

A Guide for Health Impact Assessment

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Rajiv Bhatia, MD, MPH

San Francisco Department of Public Health

Address for correspondence:

1390 Market Street, Suite 822

San Francisco, CA 94102

rajiv.bhatia@sfdph.org

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A Guide to Health Impact Assessment

Preface

Health Impact Assessment (HIA) has a simple and common sense purpose—to make visible the potentially significant human health consequences of public decisions. By doing so, HIA helps to catalyze public understanding of health determinants and to ensure the accountability of public policies and decisions to the needs of health.

While internationally many governments provide technical and financial support for health impact assessment, HIA is still an emerging practice in the United States. Examples of HIA in the U.S. have been extremely diverse in terms of approach, scope of effects assessed, analysis methods, and public engagement practices. This Guide aims to describe, in general terms, the key procedures, activities, and issues in the HIA process.

The Guide complements the recently developed *Practice Standards for Health Impact Assessment* published on April 7, 2009 by the North American HIA Practice Standards Working Group. These standards were the collective product of HIA practitioners working in the North American context to translate the values underlying HIA, provide a set of benchmarks to guide HIA practice and stimulate discussion about HIA content and quality in this emerging field. The standards document is publicly available at: www.sfphes.org, www.humanimpact.org, or www.habitatcorp.com.

The intended audience for this Guide includes current and prospective practitioners of impact assessment in the United States. The Guide may also be useful for public health agencies participating in impact assessments or regulatory agencies responsible for the implementation of impact assessments. The Guide provides a brief background on HIA, an outline of essential and common tasks in the HIA process, discussion of common issues and challenges encountered in the HIA process, and selected examples of and links to resources for practice, as well as suggestions for integrating health analysis within the regulatory environmental impact assessment process, obtaining inclusion from diverse stakeholders, and for evaluating the HIA process.

The guide is largely technical in nature and may not be considered accessible to all audiences.

The guide is general and applicable to diverse policy sector (e.g., natural resources development, land use, labor). The Guide should also not be viewed as an exhaustive methodological toolkit for HIA practice; in fact, in many cases, HIA may require development or application of novel analytic approaches. Furthermore, the guide does not address how to develop the capacity needed to conduct or institutionalize HIA, e.g., technical skills, how to construct a project team, budgeting, etc. The resources section of the guide provides links to other articles, guidance documents and references that provide complementary information.

Background

What is Health Impact Assessment (HIA)?

HIA is a systematic process to make evidence-based judgments on the health impacts of public decisions (Quigley 2006). In addition to predictive judgments of health impacts based on available theory and evidence, the defining characteristics of HIA include a broad definition of health and health determinants, application to policy-making in all public sectors, an explicit concern with vulnerable populations, and a commitment to transparency. HIA aims to draw upon both professional expertise and local knowledge, use the best available analytic methods and tools, and involve and engage decision-makers and affected stakeholders. The two primary outputs of HIA include findings with regards to health impacts as well as strategies for policy design and implementation to ensure decisions protect and promote health.

Health impact assessment may be defined as a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, program or project on the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects.

Adapted by the International Association of Impact Assessment from World Health Organization 1999

Why conduct health impact assessment?

HIA presumes that decision-making processes informed by the public's health concerns and analysis of health impacts, can lead to health-responsive actions. Intuitively, we know that our health depends on the quality of and resources available in our physical and social environments. For example, the quality and affordability of housing impacts safety, household budgets, overcrowding, and psychosocial stress. Similarly, heart disease and its risk factors are influenced by diverse environmental conditions, including air quality, noise, traffic, employment, and social cohesion.

Structural and environmental determinants of health and disease are subjects of policy-making in many sectors and these determinants are generally outside the direct control and authority of public health. In 1986, the World Health Organization (WHO) urged policy-makers in all sectors to “be aware of the health consequences of their decisions and to accept their responsibilities for health.” (WHO 1986) Furthermore, WHO called on policy-makers to conduct health impact assessments of actions that affect social, economic, and environmental conditions.

The practice of HIA aims to support healthy public decision-making in the following ways:

- ***Identifying harms and benefits before decisions are made*** Sound public policy requires information on potential health impacts, including information on both short- and long-term effects and impacts on socially excluded or vulnerable populations. HIA findings and recommendations can inform and motivate beneficial and health-protective changes to the design of a project or policy. As health provides a comprehensive lens on decisions, HIA can also be a useful tool to examine and weigh trade-offs between competing health risks and needs.
- ***Identifying strategies for decisions to protect and promote health*** HIA provides strategies to address potentially significant adverse health impacts or to extend potential health benefits of a policy decision. Strategies can take the

Steps in the HIA Process

1. **Screening** involves determining whether or not an HIA would be valuable and feasible.
2. **Scoping** involves determining health issues for analysis, the temporal and spatial boundaries for analysis, and research methods.
3. **Assessment** involves using data, expertise, and qualitative and quantitative research methods to judge the magnitude and likelihood of potential health impacts, their significance, and identifying appropriate mitigations and design alternatives.
4. **Reporting** involves synthesizing the assessment findings and communicating the results. This can take many forms including written reports, fact sheets, comment letters, and public testimony.
5. **Monitoring** describes the process of tracking the decision and implementation effect on health determinants and health status.

form of new decision alternatives, modifications to the proposed policy, program, or project, or targeted mitigation and monitoring measures.

- ***Supporting inclusive and democratic decision-making*** HIA is not intended to be an activity primarily to endorse or oppose a policy or project - rather it is a way to provide information for decision-makers to help them understand the health implications of proposed decision, and of decision alternatives. Democracy and the ethical use of evidence are key values underlying HIA practice (Quigley 2006). Public health concerns are often prominent sources of controversy in public decisions and HIA provides a way to be responsive to those concerns. Because protecting health is a widely shared value, HIA may identify areas of cooperation among opposing interests and common strategies that apply to diverse interest groups. Furthermore, a transparent accounting of impacts along with mitigations may support buy-in for decision implementation.

- ***Protecting Social Equity and Justice***
 Environmental justice is formally defined as the “...fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies” (Clinton 1994). Responding to health concerns of vulnerable populations with substantive analysis and alternatives is necessary to fulfill the requirements of social and environmental justice and to reduce health inequities. HIA provides a specific method to accomplish this.

Living in a healthy place requires having adequate housing; secure and meaningful livelihood; access to schools, parks and public spaces; safety and freedom from violence; unpolluted air, soil, and water; and a society which promotes not only opportunity and innovation but also cooperation, trust, and equity.

- ***Planning health and public health service delivery*** Because HIA can anticipate changes in future conditions important to health, it may be valuable in planning health and public health service delivery and interventions.
- ***Catalyzing social and institutional learning*** A successful HIA identifies impacts, helps to fill knowledge gaps in decision-making, and influences design for a particular policy, project or plan. It also can serve as a tool for public and institutional learning.

For example, HIA may lead to health-promoting design recommendations or mitigations being incorporated proactively into subsequent plans and projects at the design and planning stage.

What are the steps and activities in the HIA process?

The purpose of HIA is to inform and support decision-making; thus, an HIA is optimally carried out prospectively before a decision is made. HIA can be useful at any stage of policy or project design; however, the earlier in the decision-making process that an HIA can be carried out, the greater the likelihood that HIA may provide timely information to decision-makers to help understand the consequences of various alternatives.

The typical procedural steps in HIA are similar to those for other forms of impact assessment (e.g. environmental, social, and strategic) and include screening, scoping, assessment, reporting, and monitoring. These steps along with related tasks, methods, and resources are the subject of subsequent sections of this guide.

- 1. Screening** involves determining whether or not an HIA would be valuable and feasible in a particular decision-making context.
- 2. Scoping** involves determining health issues for analysis, the temporal and spatial boundaries for analysis, and the data and research methods employed in the analysis.
- 3. Assessment** involves using data, expertise, and qualitative and quantitative research methods to judge the magnitude and likelihood of potential health impacts, their significance, and identifying appropriate mitigations and design alternatives.
- 4. Reporting** involves documenting and synthesizing the assessment findings, and communicating the results and recommendations of the assessment.
- 5. Monitoring** describes the process of tracking the decision and implementation effect on health determinants and health status.

HIA employs a holistic definition of health and considers a broad set of social and environmental conditions to be determinants of health status. The scope of impacts analyzed within HIA can include physical and mental health outcomes like mortality and disability, and also behavioral factors and environmental, social, economic, and political conditions (Marmot and Wilkinson 1999).

Examples of Health Determinants Impacted by Public Policy Decisions				
Fixed Individual Factors	Individual Health Behaviors	Neighborhood Services and Public Infrastructure	Environmental Conditions	Social, Economic, and Political Factors
Heredity Gender Age Chronic disease and disabilities	Diet Physical activity Addictions Coping	Education Public transportation Health care Parks Community centers Water and waste systems	Housing Air, soil and water quality Community noise Presence of disease vectors	Livelihood Inequality Social cohesion and inclusion Political participation

What is the current experience with HIA in the United States?

HIA is an emerging practice in the United States and examples of HIA so far have not conformed to one standard for practice. HIA have been typically initiated by public agencies, decision-makers, project proponents, and other stakeholder apart from regulatory requirements and have been diverse in terms of approach, methods, and public engagement (Dannenberg 2008).

There is no current law requiring or specifying HIA methodology be used where health impact analysis is required by law; however, HIA has recently been used in several jurisdictions to fulfill regulatory requirements under the National Environmental Policy Act (NEPA) or similar state laws (Bhatia & Wernham 2008). While NEPA does not refer by name to "HIA" as a separate requirement *per se*, NEPA mandates that every Environmental Impact Statement (EIS) include analysis of important health effects. As HIA is procedurally similar and complementary to the practice of environmental impacts assessments (EIA), integration of HIA within EIS provides a productive and efficient means not only to evaluate health effects but also to evaluate the significance of environmental, social, cultural, or economic effects analyzed within an EIS.

There are other examples of legislation or policy specifically requiring HIA in specific circumstance. For example, Washington State legislation (SB 6099, 2007) required an HIA to inform mitigation planning for the State Route-520 Bridge in Seattle. The State of California law, the Global Warming Solutions Act (AB 32, 2006), requires the California Air Resources Board (CARB) to analyze the health impacts of strategies to reduce or mitigate greenhouse gas emissions.

HIA should be distinguished from individual assessment or forecasting methodologies even though such methods may be used within a HIA. For example, a variety of health assessment methods routinely contribute to policy development and can be used to profile baseline conditions in HIA. Human health risk assessment (HRA) is a specific analytic method used in regulatory settings for predicting the health consequences of a specific exposure where dose-response and exposure data permit. HRA can be used as a specific analytic approach to forecast effects of specific exposures. Federal environmental regulatory agencies also conduct cost-benefit analysis (CBA) of proposed regulations that often includes health impacts analysis. Such analytic methods can have great utility in HIA practice.

Some practitioners and evaluators distinguish between types of HIAs (Cole 2004). Typological distinctions include: rapid versus comprehensive, and qualitative versus quantitative. These categories are not mutually exclusive and the boundaries between categories are blurred. More importantly, choices regarding the scope of impacts, methods used, and timing are appropriate to make within a scoping process for an HIA. The scope of an HIA can and will vary with regard to the breadth of issues analyzed, the temporal and spatial dimensions of the assessment, and the research methods employed. It will also reflect the needs of its particular context, particularly the interests of community members, stakeholders, and decision-makers.

The Spectrum of HIA Practice		
Analysis on a discrete hazard, exposure, or health outcome	Breadth ↔	Comprehensively considers all potential health effects, including positive and negative effects
Conducted by a single expert or public institution	Participation ↔	Oversight by multiple stakeholders or community members in partnership with public institutions
Stakeholder initiated	Regulatory Integration ↔	Integrated within existing regulatory and non-regulatory assessment processes
Uses existing data and published research	Methods ↔	Collection and analysis of new data using multiple quantitative and qualitative methods

What are some of the key lessons from HIA practice experience in the U.S.?

There has been limited formal evaluation of the HIA experience in the US thus far. However, experience does demonstrate that the practice has had important and productive outcomes (Corburn 2007; Dannenberg 2008). In many cases, transparent analysis of health impacts has shaped policy design through the inclusion of health promoting choices, alternatives, and mitigations. In other cases, HIA has catalyzed local, state, and federal agency practices to integrate health considerations in policy design. HIA has also affected the knowledge of diverse public and private sector actors informing policy agendas, collaborations, and coalitions.

Key lessons, listed below, for effective HIA include following a systematic approach, being inclusive and transparent with process decisions, and responsibly and ethically using evidence.

- *Use a systematic approach* The procedural steps of screening, scoping, assessment, reporting and monitoring provide an effective and tested approach for HIA. The systematic process will ensure comprehensive issue identification, prioritization of

assessment resources, rigorous and robust analysis, and effective translation of findings and is flexible enough to be adapted to the needs of context.

- ***Value the screening process*** Screening considers factors that are predictive of the success of an HIA effort.
- ***Use a team approach*** A comprehensive assessment of health impacts requires a team approach with diverse skills and capacities. Public health expertise is essential but this needs to be complemented with expertise in planning, environmental management, policy analysis, communication, and community engagement.
- ***Include Meaningful Stakeholder Participation*** Inclusive and meaningful public participation is a key principle of social and environmental justice and a key goal of HIA. Stakeholder involvement in HIA helps to accurately identify important health concerns and questions about a decision and provides insights about data and strategies for analysis. Opportunities for stakeholder participation exist at each stage in the HIA process; however, at a minimum, stakeholders should be involved in the scoping process and also have an opportunity to critique the findings and conclusions
- ***Use the best available evidence and acknowledge limitations*** Judgments in HIA should be made based on the best available evidence and should acknowledge evidence gaps and uncertainty. Certainty is not a reasonable or expected standard for HIA judgments. Practitioners do need to be aware of their own biases as well as those of stakeholders and public decision-makers.
- ***Use HIA to meet regulatory impact analysis requirements*** Existing law requires public health analysis of many decisions that may have adverse environmental impacts. Many environmental issues considered under the EIA process such as noise, air quality, and traffic safety can benefit from methods and approaches used in HIA.
- ***Provide a transparent account of the HIA process and findings*** Policy decisions are often contested politically and many stakeholders have firm and fixed positions about the value or costs of a particular course of action. The HIA should document its methods and findings and explain how decisions were made with regards to scoping.

The Values of Health Impact Assessment**International Association of Impact Assessment, 2006**

Democracy – *emphasizing the right of people to participate in the formulation and decisions of proposals that affect their life, both directly and through elected decision makers. In adhering to this value, the HIA method should involve and engage the public, and inform and influence decision makers. A distinction should be made between those who take risks voluntarily and those who are exposed to risks involuntarily (World Health Organization, 2001).*

Equity – *emphasizing the desire to reduce inequity that results from avoidable differences in the health determinants and/or health status within and between different population groups. In adhering to this value, HIA should consider the distribution of health impacts across the population, paying specific attention to vulnerable groups and recommend ways to improve the proposed development for affected groups.*

Sustainable development – *emphasizing that development meets the needs of the present generation without compromising the ability of future generations to meet their own needs. In adhering to this value, the HIA method should judge short- and long-term impacts of a proposal and provide those judgments within a time frame to inform decision makers. Good health is the basis of resilience in the human communities that support development.*

Ethical use of evidence – *emphasizing that transparent and rigorous processes are used to synthesize and interpret the evidence, that the best available evidence from different disciplines and methodologies is utilized, that all evidence is valued, and that recommendations are developed impartially. In adhering to this value, the HIA method should use evidence to judge impacts and inform recommendations; it should not set out to support or refute any proposal, and it should be rigorous and transparent.*

Comprehensive approach to health – *emphasizing that physical, mental and social well-being is determined by a broad range of factors from all sectors of society (known as the wider determinants of health). In adhering to this value, the HIA method should be guided by the wider determinants of health.*

Stage I: Screening

Objective:

- **Determine whether or not to conduct an HIA.**
-

It is not possible or desirable to conduct an HIA on every public decision, and so, where HIA is not legally required, screening establishes whether an HIA of a particular decision is warranted. Proponents of an HIA, whether they are researchers, decision-makers, or stakeholders can help evaluate whether or not to conduct an HIA by answering the following screening questions:

- ***Value of HIA*** Are there potentially significant health effects associated with the decision alternatives? Could these impacts create or exacerbate inequities? Are impacts already known? Are impacts uncertain or controversial?
- ***Feasibility and capacity to do HIA*** Are there data and methods available to assess potential impacts? Is there leadership, resources and technical capacity to conduct analyses?
- ***Receptiveness of the decision-making process*** Is the decision-making process open to new information? Does policy or legal requirements mandate the conduct of a health analysis?

Projects that may benefit most from HIAs are those where potential health impacts are significant, where timely, meaningful analysis is possible, and where the decision-making process is receptive to the information. An HIA may be particularly valuable where impacts are uncertain or where there is controversy about the policy, plan, or project. On the other hand, an HIA may still be useful if the health impacts of a decision are scientifically established but not widely acknowledged or where there is need to consider strategies to mitigate known impacts. A separate HIA is generally not warranted where existing regulations protect against a project's likely health impacts or where a comprehensive and community responsive health analysis is already integrated with environmental impact assessment.

The feasibility of an HIA depends being able to conduct an informative HIA within the decision-making timeframe with available knowledge, methods, personnel, and other resources. Constraints on feasibility (e.g., limitations on data or time) may require reducing the scope or breadth of analysis within an HIA.

The influence of an HIA depends, in part, on the openness of a decision-making process to receiving and acting on the information. Openness is typically greater at earlier stages in the policy or project development process. However, this does not necessarily imply that HIAs should never be done when the design phase has concluded or the decision-making process is rigid.

Effective screening requires having sufficient information about the decision, decision-makers, and stakeholders. Ideally, screening should involve decision-makers and stakeholders to ensure constructive dialogue and acceptance of findings. If any entity decides to conduct an HIA, it is beneficial to notify all stakeholders, responsible public officials, and the decision-makers of these plans.

Sample HIA Screening Checklist		
Essential Screening Questions	Yes / No / Unknown	Supporting Facts / Rationale
<p>Value of and need for HIA</p> <ul style="list-style-type: none"> ➤ Does the decision have the potential to directly effect (positively or negatively) health outcomes? ➤ Does the decision have the potential to indirectly effect (positively or negatively) health outcomes via environmental or social determinants of health? ➤ Could these impacts create or exacerbate inequities? ➤ Are the proposal's impacts to health significant in terms of the number of people impacted, the magnitude, breadth and immediacy of impacts? ➤ Are health impacts unknown, uncertain, or controversial? ➤ Could HIA recommendations potentially improve the impact that the plan, policy or program has on health? 		
<p>Feasibility of conducting HIA</p> <ul style="list-style-type: none"> ➤ Is there leadership, resources and technical capacity to conduct analyses? ➤ Do data and research methods exist to analyze health impacts of concern associated with this decision? ➤ Do stakeholders have the interest and capacity to participate in an HIA? 		
<p>Receptiveness of the decision-making process</p> <ul style="list-style-type: none"> ➤ Is there a pending decision regarding the project, plan or policy? ➤ Has a final decision about whether to adopt the proposal been made? ➤ Are there policy/legal requirements mandating the consideration of direct and/or indirect health impacts? ➤ Is there sufficient time and is it feasible to conduct an analysis in the decision-making timeline (e.g., before the decision is made)? ➤ Are stakeholders requesting an HIA to inform the decision making process? ➤ Is the decision-making process open to HIA and/or recommendations for changes to design, mitigations and alternatives? 		

Other Important Screening Questions to Consider	Yes / No / Unknown	Supporting Facts / Rationale
➤ Who are the stakeholders and interest groups involved in the decision-making process?		
➤ Are there decision alternatives that are more or less advantageous to public health? Would one scenario affect vulnerable populations more than another?		
➤ Have public concerns about the health impacts of the decision been documented (even if these concerns have not explicitly been stated as health concerns)?		
➤ What are some barriers to timely completion that you might anticipate?		
➤ Could the HIA help lead to institutional and/or systemic change regarding how health issues are considered?		
➤ What additional information do you need to decide on the overall value of an HIA in this context?		

Stage II: Scoping

Objective:

- **Create a plan and timeline for conducting an HIA that identifies priority issues, research questions and methods, and participants' roles.**
-

Scoping defines the research objectives, methods, and boundaries of the HIA process.

Setting the scope of the HIA means determining:

- Who will conduct the analysis (if not already determined)? Under what oversight?
- Which specific decision alternatives and which potential health impacts will be studied?
- What are the geographical and temporal boundaries for impact analysis?
- What are the hypothesized project impacts on health or health determinants?
- Which populations and subpopulations will be considered?
- Are there sensitive or socially excluded subpopulations that are vulnerable to disproportionate impacts?
- What data, methods, and tools will be employed to evaluate impacts?
- Which experts and key informants will be engaged?
- What is the plan for public review of the HIA?
- What is the timeframe for the assessment?

Indeed, some of these questions will be initially discussed in the screening stage of the HIA. The scoping stage goes beyond these initial considerations to make determinations about what the HIA should cover. Thus the initial research conducted for the screening sets the stage for scoping.

Leadership for HIA may come from any public or private sector or organization. The agency or entity undertaking an HIA must have the necessary capacity and resources to do so. Most importantly, the entity needs to have some expertise in the likely public health impacts of the project; have the ability to collect or to access data or knowledge about the health conditions, economy, social environment, and cultural characteristics of the affected communities; have the ability to coordinate participation among stakeholders and public and private organizations; and have the ability to communicate findings to decision-makers.

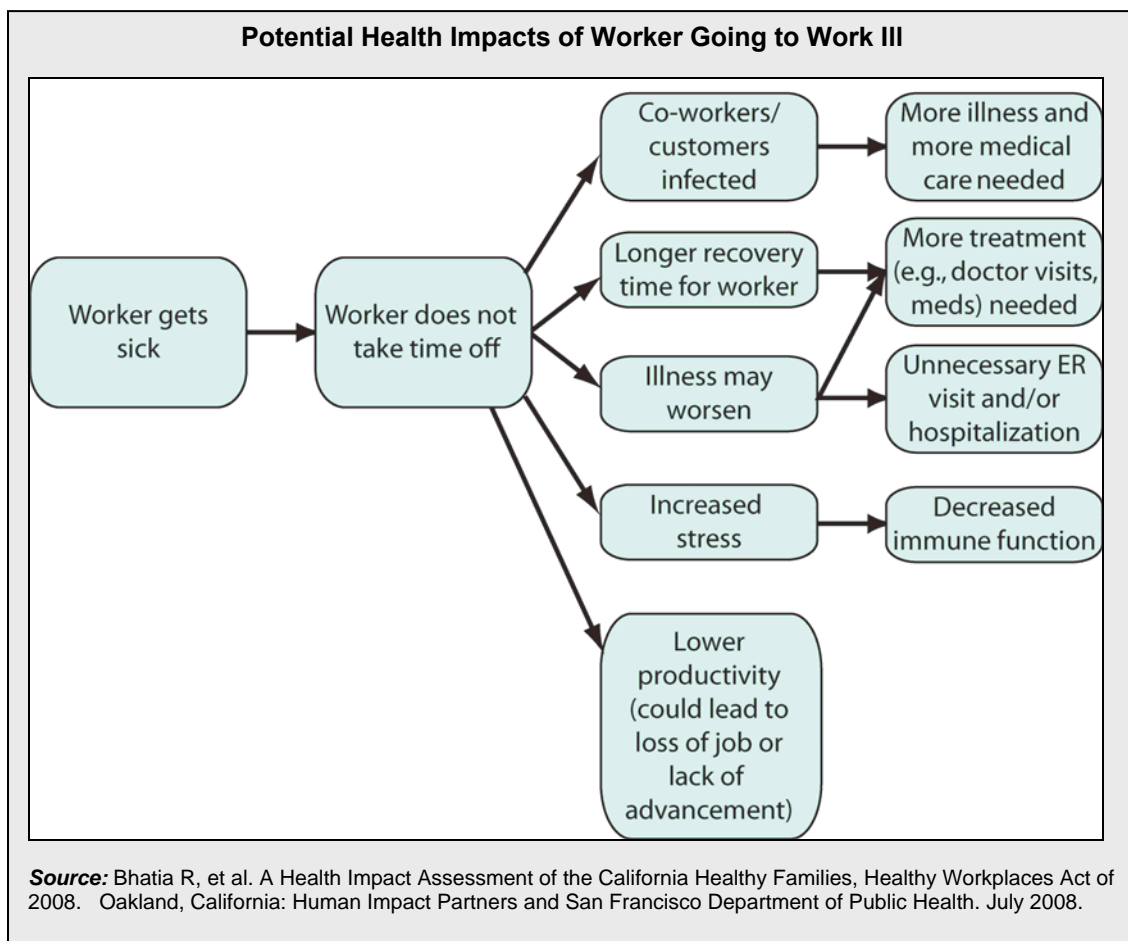
Regardless of which entity takes responsibility for conducting or coordinating the HIA, assessment of a comprehensive scope of impacts generally requires a team of contributors with a diverse set of skills, particularly related to assessment and reporting.

Scoping benefits from broad participation to ensure the most appropriate and productive focus of the analysis. Stakeholder and community participation provide knowledge and access to data sources and analytic tools that may be used in the assessment phase of the HIA. Community members knowledgeable about conditions in a place and the particulars of a proposed action also support comprehensive issue identification. Local medical providers also bring first-hand knowledge about the health problems of people living in a particular place. Local, state, and federal public health agencies conduct disease surveillance and maintain health data systems (e.g., vital statistics, communicable disease reports) on the baseline health status of affected populations, have expertise to identify and understand potential health impacts, and help establish local public health priorities.

It is particularly important that participation scoping represent expertise from diverse sectors and subject disciplines. First, the realm of possible pathways that connects decisions to health impacts involves diverse environmental conditions and human biological mechanisms and HIA needs to employ corresponding expertise. For example, analyzing environmental impacts of neighborhood conditions on respiratory disease could require understanding of housing quality and adequacy, patterns of social interaction, air pollution emissions sources and exposure pathways, endemic respiratory diseases, and respiratory physiology. Second, HIA aims to be comprehensive accounting of the most important health impacts, and the dominance of one sector or discipline can both bias the choice of impact analysis questions and limit the capacity to conduct needed analysis. For example, if participants in scoping only have expertise in one subject area (e.g. air or water pollution), then these issues are likely to get priority consideration in the scoping process and scoping is more likely to identify available methods to analyze related issues.

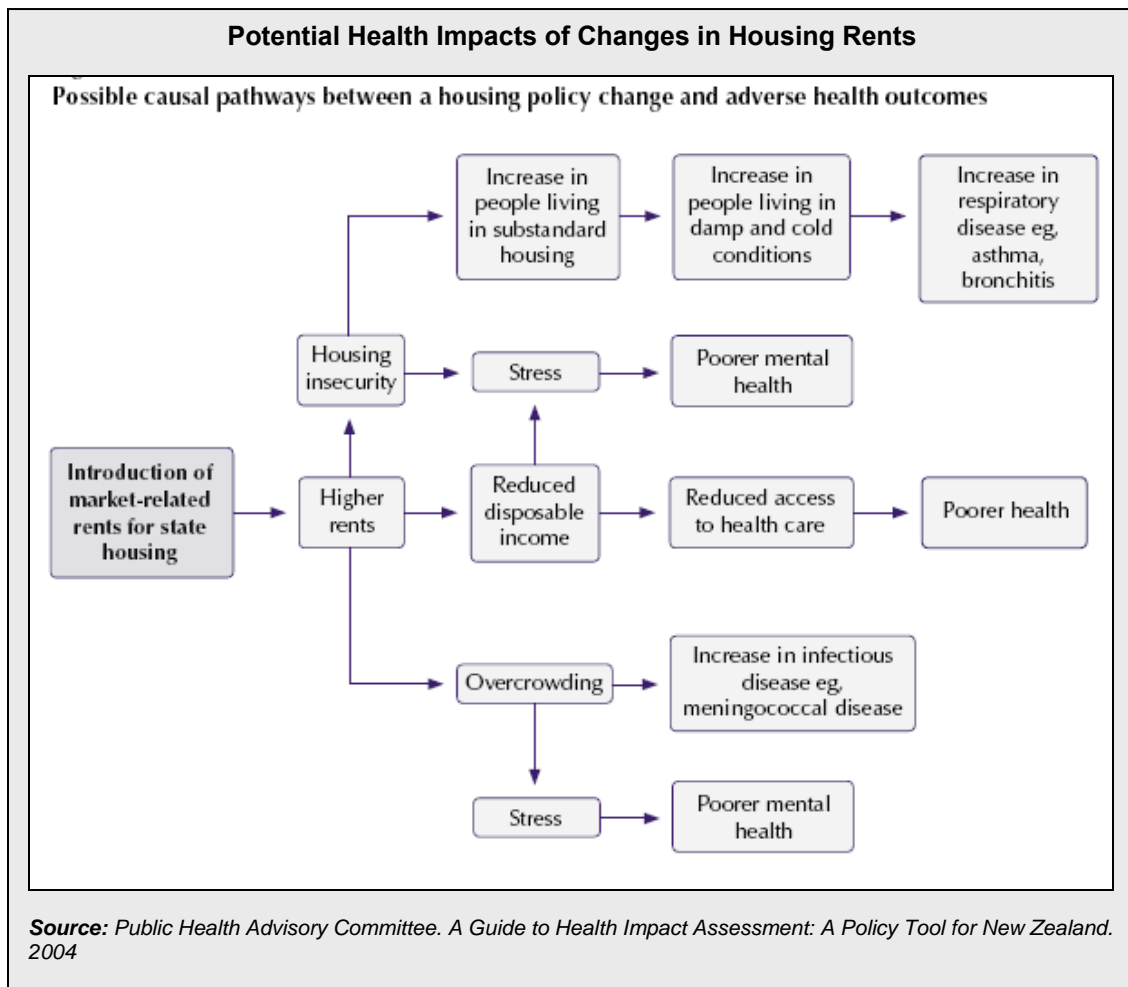
Stakeholders can have more formal roles in the oversight of HIA as well. For example, in conducting a HIA on expansion plans for the Port of Oakland, the UC Berkeley Health Impact Group established a collaboration agreement with West Oakland neighborhood residents and stakeholders who reviewed and approved the scope of the HIA analysis. Stakeholder oversight that is representative of diverse interests can add a significant measure of legitimacy and authority to the HIA process and its findings.

Scoping of HIAs requires considering and evaluating complex causal pathways in determining choices for impact analysis. Traditional causal pathways in public health are often simple and intuitive: exposure to a pesticide leads to a poisoning. However, even simple pathways may ignore the role of contextual environmental factors and social conditions. For example, the transmission of communicable disease involves factors influencing social contact among people in households, workplaces and schools; environmental factors such as household crowding and ventilation; and social factors such as income and employment benefits. Logic diagrams, which link the effects along the pathways between the decision and population health status, can also support scoping and the identification of research questions (see diagrams below).



The scenario described in the figure above—developed during the scoping process of an HIA of legislation mandating paid sick days in California—describes what might happen if a sick worker does not take unpaid time off and, instead, goes to work sick. If the illness is communicable through casual contact and the worker is infectious, the lack of paid sick days may lead to an infectious disease hazard for co-workers or customers with whom the worker interacts. Without time off, the worker may require longer time to recover or suffer more severe disease requiring increased health care utilization. The worker may also face increased stress levels and/or, as a result of lower productivity, may face job loss or lack of advancement.

The scenario below describes a sequence of potential health consequences that may arise from increased housing rents. Intermediate effects include housing insecurity, living in substandard housing, overcrowding, or an inadequate household income for essential needs. Each of these effects has direct and indirect effects on health.



For some categories of decisions or projects, checklists with questions or prompts may efficiently support issue or impact identification in the screening or scoping process. Below is an example of a checklist that can be used to scope the potential health impacts of land use and economic development decisions in a U.S. context. A similar checklist could be created or adapted from the example below for other project types or to reflect context specific concerns.

Health Impacts Checklist for Land Use and Economic Development Projects in a U.S. Context	
Potential Effects on Health Determinants	Nexus between Health Determinant and Health Outcomes
<p>Employment and Livelihood Will the action affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Level and security of employment? <input type="checkbox"/> Proportion of the population living in relative or absolute poverty? <input type="checkbox"/> Hazardous employment conditions? <input type="checkbox"/> Employment quality or job benefits? <input type="checkbox"/> Industrial diversity and resilience? 	<p>Unemployment results in material poverty, chronic stress, and low self-esteem. There is a dose-response relationship between income and life expectancy across the income distribution. Health care and sick leave benefits support the use of preventative care. Job autonomy predicts reduced mortality from cardiovascular disease</p>
<p>Housing Will the decision affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Housing affordability? <input type="checkbox"/> Adequacy of housing supply? <input type="checkbox"/> Quality or safety of housing? <input type="checkbox"/> Residential segregation? 	<p>Crowded conditions can increase the hazard for infections, respiratory disease, fires and poor mental health. Unaffordable rents or mortgages result in trade-offs between material needs such as housing, food, and medical care.</p>
<p>Food Security and Nutrition Will the decision affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Supply or cost of food? <input type="checkbox"/> Food safety? <input type="checkbox"/> Access to food resources? 	<p>Adequate nutrition is necessary for normal development and growth, normal body homeostasis, immunity, and the prevention of obesity and diet related diseases.</p>

<input type="checkbox"/> Nutritional behaviors?	
<p>Environmental Quality Will the decision affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Level of hazardous chemical or biological pollutants in outdoor air, soil, or drinking water¹? <input type="checkbox"/> Level of hazardous chemical or biological pollutants in indoor air? <input type="checkbox"/> Level of environmental noise? <input type="checkbox"/> Exposure to non-ionizing or ionizing radiation? 	<p>Air pollutant exposure retards lung growth, exacerbates respiratory disease, and increases cardio-pulmonary mortality. Indoor aero-allergens cause or exacerbate asthma. Water is a vehicle for communicable diseases. Chronic noise exposure harms sleep, temperament, hearing, and blood pressure. Solar and ionizing radiation are known carcinogens.</p>
<p>Safety Will the decision affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Demographic composition or social cohesion in an area? <input type="checkbox"/> Risk and response to fire hazards? <input type="checkbox"/> Hazard or frequency of transportation accidents or unintentional injuries? 	<p>Social cohesion inhibits crime and violence which can result in injury or property loss and provokes fear or stress. Projects can stress capacity of public safety institutions, limiting their response capacity to emergency events. Projects may increase motor vehicle traffic and vehicle collisions.</p>
<p>Transportation Will the project affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Access to jobs, goods, services, and educational resources? <input type="checkbox"/> Number of trips walking and bicycling <input type="checkbox"/> Vehicle miles traveled? <input type="checkbox"/> Vehicle volumes or speeds? <input type="checkbox"/> Availability and convenience of public transit services? 	<p>Access to employment, education, parks, and health care are critical for meeting health needs. Public transit provides such access for those without automobiles. Pedestrian and bicycle facilities facilitate active transport, reducing heart disease, diabetes, obesity, blood pressure, osteoporosis, symptoms of depression, anxiety, and falls in the elderly. Vehicle volume is proportional to collision rates and vehicle speeds are proportional to injury severity.</p>
<p>Education Will the project affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Access and capacity of schools for children or adults? <input type="checkbox"/> Quality of education resources? 	<p>Educational success predicts both health status and life-expectancy. Children commuting to school get less sleep and exercise, and greater exposure to vehicle pollution. Quality community schools can promote parent participation and</p>

¹ Note that compliance with regulatory standards does not necessarily equate with health protection for all exposures or sub-populations.

	good educational outcomes.
<p>Parks and Natural Space</p> <p>Will the decision affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Quality, proximity, or access to parks and public spaces? <input type="checkbox"/> Natural spaces or habitats? 	<p>Contact with nature facilitates cognitive and physical development and serves a restorative function throughout life. Park access increases physical activity reduces the risk of developing heart disease, diabetes, osteoporosis, and obesity. Trees and greens space remove air pollution from the air and mitigate urban heat island effects.</p>
<p>Goods and Services</p> <p>Will the decision affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Quality and proximity of financial institutions? <input type="checkbox"/> Quality and proximity of child care services? <input type="checkbox"/> Quality and proximity of health services? 	<p>Timely access and utilization of primary health services can prevent serious hospitalizations. Quality child care increases childhood educational and job outcomes. Local financial institutions help families create and maintain wealth.</p>
<p>Social Cohesion</p> <p>Will the decision affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Quality or frequency of contacts with friends, family members, and neighbors? <input type="checkbox"/> Attitudes towards or stereotypes of racial, social, and ethnic groups? <input type="checkbox"/> Participation in voluntary organizations and activities? 	<p>Physical and emotional support buffers stressful situations, supports illness recovery, prevents isolation, contributes to self-esteem, and reduces the risk of early death.</p>
<p>Social Equity</p> <p>Will the decision affect:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Segregation by race, ethnicity, or income? <input type="checkbox"/> Degree of inequality in income or wealth? 	<p>Social contact across ethnic and income groups ensures equitable access to public health and educational services. Residents of low-income and ethnically segregated neighborhoods experience high rates of teenage childbearing, tuberculosis, cardiovascular disease, and homicide. Income inequality in a region or country predicts population life expectancy independent of income in wealthy countries.</p>
<p>Social Inclusion</p> <p>Will the decision affect:</p>	<p>Participation and power in the political process affects government responsiveness to health</p>

<ul style="list-style-type: none"> <input type="checkbox"/> Degree or quality of participation in public decision-making? <input type="checkbox"/> Distribution of political power? 	<p>needs and crises.</p>
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While HIA should focus on health impacts of greatest potential significance, an HIA team needs to guard against having a selective scope. HIAs initiated by one agency or interest group, in particular, may be vulnerable to being selective in choices for impact analysis and methods. Recommendations may gravitate towards those promoting stakeholder or agency interests rather than the best available alternatives. Critics of EIA practice have long recognized that when a project proponent conducts or pays for the impact assessment, this may result in the exclusion of important community interests. Unwittingly, decision-makers may understandably accept a limited or incomplete HIA as a full and objective accounting of all health issues.

Resources and capacity to conduct an HIA should be considered in the course of scoping. While there may be many important health impacts and needs for analytic approaches, the scope of an HIA may be dependent on available data and methods as well as technical capacity to conduct the assessment. HIA methods that require the least resources include literature review, secondary data analysis, document review, and focus groups. Typically, in urban areas, there exists substantial existing data on demographic, economic, and environmental conditions. Original data collection, whether through surveys, exposure analysis, or health risk assessment, can require significant expertise and capacity.

All the agreements regarding the scoping questions should be documented as a part of the HIA process. This includes deciding who defines priority questions, who conducts the assessment, who reviews the findings, who prioritizes the recommendations, and who owns and communicates the results.

Below we include a sample HIA scoping worksheet that can be adapted for use in other contexts. We also provide an example of a completed worksheet based on a hypothetical project to widen a highway by adding a lane. The health issue under consideration in this sample worksheet is environmental noise due to the widening. Note that there are several other health impacts of this project that could be considered as well.

Sample Scoping Worksheet for HIA	
Issue: <i>Widening a 10-mile Stretch of Highway by Adding a Lane</i>	
Scoping Question	Response
Who will conduct the HIA?	Health department will coordinate the HIA, conduct the research and write the report. A community advisory body will provide oversight and feedback on the HIA process and support communications.
Specific design alternatives being studied?	Adding a lane to an existing highway No change to highway
What are the geographic and temporal boundaries?	Communities living within 1000 feet of the highway (on both sides) along the 10-mile stretch Assessing future impacts on the communities
What are the hypothesized project impacts on health or health determinants?	Increased traffic noise from lane widening will increase level of environmental noise in the adjacent neighborhood which could: <ul style="list-style-type: none"> ➤ increase annoyance and stress ➤ disturb sleep ➤ decrease ability to concentrate ➤ decrease ability to communicate outside ➤ increase prevalence of hypertension ➤ increase prevalence of heart disease ➤ negatively impact outdoor use and retail viability <p><i>Note that only one impact is listed in this example. Other impacts could be separately delineated.</i></p>
What are the existing conditions?	Significant existing noise from freight and other motor vehicle traffic on highway High levels of hypertension and heart attacks in communities living adjacent to highway Poor educational outcomes at community school
Who are the vulnerable populations?	Families living in housing adjacent to highway Low-income seniors from a nearby senior center that is close to the highway Students and staff at a community school adjacent to highway
Impact analysis questions	Will there be increased traffic on the highway as a result of the lane addition? Will the lane addition increase levels of environmental noise in the adjacent neighborhood?

	<p>Will increases in environmental noise lead to:</p> <ul style="list-style-type: none"> ➤ increased annoyance and stress? ➤ disturbed sleep? ➤ decreased ability to concentrate? ➤ decreased ability to communicate outside? ➤ increased prevalence of hypertension? <p>How will these impacts be differentially experienced by the vulnerable populations listed above?</p>
<p>What are potential alternative design choices or mitigations needing evaluation?</p>	<p>Measures to reduce noise emissions including road surface treatments or speed reductions</p> <p>Measures to mitigate exposure sound walls or building window retrofits.</p>
<p>What data sources and research methods exist to answer the identified questions?</p>	<p>Data on existing noise levels from existing environmental assessments</p> <p>Data on health outcomes from health department or hospital admissions</p> <p>Data on noise complaints filed with the local health department</p> <p>Modeled noise levels with additional traffic</p> <p>Predicted noise-related health hazards using accepted dose-response functions</p> <p>Surveys of residents</p> <p>Focus group with school officials</p>
<p>What experts and key informants will be engaged?</p>	<p>Traffic engineers</p> <p>Experts in noise modeling</p> <p>School officials</p> <p>Senior center staff</p> <p>Community leaders</p>
<p>What is the timeframe for assessment?</p>	<p>Decision to widen the highway will be made within 4-6 months</p> <p>Assessment should be completed within 3-4 months in order to submit to decision-makers</p>
<p>What is the review plan for the HIA?</p>	<p>Community advisory body to review before publication</p> <p>Traffic and noise engineers to review before publication</p>

What are potential alternative design choices or mitigations needing evaluation?	
What data sources and research methods exist to answer the identified questions?	
What experts and key informants will be engaged?	
What is the timeframe for assessment?	
What is the review plan for the HIA?	

Stage III: Assessment

Objectives:

- **Determine the baseline health status, health-relevant conditions, and vulnerabilities in the population or area potentially impacted by the decision.**
 - **Forecast health impacts using available data, qualitative and quantitative analysis, and expert and experiential knowledge.**
 - **Identify strategies for policy, program or project design, mitigations, and alternatives to protect and promote health.**
-

Assessment represents the analysis phase in the impact assessment process. The three general outputs of the assessment phase include:

1. ***Baseline conditions assessment*** A profile of existing conditions regarding population health, and related environmental and social conditions that might be affected by the decision at hand.
2. ***Impacts analysis*** Qualitative and quantitative analysis to determine potentially significant health impacts of the decision, including documentation of data sources, and analytic methods.
3. ***Strategies for policy design and implementation*** Analysis of the feasibility and effectiveness of design strategies, mitigations, and alternatives to protect and promote health.

1. Baseline Conditions Assessment

Developing a profile of existing conditions is a first step in HIA analysis. This task serves to depict the health status of affected populations, potential sensitivities and vulnerabilities, and health-relevant conditions and needs.

The profile may include indicators for health status (e.g., life- expectancy) as well as indicators for known social, economic, and environmental health determinants (e.g., wages, air pollutant concentrations). The selection of indicators for a baseline conditions analysis should aim to reflect priority health issues as determined both by knowledgeable experts and

local residents. The table below provides examples of potential community-level health indicators particularly relevant to urban areas in the United States.

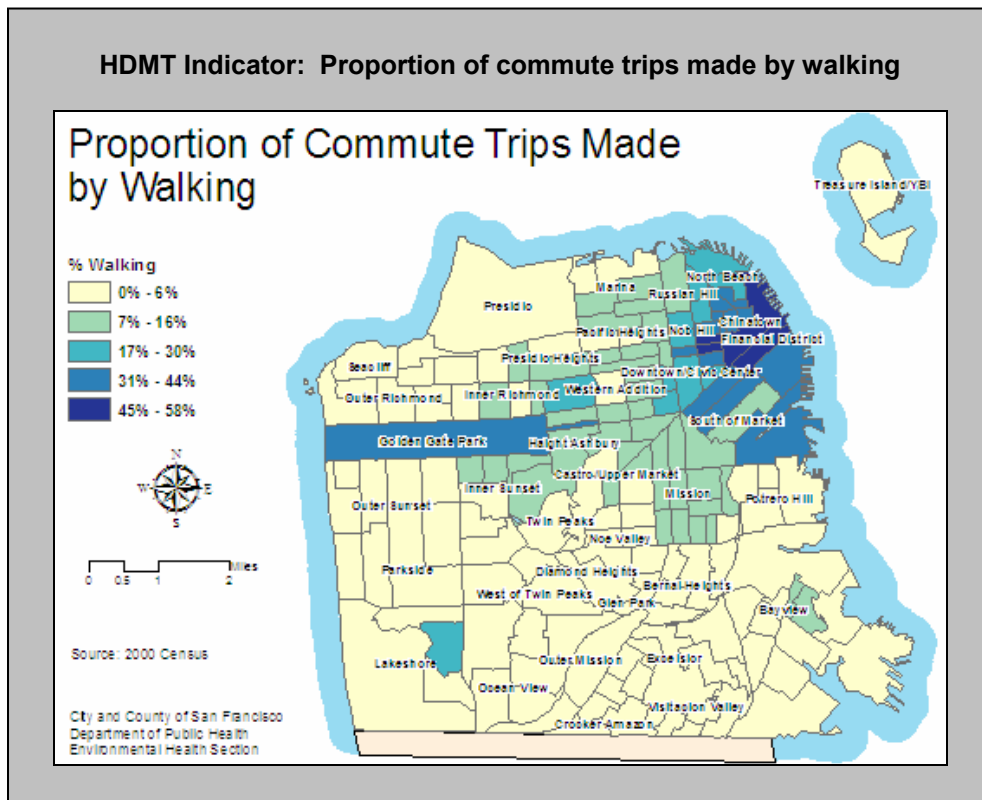
Baseline conditions analysis typically relies on available data. There are diverse sources for indicators and data appropriate for baseline conditions analysis within HIA. For example, in the U.S., the *Behavioral Risk Factor Surveillance System* (BRFSS) provides data on indicators of certain health behaviors and risk factors, the *National Center for Health Statistics* (NCHS) compiles national vital statistics, and the *Bureau of Labor Statistics* (BLS) provides data on labor and employment conditions. Data on environmental conditions are available from regulatory agencies and are often mapped spatially. For example, the U.S. Clean Air and Clean Water Acts created a national system to monitor select pollutants and the U.S. Environmental Protection Agency maintains data on air and water quality nationally. Local and state governments may track diverse data including: traffic volumes, ambient levels of noise, traffic accidents, reported crime, and housing code violations.

Several cities and some states have developed comprehensive indicator systems specifically for monitoring conditions relevant to health. *Communities Count* is a comprehensive health indicator system for King County, Washington (www.communitiescount.org). The Connecticut Association of Directors of Health has devised the *Health Equity Index* as a tool for evaluating social conditions in a community (www.cadh.org). In San Francisco, the Department of Public Health developed the *Healthy Development Measurement Tool* (HDMT) which includes a comprehensive set of community health indicators (www.thehdmtool.org).

Understanding baseline conditions is particularly important for HIA because pre-existing conditions both at the community and individual levels can mediate health impacts associated with environmental changes. For example, populations with baseline exposure to high levels of air pollutants or a high prevalence of diseases sensitive to pollution may be vulnerable to adverse health impacts from small incremental increases in air pollution.

Profiles of baseline conditions can serve a useful role in illustrating variation or inequities in health status or health determinants related to place or population characteristics. Such inequities may highlight vulnerabilities related to health impacts or needs for project or policy design. The map below, one indicator in the HDMT, illustrates spatial variation in the proportion of commute trips made by walking in San Francisco. On one hand the relative proportion of walkers is an indicator of the completeness of neighborhood goods and

services, particularly transit services. On the other hand, walking prevalence suggests vulnerability to traffic hazards and the need for attention to pedestrian safety. Secondary data may need to be specially coded or re-analyzed to illustrate such spatial variations.



Profiling baseline conditions may involve original data collection. Diverse examples exist of localities developing indicators to illustrate health-relevant conditions. For example, to support HIA for development projects, San Francisco developed a *Pedestrian Environmental Quality Index* (PEQI) that requires collecting data on factors such as street crossing distance, signal timing, cross walk treatments, lateral separation, traffic speeds, traffic volumes, driveway conflicts, turn conflicts, lighting, and shade trees (www.sfpbes.org). In HIA, the PEQI can be used both to prioritize pedestrian infrastructure improvement needs and to evaluate changes in transportation infrastructure with regards to the needs of walkers.

In 2008, the California Center for Public Health Advocacy, created a *Retail Food Environment Index* (RFEI) based on the relative numbers of fast-food restaurants and convenience stores, supermarkets, and produce vendors. Understanding the baseline RFEI, for example, could be important in assessing the scope, value, and impact of policies either limiting or supporting alternatives to fast food outlets. Similar metrics to profile baseline health conditions could be creatively developed to meet local needs and priorities for other issues and settings.

Health Determinants	Examples of Community Health Indicators
Livelihood	<ul style="list-style-type: none"> ▪ Proportion of area residents employed ▪ Proportion of area residents living in relative or absolute poverty ▪ Share of jobs that have self-sufficiency incomes, paid sick leave, or health insurance
Housing	<ul style="list-style-type: none"> ▪ Ratio of median income to median cost of housing ▪ Proportion of population living in overcrowded conditions ▪ Proportion of households without adequate heat, water, or sanitary services
Transportation	<ul style="list-style-type: none"> ▪ Vehicle miles traveled per capita ▪ Proportion of households commuting to work by public transit ▪ Number, type and location of traffic collisions
Retail and public services	<ul style="list-style-type: none"> ▪ Proportion of population within ½ mile of a full-service grocery store or fresh produce market ▪ Proportion of population within a 30 minute transit or walking commute of a primary care public health facility ▪ Proportion of population within ½ mile of regional transit stop and ¼ mile of local public transit stop ▪ Proportion of residential units within ¼ and ½ mile of public elementary and middle schools
Access to parks and natural space	<ul style="list-style-type: none"> ▪ Proportion of population within ¼ mile of neighborhood or regional park, open space, or publicly accessible shoreline ▪ Acres of neighborhood parks and natural habitats per capita ▪ Proportion of land area under tree canopy
Access to primary health services	<ul style="list-style-type: none"> ▪ Proportion with government provided health services or health insurance ▪ Proportion of households within 1 mile of a health care center primary care services
Environmental quality	<ul style="list-style-type: none"> ▪ Proportion of population living a safe distance from roadways and industries emitting hazardous pollutants ▪ Capacity of drinking water supply ▪ Proportion of population living with ambient noise levels below 65 decibels ▪ Acres of cultivatable land ▪ Per capita waste generation

Health Determinants	Examples of Community Health Indicators
Social cohesion	<ul style="list-style-type: none"> ▪ Proportion of voting age population participating in elections ▪ Perceived level of safety and “trust” of neighbors ▪ Rates of violent and property crimes ▪ Residential segregation by race/ethnicity and income

2. Impacts Analysis

Predictions of the health impacts of a policy decision require use and synthesis of data and evidence from diverse sources including empirical research, expert opinion, local knowledge, and health risk assessment (see text box).

Using epidemiological evidence

Epidemiological studies and reviews are a common basis for predictive judgments in HIA. The use of epidemiological studies begins with a review of available empirical research focused on the outcomes and predictors of interest or intermediary variables in causal pathways. Study inclusion criteria for reviews should consider populations or time periods of interest. The review involves critical evaluation of study methods in order to evaluate their internal validity. As is the case with other reviews, the reviewer should be attentive to limited study power, and biases due to selection error, loss to follow-up, analytic methods, and confounding.

Types of Data that Supports Impacts Analysis:

- Epidemiological studies and other empirical literature
- Interviews, focus groups, or surveys with community residents and local experts
- Indicators of social, economic, environmental, and health conditions
- Regulatory standards and other benchmarks
- Environmental measurement and modeling
- Risk assessments or other quantitative forecasts

Searchable databases, like *PUBMED* maintained by the National Institutes of Health, provide access empirical literature in biomedicine and other disciplines (www.ncbi.nlm.nih.gov/pubmed). The *Guide to Community Preventive Services* is a collection of systematic reviews of programs and policies to improve health and prevent disease (www.thecommunityguide.org). In addition, the *Campbell Collaboration* provides systematic reviews of social interventions in education, crime and justice, and social welfare (www.campbellcollaboration.org). Public agencies, colleagues, online searches, and professional networks are sources for other unpublished works.

Statistical or spatial associations based on empirical observation through epidemiological studies do not necessarily demonstrate cause and effect relationships. For example, while several studies have demonstrated that people in proximity to supermarkets have better nutritional quality, evaluation research has not demonstrated clear beneficial effects of new supermarkets in deprived areas on nutrition (Petticrew 2007). Criteria, such as those

proposed by Sir Bradford-Hill, may help evaluate whether the weight of evidence lends support for a cause and effect relationships (Hill 1965). Inferences made from internally valid epidemiological studies are also challenged by issues of external validity. It may not be possible to generalize findings from limited studies across time, place, or demographic subgroup.

In making predictions about health impacts, it is important to consider how effects may be mediated by particular conditions of a particular place or time. For example, health impacts of a decision to convert farm land to residential uses will depend on the remaining agricultural resources and who controls or owns those resources. Similarly, health impacts of a decision to demolish and redevelop existing housing will depend on the supply and cost of remaining housing.

Health effects also will depend on particular vulnerability or resiliency factors in a community not affected by the decision. A population may have greater susceptibility for specific health impact because of a demographic characteristic (e.g., poverty, the susceptibility of the young to pedestrian injuries); a higher prevalence of certain health conditions (e.g., asthma); environmental hazards or stressors (e.g., noise); or cultural dependence on natural resources (e.g., sustenance consumption of local wildlife).

Local knowledge

Understanding local conditions and population vulnerabilities requires access to the day-to-day experiences of community members and their knowledge and perceptions of impacts. Such *local knowledge* (i.e., ecological knowledge) can be accessed through qualitative research, including focus groups, structured and unstructured interviews, and, group consensus processes. The local knowledge of community organizations and residents can establish impacts, complement, or corroborate findings established with quantitative methods or raise additional hypotheses for research and analysis. Particularly important local sources of expertise for HIA include community leaders, local medical providers, and public health officials.

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Evaluative Standards

Another potential approach to analysis in HIA is to use existing qualitative or quantitative evaluative standards (e.g., benchmarks, checklists, thresholds, etc) to assess the presence or absence of important health impacts. This approach is common in regulatory compliance for environmental quality where conformity with environmental health or public health standards is considered a proxy for the absence of significant adverse impacts. Standards used in HIA may include those for the quality of a planning process as well as for outcomes or impacts. The approach requires an agreed upon set of standards and sufficient data about a decision outcomes to evaluate the decision against the standards. For example, the *Healthy Development Measurement Tool* (HDMT; www.thehdmtool.org) includes a checklist of quantitative and qualitative development targets that can be used to evaluate a typical urban development project. The development of the HDMT and these targets occurred both through a public process to select and prioritize impacts and indicators and a peer-review process to set quantitative targets (Farhang 2008). Design for Health's *Thresholds Analysis Workbook* is a comprehensive score-based system which includes quantitative health thresholds for land use and urban planning (Forsyth 2009; www.designforhealth.net).

The use of evaluative standards as a surrogate mechanism to conduct analysis in HIA has appeal because of efficiency; at the same time, reliance on standards has several drawbacks and limitations. First, there may not be available or agreed-upon standards for all health issues relevant to a policy sector or class of projects. Second, as HIA aims to provide a context-specific analysis, standards instruments may have either gaps or conflicts relative to local health priorities. As a consequence, an HIA that uses pre-established evaluative standards may functionally bypass the scoping process. Finally, since the process of standard setting typically reflects both technical feasibility and political and economic considerations, standards may not be adequate to meet the actual health needs of a place or population.

Quantitative forecasting

Quantitative estimation provides an additional measure of the magnitude of health impacts and can strengthen health-based decision-making. Outcomes available for quantitative estimation may include measures of life expectancy, quality adjusted life years, disease incidence or prevalence, health care utilization, health protective or health-risk behaviors, and environmental exposures.

Methods for quantitative estimation of health outcomes often involve some variation of the approach used in human health risk assessment (HRA). Generally, a risk assessment provides a quantitative estimate of a risk or hazard from a particular exposure based on available data (e.g., exposure, dose-response function) and documents the model,

parameters, assumptions, and uncertainties used to make judgments. The output of a risk assessment is expressed as a probability or frequency of a harmful effect on individuals or population resulting from environmental exposure. The approach can be applied to any quantitative exposure-response relationship and to the prediction of beneficial impacts.

The usual inputs needed for quantitative forecasting include measures of baseline and future exposure, along with an exposure-response relationship (also called a dose-response function). In general, exposure-response relationships are derived from experimental or epidemiological studies. Where available, it is preferable to use exposure-response relationships based on meta-analysis of high-quality studies or based on expert consensus. As much as possible, HIA should employ local data with regards to exposure and baseline prevalence of health conditions (e.g. mortality rates) in HRA approaches.

Example of Quantitative Analysis: San Francisco Living Wage Ordinance, 1999

At the request of the Board of Supervisors, the San Francisco Department of Public Health conducted an analysis of a proposed living wage ordinance for San Francisco, providing quantitative estimates of the adoption of a living wage of \$11.00 per hour impact on adult health and children's development outcomes (Bhatia & Katz, 2001). The assessment applied effect measures for diverse outcomes from peer-reviewed studies meeting minimum study quality criteria. Quantitative outputs included a decrease in the risk of premature death by 5% for adults 24-44 years of age in households whose current income was around \$20,000. For the offspring these workers, the analysis estimate that a living wage would result in an increase of a quarter of a year of completed education, a 34% increased odds of high school completion, and a 22% decrease in the risk of early childbirth. The analysis was used in city policy discussions both on the living wage and subsequent County wide minimum wage standard in 2003.

The general approach used in risk assessment can be applied to predicting the health impacts of changes in a broad array of environmental conditions so long as there is adequate exposure data and valid, causal exposure-response relationships. For example, forecasting impacts of a new transportation facility on respiratory disease could employ motor vehicle emissions and physical dispersion models to predict changes in regional and local air pollutant concentrations and apply those exposures to pollution-respiratory disease dose-response functions.

The approach used to predict hazards associated with environmental factors can also be used to predict health impacts from changes in “exposures” to social and economic factors. Such quantitative forecasting often requires multidisciplinary expertise in planning, environmental sciences, exposure assessment, toxicology, economics, and epidemiology. Using effect estimates from epidemiologic research, researchers have quantified changes in health status outcomes related to changes in income (Bhatia & Katz 2001; Cole 2005)(See text box above). The table below identifies examples in which HIA practitioners in the United States have used data and tools to quantitatively predict health impacts.

Examples of Quantitative Modeling in Health Impacts Assessment

HIA Subject	Inputs	Outputs	Data and Tools Used
Eastern Neighborhoods Rezoning Plan, San Francisco, CA	Expected changes in land uses, transportation uses, and demographics	Chances in vehicle-pedestrian collision frequencies.	<ul style="list-style-type: none"> ▪ San Francisco Vehicle-Pedestrian Injury Collision Model (Wier 2009) ▪ San Francisco County Transportation Model (SFCTA 2009) ▪ Estimated population and vehicle trip changes
Railroad Avenue Specific Plan, Pittsburg, CA	Highway traffic volumes Train frequencies Air and noise emissions models	Ambient particulate matter concentrations Ambient sound levels Traffic attributable pre-mature mortality rates Noise attributable sleep	<ul style="list-style-type: none"> ▪ Federal Highway Administration Traffic Noise Model (cite) ▪ CAL3QHCR Air Quality Dispersion Models (cite) ▪ Highway traffic volumes ▪ Meteorological data ▪ Commuter train noise measurement

		disturbance and annoyance	
Living Wage Ordinance, San Francisco, CA	Proposed wage increases Baseline wage and household income distribution	Wage related changes in: Adult longevity High school graduation rates Teenage pregnancy	<ul style="list-style-type: none"> ▪ Epidemiologic studies on income and health and child development outcomes ▪ Bureau of Labor statistics on wages and income
Menu Labeling Ordinance, Los Angeles, CA	Number of chain fast food restaurant meals served	Changes in caloric value of meals Expected changes in population weight gain	<ul style="list-style-type: none"> ▪ National fast food restaurant meal consumption data ▪ Observational studies on impacts of calorie labeling on food purchasing behaviors ▪ Assumptions relating meal calorie reduction to weight
Maximum Speed Limit Reduction, State of California	Baseline highway speed / traffic volume distribution Expected changes in highway speeds	Changes in: Greenhouse gas emissions Particulate matter emissions Fatal collisions Fuel consumption	<ul style="list-style-type: none"> ▪ California Department of Transportation highway traffic database (cite) ▪ Department of Energy fuel economy data ▪ California Air Resources Board EMFAC 2007 Emissions model (cite) ▪ Empirical studies on changes in speed limits, on highway speeds and injury rates

Example of Quantitative Analysis: Assessing Pedestrian Impacts of Growth in San Francisco

In order to predict the effects of land use development on pedestrian safety in San Francisco, the Department of Public Health developed a County-level model of environmental predictors of pedestrian-vehicle collisions (Wier 2009). Using binomial multivariate regression, eight variables predicted 71% of the variation in ten-year averaged pedestrian-vehicle frequencies among census-tracts: traffic volume; proportion of arterial streets; neighborhood commercial land use; total land area (square miles); employee population; resident population; proportion of households in poverty; and proportion of residents older than 65. Planning data, including data on future resident and employee populations and data on traffic volumes, provided parameters for the model's use to estimate prospective impacts on pedestrian-vehicle collisions. The model predicted that planned growth in four historically industrial and mixed-use neighborhoods would result in a cumulative 17% increase in 5-year pedestrian injury collision totals or over 30 additional collisions each year (see table). Notably, changes in expected collision frequency were greater than changes in expected traffic volume in areas with existing high volumes.

Estimated changes in modeled pedestrian-vehicle collision frequencies associated with Proposed Eastern Neighborhoods Plans

Planning Area (N, Census Tracts)	Change in Traffic Volume (%)	Change in Population (%)	Estimated change in Pedestrian Injury Collisions (%)
Eastern SOMA (N=5)	15%	25%	20%
Mission (N=13)	15%	8%	14%
Show Place Square / Potrero Hill (N=9)	15%	39%	21%
Central Waterfront (N=3)	15%	58%	24%
All Eastern Neighborhoods (N=23)	15%	16%	17%

Quantitative forecasting is not always feasible or desirable in HIA. Before embarking on quantitative analysis, the HIA team should determine not only what quantitative methods are available to predict impacts of concern and whether data and capacity exists to use such methods but also whether quantitative estimation supports the goals of the HIA. While in some cases, quantitative estimates of the magnitude of impacts could contribute to the selection or justification of alternatives and mitigations, quantification can also be resource intensive, divert from other impact assessment activities, and result in controversy over the precision and validity of the estimates themselves.

Mapping

Maps are most typically used in HIA to relationships between places, populations, and environmental conditions based on available data and can serve several objectives in HIA. First, they can illustrate the presence or absence of an environmental hazard in relationship to place or the presence of populations. Maps can illustrate the location of “hot spots” or conditions that make risky certain types of development. In a HIA conducted to evaluate the impact of Port operations on West Oakland, maps illustrated the location of collisions involving trucks. Similarly, maps can be used to identify the location of community resources related to health, including public infrastructure such as transit, private services like grocery stores, and natural resources like parks. Maps can further visually illustrate the distribution of hazards or resources in a place providing a means to identify disparities and inequalities in conditions. Furthermore, maps can be used to illustrate the joint relationship of an environmental condition and a vulnerability factor (e.g. sources of air pollution and presence of low-income households).

Maps can be used in several other creative ways. Community mapping can allow a local population identify the type and location of key health resources and needs supporting the protection or acquisition of those resources through HIA. In an HIA conducted to support the development of the Mac Arthur Bart transit village existing aerial maps (accessed via google.org) served as a mechanism to evaluate the safety of pedestrian routes from the proposed village to common destinations (e.g. schools).

Original epidemiological investigations

While resource intensive, HIA practitioners may also conduct original epidemiological studies to generate an understanding of health impacts or may develop and validate

exposure-response relationships. For example, in the example above, researchers used regression models to relate environmental characteristics to the number of vehicle-pedestrian injury collisions in San Francisco (Wier 2009). This model served to predict the impacts of changes in land use designations on pedestrian collisions. Original epidemiological investigations may be particularly warranted where the intensity of effect is potentially large but uncertain.

Economic valuation of health impacts

Occasionally, there may be additional value in placing an economic value on quantified health impacts. While placing costs on health and welfare outcomes notably raises ethical issues, data is often available to quantify the economic costs of outcomes such as years of lost life, loss of quality of life, health care utilization, and the loss of employment. For example, an HIA that predicts changes in pedestrian injuries could also compute the related economic costs of avoidable health care utilization or prevented injuries. Analysis of proposed San Francisco air quality regulations for building residences near busy roadways estimated the economic value of ventilation system impacts on premature mortality to be in the range of \$170,082 per dwelling unit (SFDPH 2008). This value was used in a cost benefit analysis of the regulation conducted by the City Controller. The U.S. Environmental Protection Agency (EPA) has guidelines for economic analysis that may be employed in HIA (USEPA 2000).

While economic valuation may be complementary to health impacts analysis, it should not be the primary or dominant output of HIA. In addition, the HIA team as well as decision-makers should consider that economic valuation may undervalue outcomes that are either not quantified or given an economic value, may result in unequal values to similar health outcome in different population, or may undervalue health outcomes in populations not in the labor force.

Analysis of disproportionate and adverse impacts

An explicit objective of HIA is to prevent public policies from generating or perpetuating health inequities. Health inequities are the systematic disparities in health status (or in the major social determinants of health) between groups with different social advantage/disadvantage (e.g., wealth, power, prestige) (Braveman 2003).

Identifying and addressing health inequity through HIA is similar to fulfilling existing Federal government mandates to achieve environmental justice. The U.S. EPA defines environmental justice as 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. Fair treatment means that no group of people, including a racial, ethnic, or a socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from the execution of federal, state, local, and tribal plans, programs and policies. Executive Order 12982 charged U.S. Federal agencies to make achieving environmental justice part of their missions by: identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the U.S. and its territories and possessions (Clinton, 1994). A Presidential memo accompanying the order further charged agencies to analyze and mitigate disproportionate impacts through the NEPA process.

The determination of whether an action will cause adverse health effects disproportionately burdening a socially excluded population requires an evaluation of four factors:

1. Whether the action will have significant adverse health or environmental effect on a vulnerable population (e.g., low income, elderly, ethnic minority);
2. Whether the magnitude of the adverse effect (e.g., the risk or rate of hazard exposure) on that population, is likely to exceed the risk or rate to a comparison group in the general population;
3. Whether the effect will contribute cumulatively to a pre-existing adverse condition or exposures; and
4. Whether attributes common to a vulnerable population will mediate or exacerbate an adverse health effect on the population. (CEQ 1997; EPA 1998)

For this last factor, it is important to note that disproportionate health or environmental effects on vulnerable communities may occur both because of proximity to a hazard (e.g., greater exposure to pollution) and also because a shared vulnerability (e.g., higher prevalence of a disease), a shared cultural practice, or unique dependence on an impacted environment resource (e.g., locally caught fish for sustenance).

Consideration and analysis of disproportionate impacts or environmental justice concerns should be conducted in HIA. In general the data and tools required to look at disproportionate impacts are no different from the tools used in impact analysis. Demographic data may be used to indicate the presence and location of socially vulnerable communities; GIS tools may aide spatially correlating impacts with the location of affected populations; and local public health data may bring attention to health sensitivities of local populations. Known health concerns about a project or plan among members of lower-income or socially marginal communities should sensitize the HIA team to the potential for disproportionate impacts and the need for their rigorous consideration.

{INSERT EXAMPLE OF DISPROPORTIONATE IMPACTS ANALYSIS FROM EXCELCIOR HIA}

Validity of Impact Analysis Judgments

HIA is not a practice that establishes cause and effect relationships; rather HIA applies available knowledge and theory to make reasoned judgments about the future (Veerman, 2007). The task of prediction in HIA is analogous to the task of diagnosis and prognosis in medical practice. Here a practitioner uses his training and experience along with a patient's history, and tests to predict a patient's fate. Error and uncertainty are assumed and experimentation (e.g., diagnostic interventions), monitoring, and adjustment to therapy is allowed and expected.

Within HIA, the validity of judgments rests on whether the judgment is plausible, is based on sound scientific evidence, applies good judgment, and acknowledges uncertainty. Principles for the ethical use of evidence are outlined in the IAIA HIA Practice Principles (Quigley 2006) and

include considering and valuing all forms of evidence and acknowledging uncertainty.

Transparency demands documenting sources of evidence and methods, including literature search strategies, justifications for both the use and exclusion of particular methods, and

Principles for the Ethical Use of Evidence in HIA

- Consider evidence, both supporting and refuting *a priori* hypotheses, from diverse sources including: available statistics, empirical research, professional expertise and local knowledge, and the products of original investigations.
- Utilize evidence from well-designed and peer-reviewed systematic reviews.
- Justify the selection or exclusion of particular methodologies and data sources.
- Make explicit any assumptions used judgments, particularly quantitative estimates of hazards or impacts.
- Identify data gaps, uncertainties, and limitations.
- Allow stakeholders to critique the validity of findings.

where insufficient knowledge exists to assess health impacts. Making judgments on the quality of evidence is not straightforward, however, the use of accepted scientifically valid methods, peer-reviewed evidence, and systematic reviews are three possible criteria for evidence quality. Valuing all forms of evidence means that in addition to traditional sources of data and expertise, the assessor considers local knowledge. In general, the use of diverse and complementary approaches supports better judgments.

The lack of robust formal scientific evidence should also not preclude reasoned, experience-based predictions. It is quite possible to make informed judgments of health effects based on available information while recognizing data and evidence limitations.

{INSERT EXAMPLE OF JUDGEMENT ACKNOWLEDGING UNCERTAINTY FROM PAID SICK DAYS HIA }

When making predictions, it is critically important to document all of the assumptions used. For example, a prediction may assume presence or persistence of certain environmental, social or economic conditions or the applicability of findings in one population to other populations. An HIA should at least qualitatively assess the uncertainty of findings and predictions and acknowledge assumptions in forecasting methods and inferences from empirical work. Sensitivity analysis can test certain assumptions and support judgments. Allowing experts and stakeholders to criticize HIA findings through opportunities for public comments on a draft report can help identify such limitations.

{INSERT EXAMPLE OF SENSITIVITY ANALYSIS IN HIA – E.G. Menu labeling }

HIA assessors need to be cautious about either overstating or understating impacts or their certainty. Overstating or understating important benefits or harms may result from stakeholder, decision-maker, or regulatory agency influence on a practitioner or a practitioner's own bias. Omitting an impact or its distribution in the scoping process can result in an equally important error in judgment about a decision's overall impacts.

The greatest mystery of modernity is that we think of certainty as an attainable state. Uncertainty has become the threat to collective action.

Sheila Jasanoff, 2007

Assessment of the Significance of Impacts

Assessment of impact significance is traditionally a part of most impact assessment processes. Significance of impacts relates both to objective characteristics of impacts (see text box) along with how societies value or prioritize these characteristics. Clearly important is the magnitude or intensity of the impact and its extent over time and space. Other characteristics of impacts include the certainty of whether an impact will occur, whether or not the impact adds or acts cumulatively with other impacts or existing conditions, whether or not there are distributional effects (inequities), whether the impact is reversible or permanent, and whether the impact can be mitigated.

Established quantitative criteria for impact significance exist for some health impacts and health-relevant environmental conditions. In these cases, legal, regulatory standards, or established policy goals (e.g., National Ambient Air Quality Criteria, Healthy People 2020) can serve as the basis for judgments of significance in impact assessment; however, as discussed above, established benchmarks may not reflect local values or exist for the breadth of impacts likely to be found in HIA.

Objective characterization of the magnitude, direction, and certainty of health impacts, does not necessarily equate to conclusions about the social significance of impacts. Social significance involves additional value judgments made outside of and apart from the HIA process.

Judgments of about social significance are understandably normative. Social values or priorities (e.g., adversity to risks, relative value of individual or collective risks) can vary considerably among and within populations and places and values related to the acceptability or unacceptability of impacts are often in conflict among affected populations. For this reason, the social significance of impacts characterized in HIA should be determined in a transparent process by stakeholders and affected community residents typically apart from the HIA process. HIAs can be expected to generate substantial discussion about the societal value or significance of the findings; however, it is not the usual role of the HIA team to make judgments about the social significance of the impacts. Several participatory and deliberative processes described in the section on stakeholder participation above may be particularly useful in developing consensus on significance.

3. Strategies for Policy Design and Implementation

A key function of HIA is to identify and analyze opportunities for the decision to respond to the needs of health. The HIA may identify alternative ways to design a policy, program, project or plan, its location, or its timing in order to benefit health or incorporate mitigation and management strategies to lessen anticipated adverse health effects of decisions. HIAs could also suggest ways to monitor potential but uncertain impacts or identify needs to enhance communication with stakeholders. Strategies recommended by an HIA should be responsive to and grounded by the findings of impacts analysis.

It is not always necessary or appropriate for an HIA to include recommendations. HIA primarily serves to analyze impacts. Also, in cases, an HIA will be informing a decision with discrete choices with limited opportunity for alternatives. For example, HIAs conducted on legislative initiatives on minimum wage and paid sick days requirements in California documented health impacts but did not endorse positions on these policy choices or offer alternatives. Decisions made during scoping may also limit the role of the assessment in proposing changes to the policy under review.

Describing a complete process to identify the breadth of potential alternatives and mitigations is beyond the scope of this guide. Developing, evaluating, and prioritizing strategies, whether alternatives or mitigations, first requires a clear understanding of a proposed project, plan, or policy and knowledge and research of existing policy implementation, design practices, and mitigation. Typically, considering alternative policy designs requires consultation with others as expertise for recommendations may not be within the HIA team and underscores the need for HIA to be an interdisciplinary analysis. The skills and expertise needed to identify and analyze alternatives and mitigations are often different from those needed to identify and analyze health impacts. These skills may lie with project proponents, others who are familiar with project design and implementation, community members, and other professionals. Communication with policy-makers/developers and stakeholders is often needed to gauge the buy-in or feasibility of policy changes.

Criteria for Alternatives and Mitigations

- Responsive to predicted impacts
- Specific and actionable
- Experience-based and effective
- Enforceable / can monitor
- Technical feasibility
- Political feasibility
- Economically efficient
- Multi-objective
- No additional negative consequences

HIA should provide substantive analysis of why recommended changes are justified and beneficial, including, where possible, HIA should estimate effects on mitigated health outcomes. The inclusion and implementation of mitigations and alternatives into a project or policy design would also be supported by evidence of feasibility, efficiency, cost-effectiveness, and political acceptability. Further analysis might test the sensitivity of outcomes to a design change.

{INSERT EXAMPLE – COST- BENEFIT ANALYSIS OF VENTILATION REQUIREMENTS}

HIA practitioners should be mindful that identification and incorporation of mitigations may not always result in policy decisions that are healthful or ethical in a holistic sense. For example, a decision to incorporate mitigations may provide needed political support for policy adoption even though those mitigations may only offer partial relief from adverse health impacts of a policy. Because HIA typically looks at multiple health-related outcomes, it is important to provide an evaluation of a policy holistically with and without available and recommended design alternatives.

Examples of Policy / Project Design Changes Resulting from HIA Recommendations**Public Housing Flooring Policies, San Francisco, 2004****Insert****National Petroleum Reserve – Lease Sales, Alaska, 2007**

Participating as a cooperating agency in the NEPA process, the Alaskan Intertribal Council conducted an HIA on proposed oil and gas leasing in the 4.6-million-acre Northeast National Petroleum Reserve, which lies within Alaska's 89,000-square-mile North Slope Borough. The Bureau of Land Management encouraged leasees and permittees engaged in oil and gas exploration, development, and abandonment procedures in the planning area to work with the local communities to develop and implement measures to avoid or minimize the potential impacts. The Environmental Impact Statement included strategies to mitigate potential impacts on infectious disease transmission, sustenance resources, nutrition, and livelihoods based on strategies used in development experiences elsewhere in the world (Wernham 2007) {Specify mitigations}.

Redevelopment of the Trinity Plaza Apartments, San Francisco, 2004

Playing an advisory role to the San Francisco Planning Department in their environmental review process, the San Francisco Department of Public Health analyzed the potential health effects of a proposal to demolish and redevelop a 360-unit rent-controlled apartment building. The analysis corroborated community concerns about the health consequences of the demolition and displacement, including psychological stress, fear, and insecurity due to eviction, as well as crowding and substandard living conditions. As a result, Planning Department officials revised the required scope of the project's Environmental Impact Report to include a no-displacement alternative and analysis of any indirect impacts of displacement. Subsequently, the no-displacement alternative was selected and approved by planning officials (Bhatia 2007).

Eastern Neighborhoods Rezoning and Area Plans, San Francisco, 2007

Participating as part of a team conducting the environmental impact assessment for the Eastern Neighborhoods Rezoning and Area Plans, staff from the San Francisco Department of Public Health analyzed conflicts between industrial uses, roadways, and proposed new residential uses and found that the rezoning would substantially increase human health hazards from noise, air pollutants, and pedestrian collisions. The analysis proposed mitigations for each of the three impacts. Final mitigations required that projects assessed proximity to high traffic volumes, estimated the concentration of PM 2.5 from traffic sources, and evaluate noise hazards. Additional mitigations (e.g., ventilation systems, acoustical insulation) were required if exposure levels were above a pre-defined threshold (Bhatia and Werhnam 2008).

General Plan Update, Humboldt County, 2008

As part of a General Plan update, the Board of Supervisors of Humboldt County requested that the public health agency consider the health impacts of three future growth alternatives ranging from restricting development to existing urban areas to allowing continued sprawl. The public health officer consulted with a non-profit organization to conduct an HIA on the three alternatives, with participation from the planning agency and a community group (Human Impact Partners, 2008). The analysis based upon 35 community-prioritized indicators found that the compact development alternative would improve health outcomes related to almost all the indicators, while the sprawl alternative would harm health. The HIA process led to a strong partnership between the planning and health agencies as well as to an increase in participation in the General Plan process on the part of community members. The planning agency used the HIA extensively in forming the policies in the Circulation element and to support infill policies in the Housing Element.

Stage IV: Reporting

Objective:

- **Communicate the findings and recommendations of an HIA in the decision-making processes.**
-

The purpose of an HIA report is to provide a succinct and coherent statement of the potential health impacts of a proposal and its alternatives to decision-makers, responsible administrators, and decision-stakeholders. The HIA report can also include mitigations and measures to prevent negative impacts or strengthen health benefits.

The HIA report serves to document the HIA process and the methods used for analysis. A comprehensive report should identify all the participants and their roles in the HIA, describe the scoping process, and describe assessment outcomes. The report should, for each issue analyzed, discuss the available scientific evidence, profile existing conditions, describe analytic methods, document and interpret analytic results, characterize the health impacts and their significance, and, if necessary, list recommendations for policy, program, or project design alternatives or mitigations. If included, recommendations for decision alternatives, policy recommendations, or mitigations should be related to impacts and justified with regards to both feasibility and efficacy.

HIA reports should be succinct, objective, based on facts and evidence, and internally consistent. A successful report often focuses attention on the key information, whether impacts or alternatives, necessary to drive action. The HIA report may include detailed technical appendices or reference more detailed studies that provide the basis for judgments and recommendations.

Effective reporting requires synthesizing the findings and recommendations in a way meaningful to the target audiences. An HIA report may serve as the basis for more targeted communication; for example, through comment letters on environmental impact reports, fact sheets, public testimony, panel discussions, and peer-reviewed publications. Stakeholder groups and the media may utilize such targeted communication to support the translation of HIA results into action.

Reporting may require developing a consensus among the project team on what to report and to whom. This process may raise conflicts between issues and interests involved in the HIA. While it is necessary to prioritize findings and recommendations, the HIA best serves health interests by reflecting an objective and transparent reporting of findings. If needed, findings may be reasonably prioritized based on overall magnitude of health benefit, impact on vulnerable populations, and perceived public concern.

The HIA reporting process should offer stakeholders and decision-makers a meaningful opportunity to critically review evidence, methods, findings, conclusions, and recommendations. Ideally, a draft report should be made available and readily accessible for public review and comment. Upon receipt of comments, the HIA team should address substantive criticisms either through a formal written response or through report revisions before finalizing the HIA report. The final HIA report should be made publicly accessible.

Key Potential Gaps to Avoid in HIA Reports	
Gap	Rationale
Failure to identify policy objective(s) of the decision	Health impacts should be evaluated in a holistic context where the policy objectives and alternatives are clearly articulated. Without understanding the policy objectives, readers are unable to consider trade-offs associated with health and other environmental or social impacts
Failure to identify key design features or parameters of the policy, plan, or project	The impacts of a policy are dependent on its design; mitigation strategies typically involve changes to design parameters. Analysis and consideration of mitigations need to be grounded in an understanding of the proposed design. For example, if the HIA describes a proposal to mine coal, it should also describe facilities needed to transport coal and plans to reclaim land after exploitation.
Failure to document the scoping process or its outcomes	All HIA analysis flows from the scoping process. Decisions on what to study and what methods to use should be transparent so readers understand why assessors focused on particular impacts or used particular analytic choices.
The report does not provide a profile of baseline conditions relevant to health impacts	Prospective health impacts are dependent on baseline health conditions. For example, the impact of a freeway expansion on asthma hospitalization rates would be worse in communities with high baseline asthma prevalence, for example, due to substandard housing conditions.
The report	While reports should be succinct, HIAs should report on all

<p>selectively discusses the impacts analyzed</p>	<p>impacts analyzed whether or not findings are adverse vs. beneficial or significant vs. insignificant. Full reporting suggests a more transparent and accountable process. Failure to do so could bias decision-making and raise public concerns about the quality of the decision-making process.</p>
<p>The report does not describe vulnerable populations or disproportionate impacts</p>	<p>An impact may have no appreciable health effect on a population as a whole but may significantly impact a subpopulation. For example, a project that results in poisoning local fish populations may have marginal nutritional impact on most residents but may severely negatively affect the nutrition of subpopulations both culturally and economically dependent on fishing.</p>
<p>The report does not describe assumptions and parameters used in assessment models</p>	<p>The validity of predictions is often dependent on the validity of assumptions. For example, prediction models based on national data may not be valid if there are substantial differences between national and local populations in model parameters.</p>
<p>A report does not justify a determination of significance and non-significance</p>	<p>Significance or acceptability is a subjective judgment that should be validated against the norms of a place or context. Assessors should not judge an impact as non-significant without reference to an established standard or public process for making that determination. For each impact, the report should clearly identify any existing and relevant environmental or health standards, objectives, or targets in a community.</p>
<p>Proposed alternatives and mitigations do not respond to identified impacts</p>	<p>HIA is not primarily a policy design exercise. It should be clear that proposed mitigations and alternatives are justified based on identified impacts.</p>
<p>The report does not justify the feasibility or effectiveness of proposed alternatives or mitigations</p>	<p>Alternatives and mitigations proposed in an HIA should also result from substantive analysis. Analysis should consider the efficacy of mitigation in addressing the impact and, its political and technical feasibility. This may enable successful adoption and implementation of alternatives and mitigations.</p>

Stage V: Monitoring

Objective:

- **Monitor the implementation of the policy decision and its outcomes on health determinants and health status.**
-

Monitoring refers to the process of tracking whether the decision is adopted and implemented as proposed and the outcomes that result from adoption and implementation of the decision on health determinants and health status. Monitoring has great value in both compliance with policy agreements and in supporting public trust in policy decision-making and implementation. Traditional environmental regulations typically use some form of monitoring to ensure compliance with policy objectives.

Monitoring can have several distinct purposes. First, monitoring provides a mechanism to track the achievement of policy goals and can provide evidence required for re-evaluation of policy or adaptation of the policy. Second, monitoring can provide an early warning system to detect unexpected or uncertain adverse outcomes. Third, monitoring can help ensure policy accountability.

A first step in monitoring is to identify key processes and outcomes for tracking. Similar to indicators used for profiling baseline conditions in the analysis phase of HIA, appropriate indicators for monitoring can include health outcomes, health-relevant behaviors, and health determinants. Monitoring typically requires collection of these indicators before, during, and after policy implementation. Process monitoring may focus on conformity with an agreed-upon design or implementation process for the policy, program, or plan or compliance with required mitigations or regulations.

If monitoring is to include health status outcomes, the HIA team should consider issues of latency and specificity in relation to implementation of decisions. Monitoring can observe changes in health outcomes expected to shift rapidly with shifts in environmental conditions. For example, roadway collisions and injuries may be expected to change contemporaneous with changes in vehicle traffic volumes or roadway conditions. Long lag times between decisions and their implementation or between implementation and health endpoints can

limit the feasibility of observing changes in health outcomes. Similarly, it is challenging to interpret changes in indicators when health outcomes are influenced by multiple individual and community level determinants (e.g., hospitalizations for diabetes).

Essential Tasks in a Monitoring Plan

- Decide on and define implementation tasks, outcomes, and indicators for long-term monitoring.
- Identify a lead individual or organization to conduct monitoring.
- Develop a monitoring plan or program, including a plan to report monitoring findings to decision-makers and HIA stakeholders.
- Ensure resources to conduct, complete, and report the monitoring.

Notably, monitoring does not aim to provide conclusive answers to questions of cause and effect. If, for example, recommendations are implemented to prevent adverse health outcomes, and long-term monitoring reveals little change in health indicators, it may not be possible to determine with certainty whether this is due to effective mitigation of adverse health effects, imprecise predictions regarding the impact itself, secular trends, or other confounding factors. Still, in some cases monitoring may be useful to test the

predictive judgments of impact analysis, check the validity of impact analysis tools, or provide lessons for subsequent analysis.

Resources provided to conduct an HIA may not include resources for long-term monitoring; however, HIA could still include consider or recommend a monitoring plan. Mitigation monitoring plans with reporting to regulatory or decision-making agencies are commonly used in environmental impact assessment and are required by some EIA regulations in the United States. Also called environmental management plans (EMP), or impact management plans, a mitigation monitoring plan documents the mitigation measures, as well as agency responsibilities and roles in ensuring and documenting mitigation achievement. Mitigation monitoring plans typically list a summary of the potential impacts requiring mitigation, a description of required mitigation measures, responsibilities and a schedule for implementation, requirements for surveillance and auditing, and triggers and contingency actions to address excessive or unexpected impacts. Public agency and project proponent responsibilities for mitigation and monitoring should be clearly defined, including arrangements for co-ordination and disclosure.

Integrating HIA with the Environmental Impact Assessment Process

HIA is procedurally similar and complementary to the process for environmental impact assessment (EIA), a practice used to fulfill regulatory requirements for impact assessment for many public agency decisions at the Federal and state level in the United States (Karkkainen 2002). Most EIA regulations require analysis of direct and indirect health effects along with environmental effects and HIA can offer a method to integrated health analysis as part of EIA (Bhatia and Wernham 2008).

The 1969 National Environmental Policy Act (NEPA) required that *any major federal action significantly affecting the quality of the human environment* must undergo an evaluation and public disclosure of its environmental effects (NEPA 1969). EIA refers to the practice used to conduct this evaluation and the evaluation is documented in the Environmental Impact Statement (EIS). NEPA's authors envisioned an integrated approach to impact assessment. The Council on Environmental Quality's (CEQ's) regulations for implementing NEPA (40 CFR 1500-1508) emphasize that the "human environment" is to be "interpreted comprehensively" under NEPA to include "the natural and physical environment and the relationship of people with that environment" (40 CFR 1508.14). NEPA regulations further define "effects" as those that are "...ecological, aesthetic, historic, cultural, economic, social, or *health*, whether direct, indirect, or cumulative," (CEQ 1978 §1508.8). According to regulations, the significance of an action must be analyzed at the level of society as a whole, the affected region, the affected interests, and the locality and may vary by settings. Judgments of intensity, or severity should reflect the particular characteristics or vulnerabilities in an area or context (e.g., proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, endangered species or ecologically critical areas) and consider the degree to which a proposed action affects *public health or safety*, the degree to which effects are controversial or uncertain, the opportunity for an action to establish a precedent for future actions, the potential for an individually insignificant action to be cumulatively significant, and the potential for an action to violate Federal, State, or local law or requirements imposed for the protection of the environment. (CEQ 1978 §1508.27)

The Executive Order on Environmental Justice further established NEPA as a mechanism to ensure federal agencies analyze and mitigate disproportionately high health and environmental impacts. The Presidential Memorandum that accompanied the Executive Order specified several specific NEPA-related actions: identifying disproportionately high and adverse environmental and health effects of federal actions on minority and low-income communities; identifying measures to address such environmental and health impacts; providing opportunities for community input in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities. The order also charged EPA with making sure responsible agencies have fully analyzed potential disproportionate effects on minority communities and low-income communities, including human health, social, and economic effects.

NEPA does not require an HIA *per se* to occur as a separate and independent process from the process for producing an environmental impact statement (EIS); however, when a Federal agency action triggers an EIS, the responsible agency must analyze any potentially significant health effects with appropriate inter-disciplinary analysis. HIA can either be integrated as part of an EIS (e.g., a public health chapter) or HIA methods and tools can be used for analysis related to individual impacts document in the EIS (e.g., impacts on air quality or housing). In general, the EIS process under NEPA has several specific entry points for integrating health concerns and analysis:

- **Screening** During the lead agency's screening phase, stakeholders, including the public health community, can identify environmental or public health impacts that may trigger a requirement for the conduct of an EIA.
- **Scoping** During the scoping phase for an EIA, stakeholders can also identify potential impacts for analysis along with supporting evidence, data on population vulnerabilities, available methodologies, relevant significance thresholds, and alternatives and mitigations.
- **Assessment** During the analysis phase, stakeholders may consider conducting independent health analysis on the proposal, sharing their analysis with the lead agency. Agencies preparing a draft environmental impact statement or report are required to consider and utilize available relevant evidence.
- **Reporting** During mandatory public review period for the draft EIA, stakeholders can offer critiques of the EIA and suggest the inclusion of public health data, additional

analysis, or consideration of alternatives or mitigations. If the lead agency does not adequately conduct analysis of health issues, stakeholders can formally challenge the adequacy of the analysis using an appeals process or litigation.

- **Monitoring** HIA stakeholders can provide a watchdog role during the implementation of the action or project development and operation to ensure accountability to agreed-upon alternatives and mitigations.

Several countries such as Canada and Australia have developed formal guidance for integrating HIA into EIA (EnHealth 2001; Health Canada 1999) In the United States, HIA practitioners have successfully used NEPA and the California Environmental Quality Act (CEQA) to gain action on health impacts of land use development (Bhatia 2007; Wernham 2007). These recent examples of integrated HIA/EIA have included important natural and built environment influences on human health including those mediated through housing conditions, food resources, and traffic safety. More recently, the U.S. Centers for Disease Control has begun to provide comments on the scope of EISs conducted by Federal agencies.

Stage of EIA Process	NEPA Requirements for Health Effects Analysis	Role of Public Health Agencies and Stakeholders
Screening	Under NEPA, federal agencies conduct an EIS when they determine their action to be a “major federal action significantly effecting the quality of the human environment” (<i>NEPA Sec. 102 [42 USC § 4332]</i>). When an EIS is required, agencies are also required to conduct analysis of health effects of the action. One of the considerations in determining “significance” of effects is “the degree to which the proposed action affects public health or safety” (<i>40 CFR 1508.27</i>).	<ul style="list-style-type: none"> ▪ Identify health-relevant environmental effects, potential public health impacts, and population sensitivities

<p>Scoping</p>	<p>There is no pre-established right or wrong scope for health analysis under NEPA. Agencies determine the need for and type of health analysis based upon knowledge about community health status and environmental conditions and social vulnerabilities. This information is available through public hearings, literature review, and consultation with local health agencies and other health experts. Agencies may determine the specific methods of analysis and identify mitigations and alternatives through a similar process.</p>	<ul style="list-style-type: none"> ▪ Identify health-relevant, environmental effects, potential public health impacts, and population sensitivities ▪ Identify available data sources and research methods ▪ Involve public health agencies in the EIR process as participating or cooperating agencies ▪ Involve participation of public health scientists
<p>Assessment</p>	<p>Assessment in an EIS involves roughly the same process as assessment in HIA. This includes a description of the affected environment (baseline conditions), an analysis of environmental consequences of the decision alternatives, and recommendations for measures to protect health. NEPA does not prescribe data sources and methods and evidence may include existing studies or statistics and original qualitative or quantitative research. Recommendations including either mitigation measures or modifications of decision alternatives should also be analyzed for effectiveness and achievability.</p>	<ul style="list-style-type: none"> ▪ Provide data to agencies conducting ▪ Conduct supplementary or participatory research to inform analysis of health effects ▪ Involve participation of public health scientists or other experts to conduct research that can be shared with responsible agencies
<p>Reporting</p>	<p>Assessment of health effects is reported within the Draft EIS (DEIS) either in subsections related to environmental topical areas or in a public health, community health, or environmental justice subsection. The DEIS is subject to public comment, reassessed and revised based upon those comments, and released as a Final EIS (FEIS). Using the information in the FEIS, agency management renders a final "Record of Decision" approving, modifying, or rejecting the proposed action.</p>	<ul style="list-style-type: none"> ▪ Review and critique environmental and health effects analysis in the DEIS ▪ Advocate for mitigations or alternatives
<p>Monitoring</p>	<p>Typically, an EIS on an action that has required mitigation includes a mitigation monitoring plan.</p>	<ul style="list-style-type: none"> ▪ Provide watchdog role for mitigation monitoring

Stakeholder Participation in HIA

Inclusive and meaningful participation of affected residents and other stakeholders in HIA supports the democratic values underpinning HIA. Residents of a place are often implied beneficiaries of projects and plans; yet they may also be subject to the associated adverse health impacts. Within a HIA process, participation of diverse stakeholders can help identify relevant research questions, sources of data and information, and proposals for alternatives and mitigations. Meaningful and inclusive public participation can also ensure that the HIA addresses issues that are community priorities and makes judgments about significance that take into account community values.

Stakeholders include any individuals or groups with a known interest or perceived interest in the outcomes of a decision potentially subject to a HIA. Stakeholders may include residents, employees, or employers of a place; sponsors of economic development projects; health providers or public health officials; or government agencies responsible for policy implementation or enforcement.

Stakeholders may hold strong and conflicting positions on decision alternative outcomes; still, stakeholders have contributions to make to an HIA. Residents are most often the best sources of priority community needs. Project proponents are likely to have knowledge about the feasibility of alternatives. Health providers bring essential information about the health status and vulnerabilities of community members. Environmental agencies may have data on existing environmental conditions relevant to health.

In cases where experts or public institutions are directing or leading an HIA, the HIA process can include significant opportunities for participation by community residents and organizations. For example, HIA practitioners may convene community residents to participate in a scoping process for an HIA to better focus research questions on community priorities. In the assessment phase, practitioners may use focus groups to gain insight and knowledge about health effects and strategies to mitigate these effects. Analysis of alternatives can involve a dialogue with both experts and project proponents or policy implementers. The table below provides other examples of possible community roles in stages of the HIA process.

Stage of HIA	Example of Community Resident or Organization Involvement
Screening	<ul style="list-style-type: none"> ▪ Community stakeholders identify the need for an HIA and create political demand for its conduct
Scoping	<ul style="list-style-type: none"> ▪ Community stakeholders participate in or conduct scoping exercises to identify high priority community health issues and concerns
Assessment	<ul style="list-style-type: none"> ▪ Community members and engaged stakeholders participate in interviews and focus groups conducted by staff ▪ Community members organize, develop, and conduct a survey ▪ Stakeholders interpret or “ground truth” staff research
Reporting	<ul style="list-style-type: none"> ▪ Stakeholders interpret and prioritize findings and recommendations ▪ Stakeholders report and communicate HIA findings to the media and to decision-makers
Monitoring	<ul style="list-style-type: none"> ▪ Stakeholders create a “watchdog” group and monitor decision outcomes and long-term results

Inclusion of residents and stakeholders can also be an opportunity to employ deliberative techniques that have been used to facilitate lay participation in bureaucratic decision-making. For example, in the Danish Board of Technology’s Consensus Conference, a lay panel deliberates and develops a consensus on a particular science or technology issue and experts contribute testimony and analysis in response to questions posed by the lay panel (Anderson 1999). Habitat Conservation Planning provides another example of consensus-building among diverse and conflicting interests as an alternative to command and control environmental regulations (Sabel 2000).

Stakeholders, such as affected community organizations, may also have the capacity to take a more direct leadership role in the organization and conduct of the HIA process. For example, a community organization could call for an HIA, organize a team to conduct an HIA, conduct a public scoping process, and provide overall ownership and oversight of a process. In this case, experts would serve a community-led process in a range of supporting roles including facilitation, research, data collection, analysis of impacts, and public testimony. An HIA conducted to analyze the health impacts of growth at the Port of Oakland involved collaboration among community stakeholders with a memorandum of understanding among parties to define roles and responsibilities.

Evaluation of Health Impact Assessment

Evaluation is important to the development of HIA practice, providing lessons to practitioners and others interested in institutionalization of the field.

Evaluation concerns both the process of HIA and its outcomes or impacts. Process evaluation of the HIA evaluates whether an HIA succeeds in achieving its objectives of a timely, complete, and relevant health analysis of a policy question. Process evaluation may provide valuable insight into ways to improve the relevance and legitimacy of the process, the accuracy of predictions, or the translation of the findings to decision-makers to impact the final decision.

Outcomes evaluation is a longer term undertaking that focuses on the influence of the HIA on the decision-making process and decision outcomes. HIA presumes informing decision-makers of health impacts can potentially identify or motivate beneficial and protective changes to the design of a project or policy, lead to decision alternatives, or influence the adoption of a policy. Such effects can result either from the rationale use of information by decision-makers or through the political use of information by interest groups.

Outcomes evaluation for HIA should also consider impacts on the future climate for HIA and other indirect or unanticipated effects. HIA is a vehicle for institutional and social learning and may have important outcomes in the ways decision-makers think about the health in policy-making; in the ways institutions integrate health considerations into policy design; and on relationships between the public health community and institutions outside the health sector.

Evaluation requires both commitment and resources. The simplest form of evaluation may involve an assessment team and HIA sponsors reviewing and reflecting on the HIA outcomes against aims and objectives established in the screening phase. If a more complete evaluation is undertaken, it is important to identify an individual or organization to lead the evaluation, identify key evaluation questions and data sources, and ensure resources to conduct, complete, and report the evaluation results to decision-makers and HIA stakeholders. The tables below list the types of questions that may be useful in the context of

process and outcomes evaluation for HIA. Additional issues for evaluation are identified in the publications listed in the resources section of this guide.

Questions for HIA Process Evaluation	
Screening	<ul style="list-style-type: none"> ▪ Who was involved in screening? ▪ What was the rationale behind conducting the HIA? ▪ Were there arguments against the conduct of an HIA? Why?
Scoping	<ul style="list-style-type: none"> ▪ Who was involved in scoping? Which stakeholders were present and which were excluded? ▪ How were impacts identified and prioritized? Were reasons for inclusion or exclusion documented? ▪ Were there constraints on analysis because of resources, technical capacity, analytic methods, or political constraints?
Assessment	<ul style="list-style-type: none"> ▪ Did the HIA utilize the best available evidence? ▪ Did the HIA make judgments on the positive and negative health effects of a project or policy? ▪ Did the HIA assess long term effects or disproportionate harms and benefits to socially excluded populations? ▪ Did the assessors document methodology and data sources as well as assumptions and limitations? ▪ Did the HIA provide analysis on the effectiveness and feasibility or health promoting design solutions, mitigations, or alternatives?
Reporting	<ul style="list-style-type: none"> ▪ Did the HIA include comprehensive documentation of the process, analysis, and findings? ▪ Did stakeholders have an opportunity to review and comment on findings? ▪ How were recommendations delivered to the relevant policy-makers? ▪ Did stakeholders use HIA findings in their positions?
Monitoring	<ul style="list-style-type: none"> ▪ Did the HIA consider priorities for monitoring? ▪ Did the HIA include a monitoring plan?

Questions for HIA Outcomes Evaluation	
Effects on design, adoption, or implementation of the project/policy	<ul style="list-style-type: none"> • Did the project or policy include a design change or mitigation to protect or promote health? • Did decision-makers consider or adopt an alternative to address health needs? • Did decision-makers postpone the decision to conduct further research on health issues?
Effects on the political environment for the policy decision	<ul style="list-style-type: none"> • Were new connections between the decision and health evident in the media, statements by public officials or stakeholders, public testimony, public documents, or policy statements? • Are new interest groups (e.g., public health advocates) supporting or opposing the decision?
Effects on institutional practices concerning health in decision-making	<ul style="list-style-type: none"> • Are public health institutions more engaged in policy evaluation in other sectors? • Is there greater public or institutional support or resources for HIA? • Are there efforts to institutionalize health analysis or health criteria into policy design and decision-making processes?

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Health Impact Assessment Resources

International Websites

- HIA Community Wiki – www.healthimpactassessment.pbworks.com
- World Health Organization HIA website – www.who.int/hia/en/
- HIA Connect (Australia) – www.hiaconnect.edu.au/
- HIA Gateway (UK) – www.apho.org.uk/default.aspx?QN=P_HIA
- London Health Commission – www.londonhealth.gov.uk/hia.htm

U.S. Government Websites

- National Association of City and County Health Officials (USA) – www.naccho.org/topics/environmental/landuseplanning/HIA.cfm
- Centers for Disease Control and Prevention – www.cdc.gov/healthyplaces/hia.htm
- San Francisco Department of Public Health – www.sfpbes.oeg
- Healthy Development Measurement Tool – www.thehdmtool.org

University HIA Education, Research and Practice Programs

- University of California, Los Angeles – HIA Clearinghouse Learning and Information Center – www.ph.ucla.edu/hs/hiaclhc
- University of California, Berkeley Health Impact Group – <http://sites.google.com/site/ucbhia/>
- University of Minnesota, University of Colorado, and Cornell University – [Design for Health – www.designforhealth.net/](http://www.designforhealth.net/)

Private HIA Practitioners

- Human Impact Partners – www.humanimpact.org
- Habitat Health Impact Consulting – www.habitatcorp.com

HIA Texts and Reviews

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Health, Social, Economic, and Environmental Indicators

- Healthy People 2010. Leading Health Indicators – www.healthypeople.gov/ghi/
- National Center for Health Statistics – www.cdc.gov/nchs/
- WHO Statistical Information System – www.who.int/whosis/en
- U.S. Census Bureau – www.census.gov/
- U.S. Bureau of Labor Statistics – www.bls.gov/
- U.S. Department of Health and Human Services - Community Health Status Indicators Report – www.communityhealth.hhs.gov/homepage.aspx?j=1
- Healthy Development Measurement Tool – www.thehdmtool.org
- USEPA Environmental Indicators Gateway – www.epa.gov/indicators/

Spatial Assessment Tools for Community Health

- Healthy Development Measurement Tool – www.thehdmtool.org
- Pedestrian Environmental Quality Index – www.sfphes.org/HIA_Tools_PEQL.htm
- Bicycle Environmental Quality Index – www.sfphes.org/HIA_Tools_BEQL.htm

Quantitative Assessment of Health Impacts

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Public Participation

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