presents a standard qualitative model that is typically used in HIA. A standard toxicological paradigm is presented that can be used for analyzing relevant contaminant release concerns and issues. The section also describes the more quantitative aspects of chemical risk assessment used by toxicologists and other health professionals. In some circumstances, fully quantitative chemical risk assessment techniques may potentially have a limited role in the overall HIA analysis.

Section 9 discusses mitigation, the process of developing measures to avoid, minimize, rectify, reduce or compensate for impacts. Mitigation efforts need to be transparent, open and considered throughout the overall HIA. The development of a health action plan is described. All three types of mitigation, i.e., regulatory driven, negotiated commitments and voluntary health contributions are described in the health action plan. In addition, the health action plan may present the verification processes that document success or failure in the achievement of key performance indicators (KPIs).

Section 10 is a general discussion of monitoring and evaluation (M&E). The development of a reasonable and appropriate set of KPIs is a complex and difficult task that often requires technical assistance from the relevant public health authorities.

Section 11 focuses on the resources needed for conducting HIAs.

Additional information is included in the technical appendices.
Section 1: General Background

Overview of HIA

This Toolkit primarily informs HIAs for major natural resource development projects in Alaska. These projects are often large, remote, complex, and typically associated with significant transportation features (e.g., roads, bridges, airstrips, port development/expansion). While resource development projects can be controversial, the appropriate development of Alaska’s natural resources is critical to the economic viability of the state and its citizens. To ensure development is compliant with a web of established laws and regulations, projects are routinely submitted to a rigorous set of impact assessments administered by government (i.e., federal, state, local and tribal) authorities. The HIA is a process that:

- Engages project proponents, key stakeholders, and community concerns in a systematic, collaborative decision-making process;
- Predicts the consequences (positive, negative or both) of different project alternatives;
- Identifies positive health effects while it prioritizes prevention of negative health effects;
- Identifies the project’s most critical potential health effects;
- Facilitates collaboration between the project and the organizations responsible for community public health in a given geographical region; and
- Assures affected communities that the proponent is considering potential human health impacts within the assessment process.

Several key terms have a specific meaning in this guidance:

Health – The reduction in mortality, morbidity and disability due to detectable disease or disorder, and an increase in the perceived level of health.

This definition is from the World Health Organization (WHO) Regional Office for Europe “Health21” policy framework publication (WHO, 1999). As pointed out in this WHO publication, the definition of “health” used in the 1946 WHO Constitution (“A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity”) expresses an ideal that should be the goal of all health development activities. However, this definition does not lend itself to objective measurement, and for the working purposes a narrower definition is needed. The WHO Health21 definition recognizes the difference between ‘aspirations’ (striving for ideals of human health) and ‘operations’ (striving to maintain and advance current human health status) while still allowing for subjectivity in terms of ‘perceived level of health.’
While a project may have positive and negative health effects, there are critical aspects of health that cannot be realistically measured, managed, or mitigated by the private sector. The Alaska HIA Guidance tries to differentiate between the roles and responsibilities of government, the private sector, communities, and individuals.

*The Alaska HIA Guidance has adopted many of the standard terms and definitions that are used in the NEPA impact assessment process*

**Environmental Health** – The body of knowledge concerned with the prevention of disease through control of biological, chemical, or physical agents in the air, water, and food, and the control of environmental factors that may have an impact on the well-being of people. Environmental health encompasses the human living environment and stresses primary prevention based on engineering and design improvements (World Bank; Listorti, 1996).

Environmental health refers to health issues affected by the social, economic and physical context in which people exist. For example, economically driven (job-seeking) influx can have potential health consequences.

Private sector resource development projects tend to focus on classic environmental health concerns such as contaminants or noise since these issues are well understood and are typically addressed in many internal environmental and social impact guidelines. This toolkit provides a means to consider SDH and associated key health outcomes (e.g., alcohol/drugs, gender violence, suicide, etc.) that are related to the environments where people live. The broad-based descriptor “health effects categories” is used in this guidance and is generally consistent with the environmental health areas (EHA) framework utilized by the International Finance Corporation in their HIA Toolkit.

**Impacts/Effects** – The terms "effect" and “impact” are synonymous in this toolkit. Effects may include those that have beneficial or detrimental consequences to communities or individuals. Impacts are usually classified into three types:

- **Direct** – caused by an action and occurring at the same time and place
- **Indirect** – caused by an action and occurring later in time or farther removed in distance, but still reasonably foreseeable.
- **Cumulative** – caused by an action and when added to other past, present and potential actions, may become collectively significant over a period of time.

These definitions have been developed for the National Environmental Policy Act (NEPA) but are also useful for health impact analysis because of the emphasis on place and timing.
Human Environment – The relationship of people to their physical and social environment.

Affected Environment – A term used in the NEPA process referring to an area that will be affected or created by the alternatives under consideration.

Significance – Refers to the relative importance of an impact. It is important to note that the term significance has different meanings when it is used in the HIA document than it does when it is used in the EIS generated for NEPA. NEPA significance is a highly technical term that is carefully defined in federal regulations under 40 CFR 1508.27.

In the HIA document, however, significance has a broader meaning that is tied to recommended mitigation strategies. Health impacts deemed to have a certain level of significance (usually medium or higher, see Section 8) may act as a signal for the HIA team to propose some reasonable mitigation strategy within their report. It is possible that an impact could be significant in the context of a stand-alone HIA but not be deemed significant in the EIS under NEPA.

The HIA team has adopted a model to assess significance that evaluates several different dimensions of an impact and assigns it an overall significance score. This method is described in detail in Section 8.

Finally, it should be clear that HIA/NEPA significance should not be confused with mathematical/statistical significance language that is used in medical literature to describe the reliability of a scientific result.

Social Determinants of Health (SDH) – The range of personal, social, economic and environmental factors that interact to influence the health status of individuals or populations.

In the USA, the Centers for Disease Control and Prevention (CDC) define SDH as “the circumstances, in which people are born, grow up, live, work, and age, as well as the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies, and politics”. There are a variety of SDH models that are used and promoted including those from the World Health Organization (2008).

The HIA Process
The typical flow of the HIA process is represented in Figure 1 on the next page.
Figure 1: HIA Process

Downsizing: decommissioning: divestment

Operations

Construction

Project Cycles

Feasibility studies: project planning

Project concept

Hazard types: Health Hazard ID

Legislation and project information

Screening

Health context

Define TOR

Baseline data

Health management plan

Decision-making: Establishing priorities, responsibilities

Risk assessment: Assessing impact

Modeling & Ranking

Significance Criteria

Define Roles & Responsibilities

Implementation & Monitoring

Audit

Surveillance System

Evaluation

Significance criteria

Review

Stakeholder Communication and Consultation

Technical Guidance for HIA in Alaska 2011
In the HIA roadmap, the yellow “project cycles” blocks illustrate the typical phases of resource development projects. The elements of an HIA may or may not follow the timing of the project sequence. The orange bar entitled “stakeholder communication and consultation” illustrates that stakeholders should have input throughout the entire process (see Section 7 for detailed comments on stakeholder engagement). The beige boxes indicate key activities performed during the various steps of an HIA. The blue boxes in the center are the main steps of the HIA process which include:

- **Screening** – Preliminary evaluation to decide whether a project poses any significant health questions and if an HIA is needed

- **Scoping** – During scoping, a vast array of health issues of potential concern are considered, and a finite set of health impacts that must be addressed are identified. Useful baseline health information, along with the input of key stakeholders and the relevant health authorities, is important to identifying this realistic set of health concerns. See Section 5, Scoping, for a fuller discussion of this topic as well as Section 7, Stakeholder Engagement, for guidance on involving local communities fully in the scoping process.

- **Health Risk/Impact Assessment** – The health impacts identified during the scoping process are ranked, qualitatively or quantitatively. This step explicitly describes the intensity, geographic extent, duration, and likelihood of the key health impacts. (See Section 8)

- **Health Action Plan** – The HAP, using the rankings developed in the risk assessment, establishes the proposed mitigations for identified impacts in a written plan. Mitigations are actions that totally eliminate or compensate for potentially negative impacts.

- **Implementation and Monitoring** – After the health action plan is developed, it is necessary to decide how the mitigation actions will be implemented and monitored, and to establish the roles and responsibilities of the key stakeholders, including the project proponents. During this process, action frameworks, allocation of resources, and monitoring systems may be developed in order to provide satisfactory review of mitigation strategy. In addition, the monitoring system may be designed to capture unanticipated effects or provide an early-warning system to raise an alert if problems are occurring at the community level. The monitoring plan should define appropriate key performance indicators.

**Evaluation and Verification of Performance and Effectiveness** – A step to ensure that implementation has been accomplished and is achieving the intended results. Community participation in this process is an important strategy that should be considered.

A summary of some of the key activities performed during the various phases of an HIA are shown below.
### Key Activities during the Steps of an HIA

**Screening**

1. Assemble the team
2. Identify legislative and relevant corporate requirements
3. Gather and review relevant project information
4. Evaluate health context
   a. Location
      - Rural
      - Urban
      - Peri-Urban
   b. Influx
      - Temporary
      - Permanent
      - Countries or locations of origin
   c. Culture including history
      - Tribal
      - Level of subsistence harvesting
      - Alcohol status
5. Review project design
   a. Water bodies
   b. Waste management
   c. Roadways, pipelines
   d. Construction camps
   e. Operations facilities
   f. Sources of potential exposure
   g. Transmission-line corridors
6. Review the possible health impacts using health effect categories
7. Identify potentially impacted geographic areas and potentially affected communities
8. Identify key stakeholders
9. Determine whether HIA is needed

**Scoping**

1. Set the geographical, time scale, and population boundaries to the assessment
2. Determine HIA approach
   a. Comprehensive
      - Significant influx concerns
      - Resettlement/relocation
      - Key SDHs, e.g., income, employment
      - Significant construction activity
      - New linear features, including transportation
      - Large project in rural setting
      - Potential subsistence impacts
      - Community perceptions
   b. Rapid Appraisal
      - No new data collection anticipated within communities of concern
   c. Desktop
      - Limited review
      - Existing data source review

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**Technical Guidance for HIA in Alaska**

2011
Baseline Data

1. Literature review by Health Effects categories
2. Evaluation of existing country survey and research data
   - Data validation
   - Statistical analysis
3. Evaluation of data from key stakeholders; traditional and local knowledge
4. Evaluation of health data from existing project workers

Impact/Health Risk Assessment

1. Detailed description of risks and potential causation
   - Use map to brainstorm and identify risks
2. Assess impact significance
   - Perception of risks by potentially affected communities
   - Nature—direct, indirect or cumulative
   - Timing and duration
3. Risk Ranking
   - Severity
   - Probability
   - Extent
   - Magnitude
   - Frequency

Health Action Plan, addressing risks identified

1. Mitigation Approach
   - Action
   - Resource flows and responsibilities
   - Timing (construction, operations, decommissioning)
   - Collaborating organizations, if applicable

Monitoring & Evaluation

1. Define Key Performance Indicators (KPIs)
2. Determine approach to data collection
   - Implement
   - Evaluate
Can occur at all levels

Stakeholder Engagement

1. Transparency
2. Consultation
3. Response/feedback for public comments
4. Accountability, including consideration of participatory monitoring/verification
   - Evaluate
Section 2: Screening—How to Decide Whether to Conduct an HIA

All screening discussions should attempt to answer two basic questions:

- Is a formal HIA appropriate for this project?
- If yes, what level of effort is appropriate?

When does screening happen?

Screening is typically the first activity in the HIA process. The HIA screening process can happen through formal or informal conversations and is often captured in brief documents that explain the rationale behind screening choices. In many cases, screening has been conducted by other stakeholders or project proponents. Experience indicates that the HIA team should be prepared to conduct its own review in order to independently determine the need for an HIA for the proposed project.

How are screening decisions made?

The project plan is reviewed for factors that are known to influence human health. Because resource development projects are extremely diverse, it is impractical to devise a rigid set of screening rules for HIA. Alaskan projects can range from exploration efforts with a small workforce to massive development projects that require thousands of workers. Projects can be located in remote areas far from any villages or near major population centers. As a result, this toolkit suggests a number of “indicators”, such as project design features, environmental contaminants of concern, social concerns, or community concerns, which may indicate that an HIA is needed.

What resources support HIA screening decisions?

Most large private resource development companies operating in Alaska already have a formal health review cycle and they often publish some type of community health assessment, which can be very useful to the HIA team during screening. Several industry trade associations (e.g., International Council on Mining and Metals (ICMM) and International Petroleum Industry Conservation Association (IPIECA)) have detailed HIA guidance for their members. When proponent’s health assessments are done in accordance with this guidance, it is more likely that they will be useful to the HIA team. Proponents should be aware that health assessments performed prior to the start of the HIA can make the process more effective and efficient.

What if a governmental agency contacts the HIA team?

If a state, federal, or tribal agency (e.g., State Department of Natural Resources) contacts the HIA team, there is a presumption that the agency has already screened the project and determined that performance of an HIA might be appropriate. After reviewing the decision of the requesting agency, the next step for the HIA team is to determine the level of effort required for the HIA by gathering key screening information about the project (Table 2 below). This screening review could generate an assessment as short as one to two pages that succinctly states the likelihood of potential impacts and proposes whether additional analysis is required. While unlikely in Alaska, it is not impossible that an HIA would be performed in the absence of regulatory frameworks.
What principles guide screening decisions?

The principle of “fit for purpose” means that the level of effort should be appropriate for the proposed project. The precise terminology that describes the level of HIA (i.e., desktop, rapid appraisal, comprehensive, see Section 3) is less critical than performing systematic and reproducible analyses. The HIA team should analyze every project using the same basic approach so that proponents and agencies can anticipate the steps and scale of the overall HIA process and plan accordingly.

*The potential for project related health impacts should always be considered*

*If an HIA is performed it should be fit for purpose.*

What factors invite more in-depth health impact analysis?

More in-depth health impact analyses are generally guided by

- project characteristics
- environmental and social concerns,
- community concerns.

The HIA team should review each factor in detail and understand that there will be overlap between the categories.

Project characteristics

- **Prominent and new linear features with an emphasis on transport linkages**

Linear features are structures such as airstrips, railway lines, power transmission lines, pipelines, roads, and rivers used as transport conduits. Linear features often connect many ecological and human communities. Because of this, linear features of all types can generate health impacts during all phases of a project. Direct impacts from linear features include increases in accidents and injuries and greater exposures to dust and vehicle emissions. Linear features could potentially change migration patterns for subsistence species; this is an important screening topic the HIA team should consider.

Indirect and cumulative impacts from linear features are intertwined with social considerations. Changes in transportation corridors, for example, may influence disease transmission patterns. One common Alaskan example, the “fly in fly out” (FIFO) system, may facilitate widespread transmission of an infectious agent that would otherwise remain in a specific locale. Similarly, the spread of diseases (for example, sexually transmitted infections and certain respiratory infectious diseases) can be imported by expansion of sea and river boat/barge activity that introduces non-local job seekers and construction workers into previously unexposed geographical areas and communities. New transport corridors can also introduce previously “dry” communities to alcohol and drugs. Therefore, linear features and transport linkages often invite an HIA.
Large footprint facilities

Alaskan projects may require a large constellation of engineered facilities (e.g., tailings dams, ponds, roads, pipelines, and storage tanks) that are referred to as the physical footprint. For human health impacts, the project footprint may include communities affected by the movement of supplies and personnel as well as locations where these entities interface with the public.

Large projects in rural settings

Most often, large Alaskan projects are in rural settings and some of their features have potential impacts to subsistence hunting, fishing, and gathering practices. An expansion of an existing project may also produce subsistence issues during screening, but may require a more complex analysis than a new development.

Exploration and/or construction phase related influx

Even exploratory projects with a limited initial scope can act as a migratory magnet for the immediate geographical area. In the typical rural Alaskan setting, a significant portion of the local population will be considered for employment or workers from other locations will be brought in via a FIFO system. These realities may influence entire regions as the search for workers expands. Even if the workers are completely housed within a camp, some indirect impacts to the community could occur via influx of extended family job seekers. In addition to exploration, the construction phase holds many potential health impacts, positive or negative, and may warrant some level of HIA.

There are certain project features and characteristics that make health impacts more likely.

Environmental and Social Concerns

Projects that require a formal EIS under NEPA may also require some level of HIA. The HIA is designed to be an appropriate technical methodology that can efficiently analyze relevant health issues that must be addressed by the EIS.
Environmental concerns

- **Exploration and/or construction phase influx**

If a project has the potential to release hazardous materials into the environment, this will usually indicate a more in-depth HIA. The HIA team should be aware that Alaska-specific exposure scenarios for chemicals are often different from those upon which federal standards are based. Alaska intake of subsistence foods is substantially higher than typically experience in other states. For example, fish meal consumption by Alaska residents may be dramatically higher than typically experienced by lower 48 residents. This situation can have potentially significant effects for substances that bio-accumulate in subsistence resources. For example, rural residents eating a subsistence diet may be exposed to higher than expected levels of methyl mercury because fish constitutes a very large portion of their daily dietary intake. Consumption of fatty tissues from marine mammals (whale, seals, shark, and porpoise) is common among Alaskan Natives and may produce significant exposure to bio-accumulated compounds. This potential risk of elevated exposure levels may indicate a more in-depth environmental and human sampling, e.g., biomonitoring for specific compounds such as methyl mercury.

- **Air quality**

Air quality issues associated with projects that generate large amounts of dust, produce high levels of stack emissions from incineration of waste materials, or release persistent organic pollutants (POPs) may also invite the need for a more in-depth baseline human health evaluation in order to objectively address these types of potential exposures.

- **Water resources – quality, quantity and access**

Water access is a very important issue. Project features (e.g., dams, stream diversion, drilling activities, etc) that are likely to challenge water access or strain water delivery infrastructure should be analyzed. In rural Alaska, water quality/quantity issues are strongly linked to individual and community well-being and deeply important to Alaska Native stakeholders. Many rural villages struggle to maintain adequate quantity and access to potable water supplies.

- **Subsistence resources, harvest, and practices**

Project features that will affect subsistence resources are a key topic in Alaska, particularly in rural settings that host native communities. Subsistence concerns are cross-cutting because they affect the physical environment, social relationships, and health behaviors. Key questions related to Alaskan subsistence practices are:

  - **Quality** – Does the proposed project increase or decrease contaminant levels in subsistence resources (e.g., increased heavy metal concentrations)?
  - **Quantity** – Does the proposed project increase or decrease the quantity of the resources?
  - **Access** – Does the proposed project limit or promote community access to subsistence resources?
  - **Competition** – Does the proposed project increase competition for the resource?
**Potential impacts to subsistence resources are a critical area. It should be determined if a project is likely to affect the access, quantity, quality or competition for the subsistence resources.**

**Social Concerns**
In addition to environmental concerns, some social issues may also identify the need for an in-depth HIA. Social analysis is often focused on these major areas:

- **Influx of workers or other individuals to a region**

  Influx can occur due to job seeking, commercial opportunities, small-scale trading, or extended-family in-migration. Significant influx can strain fragile local infrastructures and vulnerable populations and affect health.

- **Resettlement or relocation of villages or individuals**

  Resettlement and/or relocation invariably have significant direct, indirect, and cumulative health impacts. Therefore an in-depth health analysis may be needed if a project is going to produce significant community resettlement/relocation.

- **Economic changes**

  Significant changes in household and community income and consumption expenditure, and the costs of housing, food, and fuel, hold the potential for both positive and negative health effects. The range of potential effects is complex and very diverse. Projects that plan substantial recruiting from local populations may bring notable changes in income and this may also produce a more detailed HIA. The HIA team must coordinate with the social assessment team during this analysis.

- **Access and use of alcohol and other substances of abuse**

- **Equity**

  Equity involves the distribution of impacts for various community groups, identification of potentially vulnerable populations, and identification of environmental justice issues (EJ). According to EPA, EJ is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

  Project features that could limit access to education, for example, would produce unequally distributed effects on the population (i.e., mostly youth are affected) and this may evoke important EJ concerns and a detailed assessment of health.
The social and health impact assessments should be carefully coordinated to avoid duplicative data collection and redundant analyses

Community concerns

Strongly held community concerns may also serve as a reason for more in-depth HIA analyses. In many situations, especially concerning the fate and transport of potentially hazardous materials, stakeholders may voice concerns that lack an objective and scientific basis. Regardless of the absolute validity of the concerns, it is extremely important for the HIA team to acknowledge these concerns and provide reassurance that these questions will be reviewed in the HIA. During the screening process the HIA team should anticipate concerns common to large development projects and prepare materials and responses for stakeholder discussions. Much of this information can be available from close coordination with the environmental and social assessment teams.

In order to manage the screening process, key information about the proposed project should be obtained (see Table 2). It is impossible to predict every situation that might occur during the government permitting process. In this way, HIA is an art that requires a robust knowledge base and the ability to be creative and adaptable in order to accomplish objectives during a complicated process.
Table 1  HIA Screening Process: Key Project Information

- **Describe project type**
  - Identify target materials (gold, copper, oil, natural gas, etc.)
  - New project or expansion
  - Understand type of mine (open pit, subterranean)
  - Drilling type (On-shore or off-shore drilling)

- **Gather previous experience**
  - Solicit proponent experience with similar projects
  - Perform literature review

- **Characterize Project location**
  - Rural-remote, rural, urban, or suburban
  - Identify PACs (define radius of potential influence)
  - Consider geographic extent of impacts (local, regional, state-wide)
  - Identify if project area is a critical habitat for subsistence resources

- **Understand Project Characteristics**
  - Conceptualize linear features
  - Determine extent of facilities' health impacts footprint
  - Characterize exploration plans and/or construction phases

- **Collect Environmental and/or social assessment reports**
  - Hazardous materials concerns, including air and water releases
  - Air quality impacts
  - Water quality and quantity impacts
  - Subsistence and Traditional Knowledge (TK) reports
  - Influx/resettlement and/or relocation
  - socio-economics reports
  - Equity concerns including environmental justice (EJ)
  - Vulnerable populations

- **Review significant community concerns**
  - Stakeholder engagement reports
  - Published materials explaining community concerns

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*There is no perfect HIA screening system. Informed professional judgment is essential. HIA is both art and science.*
Section 3: Types of HIAs

HIA practitioners refer to different types of HIAs primarily to indicate various levels of effort, particularly related to new community-level data collection, and the overall time needed to complete a document. There is currently no consistent terminology used to distinguish one type of HIA from another. For this toolkit, the key descriptive terms for the types of HIA are:

- Desktop
- Rapid appraisal
- Comprehensive

Each type requires a different approach to baseline data collection and stakeholder engagement, and requires different amounts of time.

Desktop HIA

The desktop HIA is a qualitative assessment and is most appropriate for projects with few anticipated health impacts. The desktop HIA ideally requires 2 to 4 weeks but may require longer if baseline data is difficult to obtain. The HIA team often does not pursue extensive stakeholder engagement although some involvement is usually required. The level of external stakeholder input should be documented.

The desktop HIA is often useful for determining whether a more detailed review is needed. Many desktop HIAs are performed by project proponents as an internal “exercise” and are not released for public review or comment. From a State of Alaska perspective, a desktop HIA doubles as a screening exercise and it can reveal the need for further work. Usually, the desktop HIA confirms that a more detailed HIA is not warranted. The HIA team should make efforts to obtain any internal desktop HIA work completed by proponents before beginning their own work. As performed by the State, the desktop HIA is a screening tool that could become part of the overall project file. In addition to documenting stakeholder engagement, the HIA team should document why a more detailed HIA was not performed.

In a desktop analysis, the following elements should be covered:

- Project background
- Scope of the HIA
- Brief project description including (i) location, (ii) site access (are new transport features needed?) and (iii) timing/schedule
- Potentially impacted areas (geography)
- Potentially affected communities (if any)
- Community and/or external stakeholder concerns or comments
- Brief baseline analysis
- Risk analysis based on the standard health effects categories
 Mitigation analysis (if any required or if none, why not)
 Monitoring and evaluation analysis (if any required or if none, why not)

Rapid Appraisal HIA

For this toolkit, a rapid appraisal HIA is considered to be a site-specific HIA that uses health information that is already available or potentially accessible without conducting new field survey work.

Data sources for a rapid appraisal may include peer-reviewed scientific literature, health department databases and tribal health service data sources. The HIA team mines these sources for relevant information. For non-governmental consultants, there are often significant barriers to data access due to the sensitivity of human health information. Once the information is obtained, the HIA team will analyze and report the data. If performed by the State, these HIAs will be public documents subject to the same rules and disclosures as other similar environmental and social technical reports.

Comprehensive HIA

The hallmark of the comprehensive HIA is new field study data. Field studies address data-gaps identified during the scoping process. A comprehensive HIA may be appropriate for large, complex projects that involve

 Resettlement of existing communities
 Significant population influx
 Major disruption of subsistence practices
 Significant impact to key social determinants of health
 Information gaps related to a well-known aspect of a project

There are three general types of HIA: desktop, rapid appraisal and comprehensive.

The need for new field study data is a key characteristic of comprehensive HIAs.
Table 3: Levels and Characteristics of HIAs

<table>
<thead>
<tr>
<th>Level of HIA</th>
<th>Characteristics</th>
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<tbody>
<tr>
<td>Desktop HIA</td>
<td>• Broad overview of possible health impacts</td>
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<tr>
<td></td>
<td>• Analysis of existing and accessible data</td>
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<tr>
<td></td>
<td>• No new data collection</td>
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<tr>
<td></td>
<td>• Usually takes an experienced assessor 2-3 weeks to perform the appropriate</td>
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<tr>
<td></td>
<td>literature searches, analysis, and write-up</td>
</tr>
<tr>
<td>Rapid Appraisal HIA</td>
<td>• Provides more detailed information of possible health impacts</td>
</tr>
<tr>
<td></td>
<td>• Analysis of existing data</td>
</tr>
<tr>
<td></td>
<td>• Stakeholder and key informant analysis</td>
</tr>
<tr>
<td></td>
<td>• No new data collection</td>
</tr>
<tr>
<td></td>
<td>• Typically takes a team of two experienced assessors 10-14 days in the field,</td>
</tr>
<tr>
<td></td>
<td>followed by 4-8 weeks of analysis and document preparation, with literature</td>
</tr>
<tr>
<td></td>
<td>(desktop) searches performed prior to the field work</td>
</tr>
<tr>
<td>Comprehensive HIA</td>
<td>• Provides a comprehensive assessment of potential health impacts</td>
</tr>
<tr>
<td></td>
<td>• Robust definition of impacts</td>
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<tr>
<td></td>
<td>• New data collection</td>
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<tr>
<td></td>
<td>• Participatory approaches involving stakeholders and key informants</td>
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<tr>
<td></td>
<td>• Requires approximately 2-4 weeks of field work. In Alaska, community surveys</td>
</tr>
<tr>
<td></td>
<td>often require a minimum of 4-6 months of pre-work to coordinate field studies</td>
</tr>
<tr>
<td></td>
<td>with local communities. Field work in Alaska is heavily dependent on seasonal</td>
</tr>
<tr>
<td></td>
<td>subsistence patterns.</td>
</tr>
</tbody>
</table>

How to Determine the Type of HIA

The HIA team should document how they selected the level of HIA performed. While there is no formal algorithm used to select the level of HIA, Figure 2 (below) suggests key factors for consideration and a schematic for decision-making.

Perform the type of HIA needed to best understand, document and mitigate potential project impacts.
The **potential health impacts** axis considers health issues in the proposed project location, such as:

- **Hazardous materials exposure** – considers facility operation, and potential exposures to physical (including noise and illumination), biological, and chemical hazards, particularly potential impacts on subsistence resources through emissions or avoidance of an area due to noise or other physical hazards.

- **Resettlement, relocation, influx** – considers whether or not the project will require the need for changes in the existing community configuration and social structures.

- **Endemic disease profile** – considers the likelihood of sexually transmitted infections including HIV/AIDS, communicable respiratory diseases including tuberculosis, etc.

- **Health systems and infrastructure** – considers status of existing public health infrastructure and potential effects to direct clinical care services and resources.

- **Stakeholder concerns** – considers critical community issues, such as impacts on subsistence harvest, water quality, crime rates, increased road traffic and accidents, noise, dust, etc.
Social sensitivity – considers whether or not the project will significantly alter existing cultural, community, and household social relationships.

The social sensitivity axis gives special focus to some of the social determinants of health such as gender, ethnicity, cultural cohesion, physical or mental distress due to cultural change, education levels, poverty or economic disadvantage, and dependence on unique natural resources. These topics are usually addressed in the social impact analysis, so it is extremely important that the HIA Team understand the SIA approach to social analysis.

The project footprint axis applies to:

- Physical area, and number of communities affected by construction, operation, and decommissioning. The health-specific project footprint may extend beyond the immediate physical footprint. It may be a useful technique to organize potentially impacted communities into geographic “zones of impact” (e.g., Zone 1 representing those most impacted proximate communities, Zone 2 those potentially impacted but geographically distant, Zone 3 areas with low likelihood for potential impact)
- Inconveniences to the population’s quality of life such as dust, noise, transportation congestion, re-routing of roads, re-routing or damming of rivers, and positioning of construction camps
- Impacts on natural resources used by the communities for subsistence, such as hunting and fishing, foraging, and water supplies for drinking
- Physical displacement (i.e., resettlement or relocation of individuals or communities increases the project footprint)
- Impact on community road access, resulting in potential changes in access to alcohol and drugs (negative) as well as goods and services (positive)
- Potential of the project to cause local violence or other significant disruptions of community cohesion
- Native peoples’ cultural health practices and access to health infrastructure and services
- Distortion of local prices, especially of food, property and energy

The specific HIA type is less important than the need to reasonably address key issues that are raised by relevant stakeholders.

Coordinating the HIA with the environmental and social impact assessment process

The HIA team should attempt to integrate with the environmental and social impact assessment process whenever possible. In some situations (particularly involving large
projects) the concerns of the environmental and social analysis may not match the health analysis:

- Geographic extent will often differ between the EIA, SIA, and the HIA because the HIA involves the health effects involved with the movement of people.
- Potentially affected communities will often differ between the EIA, SIA, and HIA because the various groups review different impact types.
- Health equity is a unique consideration of the HIA. While it may correlate with certain questions in the SIA, it is generally not considered in the EIA.
- The epidemiology of disease transmission will not be considered during the SIA and may be considered in the EIA only related to wildlife and habitat issues.
- Workforce issues will be considered differently by the HIA, SIA, and EIA. The HIA will acknowledge many social dynamics created by the influx or egress of a working population, especially as it influences human health. The SIA will primarily review how influx and egress affect social and economic dynamics in the community, but may not ask health questions. The EIA will primarily review how changes in the workforce will affect the project footprint and subsequently, the physical environment.

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*The SIA, EIA, and HIA ask different questions. It is vital for these teams to coordinate and communicate effectively.*

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**Related Health Impact Assessments**

*Health Risk Assessments* (HRAs) classically address “inside the fence” issues that focus on the workforce. These assessments include the quantitative calculation of incremental individual exposure risk to hazardous materials in the environment or the assessment of exposure risks encountered while working at the project facility, such as chemical exposures, cold and heat exposures, or safety hazards. In Alaska, quantitative risk assessment may be useful, particularly related to impact on local communities and subsistence resources. Again, the workforce HRA is usually an “inside the fence” concern and not routinely part of the HIA. There are, however, cross-over considerations when workers act as transmission agents for potentially hazardous materials from site to home (e.g., lead or infectious diseases). These situations are typically evaluated as part of an industrial hygiene/safety review by the proponent and should be carefully considered by the HIA team.

*Health Need Assessments* (HNAs) generally describe the health needs and health assets of different groups in the local population without reference to a specific project. HNA’s primary function is to inform decisions about health strategies, health service priorities, program commissioning, and local health delivery plans. If all of these assessments are completed, these different documents will overlap and the HIA team will find useful information through exchanging and sharing data.
Section 4: Health Effects Categories (HECs)

Health Effects Categories (HECs) supply the fundamental framework for scoping discussions (Section 5). HECs allow the HIA team to systematically review each human health area in the light of the project design, policy description, or program description. The HECs inform baseline health studies considered in the HIA and inform how the HIA team identifies and rates health impacts.

Some international guidance documents use the term “environmental health areas (EHAs)” to address this topic, but for this toolkit the working group selected the term “health effects categories (HECs)”. The working group selected these HECs from a list of previously published EHAs and modified them for the Alaskan context. While health effects not addressed by the HECs can always be considered, international experience and the published literature indicates that the HEC system works well and captures the most important potential human health impacts.

Creation of a health effects categories framework allows for a systematic and consistent analysis.

The table shown below presents a list of health effects relevant for Alaskan resource development projects. The HECs can be used for desktop, rapid appraisal and comprehensive HIAs.
### Health Effects Category Table

<table>
<thead>
<tr>
<th>Health Effects Category</th>
<th>Pathway Description</th>
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</table>
| **Social Determinants of Health (SDH)**     | This is a broad category that considers how living conditions and social situations influence the health of individuals and communities.  
    psychosocial issues related to drugs and alcohol,  
    teenage pregnancy  
    family stress  
    domestic violence  
    depression & anxiety  
    isolation  
    work rotations and hiring practices,  
    cultural change  
    economy, employment, and education  
   **Limitations:** While SDH are real and important, it is extremely difficult to establish direct causality between a change in a social determinant and a particular health outcome. The language used to communicate impacts related to social determinants should reflect that SDH influence health in complex ways. |
| **Accidents and Injuries**                  | This category includes impacts related to both fatal and non-fatal injury patterns for individuals and communities. Changed patterns of accidents and injuries may arise due to:  
    Influx of non-resident personnel (increased traffic on roadways, rivers, air corridors  
    Distance of travel required for successful subsistence.  
    Project-related income and revenue used for improved infrastructure (e.g., roadways) and improved subsistence equipment/technology. |
| **Exposure to potentially hazardous materials** | This category includes project emissions and discharges that lead to potential exposure. Exposure pathways include:  
    Food. Quality changes in subsistence foods (risk based on analysis of foods or modeled environmental concentrations)  
    Drinking water  
    Air. Respiratory exposures to fugitive dusts, criteria pollutants, VOCs, mercury, and other substances.  
    Work. Secondary occupational exposure such as a family member’s exposure to lead on a worker’s clothing.  
    Indirect pathways, such as changing heating fuels/energy production fuels in communities |
| **Food, Nutrition, and Subsistence Activity** | This section depends on the subsistence analysis and nutritional surveys (if completed) and considers:  
    **Effect on Diet:** This pathway considers how changes in wildlife habitat, hunting patterns, and food choices will influence the diet of and cultural practices of local communities. While nutritional surveys are the most effective way to assess dietary intake, conclusions can be drawn if certain assumptions are accepted  
    **Effect on Food Security:** This discussion considers project-specific impacts that may limit or increase the availability of foods needed |
| **Infectious Disease** | This category includes the project’s influence on patterns of infectious disease: The pathways include:
- Influx of non-resident personnel from outside the region
- Crowded or enclosed living & working conditions and the mixing of low and high prevalence populations due to influx can create an increased risk for transmission of STIs such as syphilis, HIV, and chlamydia.
- Changes to groundwater/wetlands can alter habitat for agents that transmit vector-borne diseases. This is not a likely scenario in Alaska, but with the cumulative effects of climate change it may become an issue of greater concern in the future. |
| **Water and Sanitation** | This category includes the changes to access, quantity and quality of water supplies. The pathways include:
- Lack of adequate water service is linked to the high rates of lower respiratory infections observed in some regions, and to invasive skin infections.
- Revenue from the project that supports construction and maintenance of water & sanitation facilities.
- Increased demand on water and sanitation infrastructure secondary to influx of non-resident workers. |
| **Non-communicable and Chronic Diseases** | This category considers how the project might change patterns of chronic diseases. The pathways include:
- Nutritional changes that could eventually produce obesity, impaired glucose tolerance, diabetes, cardiovascular disease.
- Pulmonary exposures that lead to tobacco related chronic lung disease, asthma; in-home heat sources; local community air quality; clinic visits for respiratory illness
- Cancer rates secondary to diet changes or environmental exposures
- Increased rates of other disorders, specific to the contaminant(s) of concern |
| **Health Services Infrastructure and Capacity** | This category considers how the project will influence health services infrastructure and capacity. The pathways include:
- Increased revenues can be used to support or bolster local/regional services and infrastructure
- Increased demands on infrastructure and services by incoming non-resident employees or residents injured on the job, especially during construction phases. |

The HIA team should also realize that while not every HEC is relevant for a given project, they should at least give initial consideration to all of the standard HEC categories during scoping exercises.

**Social Determinants of Health**

It is widely accepted that human health is strongly influenced by a constellation of factors such as political change, impoverishment, educational opportunity, family dynamics, and
social integration. Social and health scientists often refer to these factors as “determinants”, because their influence on health is so strong. The World Health Organization (WHO) definition describes the social determinants of health (SDH) as “the circumstances in which people are born; grow up, live, work and age, and the systems put in place to deal with illness.” In remote rural Alaskan settings communities often suffer from high rates of illness due to poor water quality and quantity, poor sanitation, inadequate shelter, indoor air pollution, limited access to appropriate medical care, and the inability to control exposure to infectious agents. Urban settings in Alaska have their own set of determinants that should also be considered in the SDH analysis.

As the HIA team describes how project features affect each HEC, it must also describe whether the effects will be individual and/or community wide, and whether the impacts are direct, indirect, or cumulative. Evidence-based studies of Arctic populations are few and often unrelated to health questions encountered during scoping exercises. Even though this process is complex and evidence may be sparse, it is important to employ professional experience to make reasonable predictions about project effects on the HECs and to identify measurable outcomes.

Psychosocial Issues
The term psychosocial refers to social situations that produce psychological distress or psychological relief. Many adverse health behaviors are selected to cope with psychological distress just as many beneficial health choices are engaged during periods of psychological optimism and relief. In Alaska, poverty, rural isolation, urban isolation, cultural change, and a host of other social factors can produce psychological distress. Project features should be reviewed with psychosocial issues in mind and overt sources of psychosocial distress should be identified and avoided. While it is true that subsistence-based rural populations suffer significant psychological distress associated with perceived changes in their lifestyle and cultural stability, this reaction is not always uniform since some community members (e.g., younger members or those who have moved away) may feel less bound to traditional practices. Some of the most challenging health issues for Alaskans are social and cultural changes that produce psychological distress resulting in adverse health behaviors (especially substance abuse and addictive behaviors) followed by depression and, in some cases, suicide. While psychosocial impacts are most often indirect impacts involving a constellation of choices and causal factors, there may be instances when a project feature clearly exacerbates or ameliorates a psychosocial issue and the associated health outcomes. The most common examples are community fear that a project will affect their subsistence foods or the fear of environmental catastrophe such as an oil spill or tailings dam failure. Careful professional judgment should be employed to ensure that the HIA addresses psychosocial impacts that are clearly related to the project.

Individual Factors
Many SDH are strongly influenced by individual factors, such as genetic traits, lifestyle choices, and personal circumstances. Examples of individual determinants include gender, age, dietary intake, exercise patterns, alcohol and tobacco use, educational attainment, and employment. The causal relationship between a project and SDH for any given individual is very complex, but some level of causality can be predicted for subgroups within a community that share certain individual traits (e.g., pregnant women).
Institutional Factors

Institutional factors refer to infrastructure and address the adequacy of public sector services such as health care facilities, schools, transportation resources, sanitation, and communications infrastructure. It is especially important for the HIA team to understand the project’s potential impacts on the local health system since a large influx of workers can overwhelm already understaffed local health clinics, police departments, fire departments, emergency response services, and other services critical public health and safety. Positively, many large projects have their own internal medical services and have developed outreach programs with local clinics to benefit community health service delivery. In addition, projects can improve local economies and one possible outcome is better health care facilities and improved program delivery.
Section 5: Scoping—Developing an Appropriate Work Plan

Scoping uses the HECs to identify a spectrum of potential health impacts and then narrows that spectrum to a handful of key health concerns related to the project. Scoping also establishes the geographical, chronological, and demographic boundaries for the HIA. Before scoping can occur, the HIA team should obtain general knowledge of the project, including its location, size, workforce, affected communities, operations, and likely exposures. A field visit to the project site and surrounding communities is standard practice to provide context for the HIA team. The scoping process usually results in the development of a formal work plan with which the HIA team announces what issues it will and will not consider and how it proposes to complete its work. This work plan could also be utilized as a detailed scope of work if the HIA is tendered to outside contractors.

Establishing Reasonable Limits on HIA Scope

A limited scope means that the HIA team will not address every conceivable health effect or effects that are primarily nuisance impacts and rarely observed. Instead, scoping highlights health effects that produce intense impacts—with persistent duration and broad geographical scope—that are highly likely to occur. There must also be a clearly-defined causal link between the project and the anticipated health effect. The HIA should recognize that community perception of the project is deeply important and may cause behavioral changes where none would otherwise exist.

The HIA team should develop a detailed template that includes certain key subject areas and routinely excludes areas that are covered by other impact teams or that are seldom associated with significant health impacts. Standardization produces tremendous flexibility because the HIA team habitually reviews a set list of areas and can expend focused time and energy to review unique health impacts from novel project features.

The HIA should focus on major potential issues of concern. Every question and potential impact cannot be addressed

Framing the Scope of the HIA

The work plan should match the proportion of the potential health impacts and risks. A well proportioned HIA allows health issues to be integrated into project planning in a timely and cost-effective manner. The HIA team should consider the following questions as they create the work plan:

➢ Will the HIA be a standalone document or integrated into an environmental/social impact assessment?
Experience indicates that a standalone HIA is often easier to construct and write. The stand-alone HIA can be included as an appendix in an EIS. The NEPA/EIS team (often a large environmental contractor) can reference the HIA appendix while they complete various chapters of the EIS.

➢ Does the HIA work plan adequately coordinate with the environmental and social assessment teams?

If subsistence issues are a potential concern, the HIA team must discern whether they will have access to environmental data and whether environmental data answers questions related to human health. In Alaska, many surveys describe the harvest of wildlife but do not account for consumption. Often household nutritional surveys are needed for this purpose. Social impact teams will also survey Traditional Knowledge (TK) and the HIA team must determine if these surveys will include human health. All of the impact teams for a project must rate and rank risks, and it is important for the HIA team to use an approach that is compatible with the other analyses, but also specific to human health.

➢ Have the environmental, social, and health teams adequately mapped and selected the PACs and the geographical area of impact?

The HIA team should understand the rationale for differences in the projected geographical scale of the project between environmental, social, and health analyses. The HIA team must also look within potentially affected communities (PACs) to understand if there are sub-groups that are particularly vulnerable to project features. The HIA teams should ensure that these vulnerable groups are acknowledged and studied appropriately.

➢ Has the HIA team identified overlaps between health, social and environmental analyses in order to avoid redundancy?

Coordination with other groups working on a project review is emphasized many places in this toolkit. Especially when work areas overlap, the various teams must communicate often in order to save time and effort. Especially if one group is planning field work, other groups should be notified so that data collection can benefit the overall project review process.

➢ Has the HIA team identified which indirect impacts have plausible causal links to the project?

➢ During which stakeholder meetings will health discussions occur?

It is inefficient to have separate stakeholder meetings for health discussions. The HIA team should communicate with other project review teams in order to join stakeholder discussions already in progress.
Has the HIA team identified information gaps in plans produced by the project proponent?

In the early stages of project planning, proponents will commonly provide very tentative design information that does not specify important project features such as the location of construction camps, the layout of transportation corridors, or the movement of materials. The HIA team should carefully understand when these plans will be formalized and how potential changes may influence the health impacts anticipated. The HIA team must understand as much as possible about the amount, handling, and fate of potential contaminants of concern such as metals (e.g., lead and mercury) or toxic chemicals used in the extraction process. For remote projects, human waste and trash disposal often require incineration and the release of toxins from incinerators is often substantial. The HIA team must understand the model and operation of the incinerators included in project plans.

**Defining Potentially Affected (Impacted) Communities (PACs)**

During the scoping process, the HIA team must define the PACs and be careful to identify vulnerable subgroups within these communities. This process is subjective and should be coordinated with the environmental and social teams. A set of clear criteria often allow PACs to be identified in a systematic way and facilitates the development of zones of impact for the project. Some sample criteria are communities with:

- Close geographic proximity to the project
- Potential changes to water sources and quantities
- Locations in projected release areas for contaminants of concern (e.g., plume)
- High likelihood for influx, resettlement, or relocation
- Intense work force recruitment potential
- High likelihood for change in key subsistence resources
- High likelihood for change in transportation infrastructure
- Potential for economic change including regional staging centers
- Existing large burden of diseases or health problems
- Existing high level of exposure to an environmental hazard

*Defining potentially affected communities is a critical part of the HIA.*

*In Alaska, a large project that utilizes a FIFO system may draw its workforce from an extremely large geographical area.*
Considering the Availability of Key Performance Indicators (KPIs)

As the HIA team completes the scoping process, it should also anticipate the need for monitoring and evaluation (M&E) of potential health impacts which are presented in Section 10. Ultimately, scoping identifies a handful of high priority health impacts specifically related to the project. This group of impacts often becomes known as the Key Performance Indicators (KPIs) that are used to evaluate the project once operations begin. KPIs must be measurable and it is ideal if they are easy to monitor on a regular basis. An experienced HIA team will use the scoping period to create KPIs for later use.

Potential Partners for the Alaskan HIA Team

As with any major project review, the HIA team must cultivate relationships with a variety of partners who are involved with the process. Federal and state regulatory agencies will almost always be involved as well as local governments at the regional (borough), city, and village level (village councils). Each entity has unique information about the project, the local environment, and cultural and traditional practices important for completing the HIA and other assessments. In Alaska, there are a host of Alaska Native tribal organizations and affiliations that must be engaged prior to conducting an HIA for a given project. The HIA team should be very careful to involve tribal organizations in the HIA process and keep them regularly apprised of decisions and progress. Tribal organizations have considerable public health and epidemiological expertise and they maintain specialized databases, disease surveillance programs, and health records that are often the only sources of information needed to characterize the baseline health status of affected populations. The North Slope Borough and City of Anchorage are the only two municipalities in the state that have municipal health departments.

HIA practitioners from outside Alaska should be aware that the Alaska State Department of Health and Social Services (DHSS) maintains an established HIA program. This program does conduct HIAs, but also cooperates with other entities seeking to conduct HIAs in the Alaska. The HIA program maintains this toolkit document and can answer questions about the location of key data sources and best practices for Alaskan HIAs.
Table 2: Selected Tribal Health Organizations

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alaska Native Tribal Health Consortium</td>
</tr>
<tr>
<td>2</td>
<td>Aleutian/Pribilof Islands Association</td>
</tr>
<tr>
<td>3</td>
<td>Arctic Slope Native Association</td>
</tr>
<tr>
<td>4</td>
<td>Bristol Bay Area Health Corporation</td>
</tr>
<tr>
<td>5</td>
<td>Chugachmiut</td>
</tr>
<tr>
<td>6</td>
<td>Copper River Native Association</td>
</tr>
<tr>
<td>7</td>
<td>Council of Athabascan Tribal Governments</td>
</tr>
<tr>
<td>8</td>
<td>Eastern Aleutian Tribes</td>
</tr>
<tr>
<td>9</td>
<td>Ketchikan Indian Community</td>
</tr>
<tr>
<td>10</td>
<td>Kodiak Area Native Association</td>
</tr>
<tr>
<td>11</td>
<td>Maniilaq Association</td>
</tr>
<tr>
<td>12</td>
<td>Metlakatla Indian Community</td>
</tr>
<tr>
<td>13</td>
<td>Mt. Sanford Tribal Consortium</td>
</tr>
<tr>
<td>14</td>
<td>Native Community of Eklutna</td>
</tr>
<tr>
<td>15</td>
<td>Native Community of Tyonek</td>
</tr>
<tr>
<td>16</td>
<td>Ninilchik Traditional Council</td>
</tr>
<tr>
<td>17</td>
<td>Norton Sound Health Corporation</td>
</tr>
<tr>
<td>18</td>
<td>Seldovia Community Tribe</td>
</tr>
<tr>
<td>19</td>
<td>Southcentral Foundation</td>
</tr>
<tr>
<td>20</td>
<td>Southeast Alaska Regional Health Consortium</td>
</tr>
<tr>
<td>21</td>
<td>Tanana Chiefs Conference</td>
</tr>
<tr>
<td>22</td>
<td>Yukon-Kuskokwim Health Corporation</td>
</tr>
<tr>
<td>23</td>
<td>Valdez Native Tribe</td>
</tr>
</tbody>
</table>

Tribal health organizations are extremely important stakeholders in the HIA effort.
Section 6: Collecting and Reporting Baseline Data

Collecting and reporting baseline data is usually the first major analytic task for the HIA team. The HIA team should obtain as much data as possible regarding each high-priority issue identified during scoping (see Section 5). In many situations careful literature searches, review of government (federal, state, local and tribal information systems), and consultation with key stakeholders are sufficient. Occasionally, there are key data gaps that must be addressed through the collection of baseline field data (e.g. nutritional surveys). The data collection efforts should match the complexity and practical needs of the HIA, and should avoid devolving into an academic exercise. It is important to always think about why data needs to be collected, how it is relevant to the project, and how it relates to the overall final analysis of a project. Table 3 presents some examples of key information sources in Alaska.

Table 3  Alaska-Specific Sources of Information

<table>
<thead>
<tr>
<th>(a) Published public health studies (literature review)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) State public health surveillance:</td>
</tr>
<tr>
<td>1. Reportable illnesses</td>
</tr>
<tr>
<td>2. Vital statistics</td>
</tr>
<tr>
<td>3. Trauma registry</td>
</tr>
<tr>
<td>4. Hospital discharge database</td>
</tr>
<tr>
<td>(c) Tribal health databases:</td>
</tr>
<tr>
<td>1. Cancer registry</td>
</tr>
<tr>
<td>2. Diabetes registry</td>
</tr>
<tr>
<td>3. Trauma database</td>
</tr>
<tr>
<td>(d) Health records: most Alaska Native hospitals and</td>
</tr>
<tr>
<td>clinics in Alaska use the Resource Patient</td>
</tr>
<tr>
<td>Management System database (RPMS), which can be</td>
</tr>
<tr>
<td>queried for rates of specific illnesses.</td>
</tr>
<tr>
<td>(e) Other sources of health-related information:</td>
</tr>
<tr>
<td>1. Uniform crime reports;</td>
</tr>
<tr>
<td>2. family violence reporting</td>
</tr>
</tbody>
</table>
State and tribal health agencies have tremendous data resources. These sources of information should be carefully evaluated and utilized whenever practical.

Guidelines for Human Health Data Collection and Use

Unlike the collection and reporting of environmental data, human health data collection and use is governed by strict legal and ethical codes. This is especially true when

- Accessing federal, state, local or tribal databases or
- Collecting new health information in the field

The HIA team must be aware of local peculiarities related to health information and it must be prepared for the protracted time frame required to approve human subject research projects. In many cases, the difficulty, cost, and privacy concerns generated by human subject research means that only the most significant health issues will receive this level of investigation.

For most sources in Alaska, public health surveillance data are available at a statewide or regional level, but not at the village or community level. One reason for this is that health challenges can stigmatize rural Alaskan communities; this must be avoided at all costs. Another reason for limited data availability is that statistical validity is rarely achieved at the village level since the numbers of cases for a given outcome are usually small. The State of Alaska does not release disaggregated results if the number of cases is less than six. In some cases, this situation can be remedied by creating zones of impact around a project and aggregating data from each zone. Zones increase the sample sizes involved, protect the privacy of individual communities, and provide useful information to the project proponent as well as regional health authorities.

In cases where low numbers or other concerns prevent public disclosure of baseline rates of illness, it may be possible to undertake certain baseline analyses through a private collaboration between stakeholders. Information collected by public health agencies during activities such as baseline analysis could potentially be used for disease surveillance and service planning by municipal, tribal and state health agencies, even when not reported publicly.

Many rural Alaskan communities contain a high percentage of Alaska Natives and these communities often track health information in a centralized computerized data base. In general, approval of tribal communities is required to access these records. Health data is personal information that is protected by ethical principles as well as legal regulations. **Under no circumstances may individually identifiable health information be included in any document related to a HIA.** HIA practitioners may need to review personal medical records in order to understand some disease conditions, but in all cases this information is protected under the federal Health Insurance Portability and Accountability Act (HIPAA), applicable Institutional Review Board (IRB) requirements and guidelines (45
CFR § 46), and institutional policies in the hospital, clinic, or other facility in which the records reside.

The U.S. Department of Health and Human Services (DHHS) has developed regulations that assure the protection of human subjects from research risks (45 CFR § 46). The purpose of an IRB is to protect the rights and welfare of human subjects, to protect privacy, and to ensure that human data are used ethically and responsibly. It is often difficult to determine whether specific public health activities are subject to 45 CFR § 46, because they cannot unambiguously be classified as either research or non-research. Guidelines and decision charts are provided by DHHS to assist public health practitioners in determining whether 45 CFR § 46 regulations apply to specific activities occurring at the boundary between public health non-research and public health research, such as data collection for HIAs. When in doubt, it is best to consult with the appropriate jurisdiction’s IRB to request their assistance in classifying the project to ensure compliance with both the letter and spirit of 45 CFR § 46. For projects involving tribal members as research subjects, the Alaska Area IRB is the appropriate entity to review research and data collection protocols.

In all cases, the HIA team must identify the legal and ethical restrictions on collecting, evaluating, and reporting health statistics. As a general rule, collaboration with municipal, tribal, and state governments and health agencies is essential to ensure that health data are used in an appropriate manner.

There are limitations and restrictions associated with the data from federal, state, local and tribal health organizations and databases.

Baseline Data Activities and Tasks

While each project is different, baseline data collection often occurs before proponents specify the design features for their project. Experienced HIA practitioners develop a standardized approach to baseline data collection. Again, the social and environmental review teams often produce baseline data that will be very useful to the HIA team. In addition, these teams often perform survey work that can also be timed with HIA surveys during a comprehensive HIA.

Data Gaps Analysis

After the key baseline data has been reviewed, the HIA team will need to assess if there are significant data gaps. This is a critical exercise so that a coherent and cost-effective plan for closing critical gaps can be created. Experience in Alaska indicates that several data gaps are likely to emerge, shown on the table below.
Common Data Gaps for Alaskan HIAs

<table>
<thead>
<tr>
<th>Issue</th>
<th>Potential baseline studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Community morbidity patterns</td>
<td>• Discussion with local clinic staff</td>
</tr>
<tr>
<td></td>
<td>• Review of a representative random sample of medical records</td>
</tr>
<tr>
<td></td>
<td>• Body Mass Index measurements</td>
</tr>
<tr>
<td>2. Subsistence consumption</td>
<td>• Baseline nutritional surveys</td>
</tr>
<tr>
<td></td>
<td>• Baseline food security (via representative survey)</td>
</tr>
<tr>
<td>3. Baseline contaminant levels for</td>
<td>• Baseline study of contaminants in</td>
</tr>
<tr>
<td>subsistence resources/</td>
<td>• subsistence resources</td>
</tr>
<tr>
<td>in humans</td>
<td>• humans who consume the resource</td>
</tr>
</tbody>
</table>

Data gaps will occur. These gaps should be described. Some uncertainty is inevitable.

Subsistence Issues

Most of rural Alaska sustains a “mixed, subsistence-market” economy, wherein families invest money into small-scale, efficient technologies to harvest wild foods (ADF&G 2000). In the non-urban areas of the state, many households depend on a mix of cash, subsistence (hunting, fishing and gathering), sharing, and non-cash trading. Potential impacts, either positive or negative, on subsistence resources can have large and persistent impacts on community health.

For Alaska Natives, subsistence is more than the harvesting, processing, sharing, and trading of marine and land mammals, fish, and plants. Subsistence embodies cultural, social, and spiritual values that are the essence of Alaska Native cultures (Braund, 2010). In addition, subsistence fishing, hunting, and gathering are important sources of nutrition and non-traditional employment in almost all rural communities. The Alaska Federation of Natives (AFN, 2010) describes subsistence as:

“the hunting, fishing, and gathering activities which traditionally constituted the economic base of life for Alaska’s Native peoples and which continue to flourish in many areas of the state today. ... Subsistence is a way of life in rural Alaska that is vital to the preservation of communities, tribal cultures, and economies. Subsistence resources have great nutritional, economical, cultural, and spiritual importance in the lives of rural Alaskans. ...Subsistence, being integral to our
worldview and among the strongest remaining ties to our ancient cultures, is as much spiritual and cultural, as it is physical.”

According to Braund (2010), full-time, year-round wage employment has positively and negatively affected the pursuit of subsistence resources. It has positively affected the subsistence hunt by providing cash for snow machines, boats, motors, fuel, equipment, and ammunition required for the hunt. Negatively, however, full-time year-round employment limits the time a subsistence hunter can spend hunting to non-work hours. Remote employment further limits the pursuit of subsistence resources, as hunters may be away working at the best times for harvesting in their home region. During midwinter, this time window is further limited by brief daylight hours. In summer, extensive hunting, fishing, and gathering activities can be pursued during non-work hours without any light limitation, but travel away from the road and trail system is limited to raised ground and waterways.

Fully evaluating subsistence issues will clearly involve environmental, social and health teams. Impacts to subsistence may be positive, negative or mixed. The HIA team must consider how subsistence issues interact with the proposed project location, size, linear features and number and variety of communities in reasonably close proximity to the project. Both direct and indirect impacts to subsistence and both must be considered during HIA baseline data collection planning.

Direct Impacts

- **Access** – If a project either limits or increases access to subsistence resources, this should be reviewed by the HIA team. Economic growth and new access routes such as transportation corridors may increase the number of individuals (some from very distant communities) competing for a resource in a given area. Baseline data collection can confirm harvest patterns and stakeholder engagement can clarify subsistence practices before the project is designed or implemented. While environmental teams place great emphasis on access to subsistence resources, the HIA team cannot wait until the environmental assessment is completed as opportunities to collaborate and streamline data collection will be lost.

- **Quantity** – Project features that change the quantity (change in number, change in size, and change in species) of a common subsistence resource also indicate significant impacts that should be reviewed by the HIA team. For example, will the physical footprint (e.g., river diversion) of the project change the absolute number or size of certain critical fish species (e.g. salmon or pike) that support subsistence practices in local communities?

- **Quality** – Project features may also change the quality of a resource, either through contamination or overall well-being of the resource. To determine the impact of the project on resource quality, the HIA team should understand the fate-transport pathways of potentially hazardous materials at the project location. Typically, a conceptual site model is created that describes how materials move in the environment and at what point subsistence resources may be affected.
Potential impacts to access, quantity and quality may indicate the need for further field work including community nutritional surveys.

Quality can be affected by bioaccumulation, the process by which a substance builds up in the tissue of species in an ecosystem, so that the highest concentrations are found in the species at the top of the food chain. Large marine mammals in Alaska (whales, seals, otters) and certain freshwater fish (pike, burbot) can accumulate enough of a substance to merit consumption guidelines. So, even though the absolute emissions from a project may meet regulatory standards, a combination of factors such as bioaccumulation can magnify the presence of a substance in the ecosystem. Bioaccumulation is especially problematic when it affects key subsistence species because individuals who depend on these species may experience increased exposure compared with others who consume a typical American diet.

If the project will affect access and quantity or quality of a resource, the HIA team can collect baseline nutritional data using dietary surveys. The point of a nutritional survey is to determine which foods are eaten and what relative quantities are eaten in a given region. The results of the survey should indicate the extent to which specific subsistence foods are relied upon for basic food security (quantity) as well as nutritional adequacy. Nutritional surveys focused on subsistence diets are one of the most common measures taken to address data gaps for Alaskan HIAs.

Indirect Impacts

The analyses of indirect impacts can be especially complex for subsistence issues. As a simple example, the presence of a development project may lead to rising incomes in a community, which may precipitate a variety of interrelated but independent choices for various members of the community. Some may use their improved economic standing to increase their engagement with subsistence living through the purchase of improved transportation and harvest equipment. Others may choose to use their new economic status to purchase prepared food from local sources and eat less subsistence food. The presence of individual choices renders this scenario an indirect impact.

Indirect subsistence issues require careful causation analysis and documentation.

Before drawing conclusions about subsistence impacts, the HIA team must generate a contextual understanding of regional subsistence patterns without regard to a specific project. In order to understand this context, baseline nutritional surveys and the selection of control (comparison) regions can provide valuable information. In cases where a specific subsistence resource could be substantially affected by a project, a plausible causal chain, appropriate baseline information, comparison data, and documented shifts in consumption or harvest should be used to tie the impact to the project.
Baseline nutritional surveys are very important documentary tools for this portion of an HIA. A baseline nutritional survey can establish the proportion of the local diet that is drawn from a subsistence resource before the project is implemented. Nutritional surveys can also correlate subsistence consumption with baseline environmental hazards such as methyl mercury through non-invasive sampling. If future nutritional surveys are coupled with a plausible causal chain of events, and if they demonstrate differences in subsistence consumption, the project team can address the issue based on concrete baseline information.

In addition to documenting overall change, baseline nutritional surveys provide a profile of the whole diet and reveal what foods replaced the subsistence food in question. Communities may purchase more store-bought food, or they may be choosing another subsistence resource that is more available. A baseline nutritional survey allows the project team to answer many of these critical questions about indirect impacts to subsistence resources. Ultimately, baseline information reveals if the community is able to adapt to the change in a healthy way, or if additional measures are required to ensure that the dietary health of the community is protected.

**Cumulative Impacts**

Cumulative impacts on subsistence resources should be considered by the HIA team. If there have been many long-term industrial projects, contaminants in subsistence resources could accumulate. Adequate baseline studies, especially nutritional work, will help document such effects as required. Although this scenario will likely be evaluated by the environmental team, the HIA should also consider it in a health-specific context.

**Nutritional Surveys**

The nutritional survey is the most effective tool available to characterize the relationship between development projects, subsistence practices, and human health. Subsistence diets that consist of fish and other seafood, terrestrial (moose and caribou) and marine mammals (whale and seal), and local flora (berries) are sources of lean protein, rich in nutrients, and are considered highly nutritious. These subsistence resources are critical to basic food security in many Alaskan communities, where market foods are of limited availability, lower quality, and are prohibitively expensive. In rural Alaska, a gradual shift towards a Westernized diet has been associated with a decline in nutritional status, and associated with an increasing incidence of nutritionally-related conditions such as diabetes, obesity, heart disease, and dental caries. While these relationships are complex, they are very important to the sustainable community health and well being.

HIA practitioners may wish to use subsistence harvest information as a proxy for nutritional surveys, but harvest data is not sufficient to characterize the diet in Alaskan communities. Past dietary survey work in Alaska has shown that subsistence harvest levels are not equal to consumption levels. In many cases consumption rates of subsistence resources are lower than harvest rates, due to a variety of factors including the sharing of resources among communities, or other uses of harvested animals such as the feeding of sled dogs or other working animals. In a few cases, consumption rates for resources such as berries have been greater than the harvested amount, due to supplemental purchases of the resource from a market.
The HIA team should consider the type of data required, ease of data collection, quality of the resulting data, and the ability of the data to answer the desired questions before they select a nutritional survey plan. The following table outlines the various methods for collecting dietary data, their limitations, and most appropriate uses.

<table>
<thead>
<tr>
<th>Method and Procedures</th>
<th>Uses and Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>24-hour recall</strong></td>
<td>• Useful for assessing average usual intakes of a large population</td>
</tr>
<tr>
<td>• Subject recalls food intake of previous 24-h</td>
<td>• Useful for international comparisons of relationship of nutrient intakes to health</td>
</tr>
<tr>
<td>• Quantities estimated using food models</td>
<td>• Inexpensive, easy, compliance is high</td>
</tr>
<tr>
<td>• Nutrient intakes calculated using food consumption data</td>
<td>• Large coverage possible</td>
</tr>
<tr>
<td></td>
<td>• Can be used with illiterate individuals</td>
</tr>
<tr>
<td></td>
<td>• Because of the element of surprise, subjects are less likely to modify eating pattern</td>
</tr>
<tr>
<td></td>
<td>• Single 24-h recalls likely omit foods consumed infrequently.</td>
</tr>
<tr>
<td></td>
<td>• Unsatisfactory for elderly and children.</td>
</tr>
<tr>
<td></td>
<td>• Multiple 24-h recalls used to estimate average intake</td>
</tr>
<tr>
<td><strong>Estimated food record</strong></td>
<td>• Used to assess actual intakes</td>
</tr>
<tr>
<td>• Record of all intake for 1-7 days</td>
<td>• Used for diet counseling and statistical analysis involving correlation and regression.</td>
</tr>
<tr>
<td></td>
<td>• Accuracy depends on ability to estimate quantities</td>
</tr>
<tr>
<td></td>
<td>• Higher respondent burden and lower cooperation.</td>
</tr>
<tr>
<td></td>
<td>• Subjects must be literate</td>
</tr>
<tr>
<td><strong>Weighed food record</strong></td>
<td>• Used to assess actual intake</td>
</tr>
<tr>
<td>All food consumed over a defined period is weighed using food samples</td>
<td>• Accurate but time-consuming</td>
</tr>
<tr>
<td></td>
<td>• Setting must permit weighing</td>
</tr>
<tr>
<td></td>
<td>• Subjects may change their eating patterns to simplify weighing or to impress investigator.</td>
</tr>
<tr>
<td></td>
<td>• Requires literate, motivated, and willing participants</td>
</tr>
<tr>
<td></td>
<td>• Expensive</td>
</tr>
<tr>
<td><strong>Dietary history</strong></td>
<td>• For food or nutrient intakes over a relatively long time period</td>
</tr>
<tr>
<td>• 24-h recall of actual intake</td>
<td>• Used to estimate prevalence of inadequate intakes</td>
</tr>
<tr>
<td>• information on overall eating pattern</td>
<td>• Used for national food policy development, for food fortification planning, and to identify food patterns associated with infrequent intakes</td>
</tr>
<tr>
<td>• Food frequency questionnaire to verify initial data.</td>
<td>• Labor-intensive, time-consuming, and results depend on skill of interviewer</td>
</tr>
<tr>
<td>• Usual portion sizes in household measures</td>
<td></td>
</tr>
<tr>
<td>• Nutrient intakes calculated using food composition data</td>
<td></td>
</tr>
</tbody>
</table>
Food frequency questionnaire

- Comprehensive or specific food item list to record intakes for given period (week, month, year)
- Record obtained by interview or self-administered questionnaire
- Questionnaire is semi-quantitative

- Used to obtain qualitative, descriptive data on usual intakes of foods or classes of foods time
- Useful in epidemiological studies for
  - ranking subjects into broad categories of low, medium, and high intakes of specific foods, food components, or nutrients,
  - comparison with the prevalence or mortality statistics of a specific disease.
- Used to identify food patterns associated with inadequate intakes of specific nutrients
- Method is rapid
- Low respondent burden and high response rate
- Accuracy is lower than other methods.

The survey methodology should supply baseline data that accurately describes consumption of subsistence foods in PACs. Alaskans modify their eating patterns seasonally, and may only consume a traditional subsistence resource during one season. For this reason, a food frequency questionnaire supplemented by 24-h recalls may be the best approach to capture the importance of subsistence foods in the diet. While food frequency questionnaires can overestimate consumption, this still reflects the importance of subsistence foods in the community.

The HIA team should know that there is an Alaska-specific food frequency questionnaire previously developed as part of the Alaska Traditional Diet Survey. This food frequency questionnaire should be utilized in any dietary survey carried out as part of a Health Impact Assessment project, as many subsistence foods native to Alaska have already been included in the questionnaire and the survey has been validated. Many tribal stakeholders already have experience with this survey and the field work involved.

Household level nutritional surveys are an important tool and should be considered when significant subsistence impacts are likely.

Collecting Data

Organizations such as the International Organization for Standardization (ISO 26000) and the U.S. EPA have developed a variety of quality-assurance and quality-control (QA/QC) programs for environmental surveys that are also well suited to HIA. The ISO 26000 Social Responsibility guidance is voluntary and will not be a certification standard. While smaller HIA efforts will use existing data, comprehensive HIA requires new data collection and it is important to develop logical and structured data-collection processes.
**Biomonitoring Data**

Human biomonitoring assesses exposure to environmental agents based on sampling of an individual’s tissues and fluids. Blood, urine, breast milk, hair, and expelled air are most commonly measured, but nails, fat, bone, and other tissues can also be sampled.

Human biomonitoring is routinely performed by the State of Alaska and other federal agencies such as the CDC. CDC conducts the National Health and Nutrition Examination Survey (NHANES), which routinely measures hundreds of chemicals in the blood and urine of randomly selected Americans and provides invaluable comparison data for biomonitoring. DHSS also has an ongoing statewide hair mercury biomonitoring program and any woman of childbearing age is eligible to participate in this free program. Blood lead surveillance is also routinely conducted by DHSS. The HIA team should be aware that DHSS has significant experience with human biomonitoring and can function as a resource for HIA-related studies.

Mining projects often require baseline biomonitoring studies because toxic metals (e.g., arsenic and mercury) are commonly involved in some aspect of the process. Biomonitoring data benefits stakeholders because it provides objective baseline data and provides a way to continuously monitor project impacts. Stakeholders, especially proponents, must understand the costs and benefits of human biomonitoring and the rationale for obtaining the data should be clearly documented in a brief proposal. Table 4 provides the CDC’s guidance for determining when collection of baseline human biomonitoring is appropriate.

**Table 4 Factors to Consider when Contemplating Human Biomonitoring**

<table>
<thead>
<tr>
<th>Human Biomonitoring Advised</th>
<th>Human Biomonitoring Not Advised</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Measurable amount of a contaminant of concern (COC) is likely present in humans at baseline</td>
<td>• COC probably not present at baseline</td>
</tr>
<tr>
<td>○ Inorganic elements such as lead, mercury, cadmium, arsenic</td>
<td></td>
</tr>
<tr>
<td>○ Persistent bioaccumulative contaminant likely present in subsistence foods</td>
<td></td>
</tr>
<tr>
<td>• Potential exposure pathways exist (from project to human)</td>
<td>• No potential exposure pathway</td>
</tr>
<tr>
<td>• Chemical persists in human body</td>
<td></td>
</tr>
<tr>
<td>• Analytical chemistry factors</td>
<td>• Chemical is rapidly cleared from human body</td>
</tr>
<tr>
<td>○ Methods exist</td>
<td>• Method development is needed</td>
</tr>
<tr>
<td>○ Lab services widely available for analysis</td>
<td>• Few labs conduct analysis in needed matrix</td>
</tr>
<tr>
<td>○ Lab analysis is inexpensive</td>
<td>• Expensive</td>
</tr>
<tr>
<td>• Toxicology information available to interpret health implications</td>
<td>• Health implications of measured level is unknown</td>
</tr>
<tr>
<td>• Sample collection is not invasive</td>
<td>• Collection procedure is invasive</td>
</tr>
</tbody>
</table>
While the focus of biomonitoring is on human health, the HIA team should also focus on monitoring subsistence resources. Much of this work is performed by the environmental teams during the baseline period. Baseline subsistence resource biomonitoring is typically needed when a measurable amount of a substance exists in a species prior to project development. This situation most commonly occurs for two types of contaminants:

- Inorganic elements naturally present in the environment at some concentration, such as arsenic, mercury and cadmium
- Persistent, bio-accumulative organic contaminants (POPs) such as polychlorinated biphenyls, organochlorine pesticides and dioxins. These chemicals are measurable in aquatic arctic food chains and can reach high levels in the fatty tissues of top predators such as marine mammals

As with all health impacts, the HIA team should develop a clear exposure pathway from the project to humans. This process begins as HIA team establishes that chemicals of concern are, in fact, emitted by the project. Distribution patterns for airborne or water-based transport should be described in detail and there should be a plausible mechanism for exposure such as inhalation, ingestion, skin contact, or biotransformation. Whenever possible, a disciplined estimate of exposure should be made using predictive models and collected data. While HIA is a predictive tool and involves some speculation, the HIA team should make every effort to describe biological exposures as carefully as possible. Table 5 presents factors to consider when designing a monitoring project for contaminants in a subsistence food species. Toxicologists and subsistence specialists from the Alaska Department of Fish & Game (ADF&G) are important resources for study design and access to existing data.
### Table 5 Factors to Consider when Biomonitoring Contaminants in a Food Species

<table>
<thead>
<tr>
<th>Subsistence Food Biomonitoring Advised</th>
<th>Subsistence Food Biomonitoring Not Advised</th>
</tr>
</thead>
</table>
| • Measurable amount of a COC is likely present in foods at baseline  
  o Inorganic elements such as lead, mercury, cadmium, arsenic  
  o Persistent bio-accumulative contaminant likely present in subsistence foods  
• Potential exposure pathways exist  
  (from project to food species)  
• Chemical biomagnifies in food chain  
• Analytical chemistry factors  
  o Methods exists  
  o Lab services widely available for analysis  
  o Lab analysis is inexpensive  
• Toxicology information available to interpret health implications | • COC probably not present at baseline  
• No potential exposure pathway  
• Chemical is not persistent or bio-accumulative  
• Method development is needed  
• Few labs conduct analysis in needed matrix  
• Expensive  
• Health implications of measured level is unknown |

<table>
<thead>
<tr>
<th>Good species to monitor</th>
<th>Poor species to monitor</th>
</tr>
</thead>
</table>
| • Subsistence species in important to local diet of humans  
• Subsistence species is a potential pathway of exposure to site-related chemicals  
• COC concentration likely high due to high trophic level/top of food chain  
• Species is resident/non-migratory; representative of local conditions  
• Individual and tissue chosen is representative of food item  
• Sufficient samples collected to determine variance in contaminant level | • Species not eaten by people  
• No potential exposure pathway  
• Species unlikely to contain measurable contaminant  
• Species migrates; not representative of local conditions  
• Age, size and tissue different from that consumed  
• Too few samples |

*Baseline biomonitoring may be extremely important for some projects.*
Section 7: Stakeholder Engagement

Effective stakeholder engagement is essential to a well-balanced HIA. Whenever possible, the HIA should be integrated with stakeholder meetings held by the proponent and the lead federal agency, as well as the environmental and social review teams. The HIA team should avoid creating separate stakeholder engagement processes. For smaller projects it may be reasonable to rely on established public notice and commenting protocols.

Who are stakeholders? Stakeholders are persons or groups who are affected by a project, as well as those who may have interests in a project or the ability to influence its outcome. Stakeholders may include locally affected communities or individuals, their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations, special interest groups, the academic community, or third-party businesses. The term ‘stakeholder” has broadened over time and includes any interested parties, regardless of their location or their direct contact with the project.

The objectives of stakeholder engagement and public participation include

- Obtaining public input on the nature of health risks and benefits posed by the project, and possible locally-relevant solutions;
- Ensuring that the analysis of potential impacts proceeds in a publicly transparent and unbiased manner;
- Obtaining information regarding local and traditional knowledge, scientific data, and other sources of information that may be available to contribute to a more complete HIA; and
- Building trust and collaboration between stakeholders.

The HIA should be conducted in a publicly transparent manner, with appropriate opportunity for public comment on:

- The scope of concerns to be addressed;
- Projected impacts on public health;
- Potential mitigation measures; and
- Monitoring and evaluation parameters.

The public participation process should be coordinated so that relevant health issues are integrated into the overall environmental/social process. Every effort should be made to avoid duplicative community meetings as stakeholders can experience “consultation fatigue” just as easily as “survey fatigue.”

Cultural Considerations

Timing is essential to avoid conflicts with subsistence activities and other community events. Careful coordination can enable attendance and participation in most cases. Participation is greater when planners make attendance as convenient and enjoyable for
the community as possible – providing food, door prizes and child care can enhance attendance at meetings.

**Participation**

The overall project stakeholder engagement plan must be a coordinated effort and should outline the overall strategy and approximate timelines. The geographic isolation of rural Alaskan communities, language barriers, seasonal subsistence activities, and the sheer number of small communities affected by large projects can frustrate efforts to coordinate meetings. Summer is a very challenging time for meeting with rural communities because many have departed for fishing or hunting opportunities. Winter can create daunting transportation challenges in remote Alaska. Often, the shoulder seasons just prior to summer and just before winter are good times to coordinate visits with rural Alaskan communities. When the HIA is performed by an agency the existing public noticing and meeting process used for the environmental/social impact assessment should accommodate HIA needs.

*The stakeholder engagement process should be coordinated so that health issues are captured as part of the overall engagement process.*
Section 8: Impact Assessment – Rating and Ranking Health Risks

Once the specific health impacts for a project have been identified during the scoping process and once baseline data have been reviewed, the HIA team must rate and rank the health impacts they have identified. There are various impact assessment methods, but ultimately the method will either be qualitative or quantitative. The point of rating and ranking impacts is to enable interested parties to construct an impact mitigation framework. The health impacts assessment process in HIA may include:

- An in-depth review of available state, regional, and local health data
- Comparison of study-area data to state and regional health data
- Analysis of special at-risk subpopulations (such as children under the age of five years, pregnant women, elderly, or other previously defined vulnerable groups)
- Field survey visit by an HIA study team. Consultation with local health representatives, particularly from tribal organizations if present.
- Seasonality considerations, that is, summer versus winter, potentially significant differences in subsistence practices, water use and associated disease-transmission dynamics
- Variability of existing health care infrastructure across different project areas
- Coordination and alignment with existing State disease-control programs and strategies (e.g., TB, HIV/AIDS, hypertension, diabetes, substance abuse, etc.)

What are the Dimensions of Health Risks?

Each health risk impact has several different dimensions. These include:

- **Significance** – perception of risks by a potentially affected community. Individuals and social groups generally appraise the significance of risks based on whether the risk is familiar and whether it is voluntary or involuntary. Because hazardous exposures involve many unfamiliar risks and there is low control over the risks, affected individuals almost always rate this issue as highly significant.

- **Nature** – direct, indirect, or cumulative

- **Timing and duration** – project phase, i.e., exploration, construction, operations, decommissioning

- **Extent** – localities most likely to experience the projected impact (state, regional, local)

- **Magnitude** (intensity) – degree, extensiveness, and scale, particularly with regard to existing baseline conditions

- **Frequency** – the overall rate of occurrence

These terms are also defined in Section 1 and are based on practices required in the National Environmental Policy Act (NEPA). There will be a level of uncertainty...
associated with these definitions. Extensive and detailed uncertainty analyses (e.g., Monte Carlo analyses) that are often employed in quantitative analyses are unlikely to be helpful.

**The health impact assessment process is used to rate and rank potential impacts in order to help prioritize mitigation.**

**How Can Health Impacts Be Rated?**

Potential impacts can be rated using a semi-quantitative approach. The HIA team benefits from risk ranking because it allows them to prioritize elements of the action plan. Error! Reference source not found. and 3 show an example of a qualitative risk-ranking or risk-analysis matrix used to help identify priorities. More diamonds signify a greater potential effect.

**Figure 2  Step 1 of 4-Step Risk Assessment Matrix**

<table>
<thead>
<tr>
<th>Step 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Level (score)</td>
<td>Consequences</td>
</tr>
<tr>
<td><strong>Low (0)</strong></td>
<td>Effect is not perceptible</td>
</tr>
<tr>
<td><strong>Medium (1)</strong></td>
<td>Effect results in annoyance, minor injuries or illnesses that do not require intervention</td>
</tr>
<tr>
<td><strong>High (2)</strong></td>
<td>Effect resulting in moderate injury or illness that may require intervention</td>
</tr>
<tr>
<td><strong>Very high (3)</strong></td>
<td>Effect resulting in loss of life, severe injuries or chronic illness that requires intervention</td>
</tr>
</tbody>
</table>
In Step 1, the extent of the four different consequences — (A) health effect; (B) duration; (C) magnitude; and (D) extent—is rated according to the criteria set forth. The output of this rating is a score between 0 and 3 for each consequence, depending on the estimated impact level:

- Low (score = 0)
- Medium (score=1)
- High (score=2)
- Very high (score=3).

**Figure 3  Steps 2, 3, and 4 of 4-Step Risk Assessment Matrix**

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severity Rating</strong></td>
<td><strong>Likelihood Rating</strong></td>
</tr>
<tr>
<td>(Magnitude + Duration + Geographic Extent + Health Effect)</td>
<td>Extremely Unlikely &lt; 1%</td>
</tr>
<tr>
<td>Low (1-3)</td>
<td>•</td>
</tr>
<tr>
<td>Medium (4-6)</td>
<td>•</td>
</tr>
<tr>
<td>High (7-9)</td>
<td>**</td>
</tr>
<tr>
<td>Very high (10-12)</td>
<td>••</td>
</tr>
</tbody>
</table>

| Step 4                      | Impact Rating        |

In this figure, numbers can be assigned to each category within the scale (for example, low=1-3, medium=4-6, and so on) to create a quantitative scale of the probability-weighted impact. Both the assigned probability (extremely unlikely, very unlikely, unlikely, about as likely as not, likely, very likely and virtually certain (IPCC 2007) and the severity of a risk are often a function of how the impacts of the risk are calculated or perceived by the group performing the analysis, rather than how they're perceived by the community. For example, community members potentially exposed to the risks might weight the impacts very differently than would scientific experts focusing only on statistical probabilities. Therefore, it is highly important to develop a process that rates risks from multiple perspectives and allows for adequate stakeholder participation.

Once the HIA team rates the various health impacts, the likelihood or probability can be semi-quantitatively evaluated as illustrated below.
### Table 6  Severity Determination

<table>
<thead>
<tr>
<th>Scale</th>
<th>Community Health</th>
<th>Safety (inside the fence)</th>
<th>Environmental Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERY HIGH</td>
<td>High level of concern or interest from local community due to health-related issues. National and/or international media interest. Serious breach of regulation, resulting in investigation by regulator. Operation suspended, licenses revoked.</td>
<td>One or more fatalities or multiple permanent injuries</td>
<td>Damage is long-term and or extensive</td>
</tr>
<tr>
<td>HIGH</td>
<td>Increasing rate of health-related complaints, repeated complaints from the same area (clustering). Increased local/national media interest</td>
<td>Serious injury</td>
<td>Short-term damage within facility boundary</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>Small numbers of sporadic community health complaints. Local media inquiries.</td>
<td>Recordable injury, first aid, serious occurrence</td>
<td>Rapid on-site clean-up</td>
</tr>
<tr>
<td>LOW</td>
<td>Isolated community health complaint. No media inquiry.</td>
<td>Minimal impact</td>
<td>Minimal impact</td>
</tr>
</tbody>
</table>

Source: Winkler et al, 2010

Finally, thinking about the manageability, or ability to influence risk responses, is very important, particularly from a role and responsibility perspective.

### Table 7  Manageability

<table>
<thead>
<tr>
<th>Scoring Scale—Manageability</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>Within the control of the project management team. Can control probability and/or impact.</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>Within the influence of the project management team. Can influence probability and/or impact.</td>
</tr>
<tr>
<td>LOW</td>
<td>Outside the influence of the project management team. Can only influence impact.</td>
</tr>
</tbody>
</table>

Source: Winkler et al, 2010
Consistently defining the risk-rating scales within the overall impact assessment process is crucial, because it allows for health risks to be fully considered and potentially compared against projected environmental and social impacts if similar systems are used. The overall approach to risk assessment is summarized in the chart shown below.

### Health Impact Assessment Approach

<table>
<thead>
<tr>
<th>Activities</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health Risk Assessment</strong></td>
<td>In either a qualitative or quantitative analysis, the magnitude of the potential health effect on the worker and community populations is a function of:</td>
</tr>
<tr>
<td></td>
<td>• Hazard’s potency</td>
</tr>
<tr>
<td></td>
<td>• Exposure level</td>
</tr>
<tr>
<td></td>
<td>• Number of people exposed</td>
</tr>
<tr>
<td></td>
<td>• Probability that exposure occurs, and</td>
</tr>
<tr>
<td></td>
<td>• Modifying factors</td>
</tr>
</tbody>
</table>

- **Activities:** Estimate the magnitude of potential health effects resulting directly from project-specific hazards within each potential health-impact area of concern (e.g., resettlement areas, construction camps, camp followers, etc.):

  - Qualitative: using expert judgment, rate each hazard as high, medium, or low, based on the consequences of the exposure the target population(s) will receive and the probability that exposure will occur.
  
  - Consequences are related to:
    - Health Effect (incidence, severity)
    - Health Hazard (toxicity)
    - Exposure Level (frequency, duration, dose)
    - Population(s) at Risk (number, degree of susceptibility)
    - Probability of Exposure (high, medium, low)
    - Modifying Factor(s), e.g., cultural, personal habits, availability of medical treatment, etc., (hazard-modifying influence: increase, neutral, decrease)

- Quantitative: As appropriate (based on the degree of risk or stakeholder requirements), determine or estimate hazard potency (i.e., disease per unit exposure) and probabilities of exposure to the community. Apply to the estimated number of people affected and adjust to reflect modifying factors.

- Classify each potential health effect: high, medium, low, none, or enhanced.
Assessing Toxicology Risks

It is not unusual for community stakeholders to raise a variety of questions regarding potential exposures to hazardous materials and the likelihood of adverse health impacts. The investigation and evaluation of community exposure to potentially hazardous materials has been the subject of numerous publications in the established scientific literature, and a standard conceptual framework has been developed and published in standard textbooks of occupational/environmental medicine and toxicology.

In order to determine that a significant medical effect has been caused by a potential exposure, it is necessary to proceed in a logical fashion that

- First establishes the presence of a complete (unbroken from source to exposure point) exposure pathway and appropriately assesses the likelihood of exposure
- Calculates or measures the concentration of any chemical(s) under investigation at the logical exposure points (i.e., the geographical locations where an individual comes in contact with the source material)
- Calculates or measures the dose received by the individual at the exposure point(s)
- Analyzes the health effects of the chemicals demonstrated to occur at such doses and the dose-response relationship of the chemical(s) under investigation so that an assessment of potential health risks can be made.

The HIA analysis of potential community health impacts from emissions related to a proposed project should be performed using this standard medical toxicological model:

![Diagram: Source → Exposure → Dose → Health Effect(s)](source_exposure_dose_health_effect)

This form of the medical toxicological model is discussed in the 1991 National Research Council monograph, *Human Exposure Assessment for Airborne Pollutants: Advances and Opportunities*. Similar materials are available from the NRC, ATSDR, WHO and US EPA, including the 2008 NRC publication *Science and Decision: Advancing Risk Assessment*. The key points emphasized in all of the contemporary risk assessment literature is the need to tie the risk-management questions to the risk assessment—calculations should not be performed simply because computational capacity exists. The literature also discusses how to align the detail of uncertainty and variability analyses with what is actually needed to inform risk management decisions.
Section 9: Mitigation

Stakeholders respond to health impacts with mitigation strategies. These can be measures that avoid, minimize, or eliminate an adverse effect, or measures that maximize a potential benefit. Although mitigation is presented as the final phase in an HIA, it should be viewed as an ongoing process, beginning as the project is being conceptualized and designed, and ending only when impacts from the project and decommission have concluded. Mitigations may be:

- Regulatory requirements
- Negotiated commitments made by project proponents
- Voluntary contributions made to maximize potential benefits

The project can use the outcomes of the risk assessment step (Section 8) to establish actions that will limit the severity of identified impacts. In general, mitigation measures should be tied to potential project impacts; however, voluntary contributions that are made to maximize potential benefits are important and significantly improve a project’s profile in affected communities. Similarly, project proponents may wish to formally negotiate a series of specific commitments to affected communities (e.g., participatory monitoring of certain impacts, subsistence resource access, quantity and quality). The presentation of health mitigation measures should be carefully coordinated with the environmental and social assessment, as overlap is likely. However, in some circumstances, if the project is large or complex, a separate chapter (or report) on how to mitigate health impacts may be appropriate.

Some important considerations for mitigation strategies include:

- Determining the level of prevention where the mitigation will occur (e.g. primary, secondary, or tertiary prevention)
- Availability of mitigation strategies (e.g. engineering interventions that affect water quantity, quality, and sanitation)
- Timeline for the mitigation effort
- Availability of interim mitigations
- Local capacity to absorb the proposed mitigation strategies
- Responsibility for implementation

Fundamental Concepts

Mitigations are generally organized around two fundamental public health concepts: disease prevention and health promotion and education.

Disease Prevention

Disease prevention includes any intervention that seeks to reduce or eliminate diagnosable conditions. It may be applied at the individual level (as in immunization) or at the community level (as in chlorination of the water supply).
The concept of disease prevention is often illustrated by the prevention pyramid, which is composed of the following actions:

**Primary Prevention** – Prevents the condition before it occurs (e.g., preventing diabetes before it develops). For HIA, these actions include elimination (eliminate certain features of the project), substitution (for example, providing diesel fuel as a fuel source instead of wood), design or engineering preventions, and administrative controls.

**Secondary Prevention** – Once a health condition exists, secondary prevention seeks to screen individuals at high risk and to stop the onset of symptoms in those who have the condition (e.g., early diagnosis of diabetes and accurate management to prevent vascular symptoms). Secondary prevention measures are appropriate when the project has a high likelihood of causing an effect or it has had some observable effect. Secondary prevention efforts seek to detect that effect as early as possible and keep it from bringing harm to health (e.g., detecting elevations in contaminant levels and keeping individuals away from certain project sites or discouraging over-consumption of certain foods).

**Tertiary Prevention** – Once health conditions exist and once individuals have symptoms, tertiary prevention seeks to avoid symptom progression. This usually involves treatment or rehabilitation of existing, serious problems, such as preventing infection of diabetic foot ulcers. Tertiary prevention is appropriate when the project has had some effect and this effect has caused health impacts. Tertiary preventions seek to keep the human health impacts from continually affecting communities or from affecting a wider circle of people.

**Figure 4: The Disease Prevention Pyramid**
Even though well-developed generic health intervention strategies have been developed for many problems (e.g., infectious diseases), the HIA team should develop mitigation strategies that are scientifically defensible (evidence-based) and tailored to the local situation.

The HIA team must distinguish between regulatory mitigations enforced by law (e.g., contaminants of concern, hazardous materials transport) and negotiated or voluntary mitigations with the applicants. For regulatory mitigation, the impact must be under the control of the proponent and clearly tied to a project-related effect. For negotiated mitigation or voluntary mitigation, the proponent usually has less control over the health impact but voluntarily agrees to adjust their project plan or institute a new program to alleviate a health impact. These mitigations are generally discussed when the impact is indirect or not causally linked with a specific project feature. Many proponents have internal corporate policies that prioritize attentiveness to negotiated or voluntary mitigations. In addition to identifying adverse impacts, the HIA team should help proponents find ways to improve the regions they develop. Mitigation selection is not a pure process based only on data. Much mitigation exists at the interface between analysis, risk perception, and community need. Project proponents and the HIA team must engage key stakeholders, including relevant tribal authorities, during the selection of mitigation measures.

The HIA team must also remember that significant adverse community reaction can develop when the conditions for negotiated mitigations or voluntary mitigation efforts are not clarified and explained (i.e., the project may not agree to everything that may be desired by local communities). The HIA may reveal opportunities that are not engaged by proponents, but this should not preclude interventions by tribal organizations or other NGOs.

**Health Promotion and Education**

Another approach to mitigation is health promotion and education. It includes any combination of health education and related interventions—organizational, political, economic—designed to facilitate improved health through behavioral and environmental adaptations. In combination with primary prevention, health promotion and education is the most efficient and cost-effective method of managing potential impacts.

A workforce health promotion and education effort spearheaded by the project can significantly impact behaviors and practices in local communities by using the project workforce as peer educators and ambassadors to local communities. There is substantial evidence in the prevention literature showing that peer educators are one of the most successful change agents at the household level.

**Critical Aspects of Mitigation Plans**

Evaluation of the mitigation strategy requires careful review of several critical elements, including resource flows and responsibilities, local absorptive capacity, and social and environmental determinants.
Resource Flows and Responsibilities
The effectiveness of the mitigation strategy depends on adequate resource flows and careful delegation of responsibility between stakeholders. Among the most challenging tasks is assessing local mitigation resources and identifying reliable partners that can sustain mitigation efforts. Local participation in mitigation requires preparation, experience, and sufficient personnel and financial resources.

In one example from international HIA work, proponents will often build and/or refurbish hospitals, clinics, or health dispensaries as mitigation. Although these activities are highly visible and initially well-received, they tend are difficult to sustain long-term due to shortage of technical support staff such as physicians, nurses, laboratory technicians. To be sustainable, structural improvements should be coupled with a realistic and long-term assessment of the locally available human resources.

Experience also shows that mitigation measures have a greater sustainability when they are focused on specific project effects, such as adequate drinking-water supply, solid and human waste disposal, and appropriate systems to deal with the influx of workers in a community.

Social Determinants Issues
A variety of important potential positive and negative indirect effects tied to social determinants of health and psychosocial issues (e.g., alcohol, drug use, gender violence, suicide) may be identified. Mitigation strategies directed towards social determinants must:

- Coordinate with social impact mitigation strategies
- Be carefully reviewed, and the roles and responsibilities realistically appraised
- Account for the existence of personal choice
- Be clearly defined to include factors that are within the span of control of the project (e.g. workforce scheduling, imposition of a “dry status” at all project facilities, pre-employment and random drug and alcohol testing)

At a minimum, strategies directed towards social determinants will require a multidisciplinary effort, involving social and medical specialists as well as community stakeholders. Appendix 1 presents a more detailed list of potential mitigation actions by health effects category.
Section 10: Monitoring and Evaluation

Once mitigation strategies are selected, the HIA team must develop an objective method to demonstrate that the intervention strategies achieve their intended effect. To monitor effectiveness, the monitoring and evaluation (M&E) plan is often anchored to a set of key performance indicators (KPIs). In general KPIs can measure:

- A health outcome (e.g., clinic visits per month for asthma exacerbation)
- An intermediate health risk indicator (Body Mass Index is a risk factor for problems such as cardiovascular disease and diabetes mellitus)
- A health hazard or health determinant (fine particulate levels are a health hazard that influences asthma rates)

Key Performance Indicators

Numerous KPIs have been established for monitoring health performance (Mosse and Sontheimer, 1996), but in general KPIs fall into three categories:

**Structural** – Assess buildings, equipment, drugs, medical supplies, and vehicles; personnel; money; and organizational arrangements.

**Process** – Assess the effectiveness of the actions, and identify who is involved and whether the various programs are working.

**Outcome** – The five Ds (death, disease, disability, discomfort, and dissatisfaction) are typically considered outcome measures. The morbidity and mortality outcome indicators are calculated as rates.

Some examples of the more common KPIs are:

**Structural**
- Household characteristics (household size, number of rooms)
- Pharmacy supplies of specific categories of drugs
- Sanitation systems such as septic tanks, latrines, etc.
- Water supply systems – indoor supply percent
- Solid waste – permitted landfill vs. open dump

**Process**
- Access to maternal medical services (such as trained birth attendants) and number of pre-delivery visits
- In-migration patterns (place of origin of household members, professional status of household members)
- Training with follow-up knowledge, attitudes, practices, beliefs concerning prevailing diseases
Outcome
- Disease-specific prevalence rates
- Anemia prevalence
- Anthropometric measurements of young children
- Alcohol use, smoking rates, domestic violence, and accidents
- Toxicology-biomonitoring (lead, arsenic, and so on), if relevant
- Increase in prevalent disease
- Appearance of new disease

Appendix 2 presents a more detailed list of potential KPIs by health effects category.

The baseline health assessment must be as complete as possible in order to observe changes in the KPIs. As discussed in Section 6, Alaska reports health information at the state or regional level, but not for individual communities. Given these limitations, the HIA team should choose KPIs that can be tracked using state or regional data. The selection of appropriate and relevant KPIs requires careful technical review by epidemiologists and biostatisticians.

There are several features common to a well-selected KPI. First, KPIs should be measurable. In small rural Alaskan communities this presents a particular challenge because the size of the population limits the statistical reliability of many disease rates. Even so, the HIA team can select KPIs that report health risk factors or intermediate health indicators that serve as a proxy for the health issues of interest.

Second, KPIs should measure impacts to both the project workforce and the community. For instance, a KPI that measures a health impact in the project workforce may also give excellent information about the wider rural or urban environment surrounding the project. This is especially true when the project employs a large local workforce. Therefore, many of the monitoring strategies originate inside the fence line and extend outside to specific project-affected areas.

Third, KPIs should detect both acute and chronic changes within PACs. Acute changes appear within weeks to months, such as acute disease-rate changes for respiratory infection. Chronic non-communicable disease-rate changes for diabetes or cardiovascular disorders evolve over a much longer period of time. A well-selected set of KPIs will detect both acute and chronic changes in health status.

Fourth, the HIA team should select KPIs that are clearly linked to the project. Monitoring and evaluating community health changes unrelated to a project is important, but beyond the scope of the HIA.

Fifth, the KPIs should capture both positive and negative health impacts. For example, the alleviation of income poverty will produce both positive and/or negative changes across many health outcomes.

Finally, KPIs should be drawn from existing health information systems. Alaska administers a state version of the Behavioral Risk Factor Surveillance System (BRFSS) each year, so KPIs drawn from BRFSS will be available for review on an annual basis.
Internationally, the development of district and local-level demographic surveillance systems (DSS) has been shown to be an effective method of long-term longitudinal surveillance.

Verification

The HIA team can also plan a verification system so that the progress of the mitigation efforts can be reviewed at a community level. For most projects, it is unrealistic to begin the verification process before the project has collected at least 6–12 months’ worth of information. For most health indicators, yearly verification reviews are likely to be sufficient. Formal external verification for health performance should be performed at selected time intervals, but it is possible to create a platform for more frequent community stakeholder involvement and input. Verification systems should be integrated with, and not duplicative of, other environmental verification systems (such as periodic environmental audits already required by the State for mining projects).
Section 11: Resourcing

While the DHSS will serve as the State of Alaska’s technical lead on HIA, project proponents should work with the State team to assign budget and resources for the development and implementation of the applicable health impact assessments, health studies, monitoring and evaluation programs, and health management and verification plans. Some projects may require comprehensive HIAs, but most projects will not.

The financial and human resources allocated to an HIA ought to be commensurate with the potential anticipated risks. Costs are largely a function of scope, schedule, and final deliverable report. Key aspects to consider include development of clear work plans and a careful assessment of the adequacy of existing baseline data. New data collection is often a difficult, time-consuming, and expensive process. Coordination with the environmental and social impact assessment process will minimize duplication and delays in schedules.

Disclaimer: The information contained in the following resource materials does not necessarily represent the viewpoint of the State of Alaska, the HIA program, or the HIA working group.

HIA Information Websites

1. UCLA HIA Clearinghouse Learning and Information Center: http://www.ph.ucla.edu/hs/hiaclic/index.htm

International Natural Resource Development HIAs:


U.S. Voluntary HIA’s outside the Resource Development Sector:

1. Oak to Ninth Housing Development HIA: http://ehs.sph.berkeley.edu/hia/O2ND.FullDraft.pdf


3. The Atlanta Beltline Redevelopment HIA, at
http://www.hiaguide.org/hia/atlanta-beltline-health-impact-assessment

U.S. Natural Resource Development Sector:


Guidance and Toolkits
Section 12: References Cited


## Appendix 1

### Potential Mitigations Associated with Specific Health Effects Categories

<table>
<thead>
<tr>
<th>Health Effects Category</th>
<th>Potential Mitigation Measures</th>
</tr>
</thead>
</table>
| 1. Social Determinants of Health (SDH) including psychosocial, domestic violence and gender issues | • Work schedules  
• Family friendly programs — leave, visitation policies  
• Drug and alcohol testing  
• Local hiring practices  
• Outreach efforts to local communities using Employee Assistance-type organizations  
• Voluntary contributions to local organizations – NGOs, etc  
• Village Safety Officers Program VSOP support |
| 2. Accidents and Injuries | • Transportation management plans  
• School education/injury prevention programs |
| 3. Exposure to potentially hazardous materials | • Regulatory standards  
• Biomonitoring |
| 4. Food, Nutrition, and Subsistence Activity | • Work schedules |
| 5. Infectious Disease | • Project design specifications for worker quarters, e.g., occupancy space. |
| 6. Water and Sanitation | • Regulatory standards  
• In/out migration monitoring |
| 7. Non-communicable/Chronic Diseases | • Workforce preventive health monitoring  
• Community level Disease Intervention Specialist funding |
| 8. Health Services Infrastructure and Capacity | • Coordination of emergency response services between the project and potentially impacted communities |
## Appendix 2

### Key Performance Indicators:
**Detailed list of Potential Health Indicators and Data Sources for Alaska HIA**

*Not all indicators may be available or applicable; Best professional judgment is required*

<table>
<thead>
<tr>
<th>Health Impact Category/EHA</th>
<th>Indicator¹</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Determinants of Health (SDH)</strong></td>
<td>Health Determinants</td>
<td></td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i.</td>
<td>Employment /unemployment</td>
<td>i. Census 2000; ADOL</td>
</tr>
<tr>
<td>ii.</td>
<td>% below federal poverty limit</td>
<td>ii. BEA: total employment in community (REIS) <a href="http://www.bea.gov/regional/reis/default.cfm?catable=CA30">http://www.bea.gov/regional/reis/default.cfm?catable=CA30</a></td>
</tr>
<tr>
<td>v.</td>
<td>Diversity of economic base: number of industries contributing over 5% to the local economy</td>
<td>v. Calculate using census data, ratio of 20:80th quintile.</td>
</tr>
<tr>
<td>vi.</td>
<td>Median household Income</td>
<td>vi. Business Activity: <a href="http://censtats.census.gov/cbpnaic/cbpnaic.shtml">http://censtats.census.gov/cbpnaic/cbpnaic.shtml</a> local survey; DCCED -Number of local business licenses</td>
</tr>
<tr>
<td>vii.</td>
<td>% of locally-owned businesses</td>
<td>ii. DCCED: <a href="http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm">http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm</a></td>
</tr>
<tr>
<td>viii.</td>
<td>Income sources</td>
<td>iii. Local survey; ADOL; DCCED</td>
</tr>
<tr>
<td>x.</td>
<td>Cost of Living Indicators</td>
<td>v. <a href="http://www.uaf.edu/coop-ext/fcs/">http://www.uaf.edu/coop-ext/fcs/</a>: food costs, but also has a few other costs reported. CPI is done only for Anchorage: are there</td>
</tr>
</tbody>
</table>

¹ Note: these are indicators both for baseline analysis, and for ongoing monitoring. Also note that some may NOT have clear-cut links to a project (for example smoking rates), but will nevertheless be important at least for baseline analysis because they contribute to the outcome of interest
1. Social Determinants of Health (SDH) (cont)

<table>
<thead>
<tr>
<th>Economically Distressed Community status</th>
<th>other indicators? Housing cost? Heating cost? (both relative to income)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Demographic</th>
<th>i-viii: Census and ADOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Population</td>
<td></td>
</tr>
<tr>
<td>ii. Population change over time</td>
<td></td>
</tr>
<tr>
<td>iii. Dependency Ratio</td>
<td></td>
</tr>
<tr>
<td>iv. Emigration rate</td>
<td></td>
</tr>
<tr>
<td>v. Immigration rate</td>
<td></td>
</tr>
<tr>
<td>vi. Birth rate</td>
<td></td>
</tr>
<tr>
<td>vii. Race composition</td>
<td></td>
</tr>
<tr>
<td>viii. Percent Alaska Native</td>
<td></td>
</tr>
<tr>
<td>ix. Average family size</td>
<td></td>
</tr>
<tr>
<td>x. Non-resident worker population</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>i. Education/drop-out rate</td>
<td>ii. School District: by district only. May be able to request from school.</td>
</tr>
<tr>
<td>iii. Educational Attainment, HOH</td>
<td>iv. School district reports</td>
</tr>
<tr>
<td>iv. Literacy</td>
<td>v. <a href="http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm">http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cultural</th>
<th>i. ADF&amp;G (incomplete time series for most regions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. % participating in subsistence</td>
<td>ii. Census 2000: <a href="http://146.63.75.45/census2000/Census_Reports.asp">http://146.63.75.45/census2000/Census_Reports.asp</a></td>
</tr>
<tr>
<td>ii. % speaking traditional language</td>
<td>iii. Local survey, regionally-relevant studies: CANHR, EARTH; ISER</td>
</tr>
<tr>
<td>iii. Active cultural traditions? (dancing, festivals, sharing networks, etc)</td>
<td>Health Status of Alaska Natives</td>
</tr>
<tr>
<td>iv. School District</td>
<td></td>
</tr>
</tbody>
</table>
### 1. Social Determinants of Health (SDH) (cont)

<table>
<thead>
<tr>
<th>Health Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Presence of community clinic</td>
</tr>
<tr>
<td>ii. Adequate staffing of community clinic (health aide present in community and available for patient care at all times)</td>
</tr>
<tr>
<td>iii. GPRA screening/prevention indicators</td>
</tr>
<tr>
<td>iv. Clinic visits/day/CHA</td>
</tr>
<tr>
<td>v. Number of fully trained CHP</td>
</tr>
<tr>
<td>vi. Physician shortage area</td>
</tr>
<tr>
<td>% Clinic’s with Disaster/Emergency Plan</td>
</tr>
<tr>
<td>i. CHAP [see Directory of Health Care Services – being updated with level of provider to include whether or not a midlevel or physician is in residence or itinerant; if itinerant, frequency]</td>
</tr>
<tr>
<td>ii. CHAP</td>
</tr>
<tr>
<td>iii. GPRA: permission from service area/consortium;</td>
</tr>
<tr>
<td>iv. and v. CHAP</td>
</tr>
<tr>
<td>vii. ANTHC Emergency Preparedness Program</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Life expectancy at birth</td>
</tr>
<tr>
<td>vii. Mortality rate</td>
</tr>
<tr>
<td>viii. Infant mortality</td>
</tr>
<tr>
<td>ix. Child &lt; 5 mortality</td>
</tr>
<tr>
<td>x. DALYs</td>
</tr>
<tr>
<td>xi. BRFSS Quality of Life questions</td>
</tr>
<tr>
<td>i. Vital Statistics,</td>
</tr>
<tr>
<td>ii. Vital Statistics</td>
</tr>
<tr>
<td>iii. Vital Statistics; DHSS MCH:</td>
</tr>
<tr>
<td>iv. Vital Statistics: DHSS MCH:</td>
</tr>
<tr>
<td>v. Alaska MCH, PRAMS</td>
</tr>
<tr>
<td>vi. ABVSS</td>
</tr>
<tr>
<td>vii. FAS Surveillance</td>
</tr>
<tr>
<td>viii. [Survey-based]</td>
</tr>
</tbody>
</table>

Other general source for this section: Alaska Health Care Data Book 2007: online at [http://www.hss.state.ak.us/dph/Healthplanning/publications/healthcare/default.htm#download](http://www.hss.state.ak.us/dph/Healthplanning/publications/healthcare/default.htm#download)

### 1(b). Psychosocial/Gender Issues

<table>
<thead>
<tr>
<th>Health Determinants</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Economic (see section 1)</td>
</tr>
<tr>
<td>ii. Demographic (see section 1)</td>
</tr>
<tr>
<td>iii. Cultural (see section 1)</td>
</tr>
<tr>
<td>iv. Subsistence (see section 2)</td>
</tr>
<tr>
<td>v. Community alcohol policy</td>
</tr>
<tr>
<td>vi. Community VPO staffing</td>
</tr>
<tr>
<td>vii. Behavioral Health Aide staffing levels</td>
</tr>
<tr>
<td>i.-iv (see section 1)</td>
</tr>
</tbody>
</table>

v. Dept. of public safety: [http://www.dps.state.ak.us/ABC/docs/localopt.xls](http://www.dps.state.ak.us/ABC/docs/localopt.xls)

vi. [http://justice.uaa.alaska.edu/rlinks/lawenforcement/ak_vpso.html](http://justice.uaa.alaska.edu/rlinks/lawenforcement/ak_vpso.html)

vii. ANTHC Behavioral Health Aide program –
Technical Guidance for HIA in Alaska 2011

### 1(b). Psychosocial/Gender Issues (cont)

<table>
<thead>
<tr>
<th>Health Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Suicide/attempt rate</td>
</tr>
<tr>
<td>ii. Injury mortality/hospitalization rate</td>
</tr>
<tr>
<td>iii. Adolescent pregnancy rate</td>
</tr>
<tr>
<td>iv. STIs in under age 16</td>
</tr>
<tr>
<td>v. Child abuse</td>
</tr>
<tr>
<td>vi. Domestic violence rate</td>
</tr>
<tr>
<td>vii. Assault rate</td>
</tr>
<tr>
<td>viii. Homicide rate</td>
</tr>
<tr>
<td>ix. Index crimes</td>
</tr>
<tr>
<td>x. DUIs</td>
</tr>
<tr>
<td>xi. Alcohol/Substance abuse-related clinical encounters</td>
</tr>
<tr>
<td>xii. Depression treatment</td>
</tr>
<tr>
<td>xiii. BRFSS Depression</td>
</tr>
<tr>
<td>xiv. BRFSS alcohol/substance abuse</td>
</tr>
<tr>
<td>xv. Alaska Screening Tool</td>
</tr>
<tr>
<td>xvi. Adolescent suicidal ideation</td>
</tr>
<tr>
<td>xvii. Substance abuse treatment numbers</td>
</tr>
<tr>
<td>xviii. Depression screening in health care setting</td>
</tr>
<tr>
<td>xix. Adolescent Risk Behavior</td>
</tr>
</tbody>
</table>

- i. Vital Statistics/Trauma registry
- ii. Vital Statistics/Trauma registry (new EMS registry in progress at state)
  - For trauma registry: Dataset is available down to community level. Updated through 2005 currently. Can also look at RPMS for non-hospitalizations.
- iv-vii. UAA Justice Center
- iv-vii. Vital Statistics [Medical Examiner determines]
- viii. RPMS; community clinic data; Medicaid billing (MCH Dr. Gessner – special request)
- ix. RPMS
- x, xi. Regional BRFSS analysis (HSS did); community-level BRFSS
- xii. data reported by each state. Health grantee.
- xiii. YRBS (would need to be oversampled to get community-level)
- xiv. [regional programs]
- xv. GPRA
- xvi. YRBS Data by school district; ASSETS

<table>
<thead>
<tr>
<th>Health Determinants</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Community alcohol policy</td>
</tr>
<tr>
<td>ii. Community public safety program: type/staffing</td>
</tr>
<tr>
<td>iii. Subsistence impacts (e.g. displacement of caribou/whales)</td>
</tr>
<tr>
<td>iv. Climate change research (breakup, freeze-up times, ice thickness, etc)</td>
</tr>
<tr>
<td>v. EIS analysis</td>
</tr>
</tbody>
</table>

- i. Dept. of public safety: [http://www.dps.state.ak.us/ABC/docs/localopt.xls](http://www.dps.state.ak.us/ABC/docs/localopt.xls)
- ii. [http://justice.uaa.alaska.edu/rlinks/lawenforcement/ak_vpso.html](http://justice.uaa.alaska.edu/rlinks/lawenforcement/ak_vpso.html)
- iii. ADF&G, U of A research
### 2. Accidents and Injuries (cont)

| iv. | Stability of ice |
| v.  | Anticipated changes in traffic flows |

**Health Outcomes**

| i. | Injury mortality rate |
| ii. | Injury hospitalization rate |
| iii. | Outpatient visits for injury |

i. Vital Statistics; trauma registry  
ii. Alaska Trauma Registry; AKHDDS  
iii. RPMS; others [HDDS should be including outpatient/ER visits starting 2007 – however native hospitals and CAI not yet included]

### 3. Exposure to potentially Hazardous Materials

**Health Determinants**

| i.  | Soil quality/contamination |
| ii. | Air quality monitoring/modeling data (e.g. levels of fine particulate) |
| iii. | Water Quality monitoring data: |
| iv. | Subsistence food contaminant levels |
| v.  | Human biomonitoring data |

i. Industry pre-permitting data;  
ii. -ADEC/EPA existing data  
   -industry baseline data collection  
   -ADEC annual consumer report – not all contaminants are annual  
   -DEC air quality advisories (Clint Far, DEC)  
iii. -DEC: drinking water testing required for residual chlorine, coliforms, fluoride, nitrate/nitrite, old inorganics, new inorganics, VOCs, Synthetic organics, lead/copper, asbestos, radioactivity, disinfectants, arsenic.  
   -Pre-permitting studies  
iv. -DEC Env. Health program:  
   [http://www.dec.state.ak.us/eh/news.htm#fmp](http://www.dec.state.ak.us/eh/news.htm#fmp)  
   -Agency reports (USFWS, ADF&G, ADHSS, NSB)  
   -University publications  
v. -ANTHC Cord Blood program (Berner, personal communication, when available)  
   -ADHSS statewide hair mercury:  
   [http://www.epi.hss.state.ak.us/eh/biom/default.htm](http://www.epi.hss.state.ak.us/eh/biom/default.htm)  
   -ADHSS lead surveillance:  
   [http://www.epi.hss.state.ak.us/eh/default.stm](http://www.epi.hss.state.ak.us/eh/default.stm)  
   -ADHSS special projects: Epi bulletins at  
   [http://www.epi.hss.state.ak.us/bulletins/bltnidx.jsp](http://www.epi.hss.state.ak.us/bulletins/bltnidx.jsp)  
   -ACAT special projects:  
   -University research: Todd O’Hara, UAF; Larry Duffy…  
   -NHANES: comparison to national:  

**Health Outcomes**

*(depends on contaminant — these are examples only)*

| i. | Asthma/COPD prevalence & exacerbations |
| i. | ADHSS publications:  
   [http://www.hss.state.ak.us/dph/infocenter/topics/respiratory.htm](http://www.hss.state.ak.us/dph/infocenter/topics/respiratory.htm)  
   -RPMS prevalence data; RPMS prescriptions…?  
   -ADHSS vital stats (mortality)  
   -Medicaid database (permission from Medicaid; MCH, Dr. Gessner has data) |
### 3. Exposure to potentially Hazardous Materials (cont)

<table>
<thead>
<tr>
<th>ii. Cancer rates</th>
<th>iii. Thyroid disorders</th>
</tr>
</thead>
<tbody>
<tr>
<td>iv. Acute poisonings</td>
<td>v. Developmental delay</td>
</tr>
<tr>
<td>vi. Birth Defects</td>
<td>Health Determinants</td>
</tr>
</tbody>
</table>

- AHDDS
- ANTHC Tumor Registry
- ADHSS: [http://www.hss.state.ak.us/dph/infocenter/topics/cancer.htm](http://www.hss.state.ak.us/dph/infocenter/topics/cancer.htm)
- RPMS
- [http://www.hss.state.ak.us/dph/infocenter/default.htm](http://www.hss.state.ak.us/dph/infocenter/default.htm)
- Poison control center: 800-222-1222 – staff toxicologist
- (Probably a poor measure unless mercury or PCB levels markedly elevated) School IEPs
- ADHSS Birth Defects Registry

### 4. Food, Nutrition & Subsistence

| i. % of caloric intake from subsistence foods |
| ii. Dietary composition |
| iii. Food available in stores |
| iv. Market basket price, recommended foods |
| v. Availability of high-quality drinking water |
| vi. Subsistence food harvest per capita |
| vii. Physical activity level |
| viii. Subsistence harvest |

- RPMS
- AntHC DM registry; ADHSS DPH CDP/HP —
- ADF&G (incomplete sampling); BRFSS (RPMS?)
- WIC, GPRA

### Health Outcomes

| i. Micronutrient deficiencies diagnosed |
| ii. Youth obesity |
| iii. Food insecurity/hunger |
| iv. Protein-calorie malnutrition |
| v. Anemia |

### 5. Non-communicable Diseases

| (same as 5.1, + others if other chronic diseases are added) |
| ii. Smoking rates |

### Health Determinants

- BRFSS, YRBS

### Health Outcomes

- RPMS
- ANTHC DM registry; ADHSS DPH CDP/HP —
- ADF&G (incomplete sampling); BRFSS (RPMS?)
- WIC, GPRA

NOTE: there are also ongoing studies (EARTH and CAHNR) that may address these topics for certain regions.
### 5. Non-communicable Diseases (cont)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>HTN</td>
<td>ii. GPRA; RPMS</td>
</tr>
<tr>
<td>3.</td>
<td>Hyperlipidemia</td>
<td>iii. Hyperlipidemia: GPRA for diabetics; RPMS;</td>
</tr>
<tr>
<td>4.</td>
<td>Obesity/BMI</td>
<td>iv. BRFSS; RPMS; GPRA</td>
</tr>
<tr>
<td>5.</td>
<td>Cardiovascular mortality/disease</td>
<td>v. Vital stats/AKHDDS/RPMS (CHD/HP has a CVD Prevention Program with data in hand)</td>
</tr>
<tr>
<td>6.</td>
<td>COPD</td>
<td>vi. Vital Statistics; ?BRFSS; Alaska Hospital Discharge Data System</td>
</tr>
</tbody>
</table>

### 6. Cancer

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Smoking/Alcohol rates</td>
<td>i. Regional/Community level BRFSS; GPRA?</td>
</tr>
<tr>
<td>ii.</td>
<td>Saturated fats in diet</td>
<td>ii. Dietary surveys</td>
</tr>
<tr>
<td>iii.</td>
<td>H. pylori prevalence</td>
<td>iii. ?RPMS/Epi Center?</td>
</tr>
<tr>
<td>iv.</td>
<td>Contaminant exposure and levels (see section 3)</td>
<td>iv. (section 3)</td>
</tr>
<tr>
<td>v.</td>
<td>Screening rates (CRC, Breast, Cervical)</td>
<td>v. GPRA</td>
</tr>
</tbody>
</table>

### 7. Infectious Diseases (cont)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Level of water/sanitation service</td>
<td>i. DEC; ANTHC DEHE</td>
</tr>
<tr>
<td>iii.</td>
<td>Population flux in community</td>
<td>iii. ADOL Research &amp; Analysis, Demographer</td>
</tr>
<tr>
<td>iv.</td>
<td>(?Road access to urban area)</td>
<td>iv. See Isolation and Level of Community matrix</td>
</tr>
<tr>
<td>v.</td>
<td>Immunization rates</td>
<td>v. GPRA; ANTHC EpiCenter? State: immunization information system (Jerry Yett 269-8006) is being developed,</td>
</tr>
<tr>
<td>vii.</td>
<td>Access to educational materials</td>
<td>vii. Epi bulletins; school educational programs</td>
</tr>
<tr>
<td>viii.</td>
<td>Illicit drug use prevalence</td>
<td>viii. Regional or community-level BRFSS; RPMS hospital discharge and/or outpatient visits</td>
</tr>
<tr>
<td>ix.</td>
<td>Exposure to animal and insect vectors</td>
<td>ix. Rabies – state tracks endemicity of rabies; bird flu samples; presence of appropriate mosquitoes for encephalitis’s.</td>
</tr>
<tr>
<td>x.</td>
<td>Responsible sexual behavior (Condom usage)</td>
<td>x. BRFSS</td>
</tr>
</tbody>
</table>
## 7. Infectious Diseases (cont)

<table>
<thead>
<tr>
<th>Health Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Pneumonia (outpt tx, hospitalization/mortality)</td>
</tr>
<tr>
<td>ii. RSV (outpatient tx/hospitalization)</td>
</tr>
<tr>
<td>iii. Diarrheal illnesses - giardia, salmonella, e.coli, vibrio parahemolyticus, norovirus</td>
</tr>
<tr>
<td>iv. STD prevalence</td>
</tr>
<tr>
<td>v. HIV prevalence</td>
</tr>
<tr>
<td>vi. Reportable blood-borne infections</td>
</tr>
<tr>
<td>vii. Skin infections</td>
</tr>
</tbody>
</table>

### i.-iii. AHDDS; RPMS;  
### iv. & v. HSS reportable diseases; Public Health Nursing; EpiCenter;  
### v. & vi. ADHSS reportable diseases  
### vii. ANTHC DEHE; hospital antibiograms for MRSA; hosp discharge database

## 8. Water, and Sanitation

<table>
<thead>
<tr>
<th>Health Determinants</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Level of sewer service</td>
</tr>
<tr>
<td>ii. Level/adequacy of water service</td>
</tr>
<tr>
<td>iii. Source of water</td>
</tr>
<tr>
<td>iv. Potential for contamination of water source</td>
</tr>
</tbody>
</table>

### i.-iii. DCCED or DEC:  
Percent of Communities with Significant Non-Compliance (SNC)  
Classification – ADEC VSW  
DNR Water Rights and Well rights  
[http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm](http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm)  
### iv. EIS/permit evaluation

<table>
<thead>
<tr>
<th>Health Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Infectious (Category 8)</td>
</tr>
<tr>
<td>ii. Contaminant Exposure (category 9)</td>
</tr>
</tbody>
</table>

## 9. Health Services Capacity and Infrastructure

<table>
<thead>
<tr>
<th>Health Determinants</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Available health services (regional/community-level assessment of existing health care and public health services)</td>
</tr>
<tr>
<td>ii. Anticipated change in demand for services (influx of population; health benefits for employees)</td>
</tr>
</tbody>
</table>

### i. State, regional, and tribal health agency survey; Directory of Health Care Services (Alaska Primary Care Office)  
[www.hss.state.ak.us/directoryhealthcare/default.htm](http://www.hss.state.ak.us/directoryhealthcare/default.htm)  
HPSA designations:  
[http://www.hss.state.ak.us/dph/Healthplanning/primarycare/HPSA.htm](http://www.hss.state.ak.us/dph/Healthplanning/primarycare/HPSA.htm)  
### ii. EIS/Project permitting analysis
<table>
<thead>
<tr>
<th>Cross-over Occupational/Community Health issues</th>
<th>(For Discussion): This category would address “crossover issues,” where employee health policies/practices could impact the health of the community. Examples include:</th>
</tr>
</thead>
</table>
| *Note: in general, HIAs will not address occupational health, as it is under various state and federal regulations, and occupational data are proprietary. This category addresses issues that may overlap with community health concerns. | • Workplace health screening and immunization protocols, if interaction between workers and the community is planned.  
• Drug and alcohol policy and enforcement  
• Cultural orientations  
• STI transmission prevention strategies.  
(others) |

Occupational health section of epidemiology for DHSS
Appendix 3: Baseline Data Collection Process

Key Activities during Baseline Data Collection:
Obtain a demographic profile for the impacted community. Include important community features, such as:

- Residential, commercial and subsistence hunting/fishing/gathering areas
- Locations of schools, churches (i.e., places of worship and other sacred sites), health care facilities, and recreational areas
- Location of water sources, local food sources, reservoirs, sewage/waste system
- Languages of the area

This information is typically collected as part of the social assessment effort; hence, close coordination between the HIA and social team is needed to avoid effort redundancy.

Translating this information into maps of the potentially impacted area is an excellent way to show results. Maps also help the project anticipate possible project impacts. Coordination with any social mapping exercise is also important.

Identify community health issues that have been identified from other HIAs, published studies, reports, or communiqués on projects similar to the one under consideration.

Identify health risks and define baseline data using the health effects categories framework.

Conduct a baseline literature search, review, and analysis. Review current and updated project documents and data

Key Tasks

Verify that the following activities/plans have occurred or exists. Review specific documents where available and note any significant data gaps

- Social impact/management reports
- Subsistence literature review
- Traditional Knowledge (TK) surveys
- Environmental impact/management reports
- Water quality sampling results
- Influx management plan
- Sewage treatment plant capacity plans
- Medical response
- Food and water safety plans and procedures
- Any anticipated survey efforts (before the surveys are conducted)
- Existing baseline data collected
Stakeholder consultation meeting minutes/reports
Existing contaminant monitoring data for humans, subsistence species or environmental matrices
Existing Facilities layout/design/location

**Fact-gathering meetings with project personnel**

- Project management—regarding community health-related concerns, project perceptions of health/social/environmental impacts
- Environmental representative—regarding air emissions, road dust, water and subsistence resources
- Hydrogeology representative—regarding water-management practices and water monitoring
- Social representative—regarding social impacts identified that may relate to health and potentially affected communities
- Geographical Information data representative (ArcGIS or CAD)—regarding regional and community level GIS/map files
- Head personnel manager—regarding work force recruitment, scheduling, housing and potential FIFO systems

**Fact-gathering meetings with governmental/institutional personnel (with emphasis on project location)**

- Tribal representatives in the area
- Fish and Game representatives
- Water Sanitation representatives
- Transportation Safety Department
- HIV/AIDS—Sexually Transmitted Infections Control Program
- Respiratory Disease Control Program
- Tuberculosis Control Program
- Road Safety Department
- Alcohol Prevention Program
- Domestic Violence Prevention Program
- Education Department
- Water Sanitation programs
- Local health clinic

**Ground truthing (site visit and review) of each project location**

Field activities will include:
- Characterization of the project from a health perspective
- Where the project will be located (visual evaluation of adjacent and surrounding communities—no community population interviews)
- Review of subsistence practices
- Physical structures and facilities
- How the project is designed to operate
- Potential exposures to the community from physical, biological, radiological and chemical substances (what, how much, how often)
- Workforce size
- Workforce management if there are already ongoing exploration activities
- Planned locations of worker populations during each major project phase
- Identify communities that are downstream and downwind
- Transportation corridor(s)
- Energy sources including transmission-line corridors, on-site storage of diesel, etc. (if applicable)
- Pipeline corridors (if applicable)
- Project timing
- Physical issues (weather, topography)
- Environmental issues related to health (EIA)
- Social issues related to health (SIA)
- Current health infrastructure and systems in potentially affected communities with emphasis on discussions with local health services representatives

**Community engagement, including group discussions**

- Individual perceptions of health impacts (including project personnel)
- General view of community lifestyles
- Traditional Knowledge (TK)
- Women’s groups (currently organized religious, water/sanitation, or support groups)
- Subsistence practices review
- Nutritional practices review