# Assessment of the Potential Health Impacts of Climate Change in Alaska

ONE HEALTH MEETING

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# Overview

Health Impact Assessment (HIA) Background

Summary of Observed and Predicted Changes

Potential Health Impacts in Alaska

Examples of Monitoring and Adaptation Strategies

# What is an HIA?

Preventive health report

Informs decision makers

Potential health effects
- Projects
- Policies
- Programs

Minimize adverse health effects

Maximize health benefits

# Health Impact Assessment (HIA)

Useful for proposals that fall outside the traditional public health arenas

- Transportation
- Resource development
- Climate Change

# What Prompted This HIA?

The 3rd National Climate Assessment was released in 2014 and had specific chapters on Alaska, health, and indigenous populations

The national assessment inspired us to develop an in-depth report that would tie together these themes to serve as a resource for Alaska

# Purpose of This HIA

Provide a broad overview of the range of potential adverse impacts of climate change on human health in Alaska

Present examples of strategies for communities and decision-makers to consider

Review existing literature, apply to human health in Alaska

# Areas Not Addressed by the HIA

Not intended to present any new models, make new predictions for climate change in Alaska, or offer an opinion about current predictions

Beneficial health impacts of climate change

# Indicators

Temperature

Precipitation

Weather

Sea Ice

Glaciers

Permafrost

Sea level

# Predicted Environmental Changes

Increased annual temperatures

Increased precipitation

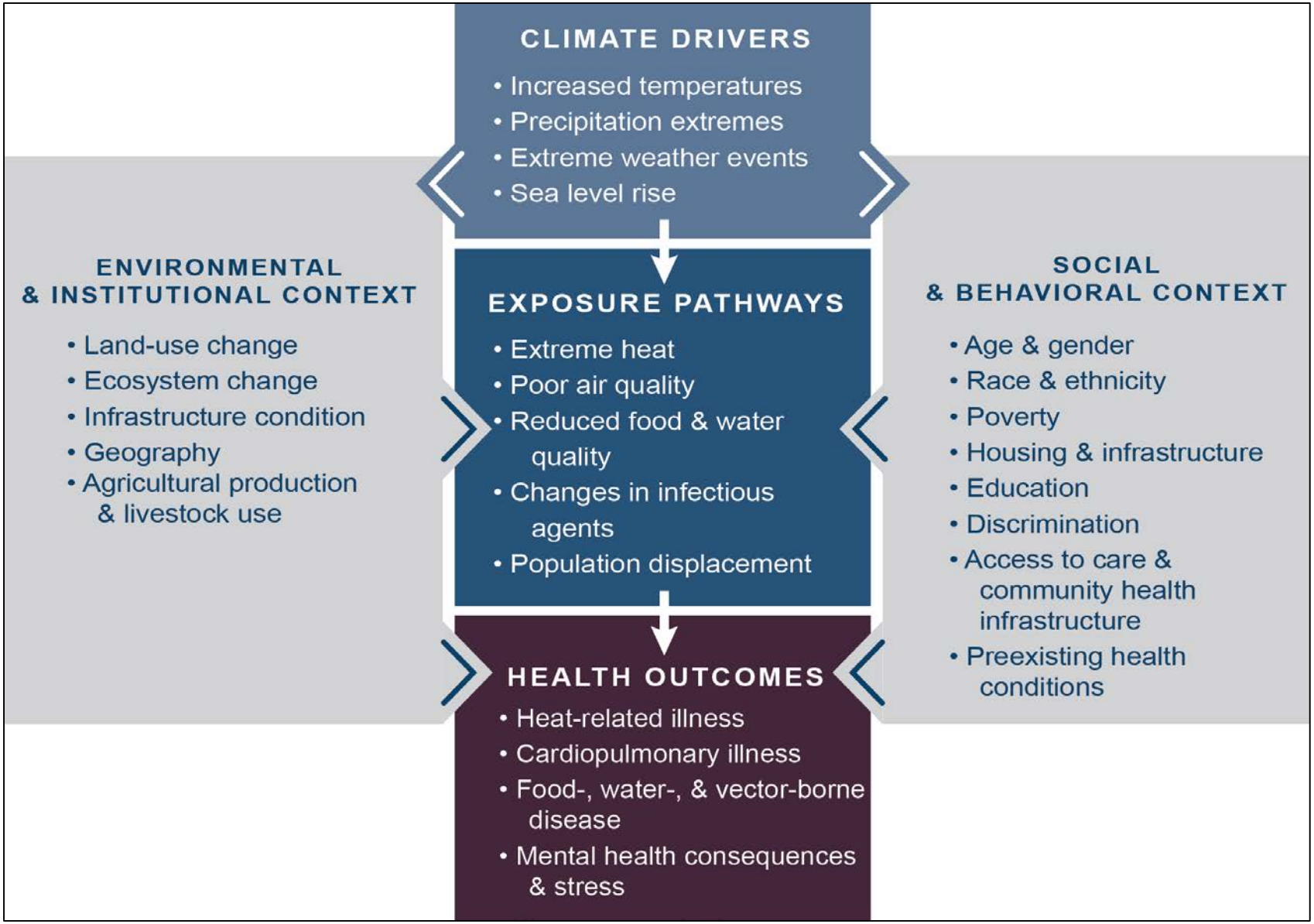
Increased storm intensity

Increased sea level

Decreased sea ice

Glacial recession

Decreased permafrost




USGCRP, 2016; modified from U.S. Environmental Protection Agency

# Health Effect Categories

Mental Health and Wellbeing

Accidents and Injuries

Hazardous Substances

Food, Nutrition, Subsistence

Infectious Diseases

Chronic Diseases

Water and Sanitation

Health Care Delivery

# Mental Health and Wellbeing

Increased psychosocial distress (e.g., anxiety or depression) due to the changing environment

- Community relocation
- Infrastructure damage
- Increase in extreme weather events and wildfires
- Changing way of life, uncertainty
- Solastalgia—a sense of loss caused by environmental change

Maladaptive coping behaviors (e.g., substance abuse, suicidality)

# Accidents and Injuries

Increased accidents and injuries due to

- Infrastructure damage
- Wildfires
- Extreme weather events
- Flooding
- Unsafe ice conditions

https://sites.google.com/site/scrapesproject/home/global-warming

# Exposure to Potentially Hazardous Materials

Increased cardiovascular and respiratory disease due to air pollution

- Wildfire smoke

Increased exposure to hazardous materials

- Infrastructure damage
- Storm events
- Shipping routes


http://dec.alaska.gov/air/am/2004_wf_sum.htm

# Food, Nutrition, and Subsistence

Decrease in subsistence food consumption and food security

Change in food distribution and subsistence patterns

# Infectious Diseases and Toxins from Microorganisms

Increased vectorborne and zoonotic diseases

- West Nile virus, Lyme disease, rabies, etc.

Increased food- and waterborne diseases

- PSP, *Vibrio parahaemolyticus,* botulism

Increased exposure to other infectious diseases and toxins

# Non-communicable and Chronic Diseases

Increased allergies and respiratory illness

- Increased pollen counts
- Wildfire smoke

http://expertherald.com/birch-pollen-allergy-market-research

# Water and Sanitation

Increased water and sanitation infrastructure damage

http://www.theguardian.com/environment/interactive/2013/may/15/newtok-safer-ground-villagers-nervous

# Rating/Prioritizing Impacts

**Table 3. Example of a System to Rank the Timing and Magnitude of Health Impact Dimension Criteria**

| | Timing and Magnitude | | |
|---|---|---|---|
| **Health Impact Dimension** | **Lower** | **Intermediate** | **Higher** |
| Time to Impact | ≥50 years | 20–50 years | <20 years |
| Geographic Extent | Local | Regional | Statewide |
| Number of People Directly Impacted | Few | Intermediate | Many |
| Number of People Impacted who Might Experience Serious Health Problems | Few | Intermediate | Many |
| Resources Needed to Adapt/Respond | Few | Intermediate | Many |

**Table 4. Notional Example of Potential Adverse Health Impacts of Climate Change Statewide, by Health Effect Category***

| Health Effect Category | Selected Adverse Health Impacts | Time to Impact | Geographic Extent | # of People Directly Impacted | # People Experiencing Serious Health Problems | Resources Needed to Adapt/ Respond |
|---|---|---|---|---|---|---|
| Mental Health and Wellbeing | Increase in solastalgia, anxiety, and depression due to the changing environment | | | | | |
| Accidents and Injuries | Increased heat stress and associated disorders | | | | | |
| | Increased accidents/injuries due to infrastructure damage | | | | | |
| | Increased accidents/injuries due to wildfires | | | | | |
| | Increased accidents/injuries due to extreme weather events (e.g., flooding) | | | | | |
| | Increased accidents/injuries due to unsafe ice conditions | | | | | |
| Exposure to Potentially Hazardous Materials | Increased cardiovascular disease morbidity/mortality due to air pollution (e.g., caused by wildfires) | | | | | |
| | Increased respiratory disease morbidity/mortality due to air pollution (e.g., caused by wildfires) | | | | | |
| | Increased exposure to hazardous materials (e.g., due to infrastructure damage, storm events) | | | | | |
| Food, Nutrition, and Subsistence Activity | Decrease in subsistence food consumption and food security (e.g., due to migration changes, increased costs of importing foods) | | | | | |
| Infectious Diseases and Toxins from Microorganisms | Increased morbidity/mortality related to vectorborne diseases | | | | | |
| | Increased morbidity/mortality related to zoonotic diseases | | | | | |
| | Increased morbidity/mortality related to food- and waterborne diseases (e.g., botulism, PSP, *Vibrio parahaemolyticus*)† | | | | | |
| Non-communicable and Chronic Diseases | Increased rates of chronic diseases such as obesity, diabetes, and hyperlipidemia due to changing lifestyles‡ | | | | | |
| | Increased rates of chronic respiratory diseases due to aeroallergens | | | | | |
| Water and Sanitation | Increased morbidity/mortality due to compromised access to water and sanitation facilities (e.g., infrastructure damage) | | | | | |
| Health Services Infrastructure and Capacity | Increased morbidity/mortality due to compromised access to health care (e.g., infrastructure damage) | | | | | |

# Monitoring Recommendations

Report provides examples of relevant health and environmental indicators for each potential health impact

- e.g., hospital admissions, air pollution monitoring data, Local Environmental Observer (LEO) Network

Identifies existing resources to monitor indicators

Suggests additional monitoring needs

# Monitoring Recommendations Table

**Table 5. Proposed Health and Environmental Indicators and Monitoring Resources**

| Potential Impact | Health and Environmental Indicators | Examples of Existing Monitoring Resources |
|---|---|---|
| **Mental Health and Wellbeing** | | |
| Increase in psychosocial distress (e.g., anxiety or depression) due to the changing environment | Health indicators<br>• Hospital/clinic visits due to distress following a climate-associated event (e.g., flooding, storm surge, wildfire)<br><br>Environmental indicators<br>• Tidal gauges (to monitor sea-level rise) | Health resources<br>• Alaska Trauma Registry (ATR) for injury trends: http://dhss.alaska.gov/dph/Emergency/Pages/trauma/registry.aspx<br>• Alaska Health Facilities Data Reporting Program (HFDR) for hospital diagnoses trends: http://dhss.alaska.gov/dph/HealthPlanning/Pages/DischargeData.aspx<br><br>Environmental resources<br>• NOAA Sea Level Trends: http://tidesandcurrents.noaa.gov/sltrends/sltrends.html |
| **Accidents and Injuries** | | |
| Increased heat stress and associated disorders | Health indicators<br>• Deaths due to heat (number, rate)*<br>• Hospitalizations due to heat (number, rate)*<br>• ER visits due to heat (number, rate)*<br><br>Environmental indicators<br>• Daily maximum and minimum temperatures | Health resources<br>• ATR for injury trends<br>• Alaska HFDR for hospital diagnoses trends<br><br>Environmental resources<br>• Scenarios Network for Alaska + Arctic Planning (SNAP) for community profiles on observed and projected temperatures: https://www.snap.uaf.edu/tools-and-data/all-analysis-tools |

# Adaptation Strategies

Climate change adaptation: adjusting to climatic changes in an effort to decrease negative impacts and increase beneficial opportunities

Report provides examples of adaptation strategies with a health focus

# Overarching Adaptation Strategies

**Table 6. Overarching Adaptation Strategy Examples for Communities**

| Adaptation Strategies |
|---|
| Create local climate change advisory groups, assessments, and adaptation plans |
| Offer community members ample opportunity to relay their concerns about climate change and propose solutions |
| Develop and implement local community resilience plans (https://www.communityresiliencebuilding.com) |
| Include human health in community vulnerability assessments for climate change (for an example, see: http://www.georgetowntc.com/pdf/GeorgetownVulnerabilityAssessmentFinal.pdf) |
| Develop or update Small Community Emergency Response Plans (SCERP) and include potential climate-related disasters in the plans (https://ready.alaska.gov/Plans/SCERP). |
| Develop local and statewide health surveillance systems for selected climate change indicators |
| Provide informational resources to community members about the potential health impacts of climate change |
| Promote climate change research at local, regional, and statewide levels |
| Develop an ongoing catalogue of climate change studies and data gaps in Arctic and sub-Arctic populations |
| Assure sufficient public health workforce capable of performing climate change research, surveillance, and adaptation |
| Conduct risk communication, health education, and community outreach as needed |

# HEC-Specific Adaptation Strategies

Specific strategies for each HEC include

- Review architecture and engineering designs to ensure that plumbing infrastructure can withstand changes to the underlying permafrost
- Develop community response plans for wildfires
- Support successful community-based mental health wellness programs

# HEC-Specific Adaptation Strategy Table

**Table 7. Health Effect Category-Specific Adaptation Strategy Examples for Alaska Communities**

| Health Effect Category | Potential Adaptation Strategies |
|---|---|
| **Mental Health and Wellbeing** | • Raise awareness about solastalgia (the distressing sense of loss that people experience as a result of unwanted environmental changes that occur close to one's home) and promote strategies that mediate public risk perceptions, psychological and social impacts, coping responses, and behavioral adaptation (Resser et al. 2011)<br>• Implement community-based strategies to promote mental health and wellbeing<br>• Implement and strengthen existing community-based behavioral health programs that aim to prevent mental/behavioral health problems (e.g., anxiety/depression, substance abuse, suicide, and violence prevention programs) |
| **Accidents and Injuries** | • Review architecture and engineering designs to ensure that infrastructure can withstand changes to the underlying permafrost and extreme weather events, and if not, consider ways to address the problem<br>• Support surveillance and communication networks to warn community members of dangerous travelling conditions (e.g., thin ice, frost heaves in roads, storm surges)<br>• Develop risk-appropriate storm shelters for Alaska communities<br>• Develop a plan to create access to cooling centers during extreme heat events (e.g., in interior Alaska; often cooling centers are located in buildings with the capacity to provide cooler environments, such as an air-conditioned school or library) |
| **Exposure to Potentially Hazardous Materials** | • Review architecture and engineering designs to ensure that infrastructure can withstand changes to the underlying permafrost, and if not, consider ways to address the problem<br>• Assess location-based vulnerabilities to wildfires, mitigate high-risk areas, and develop community response plans, such as the Firewise Community Program<br>• Develop a plan to create access to clean air centers during wildfires |

# Adaptation Strategies Already Occurring

Alaska Climate Change Strategy and Climate Action for Leadership Team

- Administrative Order 289
- Creates a framework for Alaskans to build a strategic response to climate change
- Calls for State departments to review their previous work on climate change, and identify immediate adaptation and response action

# Adaptation Strategies Already Occurring

Adapt Alaska

- Developed by Alaska Sea Grant
- Creates a discussion space for Alaska communities, tribes, agencies, and nonprofits
- Goal is to allow residents to share information and learn from one another about what they are experiencing and how they can adapt
- http://adaptalaska.org/

# Adaptation Strategies Already Occurring

Native Village of Georgetown

Climate Change Vulnerability Assessment, 2017

- Documents climate-related changes and trends
- Commissioned by the Georgetown Tribal Council
- Includes a section on health impacts

**Identified Vulnerabilities**

The Vulnerability Assessment identified the following primary vulnerabilities to Health:

**MEDIUM-HIGH** – Impacts to mental health and overall well-being from the loss of cultural, spiritual, subsistence, and economic opportunities

**MEDIUM** – Increase in pests and insects, such as ticks, that affect people, pets, and wildlife

**MEDIUM-LOW** – Health impacts from increases in heat, smoke, and pollen

**MEDIUM-LOW** – Safety of pets, infants, elders, etc. in the face of more extreme heat and precipitation

**BENEFIT** – More opportunities for outdoor activities increasing physical health

**BENEFIT** – More opportunities for gardens and agriculture

http://www.georgetowntc.com/pdf/GeorgetownVulnerabilityAssessmentFinal.pdf

# Summary

Given the broad scope of climate change, there are a wide range of potential adverse health impacts in Alaska

There are strategies to avoid or minimize these potential health impacts

The report provides guidance on

- Identifying relevant adverse health impacts in communities
- Developing community-specific monitoring and adaptation strategies

# Questions?

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**Link to the DHSS report:**
**http://www.epi.alaska.gov/bulletins/docs/rr2018_01.pdf**