BASELINE COMMUNITY HEALTH DATA

Alaska Pipeline Project

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ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADHSS	Alaska Department of Health and Social Services
ADOT	Alaska Department of Transportation and Public Facilities
ADNR	Alaska Division of Natural Resources
AFN	Alaska Federation of Natives
AN EpiCenter	Alaska Native Epidemiology Center
ANMC	Alaska Native Medical Center
ANTHC	Alaska Native Tribal Health Consortium
APP	Alaska Pipeline Project
ASNA	Arctic Slope Native Association
AST	Alaska State Trooper
ATR	Alaska Trauma Registry
ATSDR	Agency for Toxic Substances and Disease Registry
BLM	U.S. Bureau of Land Management
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Center for Disease Control and Prevention
CHAP	Community Health Aide Program
CIS	Community Information Summaries
COPD	Chronic obstructive pulmonary disease
CS	Contaminated site
DNR	Alaska Department of Natural Resources
DTP	Diphtheria-tetanus-pertussis
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FAS	Fetal alcohol syndrome
FCS	Food cost survey
FERC	Federal Energy Regulatory Commission
FMDR	Full mouth dental reconstruction
FUD	Formerly used defense site
HAPs	Hazardous air pollutants
HEC	Health Effect Category
HIA	Health Impact Assessment
Hib	*Haemophilis influenzae* type B
HIPAA	Health Insurance Portability and Accountability Act of 1996
HIV/AIDS	Human immunodeficiency virus/acquired immune deficiency syndrome
MCL	Maximum contamination level
MMR	Measles-mumps-rubella
µg/dL	Micrograms per deciliter
mg/dL	Milligrams per deciliter
NCD	Non-communicable Disease
NSB	North Slope Borough
NEPA	National Environmental Policy Act
PAC	Potentially affected community

PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PID	Pelvic inflammatory disease
PM	Particulate matter
ppm	parts per million
P.S.D.	Prevention of Significant Deterioration
SDH	Social Determinants of Health
SIDS	Sudden infant death syndrome
STI	Sexually transmitted infection
TCC	Tanana Chiefs Conference
TMDL	Total maximum daily load
TRI	Toxics Release Inventory
UAF	University of Alaska Fairbanks
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDHHS	U.S. Department of Health and Human Services
USGS	U.S. Geological Survey
VOCs	Volatile organic compounds
VPSO	Village Public Safety Officer
WHO	World Health Organization
WIC	Women's, Infants, and Children assistance program
WQS	Water quality standards

GLOSSARY

This report is intended for readers both with and without a background in public health. Definitions of technical terms that are used throughout the report are provided below:

Rate: A rate is defined as the number of events or cases occurring in a specified time period, divided by the number of people in the population during that period.

Prevalence: A common descriptive statistic, prevalence refers to the total number of cases, new or old, of a disease, condition, or characteristic existing at a point in time divided by the total population at the point in time, generally multiplied by a factor of 100–100,000 (depending on how common or rare the disease is). The prevalence of a disease in a population depends on the number of people who get the disease as well as how long they live with the disease.

Age-adjusted rate: An age-adjusted rate is a mathematically-weighted average of the age-specific actual (crude) rates of a disease or condition. The "weight" of each age group is determined by the proportion of persons in that age group in a standard population (commonly the 2000 U.S. standard population). Disease rates are typically age-adjusted to allow comparisons between populations with different age distributions. For example, if one population has a higher proportion of older people, that population is likely to have a higher death rate from heart disease, while a younger population may have relatively higher death rate from motor vehicle accidents. To compare death rates in these two populations, the rates can be adjusted to control for the effect of age.

Crude rate: A crude rate is calculated by dividing the actual number of observed events or cases in a population by the total population, generally multiplied by a factor of 100–100,000 (depending on how common or rare the disease is).

Morbidity rate: T morbidity rate is the relative incidence of a particular disease in a specific location.

Mortality rate: The mortality rate, sometimes also called a death rate, is the total number of deaths in a population (from a specific cause or all causes combined) during a year, divided by the total population, generally multiplied by a factor of 100,000.

Infant mortality rate (IMR): IMR refers to the number of deaths in infants less than 1 year of age during a year, divided by the total number of live births during that year, generally multiplied by a factor of 1000.

Neonatal mortality rate: The neonatal mortality rate is a sub-classification of infant mortality rate, referring to the number of deaths in infants less than 28 days of age during a year, divided by the total number of live births during the year, generally multiplied by a factor of 1000.

Post-neonatal mortality rate: The post-neonatal mortality rate refers to the number of deaths in infants between 28 days and 1 year of age during a year, divided by the total number of live births during that year, generally multiplied by a factor of 1000.

Sudden infant death syndrome (SIDS): SIDS refers to the sudden, unexplained death of an infant from an unknown cause.

Adequate prenatal care: In this report, we utilized a measurement call the Adequate Prenatal Care Utilization (APNCU) index. This index assesses the adequacy of prenatal care based on the following information obtained from birth certificates: trimester of entry into prenatal care, number of prenatal visits, and gestational age of infant at birth. For this report, the term "adequate prenatal care" combines the categories of "adequate" and "adequate plus," according to the index categories used by the Alaska Bureau of Vital Statistics.

Low birth weight: Low birth weight refers to infants born weighing less than 2500 grams (5.5 pounds).

Preterm birth: Preterm refers to infants born before 37 weeks gestation.

Body mass index (BMI): BMI refers to a person's weight in kilograms, divided by their height in meters squared. The categories of underweight, normal weight, overweight, and obese are based on BMI. For most people, BMI correlates with their amount of body fat and is an inexpensive and simple method for estimating obesity rates in a population. The categories below are based on Centers for Disease Control and Prevention guidelines:

- Overweight (adults 19 – 74 years): Persons who have a current BMI assessment with a BMI of 25 to 29.9.
- Obese (adults 19 – 74 years): Persons who have a current BMI assessment with a BMI of 30 or greater.
- Overweight (children 2-18 years): Persons who have a current BMI assessment with a BMI between the 85^{th}-95^{th} percentile using sex and age-specific growth charts are considered overweight.
- Obese (children 2-18 years): Persons who have a current BMI assessment with a BMI greater than or equal to the 95th percentile using sex and age-specific growth charts are considered obese.

Fetal alcohol spectrum disorders (FASD): FASD describe infants with physical, mental, behavioral, or learning disabilities associated with maternal alcohol use during pregnancy. Approximately 1 in 10 infants diagnosed with FASD meet the case definition for the most severe form of the disorder, **fetal alcohol syndrome, or FAS**, which requires specific deficits including typical facial features, growth deficits, and neurodevelopmental deficits in the setting of prenatal alcohol exposure

Dry/Wet/Damp community: Title 4 is the Alaska state law that deals with the regulation, control and distribution of alcoholic beverages throughout the state. This law includes provisions that allow for local options (AS 04.11.491), which determine whether the sale, importation or possession of alcohol is allowed in the community. Many Alaskan Native villages have enacted policies that designate a community as "dry" (alcohol sale and importation prohibited) or "damp" (sale of alcohol illegal, but importation allowed). Communities that allow the sale, importation, and possession of alcohol are considered "wet".

Health disparity: An important concept in population health, health disparities are substantial differences in measures of health, life expectancy, and quality of life that occur among populations differing by race or ethnicity, gender, education or income, disability, living in rural localities, or sexual orientation.

Food security: People are food secure when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life. The US Department of Agriculture describes the ranges of food security

- High food security - no reported indications of food-access problems or limitations.
- Marginal food security - 1 or 2 reported indications--typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake.
- Low food security - reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake.
- Very low food security - reports of multiple indications of disrupted eating patterns and reduced food intake.

Statistical significance: An observed difference between two populations or relationship between two variables (for example, age and general health status) is termed statistically significant when it is unlikely to have occurred by chance. Generally, the level of statistical significance is set at 5% where there is only a 5% chance that the observed difference or relationship occurred by chance alone. Statistically significant differences are difficult to detect when 1 or more groups being compared are very small, unless the differences between the 2 groups are very large or the relationships between two variables are very strong.

95% Confidence Interval: A statistical term used in a number of different settings, the 95% confidence interval around an estimated rate is the range in which one can be 95% confident that the true population rate or proportion lies. Estimated rates in small populations or based on small sample sizes tend to have wider confidence intervals. If two groups have estimates with 95% confidence intervals that do not overlap, then one can be fairly sure that the death or event rate, or prevalence of disease or health characteristic, is truly different in these two populations.

1.0 INTRODUCTION AND OVERVIEW

1.1 Overview

This document contains baseline community health data related to the Alaska Pipeline Project (APP) which was available by April 2012, when work on the APP was suspended. The information in this Baseline Community Health Data Assessment (Assessment) can be utilized by APP and other members of the public for reference and to support future development activities.

The Assessment contains a preliminary treatment of the potentially affected communities and environmental justice considerations as well as a preliminary stakeholder issues review (Section 2). A stakeholder issue review is included (Section 3) as a routine part of HIA methodology. "Health and disease" are strongly tied to cultural attitudes, practices and beliefs; hence, it is important for the objective disease data to be understood within the larger community context.

1.1.1 Organizing Baseline Health Data

Based on extensive international experience with the health impacts of extractive industries, the International Finance Corporation (IFC) developed a standard set of environmental health areas (EHAs) that allowed for an efficient but detailed analysis of potential project impacts. The State of Alaska has developed a document entitled "Technical Guidance for Health Impact Assessment (HIA) in Alaska" (ADHSS HIA 2011) which refined the IFC EHAs into 8 Alaska-specific "health effect categories (HECs)." An HEC contains a set of health concerns that are closely related such as accidents and injuries. Table 1 presents the standard list of health effects categories that have been published by the State of Alaska HIA Program (ADHSS HIA 2011) for resource development projects. Past HIA experience in Alaska has demonstrated that the HEC framework is useful for analyzing, rating and ranking potential impacts, both positive and negative. Furthermore, the HIA Program has found it efficient to organize the available baseline data by HECs as these data will be used to provide objective data support to the overall rating and ranking process. Therefore, this assessment organizes and presents all data and analysis through the HEC framework. Health-specific stakeholder comments are organized in similar fashion.

Table 1. Health Effects Categories

Health Effects Category	Pathway Description
Social Determinants of Health (SDH)	This is a broad category that considers how living conditions and social situations influence the health of individuals and communities. ◆ Psychosocial issues related to drugs and alcohol, ◆ Teenage pregnancy ◆ Family stress ◆ Domestic violence ◆ Depression & anxiety ◆ Isolation ◆ Work rotations and hiring practices, ◆ Cultural change

Table 1. Health Effects Categories

	• Economy, employment, and education Limitations: While SDH are real and important, it is extremely difficult to establish direct causality between a change in a social determinant and a particular health outcome. The language used to communicate impacts related to social determinants should reflect that SDH influence health in complex ways.
Accidents and Injuries	This category includes impacts related to both fatal and non-fatal injury patterns for individuals and communities. Changed patterns of accidents and injuries may arise due to: • Influx of non-resident personnel (increased traffic on roadways, rivers, air corridors • Distance of travel required for successful subsistence. • Project-related income and revenue used for improved infrastructure (e.g., roadways) and improved subsistence equipment/technology.
Exposure to Potentially Hazardous Materials	This category includes project emissions and discharges that lead to potential exposure. Exposure pathways include: • Food. Quality changes in subsistence foods (risk based on analysis of foods or modeled environmental concentrations). • Drinking water. • Air. Respiratory exposures to fugitive dusts, criteria pollutants, VOCs, mercury, and other substances. • Work. Secondary occupational exposure such as a family member's exposure to lead on a worker's clothing. • Indirect pathways, such as changing heating fuels/energy production fuels in communities.
Food, Nutrition, and Subsistence Activity	This Section depends on the subsistence analysis and nutritional surveys (if completed) and considers: • *Effect on Diet*: This pathway considers how changes in wildlife habitat, hunting patterns, and food choices will influence the diet of and cultural practices of local communities. While nutritional surveys are the most effective way to assess dietary intake, conclusions can be drawn if certain assumptions are accepted. • *Effect on Food Security*: This discussion considers project-specific impacts that may limit or increase the availability of foods needed by local communities to survive in a mixed cash and subsistence economy present in rural Alaska.
Infectious Disease	This category includes the project's influence on patterns of infectious disease: The pathways include: • Influx of non-resident personnel from outside the region • Crowded or enclosed living & working conditions and the mixing of low and high prevalence populations due to influx

Table 1. Health Effects Categories

	can create an increased risk for transmission of STIs such as syphilis, HIV, and Chlamydia. ◆ Changes to groundwater/wetlands can alter habitat for agents that transmit vector-borne diseases. This is not a likely scenario in Alaska, but with the cumulative effects of climate change it may become an issue of greater concern in the future.
Water and Sanitation	This category includes the changes to access, quantity and quality of water supplies The pathways include: ◆ Lack of adequate water service is linked to the high rates of lower respiratory infections observed in some regions, and to invasive skin infections. ◆ Revenue from the project that supports construction and maintenance of water & sanitation facilities. ◆ Increased demand on water and sanitation infrastructure secondary to influx of non-resident workers.
Non-communicable and Chronic Diseases	This category considers how the project might change patterns of chronic diseases. The pathways include: ◆ Nutritional changes that could eventually produce obesity, impaired glucose tolerance, diabetes, cardiovascular disease. ◆ Pulmonary exposures that lead to tobacco related chronic lung disease, asthma; in-home heat sources; local community air quality; clinic visits for respiratory illness. ◆ Cancer rates secondary to diet changes or environmental exposures. ◆ Increased rates of other disorders, specific to the contaminant(s) of concern.
Health Services Infrastructure and Capacity	This category considers how the project will influence health services infrastructure and capacity. The pathways include: ◆ Increased revenues can be used to support or bolster local/regional services and infrastructure. ◆ Increased demands on infrastructure and services by incoming non-resident employees or residents injured on the job, especially during construction phases.

Source: ADHSS Technical Guidance for Health Impact Assessment (HIA) in Alaska, 2011

2.0 PLACE AND PEOPLE

2.1 The Place – Alaska Pipeline Project - Location and Environs

TransCanada Alaska Company, LLC and Foothills Pipe Lines, Ltd., are working with ExxonMobil Alaska Midstream Gas Investments, LLC, to develop the Alaska Pipeline Project (APP or Project) designed to treat, transport, and deliver gas from the Alaska North Slope to markets in North America. Although the

Project will cross over into Canada on its way south, this HIA only covers that portion of the Project in Alaska. As shown on Figure 1 (Figure 1.1-1 of the Alaska Pipeline Project, Preliminary Draft Resource Report No. 1 [APP April 2011]), mileposts (MPs) are commonly used markers along linear projects, such as APP. To distinguish the Point Thomson Gas Transmission Pipeline (PTGP) from the Alaska Mainline Pipeline, APP has prefixed its MP identifier with a PTGP MP (PMP) or an Alaska Mainline Pipeline MP. This convention is used on Figure 1 to identify resources and features along the proposed pipeline route.

The Alaska Pipeline Project will be constructed in the following major components in Alaska:

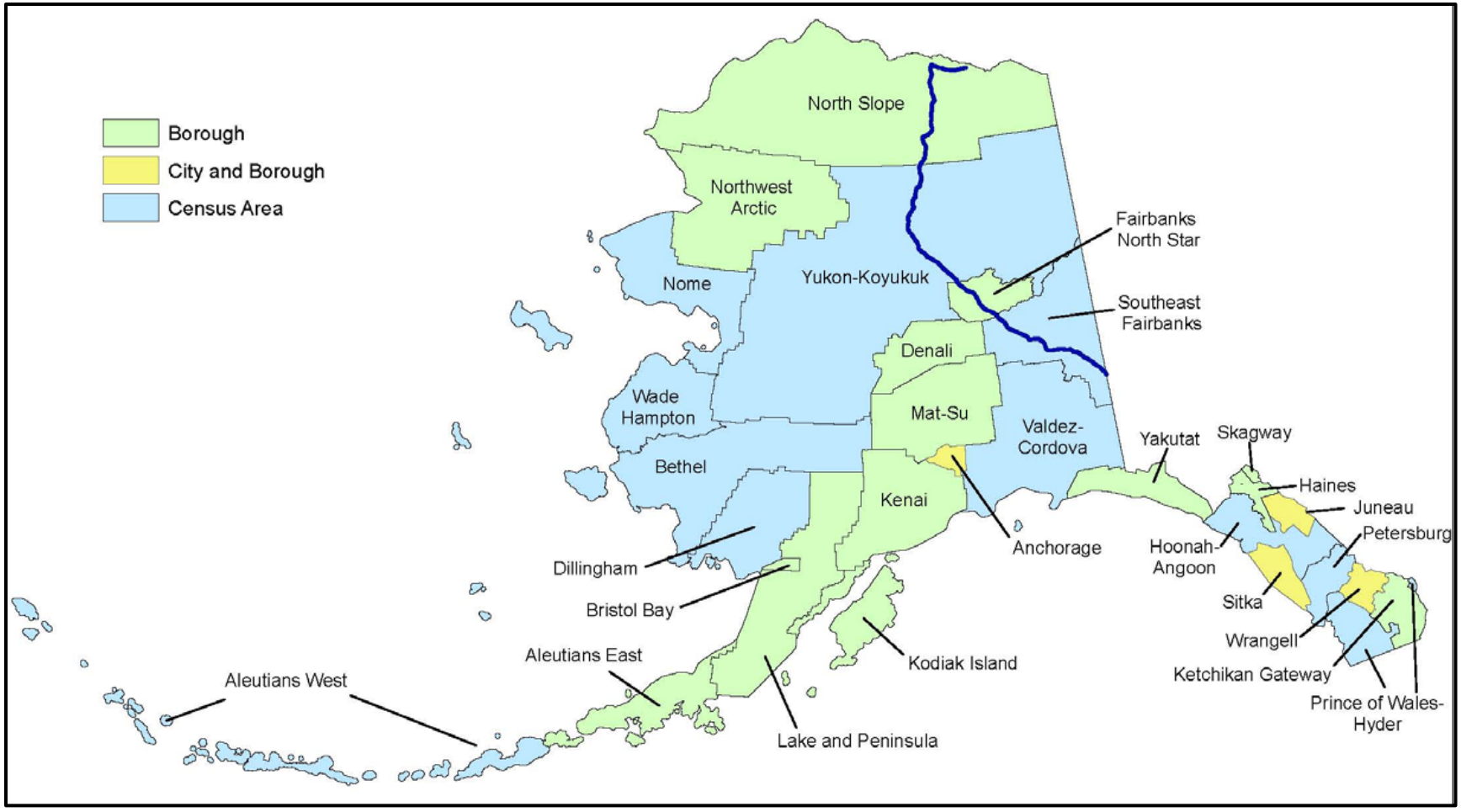
- About 58.3 miles of buried 32-inch-diameter PTGP and associated aboveground, ancillary, and auxiliary facilities from the processing facilities at the Point Thomson field to a gas treatment plant (GTP) near Prudhoe Bay, Alaska;

- A GTP near Prudhoe Bay, Alaska, that would process gas from the existing Central Gas Facility (CGF) near Prudhoe Bay and from the Point Thomson field to deliver up to 4.5 billion cubic feet per day (bcfd) of residue gas, depending on final subscriptions and gas source; and

- About 744.5 miles of buried 48-inch-diameter Alaska Mainline and associated aboveground, ancillary, and auxiliary facilities from the GTP to the Alaska-Yukon border, including provisions for gas delivery points within Alaska.

APP plans to construct 8 compressor stations, 2 meter stations, various mainline block valves, and pig launcher and receiver facilities. In addition APP will construct associated ancillary and auxiliary infrastructure such as additional temporary workspace, access roads, helipads, construction camps, pipe storage areas, contractors' yards, borrow sites, and dock modifications in Alaska. APP will use existing airstrips.

Figure 1. Location Map



Source: APP Resource Report #5

3.0 STAKEHOLDER ENGAGEMENT

3.1 Public Issues and Concerns

Depending on the regulatory and geographical context, stakeholder input may be gathered by a variety of acceptable methods that include formal public scoping meetings and submission of written comments, or more informally in a focus group format. To date, the APP staff has conducted over 25 public meetings in 2 rounds (between April 2010 and June 2011) designed to elicit comments and concerns about the Project, as reported in unpublished APP summaries. In addition, the Federal Energy Regulatory Commission (FERC) held a series of Scoping Meetings in 2012 (Table 2) as reported in Summary of Scoping Comments, an attachment to the FERC letter to the EIS Project Manager, May 4, 2012. While none of these meetings was designed to focus on health concerns and issues, NewFields has reviewed meeting summaries and presents health issues by HEC in Table 3. Please note that the FERC scoping summary did not indicate the meeting at which the comment was made.

Table 2. Public Meetings, Dates, and Locations

Date	Meeting	Location
4/12/2010	APP Barrow Public Meeting	Barrow
4/13/2010	APP Kaktovik Leadership and Public Meeting	Kaktovik
4/15/2010	APP Anaktuvuk Pass Leadership Meeting	Anatuvuk Pass
4/17/2010	APP Din e'h LLC Monthly Meeting	Fairbanks
4/20/2010	APP Fairbanks/North Pole/Fairbanks North	Fairbanks
	APP Star Borough Leadership Meeting	
4/27/2010	APP Evansville, Inc Leadership Meeting	Fairbanks
5/3/2010	APP Seward Leadership and Public Meeting	Seward
5/11/2010	APP Stevens Village Leadership/Public Meeting	Stevens Village
5/12/2010	APP Minto Leadership/Public Meeting	Minto
5/20/2010	APP Nenana Public Meeting	Nenana
5/20/2010	APP Toghotthele Corporation (Nenana)	Nenana
	Leadership Meeting	
6/15/2010	APP Haines Leadership Meeting	Haines
6/15/2010	APP Haines Public Meeting	Haines
7/1/2010	APP Alatna/Allakaket Leadership and	Alatna
	Public Meeting	
7/14/2010	APP Tok Public Meeting	Tok
7/20/2010	APP Wiseman/Coldfoot Public Meeting	Wiseman
3/14/2011	APP Kaktovic Community and Leadership	Kaktovik
	Meeting	
3/15/2011	APP Nuiqsut Leadership Meeting	Nuiqsut

3/15/2011	APP Nuiqsut Community Meeting	Nuiqsut
3/15/2011	APP Barrow Community Meeting	Barrow
3/17/2011	APP Anaktuvuk Pass Leadership Meeting	Anaktuvuk Pass
3/23/2011	APP Healy Lake Traditional Council Leadership Meeting	Healy Lake
3/24/2011	APP Stevens Village Community and Leadership Meeting	Stevens lake
4/11/2011	APP Tok Community and Leadership Meeting	Tok
6/2/2011	APP Minto Community Meeting	Minto
1/30/2012	FERC Public Scoping Meeting	Fairbanks
1/31/2012	FERC Public Scoping Meeting	Delta Junction
2/1/2012	FERC Public Scoping Meeting	Tok
2/6/2012	FERC Public Scoping Meeting	Barrow
2/7/2012	FERC Public Scoping Meeting	Nuiqsut
2/8/2012	FERC Public Scoping Meeting	Kaktovik
2/13/2012	FERC Public Scoping Meeting	Anchorage

The HIA team also completed an internet search of environmental groups which might have expressed a health issue or concern about Project, including:

- Alaska Center for the Environment
- Alaska Conservation Alliance
- Alaska Conservation Foundation
- Alaska Conservation Voters
- Alaska Youth for Environmental Action
- American Rivers
- Arctic Road
- Ground Truth Trekking
- Indian Law Resource Center
- Naqsramiut Tribal Council (Anaktuvuk Pass)
- National Wildlife Federation – Alaska Regional Center
- North Slope Fish & Wildlife Advisory Council
- Northern Alaska Environmental Center
- Sierra Club – Alaska Field Office
- Sierra Club (Sierra Borealis June 2011)
- Survey of Living Conditions in the Arctic, 2007
- Trout Unlimited – Alaska Chapter
- Trustees for Alaska
- Western Arctic Caribou Herd (WACH) Working Group

The HIA team also reviewed the finding of the Survey of Living Conditions in the Arctic (SLiCA), as summarized in ISER 2007 to determine what health issues were reported by participants.

This process generated a list of potential benefits and concerns from stakeholders who are both opposed to and in favor of the Project (Table 3). All of these data are organized by health effects category (HEC).

Table 3. Preliminary Issue Identification

Health Effects Category	Health Concern	Contact
Social Determinants of Health (SDH)	How will the NSB and the Fairbanks North Star Borough respond to increased construction activity, the influx of workers and compensation?	Minto APP meeting
	Haines Borough needs to be provided with estimates of new population growth to allow for service planning	Haines APP meeting
	Residents want a clear understanding of the impacts to community well-being: cultural, education, behavioral, and physical health	Stevens Village APP meeting
	Are there any grants available for suicide prevention, secondary education and playground equipment	Minto APP meeting
	Concern that the pipeline will create a boom /bust cycle during and after construction with impacts on local services. Communities need to know what size population influx to expect.	Tok APP meeting
	Concern that the project will cause out-migration from Tribal communities	FERC scoping meeting
	Provide local Alaska Natives with preferential work and contracting opportunities	FERC scoping meeting
	Potential for higher food and utilities costs in Native communities	FERC scoping meeting
	Impacts on mixed subsistence economy	FERC scoping meeting
	Impacts on cultural resources, including sacred sites, traditional cultural properties and landscapes,	FERC scoping meeting
Accidents and Injuries	Concerned that pipes will rupture when the pass thru residential areas	Fairbanks/North Pole/Fairbanks North Star APP meeting
	What will be the traffic impacts to the highway in Haines?	Haines APP meeting
	What are the potential impacts from spills to fish bearing/spawning waters in the Haines area?	Haines APP meetings
	Pressures for new exploration, opening new roads and pressure on local resources will occur once the	Wiseman/Coldfoot APP meeting

Table 3. Preliminary Issue Identification

	pipeline is operational – induced development.	
	Are traffic patterns being evaluated?	Tok APP meeting
	Oil and gas and road activities at Umiat	FERC scoping meeting
Potential Exposures to Hazardous Materials	Concerned that the project will impact air quality in Fairbanks and the ability to track nonconformity determinations and nonattainment issues	Fairbanks/North Pole/Fairbanks North Star APP meeting
	What happens if there is a leak, since the pipeline will be underground for many years.	Stevens Village APP meeting
	APP should inform residents of the NSB about the risks of contaminants associated with the project	Barrow APP meeting
	If the pipeline cracked, would animals be hurt?	Nuiqsut APP meeting
	Is the pipeline bullet proof? Is there any danger that the pipeline could interfere with TAPS	Minto APP meeting
	There is concern that the thermokarst effects from fugitive dust will affect permafrost areas	EPA from FERC scoping meeting
	Impacts on air quality during construction and operation of all facilities including compressor stations and gas treatment plant and from vehicles and vessels/barges	EPA, NAEC at FERC scoping meeting
	Consider magnitude and significance of fugitive dust emissions and identify sensitive receptors	EPA at FERC scoping meeting
	Consider restrictions on flaring and other oil and gas emissions	FERC scoping meeting
	Consider construction and operating noise impacts on local residents, including blasting	EPA, NAEC at FERC scoping meeting
	Consider the impacts of air emissions on respiratory disease, including infants	FERC scoping meeting
	Consider accidental releases of toxic materials to land and water	EPA, Din e'h at FERC scoping meeting
Food, Nutrition, Subsistence	Concerned that construction activities will impact returning salmon which are vital to maintaining subsistence	Toghotthele Corporation (Nenana) APP meeting
	Would APP safety standards restrict subsistence hunting near an elevated pipeline	Kaktovik APP meeting
	Subsistence trapping, fishing, and hunting is the way of life in Anaktuvuk Pass and should be protected. Food security is an issue.	Anaktuvuk Pass APP meeting

Table 3. Preliminary Issue Identification

	Concerned that an influx of workers on the project will increase pressure on scarce subsistence resources south of the Brooks Range.	Wiseman/Coldfoot APP meeting Alatna/Allakaket APP meeting
	Concern that inadequate law enforcement will allow poachers to decimate subsistence resources.	Wiseman/Coldfoot APP meeting Alatna/Allakaket APP meeting
	Concern that the pipeline would impact on wildlife	Alatna/Allakaket APP meeting
	APP should consult with local Tribes on subsistence issues	Stevens Village APP meeting
	Studies about the impact of the West Dock renovations on fish populations must be completed	Kaktovik APP meeting
	Is information being obtained from the NSB Wildlife Department specifically on subsistence gathering?	Nuiqsut APP meeting
	What affect will the pipeline have on caribou migration patterns	Barrow APP meeting Anaktuvuk Pass APP meeting
	There is concern about pressure on subsistence hunting and what FERC subsistence guidance looks like.	Tok APP meeting
	Conflict with traditional subsistence land uses	FERC scoping meeting
	Consider the impact of noise and vibrations on subsistence resources (including whaling)	NAEC at FERC scoping meeting
	Consider the health impacts from disruptions in traditional food consumption	FERC scoping meeting
	Impacts from invasive species associated with ballast water and mitigation measures to minimize adverse impacts to human health	FERC scoping meeting
	Cumulative impacts of additional construction ROW restrictions on hunting areas	FERC scoping meetings
	Cumulative impacts of additional construction on increased ocean temperatures and increased marine traffic on bowhead whale migration patterns and disappearing nesting grounds for migrating bird species	SLiCA
	Cumulative impacts of global warming on thawing traditional permafrost food storage cellars resulting in food insecurity and food safety issues	SLiCA

Table 3. Preliminary Issue Identification

Infectious Disease	No issues raised	
Water and Sanitation	Project impacts to public drinking water supplies, including source water protection areas	EPA at FERC scoping meeting
	Solid and hazardous waste management issues	EPA at FERC scoping meeting
	Impacts of global warming on water and sanitation infrastructure and possible contamination of water sources	SLiCa
Non-communicable Chronic Disease	No issues raised	
Health Infrastructure and Services	Concerned that the Project will strain local government services such as EMS.	Fairbanks/North Pole/Fairbanks North Star APP meeting
	We need tangible benefits such as the benefits that the NSB receives via TAPs royalties	Alatna/Allakaket APP meeting
	APP should use its community investment funds to improve health, safety, and human services	Nuiqsut APP meeting
	Impact of sanitation, roads and other infrastructure needed to support the project	FERC scoping meeting
	Conduct a baseline health profile for villages along the corridor to identify impacts on existing health services	TCC FERC scoping meeting

3.2 Stakeholder Engagement Concerns, by HEC

3.2.1 Social Determinants of Health

A large number of stakeholder comments focused on issues that belong to the social determinants of health category. Many stakeholders expressed their concerns about population influx into the villages and the impact on the existing mixed subsistence economy and the potential for inflation as well as potential negative effects on cultural resources and traditional lifestyles.

3.2.2 Accidents and Injuries

Many stakeholder comments raised issues in the accidents and injuries HEC. The most prominent concern related to the potential for pipeline accidents and related spills as well as increased traffic on the Dalton and Alaska highways during construction.

3.2.3 Exposure to Potentially Hazardous Materials

The exposure to potentially hazardous materials category received a large number of comments. Stakeholders were concerned about the potential for release of toxic materials from a pipeline accident and increased air emissions leading to further erosion of air quality.

3.2.4 Food, Nutrition, and Subsistence

Stakeholders raised concerns about how the proposed project might affect issues that belong to the food, nutrition, and subsistence category. Most comments can be summarized as concerns about how the proposed APP activities could affect the quantity and quality of subsistence wildlife and plant life through possible negative changes to local habitat. Stakeholders identified subsistence resources as both an important food source and a cultural component of their existing lifestyle. In addition, the public expressed concern that new workers would put additional pressure on the resource.

3.2.5 Infectious Diseases

Stakeholders did not raise any concerns related to the infectious disease health effect category.

3.2.6 Water and Sanitation

There were a few comments related to the water and sanitation health effect category, and these focused on concerns over the potential for contamination of the domestic water supply.

3.2.7 Non-communicable Chronic Diseases

Stakeholders did not raise any concerns related to the chronic diseases HEC.

3.2.8 Health Services Infrastructure and Capacity

Stakeholders were pleased that there would be new royalties and community investments available but were concerned about the potential to strain existing health services infrastructure and capacity.

4.0 BASELINE COMMUNITY HEALTH DATA

4.1 Introduction and Background

Baseline health conditions form a fundamental context for the overall health impact assessment process. The baseline health data assessment creates a point of reference for the health status of a community prior to development of a proposed project and also describes an overall health profile for an area. The health profile can inform decision makers about health vulnerabilities in a region as well as positive health traits present in a population. Decision-makers can use their knowledge about the features of a project and the health profile of a region to better consider health in their deliberations.

For Alaska, baseline health information resides in public health surveillance systems maintained by the State of Alaska, the Alaska Native Tribal Health Consortium (ANTHC) and occasionally local borough and tribal data sets. This chapter reviews of existing public health surveillance data and is careful to report all personal health information according to (i) the requirements of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and (ii) the published State of Alaska HIA Guidance (ADHSS HIA 2011).

The Baseline Community Health Data Assessment relies on information available as of April 2012 that has been provided by the Project and tribal, federal and State of Alaska public health authorities, in particular the Alaska Department of Health and Social Services (ADHSS) Bureau of Vital Statistics, North Slope Borough (NSB) Health and Social Services Department, the Tanana Chiefs Conference Health Department, and the Alaska Native Tribal Health Consortium (ANTHC) Epidemiological Center (AN EpiCenter).

Alaska public health agencies routinely report public health surveillance data at the statewide or regional level. These agencies do not report village or community-level data to avoid privacy violations (e.g., stigmatization) and problems with statistical analysis when case numbers are small. In general, the State of Alaska does not release disaggregated results for small numbers (e.g., <6). As a result, the information in Section 5.0 of the baseline summary represents the entire North Slope Borough and does not generally report community level data with the exception of responses to the questions included on the 2010 NSB census.

Many rural Alaskan communities contain a high percentage of Alaska Natives. These communities may occasionally track health information in a centralized computerized database. Permission from tribal communities is required to access these records. The North Slope Borough Health Department commissioned a Baseline Community Health Analysis which incorporated the results of a borough census taken in 2010 providing much unique data to the analysis and this assessment. The ANTHC prepared a Regional Health Profile for the Arctic Slope Region (Service Area) which is composed of the North Slope Borough minus the community of Point Hope.

4.2 Sources of Information

Specific health data are taken from these sources:

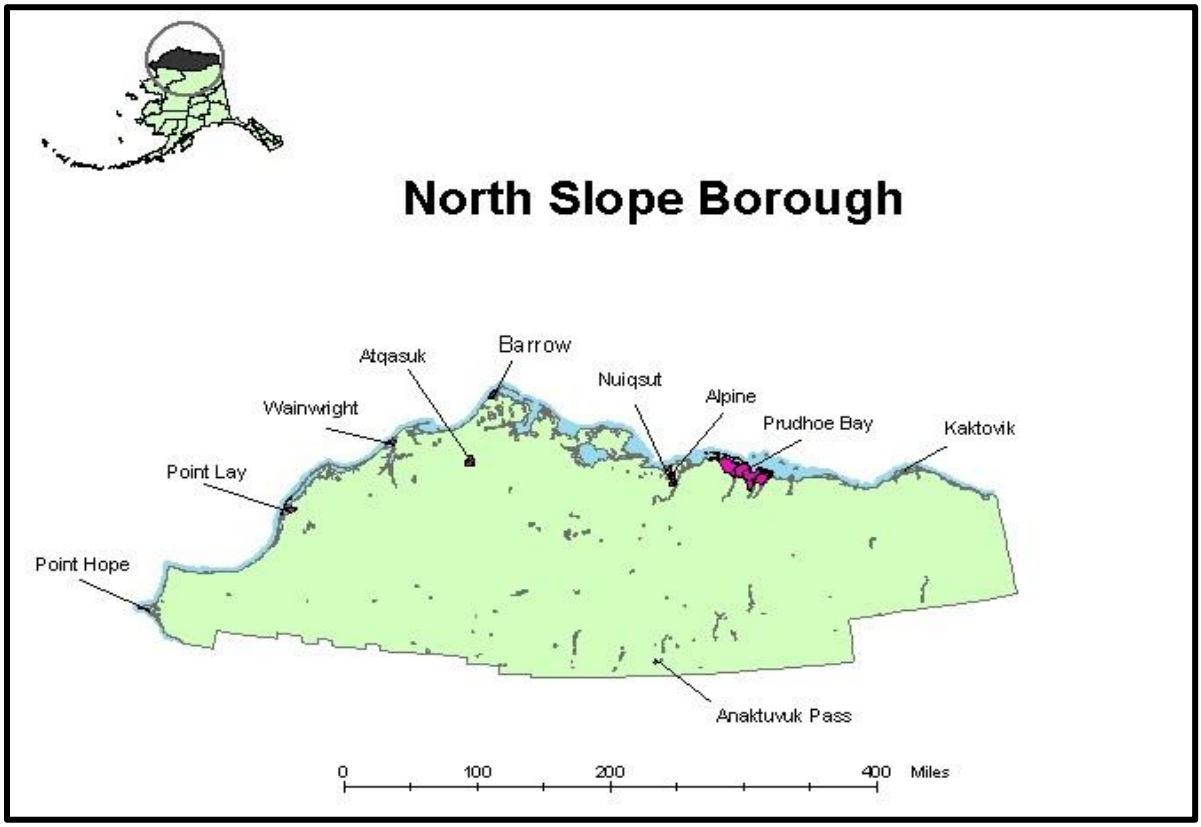
- Alaska Native Regional Health Status Reports (ANTHC)
  - Alaska Native Health Status Report, August 2009
  - Regional Health Profile for the Arctic Slope Native Association, April 2009
  - Interior Regional Health Profile, July 2011
- North Slope Borough, Baseline Community Health Analysis, August 2012
- State of Alaska Department of Labor and Work Force Development(AKDOLWD)
- Alaska Bureau of Vital Statistics (BVS)
- Alaska Behavioral Risk Factor Surveillance Survey (BRFSS)
- Youth Behavioral Risk Surveillance Survey (YBRS)
- Alaska Department of Health and Social Services, Section of Epidemiology (SOE)
- Alaska Trauma Registry (ATR)
- Alaska Department of Health and Social Services, Cancer Registry
- Alaska Division of Community and Regional Affairs, Alaska Community Information Summaries (CIS)
- County Health Rankings (University of Wisconsin)
- 2010 U.S. Census

- U.S. Census Bureau, American Community Surveys 2005-2009,2006-2010

Baseline community health data are organized and presented by specific HECs. The report focuses on health data that, based on experience with similar types of projects, is likely to be relevant for future impact rating and ranking. The data gathering and review exercise has been extensive; however, the report is not designed to be "encyclopedic" but rather focused and relevant for both the Project permit needs and eventual development of the draft HIA.

The Alaska HIA Toolkit defines a potentially affected community (PAC) as an area, community, or village where project-related health impacts may reasonably be expected to occur (ADHSS HIA 2011). Not all PACs experience health impacts of the same intensity, but it is still important to identify all communities that could possibly be affected. The baseline community health data for the proposed gas transmission pipeline from Point Thompson to Prudhoe Bay and the Gas Treatment Plant at Prudhoe Bay focuses on the North Slope Borough, portions of the Arctic Slope service area, and the communities of Barrow, Anaktuvuk Pass, Kaktovik, Nuiqsut, and Atqasuk (Figure 2). The HIA team normally uses zones of impact to distinguish between communities that will experience intense impacts and those that will experience minimal health effects; however, the PACs for this component of the APP were identified using the recommendations in Resource Report #5 (APP December 2011). The health-specific PAC (i.e., the distribution of health impacts) footprint does not necessarily match the environmental and social PAC footprints, but in this case it does because of the potential for long-term impacts from the operation of the gas treatment plant. Impacts will depend on the amount of construction, attendant employee levels and construction timing for the project components, as well as by the long term operation of the gas treatment plant. Baseline data for the Alaska Mainline Pipeline between the Prudhoe Bay and the Canadian border will be covered in Section 6 of this report.

Figure 2. North Slope Borough and affected communities



Source: Alaska Department of Labor and Workforce Development, Research and Analysis
US Census Bureau, 2000 Tigerline files

Several communities will be impacted by any construction/operation in the North Slope Borough. Although Prudhoe Bay/Deadhorse has virtually no permanent residents, it is the nexus for workers, materials, and supplies into the slope. Anchorage and Fairbanks may be impacted by increased air and road traffic during construction and by population influx during construction and operation given the industry-typical fly in/fly out policy. Some workers already have or will choose to have a permanent residence in these cities, although no specific numbers will be available until a Project description is chosen.

Prudhoe Bay/Deadhorse. Prudhoe Bay is a large work camp for the oil industry. All residents are employees of oil-drilling or oil-production and support companies and work long consecutive shifts. Living quarters and food are provided to the workforce, and there are a number of recreational facilities. For reasons which are unclear, the U.S. Census Bureau counted the employees living at the oil industry facilities in 2010. Previous census counts had not counted any 'residents' of Prudhoe Bay but in 2000 noted that 6 people lived in Deadhorse, which is 6 miles outside the fence of Prudhoe Bay. Deadhorse is the site of the state-owned airport, which is the primary means of public transportation to the North Slope. There is a state-owned heliport at Prudhoe Bay. The Dalton Highway is used year-round by trucks to haul cargo to the North Slope. Because there are no residents "outside the fence", Prudhoe Bay/Deadhorse will not be included in any health baseline data assessment or impact analysis. The community(ies) and the workers who reside there during their work shifts will be considered to be "inside the fence" and the subject of occupational medicine not public health. APP has proposed locating the Gas Treatment Plant, a work camp, and a storage yard at Prudhoe Bay.

Anchorage is the most populous city in Alaska and the transport hub for people and materials that may be used in the construction of the Alaska Pipeline Project. Employees who are not residents of the local area may live in Anchorage during their off work rotations or may fly to the lower 48 during these times. Most of the flights to the Alaska Interior originate at Ted Stevens International Airport and much of the material arrives at the Anchorage Port to be trucked or trained to the Interior. Medical facilities in Fairbanks and the communities along the pipeline route operated by the North Slope Borough or the Tanana Chiefs Conference tend to the medical and emergency needs of residents in the area although Alaska Natives travel to the Alaska Native Medical Center in Anchorage for specialized medical care. In addition, some residents of the Anchorage area engage in subsistence hunting and fishing in the pipeline area. While there could be some temporary impacts to the Anchorage area from construction of the Alaska Pipeline Project, no lasting health impacts on the community are expected.

Fairbanks, including College, Eielson Air Force Base, Ester, Fox, Harding-Birch Lake, Moose Creek, North Pole, Pleasant Valley, Salcha, and Two Rivers, which encompass all of the communities of the Fairbanks North Star Borough. No individual communities will be described. The Fairbanks North Star Borough is located in the heart of Interior Alaska and is the second-largest population center in the state. The Richardson Highway, the Parks Highway, the Steese Highway, and the Elliott Highway connect the Interior to Anchorage, Canada, and the lower 48. Truck, rail, and air services provide transportation of cargo. Scheduled jet services are available at Fairbanks International airport.

Fairbanks developed when the Chena steamboat landing brought many non-Natives to Fairbanks during the Pedro Dome gold rush. The population of the area continued to increase after construction of the Alcan Highway and the Trans-Alaska Oil Pipeline. City, borough, state, and federal government agencies, including the military, provide over one-third of the employment in the borough. The borough school district and the University of Alaska Fairbanks are the primary public employers. In 2011, nearly 8,600 soldiers were stationed in the borough on Fort Jonathan Wainwright or the Eielson Air Force Base. Retail services, gold mining, tourism, transportation, medical, and other services are the primary private sector activities.

Community Profiles

Information for this Section was taken directly from the Alaska Division of Community and Regional Affairs: Alaska Community Database, Custom Data Queries and Alaska Community Database Community Information Summaries (CIS) (http://www.commerce.state.ak.us/dca/commdb/CF_CIS.htm); and the Alaska Department of Labor and Workforce Development, Research and Analysis Section, Alaska Local & Regional Information (Workforce Information). None of these communities have direct land/road access and rely on air transportation for people, materials and supplies.

Anaktuvuk Pass: Anaktuvuk Pass is located at 2200 feet elevation on the divide between the Anaktuvuk and John Rivers in the central Brooks Range. According to U.S. Census 2010, 324 people lived in Anaktuvuk Pass. There were 118 housing units in the community, and 99 were occupied. In 2010 the median age of Anaktuvuk Pass residents was 27 years, 55.6% were male, and 83.3% were Alaska Native. The Village of Anaktuvuk Pass is a federally-recognized tribe and is the last remaining settlement of the Nunamiut (inland northern Inupiat Eskimo).

Economic and employment opportunities are limited in Anaktuvuk Pass, due to its isolation. It is a community dependent upon subsistence activities. Caribou is the primary source of meat; other

subsistence foods include Dolly Varden, Arctic Char, grayling, moose, sheep, brown bear, ptarmigan, and water fowl. Hunting and trapping for the sale of skins, guiding hunters, or making traditional Caribou skin masks or clothing provides income. Some residents have seasonal employment outside of the community.

Atqasuk: Atqasuk is located on the Meade River, 60 miles south of Barrow. According to U.S. Census 2010, 233 people lived in Atqasuk. There were 68 housing units in the community, and 64 were occupied. In 2010, the median age of Atqasuk residents was 24.3 years, 57.9% were male, and the population was 92.3% Alaska Native. Atqasuk Village is a federally-recognized tribe in the community, a traditional Inupiat Eskimo village.

Education and other government services provide the majority of full-time employment in Atqasuk. Subsistence activities provide food sources and are important to the lifestyle. Grayling, white fish, caribou, geese, ptarmigan, polar bear, seal, walrus, and whale are harvested and traded. Residents trap and sell furs to supplement cash income.

Barrow: Barrow, the northernmost community in the United States, is located on the Chukchi Sea coast, 10 miles south of Point Barrow, from which it takes its name. It lies 725 air miles from Anchorage. According to U.S. Census 2010, 4212 people lived in Barrow. There were 1554 housing units in the community and 1280 were occupied. In 2010, the median age of Barrow residents was 28 years, 51.4% were male, and the population was 61.2% Alaska Native. The Native Village of Barrow Inupiat Traditional Government is a federally-recognized tribe in the community. The majority of residents are Inupiat Eskimos.

Barrow is the economic center of the North Slope Borough, the city's primary employer, and numerous businesses provide support services to oil field operations. State and federal agencies also provide employment. The midnight sun has attracted tourism, and arts and crafts sales provide some cash income. Traditional marine mammal hunts and other subsistence practices are an active part of the culture and many residents rely upon subsistence food sources: whale, seal, polar bear, walrus, duck, caribou, grayling, and whitefish are harvested from the coast or nearby rivers and lakes.

Kaktovik: Kaktovik lies on the north shore of Barter Island, between the Okpilak and Jago Rivers on the Beaufort Sea coast. It lies in the 19.6-million-acre Arctic National Wildlife Refuge, an occasional calving ground for the Porcupine caribou herd. According to U.S. Census 2010, 239 people lived in Kaktovik; there were 87 housing units in the community, and 72 were occupied. In 2010, the median age of Kaktovik residents was 30.5 years, 52.3% were male, and the population was 88.7% Alaska Native. Kaktovik Village (aka Barter Island) is a federally-recognized tribe in the community.

Economic opportunities in Kaktovik are limited due to the community's isolation. Most employment is in education, or borough or city services. Part-time seasonal jobs, such as construction projects, provide income. The community is dependent on subsistence activities, primarily caribou, bowhead whale, and various seals and non-salmon fishes.

Nuiqsut: Nuiqsut is located on the west bank of the Nechelik Channel of the Colville River Delta, about 35 miles from the Beaufort Sea coast. According to U.S. Census 2010, 402 people lived in Nuiqsut; there were 136 housing units in the community, and 114 were occupied. In 2010, the median age of Nuiqsut residents was 25.2 years, 51.7% were male, and the population was 87.1% Alaska Native. The Native Village of Nuiqsut is a federal-recognized tribe in the community.

The Kuukpik Native Corporation, school, borough services, and store provide most of the year-round employment in the village. The majority of the population is Inupiat Eskimo and practices a traditional subsistence lifestyle. Trapping and craft-making provide some income. Caribou, bowhead and beluga whale, seal, moose, and fish are staples of the diet. Polar bears are also hunted.

Environmental Justice

On February 11, 1994, President Clinton issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* (Council on Environmental Quality. *Environmental Justice: Guidance Under the National Environmental Policy Act.* Washington, D.C. The White House. Council on Environmental Quality. 1997. [Online} http://epa.gov/compliance/ej/resources/policy/exec_order_12898.pdf). The purpose of the order is to avoid the disproportionate placement of adverse environmental, economic, social, or health effects from federal actions and policies on minority and low-income populations. Executive Order 12898 defines a "disproportionately high and adverse effect on minority and low income populations" as follows:

> "An adverse effect that is predominantly borne by a minority population and/or a low-income population; or will be suffered by the minority population and/or low-income population, and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population."

The first step in analyzing this issue is to identify minority and low-income populations that might be affected by implementation of the proposed action or alternatives. Demographic information on ethnicity, race, and economic status is provided in Table 4 as the baseline against which potential effects can be identified and analyzed.

The Council on Environmental Quality (CEQ) identifies groups as low income or minority populations when either (1) the minority or low-income population of the affected area exceeds 50% or (2) the minority or low-income population percentage in the affected area is meaningfully greater than the minority population percentage in the general population or appropriate unit of geographical analysis. In order to be classified meaningfully greater, a formula describes an environmental justice threshold of 10% above the State of Alaska percentage of for local minority (above 39.5%) and low-income persons (above 10.5%). For purposes of this Section, minority and low-income populations are defined as follows:

- *Minority populations* are persons of Hispanic or Latino origin of any race, Blacks or African Americans, American Indians or Alaska Natives, Asians, and Native Hawaiian and other Pacific Islanders as reported in the 2010 US Census
- *Low-income populations* are persons living below the poverty level as reported by the American Community Survey for 2006-2010.

Estimates of these two populations were developed to determine if environmental justice populations exist in the PACs, as presented below (Table 4).

Table 4. Environmental Justice Status of Potentially Affected Communities in the North Slope Borough

Community	Total Population 2010	Percent Minority Population 2010 (> 39.5%)	Percent of People below Poverty Limit 2010 (> 10.6%)
State of Alaska	710,231	35.9	9.6
North Slope Borough	9,430	67.6	11.8
Anaktuvuk Pass	324	83.3	20.3
Atqasuk	233	92.3	11.2
Barrow	4212	61.2	17.9
Kaktovik	239	88.7	10.4
Nuiqsut	402	87.1	0.5

Sources: U.S. Census for Alaska, 2010
American Community Survey 2006-2010 5-year estimates*

All of the communities qualify as Environmental Justice communities because they have minority populations that make up at least 39.5% of the population (10% higher than the state's percentage); in addition, each of the communities has a federally recognized tribe within its boundaries. Almost all of the communities have a low income population percentage that is at least 10% higher than the percentage of this population in the State of Alaska (9.6%). Nuiqsut had a very low percentage of residents with incomes below the poverty limit in 2010 due in large part to current oil and gas employment. The possibility of the Project resulting in disproportionately high and adverse effects on minority and/or low-income populations along the pipeline is substantial.

5.0 ALASKA PIPELINE PROJECT: GAS TRANSMISSION PIPELINE AND GAS TREATMENT PLANT BASELINE HEALTH DATA

5.1 HEC 1: Social Determinants of Health

The World Health Organization (WHO) defines the social determinants of health as, "the circumstances in which people are born, grow up, live, work, and age, and the systems put in place to deal with illness" and asserts that "the social determinants of health are mostly responsible for health inequities - the unfair and avoidable differences in health status seen within and between countries" (WHO 2011).

Both health outcome data and health determinant data are used to establish baseline health status according to the social determinants of health. An outcome is a health event that has actually occurred, while a determinant is a "setting" or context that strongly influences health status.

Life expectancy, maternal and child health, intimate partner violence and sexual violence, oral health, suicide rates, and substance dependence are health outcomes used as general indicators of physical and

social wellness. Family structure, economic status, educational attainment, family stability, and cultural continuity are health determinants that are associated with positive and negative health outcomes. Regional information is compared to information for all Alaska Natives, Alaskans statewide, and to the U.S. population, where possible.

5.1.1 Life Expectancy

Life expectancy data give some indication of the overall health of a population. Information on life expectancy at birth is currently unavailable for residents of the North Slope Borough or the Arctic Slope service area. For the State of Alaska, however, the life expectancy at birth for the total population in 2000 was 74.9 years for males and 79.7 years for females. This was similar to the life expectancy for the United States, with a life expectancy of 74.0 years for males and 79.4 years for females in 2000 (ADOLWD 2009). It is important to note that this is the most recent data giving an accurate comparison of life expectancy for Alaska versus the U.S. Consistent with global life expectancy trends, Alaska has seen an increase in life expectancy since 1950; however, both Alaska and the U.S. have seen a slower rate of increase in life expectancy than has been experienced by the 10 nations with the best life expectancy during this period (Kulkarni et al. 2011). Life expectancy for Alaskans in 2007 increased slightly to 75.9 years for males and 80.5 years for females (Table 5).

Table 5. Life Expectancies of Males and Females in Alaska and the United States, 2007

	Male Life Expectancy (yrs)	Female Life Expectancy (yrs)
Alaska	75.9	80.5
United States	75.6	80.8

Source: Kulkarni et al. 2011

Life expectancy varies by racial/ethnic group and geographic location, with Alaska Natives experiencing a lower life expectancy than Alaskans overall. Life expectancy at birth for Alaska Natives was 67.2 years for males and 73.7 years for females in 2000, compared to life expectancy as reported above for all Alaskans (IHS 2011) (Table 5). The NSB Baseline Community Health Analysis, Draft 2012 reports that during the decade 1999–2008, the life expectancy for Alaska Natives (70.1 years) still lagged behind that of Alaskans overall (75.6 years) and that of the general U.S. population (77.8 years) (NSB 2012).

Based on this information, life expectancy in the North Slope Borough, which is comprised of mostly Alaskan Natives, may be expected to be lower than other regions of the state but greater than that reported in 2000 due to increasing life expectancy overall in the previous decade.

Table 6. Average Life Expectancy among Alaska Natives and Alaskans Statewide, 1999-2008

	Average Life Expectancy at Birth (yrs)
Alaska Natives	70.1
Alaskans Statewide	75.6

Source: Alaska Bureau of Vital Statistics

5.1.2 Maternal and Child Health

In the United States, more than 80% of women will become pregnant and give birth to at least 1 child in her lifetime (CDC 2010). Maternal and child health outcomes (e.g. low birth weight) can profoundly influence youth and adult health status and can suggest current or future challenges (or improvements) to human health (AMAP 2009). This Assessment presents components of maternal and child health including initiation of prenatal care, infant mortality, low-birth weight, teen-birth rates, and substance use during pregnancy.

Infant Mortality

Infant mortality is an important indicator for population health and is influenced by living conditions, food security, domestic conflict, socio-economic wellbeing, and access to health services. Infant mortality can be separated into neonatal deaths, which occur during the first 28 days of life, and post-neonatal deaths, which occur from the 28th day to 1 year of life. Whereas neonatal deaths are associated with the quality of prenatal and perinatal health care, post-neonatal deaths are more closely associated with socio-economic conditions (AMAP 2009).

The North Slope Borough had infant mortality rates that were higher than the State of Alaska and that of the United States (Table 7) from 2005 to 2009 (ADHSS BVS January 2012, CDC 2007). These data suggest that the post-natal experience, which is affected by socio-economic conditions, is of concern in the North Slope Borough compared to Alaska overall and the U.S.

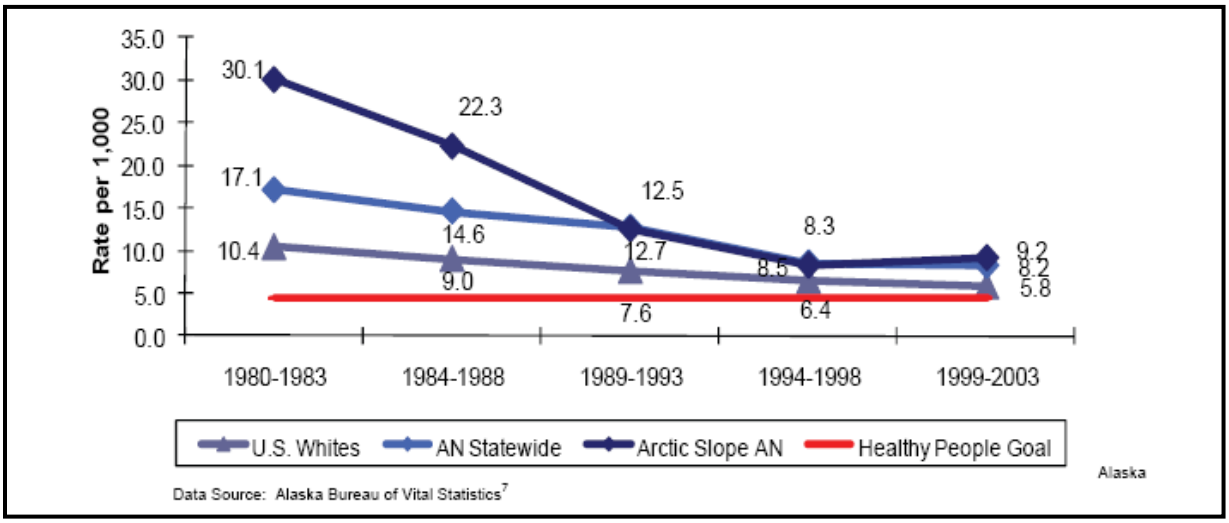
Table 7. Infant Deaths and Infant Mortality Rates for North Slope Borough and Alaska, 2005 to 2009

Infant Deaths	North Slope Borough		State of Alaska	United States
	Number of deaths	Rate per 1000 live births	Rate per 1000 live births	Rate per 1000 live births (2007)
Neonatal (infants less than 28 days of age)	5	**	2.9	4.42
Post-neonatal (infants 28 days to 1 year of age)	3	**	3.4	2.34
Total infant deaths	8	8.9*	6.3	6.75

Source: North Slope Borough and State of Alaska: Alaska Bureau of Vital Statistics
United States: National Vital Statistics Reports. Deaths: Final Data for 2007
*Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution
**Rates based on fewer than 6 occurrences are not reported

The infant mortality data available for the Alaska Natives, as reported in the Arctic Slope Regional Health Profile (AN EpiCenter April 2009), is from 2003 (Figure 3). Between 1980 and 1983, the infant mortality rate in Arctic Slope service area (30.1 deaths per 1000 live births) was significantly higher than the rate experienced by Alaska Natives statewide (17.1 deaths per 1000 live births). But for the period between 1999 and 2003, the infant mortality rate among NSB Alaska Natives decreased to 9.2 deaths per 1000 live births, similar to the Alaska Native statewide rate of 8.2 deaths per 1000 live births (Figure 3). No data are available at the village level.

Figure 3. Infant Mortality Rates, 5-year intervals, 1980 to 2003



Source: AN EpiCenter April 2009

Adequacy of Prenatal Care

Initiation of prenatal care during the first trimester is an important marker of improved infant health outcomes (Krueger and Scholl 2000). Prenatal care not only identifies women at risk for complications during delivery but also enables screening and treatment of medical conditions that may arise during pregnancy. Some conditions, such as preeclampsia, hemorrhage, and intra-partum infection, may be life threatening to both the mother and developing fetus. Prenatal appointments further allow for interventions involving behavioral risk factors associated with poor birth outcomes, such as smoking (WHO 2005). Adequate prenatal care has been shown to increase the likelihood of a healthy pregnancy and reduce the likelihood of adverse birth outcomes (CDC 2010).

The Adequate Prenatal Care Utilization Index (APCNU) is a measure that combines the initiation of prenatal care and the number of prenatal visits. A ratio of actual to recommended visits is calculated. If the ratio is 110% or greater, care is considered "adequate plus" prenatal care. If the ratio is greater than 80% but less than 110%, care is considered "adequate". A ratio between 50% and 79% is considered "intermediate" and a ratio of less than 50% is considered "inadequate" (CDC 2010). Here the categories of "adequate" and "adequate plus" were also combined to create the category "adequate or better" (AN EpiCenter April 2009).

In 2009, only 22.1% of all pregnant women in the North Slope Borough were documented on the birth certificate as having received "adequate or better"(includes the adequate and adequate plus categories) prenatal care. This is considerably less than in the State of Alaska, where nearly 60% of all pregnant women reported experiencing adequate or better prenatal care (Table 8). Of pregnant Alaska Native women in the North Slope Borough, only 21.7% received adequate or better prenatal care compared to 44.3% of all Alaska Natives in 2009. This 50% discrepancy indicates that fewer Alaska Native women within this specific region were receiving proper prenatal care. On a percentage basis, fewer Alaska Native women received adequate or better prenatal care than white women living in the North Slope Borough, revealing a disparity within the region based on race / ethnicity. The percentage of all women receiving adequate or adequate plus care decreased significantly from the 2007 levels (ADHSS BVS January 2012). Even though infant mortality is steadily decreasing in the state, prenatal care remains a critical topic that appears to be experiencing some challenges.

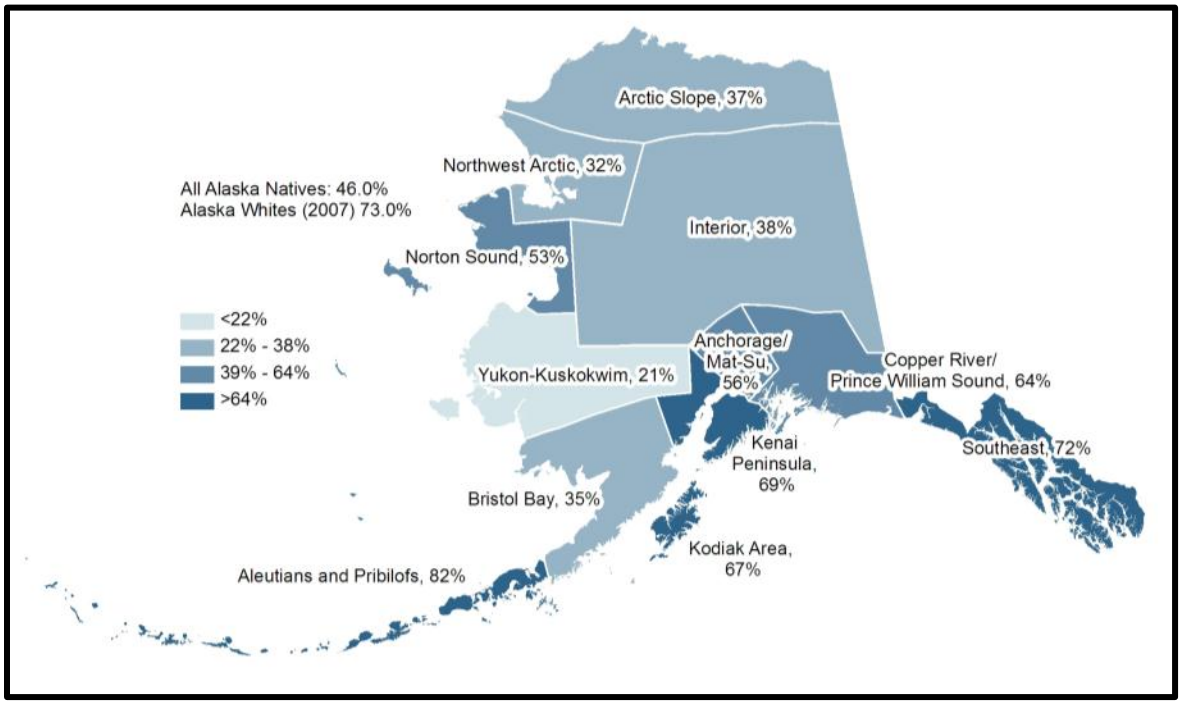
The most recent data from the ANTHC (AN EpiCenter August 2009) were gathered from 2006 to 2007. Of all mothers in the State of Alaska, approximately 27% fewer Alaska Native mothers received adequate or adequate plus prenatal care as compared to all Alaska white mothers (Figure 4). This may be due to prenatal care not being documented on birth certificate forms; however, given the magnitude of this discrepancy, it is unlikely to account for the entire difference. Additionally, in the Arctic Slope service area, 37% of Alaska Native mothers received adequate prenatal care from 2006 to 2007, more than the 2009 percentage of 21.7%, indicating a large decrease in prenatal care between 2007 and 2009. Alaska Native mothers living in the Bristol Bay, Interior, Northwest Arctic and Yukon-Kuskokwim regions had significantly lower rates of documented adequate prenatal care than Alaska Natives statewide (AN EpiCenter August 2009). No specific rural community data are available.

Table 8. Adequacy of Prenatal Care for Females in the North Slope Borough and the State of Alaska by Race, 2009

Adequacy of Prenatal Care (APNCU Index)	ALL RACES		WHITE		ALASKA NATIVE	
	Births (No.)	Percent (%)	Births (No.)	Percent (%)	Births (No.)	Percent (%)
North Slope Borough						
Adequate or better	**36**	**22.1**	**3**	**37.5**	**32**	**21.7**
Adequate plus	12	7.4	2	25.0	10	6.8
Adequate	24	14.7	1	12.5	22	14.9
Intermediate	56	34.4	3	37.5	50	33.8
Inadequate	71	43.6	2	25.0	66	44.6
State of Alaska						
Adequate or better	**5,568**	**59.5**	**3,671**	**67.8**	**1,253**	**44.3**
Adequate plus	1,993	21.3	1,326	24.5	409	14.5
Adequate	3,575	38.2	2,345	43.3	844	29.8
Intermediate	2,178	23.3	1,148	21.2	797	28.2
Inadequate	1,605	17.2	602	11.1	780	27.6

Source: Alaska Bureau of Vital Statistics

Figure 4. Percentage of Mothers with Adequate and Adequate Plus Prenatal Care, Regional Data 2006 to 2007



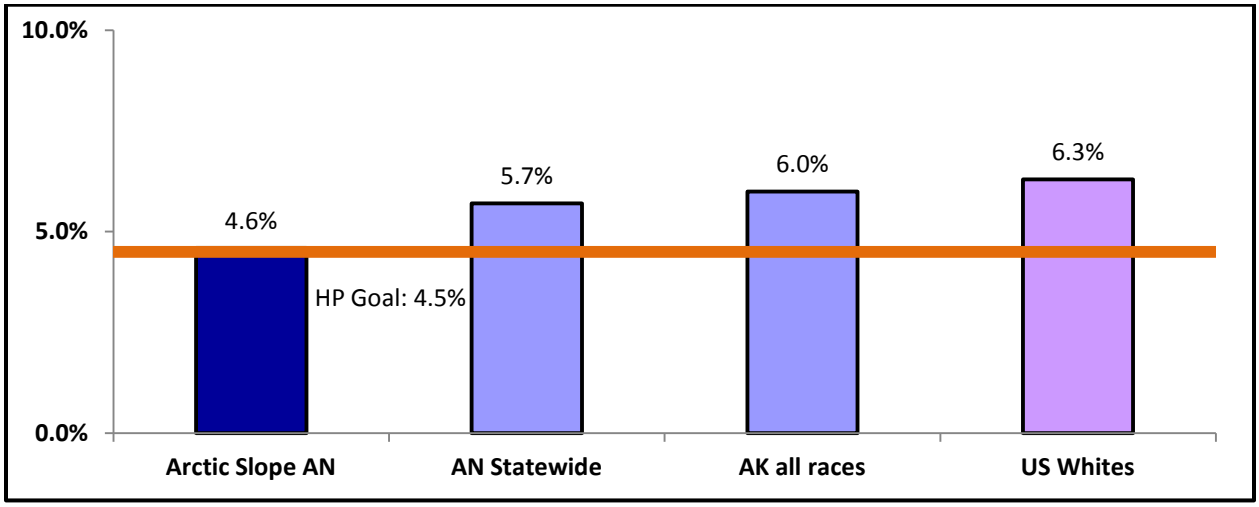
Source: AN EpiCenter August 2009

Low Birth Weight

Low birth weight, is defined by the WHO as a weight at birth of less than 2500 g, (5.5 lbs) (WHO 2005, AN EpiCenter August 2009) most often results from poor delivery of nutrients and oxygen to the fetus, which is directly related to the health of the mother (Marmot and Wilkinson 2006). Low birth weight is associated with an increased risk of lifelong disability and a 20-fold increased risk of premature death (National Center for Health Statistics 2011). Low birth weight is therefore both an indicator of the health of the maternal population and a determinant of the health of the infant.

The percentage of low birth weight infants (all races) in the North Slope Borough (8.9% deaths) in 2009 was more than in the State of Alaska (5.9%). (ADHSS BVS January 2012, CDC 2009). This rate has decreased stable in this region since 2000. During 2003—2005,the percentage of Alaska Native infants in the Arctic Slope service area with low birth weight was lower than in the State of Alaska for Alaska Natives and for all races (Figure 5).

Figure 5. Percentage of Live Births with Low Birth Weight, 2003-2005



Source: AN EpiCenter April 2009

Substance Use during Pregnancy

Substance use during pregnancy refers to the consumption of alcohol, tobacco, and/or drugs during the partum period. Substance use endangers both the mother and the fetus and can lead to premature detachment of the placenta, sudden infant death syndrome (SIDS), and developmental problems in childhood (WHO 2005). Alcohol use during pregnancy puts infants at risk for fetal alcohol spectrum disorders (FASDs), the leading preventable cause of birth defects and mental retardation (Healthy People 2020). In the North Slope Borough during 2009, the percentage of infants born to all mothers who reported drinking alcohol (6.5%) during the pregnancy is twice that of all Alaska mothers (3.1%) (ADHSS BVS January 2012).

Fetal alcohol spectrum disorders (FASD) describe with a group of physical, mental, behavioral, or learning disabilities associated with maternal alcohol use during pregnancy. Approximately 1 in 10 infants diagnosed with FASD meet the case definition for the most severe form of the disorder, fetal alcohol syndrome, or FAS, which produces typical facial features as well as growth and neurodevelopmental deficits from prenatal alcohol exposure (CADCA 2010).

The NSB Baseline Community Health Analysis (NSB 2012) reports that the prevalence of FASD in the NSB was more than 3 times the state average and 16 times the rate in non-Natives statewide, but similar to the statewide rate estimate for Alaska Natives. According to NSB 2012, of the different regions examined, the Northern Region had the highest prevalence of FASD, more than twice that of any of the other regions. Variation in screening practices, diagnosis, and reporting may account for some of the regional differences. For infants born between 1996 and 2002 and diagnosed by 2008 (age 6), the rate of fetal alcohol spectrum disorder births declined among Native Alaskans from 20 per 10,000 births to 13.5 per 10,000 births (CADCA 2010). While no specific information on fetal alcohol syndrome in the North Slope Borough is currently available, this information may suggest that FAS is declining among Native Alaskans.

Smoking during pregnancy is the single most important contributor to low birth weight (CDC 2004, Brooke 1989, Kramer 1987). In the North Slope Borough in 2009, 45.6% of infants were born to mothers who reported smoking during pregnancy, almost 3 times as high as the percentage for the State of Alaska, in which 15.6% of infants were born to mothers reporting smoking during pregnancy (Table 9). The percentage of mothers who reported smoking during pregnancy in the North Slope Borough has decreased since 1992 (ADHSS BVS January 2012).

Table 9. Infants Born to All Mothers Reporting Substance Use during Pregnancy in North Slope Borough and the State of Alaska, 2009

	North Slope Borough		State of Alaska	
	Births (No.)	Percent (%)	Births (No.)	Percent (%)
Reported drinking	11	6.5	340	3.1
Reported smoking	77	45.6	1,744	15.6

Source: Alaska Bureau of Vital Statistics

Teen Birth Rates

Infants born to teen-age mothers (defined by AN EpiCenter August 2009 as women aged 15 to 19 years) are at increased risk of preterm birth, low birth weight, and death during infancy. They are more likely to have health problems as children, to drop out of school, to be incarcerated during adolescence, to give birth as a teenager, and to be unemployed as a young adult (Ventura et al. 2011). Teen-age mothers are less likely to receive a high school diploma, which may negatively impact their future health.

In 2009, the percentage of total births to mothers less than 20 years of age in the North Slope Borough was higher than statewide percentages for both Alaska Native mothers and for all mothers (Table 10). There were no births to mothers less than 15 years of age in the North Slope Borough in 2009. The proportion of births to teen mothers <20 years of age in the North Slope Borough has increased from just fewer than 14% of all live births during 1990-1992 to 18.6% of all live births during 2007-2009). The rate of births to mothers less than 20 years of age for the North Slope Borough during 2007-2009 was 92.9 per 1,000 live births, and the state rate for the same age group and time period was 41.2 per 1,000 live births (ADHSS BVS January 2012).

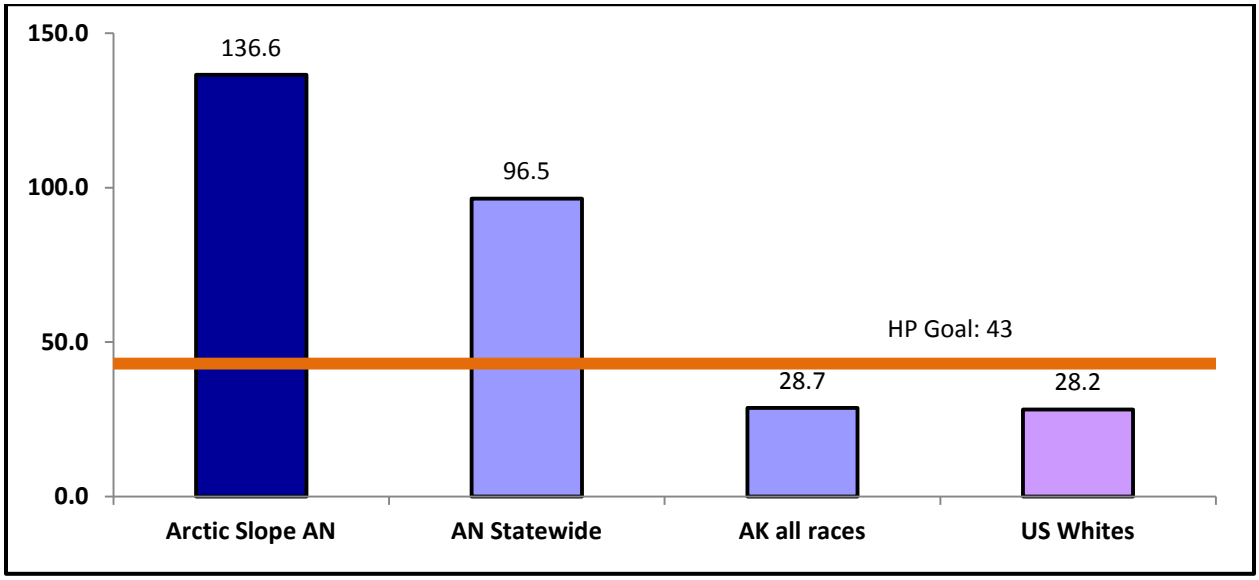
Table 10. Proportion of Births to Teens < 20 years in North Slope Borough and the State of Alaska, 2009

	Alaska Native mothers < 20 years		All mothers <20 years	
	North Slope Borough	**State of Alaska**	**North Slope Borough**	**State of Alaska**
Percent of total births (%)	17.5	16.1	16.6	9.9

Source: Alaska Bureau of Vital Statistics

During 2001—2005, the teen birth rate (15-19 years) for the Arctic Slope service area was higher than for Alaska Native people statewide and nearly 5 times the Alaska white rate (Figure 5) (AN EpiCenter April 2009). During the same time period, one third of Alaska Native high school students statewide reported themselves as sexually active. Of those students, 68% used a condom at last intercourse (An EpiCenter August 2009).

Figure 5. Teen Birth Rate (15 to 19 yrs) per 1000 Live Births, 2001 to 2005



Source: AN EpiCenter April 2009

Among NSB high school students surveyed in the 2005 YBRSS, the most common method used to prevent pregnancy among both males and females was condoms. Overall, 28% of students who had had sex within the past 3 months reported using no method or being unsure of the method used to prevent pregnancy during their most recent sexual intercourse. Of the students who had had sexual intercourse within the past 3 months, the percentage of NSB high school students reporting the use of birth control pills was significantly lower than in the statewide sample (9.6% vs. 23%, respectively).(NSB 2012)

Child Abuse and Out-of-Home Placement

Child abuse is a major contributor to childhood morbidity and mortality. In addition to its direct impact on health, child abuse has been linked to long-term effects on cognitive development and on physical and mental health. Childhood physical abuse predicts a graded increase in depression, anxiety, and severe ill health, as well as multiple medical diagnoses and physical symptoms (Springer et al. 2007, Healthy People 2020, Chartier et al. 2007, WHO 1987).

Child abuse rates are not aggregated specifically for the North Slope Borough or the Arctic Slope Native Corporation service area. Instead, the Alaska Office of Children's Services (OCS) publishes child abuse rates for each of 5 regions (Table 11) for children < 18 years of age. The Northern Region, which includes the North Slope Borough, has the second highest rate of substantiated allegations of child abuse (292 per 10,000 children), as well as the second highest rate of child abuse victims (136 per 10,000 children) (Table 12). According to the NSB Baseline Community Heath Analysis, in 2009, in the Northern Region the substantiated allegations were composed of:

- 55% neglect,
- 8% physical abuse,
- 1% sexual abuse,
- 35% mental injury, and
- 1% undetermined

Statewide, over 70% of substantiated allegations were for neglect, with only 17% for mental injury (ADHSS OCS 2011). According to NSB 2012, Alaska has one of the highest documented infant physical abuse incidences reported in the literature for any state. Child abuse appears to be an area of racial health disparity, with rates of abuse-related infant deaths that are 3.2 times higher for Alaska Native than for non-Native infants (NSB 2012). Again, differences in diagnosis and reporting practices may account for some of the regional and racial differences observed. (ADHSS OCS 2011).

It is important to note that an allegation of child abuse means that someone - the child, a teacher, a neighbor - makes an assertion that a child has been harmed by abuse or neglect with little or no proof. A substantiated allegation of child abuse means that the OCS finds the available facts indicate that a child suffered harm as a result of abuse or neglect. There is not enough staff to investigate every alleged case of child abuse, so it is possible that substantiated cases of abuse could underestimate actual cases of abuse in the region. Nevertheless, this information is the best available data on this topic. The Healthy Alaskans 2010 target was a reduction in the rate of child abuse to less than 10 substantiated reports per 1000 children, or 100 substantiated reports per 10,000 children (ADHSS 2005).

Table 11. Allegations of Child Abuse Substantiated in Calendar 2010, <18 Years, by Region

Region	Census Areas	Total allegations substantiated in 2010	Total population under 18 years	Rate per 10,000 children
Anchorage	Municipality of Anchorage	1459	82,067	178
Northern Region[a]	Yukon-Koyukuk Census Area Fairbanks North Star Borough North Slope Borough Northwest Arctic Borough Nome Census Area Southeast Fairbanks Census Area Denali Borough	1198	40,999	292
South Central Region	Aleutians East Borough Aleutians West Census Area Bristol Bay Borough Kenai Peninsula Borough Kodiak Island Borough Lake and Peninsula Borough Dillingham Census Area Valdez-Cordova Census Area Matanuska-Susitna Borough	1188	48,855	243
Western Region	Bethel Census Area Wade Hampton Census Area	479	10,636	450
Southeastern Region	Haines Borough City and Borough of Juneau Ketchikan Gateway Borough City and Borough of Sitka Municipality of Skagway Borough City and Borough of Wrangell City and Borough of Yakutat Hoonah-Angoon Census Area Prince of Wales-Hyder Census Area Petersburg Census Area	331	17,216	192

Source: ADHSS OCS 2010
[a]Northern Region includes North Slope Borough and the Alaska Mainline Pipeline Study Area jurisdictions of Fairbanks North Star Borough and the Southeast Fairbanks and Yukon Koyukuk census areas.

Table 12. Victims of One or More Substantiated Allegation of Child Abuse in 2012, < 18 Years, by Region

Region	Total Victims	Population under 18	Rate per 10,000 children
Anchorage	867	82,067	106
Northern Region[a]	570	40,999	139
South Central Region	495	48,855	101
Western Region	230	10,636	216
Southeastern Region	123	17,216	71

Source: ADHSS OCS 2010
[a]Northern Region includes North Slope Borough and the Alaska Mainline Pipeline Study Area jurisdictions of Fairbanks North Star Borough and the Southeast Fairbanks and Yukon Koyukuk census areas

The Northern Region had the second lowest rate of children in out-of-home placement (76 per 10,000 children) (Table 13) (AHDSS OCS 2010, ADOLWD 2009).

Table 13. Children in Out-of-Home Placement in 2012, < 18 Years, by Region

Region	Children in Out of Home Care	Population under 18	Rate per 10,000 children
Anchorage	650	82,067	79
Northern Region[a]	312	40,999	76
South Central Region	171	48,855	35
Western Region[a]	227	17,216	132
Southeastern Region	512	10,636	481
Statewide	1,872	199,773	94

Source: ADHSS OCS 2010
[a]Northern Region includes North Slope Borough and the Alaska Mainline Pipeline Study Area jurisdictions of Fairbanks North Star Borough and the Southeast Fairbanks and Yukon Koyukuk census areas

5.1.3 Intimate Partner Violence and Sexual Violence

Intimate partner violence and sexual violence cause an array of direct physical and psychological injuries to victims. In one study, abuse was linked to numerous adverse medical effects including arthritis, chronic neck or back pain, migraine, sexually transmitted infections including HIV/AIDS, chronic pelvic pain, peptic ulcers, irritable bowel syndrome, and frequent indigestion, diarrhea, or constipation (Coker et al. 2000). Abuse of pregnant women can cause pregnancy complications such as low weight gain, anemia, infection, and first and second trimester bleeding, as well as elevated rates of depression, suicide attempts, and substance abuse among mothers (The Family Violence Prevention Fund 2004).

Exposure to high levels of intimate partner violence has also been shown to have a dose-dependent association with intelligence quotient suppression in young children (Koenen et al. 2003).

The NSB Baseline Community Health Analysis (NSB 2012) reports that, according to the Uniform Crime Reporting surveillance system, between 2000 and 2009, the number of rapes reported to the North Slope Borough Police Department ranged from 1 to 29 per year, averaging 16.5 cases per year during this time period. The average rate of forcible rape in the borough between 2000 and 2009 was roughly 3 times the Alaska rate and more than 7 times the U.S. rate for the same period (FBI UCR 2011. Such rate comparisons must be made with caution, particularly given the small population of the borough).

The NSB Police Department provided information from their records to the NSB Baseline Community Health Analysis team on the total number of sexual assault cases reported annually in the NSB since 2007, both for adults and children. These statistics emphasize the large proportion of cases in the NSB that involve children (NSB 2012). According to NSB 2012, the number of domestic violence calls to which the NSB Police Department responds can vary quite dramatically from year to year. Moreover, these statistics are not systematically tracked, and the wide variation in the 2 years of data provided raise questions about the reliability of this data.

The Alaska Behavioral Risk Factor Surveillance System (BRFSS) collected data from the North Slope Borough residents regarding domestic and sexual violence. In 2004–2006, the most recent years for which local data were available, 29% of the 72 adults borough residents surveyed (including both men and women) reported having been hit, hurt, or threatened by an intimate partner at some time in their lives. Over 9% of NSB survey respondents reported fearing for their safety or being physically hurt by a current or former intimate partner within the past five years (ADHSS BRFSS 2009).

Alaska's rate of forcible rape (sexual violence) is 2.3 times the national average (CDVSA 2010). In 2010, the Alaska Victimization Survey estimated that nearly half of all women in Alaska will experience intimate partner violence in their lifetime, and more than 37% will be victims of sexual violence (Rosay et al. 2010). The Alaska Victimization Survey is modeled after the National Intimate Partner and Sexual Violence Surveillance System, which has not been published. Estimates of completed rape in the past year (2009) were 0.3% for women nationally, compared to a past year estimate of 2.5% in Alaska (CDVSA 2010).

In 2006, Alaska BRFSS data revealed that English-speaking Alaska Native females from rural areas (including the North Slope Borough) were the most likely subpopulation to experience intimate partner violence in their lifetime. Populations living in rural areas are less likely to experience unwanted sexual activity (Table 14). Again, these data should be interpreted with caution, as a variety of regional and cultural groups are included in the category of 'rural.' Specific regional information on the North Slope Borough for 2006 is not available, but the borough was included in the 'rural region,' which spans much of the landmass of the state (Utermohle and Wells 2009).

The lifetime estimate of intimate partner violence in the United States was half that as experienced in Alaska, while the past year estimate of intimate partner violence was 1.3% in the United States and 8.6% in Alaska (Table 15). According to these data, the lifetime and past year likelihood of experiencing intimate partner violence among women in Alaska is much greater than the United States overall (Table 14) (Utermohle and Wells 2009).

These past year estimates are 10 to 20-times higher than the official annual forcible rape rate for Alaska based on crime reports. This highlights the problems of underreporting and the scope of sexual violence in Alaska. Sexual assault is also an area of racial disparity. Alaska Native and Native American women are 2.5 times as likely to be raped or sexually assaulted as are other women in the U.S. (NSB 2012).

Table 14. Lifetime Prevalence of Intimate Partner Violence and Unwanted Sexual Activity among English-Speaking Adults in Alaska by Risk Factor, 2006

Risk Factor	Intimate Partner Violence (%)	Unwanted Sexual Activity (%)
Sex		
Female	30.1	24.2
Male	15.0	4.3
Race		
American Indian/Alaska Native	31	15
Total population	22.4	14
Location		
Anchorage & Vicinity	23	14
Fairbanks & Vicinity	19	14
Gulf Coast	23	15
Southeast	21	14
Rural[a]	26	11

Source: Uthermohle and Wells 2009
[a]Includes North Slope Borough

Table 15. Lifetime Estimates of Intimate Partner Violence and Sexual Violence among English-Speaking Adult Women in Alaska and the United States, 2010

Lifetime Estimates	State of Alaska (%)	United States (%)
Intimate Partner Violence[a]	47.6	ND
Threats	31.0	ND
Physical Violence	44.8	22.1
Sexual Violence	37.1	ND
Alcohol or Drug Involved Sexual Assault	26.8	ND
Forcible Sexual Assault	25.6	14.8

Source: CDVSA 2010
[a]Includes both threats of physical violence and physical violence by intimate partners

Table 16. Past Year Estimates of Intimate Partner Violence and Sexual Violence Among English-Speaking Adult Women in Alaska and the United States, 2010

Past Year Estimates (2009)	State of Alaska (%)	United States (%)
Intimate Partner Violence[a]	9.4	ND
Threats	5.8	ND
Physical Violence	8.6	1.3
Sexual Violence[b]	4.3	ND
Alcohol- or Drug-Involved Sexual Assault	3.6	ND
Forcible Sexual Assault	2.5	0.3

Source: CDVSA 2010
[a]Includes both threats of physical violence and physical violence by intimate partners
[b]Includes both alcohol or drug involved sexual assault and forcible sexual assault

5.1.4 Suicide

Suicide is an important health outcome that can indicate mental health illness in a population and has devastating effects on families and communities. Suicide was the fifth leading cause of death in the North Slope Borough and the sixth leading cause of death in the State of Alaska from 2007 to 2009. Age-adjusted suicide rates in the North Slope Borough from 2007 to 2009 were almost twice as great as those for the State of Alaska (Table 17). More than half of the suicides in the North Slope Borough Area were due to firearms (ADHSS BVS January 2012). After a period of increasing rates through the 1980s, suicide rates in the North Slope Borough appear to have leveled although they continue to fluctuate

from year to year. Suicide has remained a leading cause of death in the NSB for over 2 decades, ranked as either the fourth or fifth leading cause of death since 1992 (AHDSS BVS January 2012).

Table 17. Suicide Rates in the State of Alaska and the North Slope Borough, 2007 to 2009

	Number of Deaths	Age-adjusted Rate per 100,000 Population[a]	Leading Causes of Death Rank
State of Alaska	456	22.7	6
North Slope Borough	9	43.6	5

Sources: ADHSS BVS January 2012
[a]Age-adjusted rates are per 100,000 U.S. year 2000 standard population

The age distribution of suicides in Alaska is also quite different than the national age distribution. In Alaska, young people aged 15–24 years have the highest risk of suicide. In 2009, the suicide rate for young men aged 15–24 years was 56 per 100,000, compared with an overall rate of 20 per 100,000 (ADHSS Statewide Suicide Prevention Council 2010). The suicide rate among young men is more than 3 times that of young women. By contrast, in the U.S. overall, older persons are disproportionately more likely to die of suicide (NIMH 2012)

The NSB Baseline Community Health Analysis reports on adolescent and teen suicide by relying on personal communications with employees of the NSB Health Department who state that are reporting on what they have learned from Elders and from knowledgeable presenters, as follows:

- "Adolescents, Ages 10–14 Years**:** From 1996 to 2005, the leading cause of death to Alaskan adolescents was unintentional injury (49%), followed by suicide (11%). During this time period, the unintentional injury rate was significantly higher among Alaska Native adolescents, compared with non-Natives. The suicide rate among Alaska Native adolescents (5.7%) was twice that of non-Native adolescents (2.8 per 100,000)" (NSB 2012).

- "Teens (Ages 15–19): During 1996–2005, 82% of deaths among Alaskan teens were caused by unintentional injury, assault, and suicide. The leading cause of death among Alaska Native teens was suicide, accounting for 47% of deaths. Among non-Native teens, unintentional injury was the leading cause of death. The teen suicide rate was more than eight times higher among Alaska Native teens than among non-Native teens (110.8 vs. 13.1 per 100,000, respectively)" (NSB 2012).

No data in the Alaska Bureau of Vital Statistics is available to corroborate this information by borough. From 2007 to 2009, suicide was the third leading cause of death among Alaska Natives statewide ages 5 to 14; the number 2 cause of death for Alaska Natives ages 15 to 24 and 25 to 34; and the third leading cause of death in those age 35 to 44 (ADHSS BVS January 2012).

5.1.5 Substance Abuse

"Substance abuse refers to a set of conditions associated with the consumption of mind- and behavior-altering substances that have negative behavioral and health outcomes" (AN EpiCenter August 2009). Substance abuse can directly cause health problems and strongly influences many related health outcomes such as accidents and injuries (Brooke 1989).

Between 2003 and 2009, the percentage of adults in the North Slope Borough who self-reported excessive drinking (encompassing both binge-drinking and heavy drinking) was lower than in the State of Alaska (Table 18) (University of Wisconsin 2011); however, data based on self-report severely underestimates actual consumption (Brooke 1989). The County Health Rankings, the source of the data presented below, are produced by the University of Wisconsin Population Health Institute and are based on BRFSS survey data.

Table 18. Excessive Drinking Rates for North Slope Borough and Statewide, All Adult Residents, 2010

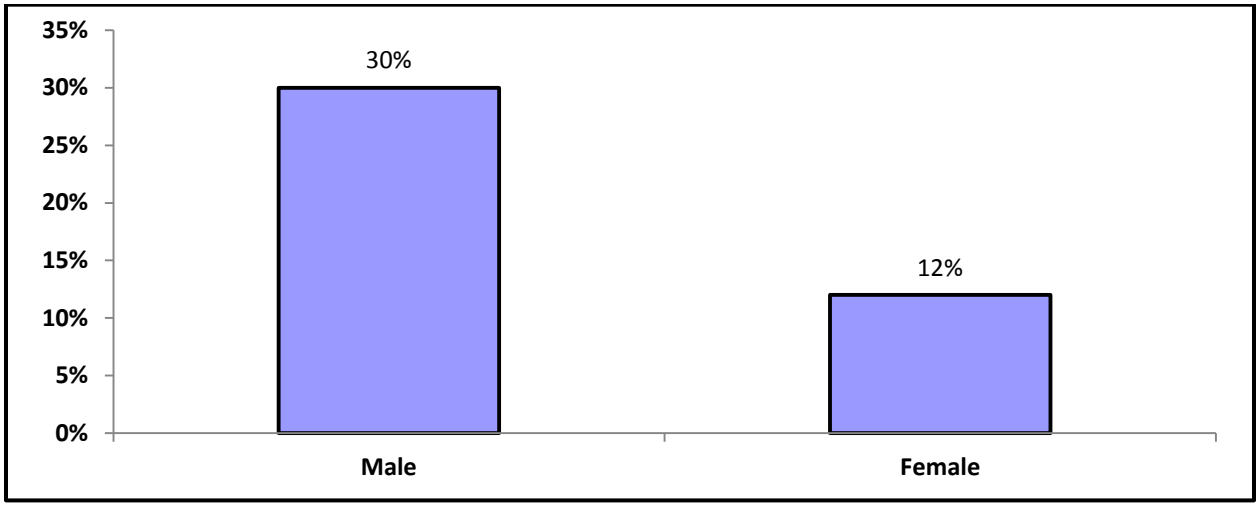
	North Slope Borough	Alaska Statewide
Percentage of adults reporting excessive drinking[a] (%)	15	19

Source: University of Wisconsin, County Health Rankings, 2011
[a]Excessive drinking encompasses both binge drinking and heavy drinking

In the 2010 NSB Census, as reported in NSB 2012, household heads were asked about the effect of drugs and alcohol on the health of their household members and their community. According to the NSB Baseline Community Health Analysis, a minority of household heads of all ethnic groups in the NSB thought that someone in their household had been hurt by alcohol or drugs in the past year. The response to this question did not vary significantly by age or gender; however, Inupiat household heads were 3 times as likely as white and twice as likely as those in other ethnic groups to report that a household member had been hurt by alcohol or drugs (NSB 2012).

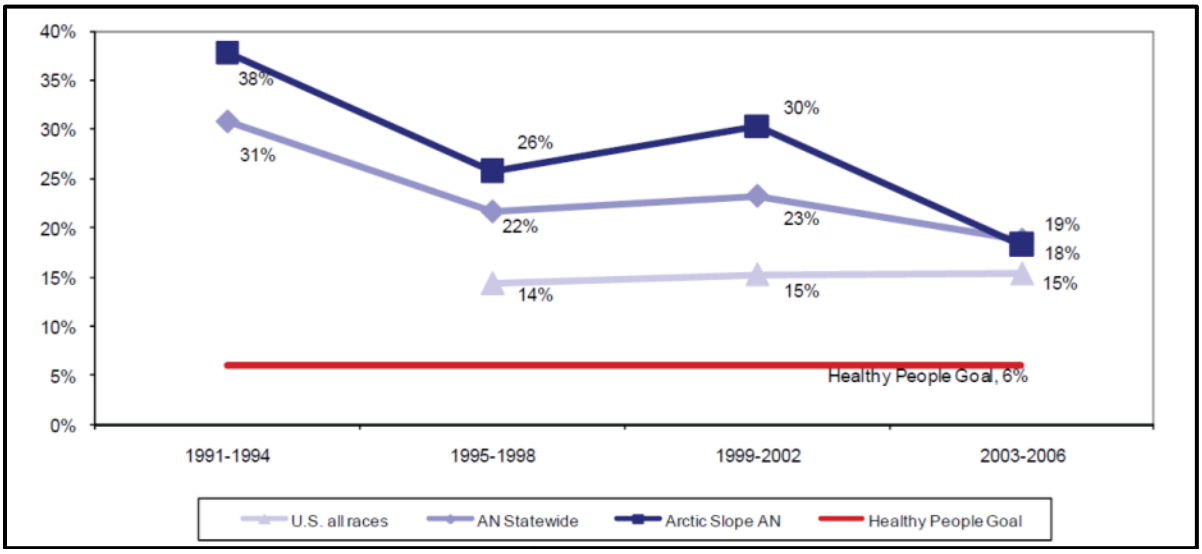
Self-reported percentages of binge drinking were more than twice that in males than females among Arctic Slope service area residents between 2001 and 2004 (Figure 6). Age group data is available for 1993 to 2004; it reveals that Alaska Natives 18 years and older living in the Arctic Slope Region reduced the amount of binge drinking during the study period. Self-reported rates of binge drinking decreased almost 50% between 1991 and 2004 (Figure 7).

Figure 6. Binge Drinking by Gender, Arctic Slope Alaska Natives, 18 years and older, 2001 to 2004 (weighted)



Source: AN EpiCenter April 2009

Figure 7. Binge Drinking, 18 years and older, 1993 to 2004 (weighted)



Source: AN EpiCenter April 2009

5.1.6 Oral Health

Oral health is an important and often-overlooked component of overall health. In May 2000, the U.S. Surgeon General released the first-ever report on Oral Health in response to what he termed a "silent epidemic" of dental and oral health. In addition to its immediate effects, poor oral health has been associated with heart disease, stroke, and preterm, low-birth weight births (USDHHS 2000). Tooth decay and periodontal disease can lead to loss of permanent teeth, resulting in difficulty chewing and eating a healthy diet. Periodontal disease can also worsen diabetes and may be a causal factor in a number of other health problems, including preterm delivery and cardiovascular disease.

Regular dental visits are important for identifying oral diseases, the most common of which are dental caries (cavities), gingivitis, and periodontal disease (ADHSS OHP 2005). In addition, many systemic diseases and medical conditions have early oral symptoms and are discovered during dental visits (ADHSS 2005). Of particular importance is the detection of oral and pharyngeal cancers, more than 75% of which are attributable to tobacco use (ADHSS 2002). As the percentage of smokers in the North Slope Borough is nearly 3 times the national average and the percentage of smokeless tobacco users is greater than 8 times that of Alaska non-Natives statewide, routine dental visits are particularly important in this population (AN EpiCenter August 2009).

Specific data for the North Slope Borough on oral health are not available. Only 20% of Alaska Natives had a dental visit in the year 2008, compared to 25% of American Indian/Alaska Natives overall (Table 19) (National Center for Health Statistics. 2011). This is significantly less than among the U.S. population where 65% of Americans reported a dental visit during 2008 (AN EpiCenter August 2009).

Table 19. Prevalence of Dental Visits among Alaska Natives, All U.S. American Indians/Alaska Natives, and United States Population in the Past Year, 2009

	Alaska Natives (%)	All U.S. American Indians/Alaska Natives (%)	United States (%)
Dental visit in the past year (2008)	20.0	25.0	65.1

Source: AN EpiCenter August 2009

The NSB Baseline Community Health Analysis reports that, according to BRFSS (2003 and 2005), 64% of adults in the NSB have had at least 1 permanent tooth removed (excluding tooth loss because of trauma), a statistically significantly higher proportion than among Alaska (43% noted in 2004 BRFSS) or U.S. adults (44% noted in 2004 BRFSS). About 25% of NSB adults have had 6 or more permanent teeth removed (NSB 2012).

Tooth decay is the most common chronic disease of childhood and can be associated with speech problems, difficulty eating and sleeping, and poor school performance (NSB 2012). The NSB Baseline Community Health Analysis reports on local NSB data from an Arctic Slope Native Association sealant clinic in Barrow in 2010. The clinic indicated that 53.6% of 1st and 5th graders have cavities, with an average of 3.4 cavities per child. Roughly 75% of students in these grade levels participated in the clinic and notes that while data from other sources are not directly comparable to the NSB sealant clinic data, a 2004 statewide oral health survey of 3rd graders found that 43.5% of Alaska Native students had untreated caries, compared with 28% of all Alaskan 3rd graders. Students living in rural Alaska had the highest percentage of untreated caries (43.1%) (ADHSS OHP 2004 - 2005). No borough-level data were available from this survey. At Samuel Simmonds Memorial Hospital, more than 2900 treatments with prophylactic fluoride were recorded among school-aged children in 2008–2009 (NSB 2012). An oral health surveillance system is under development and will be able to track data at the regional level in the future.

In children, full mouth dental reconstruction is a serious condition, which includes extractions and restorations of multiple carious teeth, that is performed under general anesthesia. Dental caries are known to cause pain, which can affect a child's normal growth and development. In April 2009, the Arctic Investigations Project and the ADHSS conducted a study among children to investigate associated risk factors for dental caries in a remote region of Alaska comprised of 85% Yup'ik Eskimo (CDC 2011). Despite a small sample size, the study found that among children 4 to 5 years and 12 to 15 years, 87% and 91% respectively, had dental caries compared with 35% and 51% of all U.S. children in those age groups. Also, those children aged 4 to 5 years and 12 to 15 years had 4.5 and 2.8 times the number of dental caries, respectively, than in the same-aged U.S. children.

The Arctic Investigations Project and ADHSS study also identified that lack of water fluoridation and consumption of soda pop was associated with dental caries severity. Children living in villages without fluoridated water had 1.2 to 2.9 times higher mean number of decayed teeth and decayed, missing, and filled permanent teeth than children living in villages with fluoridated drinking water (CDC 2011). Barrow is the only potentially affected community that provides fluoridated water to the community. In 2005, ADHSS found that 75% of Alaska Native children had dental caries. Although there were no differences by gender, the proportion of Alaska Native children in need of dental treatment was twice that of white Alaskan children (ADHSS OHP 2004 - 2005). Given the magnitude of the prevalence of severe dental caries within a predominately Alaska Native population above that of U.S. children, it is reasonable to assume a similar pattern in the North Slope Borough and the Arctic Slope service area.

5.1.7 Economic Indicators

Previous studies have documented the relationship between socioeconomic status and health. This trend spans all income levels; while those living in poverty have the worst health, even middle-class people have worse health outcomes than those who are more affluent. This association persists even when there is no accounting for differences in health insurance coverage (Braveman et al. 2011).

The U.S. Census Bureau collects data on median household income via the American Communities Survey (ACS). Median means that half of the households have higher income and half of the households have lower income. Income includes all monetary sources of income including wages, the Permanent Fund Dividend, Corporation Dividends and Public Assistance (ADCRA 2012). Income does not include any dollar equivalent of subsistence resources. For 2009, the estimated median household income in the NSB was $68,517; for Alaska it was $64,576 (Table 20). The range of median household income in the PACs ranged from $43,162 to $86,458; in most villages median household income was substantially higher than in 1999.

The 2010 per capita income in the North Slope Borough was considerably lower than in the State of Alaska: $22,109 in the North Slope Borough, compared to a per capita income of $30,598 in the State of Alaska. The per capita income in several of the communities was even lower than the borough overall with the exception of Barrow and Nuiqsut (Table 20).

Table 20. Economic Indicators for the State of Alaska and North Slope Borough Communities, 2010

Location	Per Capita Income (2010) ($)	Median Household Income (2010) ($)	% of People Living Below the Poverty Limit (2010)
State of Alaska	30,598	64,576	9.5
North Slope Borough	22,109	68,517	11.8
Anaktuvuk Pass	15,015	43,162	14.0
Atqasuk	19,947	66,042	10.8
Barrow	25,528	78,250	14.5
Kaktovik	17,799	46,458	13.3
Nuiqsut	22,981	86,458	0.6

Sources: Alaska, North Slope Borough, and communities data- Median household income, per capita income, and percent of families living below the poverty line: 2010 American Community Survey 2010 1-Year Estimates
Unemployment Rates will be presented in the final HIA and are based on U.S. Bureau of Labor Statistics. Not seasonally adjusted.

Poverty is a powerful determinant of human health (Braveman et al. 2011). The U.S. Census defines poverty in a way that does not take into account the higher cost of living in Alaska. The ADHSS adjusts poverty guidelines for entitlement programs such as Women, Infants and Children, and Temporary Assistance for Needy Families for local factors. For a single person, the 2012 ADHSS poverty level for Alaska for 1 person was $13,970 and for a 4-person household it was $28,820 (Table 21). However, the poverty measure may still not accurately predict the well-being of a family in rural Alaska, due to the contributions from subsistence and sharing resources within the community (Goldsmith 2007).

In 2010, the percent of residents living below the federal poverty level in the North Slope Borough was almost 12% compared to 9.5% for all of Alaska (Table 20 above). The variation between villages is high, ranging from less than 1% in Nuiqsut to over 14% in Barrow. All villages, except Nuiqsut, had a higher percentage of residents living below the poverty line than the State of Alaska as a whole (ADCRA 2012).

Table 21. Comparison of 2012 Poverty Guidelines for Alaska and the Lower 48 States

Persons in family	Alaska	48 Contiguous States and DC
1	$13,970	$11,170
2	18,920	15,130
3	23,870	19,090
4	28,820	23,050
5	33,770	27,010
6	38,720	30,970
7	43,670	34,930
8	48,620	38,890
	For families with more than 8 persons, add $4,950 for each additional person.	For families with more than 8 persons, add $3,960 for each additional person

Source: 2012 Federal Poverty Guidelines, as accessed on March 9, 2012, at http://aspe.hhs.gov/poverty/12poverty.shtml

Employment is another key demographic factor that influences health (AN EpiCenter August 2009), which reports that unemployment included anyone who had made an active attempt to find work in the four-week period up to and including the week that included the 12th of the referenced month. Due to the scarcity of employment opportunities in rural Alaska, many individuals did not meet the official definition of unemployed because they were not conducting active job searches. Unemployment has been independently linked to poor health, with a higher prevalence of ill health and excess mortality in men and women who are unemployed (Marmot and Wilkinson 2006). The unemployment rate is not presented as it is volatile. Source of data is shown in the Sources of Table 22 so that it can be updated.

5.1.8 Dependency Ratio

Another useful measure of age composition of a community is the dependency ratio, a measure of the portion of a population that is composed of dependents (people who are too young or too old to work and need support or care) to those of working age. This ratio, in part, determines the amount of services needed in a community and the economic workforce available to fund them. It is also a factor in economic growth and stability. According to the 2010 NSB Census, the ratio of residents aged 0 to 15 years or 65+ years to those aged 16 to 64 years is 0.56, although it is higher in some North Slope Borough communities. This number indicates that there are slightly less than 2 people of working age for every person in "dependent" age groups in the NSB (NSB 2012).

5.1.9 Educational Attainment

Internationally, the highest level of household educational attainment positively associated with improved overall family health status (Muennig 2006). Household head educational attainment level also predicts challenges or opportunities that will occur in regards to local hiring programs. This is especially true in oil and gas developments such as the Gas Treatment Plant where permanent positions may require significant technical skill sets.

Additionally, high school graduates have been found to live an average of 6 to 9 years longer than high school dropouts (Wong et al. 2002). Adults with low educational attainment are more likely to die from cardiovascular disease, cancer, and lung disease (Muennig 2005). Multiple mechanisms have been proposed to account for this trend. Education positively impacts lifestyle choices and health-related decisions, and better-educated people are also less likely to be employed in dangerous jobs (Muennig 2006).

Compared to the State of Alaska, the North Slope Borough has a lower percentage of adults with a high school diploma and with a bachelor's degree or higher (Table 22). The percentage of adults who are high school graduates varies considerably among the 5 communities, from a low of 58% in Kaktovik to a high of 80% in Barrow. The percentage of adults with a bachelor's degree or higher is lower than in the State of Alaska in the borough and every village.

Table 22. Education Indicators for the State of Alaska and the North Slope Borough Communities, 2005 to2009

Location	Educational Attainment of Population 25 Years and Over		High School Drop-out Rate (%)*
	High School Graduate or Higher (%)	Bachelor's Degree or Higher (%)	
State of Alaska	90.7	27.0	5.8
North Slope Borough	73.8	13.5	11.6
Anaktuvuk Pass	77.4	12.8	0.0
Atqasuk	60.6	12.0	13.5
Barrow	80.2	18.1	9.1
Kaktovik	58.4	0.9	17.5
Nuiqsut	76.4	17.8	16.8

*In general, the dropout rate reflects the percentage of all students enrolled in grades 7-12 who leave school during a single school year. It is calculated by dividing the number of dropouts by a membership base, which includes all students who were in membership any time during the year. It is not directly related to the percentage of people over 25 years of age who have graduated from high school.
Sources: Educational Attainment: 2009 American Community Survey 1-Year Estimates
Village data: Educational Attainment: 2005-2009 American Community Survey 5-Year Estimates
State of Alaska Report Card, 2009-2010 School Year

5.1.10 Family Stability

Family stability has been found to have positive effects on children's health behaviors and outcomes (Harden 2004). Family stability exists in families whose parents are healthy and earning incomes; whose members experience housing changes only infrequently; and whose family members stay together with infrequent divorce and remarriage, or few separations due to immigration and job-seeking reasons (Patterson and Yoerger 2002). Family stability results in more effective child supervision and parental monitoring, less family conflict, and more family cohesion (Robertson et al. 2008). Good parental

monitoring, in particular, results in better child physical and mental health and long term development (Proeschold-Bell 2010).

Family stability has traditionally been assessed according to factors related to family structure, such as single parenthood. More recently, factors such as parental mental health, stability of relationships among caregivers, and positive parenting have been used as markers of family stability. These may be more representative of family stability among Alaska Natives, for whom the nuclear family model is not always appropriate (Freeman et al. Undated). However, these factors are difficult to assess, and regional and local data are not available.

One alternative measure of family stability is the divorce rate. The Alaska Bureau of Vital Statistics maintains a database on divorce for the state and boroughs (ADHSS BVS February 2012). Table 23 below presents the divorce rate for females and males in the State of Alaska and the North Slope Borough, and shows a lower rate of divorce in the North Slope Borough than in the State of Alaska, indicating greater family stability in this region.

Table 23. Divorce Rates, State of Alaska and the North Slope Borough by Gender, 2009

	Female Rate per 1000 Population	Male Rate per 1000 Population
Alaska	8.1	7.5
North Slope Borough	4.5	3.1

Source: Alaska Bureau of Vital Statistics

Using single parenthood as another marker of family stability, the North Slope Borough and all of the communities have a higher percentage of households headed by females without husbands than the State of Alaska (Table 24). In Nuiqsut, almost 35% of households are headed by females only, more than twice the statewide percentage. This indicator would suggest decreased family stability in the region; however, when considering other markers of family stability such as divorce, the statistics may not be conclusive.

Table 24. Household Characteristics for State of Alaska and the North Slope Borough Communities, 2010

Location	Number of Households	Average Household size	Percent of Family Households	Female Headed Households, No Husband Present (Percent of Family Households)	Two-Parent Households with own Children Present < 18 (Percent of Family Households)
State of Alaska	258,058	2.7	66.2	16.2	49.9
North Slope Borough	2,029	3.3	71.1	28.0	55.6
Anaktuvuk Pass	99	3.3	65.7	29.2	52.3
Atqasuk	64	3.6	70.3	28.9	66.7
Barrow	1,280	3.3	69.8	27.0	55.8
Kaktovik	72	3.3	72.2	26.9	50.0
Nuiqsut	114	3.5	73.7	34.5	47.6

Source: American Community Survey, 2005-2009

5.1.11 Cultural Indicators

Cultural continuity has been linked to numerous health outcomes including reduced rates of suicide (Chandler 1998, Chandler 2004). Speaking a native language and participating in subsistence activities have been highlighted by circumpolar Natives as important signifiers of community health and cultural continuity (Stevenson 2009). Subsistence participation can include use of subsistence resources, harvest activities, sharing, and receiving subsistence resources.

In the North Slope Borough, 75.5% of the population is Alaska Native, primarily Inupiat Eskimo. As of 2010, almost 50% of the population spoke a language other than English at home (most commonly Inupiaq) (Table 25). These data show that 41 to 71% of residents in the 5 North Slope Borough communities speak another language at home compared 16% of the residents of the State of Alaska (Table 25). This suggests that cultural continuity is high in the North Slope Borough and its villages.

Participation in subsistence activities is high throughout the region although precise numbers are not known at this time. The Alaska Department of Fish & Game (ADF&G) completed a harvest survey in Anaktuvuk Pass in early 2012 but the results will not be published for several months. Participation is typically a voluntary attempt to preserve cultural continuity, a necessity for survival, or a combination of both.

Table 25. Cultural Indicators for the State of Alaska and North Slope Borough Communities, 2010

Location	Primary Cultural Group(s)	Percent Speaking a Language Other than English at Home (2010) (%)[a]	Percent Participating in Subsistence Activities (20xx) (%)[b]
State of Alaska		16.5	ND
North Slope Borough		48.6	ND
Anaktuvuk Pass	Inupiat Eskimo	67.0	ND
Atqasuk	Inupiat Eskimo	53.1	ND
Barrow	Inupiat Eskimo	41.5	ND
Kaktovik	Inupiat Eskimo	46.2	ND
Nuiqsut	Inupiat Eskimo	71.4	ND

[a]According to US Census: Alaska- Fact Sheet (2010 American Community Surveys 1 year average)
Subsistence participation rates will be presented in the ADF&G Harvest Surveys

5.1.12 Summary

The health of residents in many of the potentially affected communities is affected by their economically disadvantaged position:

- The per capita income of residents in the PACs is lower than the per capita income of the state;
- All villages, except Nuiqsut, had a higher percentage of residents living below the poverty line than the State of Alaska as a whole.
- Education levels past high school are lower so that fewer people are prepared for work

Areas of Vulnerability

Alaska Natives in the North Slope Borough are faced with more challenges to social determinants of health than non-Natives. Alaska Natives fared worse in every health indicator for which data was available by ethnicity, such as:

- Lower life expectancies
- Fewer women received adequate or adequate plus prenatal care and the infant mortality rate is higher. Even though infant mortality is steadily decreasing in the state, prenatal care remains a critical topic that appears to be experiencing some challenges
- Higher percent of low birth weight babies
- Percentage of Alaska Natives statewide who had received a dental visit in the past year was lower
- A greater percentage of women in the North Slope Borough reported smoking during pregnancy than in the state.
- Suicide rates were almost twice as high among Alaska Natives in NSB than among whites statewide
- Intimate partner violence and unwanted sexual activity rates are higher

- The Rural Region (which includes the North Slope Borough) had the highest rates of child abuse in the state
- Percentage of households with no husband present is higher in the NSB than statewide, and is higher still in the villages.

Areas of Resilience/Success

Despite significant challenges, residents of the villages fared better on several important health indicators and health determinants:

- Residents of the NSB have lower divorce rates than residents of the state
- Rates of heavy drinking and binge drinking in the NSB are lower than in the state
- Residents of the villages report high levels of participation in cultural continuity indicators.

5.1.13 Data Gaps

- North Slope Borough level specific data are not available for several of the variables including life expectancy, child abuse and out-of-home placement, and intimate partner violence and sexual violence.
- Individual community and household level specific data are not available for many of the variables.
- Unemployment data was not gathered because it is calculated each month and would not be valid when the Project resumes.

5.2 HEC 2: Accidents and Injuries

Accidents and injuries are an important cause of mortality and morbidity in Alaska. The term unintentional injury refers to causes of injury or death other than suicide and homicide. Fatal injury information is drawn from death certificates and the Alaska Violent Death Reporting System while non-fatal injuries are typically obtained from the Alaska Trauma Registry (ATR). Alcohol use is a powerful risk factor for accidents and injuries and so alcohol related injury events are reported. The presence of law enforcement or village public safety officers (VPSO) also influences safety in rural communities.

5.2.1 Non-Fatal Accidents and Injuries

According to the NSB Baseline Community Health Analysis, from 1999 to 2008, there were 736 non-fatal injury hospitalizations among North Slope Borough residents. During this 10-year period, the leading causes of injury hospitalization were falls, followed by suicide attempts, assault, and snowmachine-related injury hospitalization. With the exception of motor vehicle traffic-related injury hospitalizations, rates in the NSB were higher than statewide rates for the leading causes of injury hospitalization (NSB 2012).

5.2.2 Fatal Accidents and Injuries

Of the 958 total injuries reported from 2001 to 2010, 19 (2%) resulted in death. The NSB Community Health Data Analysis states that “death rates from unintentional injury remain higher in the NSB than statewide and national rates and Healthy Alaskans 2010 targets. Unintentional injury is the leading cause of premature death in the NSB and the leading cause of death among Alaska Native children

statewide." The largest single cause of unintentional injury death from 1994 to 2008 in the NSB is motor vehicle accidents, specifically snow machine accidents (NSB 2012).

Between 2007 and 2009, unintentional injuries were the third leading cause of death among all residents of the North Slope Borough. The largest single cause of unintentional injury death in the NSB is motor vehicle accidents (both on- and off-road), and the mortality rate from motor vehicle accidents is more than twice the statewide rate. The NSB death rate for off-road vehicle accidents is more than 8 times the statewide rate (ADHSS BVS January 2012).

Table 26. Unintentional Injury Deaths by Cause, North Slope Borough and State of Alaska, 2007 to 2009

	North Slope Borough		State of Alaska	
Cause of Death	Number of Deaths	Age-adjusted Rate[a]	Number of Deaths	Age-adjusted Rate[a]
Unintentional Injuries	**16**	**129.1***	**1025**	**55.3**
Transport accidents	7	43.3*	310	15.5
Motor vehicle accidents	7	43.3*	263	13.2
Snowmachine[b]	5	**	48	2.5
ATV[c]	2	**	21	1.0
Water transport	0	0.0	16	8*
Air transport	0	0.0	27	1.3
Other transport accidents	0	0.0	4	**
Nontransport accidents	9	85.8*	715	39.8
Falls	0	0.0	73	5.6
Accidental discharge of firearms	0	0.0	6	3*
Drowning and submersion	3	**	73	3.6
Smoke, fire and flame	0	0.0	39	1.9
Poisoning	3	**	348	16.9

Source: ADHSS BVS January 2012
[a] Age-adjusted rates are per 100,000 U.S. year 2000 standard population
[b] Deaths to an operator or passenger related to the use of a snow machine
[c] Deaths to an operator or passenger related to the use of an ATV
* Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution
**Rates based on fewer than 6 occurrences are not reported

5.2.3 Intentional Self-Harm: Suicide

Suicide was the fifth leading cause of death in the NSB in 2007 to 2009 (ADHSS BVS January 2012). After a period of increasing rates through the 1980s, suicide rates appear to have roughly leveled off (although they fluctuate from year to year) in the NSB. They have remained a leading cause of death in

the NSB for over 2 decades. Since 1990, age-adjusted suicide mortality rates in the NSB are twice the statewide average and 4 times the national average. More than two-thirds of the completed suicides occurring on the North Slope since 2000 have been by use of firearms" (NSB 2012).

5.2.4 Accidents and Injuries among Alaska Natives

Non-fatal Injuries among Alaska Natives

Falls, suicide attempts, and assaults were the most common causes of injury hospitalization for all Alaska Natives from 2001 to 2010.

Fatal Accidents and Injuries among Alaska Natives

From 2005 to 2007, the most common cause of unintentional injury among Alaska Natives statewide was poison, which accounted for 19.6% of deaths among Alaska Natives (Table 27). The leading causes of unintentional injury deaths for all Alaska Natives are shown in Table 27; the top 3 were unintentional poisoning (generally via alcohol ingestion), motor vehicle traffic events, and drowning.

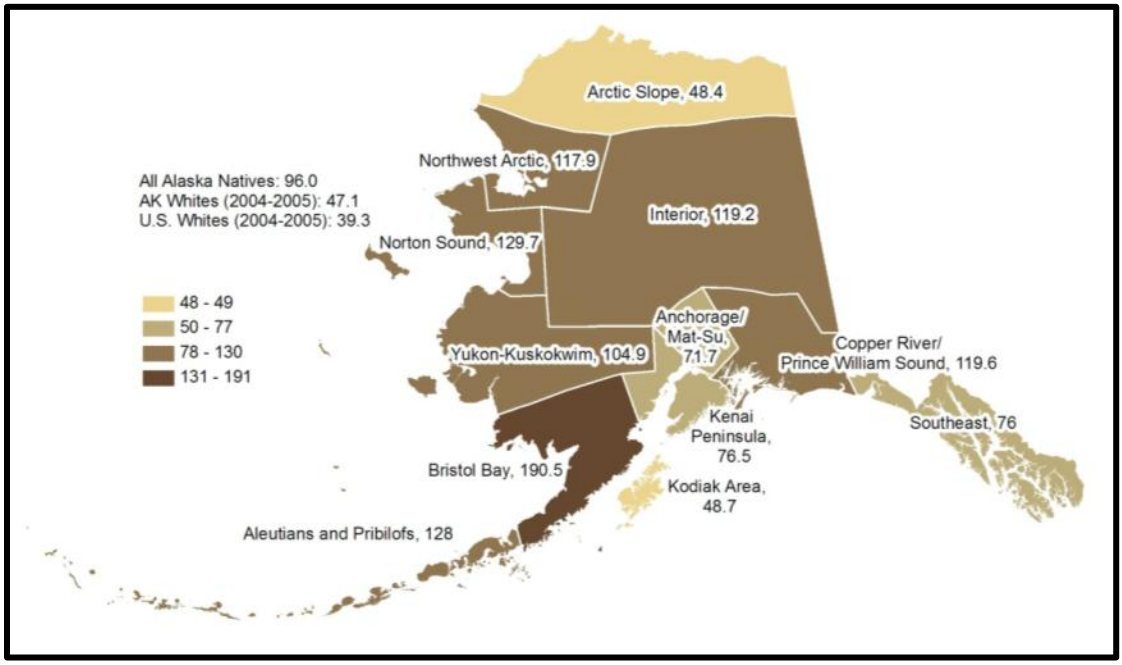
Table 27. Leading Causes of Unintentional Injury Deaths among All Alaska Natives, 2005 to 2007

Cause	Rank	Number of Deaths	Percent of Total
Unintentional poisoning	1	61	19.6
Motor vehicle traffic	2	46	14.7
Drowning	3	41	13.1
Natural/environmental	4	39	12.5
ATV/Snowmachine	5	27	8.7
Other Transport (Boat, etc.)	6	27	8.7
Suffocation	7	19	6.1
Fire/Flame	8	15	4.8
Fall	9	7	2.2
Pedestrian (Other)	10	6	1.9
Firearm	11	3	1.0
Other		9	2.9
Not Specified		12	3.8
Total		**312**	**100**

Source: AN EpiCenter August 2009

Alaska Natives residing in the Arctic Slope Region have 1 of the lowest age-adjusted unintentional injury death rates in the state, half the rate of all Alaska Natives and similar to the rate for Alaska whites (Figure 8).

Figure 8. Average Annual Age-adjusted Unintentional Injury Death Rates per 100,000 by Region, Alaska Natives, 2004 to 2007



Source: AN EpiCenter August 2009

Intentional Fatal Injuries

Suicide attempts ranked second in the most common causes of injury hospitalization for all Alaska Natives. For leading causes of injury deaths for all Alaska Natives between 2005 and 2007, suicide ranked first, with 141 deaths (Table 28).

Table 28. Leading Causes of Intentional Injury Deaths among All Alaska Natives, 2005 to 2007

Cause	Rank	Number of Deaths	Percent of Total
Suicide	1	141	78.3
Homicide	2	39	21.7
Total		**180**	**100**

Source: AN EpiCenter August 2009

5.2.5 Alcohol Related Accidents and Injuries

Alcohol consumption and injury death are strongly related. In 1997, Landen reported that in injury fatality cases where blood alcohol was actually recorded, more than 65% had a blood alcohol concentration (BAC) of ≥80 mg/dL (≥0.08%). The legal limit for blood alcohol concentrations in the majority of states, including Alaska, is 80 mg/dL (0.08%). The authors also report that living in a wet

village was an independent risk factor for injury death (Landen et al. 1997). In the NSB, 28.3% of accidents and injuries were alcohol related from 2001 to 2010 (NSB 2012).

5.2.6 Traffic and Accidents

Motor vehicles, airplanes, boats and barges, snowmachines, and all-terrain vehicles are common modes of transportation in the area. Pedestrian and motor vehicle injuries are included in the fatal and non-fatal injury figures above. Motor vehicle accidents accounted for 226 of the total accidents in the NSB from 2001 to 2010, or 23.6%.

5.2.7 Law Enforcement

The Alaska State Troopers (AST) 2010 Annual Report provides details regarding the law enforcement in the area (AST 2010). The AST is a division of the Alaska Department of Public Safety. In addition to State Troopers, the VPSO program was established as a means of providing rural Alaskan communities with needed public safety services at the local level. In 2010, the program had 86 funded positions, 78 which were filled by the end of the year (ADPS AST 2010).

The NSB Police Department is the second largest municipal law enforcement agency in Alaska, providing services to over 12,000 people, including the oil industrial complex at Prudhoe Bay. The NSB Police Department provides officers, on a rotating basis, to all the communities of the NSB (NSB 2012).

5.2.8 Dry/Wet/Damp Community

Title 4 is the Alaska state law that deals with the regulation, control and distribution of alcoholic beverages throughout the state. This law includes provisions that allow for local options (AS 04.11.491), which determine whether the sale, importation or possession of alcohol is allowed in the community. Many Alaskan Native villages have enacted policies that designate a community as “dry” (alcohol sale and importation prohibited) or “damp” (sale of alcohol illegal, but importation allowed). As of June 2011, the sale of alcohol is not allowed in any NSB communities (ADPS ABC 2011).

5.2.9 Summary

Areas of Vulnerability

- Accidents and injuries were the third leading cause of death in the North Slope Borough between 2007 and 2009. The most common causes of unintentional injury deaths among all residents and among Alaska Natives were:
    - Motor vehicle accidents (the majority of which are snow machine accidents), and
    - Drowning and submersion.
    - Poisoning (typically caused by alcohol ingestion),
- Alcohol was strongly related to over 28% of all accidents and injuries, especially among Alaska Natives between the ages of 15 to 24 years.

Areas of Resilience/Success

- Alaska Natives residing in the Arctic Slope Region have one of the lowest age-adjusted unintentional injury death rates in the state.

5.2.10 Data Gaps

- Updated accident and injury data from the Alaska Trauma Registry (2009 to 2011)
- Traffic and accident datasets

5.3 HEC 3: Exposure to Potentially Hazardous Materials

When gathering data on exposure to potentially hazardous materials, the HIA team reports on health *determinants,* including information, where available, on air monitoring data, water, and soil to understand the types and quantities of contamination that might be present.

5.3.1 Physical Hazards

There are no readily available data on illnesses related to physical hazards such as radiation, noise, vibration, light, or wildlife interactions. These are typically few in number.

5.3.2 Air Quality

Air pollution has been shown to increase the risk of or exacerbate a number of respiratory and cardiac conditions, including such major health burdens as asthma, coronary artery disease, and lung cancer. Air pollution is also associated with increased daily mortality rates (Pope et al 1993). The elderly, children, and those with underlying health problems are particularly vulnerable to the effects of air pollution.

ADEC received a grant from the EPA to prepare a report summarizing current air pollutant monitoring, emission, and meteorological data for Alaska's North Slope Borough to provide an assessment of cumulative industrial impacts. This 2011 report served 2 main purposes: regulatory compliance demonstrations for individual facilities; and assessment of cumulative, regional impacts resulting from a cluster or larger group of facilities (MACTEC 2011). The focus on emissions was on stationary point sources. ADEC identified 38 stationary sources in the North Slope Borough as major sources requiring a Federal Title V permit and 37 sources requiring a Title I permit. Major sources accounted for 96% of the total potential emissions with major sources largely concentrated in and around the Prudhoe Bay area and westward to Alpine (a lateral span east to west of approximately 100 km). All other source types including minor, synthetic minor, and 2 non-classified sources comprised the remaining 4%. Industrial activities in the North Slope Borough are largely related to oil production and transport which account for about 58% of the permitted sources. Electric power generation plants account for approximately 21%, and approximately 20%, are primarily related to the seafood and construction industries.

NSB residents are particularly concerned about air pollution generated by nearby oil and gas extraction activities. The Alaska Native Tribal Health Consortium (ANTHC) and the University of Alaska Institute for Circumpolar Health Studies investigated air quality and respiratory complaints in Nuiqsut, the village closest to active oil and gas extraction activities. According to the NSB Baseline Community Health Analysis, investigators set up air-monitoring stations in the village to measure particulate matter, carbon monoxide, sulfur dioxide, and nitrogen oxides and interviewed residents regarding perceptions of air-quality risk. Preliminary results indicate that the study has found little evidence of significant air-quality problems associated with oil development near the village (NSB 2012). The Alaska Department of Health and Social Services Section of Epidemiology also investigated air pollution and respiratory illness in Nuiqsut in response to community concerns in 2003 and 2012. Air pollution data was collected from the Conoco Phillips air quality monitoring station on the northern edge of Nuiqsut. This station monitors several pollutants of concern (particulate matter, nitrogen dioxide, sulfur dioxide, ozone, and carbon

monoxide). Air pollution was not associated with respiratory illness. (ADHSS SOE 2003, ADHSS SOE 2012).

According to the EPA, tribes in Alaska face unique challenges to protecting air quality and reducing health risks in their communities (EPA 2011).

- Most Tribes do not have a reservation or defined lands where they can assert jurisdiction to address air quality issues.
- Frozen ground prevents burying waste in landfills, and many communities resort to burning trash which creates air pollution.
- Electricity primarily comes from diesel generators which produce particulate and other air pollutants.
- The cold climate means people spend a lot of time indoors where indoor air pollution and humidity may rise to unhealthy levels.
- Many homes have older wood stoves which can be inefficient and create air pollution.
- Dust from unpaved roads may contain pollutants that can be inhaled or deposited on subsistence food sources.

Additionally, idling vehicles, may contribute to elevated air pollutant concentrations in some communities, even when temperatures are not very low.

According to NSB 2012, all but 2 villages—Barrow and Nuiqsut—use diesel oil as the primary fuel source for heating. Barrow and Nuiqsut use natural gas, and a small number of NSB households use electricity, wood, kerosene or a combination of heating sources.

Awareness of the dangers of second-hand tobacco smoke is high in the NSB, and a large majority of household heads does not permit smoking in the house. Nonetheless, of the 49% of household heads who smoke, one-third smoked and/or permitted others to smoke inside the house (NSB 2012). Barrow has enacted a smoking ban in restaurants, but the ban is not in effect in all enclosed workplaces.

5.3.3 Water Quality

The State of Alaska conducts surface and groundwater water quality monitoring investigations regularly. The Clean Water Act mandates that each state develop a program to monitor and report on the quality of its surface and ground waters and prepare a report describing the status of its water quality. Alaska updates its report every 2 years (ADEC 2010). As of 2010, there were 35 impaired waterbodies in Alaska, though there are no outstanding water quality violations in the North Slope Borough (EPA 2012).

5.3.4 Pre-existing Environmental Hazardous Materials

Alaskans in rural communities have several possible contamination exposure sources, including industrial fuel and biomass combustion; pollution transported through the air, water or locally bio-accumulated from global sources; naturally occurring substances such as asbestos and mercury; and local waste processes such as individual septic systems or honey pots. The extraction industry may also produce Hazardous Air Pollutants (HAPs) through natural gas flares which can produce dioxin through incomplete combustion (Stanmore 2004). Effective health monitoring for these contamination sources has proven difficult as the contaminants are usually spread across large distances and small population groups.

Inhalation is the principal exposure pathway to airborne contaminants. Pollutants can also dissolve in water sources or deposit on terrestrial surfaces. From their presence in any of these mediums, pollutants can be ingested through drinking or ingesting contaminants directly or through their bio-accumulation in subsistence flora or fauna. Contaminant bioaccumulation in subsistence animals is a pathway of particular concern for Alaskans.

Existing Contaminated Sites

The Alaska Department of Environmental Conservation (ADEC) Division of Spill Response and Prevention protects human health and the environment by managing the cleanup of contaminated soil and groundwater in Alaska. The program maintains a public database, which catalogues activity on contaminated sites throughout the state. The HIA team reviewed the database to determine the presence and nature of existing contamination in potentially affected communities (http://dec.alaska.gov/applications/spar/CSPSearch/default.asp).

A contaminated site (CS) is a location where hazardous substances, including petroleum products, have been improperly disposed of or accidentally released. Many of these sites resulted from disposal methods considered standard practices before we became aware of the problems or hazards they can cause. Contaminated sites can threaten public health or the environment and can cause economic hardship to indigenous people and communities. Open contaminated sites are those which have been identified and have not yet been fully remediated or remediation has not yet commenced.

ADEC will give 'Cleanup Complete' status when efforts to reduce hazardous substance contamination have achieved the most stringent levels established in state regulation, or the possibility of human exposure to any residual contamination is highly unlikely. The Department may allow hazardous substances to remain in the environment at a site if the contamination does not pose a risk to human health or the environment (e.g., it is present below the Minimal Clean-up Level (MCL), but there may be conditions or restrictions associated with the site that require compliance by current or future owners/operators. Those conditions or restrictions require follow-up reporting; the Department would then grant a 'Cleanup Complete - Institutional Controls' status.

Much of the existing contamination in Alaska is the result of inadvertent spills and careless chemical handling over the last century during the development accompanying a growing population. The large-scale military build-up beginning in World War II also contributed heavily to Alaska's contamination legacy. The following activities have contributed the majority of contaminated sites in Alaska:

- Oil exploration, exploitation, transportation, and distribution including stations and oil pipeline accidents.
- Military activities at military bases, DEW (Distance Early Warning) and WACS (White Alice Communications) sites, and shooting and maneuver ranges.
- Activity associated with airports. The factors for pollution include airplane wrecks, some tanks for fuelling purposes, antifreeze, de-icing compounds and their associated discharges.
- Mining sites make up a small proportion of total sites but can impact a significant area of land.

Barrow: There are 17 open contaminated sites in Barrow, 5 of which are associated with the DEW Line. Being the northernmost point in Alaska, the United States military has maintained a presence at Barrow since World War II when the Army established a crude radar site at Point Barrow. With the announcement of the DEW Line in 1954, Point Barrow was designed as the main site. A military airstrip (separate from the civil airport) was constructed in 1955 in order to transport aircraft and passengers to build the DEW Line stations along the northern Alaskan coast. With the signing of the North American Air Defense Modernization agreement at the "Shamrock Summit" between Canadian Prime Minister Mulroney and President Reagan in 1985, the DEW Line began its eventual upgrading and transition, becoming the North Warning System (NWS) of today. The intermediate DEW Line sites were closed in 1963 due to the advancements in radar technology.

Joint (Navy and the Air Force) remediation efforts underway since 2011 include: excavation and offsite disposal of polychlorinated biphenyl (PCB) contaminated soil from the Point Barrow Long Range Radar Station (LRRS), vehicle maintenance facility, radome, and transformer stand areas; excavation and offsite disposal of xylene-contaminated soil at the Point Barrow LRRS former Vehicle Fueling area; installation of 4 well points and sampling of active zone water at these 4 well points plus a pre-existing well point at the air terminal; removal of exposed debris at the Naval Arctic Research Laboratory Antenna Field; completion of demolition and debris removal at the Point Barrow LRRS; and Hazardous Material Survey of the Air Force Hangar at the Point Barrow LRRS Air Terminal area.

The former Long Range Aid to Navigation (LORAN) station was associated with the DEW Line and is currently a Defense Environmental Restoration Program (DERP) site. The station was abandoned in the 1950s and now receives heavy subsistence use. Trichloroethylene (TCE) contamination has been documented in surface water near Landfill A; Total petroleum hydrocarbon (TPH), and pesticides have been documented in soils. Remediation efforts have since occurred, but the site remains open.

In 1947, the Arctic Research Laboratory was established in Barrow, and was later (1967) converted to the Naval Arctic Research Laboratory (NARL) of the Office of Naval Research. There are 5 open contaminated sites associated with this facility. Limited remedial investigation at the airstrip fuel spill area and the bulk tank farm was conducted. Contamination at airstrip included benzene, toluene, ethylbenzene, and xylenes (BTEX), diesel range organics (DRO), gasoline range organics (GRO), lead, and volatile organic compounds (VOCs; including naphthalene). Sediments and surface waters of nearby Imikpuk Lake, North Salt Lagoon and melt water ponds were found to have sediment and surface water contamination, primarily DRO. The site consists of a ravine on open tundra; approximately 100 feet from the Chukchi Sea, filled with 55-gallon drums, a large fuel tank, and old military vehicles, batteries and a possible transformer casing have been identified in the debris. Remediation efforts to remove PCB and lead contaminated soil are underway.

At the site of an old oil rig on Simpson Peninsula, there is petroleum contamination of soils and elevated chromium in water. At the Barrow Elson Former Nike Facility, empty transformers and trace levels of polycyclic aromatic hydrocarbon (PAHs) and TPHs are present. The remaining sites consist of fuel contamination events such as avgas spills near the airport, heating oil near hospital staff housing and diesel at the Ukpeaġvik Iñupiat Corporation (UIC) tank farm.

Nuiqsut: There are 28 contaminated sites in the area surrounding Nuiqsut, 7 of which are associated with the DEW Line at Point Lonely. Point Lonely is located approximately 75 miles northwest of Nuiqsut, immediately adjacent to the Beaufort Sea within the National Petroleum Reserve Alaska (NPRA), Northeast Planning Area. The Point Lonely facility was originally constructed as an auxiliary DEW Line Station in 1953 and was active until 1989. In 1993, the Point Lonely installation was converted to a Short Range Radar Station (SRRS), which operated until 2005. Point Lonely facilities, which cover an area of approximately 2830 acres, have been used in the past for staging during oil and gas exploration. The camp was first used for exploration activities by the Department of the Navy (contractor- Husky Oil). Exploration activities transferred from the Navy to the US Geological Survey (USGS) in 1977 with Husky Oil retaining its contract. This use is expected to continue and will likely increase after the US Air Force's (USAF) departure. The North Slope Borough, in conjunction with UIC, has expressed an interest to the Bureau of Land Management (BLM) and USAF in using Point Lonely as a base camp in support of oil and gas exploration and development.

Contaminated sites at Point Lonely include an old landfill that received waste from the Point Lonely DEW

Line Station between 1955 and 1976. Before 1978, solid waste from other drill camps was flown to Camp Lonely for disposal. Exposed materials such as drums, glass, and scrap metal present a safety risk to trespassers or on-site workers. Several oil seeps have been observed leaching into sediments at the lagoon which could be toxic to aquatic life. The Camp Lonely Landfill was permitted by the ADEC Solid Waste Program from 1976-1989. Unauthorized materials such as batteries and petroleum products were placed in the landfill. This landfill in no longer in use, but was never officially closed with the Solid Waste Program. Landfill closure requires meeting certain standards and undertaking monitoring if needed. The primary contaminants of concern in the landfill soils are petroleum hydrocarbons and PCBs. There is also concern regarding erosion of dump waste into the Beaufort Sea.

The U.S. Navy developed the Umiat Air Force Station in 1944. The site is located on the north bank of the Colville River, approximately 70 miles south of Nuiqsut. The Umiat AFS was used from 1945-1946 as a staging area for oil exploration by the U.S. Navy. The site was later used by various state and federal agencies as a staging area for additional oil exploration until 1960. Umiat is now used as a lodging and stopover location for guided hunting and fishing trips and a base for oil exploration activities (ATSDR 2003). There is still an airstrip (now operated by the department of transportation), miscellaneous drums, landfills, gas wellheads and well houses, and waste piles (which includes transformers) (ADEC 2011).

Several contaminants have been identified in the water and/or soil surrounding the site. Contaminants of concern include petroleum products, PCBs, dioxins, lead, aluminum and antimony. A section of the site that is of particular concern is the slough where the landfill is located. The slough leads to the Colville River. Reports stated that land filled material was exposed by the Colville River due to erosion (ADEC 2011). As a result, there have been several studies to determine the impact of the contaminated water in the slough on fish and the Colville River. The Section of Epidemiology, Division of Public Health, ADHSS, examined the potential health impacts of eating fish collected in proximity of the former Umiat Air Force Station. Results indicated that PCB and DDT levels were higher in fish from the slough than in fish from the Colville River, which suggests that a source of contamination is within the slough. Results also concluded that the level of PCB and DDT detected in the fish were not at levels of concern to human health (ADHSS 2000). The Agency for Toxic Substances and Disease Registry (ATSDR) also evaluated the potential health risks associated with consuming fish (primarily burbot) from the Colville River. They concluded that the levels of PCBs, DDT, and DDT derivatives were very low and not expected to cause harmful effects to human health (ATSDR 2003).

The US Army Corps of Engineers is conducting an investigation and cleanup under the Formerly Used Defense Sites (FUDS) program. Clean up measures included removal of containerized waste, PCB-contaminated soil, and lead contaminated soil at the main pads. The removal of petroleum-contaminated soil, as well as plugging and abandoning the wells at one of the pads was conducted in 2002. Remaining contamination includes petroleum and PCBs at the pads, PCBs in the slough, petroleum at all well sites, barium at well 1, and PCBs at well 9 (ADEC 2011). In December 2011, Marsh Creek LLC received a contract from the FUDS program to remove, transport and dispose of PCB and petroleum contaminated soil remaining in the vicinity of test well 9 and a burn pit area located near the wellhead.

Kaktovik: There are 22 open contaminated sites in Kaktovik, 14 of which are associated with the DEW Line and its ancillary facilities. The Collinson Point DEW Line Station was established on Barter Island as one of 18 sites constructed in the 1950s for the defensive advance warning radar system that provided "top cover" air defense for North America. In 1970, ownership was transferred to the BLM. When the Arctic National Wildlife Refuge (ANWR) was created in 1980, ownership was then transferred to the US

Fish and Wildlife Service and remains with them today. Collinson Point was designated a FUDS and the US Army Corps of Engineers directs its cleanup following the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) standards. Potential environmental concerns include abandoned drums, solid waste problems, fuel-related contamination, and PCBs. Potential pathways of concern include migration to surface water, direct contact to contaminated soil or sediment, and subsistence. Demolition of the DEW Line buildings occurred in 2000 along with asbestos and lead-based paint abatement. At the same time, approximately 32 tons of fuel-impacted soil, equipment, and debris were removed (tower, transformers, 176 drums, etc.).

At the Marsh Creek Barrel Dump DERP site, a barrel labeled DDT-20% was discovered with bare mineral soil below the drums indicating potential release. At the Brownlow Point DERP site, significant soil contamination with PCBs and petroleum products was remediated such that contaminant levels dropped below ADEC clean-up levels by 2011.

At Waldo Arms Fuel, jet fuel contamination of soils is being addressed by the Air Force via excavation and land spreading. At the North Slope Borough Kaktovik Tank Farm Terminal, petroleum contamination has occurred north of tank farm system on gravel and in tundra along drainage swales from chronic leaks and spills from fuel transfers. There is concern for surface water impacts. The Kaktovik Inupiat Corporation (KIC) pad contains soils contaminated by the storage of large, uncontained fuel storage tanks as well as hundreds of drums and batteries. The presence of DRO and GRO above cleanup levels has been confirmed, and there is concern for offsite migration of contaminants as the natural slope of the tundra drains storm water from the pad toward the east through the residential area and into the lagoon.

In the Jago River Delta, large drums associated with the DEW Line site containing diesel, gasoline and grease presumably transported from Kaktovik and Manning Point are present. Due to of the remote location of the site and limited volume of contaminated soil, cleanup techniques have been generally limited to excavation and offsite treatment or disposal.

At the Barter Island Long Range Radar Station refueling area, there is DRO, GRO, and BTEX contamination in soil and groundwater. The same contamination is present by the hangar, in addition to elevated levels of PCBs, lead, and chromium.

Anaktuvuk Pass: In Anaktuvuk Pass, west of the airstrip there is petroleum contamination from chronic leaks and spills from fuel transfers. The extent of contamination has not yet been characterized. Just west of the airport apron the NSB former drum storage and stockpile site, there is DRO and residual range organics (RRO) contamination of soils above ADEC clean-up levels.

Deadhorse: Prudhoe Bay, located adjacent to Deadhorse, is the largest oil field in the United States producing approximately 1 million gallons of oil per day. In 2006, a leaking pipe spread over 250,000 gallons of oil and remains the largest spill to date. There are 23 open contaminated sites listed in the ADEC CS database in Deadhorse. Most of the contamination consists of DRO, GRO, and BTEX from spills associated with oil processing and handling.

5.3.5 Natural Environmental Patterns

The physical environment in which one lives affects health in many ways. Some hazardous exposures may emerge from natural environmental patterns such as flooding, wind and weather patterns that create air quality problems (i.e. inversions or high particulate matter content), or secondary effects from

climate change**.** The NSB experiences a harsh arctic coastal climate, although 1 to which Inupiat have successfully adapted over thousands of years. Connection to the natural world is a core value for many residents of the North Slope Borough, and residents depend on the natural environment for not only for food, but also for social and cultural identity (NSB 2012).

5.3.6 Summary

Areas of Vulnerability

- There are multiple contaminated sites in the NSB, primarily as a result of military activities which have not been remediated
- The weather in the NSB presents many challenges and risks, from extreme cold to thin ice.

Areas of Resilience/Success

- Results indicate little evidence of significant air-quality problems associated with oil development

5.3.7 Data Gaps

- There are no readily available data on illnesses related to physical hazards such as radiation, noise, vibration, light, or wildlife interactions.
- There is limited specific information readily available on air quality in the North Slope Borough.
- There is limited data on the health effects of active oil and gas extraction activities.

5.4 HEC 4: Food, Nutrition, and Subsistence Activity

The Alaska Federation of Natives describes subsistence as “the hunting, fishing, and gathering activities which traditionally constituted the economic base of life for Alaska's Native peoples and which continue to flourish in many areas of the state today” (AFN 1993).

Subsistence is part of a rural economic system, called a “mixed subsistence market” economy, wherein families invest money into small-scale, efficient technologies to harvest wild foods. Fishing and hunting for subsistence resources provide a reliable economic base for many rural regions. Subsistence is focused toward meeting the self-limiting needs of families and small communities (Wolfe and Walker 1987). Participants in this mixed economy in rural Alaska augment their subsistence production by cash employment. Cash (from commercial fishing, trapping, and/or wages from public sector employment, construction, fire fighting, oil and gas industry, or other services) provide the means to purchase the equipment, supplies, and gas used in subsistence activities. The combination of traditional and commercial-wage activities provides the economic basis for the way of life so highly valued in rural communities (Wolfe and Walker 1987).

Subsistence fishing and hunting are important sources of employment and nutrition in almost all rural communities (ADF&G 2007). Traditional fishing, hunting, and gathering are sources of nutrition for residents in areas of Alaska where food prices are high. While some people earn income from employment, these and other residents rely on subsistence to supplement their diets throughout the year. Furthermore, traditional and cultural activities support a healthy diet and contribute to residents’ overall wellbeing.

5.4.1 Micronutrient Deficiencies

There are no reported deaths by malnutrition in the North Slope Borough or by nutritional disorders such as scurvy, marasmus, B12, or other deficiencies. Information on clinical visits for these conditions is not available at this time, but incidence is generally low and not likely related to involuntary nutritional limitations. Vitamin D deficiency is a common problem for children and adults in Alaska and can lead to bone diseases such as rickets. People in the North Slope Borough, and many other people who live in the northern latitudes, are at an increased risk of vitamin D deficiency, which can lead to bone disorders such as rickets, and is also associated with an increase the risk of tuberculosis, dental caries, and autoimmune disorders (ADHSS 2003).

Vitamin D deficiency has also been found to be common in Alaskan children, particularly among those who are breastfed, and routine vitamin D supplements are recommended for breastfed infants after two months of age per the Alaska Division of Health and Social Services Section of Epidemiology (ADHSS 2003). Iron deficiency is also extremely common among rural Alaskan children, particularly in the northern and southwestern regions; although the cause is not entirely understood, it is probably not caused by a single factor (NSB 2012) *Helicobacter pylori* infection has been shown to be associated with iron-deficiency anemia among school-aged children in southwest Alaska (NSB 2012); however, observed patterns make either nutritional deficiency or *H. pylori* infection unlikely to be the sole etiology of the high prevalence of anemia in rural Alaska (AN EpiCenter 2008). Among young children, persistent prenatal effects appear to contribute to high rates of iron-deficiency and anemia in children up to at least age 5 years (NSB 2012).

5.4.2 Child Growth Standards

Physical growth curves in children serve as milestones for nutritional health and markers of acute and chronic malnutrition. Indicators for acute malnutrition are weight-for-height of below 2 standard deviations (z score) from WHO standards of childhood growth, and for chronic malnutrition as height-for-age (z score < -2) (WHO 1995). These WHO growth standards have shown that effects of the environment on growth of infants is much greater than any ethnic differences in populations, and thus should be an appropriate indicator for nutritional and environmental health (WHO UNICEF 2004).

5.4.3 Contribution of Subsistence Activities

According to the NSB Baseline Community Health Analysis, the 2010 NSB Census indicates that many North Slope Borough households participation in subsistence activities, particularly hunting land and sea mammals (including whales), fishing, sharing / cooking / processing wild foods, and picking berries and wild plants (NSB 2012).

According to the NSB 2012, more than 95% of NSB Inupiat household heads in every age group reported that their households used subsistence foods in 2009. An average of 67% (Table 30) of NSB Inupiat respondents reported that at least half of their household food came from local subsistence resources; the percentage ranged from 79% in Nuiqsut to a low of 60% in Barrow. NSB 2012 reports that in most villages, Inupiat households with heads who are employed full time and those with higher education levels still relied heavily on subsistence resources (NSB 2012).

Table 29. Percent of NSB Iñupiat Households for which at Least Half of the Previous Year's Household Diet Came from Subsistence Foods, 2010

	AKP	Atqasuk	Barrow	Kaktovik	Nuiqsut	NSB
2010 NSB Census	77%	67%	60%	76%	79%	67%
2003 NSB Census	79%	67%	66%	76%	67%	82%

Source: North Slope Borough Baseline Community Health Analysis, Draft 2012

The Subsistence and Traditional Land Use Patterns Section of the Point Thomson Project Draft EIS (Section 3.22) also provides summary information on subsistence in the North Slope Borough, as presented below:

> "Subsistence is a central aspect of North Slope culture and life, which is rooted in the traditional relationship of the Iñupiaq people with their environment. Residents of the North Slope of Alaska rely on subsistence harvests of plant and animal resources for nutritional sustenance and cultural and social well-being. Subsistence is not only a source of food for North Slope residents, but the activities associated with subsistence strengthen community and family social ties; reinforce community and individual cultural identity; and provide a link between contemporary Iñupiat and their ancestors.
>
> The two communities closest to the Point Thomson Project, Kaktovik and Nuiqsut, use areas in or adjacent to the Point Thomson project area (which includes the gas transmission pipeline between Point Thomson and Prudhoe Bay) for subsistence purposes. Of the various subsistence resources harvested by Kaktovik and Nuiqsut residents, the primary resources of concern for impact from the development of the APP are caribou hunting, bowhead whale hunting, seal hunting, waterfowl hunting, and fish harvesting. Data show Kaktovik hunters using the project area (Bullen Point to Point Thomson) to hunt for caribou and harvesting caribou along the coast in the project area during certain years. Bowhead whale hunting by Nuiqsut residents occurs offshore from the Point Thomson project area (although primarily west of Bullen Point). Years with unsuccessful bowhead whale harvests have caused hardships (e.g., decreased subsistence foods, increased risks to safety) for the study communities and remain in their collective memory. Residents from both communities expressed concerns about impacts on subsistence uses of these resources (caribou, bowhead whales, seals, waterfowl, and fish) during Point Thomson Project EIS public scoping meetings" (USACE 2011).

The Alaska Department of Fish and Game (ADF&G) recently conducted a Harvest Study in Anaktuvuk Pass and plans to conduct studies in additional communities during the winter of 2012/2013. Data from ADF&G Harvest Study is not currently available.

Nutrients found in Subsistence Foods

A number of important dietary surveys have been conducted in rural Alaska; however, data from North Slope Borough communities are extremely limited. Findings from other regions of Alaska suggest a higher reliance on non-traditional, or "store" foods by younger residents, and a general trend has also been observed of increasing store-bought food and sugared beverages compared with past nutritional surveys. Considerable dietary variation exists among different regions of Alaska; however, and findings

from a sample of regions cannot reliably be generalized to all of rural Alaska or to North Slope communities (NSB 2012).

The following information was originally presented in the NSB Baseline Community Heath Data Analysis:

> "Information on the composition and nutritional content of the diet of NSB residents is limited, but the research that has been conducted locally has confirmed the high nutritional value of a number of major subsistence foods in the NSB. The variety of species used for subsistence in the North Slope is large—encompassing marine mammals such as whale, walrus, and seal; caribou and other land mammals; and a wide variety of birds, fish, plants and berries. Moreover, the variety and balance of subsistence foods harvested varies considerably across the eight North Slope villages. Whereas the nutritional content of arctic subsistence foods has not been fully analyzed, an increasing amount of information on this topic has become available in recent years. In general, arctic subsistence foods, including many that are harvested and used in North Slope communities, have been found to be nutrient-dense, providing important sources of protein and energy as well as many other important nutrients. Among these nutrients are iron, zinc, selenium, vitamins A, E and C, and particularly the essential long-chain omega-3 fatty acids. These have been suggested or shown to be important in the prevention of many chronic diseases, including elevated blood pressure and cholesterol, heart disease, stroke, diabetes, arthritis, depression, and some cancers. Omega-3 fatty acids are also important for healthy fetal development. An essential subsistence food resource in the NSB, the bowhead whale has been the particular focus of recent subsistence nutrient research. Analyses of bowhead whale tissues that are used as food, including the skin and blubber (maktak), skeletal muscle, and some organ meats, have found them to be rich in protein, the healthy omega-3 fatty acids, and important elemental nutrients. The skin of bowhead whale was also found to contain a considerable amount of dietary fiber, which has generally been found to be low in other Alaskan subsistence diets as well as typical American diets. An analysis of seal and sheefish in prepared forms traditionally consumed in the Kotzebue area also found them to be rich in omega-3 fatty acids and other essential nutrients."

Many arctic communities utilize store-bought foods, replacing the relatively healthy and nutrient-rich traditional subsistence foods with market foods that are often high in sugar, calories, and unhealthy types of fat. Of the store bought foods, Inupiat household heads in the NSB reported significantly higher consumption of sugar sweetened beverages (SSBs) such as soda pop, fruit punch, sports and energy drinks, and sweetened milk, tea, and coffee drinks than did whites and those of other ethnicities (NSB 2012). Inupiat household heads were more than 6 times as likely as white household heads to report drinking more than 3 of these beverages per day (31% vs. 5%, respectively). The relationship between ethnic group and consumption of sodas and other SSBs was statistically significant in all age groups (NSB 2012).

According to the NSB 2012, consumption of sodas and SSBs was significantly associated with community of residence among Inupiat household heads. Of all the villages, household heads in Anaktuvuk Pass and Atqasuk were least likely to report drinking 2 or more of these beverages per day (49% and 48%, respectively) and most likely to report drinking none (25% and 21%, respectively) (Table 31). More than 60% of Inupiat household heads in Nuiqsut and Kaktovik reported drinking 2 or more of these beverages per day.

Table 30. Soda and Sugar-Sweetened Beverage Consumption among Iñupiat Household Heads:

Reported Average Daily Consumption, 2010

	AkP	Atqasuk	Barrow	Kaktovik	Nuiqsut	NSB Inupiat
None	25%	21%	16%	15%	11%	16%
Two or More	49%	48%	53%	65%	68%	58%

Source: NSB Baseline Community Health Analysis Draft 2012

According to the CDC, rural Alaskans without access to potable drinking water have been found to drink 3 times as much soda per day as their urban counterparts; over half (58%) of 2-year-olds drank 2 or more cups of SSBs (>13 teaspoons of added sugar) per day compared to 21%–26% of 2-year olds in all other regions of the state in 2006 (CDC March 2010).

In 2009, Alaska Native high school students were more likely than their white counterparts to drink at least 1 can/glass of SSB per day (62% vs. 43%, respectively) (YRBS 2009).YRBS 2011 results by borough or census area are not yet available but statewide results indicate that 17.6% of all Alaska high school students had drunk a can, bottle, or glass of sugar sweetened soda pop 1 or more times per day during the 7 days before the survey; 28.3% of Alaska Natives students had drunk soda pop during the same time period (ADHSS YRBS 2011).

5.4.4 Food Security

Food security is defined by the WHO as "existing when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (WHO 2011). Food security is based on the availability, access (both physical and economical), and use of food, and is related to health through malnutrition. There are no documented acute shortages of major dietary components (proteins, carbohydrates, grains, fruits, or vegetables) in any of the potentially affected communities. While many residents in the communities engage in subsistence hunting, fishing, and gathering as a part of their diets, it is not known what percent of their food supply comes from subsistence activities.

NSB households, particularly Inupiat households, reported high levels of food insecurity in the 2010 in the borough's census, as reported in NSB 2012. Up to half of the households in each of the villages participate in the USDA Food Stamp program. In 2011, 44% of students enrolled in the NSB School District were eligible for the Free or Reduced Lunch, which includes children living in families with household incomes less than 185% of the poverty level (NSB 2012).

According to the NSB Baseline Community Health Analysis, the significantly higher levels of food insecurity in villages other than Barrow persisted when looking only at Inupiat household heads. Among Inupiat household heads, those living in Anaktuvuk Pass were the most likely to report difficulty getting food for healthy meals, and a high proportion reported this difficulty to be caused by not being able to get enough subsistence foods. Almost one-half of Inupiat household heads in Anaktuvuk Pass reported household members who, at times last year, did not have enough to eat (NSB 2012).

Statewide and national food insecurity data are not easily comparable with NSB data because the state and national surveys did not ask about subsistence food security or take into account lack of availability of many foods in remote communities. For reference, in 2010, 10.8% of Alaska household surveyed were found to have some degree of food insecurity, and 4.4% were found to have "very low food security," with disrupted eating patterns or reduced food intake (USDA 2010). Although the NSB data cited in NSB 2012 are not directly comparable with statewide estimates, the results suggest that food

insecurity is a serious problem across the North Slope Borough and, like other rural areas, exists at levels higher than statewide estimates. The ADF&G Harvest Survey includes questions on food security which will be analyzed when the reports are available.

The County Ranking systems states that "Access to healthy foods is measured as the percent of zip codes in a county with a healthy food outlet, defined as a grocery store or produce stand/farmers' market (University of Wisconsin 2011). The North Slope Borough was not ranked in the 2010 access to healthy foods category, although each of the communities have Arctic Slope Regional Corporation-sponsored grocery stores which supply market goods such as beef and chicken; breads, rice and pasta; canned vegetables and fruits and fruit juices, and beverages.

5.4.5 Food Costs

The University of Alaska Fairbanks (UAF), Cooperative Extension Service, performs a Food Cost Survey (FCS) every quarter. Information on the specific vegetables, fruits, grains, carbohydrates and proteins included as well as quarterly results for the last 10 years is available online (UAF 2011).

Specific information on food costs at individual markets in the North Slope Borough is not consistently available. The UAF survey collected data for Barrow in March of 2007, 2008 and 2009 and for Anaktuvuk Pass in June 2011 on the cost to purchase the 104 items in the market basket at a local grocery store. The list is designed to feed a family of 4 -- 2 adults and 2 children. The costs reported in Anchorage are used as the basis of comparison. In the 3 reported food cost surveys for Barrow, costs were between 253 and 289% higher than the cost in Anchorage. Costs in Anaktuvuk Pass were 227% higher than the costs in Anchorage in June 2011. Costs in the North Slope communities were significantly higher than in other Alaskan communities. Table 32 presents information on the impact of this cost on rural communities and demonstrates the potential inequities in market food costs if a family purchased all of their weekly food supplies at grocery stores.

Table 31. Comparison of Annual Foodbasket Costs as a Percent of Median Household Income

Location	Median Household Income (2010)[a] ($)	Annual Cost of Foodbasket [b] ($)	Percent of 2010 Income on Foodbasket (%)
Anchorage	$64,576	$7,420	11.5
Barrow	$78,250	$17,320	22.1
Anaktuvuk Pass	$43,162	$16,840	39.0

[a] US Census, American Community Survey, 2005-2009
[b] University of Alaska Fairbanks:
Weekly cost of the foodbasket in Anchorage ($142.68 with no items missing, June 2011) times 52 weeks = $7,420
Weekly cost of the foodbasket in Barrow ($333.00 with 13 of the 104 items missing, March 2009) times 52 weeks = $17,320
Weekly cost of the foodbasket in Anaktuvuk Pass ($323.80 with 20 of the 104 items missing, June 2011) times 52 weeks = $16,840

Assuming 2010 median household incomes and using the most current available estimates of foodbasket costs from Barrow (2009) Anchorage (2010) and Anuktuvuk pass (2011), community isolation is a primary factor in the relationship between food cost as a percent of income. While the percent of median household income spent on food is 11% in Anchorage, it rises to over 22% in the Barrow and 39% of median household income in Anaktuvuk Pass. These data confirm the importance of subsistence hunting as a source of food and also identifies potential communities that are vulnerable to malnutrition and other micronutrient deficiencies in this region.

5.4.6 Summary

Areas of Vulnerability

- Consumption of sugar sweetened beverages among Inupiat household heads in the Study Area is generally high. Household heads in Anaktuvuk Pass and Atqasuk were least likely to report drinking 2 or more of these beverages per day. More than 60% of Inupiat household heads in Nuiqsut and Kaktovik reported drinking 2 or more of these beverages per day.
- NSB households, particularly Inupiat households, reported high levels of food insecurity in the 2010.
- While food costs are not available for all communities, market food costs as a percentage of median household income are between 2 and 3 times higher in NSB communities than in Anchorage.

Areas of Resilience/Success

- There are no reported deaths by malnutrition or by nutritional disorders in the North Slope Borough.
- More than 95% of NSB Inupiat household heads in every age group reported that their households used subsistence foods in 2009.

5.4.7 Data Gaps

- Detailed harvest information for Anaktuvuk Pass will not be available until late 2012. Studies in other NSB communities will not be completed under APP but may be available in late 2013 if the ADF&G Harvest Surveys completes the studies for other projects.

5.5 HEC 5: Infectious Diseases including STIs

5.5.1 Infectious Diseases

Reportable communicable diseases include infectious and parasitic diseases, such as tuberculosis, septicemia, viral hepatitis, HIV, and sexually transmitted infectious (STIs) as well as influenza and pneumonia. Communicable diseases disproportionally affect poor populations and are exacerbated by unsanitary conditions, unsafe water, and inadequate personal hygiene. Children and adults without proper immunization are at higher risk of contracting infections and left untreated, chronic infections can lead to cancers, such as cervical (caused by HPV) and liver cancer (Hepatitis B and C) (WHO 1999).

With the exception of sexually transmitted diseases, the number of cases of reportable infectious diseases in the NSB is very low. Because of the small number of cases of reportable infectious diseases each year, reliable prevalence rates for the NSB cannot be calculated for most individual reportable diseases. In general, however, trends in reportable infectious diseases in the NSB parallel those occurring statewide (NSB 2012).

Reportable communicable diseases were not among the leading cause of death in the North Slope Borough, with 3 deaths between 2007 and 2009 (Table 33). Pneumonia (1 death) and septicemia (2 deaths) were the only causes of death due to infectious diseases, accounting for approximately 2% of all deaths between 2007 and 2009 (ADHSS BVS January 2012). No influenza deaths were reported during the same time period. Over the previous decade, deaths due to infectious and parasitic diseases have remained relatively stable, while the number of deaths due to pneumonia appears to be decreasing slightly. Age-adjusted rates of death from communicable diseases have been consistently higher than those experienced in the State of Alaska since 2000 (AN EpiCenter April 2009).

Respiratory Infections

Lower Respiratory Infections (LRIs) refer to infections affecting the lung tissue and air sacs, commonly referred to as pneumonia. In 2008, pneumonia was the leading reason for pediatric hospital admission at Samuel Simmonds Memorial Hospital in Barrow (excluding newborn admission) (NSB 2012).

Pneumonia most often causes illness in children under 5 years and older adults (>65 years). Also at higher risk are those with other medical conditions, such as chronic liver, heart or lung disease (NAID 2011). The transmission of respiratory infections depends on many of the same factors as other infectious diseases. In particular, crowding, poor nutrition and underlying health problems, tobacco smoking and secondhand smoke, inadequate water supplies, and poor ventilation and indoor air quality, increase the risk of respiratory infections.

Upper Respiratory Infection (URI) is a nonspecific term used to describe the common cold, flu, and other infections involving the ears, nose, sinuses, throat, and airways. Although generally mild and self-limited, these infections lead to lost days of school and work, increases in healthcare costs, and can occasionally lead to more serious illness in vulnerable persons. URIs are the most common assessment made by NSB

community health aides as well as community health aides statewide, accounting for about one-third of all visits and acute URI is also the most commonly coded reason for an outpatient medical visit at Samuel Simmonds Memorial Hospital (NSB 2012)

Table 32. Infectious and Parasitic Disease Caused Deaths, North Slope Borough and State of Alaska, 2007 to 2009

Cause of Death	North Slope Borough Deaths	North Slope Borough Age-adjusted Rate[a]	Alaska Deaths	Alaska Age-adjusted Rate[a]
Infectious and Parasitic Disease	**2**	****	**218**	**14.1**
Tuberculosis	0	0.0	9	6*
Septicemia	2	**	80	6.3
Viral Hepatitis	0	0.0	63	2.9
HIV Disease	0	0.0	25	1.2
All Other Infectious Disease	0	0.0	41	3.1
Influenza and Pneumonia	**1**	****	**148**	**12.5**
Influenza	0	0.0	11	7*
Pneumonia	1	**	137	11.8

Source: Alaska Bureau of Vital Statistics
[a] Age-adjusted rates are per 100,000 U.S. year 2000 standard population
* Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution
** Rates based on fewer than 6 occurrences are not reported

The Bureau of Vital Statistics does not report infectious disease data by race. Therefore, data from AN EpiCenter is used as a representation of infectious disease burden for Alaska Natives. Overall reportable infectious disease cases for all Alaska Natives January 2007 to October 2008 are shown in Table 34, with similar diseases causing the most burden in both populations.

Table 33. Reportable Infectious Disease Cases, Alaska Natives, January 1, 2007 to October 3, 2008

Infectious Disease	Cases	Percent of Total
Chlamydia	4103*	79.3
Gonorrhea	476*	9.2
Hepatitis C	198*	3.8
Pneumococcal invasive	135	2.6
Tuberculosis, Pulmonary	52*	1.0
Chlamydia, PID	37*	0.7
Pertussis	32	0.6
Salmonella	25	0.5
GAS invasive disease	24	0.5
GBS invasive disease	18	0.3
Chicken Pox	15	0.3
Botulism, Foodborne	13	0.3
Campylobacter	12	0.2
Gonorrhea, PID	9	0.2
Invasive H Flu, Not Meningitis	7	0.1
Giardia	5	0.1
Hepatitis B	3*	0.1
Meningitis, Haemophilus	3	0.1
Other Infectious Diseases	10	0.2
Total	**5177**	**100.0**

Source: AN EpiCenter 2009

*Additional information is available at http://gis.cdc.gov/GRASP/NCHHSTPAtlas/main.html

Influenza

Influenza, or "the flu," refers to a common systemic illness involving the upper respiratory tract, caused by the influenza virus. People with the flu typically experience cough, fever, fatigue, and muscle aches along with other symptoms, and they may or may not seek medical care. The severity of the illness depends on many factors, including the strains of viruses circulating in a given season and the underlying health condition of the person infected. Statewide, Alaska Natives experience higher rates of serious influenza infections than non-Native Alaskans.

Bronchiolitis and Respiratory Syncytial Virus

Bronchiolitis is a common infection of the small airways, occurring most often in the winter months. It affects infants most severely and can result in prolonged illness, hospitalization, and sometimes respiratory failure. The most common cause of bronchiolitis is a virus called Respiratory Syncytial Virus (RSV). RSV infection is a major cause of illness and hospitalization in Alaska and, in particular, among Alaska Native infants, where rates far exceed U.S. rates (NSB 2012). In the winter of 2006–2007, an

outbreak of RSV occurred on the North Slope, resulting in the hospitalization of 53 infants and young children in Barrow. Twenty-eight children required transport to Anchorage for intensive care. RSV and bronchiolitis continue to be common health problems in children in the NSB, accounting for 25% of lung problems seen in NSB village clinics (NSB 2012).

Tuberculosis

Tuberculosis remains an important public health issue in Alaska and in the NSB. Over the last 25 years, the NSB has averaged less than 1 new case of tuberculosis per year (NSB 2012). The Healthy Alaskans 2010 goal is to reduce new tuberculosis cases to less than 6.8 per 100,000, and the ultimate goal of the State of Alaska's Tuberculosis Control Program is the elimination of this infection from the state (ADHSS 2005).

Infectious Diarrheal Illness

Diarrheal, or enteric, infections are typically spread through contaminated food and water or contact with an infected individual. Diarrheal infections remain a leading cause of preventable death in developing countries. According to the Centers for Disease Control and Prevention, an estimated 76 million cases of food-borne illness and 5000 associated deaths occur every year in the U.S (CDC 2007). The number of cases of reportable infectious diarrheal illnesses has declined over the past 25 years in the NSB (NSB 2012).

Hepatitis C is a chronic infection that increases the risk for liver cirrhosis and cancer. Unlike for infectious hepatitis A and B, there is no vaccine against hepatitis C. It can be contracted by having had a blood transfusion prior to the initiation of blood supply screening in 1992, injection drug use, and less commonly through sexual, household, or mother-to-newborn transmission. Since testing became widely available in the early 1990s, reported cases of chronic hepatitis C have risen steadily in the NSB, paralleling statewide and national trends (NSB 2012).

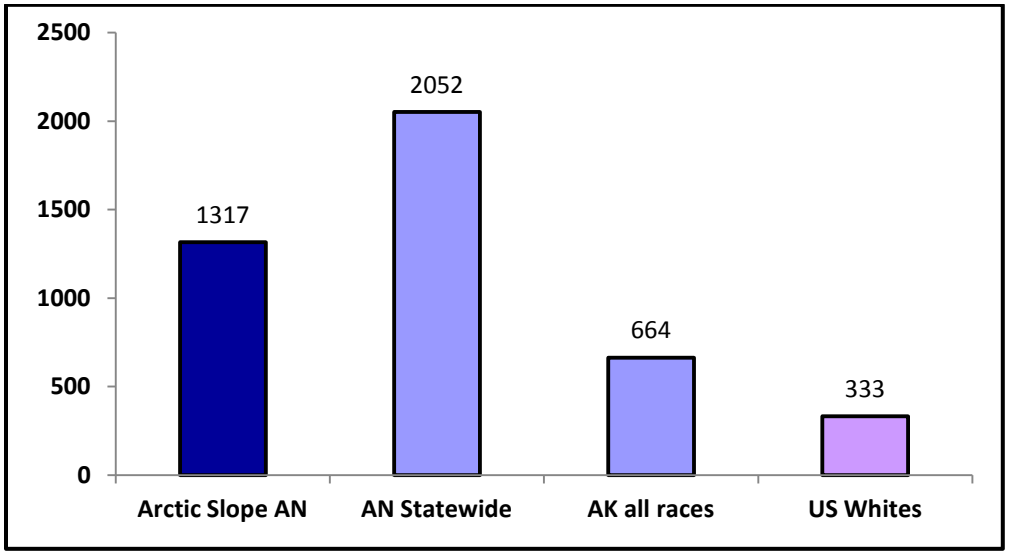
5.5.2 Sexually transmitted infections (STIs)

Between 2007 and 2008, STIs comprised 89.4% of all Alaska Native reportable infectious disease cases as shown in Table 34. *Chlamydia trachomatis* (CT) was by far the most commonly reported infectious disease, accounting for 80% of all reported infectious diseases, followed by Gonorrhea, with 10-fold fewer cases. CT is a bacterium that can cause pelvic inflammatory disease (PID), ectopic pregnancy, infertility, and preterm labor. Infants born to infected women are at risk for neonatal conjunctivitis and pneumonia. Untreated CT infections in men can cause epididymitis, Reiter syndrome, and infertility.

In 2005, the Chlamydia infection rate for Alaska Natives living in the Arctic Slope Region (1317 cases per 100,000 population) was twice that for all Alaskans (664 cases per 100,000 population (Increases in Chlamydia rates and regional differences in rates may, in part, reflect screening practices, availability of different diagnostic tests, consistency of reporting by providers and laboratories, and partner identification and testing practices.Figure 9). The Alaska Department of Health and Social Services HIV/STD Program reports on STI prevalence data race for all Alaska Native Health Corporation regions. In 2011, residents of the Arctic Slope Region experienced the fourth highest rate in the state. Of note, the age-adjusted Chlamydia rate for all races was 1114 cases per 100,000 population; for Alaska Natives the rate was 1655 cases per 100,000 population; and for non-Native residents the rate was 195 cases per 100,000 population (ADHSS STD 2012). The state's rate was 711 cases per 100,000 population (University of Wisconsin 2011). Increases in Chlamydia rates and regional differences in rates may, in

part, reflect screening practices, availability of different diagnostic tests, consistency of reporting by providers and laboratories, and partner identification and testing practices.

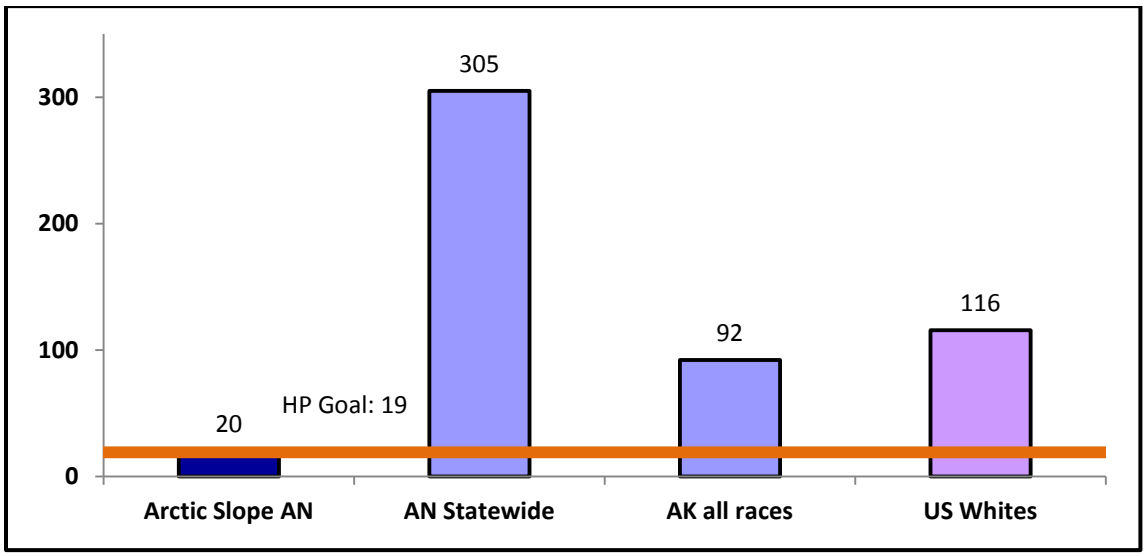
Figure 9. Chlamydia Rate per 100,000 Population, 2005



Source: AN EpiCenter April 2009

Gonorrhea is an STI caused by the bacterium *Neisseria Gonorrhea*. In 2005, the Arctic Slope Region had a Gonorrhea rate of 20 cases per 100,000 population, which is significantly less than that for all Alaskans (Figure 10). The rate of Gonorrhea in 2011 was 203 cases per 100,000 population for all races in the Arctic Slope Region for 2010; the rate for Alaska Natives was 375 cases per 100,000 population while the rate for non-Native residents was 514. Residents of the Arctic Slope Region had the fourth highest rate in the state in 2011. Rates of gonorrhea in the Arctic Slope Region have remained relatively stable from 2001-2011, with the exception of an increase of reported cases in 2007.

Figure 10. Gonorrhea Rate per 100,000 Population, 2005



Source: AN EpiCenter April 2009

Syphilis

Syphilis is an STI cased by the bacterium *Treponema pallidum*. No cases of infectious syphilis were reported among NSB residents from 1990 to 2008 (NSB 2012). Syphilis is rare in Alaska, with the exception of an outbreak in 2004 affecting Anchorage, Fairbanks, and Southeast Alaska that was not controlled until the fall of 2007 (ADHSS SOE Bulletin 4 2012). As reported in SOE Bulletin 4, 19 syphilis cases were reported to the ADHSS Section of Epidemiology between January 1, 2011 and February 14, 2012. Eleven (11) of the cases involved men, of whom 8 were involved with men having sex with men. The majority of the cases reside in Anchorage and Fairbanks; 1 case resides in a rural Alaska village who was determined to have contracted syphilis in Anchorage (ADHSS SOE Bulletin 4 2012).

Human Immunodeficiency Virus

Human Immunodeficiency Virus (HIV) is the virus that can lead to acquired immune deficiency syndrome (AIDS). The CDC estimates that about 56,000 people in the U.S. contract HIV each year and that more than 1 million people are living with HIV in the United States. HIV is spread primarily through unprotected sex, sharing needles and other equipment used for injecting illegal drugs, and from mother to child during childbirth and breastfeeding (ADHSS SOE Bulletin 3 2012). Nationwide, approximately one-half of new HIV cases occur in men who have sex with men, although almost 1 in 3 new HIV infections are contracted through heterosexual contact and 12% through injection drug use. Among women, 80% of new infections occur through heterosexual contact.

In the NSB, there were fewer than 6 reported cases of HIV between 1982 and 2008 and no new cases reported since 1995 (NSB 2012). HIV is an area of racial health disparity nationwide. African Americans continue to bear the greatest burden of HIV; however, in 2006, American Indian/Alaska Native females had an HIV diagnosis rate that was nearly twice that of white females, and rates among American Indian/Alaska Native males were slightly higher than among whites (NSB 2012).

5.5.3 STI Education Efforts and Practices

To address the elevated rates of HIV and other STIs in Alaska, several partners in state have sponsored expedited partner therapy as a means to promote safe sexual behavior (ADHSS SOE Bulletin Volume 14 2011). The SOE regularly warns health care providers to be alert for risks for and symptoms of STIs and to provide testing and prompt reporting of any outbreaks. The NSB Wellness Center conducts HIV/STI risk reduction services and provides HIV/STI testing and STI treatments.

5.5.4 Immunizations

Immunization is the best defense against pneumonia, and immunization rates (with a critical coverage goal of greater than 80%) for both children and adults serve as critical performance indicators. By 2 years of age, it is recommended that all children have received 4 doses of diphtheria-tetanus-pertussis (DTP), 3 doses of polio, 1 dose of measles-mumps-rubella (MMR), 3 doses of Hepatitis B, and 3 doses of Haemophilis Influenza, type B (Hib) vaccines. This recommendation is referred to in shorthand as "4:3:1:3:3." In 2011, the State Office of Epidemiology reported a significant decrease in the number of Alaskan children vaccinated in 2009. According to an Epidemiology bulletin, “In 2009, completion of the 4:3:1:3:3 (“0” = Hib series, which was excluded from the 2009 analysis due to a national shortage of this vaccine that year) standard series coverage rate in Alaska was 56.6%. With this coverage rate, Alaska ranked 48th in the country for 1+ MMR (85.2%) and 50th for 1+ varicella (76.0%). Alaska also ranked in

the bottom 10% of states for completion of 4+ DTaP and 3+ rotavirus vaccines" (ADHSS SOE Bulletin 2, 2011).

According to AN EpiCenter April 2009, by December 2007, 82% of people in the Arctic Slope service area had received the 4:3:1:3:3 series. This rate exceeds the nationwide Indian Health Service rate (78.0%) and surpasses the Healthy People objective of 80% coverage (ADHSS 2005). In addition, 46% of people in the Arctic Slope service area 65 years and older had received an influenza shot in the past year, and 82% of people 65 years and older had ever received a pneumococcal vaccination.

Community education levels have also been shown to predict pediatric LRI rates and are an even better predictor than the educational level of mothers. Breastfeeding and handwashing can reduce the incidence of many infectious respiratory illnesses (ADHSS SOE Bulletin 2 2011).

5.5.5 Summary

Areas of Vulnerability

- STIs are a vulnerability in the North Slope Borough given that, in 2010, the Chlamydia rate was 2.5 times higher than the state's rate; the rate for NSB Alaska Natives the rate was almost 3 times higher than the state rate.

Areas of Resilience/Success

- Reportable communicable diseases were not a leading cause of death to all races in the North Slope Borough, with 3 deaths between 2007 and 2009; septicemia and pneumonia were the only contributors.

5.5.6 Data Gaps

- Primary data sets from the BVS for the census area does not include years 2010 to 2011.
- Data from the AN EpiCenter for the Arctic Slope Regional Health Profile do not include years 2007 to 2011.

5.6 HEC 6: Water and Sanitation

In rural Alaska, a high proportion of Alaska Natives live without basic sanitation facilities and adequate in-home water sources. Relying mainly on community-based water points can lead to inadequate amounts of water collected for consumption and basic hygiene and indicates a lack of flush toilets, which increases the likelihood for transmission of diseases. A housing unit is considered to have water and sewer service if it has water/sewer pipes or closed haul services (AN EpiCenter August 2009).

In a study conducted in 6 regions in Alaska (Hennessy et al. 2008), found that regions with a lower proportion of in-home water service had a 2.5-fold higher hospitalization rate for pneumonia and influenza, a 1.9-fold increase in rate of skin or soft tissue infection, and over 3 times the rate of respiratory syncytial virus among those younger than 5 years, than did higher-service regions. Within 1 region, infants from villages with less than 10% of homes served had higher hospitalization rates for pneumonia (RR = 1.3) and respiratory syncytial virus (RR = 1.2) than did infants from villages with more than 80% served. Outpatient Staphylococcus *aureus* infections (RR = 5.1, all ages) and skin infection hospitalizations (RR = 2.7, all ages) were higher in low-service than in high-service villages (Hennessy et al. 2008).

The lack of clean running water and proper sewage disposal is a leading cause of preventable disease in rural Alaska villages and is directly linked to infectious disease mortality and morbidity. Respiratory, gastrointestinal and skin diseases are common in areas without safe water supplies. The NSB Baseline Community Health Analysis notes that the relatively high rates of stomach cancer in rural Alaska and among Alaska Natives are thought to have a cause that is at least, in part, environmental. One risk factor for stomach cancer is chronic infection with the bacteria *Helicobacter pylori*. Infection with *H. pylori* is associated with inadequate water and sanitation facilities, common in rural Alaska. It is possible that the improvements to sanitation infrastructure in the NSB have decreased this particular risk factor for cancer in the NSB (NSB 2012).

5.6.1 Service Rates

The Alaska Native Epidemiology Center included 2008 comparison data on water and sewer service in Alaska in their recent publication Regional Health Profile Arctic Slope (AN EpiCenter April 2009). As reported in Table 35, the Arctic Slope service area had one of the highest levels of water and sewer service in the state (94%) and was only slightly below the Healthy Alaskans 2010 target of 98% (ADHSS 2005).

According to the 2010 NSB Census, as reported in the NSB 2012, 92% of NSB households have running water; 91% have flush toilets and 8% currently rely on honey buckets (buckets used as toilets inside the house). Of those households with running water, 90% have it piped to the house and 10% have it hauled by water truck.

ADEC Division of Environmental Health, Drinking Water Program requires Public Water Systems (PWS) be in compliance with the state drinking water regulations, in accordance with the Federal Safe Drinking Water Act (SDWA) and Amendments, for the public health protection of the residents and visitors to the State of Alaska. Regulated contaminants are divided into 6 categories: Bacteria/Viruses, Nitrate/Nitrites, Inorganic and Heavy Metals, Volatile Organics, Synthetic Organics, and Other Organics. Information on water quality for private wells and water sources is not publicly available.

Table 34. Water and Sanitation Service Rates by Region, 2008

Regional Health Corporation	2008 Housing Units with Pipes or Close Haul	2008 Total Housing Units	Percent Served
Aleutian Pribilofs Islands Association (APIA)	271	324	84
Arctic Slope Native Association (ASNA)	462	491	94
Bristol Bay Area Health Corporation (BBAHC)	1364	1572	87
Chugachmuit	179	189	95
Copper River Native Association	343	397	86
Eastern Aleutian Tribes	507	541	94
Kodiak Area Native Association	349	356	98
Maniilaq Association	865	1140	76
Norton Sound Health Corporation	970	1509	64
Southcentral Foundation	212	238	89
Southeast Alaska Regional Health Consortium	2288	2329	98
Tanana Chiefs Conference	1150	1930	60
Yukon-Kuskokwim Health Corporation	2753	4760	58

Independent	1437	1556	92
Total	**13,150**	**17,332**	**76**

Source: AN EpiCenter August 2009

5.6.2 Drinking Water in Villages

Historically, there have been high rates of diseases associated with unsafe drinking water and lack of sanitation in Alaskan Native villages. In an attempt to address these public health problems, state and federal agencies were funded to design and build PWS in rural Alaska. There are now PWS in most NSB villages that treat and distribute drinking water for public use. The water systems in each village are subject to the regulations enacted by the EPA under the SDWA and amendments.

The capacity development regulations require that each system demonstrate the technical, managerial and financial capacity to deliver safe drinking water to their residents. Demonstrating capacity has been a challenge for villages, and public health protection goals continue to be unmet. Many villages cannot meet the requirements due to lack of economic resources, geographic and climate extremes, lack of understanding of the regulations, lack of trained water treatment plant operators, and other social concerns. Currently, there are multiple state and federal agencies involved in helping the villages deliver safe drinking water.

There are several types of public water system (PWS) configurations that may be considered for use in the villages. A system may be a watering point, which consists of a water treatment plant, storage facility, and a single watering point where villagers can collect water in containers. The PWS may be a piped distribution system, which consists of a water treatment plant, storage facility, and distribution lines that bring treated water directly to homes. A PWS may be a truck haul system, which consists of a water treatment plant and trucks used to deliver treated water to residential holding tanks. The type of PWS selected depends on the geographic conditions, especially the presence of permafrost, the population served, and the economic resources of the village.

When violations occur, the ADEC Drinking Water Program responds with either compliance assistance or enforcement depending on the severity of the violations. Many villages cannot meet the requirements of all the regulations because of the following reasons:

- **Lack of trained operators** - Many Native speaking operators cannot pass the certification tests because they are only given in English. Often, operators are not paid by the village for their work and adequate support for the operator may not be available from the community.
- **Lack of economic resources** - Most villages have a subsistence lifestyle where there is little or no cash economy. Villagers may have trouble paying for utility services. Utilities have problems paying and training operators, and there is little money to pay for water testing, treatment chemicals and supplies.
- **Geographic/climate extremes** – Many villages are geographically remote. Many places in Alaska have no road system and the only access to the villages is by airplane or helicopter. It is difficult to get replacement parts for the PWS. Fuel and electricity to run the water treatment plant are expensive and water systems routinely freeze and distribution lines constantly break due to very cold temperatures. It is extremely difficult to get water samples to the lab on time, especially time dependent samples like total coliform bacteria.

- **Lack of commitment in the village** – Some villagers do not like the taste of chlorine or groundwater, which in Alaska has high levels of iron. The villagers prefer to use their traditional stream or river water sources for drinking water and the treated water for washing clothes.
- **Social concerns/issues** – Alaska Native villages have the highest rates of suicide, fetal alcohol syndrome, post-natal death and accidental death in the United States. Due to limited economic resources, drinking water may not be a priority for these villages.

There are approximately 220 Alaska Native villages that have a PWS. A significant number of these PWSs are on the EPA's Significant Non-Complier (SNC) List due to noncompliance with the Drinking Water Regulations. Most noncompliance issues are due to the village's lack of technical, managerial and financial capacity to properly run the water treatment plant and may reflect missing test results rather than polluted water.

The EPA maintains a database, "The Drinking Water Data Search in ECHO" which displays compliance information and violations that have occurred at public water systems (http://www.epa-echo.gov/cgi-bin/ideaotis.cgi). The database lists all sanitary surveys and site visits that have occurred in the past 10 years, compliance summary data, and all violations and enforcement actions that have occurred in the previous 5 years for all PWS.

Information for this Section was taken directly from the Alaska Division of Community and Regional Affairs: Alaska Community Database, Custom Data Queries and Alaska Community Database Community Information Summaries (CIS) (http://www.commerce.state.ak.us/dca/commdb/CF_CIS.htm

Anaktuvuk Pass: The North Slope Borough provides all utilities. There are two central wells in Anaktuvuk Pass, including a treated watering point at Nunamiut School. Most households have water delivered by truck to holding tanks. A few residents haul their own water. Almost 80% of homes have running water in the kitchen. There is a PWS that serves 342 people via a groundwater source.

Atqasuk: The North Slope Borough provides the water, sewer, refuse, washeteria, landfill, and other public services. Water is obtained from Imakruak Lake and treated. The majority of homes and the school have running water and flush systems.

Barrow: The member-owned Barrow Utilities & Electric Cooperative operates the water and sewage treatment plants, generates and distributes electric power, and distributes piped natural gas for home heating. Water is derived from a dam on Isatkoak Lagoon and is stored in a tank. Most residents have piped water. The North Slope Borough provides all other utilities.

Kaktovik: The North Slope Borough provides all utilities in Kaktovik. Water is derived from a surface source and is treated and stored in a 680,000-gallon water tank. Water is delivered by truck to holding tanks; all homes have running water in the kitchen.

Nuiqsut: The North Slope Borough provides all utilities in Nuiqsut. Water is derived from a lake and is treated. Residents have individual water tanks with water delivery. A majority of homes have running water to the kitchen. The Alpine Oil Field provides piped natural gas to Nuiqsut, which decreases the cost of running the diesel electric generator and heating homes and other facilities.

Safe water and adequate sanitation facilities have been public health priorities for decades in Alaska and have contributed significantly to the improvement of health in rural Alaska. Exposures to pollution and other contaminants systems are a concern throughout the developed and developing world, but factors

specific to arctic communities have warranted attention and investigation in this area. The effects of climate change are also of particular importance and urgency to northern communities. Recently, increased attention has also been paid to the health effects of housing, urban planning, and access to safe and healthy recreational opportunities. These "built environment" issues apply not only to urban centers but also to smaller rural regions such as the North Slope Borough.

Proper disposal of solid waste is important to human and animal health. Improper dumping and poorly designed landfills can contaminate water supplies, attract wildlife foraging, create unpleasant odors, and allow litter to be blown over surrounding land. ADEC regulates and permits landfills in rural and urban areas. In 2000, only 33% of landfills in Alaska had a current permit or acceptable alternative, but as of 2010, all NSB villages had currently permitted landfills (NSB 2012). Barrow has a permitted Class II municipal landfill and other NSB villages have Class III (less than five tons of municipal waste per day) (NSB 2012)

5.6.3 Summary

Areas of Vulnerability

- None identified

Areas of Resilience/Success

- Almost 95% of villages in the Arctic Slope service area had water and sewer service in 2008.
- The NSB government has ensured that all villages have safe water, adequate sanitation facilities, and solid waste disposal facilities.

5.6.4 Data Gaps

- Data sets from AN EpiCenter do not include years 2009 to 2011

5.7 HEC 7: Non-communicable Diseases

5.7.1 Cancer

Malignant neoplasms (cancer), accounting for 25.2% of all deaths in the North Slope Borough between 2007 and 2009, and were the leading cause of death. The prevalence of death by cancer for residents of the NSB is almost twice as high as for Alaskans statewide. Table 36 presents the absolute number and age-adjusted rates of cancer deaths in the NSB by cancer type from 2007 to 2009. Lung cancer is the most common type of cancer at 158.4 deaths per 100,000 persons. These rates should be interpreted with caution due to the small number of occurrences.

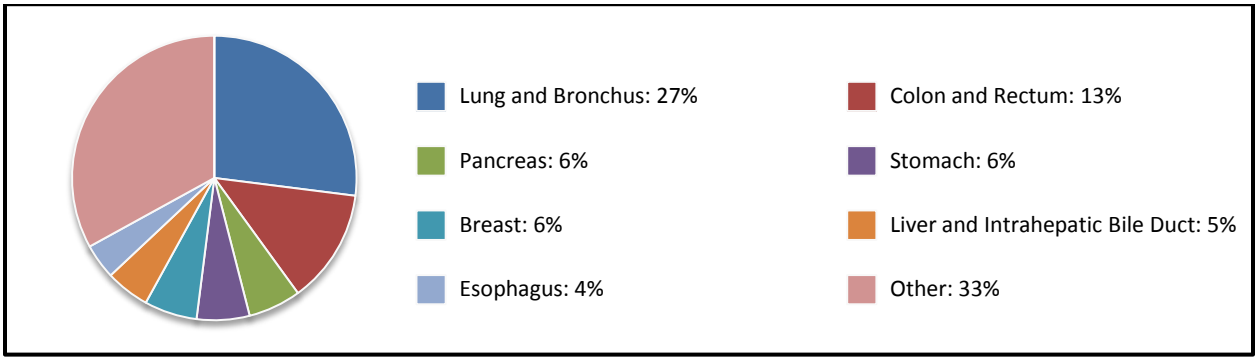
Table 35. Cancer Deaths by Type, North Slope Borough and the State of Alaska, 2007 to 2009

Cause of Death	North Slope Borough		State of Alaska	
	Number of Deaths	Age-adjusted Rate[a]	Number of Deaths	Age-adjusted Rate[a]
Malignant Neoplasms	**36**	**354.2**	**2583**	**182.8**
Colon, rectum and anus	2	**	236	17.5
Liver and intrahepatic bile ducts	1	**	94	5.7
Lung	14	158.4*	770	55.0
Breast[b]	2	**	187	24.0
Prostate[b]	1	**	104	21.0
Lymphoid & hematopoietic	2	**	209	15.5
Non-hodgkin's lymphoma	0	0	83	6.3
Leukemia	2	**	88	6.4
All other lymphoid & hematopoietic	0	0	38	2.8
All other malignant neoplasms	14	133.8*	983	67.6

Source: Alaska Bureau of Vital Statistics
http://www.hss.state.ak.us/dph/bvs/death_statistics/Detailed_Causes_Census/frame.html
[a] Age-adjusted rates are per 100,000 U.S. year 2000 standard population
[b] Breast cancer rates are for females only and prostate cancer rates are for males only
* Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution
** Rates based on fewer than 6 occurrences are not reported

Figure 11 presents the leading causes of cancer death for Alaska Natives between 2001 and 2005. The lung/bronchus cancer rates are strongly related to the extremely high tobacco usage that occurs in Alaska Native populations. Smoking rates in Alaska Natives are significantly elevated versus U.S. white populations. Colon/rectal cancers are also a leading cause of cancer death. There are multiple colon cancer risk factors including age, family history, inflammatory bowel disease, inherited genetic diseases, and numerous lifestyle factors, e.g., lack of exercise, a high-fat/low-fiber diet, obesity, smoking and high intake of alcoholic beverages (AN EpiCenter August 2009).

Figure 11. Leading Causes of Cancer Death Alaska Natives



Source: AN EpiCenter August 2009

The most frequently diagnosed invasive cancers for Arctic Slope Alaska Native people during 1989-2003 were lung (41 cases), colon/rectum (32 cases) and breast (15 cases). These 3 cancers accounted for over half (56.4%) of all cancers diagnosed. The cancers most frequently diagnosed for Arctic Slope Alaska Natives were similar to the cancers most frequently diagnosed for all Alaska Natives statewide, as shown in Table 37. It is important to note; however, that these are not deaths but incidence of cancer, which can be equally important as mortality but even more burdensome in terms of affected daily productivity and economic requirements of treatment.

Table 36. Most Common Types of Cancer in the Alaska Natives in the Arctic Slope Service Area, 1989 to 2003

Cancer Type	Alaska Natives Arctic Slope Service Area Percent of All Cancer 1989 – 2003 (%)	All Alaska Natives Percent of All Cancer 1989 – 2003 (%)
Lung	26.3	17.4
Colon/rectum	20.5	18.4
Breast	9.6	15.4
Stomach	6.4	4.7
Kidney	4.5	4.1

Source: AN EpiCenter April 2009

5.7.2 Cardiovascular Diseases

Cardiovascular disease is a category of disorders that involves blocked or narrowed blood vessels, which can lead to heart attack, chest pain, or stroke (Mayo Clinic Heart Disease). It includes coronary artery disease, other diseases of the heart, arteriosclerosis, hypertension, and cerebrovascular disease. Like many diseases, major risk factors for heart disease are smoking, age, diet, obesity, diabetes, high blood pressure, and cholesterol levels. Cardiovascular disease is one of the leading causes of death in Alaska Natives.

Age-adjusted cardiovascular disease mortality rates in the North Slope Borough are almost 60% higher than that of the state as a whole between 2007 and 2009 (Table 38). Diseases of the heart were the second most common cause of death in the North Slope Borough during this time (256.7 deaths per 100,000 people). Since 1992, the number and rate of deaths due to major cardiovascular disease has remained relatively stable.

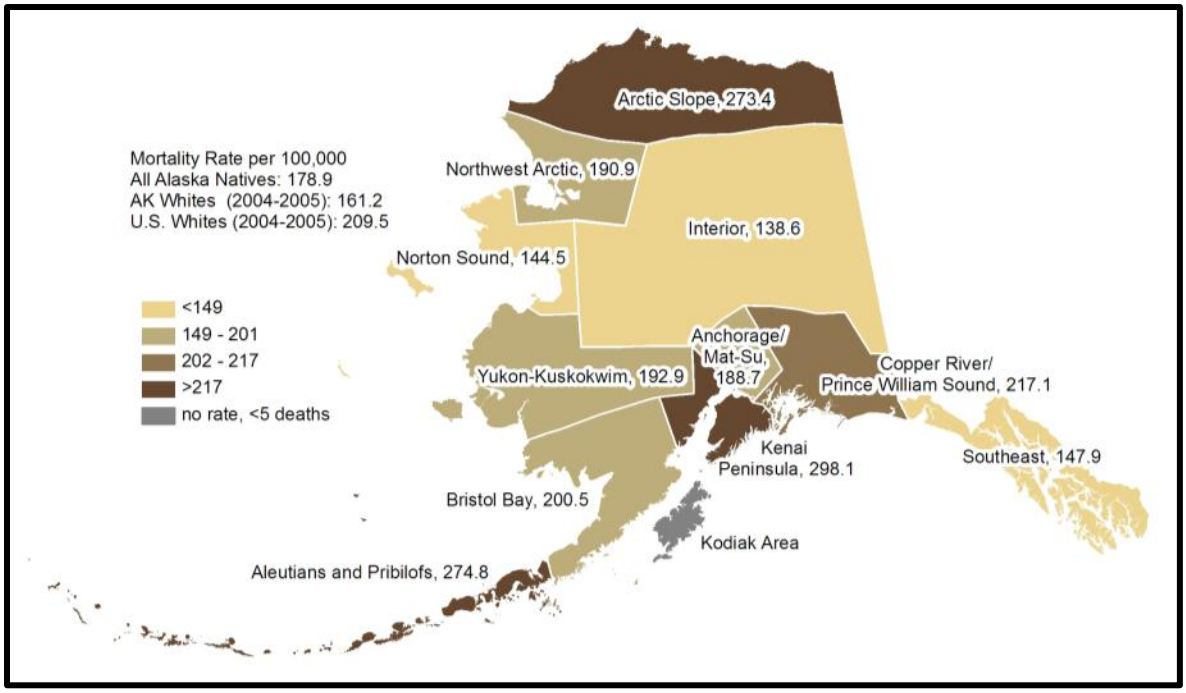
Table 37. Major Cardiovascular Disease Deaths, North Slope Borough and the State of Alaska, 2007 to 2009

Cause of Death	North Slope Borough		State of Alaska	
	Number of Deaths	Age-adjusted Rate[a]	Number of Deaths	Age-adjusted Rate[a]
Major Cardiovascular Diseases	**30**	**323.9**	**2567**	**204.9**
Heart Disease	25	256.7	1945	151.2
Ischemic heart disease	9	98.7*	1152	87.6
Acute myocardial infarction	4	**	232	19.2
Atherosclerotic cardiovascular disease	3	**	484	31.0
All other ischemic heart disease	2	**	436	37.5
All other heart disease	16	158.9*	793	63.5
Cerebrovascular disease	4	**	488	43.1
All other cardiovascular diseases	1	**	134	10.7

Source: Alaska Bureau of Vital Statistics
[a] Age-adjusted rates are per 100,000 U.S. year 2000 standard population.
* Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution
** Rates based on fewer than 6 occurrences are not reported.

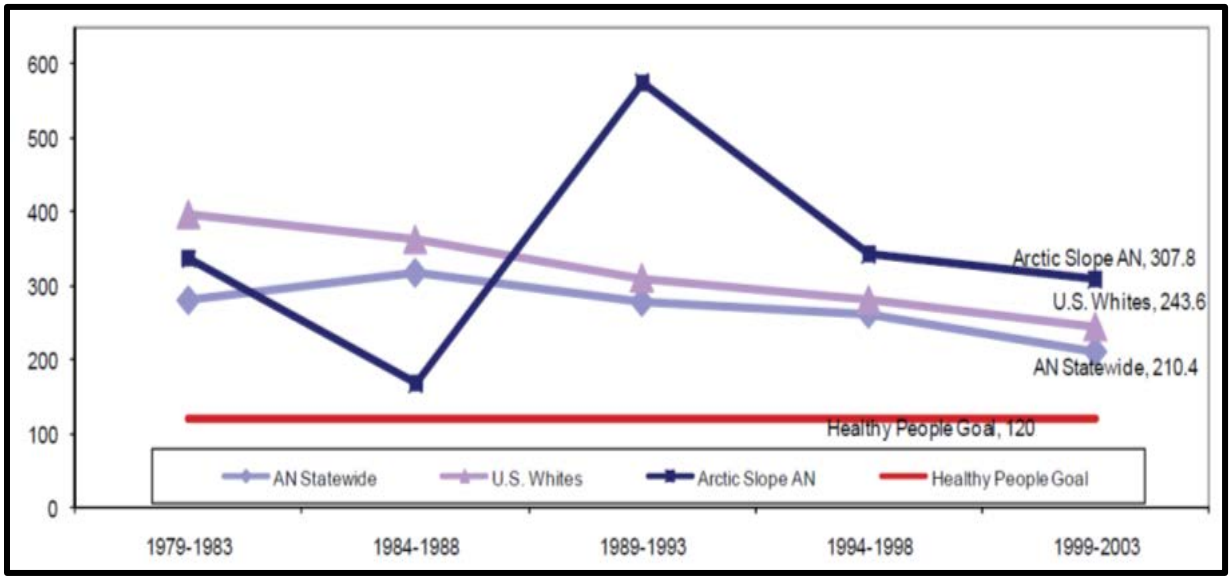
The current data on heart disease rates among Alaska Natives in the Arctic Slope Region are shown in Figure 12. For 2004 and 2005, the rate of heart disease for Alaska Natives in the Arctic Slope Region (273.4 deaths per 100,000 population) was higher than the rate for all Alaska Natives and for Alaska whites and all U.S. whites. Mortality rate from heart disease between 1979 and 2003 was 307.8 deaths per 100,000 persons, while the rate for all Alaska Natives was 210.4 during this same time period (Figure 13). Based on this data, there was a 50% higher risk of death due to heart disease in this region compared to Alaska Natives statewide. Heart disease death rates in this region almost doubled between 1979 and 1989, but then decreased back to 1979 – 1983 rates. More recent information reveals that the Alaska Native cardiovascular mortality rate decreased by 43% between 1980 and 2007 and that Alaska whites and U.S. whites also experienced a similar decrease during this time period (AN EpiCenter April 2009).

Figure 12. Average Annual Age-adjusted Heart Disease Death Rates per 100,000 by Region Alaska Natives, 2004 to 2007



Source: AN EpiCenter August 2009

Figure 13. Age-adjusted Heart Disease Death Rates per 100,000, 5-year Intervals, 1979 to 2003



Source: AN EpiCenter April 2009

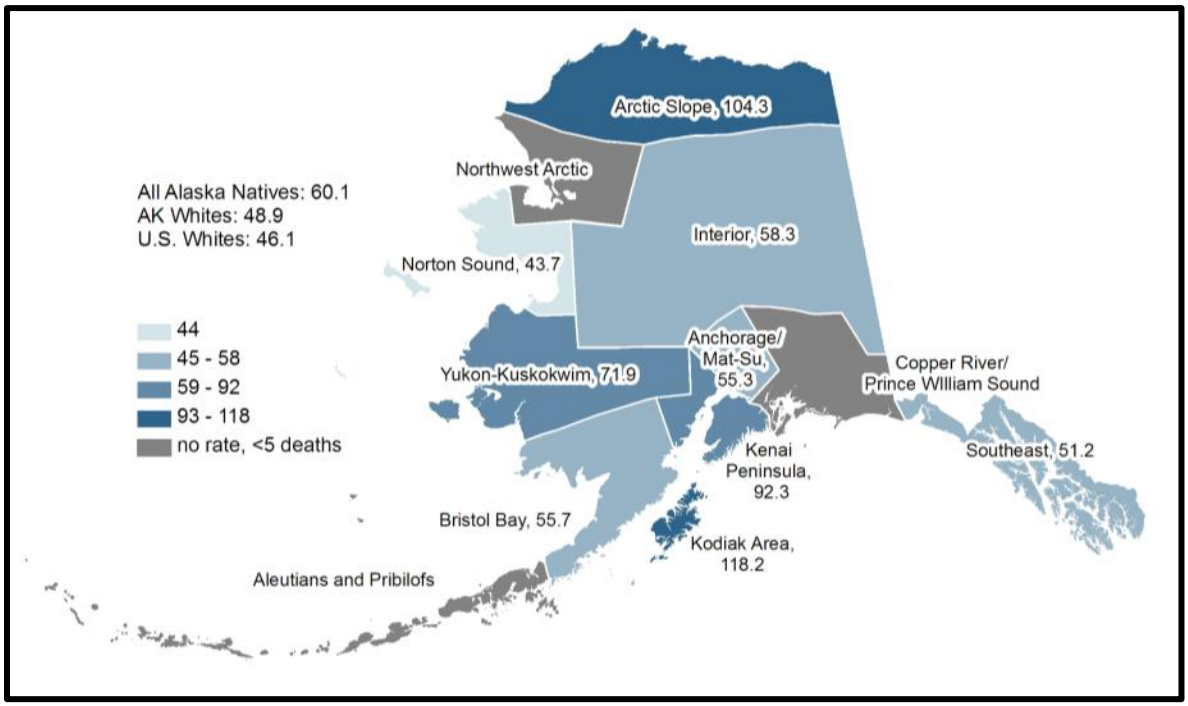
Cerebrovascular Diseases

Cerebrovascular disease, or stroke, is one of the leading causes of death in Alaska. From 2007 to 2009 there were 4 deaths attributed to cerebrovascular disease in the North Slope Borough; no age-adjusted mortality rate could be determined because of the small number of deaths. The rate for the state for all

races was 43.1 deaths per 100,000 people (Table 38). Cerebrovasclar disease has accounted for approximately 4% of deaths in the North Slope Borough since 2000 (AN EpiCenter April 2009).

In general, the prevalence of cerebrovascular diseases has decreased among Alaska Native people; however, the decrease is not significant. During 2004 to 2007, the Alaska Native cerebrovascular disease rate was 30% higher than for U.S. whites; no data were available for Alaskans statewide. The cerebrovascular disease death rate for Alaska Natives in the Arctic Slope Region between 2004 and 2007 was 104.3 deaths per 100,000 persons (Figure 14). Although there appear to be variations between regions for cerebrovascular disease rates in Figure 14, none of the regions had statistically significant differences in their rates when compared with all other regions combined.

Figure 14. Average Annual Age-adjusted Cerebrovascular Disease Death Rates per 100,000 by Region Alaska Natives, 2004 to 2007



Source: AN EpiCenter August 2009

5.7.3 Chronic Lower Respiratory Diseases

Chronic lower respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease, bronchitis, emphysema) were among the top 5 leading causes of death in the North Slope Borough from 2007 to 2009, accounting for 10 deaths with a presumed prevalence of 137.6 deaths per 100,000 population based on fewer than 20 cases(ADHSS BVS January 2012). Mortality rates from chronic lower respiratory diseases are 3 times as high as the rate for the state between 2007 and 2009 (46.5 deaths per 100,000 population in the state). Neither the rate in the North Slope Borough nor the death rate for the State of Alaska has changed substantially over the last 10 years (AHDSS BVS January 2012).

According the Alaska BRFSS, just under 10% of NSB adults surveyed in the Alaska between 2008 and 2010 reported ever having been told by a health professional that they have asthma (ADHSS BRFSS 2009). The CDC estimates that approximately 14% of the adult population of Alaska and 9% of U.S.

adults report a current diagnosis of asthma (CDC BRFSS 2011). Overall, asthma prevalence appears to be lower in rural Alaska than in urban areas, particularly Anchorage, and lower in the northern part of the state than southcentral area.

According to the NSB Baseline Community Health Analysis, the 2010 NSB Census asked household heads whether they or other household members had, in the last 12 months, had breathing problems such as asthma, emphysema, or a cough that does not go away. Results indicated that 13% of household heads and 8% of all adults in the NSB had experienced or were reported to have experienced 1 or more of these problems. Of children aged 0–17 years, 5% were reported by the household head to have had breathing problems such as asthma, emphysema, or a chronic cough in the past 12 months (NSB 2012).

In 2003, the NSB Health Department commissioned a study of respiratory illness in the community of Nuiqsut to address community concerns about asthma and pollution from nearby oil development activities. According to the NSB 2012, the study examined inpatient and outpatient visits for respiratory illness in Nuisqut and a control village which did not have oil development activities. The study found that asthma accounted for 75% of respiratory illness visits in Nuiqsut and 81% in the control village. The study determined that these percentages were similar to statewide asthma estimates, although not directly comparable. An additional 16 residents (3.6%) were identified with non-asthma respiratory diseases. The Nuiqsut residents visited the clinic more than twice as often as in the control village. The increased number of visits was due largely to a few individuals with numerous visits for asthma-related problems. Only 1 age group (10- to 19-year-olds) showed a statistically significant higher rate of asthma visits than the control village (NSB 2012).

The NSB 2010 census, as discussed in the NSB Baseline Community Health Analysis, gathered limited data on chronic health problems among children which reported:

> "Of the chronic health problems examined in the census, only 2 were prevalent among household members under age 18 years: frequent and/or chronic ear infections and respiratory problems and/or asthma. For all other morbidities, the overall estimated prevalence among NSB children was less than 1%. The prevalence was not significantly different among ethnic groups for either chronic ear infections or respiratory problems, except in the 10- to 17-year-old age group, in which children of other ethnicities were more likely to be reported to have breathing problems than were Inupiat or Caucasian children. The overall prevalence of frequent/chronic ear infections among NSB children was almost four times the statewide estimate, while the prevalence of respiratory problems such as asthma was roughly the same as statewide estimates" (NSB 2012).

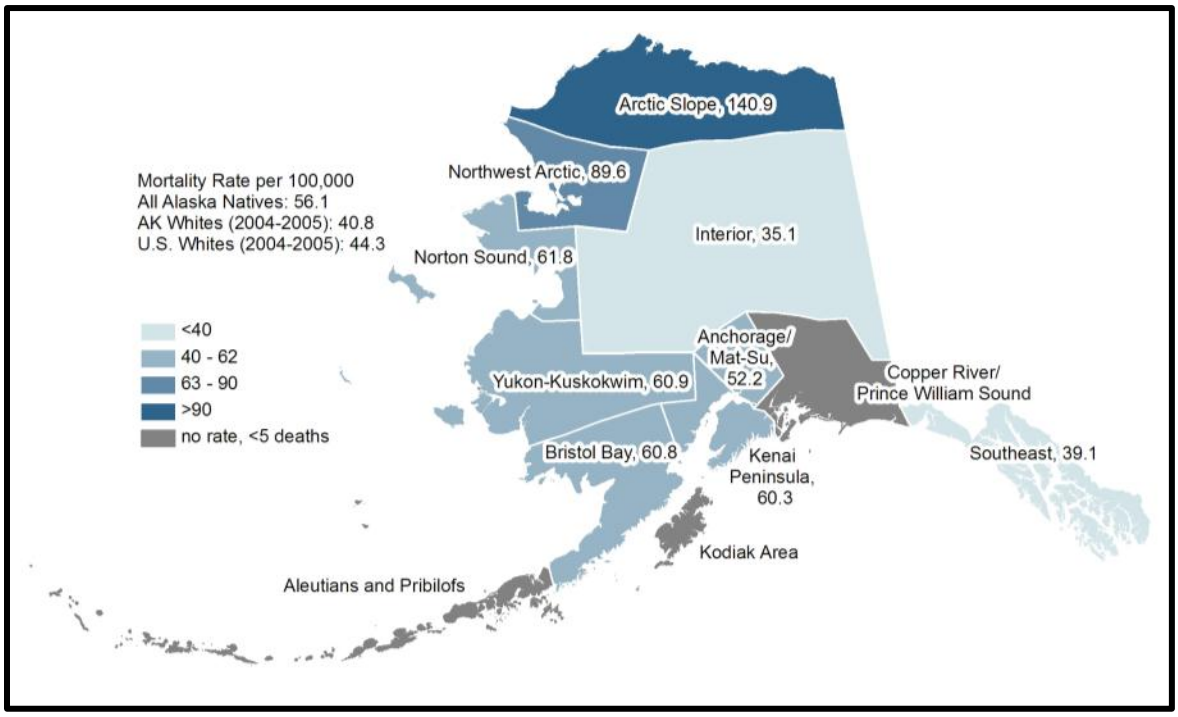
Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) refers to a group of lung diseases that typically requires the presence of chronic bronchitis and emphysema, which limits airflow of the lungs. Main risk factors associated with COPD are tobacco smoking, indoor air pollution, outdoor air pollution, and respiratory diseases (Mayo Clinic COPD).

According to the NSB Baseline Community Health Analysis, in 2008 exacerbation of COPD was the most common admitting diagnosis among adults at Samuel Simmonds Memorial Hospital, excluding childbirth (NSB 2012). In the statewide analysis of Community Health Aide practice, chronic lung disease accounted for 25% of all lung problems assessed in NSB village clinics. Overall, the pattern of lung problems seen in NSB villages was similar to statewide data within the Alaska Native rural health system (NSB 2012).

From 2004 to 2007, the rate of COPD seen among Alaska Natives in the Arctic Slope Region was 140.9 cases per 100,000 persons, which was almost 3 times the rate for all Alaska Natives, and over 3 times higher than for Alaska whites (Figure 15). The Alaska Native COPD death rate has increased 92% since 1980. The rate peaked between 1994 and 1998 and appears to be decreasing (AN EpiCenter August 2009).

Figure 15. Alaska Native Chronic Obstructive Pulmonary Disease, 2004 to 2007



Source: AN EpiCenter August 2009

5.7.4 Mental Health Disorders

Mental health, or behavioral health, is a critical component of overall health and is linked to physical health and wellbeing for people at all ages. Mental health includes reactions to stress, depression and difficulty coping with emotion (WHO Mental Health Factsheet). According to the State's BRFSS data base, between 2008 and 2010, residents of the North Slope Borough residents self-reported having 1.9 days in the past 30 days in which their mental health was not good; 4.5% reported having periods of frequent mental distress (defined by BRFSS as 14 or more days of poor mental health. These numbers were lower than the mean of all Alaska residents who self-reported 2.8 days in which their mental health was not good, and 8.0% who reported having periods of frequent mental distress (ADHSS BRFSS 2009).

Based on 2005 Youth Risk Behavior Survey (YRBS) data, more than 25% of NSB high school students have experienced symptoms possibly indicating depression during the previous year (NSB 2012). NSB-specific data from 2005 survey was provided courtesy of the NSB School District. The percentage of NSB high school students reporting depressive symptoms did not differ significantly from state or national estimates.

No specific data from the NSB School District is available for the 2009 or 2011 YRBS. The percentage of Alaska Native students who reported actually having attempted suicide 1 or more times during the 12 months before the survey (13.8%) was twice as high as the percentage white Alaskan students (6.4%) in 2009 (ADHSS YRBS 2009) In 2011, the ratio was similar to the 2009 survey results although the percentages of Alaska Native students attempting suicide had decreased to 12.0% while 6.3% of white Alaskan students had attempted suicide in the 12 months prior to the survey (ADHSS YRBS 2009).

Assessing mental health at a population level presents significant challenges. According to the NSB Baseline Community Health Analysis, Inupiaq cultural traditions sometimes prevent open recognition and discussion of emotional suffering and may result in both under-reporting and under-diagnosis (NSB 2012). The report also notes that "the high rates of suicide, domestic violence, and child maltreatment in the NSB also point to underlying community mental and behavioral health issues and support the likelihood of underreporting of problems such as depression, post-traumatic stress disorder, addiction, and other related mental health conditions perhaps not captured in these statistics." (NSB 2012) The North Slope Borough Health Department has expressed its concern that mental health among Alaskan youth, and Alaska Native youth in particular, is of urgent concern because of the high suicide rates in this group (NSB 2012).

5.7.5 Dietary Diseases

Obesity and Overweight

Obesity and overweight are terms that define an accumulation of fat that is greater than what is considered healthy. Being overweight or obese increases the risk of diabetes, diseases of the heart (mainly stroke and heart disease), cancer and even death (WHO Physical Activity). Obesity rates in the North Slope Borough are similar to other parts of Alaska.

According to AN EpiCenter August 2009, statewide, body mass index (BMI) is a common indicator of obesity and overweight status. Current BMI assessment requires that height and weight has been collected within the last five years or if over age 50, within the last two years. Children must have been assessed within the last year. These terms are defined as:

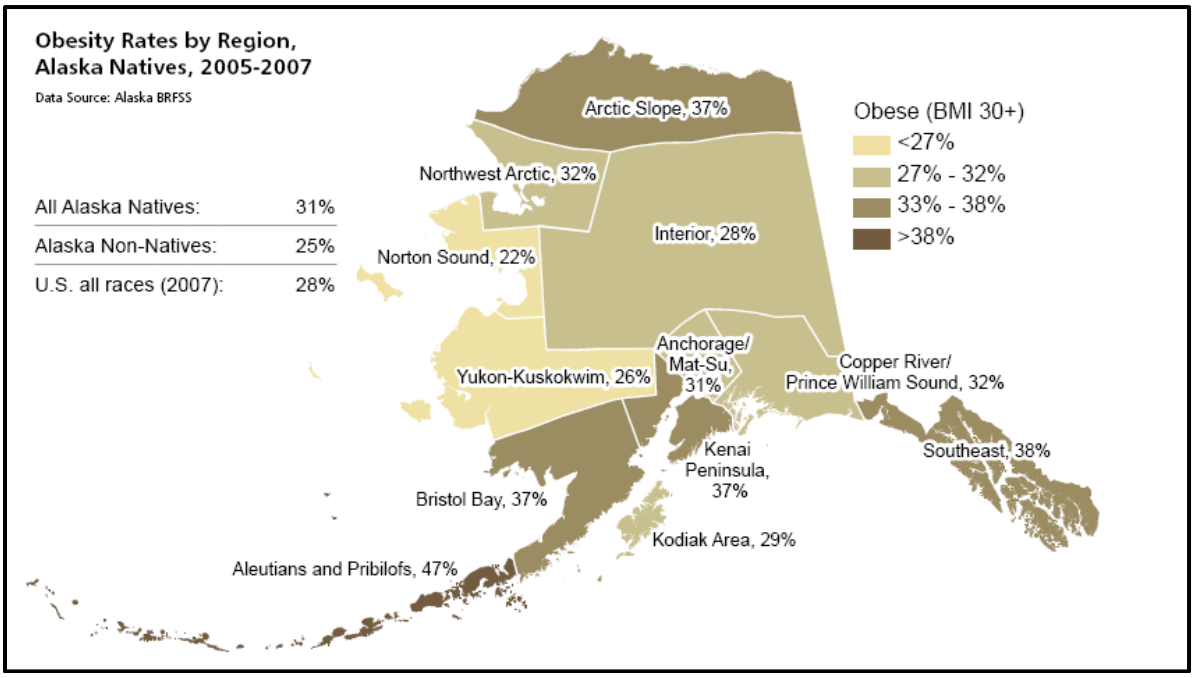
- Overweight (adults 19 – 74 years): Persons who have a current BMI assessment with a BMI of 25 to 29.9.
- Obese (adults 19 – 74 years): Persons who have a current BMI assessment with a BMI of 30 or greater.
- Overweight (children 2-18 years): Persons who have a current BMI assessment with a BMI between the 85^{th}-95^{th} percentile using sex- and age-specific growth charts are considered overweight.
- Obese (children 2-18 years): Persons who have a current BMI assessment with a BMI greater than or equal to the 95th percentile using sex- and age-specific growth charts are considered obese.

The County Health Rankings, which are derived from BRFSS data, indicated that 38% of the residents of the North Slope Borough were classified as obese in 2011, 10% more than for the state as a whole (University of Wisconsin 2011). The Alaska BRFSS data base reveals that between 2008 and 2010, 68.8% of North Slope Borough were classified as overweight, similar to that reported as the Alaska prevalence of 65.8% (ADHSS BRFSS 2011). Since 2004, the age-adjusted percentage of adults who were obese in the North Slope Borough increased by 5%, which is consistent with state and U.S. trends. As shown in

Figure 16, from 2005 to 2007, 37% of Alaska Natives living in the Arctic Slope Region were classified as obese.

Five out of every 10 (51.6%) Alaska Native Arctic Slope adults and children have a current BMI assessment on record with Arctic Slope; 42% of adults and children (2-74 years) meet the definition of obese overweight compared to 36% of Alaska Natives statewide (AN EpiCenter April 2009).

Figure 16. Obesity Rates by Region, 2005 to 2007



Source: AN EpiCenter August 2009

More than 1 out of every 3 (38.1%) Alaska Native children, 2-5 years, meet the definition of overweight in the Arctic Slope service area (AN EpiCenter April 2009). BMIs were calculated based on measured height and weight for more than 1000 NSB children aged 3–18 years in the public health nursing database (NSB 2012). Based on CDC standard definitions, half of the NSB children in this sample were either overweight or obese, and obesity prevalence estimates for children in the NSB are approximately 50% higher than among Alaskan children statewide (ADHSS 2009).

According to the 2009 and 2011 YRBS survey data, over 11% of all high school students in Alaska are classified as obese, with BMIs ≥95th percentile for sex and age, based on self-reported height and weight (ADHSS YRBS 2011). The percentage of Alaska Native high school students classified as obese rose from 11.5% in 2009 to 14.8% in 2011; the percentage of white teens in Alaska decreased from 10.7% to 9.9% during the same time period (ADHSS YRBS 2011).

Diabetes

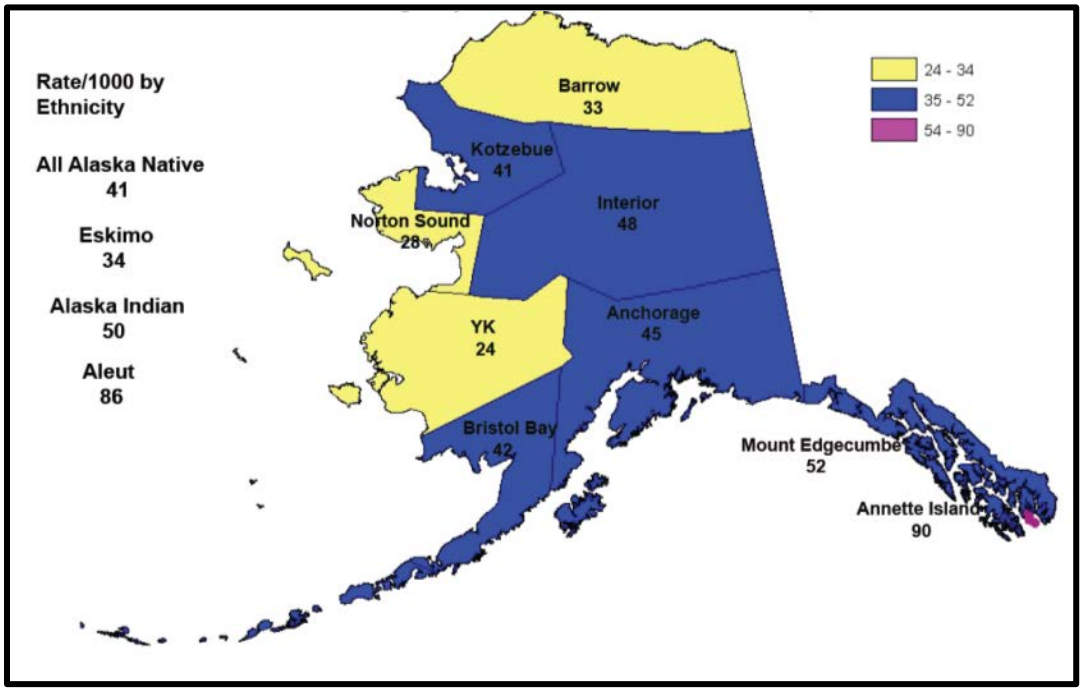
Diabetes mellitus is a metabolic disease characterized by high blood sugar levels, which result from defects in insulin secretion, insulin resistance, or both. There are two types of diabetes, Type 1 and Type 2. Type 2 is the most common type of diabetes and is considered a preventable illness. Uncontrolled

diabetes can have serious medical consequences including eye disease, dysfunction of circulation and sensation in the hands and feet, cardiovascular diseases, and ultimately, death. As both a risk factor for many diseases and a serious medical condition needing treatment itself, diabetes is an extremely serious public health challenge with tremendous population health impacts.

The Alaska Bureau of Vital Statistics (ADHSS BVS January 2012) reported that 1 person died in the North Slope Borough between 2007 and 2009 of causes related to diabetes. The number of deaths was too small to determine an age-adjusted rate; however, during the same time period, the age-adjusted rate of mortality for the State of Alaska was 21.3 deaths per 100,000 population. Since 1992, the number of deaths due to diabetes in the North Slope Borough has remained below 5 deaths per 100,000 people per year and has remained consistent over that time period. This is well below the statewide rate of 21 deaths per 100,000 people (AHDSS BVS January 2012).

The ADHSS BRFSS database reported that 11.3% of North Slope Borough adults over the age of 18 years reported having been told by a doctor that they had diabetes (2008 to 2010 data). This is almost twice that of the state mean of 6.8%. According to the NSB Baseline Community Health Analysis, the 2010 NSB Census results suggest that the overall adult diabetes prevalence in the NSB (6%) is similar to that among adults statewide (6%). Among all Alaska Native people, the prevalence of diagnosed diabetes in 2007 was 40 per 1000 people. The prevalence was 31 per 1000 people in the Barrow area which covers the entire North Slope Borough (Figure 17).

Figure 17. Diabetes Prevalence, by Region, 2009



Source: AN EpiCenter August 2009

5.7.6 Physical Activity

Physical activity can help reduce the risk of heart disease and some cancer, improve mental health, control weight, and is essential for overall health (USDHHS 2008).' For substantial health benefits, the U.S. Department of Health and Human Services recommends that "adults should do at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous intensity aerobic activity". For children and youth ages 6-18, the recommended amount of physical activity is 60 minutes every day.

The CDC collects information on trends in physical inactivity for all states by borough/census area. The age-adjusted estimate of percentage of adults (>20 years) who are physically inactive in the North Slope Borough in 2008 (most recent data) was 33.5%. In 2004, the age-adjusted percentage was the same at 32.2%, indicating that trends in physical activity are not changing in this region (CDC 2012). In the BRFSS 2008 to 2010 report, 64.5% of residents of the North Slope Borough self-reported that they participated in leisure time physical activities, which is lower than the 79% of Alaskans statewide (ADHSS BRFSS 2009).

The NSB Baseline Community Health Analysis notes that increased reliance on snowmachines, four-wheelers, and other motorized vehicles have changed physical activity patterns in rural Alaska and may be having significant effects on health (NSB 2012). The 2010 NSB Census included a question on physical activity, asking specifically about the frequency of moderate-intensity physical activity such as outdoor work, brisk walking, heavy housework, or other activities that cause an increase in breathing or heart rate (NSB 2012). NSB household heads appear to be roughly equally as likely to report getting the recommended 150 minutes of moderate physical activity (at least 30 minutes 5 days per week) as adults statewide were in 2007 (Table 39). The *Healthy Alaskans 2010* target was for at least 40% of adults achieve this recommended amount of physical activity (ADHSS 2005).

Table 38. Physical Activity among Household Heads: Number of Days per Week, on Average, Get at least 30 Minutes of Moderate Physical Activity, 2010

	AkP	Atqasuk	Barrow	Kaktovik	Nuiqsut	All NSB
"Never"	18%	24%	16%	17%	19%	16%
"Five days per week or more"	39%	29%	41%	50%	44%	44%

Source: NSB 2012

The YK Messenger recently reported on the health benefits of a subsistence lifestyle as a means of providing physical activity, as reprinted below:

> "- Fishing, gathering, and other fishcamp duties contribute to health by burning calories, increasing strength, and improving the functioning of the cardiovascular system. Although high intensity activities burn more calories per unit of time, most people cannot do them for very long. Engaging in lower intensity activities, such as hiking, gathering, net fishing, and transferring water for long periods of time will actually burn more calories than shorter bouts of high intensity activities…. Our ancestors engaged in daily, consistent exercise, but possibly never appreciated its value. While medicine has brought improvements in how long we live, a less

active civilization has brought heart disease, diabetes, and other forms of chronic disease. By embracing the subsistence way of living today, we can honor the perfect balance between modern technology and ancestral practices" (YKHC Messenger 2012).

In the 2011 YRBS survey, 21% of all Alaska high school students and 23% of Alaska Native high school studies reported being physically active for at least 60 minutes per day for 7 days of the week (ADHSS YRBS 2011). About half of all Alaskan high school students attended physical education (P.E.) classes at least once a week in 2009, similar to national estimates. The percentage of Alaska high school students attending daily P.E. has declined significantly over time, from 26% in 1995 to 17% in 2011, and this was significantly lower than the national average (ADHSS YRBS 2011). The Healthy Alaskans 2010 target was for at least 45% of high school students to attend P.E. classes daily (ADHSS 2005).

5.7.7 Tobacco Use

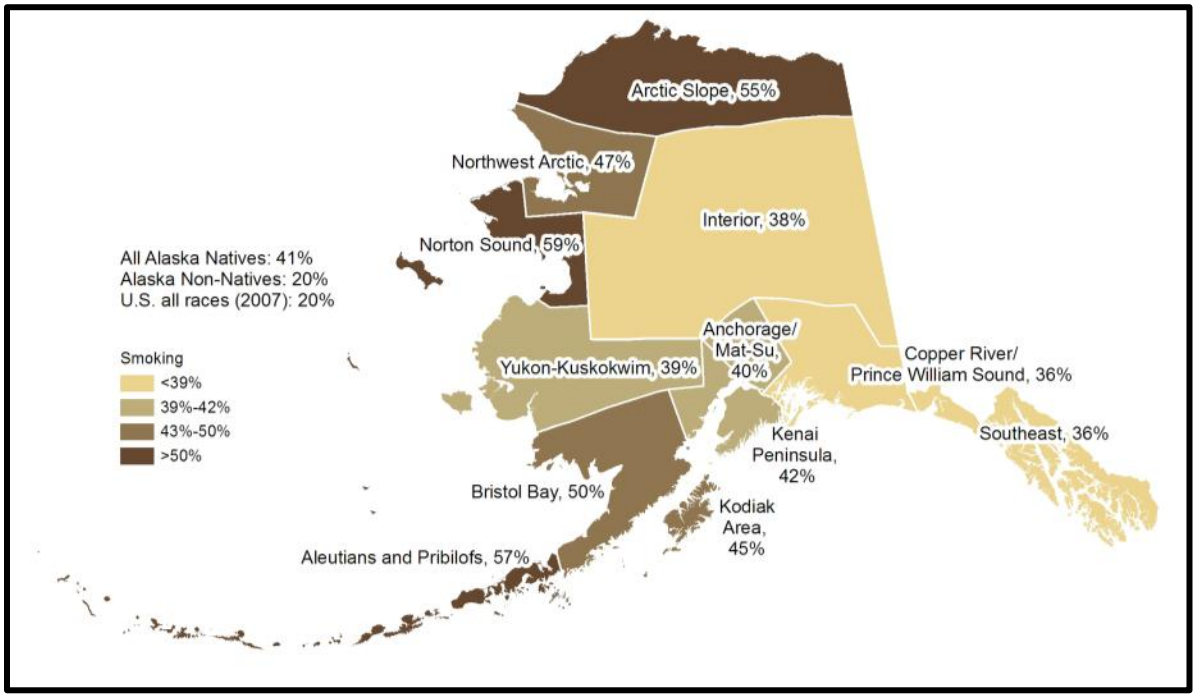
According to the Office of the Surgeon General, there is no safe level of exposure to tobacco smoke. Smoking has been directly linked to one-third of all cancer deaths each year and is the cause of 85% of all lung cancers in the U.S. In addition, smoking increases the risk of adverse pregnancy outcomes, such as miscarriage and low birth weight, and can lead to DNA damage in sperm that might reduce fertility (USDHHS 2010).

The NSB Baseline Community Health Analysis notes that tobacco was introduced to Alaska Natives in the 1700s, when it was used as an article of trade. Use of the highly addictive substance quickly became pervasive throughout rural Alaska. Alaska Natives use tobacco nearly twice as much as non-Natives; Alaska Native youth also smoke at more than twice the rate of non-Native youth and have not experienced the decline in smoking rates seen in their non-Native counterparts (ADHSS YBRS 2011).

The County Health Rankings report (2011) defines smokers as adults that currently smoke every day or most days and have smoked at least 100 cigarettes in their lifetime. As reported for 2010, 44% of all adults in the North Slope Borough were smokers. This was higher than the 23% of all Alaskans who were reported as current smokers (University of Wisconsin 2011). BRFSS (the basis for the County Health Rankings) included questions regarding people's smoking habits. During the 2008 to 2010 time period, almost 40% of North Slope Borough adults self-reported that they or someone else had smoked cigarettes, cigars, or pipes within their homes in the past year, more than twice the 20% of all Alaska adults who self-reported smoking within their homes (ADHSS BRFSS 2009). Adolescent cigarette use is defined as having smoked one or more cigarettes on one or more of the past 30 days (AN EpiCenter August 2009). In 2009, 15.7% of all Alaska high school students reported smoking; 25.2% of Alaska Native students smoked. The 2011 YBRS reported that 14.1% of all Alaskan students were smokers and that 26.4% of Alaska Native high school students smoked cigarettes on one or more of the past 30 days.

Overall regional smoking rate data for Alaska Natives is shown in Figure 18. The percentage of adults smoking from 2005 to 2007 for Alaska Natives in the Arctic Slope Region (58%) is higher than the rate for all Alaska Natives (41%) and almost 3 times the rate of Alaska non-Natives. Smoking prevalence among all Alaska Natives has not changed since 1990s, and typically young adults and males are more likely to smoke than women and older adults (Figure 18).

Figure 18. Smoking Rates by Region, Alaska Natives, 2005 to 2007



Source: AN EpiCenter August 2009

As reported in the NSB Baseline Community Health Analysis, the 2010 NSB Census provided data on tobacco use in NSB villages. NSB adults (49%) were more than twice as likely to report smoking tobacco as did adults statewide (22%). Inupiat adults in the NSB were almost 3 times as likely to report smoking as white adults in the NSB and also 37% more likely to smoke than were Alaska Natives statewide (NSB 2012). Among household heads, reported tobacco smoking varied by age, with reported smoking dropping to 34% in the 65+ age group from roughly 50% in the other age groups.

Among all household heads, the smoking rate was significantly associated with the village of residence, with Barrow household heads being the least likely to report smoking tobacco (Table 40). Among Inupiat household heads, the prevalence of tobacco smoking was also significantly related to village of residence, with slightly more than 70% of Inupiat household heads reporting smoking in Kaktovik, Atqasuk, Nuiqsut, and Anaktuvuk Pass. Smoking rates were significantly lower in Barrow than in the other villages overall, looking at all ethnicities together and at Inupiat residents only (NSB 2012).

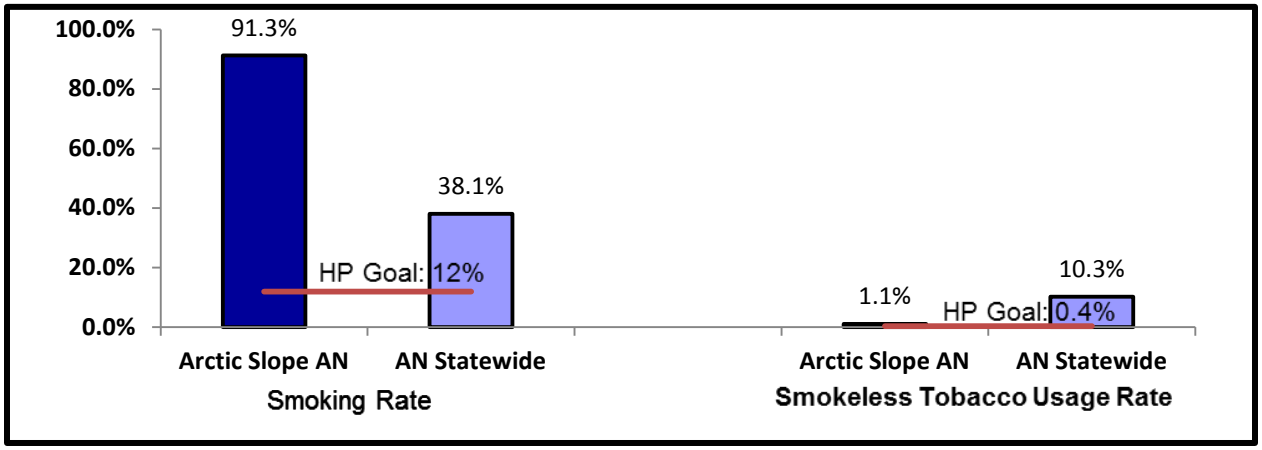
Table 39. Tobacco Smoking among NSB Household Heads: Smoke Tobacco in Any Form, 2010

	AkP	Atqasuk	Barrow	Kaktovik	Nuiqsut	All NSB
All household heads	65%	61%	44%	65%	62%	50%
Inupiat household heads	71%	73%	61%	75%	71%	63%

Source: NSB 2012

In 2009, 25.2% of Alaska Native high school students had used chewing tobacco or snuff during the past 30 days. This was almost twice as high as the percentage of Alaska Non-natives (ADHSS YBRS 2011). BRFSS asks questions on the use of smokeless tobacco products such as chewing tobacco, snuff, or Iq-mik or Blackbull (brand names for smokeless tobacco products). From 2008 to 2010 almost 4% of North Slope Borough adults self-reported that they had used such products, which was similar to the use of smokeless tobacco products by all Alaska adults (4.8%) (ADHSS BRFSS 2009).

Figure 19. Tobacco and Smokeless Tobacco Usage Rates 5 Years and Older, 2007



Source: AN EpiCenter August 2009

5.7.8 Cancer Screening

"Early detection of cancer greatly increases the chances for successful treatment. The success of screening depends on having sufficient numbers of personnel to perform the screening tests and on the availability of facilities that can undertake subsequent diagnosis, treatment, and follow-up" (WHO Cancer Factsheet). Screening can help prevent mortality and reduce cost of treatment for advanced cancer and is a crucial aspect of population health in this region given that cancer was one of the leading causes of death over the previous decade.

The most frequently diagnosed invasive cancers for Arctic Slope Alaska Native people during 1989-2003 were lung (41 cases), colon/rectum (32 cases) and breast (15 cases). These 3 cancers accounted for over half (56.4%) of all cancers (AN EpiCenter April 2009). Forth-eight percent (48.3%) of Alaska Native women in the Arctic Slope Region aged 52 to 64 years received a mammogram within 2 years of the end of 2007. This is 7% higher than for IHS American Indian/Alaska Native women nationwide but 13% lower than Alaska Natives statewide (AN EpiCenter April 2009). More than 6 out of 10 (62.6%) of Arctic Slope Alaska Native women had received a Pap smear within 3 years of the end of 2007, below the 74.6% of all Alaska Native women and far below the Healthy People goal of 90% (AN EpiCenter April 2009). Although these data have the benefit of documentation from electronic health records rather than self-report, the database may not fully capture records of Pap tests done outside the local health care system. There is no BRFSS data reported from the North Slope Borough for this question.

In 2006, a vaccine to prevent cervical cancer was approved; the vaccine protects against infection with certain types of the human papilloma virus (HPV). Currently the vaccine is recommended for all girls and women aged 9 to 26 years; the vaccine has recently been recommended for boys also as it has been found to protect against certain other types of cancer as well. The State of Alaska pays for the vaccine

for girls age 9 through 18 years who are eligible for the Vaccines for Children program. Data on vaccination rates in the NSB are not currently available (NSB 2012).

In 2008, over 1 out of every 10 (11.5%) Arctic Slope Region Alaska Natives age 51 to 80 years reported ever having a sigmoidoscopy or colonoscopy (AN EpiCenter April 2009). In contrast, 46.9% of all Alaska Native patients statewide had received colorectal cancer screening. The NSB Baseline Community Health Analysis notes that this number is likely to increase significantly with the addition of colonoscopy services through ASNA's Screening for Life program. Until recently, colonoscopies were only available outside the Barrow service area. It is also likely that some colon cancer screenings done out of the area were not included in these estimates (NSB 2012).

5.7.9 Summary

Areas of Vulnerability

- Cancer was the leading cause of death in the North Slope Borough between 1999 and 2009.
- The most common forms of cancer are lung and colorectal for all residents and for Alaska Natives.
- Heart disease was the second most common cause of death in the North Slope Borough between 2007 and 2009 for all residents and for Alaska Natives.
- Chronic lower respiratory disease was the fourth most common cause of death in the North Slope Borough between 2007 and 2009.
- 49% of all adults in the North Slope Borough were smokers in 2010; over twice the 23% of all Alaskans who were reported as smokers.

Areas of Resilience/Success

- The prevalence of diagnosed diabetes in 2007 was 31 per 1000 Alaska Native people in the Arctic Slope Region; less than the rate of 40 per 1000 people for all Alaska Natives.

5.7.10 Data Gaps

- Primary data sets from the BVS for the borough does not include years 2010 to 2011.
- Data from the AN EpiCenter for the Arctic Slope Region do not include years 2007 to 2011.

5.8 HEC 8: Health Services Infrastructure and Capacity

5.8.1 Hospitalizations

Morbidity (illness) is tracked by following hospitalization and outpatient department data. In the NSB service area, the 4 leading causes of hospitalizations were complications of pregnancy and childbirth, diseases of the respiratory system, deliveries and childbirth, and diseases of the digestive system, accounting for almost 75% of all hospitalizations in 2006 (Table 41).

Table 40. Top 10 Hospital Discharges by ICD Recode[a] All Ages, Samuel Simmonds Memorial Hospital, Fiscal Year 2006

ICD Recode	Rank	Number of Discharges	Percent of NSB Totals
Complications of pregnancy and childbirth (630-677)	1	44	25.3
Diseases of the respiratory system (460-519)	2	38	21.8
Deliveries childbirth (V01-V82)	3	38	21.8
Diseases of the digestive system (520-579)	4	10	5.7
Diseases of the skin and subcutaneous tissue (687-709)	5	10	5.7
Symptoms, signs and ill defined conditions (780-799)	6	8	4.6
Endocrine, nutrition, metabolic, immunity disorders (240-279)	7	4	2.3
Disease of the nervous system and sense organs (320-389)	8	4	2.3
Diseases of the circulatory system (390-459)	9	4	2.3
Diseases of the musculoskeletal system and connective tissue (710-739)	10		
Total Discharges		**174**	

Source: AN EpiCenter April 2009

The leading causes of inpatient days at the Samuel Simmonds Memorial Hospital in 2006 were complications of diseases of respiratory system, complications of pregnancy and childbirth, deliveries and childbirth and diseases of the skin and subcutaneous tissue (Table 42). According to the NSB Community Health Data Analysis, in 2008–2009 the leading admitting diagnoses to Samuel Simmonds Memorial Hospital (excluding childbirth and newborn care) included lower respiratory infections such as

pneumonia and exacerbations of chronic lung and heart conditions (NSB 2012). Admitting diagnoses for NSB residents to referral hospitals or other hospitals outside the NSB are not available.

Table 41. Top 10 Inpatient Days by ICD Recode[a] All Ages, Samuel Simmonds Memorial Hospital, Fiscal Year 2006,

ICD Recode	Rank	Number of Inpatient Days	Percent of NSB Totals
Diseases of the respiratory system (460-519)	1	127	32.3
Complications of pregnancy/childbirth (630-677)	2	76	19.3
Deliveries/childbirth (V01-V82	3	54	13.7
Diseases of the skin and subcutaneous tissue (680-709)	4	34	8.7
Diseases of the digestive system (520-529)	5	23	5.9
Symptoms, signs and ill defined conditions (780-799)	6	18	4.6
Endocrine, nutrition, metabolic, immunity disorders (240-279)	7	13	3.3
Diseases of the musculoskeletal system and connective tissue (710-739)	8	12	3.1
Diseases of the circulatory system (390-359)	9	10	2.5
Diseases of the nervous system and sense organs (320-389)	10	8	2.0
Total Number of Inpatient Days		**393**	

Source: AN EpiCenter April 2009

In the NSB service area, the primary reasons for outpatient visits included upper respiratory problems, accidents and injuries, pregnancy, childbirth and puerperium and hospital medical/surgical follow-up visits, as shown on Table 43. In 2008–2009, the leading outpatient visit diagnosis codes at Samuel Simmonds Memorial Hospital were primarily related to the management of chronic health conditions such as high blood pressure, diabetes, and arthritis, and to the treatment of acute respiratory infections (NSB 2012).

Table 42. Top 15 Outpatient Visits by ICD Recode[a] All ages, Samuel Simmonds Memorial Hospital, Fiscal Year 2005,

ICD Recode	Rank	Number of Outpatient Visits	Percent of NSB Totals
Upper Respiratory Problems	1	718	11.9
Accidents and Injuries	2	664	11.0
Pregnancy, Childbirth and Puerperium	3	524	8.7
Hospital Med/Surgical Follow-up	4	430	7.1
Otitis Media	5	354	5.9
Tests Only (Lab, X-Ray, Screening	6	303	5.0
Bone & Joint Disorder	7	249	4.1
Assessment of Symptoms	8	243	4.0
Hypertension	9	199	3.3
Arthritis	10	158	2.6
Musculoskeletal Disorder	11	146	2.4
Eczema Uticaria/Skin Allergy	12	138	2.3
Infected Skin & Abrasions	13	133	2.2
Bronchitis, Emphysema	14	133	2.2
Precordial & Abdominal Pain	15	123	2.0
Total Number of Outpatient Visits		**6,046**	

Source: AN EpiCenter April 2009
[a] ICD Recode combines similar primary diagnoses into categories

5.8.2 Health Services

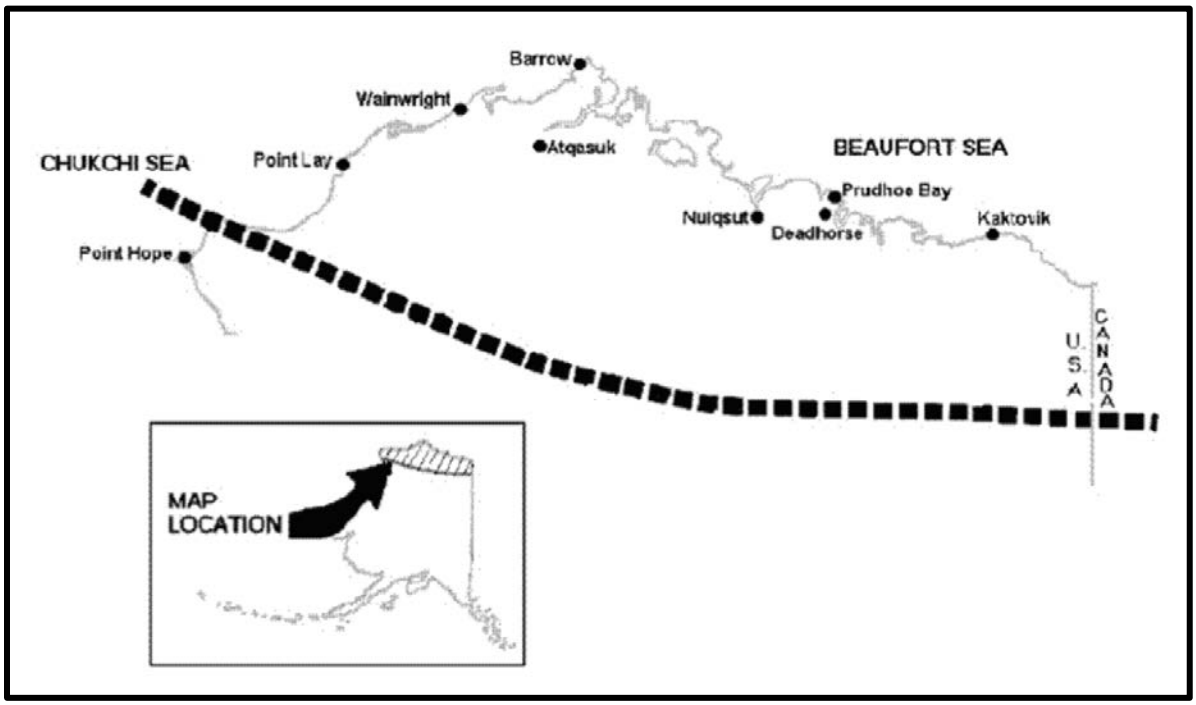
Health services are provided by a variety of organizations in Alaska, some designed for all people and others that focus on the health needs of Alaska Natives.

The Alaska Native Medical Center (ANMC), in Anchorage, is jointly owned and managed by the Alaska Native Tribal Health Consortium (ANTHC) and Southcentral Foundation (SCF), a non-profit health agency of Cook Inlet Region, Inc. (CIRI), an Alaska Native Corporation which organizes and manages services to Alaska Natives. The medical center is the state-wide referral center and gatekeeper for specialty care for Alaska Natives/American Indians. The Alaska Native Epidemiology Center (AN EpiCenter) maintains health statistics on the Arctic Slope Health Corporation service area which are used in this report with the understanding that those statistics are dominated by the City of Barrow population.

Residents of the North Slope Borough are part of the Arctic Slope Health Corporation (ASHC) which includes community clinics, sub-regional clinics, a regional hospital, dental and optical services, mental

health services, substance abuse counseling and treatment, health promotion and disease prevention programs, and environmental health service (Figure 20).

Figure 20. Health Corporation Facilities Map



Source: NSB/ASNA

According to the Samuel Simmonds Hospital webpage (http://www.arcticslope.org/hospital.html), the hospital has served the Inupiat people of the North Slope and provided care for all within the region since 1964. In 1986, control of the hospital transferred from the Indian Health Service to an agreement between the Indian Health Services and the Arctic Slope Native Association (ASNA). The ASNA, a tribally operated, nonprofit health and social services organization, has the administrative and operational control of health service programs including overseeing the regional hospital, dental and optical services, mental health services, substance abuse counseling and treatment, health promotion and disease prevention programs, and environmental health service.

The Samuel Simmonds Memorial Hospital is a critical access facility and they provide:

- An outpatient unit providing, emergency, clinic and urgent care
- An Inpatient unit providing care for newborn through elderly patients, including low-risk obstetrical services
- Case Management
- Specialty clinics offering access to specialists by referral
- Mammography screenings
- Diabetes education

The NSB and ASNA share responsibility for providing health care services to the residents of the North Slope Borough. Other than the municipality of Anchorage, the NSB is unique in Alaska in that it offers services similar to city and county governments in other states. The NSB also oversees programs—for example the Community Health Aide and Behavioral Health Programs—that are typically run by tribal health organizations in other rural parts of the state.

In addition, the ASNA oversees clinics which provide health care in villages while maintaining a strong central system with Samuel Simmonds Memorial Hospital. Six village clinics offer qualified medical staff via the Community Health Aide Program (CHAP). The health aides are non-medical personnel, typically from the communities in which they work, who are trained in the provision of basic health services according to protocols and under the supervision of medical providers in Barrow. A small minority (5–8%) of health aide visits are for preventive services.

Community Health Aides provide village based primary health care, including acute, chronic, and emergency care as well as health promotion prevention activities. With the exception of those living in Barrow, residents of the NSB primarily access the health care system through the village clinics, including:

- Anaktuvuk Pass Health Clinic, a Primary Health Care Facility
- Atqusuk Health Clinic, a Primary Health Care facility
- Kaktovik Clinic
- Nuiqsut Clinic

Other health services are provided by the North Slope Borough Health and Social Services: Public Health Nursing, Hope Community Services (a bridge that keeps people connected to their culture while receiving services), the National Alliance on Mental Illness Alaska-Barrow, and North Slope Early Intervention-Infant Learning Program. There are 5 core behavioral health programs provided by the NSB. The Integrated Behavioral Health Services (IBHS) include: Behavioral Health Services, Arctic Women in Crisis (AWIC), Gathering Place, Inupiat Teens Taking Control (ITTC) and Children and Youth Services (CYS). The referral to Anchorage for specialty services, including high-risk obstetrics, intensive care, surgery and other major procedures, and in depth consultations are coordinated by ASNA providers and case managers.

Lack of health insurance has been linked to worse general health status. According to the NSB Community Health Data Analysis, a majority of North Slope household heads had some type of health insurance coverage—a higher percentage than among Alaska adults overall (NSB 2012). The County Health Rankings for 2011 contradict these percentages reporting that 27% of NSB residents are uninsured while 23% of all Alaska residents did not have health insurance (University of Wisconsin 2011).

NSB residents face a number of serious issues with healthcare access; however, including chronic provider and staff shortages. For example, the County Health Rankings for 2011 report that there was only 1 primary care physician for every 961 people in the NSB while there was 1 primary care physician for every 731 Alaska residents (University of Wisconsin 2011). In addition, the NSB villages are remote and may lack of continuity because of high turnover; the inconvenience, logistical difficulty, and costs associated with travelling long distances for care; and the difficulty navigating a complex and often fragmented healthcare system both within the NSB and when seeking care off-Slope (NSB 2012).

5.8.3 Summary

Areas of Vulnerability

- In 2006, the 4 leading causes of hospitalizations were complications of pregnancy and childbirth, diseases of the respiratory system, deliveries/childbirth, and diseases of the digestive system, accounting for almost 75% of all hospitalizations in the North Slope Borough service area.

Areas of Resilience/Success

Comprehensive health services are available in Barrow for residents throughout the North Slope Borough service area.

5.8.4 Data Gaps

- Hospital data after 2006 has been requested but has not been received
- There appear to be a number of areas where health services-related data are particularly lacking: Anaktuvuk Pass, Atqasuk, Kaktovik and Nuiqsut.

6.0 ALASKA PIPELINE PROJECT: ALASKA MAINLINE PIPELINE BASELINE HEALTH DATA

Overview

The Alaska Pipeline Project proposes to design, permit and construct a new natural gas pipeline system beginning near Alaska's Prudhoe Bay field and extending over one of two alternative routes. One route, the Alberta option, would extend from Prudhoe Bay to points near Fairbanks and Delta Junction, and then to the Alaska-Canada border, where the pipeline would connect with a new pipeline in Canada. The pipeline in Canada would extend from the Alaska-Canada border to link up with pipeline systems near Boundary Lake, Alberta, Canada, providing the capability of transporting natural gas into the United States. An alternative pipeline route, the Valdez LNG option, would extend from Prudhoe Bay through points near Fairbanks and Delta Junction, and then to LNG facilities (to be built by third parties) near Valdez, Alaska.

The Place – Alaska Mainline Pipeline

This Section of the Community Health Data Assessment report focuses on the first pipeline option, the Alaska Mainline Pipeline--744.5 miles of buried, 48-inch-diameter Alaska Mainline and associated aboveground, ancillary, and auxiliary facilities from the gas treatment plant at Prudhoe Bay (GTP) to the Alaska-Yukon border, including provisions for gas delivery points within Alaska, as shown in yellow on Figure 1-1. APP plans to construct eight compressor stations, two meter stations, various mainline block valves, and pig launcher and receiver facilities. In addition, APP will construct associated ancillary and auxiliary infrastructure such as additional temporary workspace, access roads, helipads, construction camps, pipe storage areas, contractor yards, borrow sites, and dock modifications in Alaska. APP will use existing airstrips.

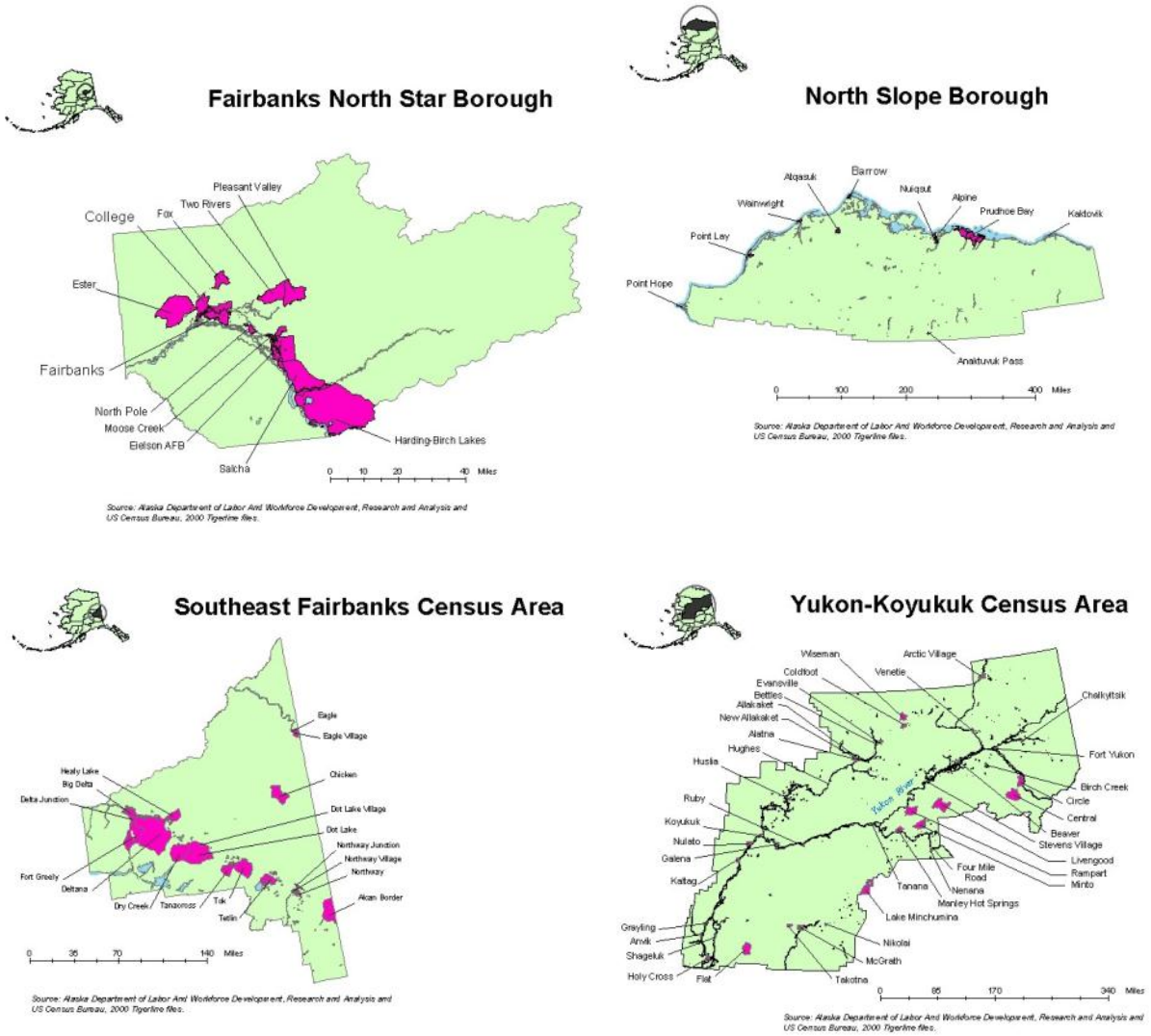
The proposed pipeline route will pass through more than 50 communities in 4 boroughs/census areas and several tribal development corporations, potentially impacting each to varying degrees depending on the amount of construction, attendant employee levels and construction timing.

Potentially Affected Communities

The Alaska HIA Toolkit defines a potentially affected community (PAC) as an area, community, or village where project-related health impacts may reasonably be expected to occur (ADHSS HIA 2011). Figure 1 presents the route of the Alaska Mainline Pipeline. Not all PACs experience health impacts of the same intensity, but it is still important to identify all communities that could possibly be affected. This report identifies 4 zones created while considering distance from the pipeline and ancillary facilities and the movement of workers and materials during construction. The HIA team also uses zones of impact to distinguish between communities that will experience intense impacts and those that will experience minimal health effects.

The proposed Alaska Mainline Pipeline and the potentially affected communities are located in the North Slope Borough, the Yukon-Koyukuk Census Area, the Fairbanks North Star Borough, and the Southeast Fairbanks Census Area. Data are collected for all Alaskans residing in boroughs and census areas; data for residents of the North Slope Borough are discussed in the previous Section on the gas treatment plant. A map of the jurisdictions is presented in Figure 21, which also identifies the communities. Table 44 presents the criteria used to determine health impact zones.

Figure 21. Boroughs and Census Areas within the Alaska Mainline Pipeline Study Area



Source: Alaska Department of Labor and Workforce Services

The PACs have been divided into zones based on the 4 primary factors:

- Whether the community is defined as being inside the pipeline corridor, as defined by Resource Report #5 (APP December 2011);
- Whether the community is located on a critical transportation corridor such as a major highway or the Alaska Railroad, as defined by Resource Report #1 (APP April 2011);
- Whether the community's subsistence hunting areas overlap with the Pipeline Corridor, as defined by Resource Report #5; and
- Whether the community is the site of any major project infrastructure such as a work camp, a compressor station or a storage yard, as defined by Resource Report #1.

In some instances, communities have been grouped together to reflect their geographic locations. Table 44 presents the scoring itself while Table 45 summarizes the communities by zone.

Table 43. Scoring of PACs

Community or group of Communities	Inside Pipeline Corridor (from Resource Report #5)	On Critical Transport Corridor (from Resource Report #1)	Community Use Areas Overlap with Project Corridor (from Resource Report #5)	Site of Major Project Infrastructure	Score
Alatna					0
Allakaket					0
Anchorage		X Port			1
Eklutna		X Glenn Hwy			
Eagle River					
Chugiak					
Peters Creek					
Alcan	X	X Alaska Hwy			2
Anderson		X Parks Hwy			1
Anaktuvuk Pass	X		X		2
Barrow	X				1
Beaver					0
Bettles					0
Cantwell		X Parks Hwy			1
Chisana			X		1
Big Lake		X Parks Hwy			1
Chistochina					0
Chitina					0
Coldfoot	X	X Dalton Hwy		Camp Compressor Station	3
Copper Center					0
Delta Junction				Camp	
Big Delta	X	X Alaska Hwy		Compressor Station	
Delta Junction	X	X Alaska Hwy		Storage Yard	3
Deltana					
Fort Greeley					
Whitestone					
Dot Lake				Compressor Station	
Dot Lake	X	X Alaska Hwy	X	Storage Yard	4
Dot Lake Village	X	X Alaska Hwy	X		
Dry Creek	X	X Alaska Hwy			2

Evansville					0
Fairbanks	X	X Alaska Hwy			3
College	X	X Alaska Hwy			
Eielson AFB	X	X Alaska Hwy		Compressor Station	
Ester				Storage Yard	
Fox	X	X Parks Hwy			
Harding-Birch Lake	X	X Elliott Hwy			
Moose Creek	X				
North Pole	X				
Pleasant Valley	X	X Alaska Hwy			
Salcha	X				
Two Rivers	X				
Fort Yukon					0
Gakona					0
Girdwood					0
Glennallen					0
Gulkana					0
Healy		X Parks Hwy			1
Healy Lake			X		1
Houston		X Parks Hwy			1
Kaktovik	X		X		2
Kenny Lake					0
Knik-Fairview		X KGB			1
Livengood	X	X Elliott Hwy		Camp	3
Manley Hot Springs					0
McKinley Park		X Parks Hwy			1
Mentasta Lake			X		1
Minto			X		1
Moose Pass		X Seward Hwy			1
Nabesna					0
Nenana	X	X Parks Hwy			2
Northway					4
Northway	X	X Alaska Hwy	X	Storage Yard	
Northway Junction	X	Airport	X		
Northway Village	X	X Alaska Hwy	X		
Nuiqsut	X		X		2
Paxson					0

Point MacKenzie		X Port			1
Rampart			X		1
Salcha					0
Seward		X Port			1
Slana					0
Stevens Village			X		1
Talkeetna		X – ARR			1
Tanacross	X	X Alaska Hwy	X		3
Tanana					0
Tetlin Village	X	X Alaska Hwy	X	Compressor Station	4
Tok	X	X Alaska Hwy	X	Camp Storage Yard	4
Tonsina					0
Wasilla		X Parks Hwy			1
Willow		X Parks Hwy			1
Wiseman	X	X Dalton Hwy	X		3

Table 44. PAC Zones for the Alaska Pipeline Project

Community	Score*	2010 U.S. Census Population	Borough
Zone 1			
Dot Lake**	4	75	SE Fairbanks
Northway**	4	223	SE Fairbanks
Tetlin	4	127	SE Fairbanks
Tok	4	1,258	SE Fairbanks
Zone 2			
Fairbanks**	3	55,687	Fairbanks North Star
Delta Junction**	3	4,436	SE Fairbanks
Tanacross	3	136	SE Fairbanks
Coldfoot	3	10	Yukon-Koyukuk
Livengood	3	13	Yukon-Koyukuk
Wiseman	3	14	Yukon-Koyukuk
Zone 3			
Anaktuvuk Pass	2	324	North Slope Borough
Kaktovik	2	239	North Slope

			Borough
Nolan	2	NA	North Slope Borough
Nuiqsut	2	402	North Slope Borough
Alcan Border	2	33	SE Fairbanks
Dry Creek	2	94	SE Fairbanks
Nenana	2	378	Yukon-Koyukuk
Zone 4			
Anchorage**	1	254,594	Anchorage Municipality
Anderson	1	246	Denali
Cantwell	1	219	Denali
Healy	1	1,021	Denali
McKinley Park	1	185	Denali
Moose Pass	1	219	Kenai Peninsula Borough
Seward	1	2,693	Kenai Peninsula Borough
Big Lake	1	3,350	Mat-Su
Houston	1	1,912	Mat-Su
Knik-Fairview	1	14,923	Mat-Su
Point MacKenzie	1	529	Mat-Su
Talkeetna	1	876	Mat-Su
Wasilla	1	7,831	Mat-Su
Willow	1	2,102	Mat-Su
Barrow	1	4,212	North Slope Borough
Healy Lake	1****	13	SE Fairbanks
Chisana	1****	0	Valdez-Cordova
Mentasta Lake	1****	112	Valdez-Cordova
Minto	1****	210	Yukon-Koyukuk
Rampart	1****	24	Yukon-Koyukuk
Stevens Village	1****	78	Yukon-Koyukuk

*Scoring based on criteria set forth in scoring table
**Includes a group of communities and/or a federally recognized native tribe
***2010 U.S. Census included workers living at Prudhoe Bay facilities while on duty
****Denotes that score is only subsistence issue which will be further explained in the subsistence reports

Prudhoe Bay/Deadhorse and Anchorage are discussed in Section 5.0.

Community Profiles

Information for this Section was taken directly from the Alaska Division of Community and Regional Affairs: Alaska Community Database, Custom Data Queries and Alaska Community Database Community Information Summaries (CIS), and the Alaska Department of Labor and Workforce Development, Research and Analysis Section, Alaska Local & Regional Information (Workforce Information).

Zone 1 includes Dot Lake, Dot Lake Village, Northway, Northway Junction, Northway Village, Tetlin, and Tok because they are within the Pipeline Corridor, they are located on the Alaska Highway which will be a major conduit for workers and materials during construction, they have subsistence hunting areas which are inside the Project corridor, and Project infrastructure will be located nearby thereby either increasing traffic or contact with construction works.

Dot Lake and Dot Lake Village: Dot Lake and Dot Lake Village are located on the Alaska Highway at milepost 1361, 50 miles northwest of Tok and 155 road miles southeast of Fairbanks. Dot Lake lies south of the Tanana River; Dot Lake Village is located nearby. Employment in the area is limited to the family-owned Dot Lake Lodge, the village council, Tanana Chiefs Conference (TCC) offices, and the school. In the summer, the Bureau of Land Management (BLM) hires firefighting crews. Subsistence activities are particularly important; moose, ducks, geese, ptarmigan, porcupines, caribou, whitefish, and other freshwater fish are utilized.

Northway Junction, Northway, and the Northway Native Village: The Northway group is composed of 3 dispersed settlements: Northway Junction (milepost 1264 on the Alaska Highway), Northway (the airport), and the Northway Native Village (2 miles north on the east bank of Nabesna Slough), 50 miles southeast of Tok. The communities lie off the Alaska Highway on a 9-mile spur road, adjacent to the Northway airport. The area is 42 miles from the Canadian border in the Tetlin National Wildlife Refuge. Most wage employment is with facilities or services for the airport, which would also be utilized by the Project, including an FAA Flight Service Station and U.S. Customs office which are located at the airport. Most wage employment is with state highway maintenance or services for highway travelers such as a motel, cafe, bar, pool hall, grocery store, and garage. Tribal offices for Northway Village, the school, and the clinic provide additional wage and salary income. The BLM fire guard station and construction jobs provide limited seasonal employment. Trapping also provides income and families trap and sell furs and produce birch-bark baskets, moccasins, mukluks, mittens, hats, and beadwork accessories....

The Native Village of Tetlin: Tetlin is located along the Tetlin River, between Tetlin Lake and the Tanana River, 20 miles southeast of Tok. It lies in the Tetlin National Wildlife Refuge. The village is connected by road to the Alaska Highway at milepost 1302, Tetlin Junction. The school, tribe, clinic, store, and post office provide the only employment. Many residents engage in trapping or making handicrafts for sale. Firefighting for BLM employs members of the community in the summer. Nearly all families participate in subsistence activities throughout the year. Whitefish, moose, ducks, geese, spruce hens, rabbits, berries, and roots are harvested.

Tok: Tok is located at the junction of the Alaska Highway and the Tok Cutoff to the Glenn Highway at milepost 1314, 200 miles southeast of Fairbanks. It is called the "Gateway to Alaska," as it is the first major community upon entering Alaska, 93 miles from the Canadian border. Tok is the transportation, business, service, and government center for the Upper Tanana region. The Project proposes to locate a construction camp and storage yard in the Tok area to take advantage of its location on the Alaska Highway. Employment and business revenues peak in the summer months, with the RV travelers on the

Alaska Highway. Subsistence and recreational activities are prevalent. Moose, bear, rabbit, grouse, and ptarmigan are taken. Dall sheep and caribou are hunted outside of the region but only through lottery permits. Salmon are obtained from the Copper River to the south. Berry-picking and gardening are also popular activities.

Zone 2 PACs were selected because they met 3 of the 4 scoring criteria and include Fairbanks, College, Eielson Air Force Base, Ester, Fox, Harding-Birch Lake, Moose Creek, North Pole, Pleasant Valley, Salcha, Two Rivers, Delta Junction, Deltana, Fort Greeley, Whitestone, Tanacross, Coldfoot, Livengood, and Wiseman.

Fairbanks, including College, Eielson Air Force Base, Ester, Fox, Harding-Birch Lake, Moose Creek, North Pole, Pleasant Valley, Salcha, and Two Rivers which encompass all of the communities of the Fairbanks North Star Borough. No individual communities will be described in this Section. The Fairbanks North Star Borough is located in the heart of Interior Alaska and is the second-largest population center in the state. The Richardson Highway, the Parks Highway, the Steese Highway, and the Elliott Highway connect the Interior to Anchorage, Canada, and the lower 48. Truck, rail, and air services provide transportation of cargo. Scheduled jet services are available at Fairbanks International Airport.

Fairbanks developed when the Chena steamboat landing brought many non-Natives to Fairbanks during the Pedro Dome gold rush. The population of the area continued to increase after construction of the Alcan Highway and the Trans-Alaska Oil Pipeline. City, borough, state, and federal government agencies, including the military, provide over one-third of the employment in the borough. The borough school district and the University of Alaska Fairbanks are the primary public employers. In 2011, nearly 8,600 soldiers were stationed in the borough on Fort Jonathan Wainwright and the Eielson Air Force Base. Retail services, gold mining, tourism, transportation, medical, and other services are the primary private sector activities.

Delta Junction, including Deltana, Fort Greeley, and Whitestone. This group of communities is located at the convergence of the Richardson and Alaska Highways, approximately 95 miles southeast of Fairbanks. The area developed along the east bank of the Delta River, south of its junction with the Tanana River.

The Alaska National Guard's 49th Missile Defense Battalion provides both military and civilian employment in Delta Junction. The nearby Pogo Mine is a major employer, 38 miles northeast of Delta Junction. Other major employers are the Delta/Greely School District and Alyeska Pipeline Services. Several state and federal highway maintenance shops are located in Delta Junction. There are also a number of small businesses that provide a variety of services. Delta Junction's location at the junction of two major highways has also brought development based on services to travelers. Nearly 40,000 acres are farmed in the Delta Junction area, producing barley, other grains and forage, potatoes, dairy products, cattle, and hogs.

Tanacross: Tanacross is located on the south bank of the Tanana River, 12 miles northwest of Tok, at milepost 1324 of the Alaska Highway. Many residents work during the summer as emergency firefighters for the BLM. Some people engage in trapping or in making Native handicrafts to sell. Nearly every family depends on subsistence activities for food. Whitefish, moose, porcupine, rabbit, ptarmigan, ducks, and geese are utilized. Caribou may be hunted by lottery permit. Some residents travel to Copper

River for salmon each summer. Employment at the washeteria and clinic is provided by the tribe, which has formed two profit-making corporations to employ members of the tribe.

Coldfoot: Coldfoot is located at the mouth of Slate Creek on the east bank of the Middle Fork Koyukuk River. It lies at mile 175 of the Dalton Highway. Most employment is in government and services to road travelers. There are 3 motels in Coldfoot, 2 of which are open year-round as it is a major stop along the Dalton Highway. There are approximately 78 rooms open all year. There are other services in Coldfoot, including a restaurant, a gas and service station, a RV park and dump station, a state trooper, a state Fish & Wildlife officer, and a U.S. Bureau of Land Management field office. Coldfoot has an area designated for future industrial development, and the Project plans to construct a work camp and a compressor station in the area.

Livengood: Livengood is 50 miles northwest of Fairbanks on the Dalton Highway at its junction with the Elliot Highway, affording the community year-round access via the Dalton Highway. Livengood is an historic mining community which peaked in 1915; new companies are exploring in the area with the goal of developing a gold mine in the community. Currently year round employment is limited although the location on the Dalton Highway provides opportunities to provide roadside services. APP has proposed to locate a worker camp at Livengood.

Wiseman: Wiseman is located in the Brooks Range on the middle fork of the Koyukuk River, at the junction of Wiseman Creek. It is about 260 miles northwest of Fairbanks off the Dalton Highway, 13 miles north of Coldfoot, and 75 miles north of the Arctic Circle. Roadside services and transportation of materials for the North Slope Borough provide a few positions in Wiseman. Several residents sell handcrafted items and furs. Self-employment, seasonal visitor service jobs, seasonal highway maintenance jobs, and jobs with the National Park Service provide income.

Zone 3 includes communities that are all located within the Project Corridor and are either on a major transportation route or their subsistence use area overlaps the Project Corridor. Anaktuvuk Pass, Kaktovik, and Nuisqsut are located in the North Slope Borough inside the Pipeline Corridor and use subsistence hunting areas which are also within the corridor. These communities will also be impacted by the development of the pipeline between Point Thomson and Prudhoe Bay and the Gas Treatment Plant proposed for Prudhoe Bay and are described in detail in Section 5 of this assessment. Alcan and Dry Creek are located on the Alaska Highway. Nenana is located on the Parks Highway and may be impacted by transport of materials and supplies depending on which port facility APP utilizes.

Zone 4 communities, with the exception of Barrow which is inside the Project Corridor, include communities which are ports (Point MacKenzie and Seward) or are located on major route from a port to the proposed Fairbanks supply depot such as Knik Fairview on the Knik Goose Bay Road from Point Mackenzie or Wasilla, Willow, Big Lake, Cantwell, Anderson, Healy, Houston, and McKinley Park up the Parks Highway. Talkeetna is ranked as a Zone 4 community because materials and supplies may increase railroad traffic through the town. In addition, several communities are in Zone 4 because their community subsistence use areas overlap with the Project Corridor including Chisana, Healy Lake, Mentasta Lake, Minto, Rampart and Stevens Village.

Community descriptions for each of the Zone 3 and Zone 4 communities are available at the Alaska Division of Community and Regional Affairs (http://www.commerce.state.ak.us/dca/commdb/CF_CIS.htm).

Environmental Justice

Please see Section 5 of this assessment for an explanation of the definitions of Environmental Justice. Estimates of the minority and low income populations were developed to determine if environmental justice populations exist in the Zone 1 PACs, as presented below (Table 46).

Table 45. Environmental Justice Status of Potentially Affected Communities in Zones 1 and 2

Community	Total Population 2010	Percent Minority Population 2010 (> 39.5%)	Percent of People below Poverty Limit 2010 (> 10.6%)
State of Alaska	710,231	35.9	9.6
Yukon Kuyokok Census Area	5,588	78.2	23.6
Fairbanks North Star Borough	97,581	20.0	7.6
Southeast Fairbanks Census Area	7,029	21.3	10.0
Zone 1			
Dot Lake*	75	18.7	36.0
Northway*	223	90.3	32.7
Tetlin	127	89.8	26.0
Tok	1,258	24.6	10.1
Zone 2			
Fairbanks*	55,687	32.4	9.6
Delta Junction*	4,436	12.4	7.2
Tanacross	136	10.3	14.4
Coldfoot	10	10.0	0
Livengood	13	25.0	0
Wiseman	14	7.1	0

Sources: US Census for Alaska, 2010
2010 American Community Survey 2006-2010 5-year estimates
*Includes a group of communities and/or a federally recognized native tribe

The following communities qualify as Environmental Justice communities because they have minority populations that make up at least 39.5% of the population: Northway and Tetlin. Almost half of the communities have a higher low income population percentage than the State of Alaska (10.6%) including Dot Lake, Northway, Tetlin, and Tanacross.

Communities in Zones 3 and 4 are typically included as Environmental Justice communities due to the proportion of Alaska Native residents and their status as Alaska Native Villages, including Cantwell, Eklutna, Mentasta Lake, Minto, Nenana, Rampart, and Stevens Village. The possibility of the Project resulting in disproportionately high and adverse effects on minority and/or low-income populations along the Alaska Mainline Pipeline will be evaluated during the impact assessment process once the Project is clearly defined.

6.1 HEC 1: Social Determinants of Health

The SDH are defined in Section 5.1.

6.1.1 Life Expectancy

No information on life expectancy at birth is available for residents of the Alaska Mainline PipelineStudy Area. Information for the State of Alaska; however, is presented in Section 5.1.1.

6.1.2 Maternal and Child Health

This Baseline Community Health Data Assessment presents components of maternal and child health including initiation of prenatal care, infant mortality, low-birth weight, teen-birth rates, and substance use during pregnancy, described in detail in Section 5.1.2.

Infant Mortality

Infant mortality is an important indicator for population health and is influenced by living conditions, food security, domestic conflict, socio-economic wellbeing, and access to health services and its terms are defined in Section 5.1.2.

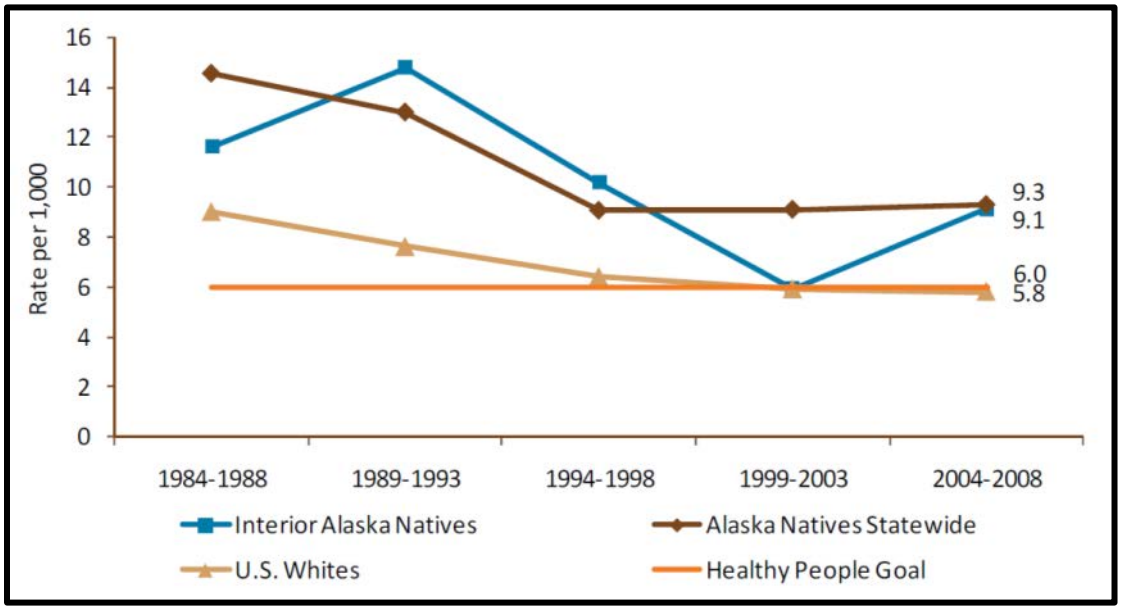
The Yukon-Koyukuk Census Area had infant mortality rates that were more than twice as high as the State of Alaska and that of the United States (Table 47) from 2005 to 2009 (ADHSS BVS January 2012). These data suggest that the post-natal experience, which is affected by socio-economic conditions, is of concern in this part of the Alaska Mainline PipelineStudy Area. Between 1984 and 2008, the infant mortality rate among Interior Alaska Natives decreased to 9.1 deaths per 1000 live births, slightly lower than the Alaska Native statewide rate of 9.3 deaths per 1000 live births (Figure 22).

Table 46. Infant Deaths and Infant Mortality Rates for Alaska Mainline Pipeline Study Area and Alaska, 2005 to 2009

		Neonatal (infants less than 28 days of age)	Post-neonatal (infants 28 days to 1 year of age)	Total Infant Deaths
United States	Rate per 1000 live births	4.42	2.34	6.75
Alaska	Rate per 1000 live births	2.9	3.4	6.3
Fairbanks North Star Borough	Number of deaths	9	9	18
	Rate per 1000 live births	1.7*	1.7*	3.5*
Southeast Fairbanks Census Area	Number of deaths	1	0	1
	Rate per 1000 live births	**	0.0	**
Yukon-Koyukuk Census Area	Number of deaths	1	6	7
	Rate per 1000 live births	**	13.4*	15.6*

Source: Study Area: Alaska Bureau of Vital Statistics
United States: National Vital Statistics Reports. Deaths: Final Data for 2007
* Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution
**Rates based on fewer than 6 occurrences are not reported

Figure 22. Infant Mortality Rates per 1,000 Live Births, 1984 to 2008



Source: AN EpiCenter 2011

Adequacy of Prenatal Care

In 2009, only 50.8%, 32.7%, and 31.7% of all pregnant women in the Fairbanks North Star Borough, Southeast Fairbanks Census Area, and the Yukon-Koyukuk Census Area (respectively) were documented on the birth certificate as having received adequate or better (includes adequate and adequate plus) prenatal care. This is considerably less overall than in the State of Alaska, where nearly 60% of all pregnant women reported experiencing adequate or better prenatal care (Table 48). The same is true of pregnant Alaska Native women; considerably fewer Alaska Native women received adequate or better prenatal care in the study area compared to 44.3% of all Alaska Natives in 2009 (approximately 50% discrepancy in some cases). This 50% discrepancy suggests that fewer Alaska Native women within this specific region were receiving proper prenatal care. The percentage of all women receiving adequate or better care decreased significantly from the 2007 levels (ADHSS BVS January 2012).

Table 47. Adequacy of Prenatal Care for Females, 2009

Adequacy of Prenatal Care (APNCU Index)	ALL RACES		WHITE		ALASKA NATIVE	
	Births (No.)	Percent (%)	Births (No.)	Percent (%)	Births (No.)	Percent (%)
State of Alaska						
Adequate or better	**5,568**	**59.5**	**3,671**	**67.8**	**1,253**	**44.3**
Adequate plus	1,993	21.3	1,326	24.5	409	14.5
Adequate	3,575	38.2	2,345	43.3	844	29.8
Intermediate	2,178	23.3	1,148	21.2	797	28.2
Inadequate	1,605	17.2	602	11.1	780	27.6
Fairbanks North Star Borough						
Adequate or better	**771**	**50.8**	**625**	**54.2**	**66**	**35.1**
Adequate plus	194	12.8	148	12.8	17	9.0
Adequate	577	38.0	477	41.4	49	26.1
Intermediate	468	30.9	360	31.2	60	31.9
Inadequate	278	18.3	168	14.6	62	33.0
Southeast Fairbanks Census Area						
Adequate or better	**34**	**32.7**	**31**	**34.8**	**2**	**28.6**
Adequate plus	6	5.8	5	5.6	1	14.3
Adequate	28	26.9	26	29.2	1	14.3
Intermediate	38	36.5	34	38.2	1	14.3
Inadequate	32	30.8	24	27.0	4	57.1
Yukon-Koyukuk Census Area						
Adequate or better	**33**	**31.7**	**3**	**25.0**	**30**	**34.4**
Adequate plus	15	14.4	0	0.0	15	17.2
Adequate	18	17.3	3	25.0	15	17.2
Intermediate	29	27.9	2	16.7	24	27.6
Inadequate	42	40.4	7	58.3	33	37.9

Source: Alaska Bureau of Vital Statistics

The most recent data from the AN EpiCenter were gathered from 2006 to 2007. Of all mothers in the State of Alaska, approximately 27% fewer Alaska Native mothers received adequate or better prenatal care as compared to all Alaska white mothers (Figure 4) (AN EpiCenter 2011). This may be due to prenatal care not being documented on birth certificate forms; however, given the magnitude of this discrepancy, it is unlikely to account for the entire difference. Additionally, in the Interior Region, 38% of Alaska Native mothers received adequate or better prenatal care from 2006 to 2007. No specific rural community data are available.

Low Birth Weight

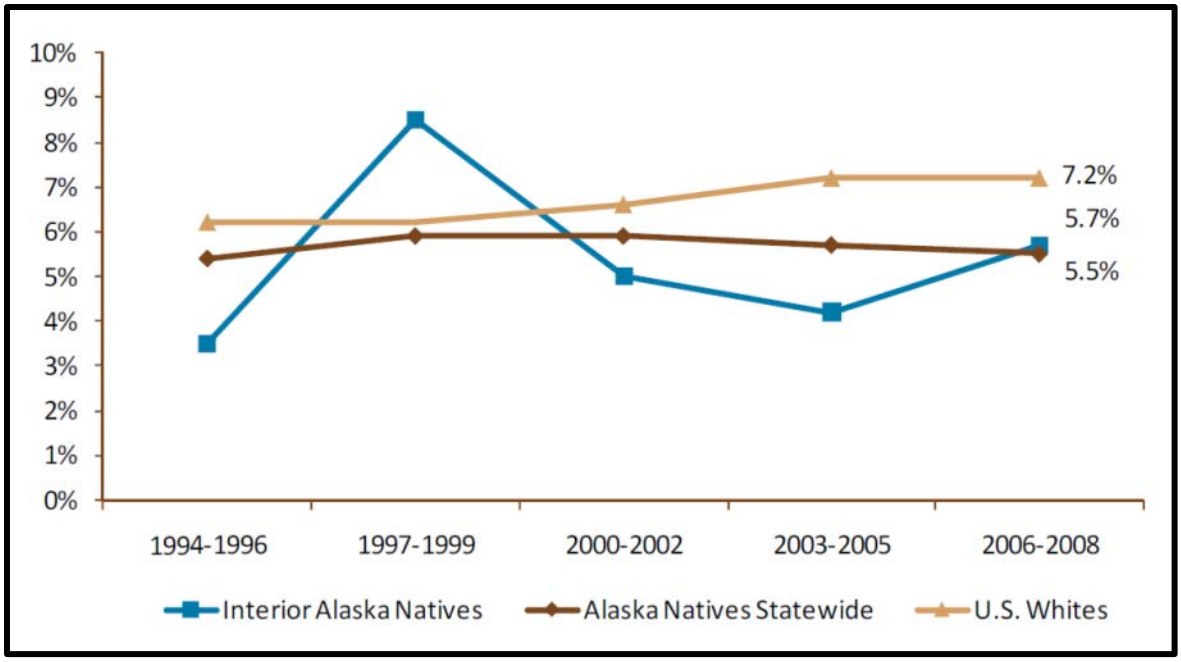
The percentage of infants born of low birth weight in the Southeast Fairbanks Census Area in 2009 was slightly higher than in the State of Alaska (Table 49) (ADHSS BVS January 2012). Since 2001, the percent of low birth-weight newborns has remained relatively constant, with Alaska Natives experiencing a slightly higher rate overall than Alaskan whites and all Alaskans statewide. No data was available specifically for the study area communities during this period (Figure 23).

Table 48. Percentage of Infants with Low Birth Weight Born, the United States, Alaska, and the Alaska Mainline Pipeline Study Area, 2009

	Percentage of infants born with low birth weight (%)
United States	8.16
Alaska	5.9
Fairbanks North Star Borough (FNSB)	5.2
Southeast Fairbanks Census Area SEF)	8.0
Yukon-Koyukuk Census Area (YK)	2.9

Source: Alaska Bureau of Vital Statistics
CDC Key Birth Statistics 2009

Figure 23. Live Births with Low Birth Weight, 1994 to 2008



Source: AN EpiCenter 2011

Substance Use during Pregnancy

Smoking during pregnancy is the single most important contributor to low birth weight (CDC 2004, Brooke 1989, Kramer 1987). In the Yukon Koyukuk Census Area (34.5%), the percent of infants born to mothers who reported smoking during pregnancy was significantly higher than for the State of Alaska. Alaska state statistics report that 15.5% of infants were born to mothers whom reporting smoking during pregnancy and the percentage of women who reported drinking during pregnancy, was almost twice the statewide rate (Table 50).

Table 49. Infants Born to Mothers Reporting Substance Use during Pregnancy, Alaska and the Alaska Mainline Pipeline Study Area, 2007 to 2009

		Reported drinking	Reported smoking
Alaska	Births (No.)	935	5,212
	Percent (%)	2.8	15.5
Fairbanks North Star Borough	Births (No.)	94	648
	Percent (%)	1.8	12.6
Southeast Fairbanks Census Area	Births (No.)	3	31
	Percent (%)	0.9	9.2
Yukon-Koyukuk Census Area	Births (No.)	16	99
	Percent (%)	5.6	34.5

Source: Alaska Bureau of Vital Statistics, accessed 2012

Teen Birth Rates

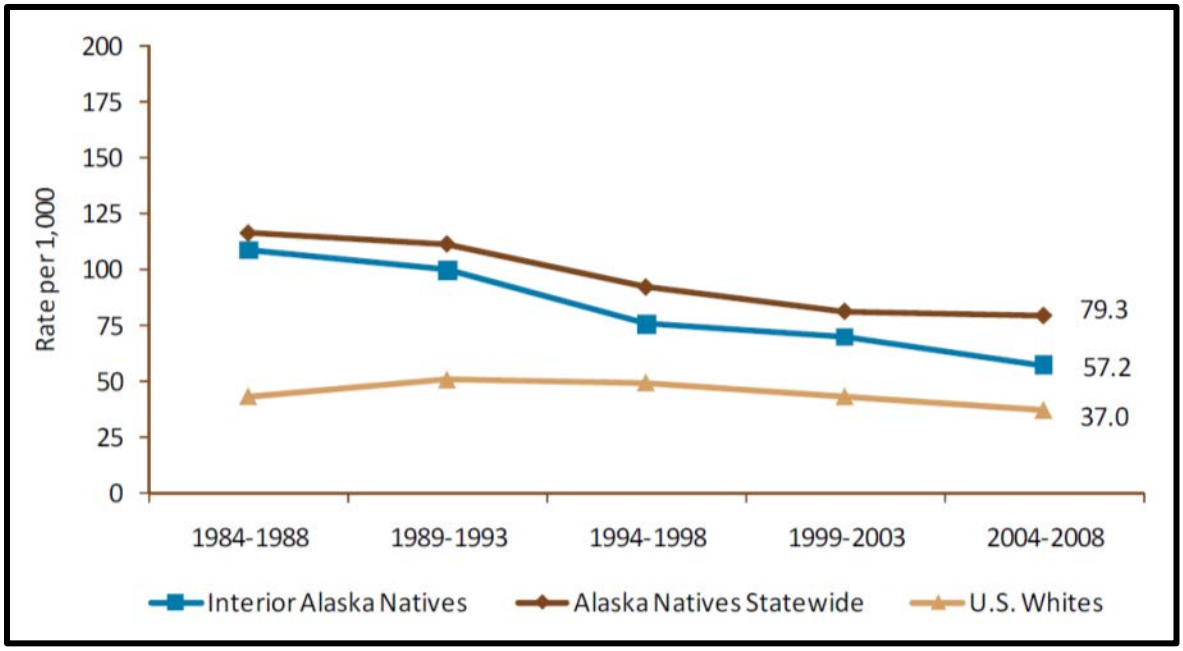
In 2009, the percentage of total births to mothers less than 20 years of age was lower or the same in the jurisdictions of the Alaska Mainline Pipeline Study Area than statewide percentages for both Alaska Native mothers and for all mothers (Table 51). The rate for the State of Alaska, however, has declined much more dramatically, by 1.6 times, from 1990 through 2009 (ADHSS BVS January 2012). The same is true among Interior Alaska Natives and Alaska Natives statewide from 1984 to 2008 (Figure 24).

Table 50. Proportion of Births to Teens < 20 Years among Alaska Natives and All Mothers, Alaska, and the Alaska Mainline Pipeline Study Area, 2009

	Births to Alaska Native mothers < 20 years (%)	Births to all mothers < 20 years (%)
Alaska	16.1	9.9
Fairbanks North Star Borough	14.6	7.0
Southeast Fairbanks Census Area	0.0	6.3
Yukon-Koyukuk Census Area	16.1	15.4

Source: Alaska Bureau of Vital Statistics

Figure 24. Teen Birth Rate per 1,000 Females, Ages 15-19 Years, 1984 to 2008



Source: AN EpiCenter 2011

Child Abuse and Out-of-Home Placement

No information on child abuse and out-of-home placement is available on a borough or community level; a full description of statewide information on child abuse and out-of-home placement is provided in Section 5.1.2.

6.1.3 Intimate Partner Violence and Sexual Violence

No information on intimate partner violence and sexual violence is available on a borough or community level; a full description of statewide information on intimate partner violence and sexual violence is provided in Section5.1.3.

6.1.4 Oral Health

No information on oral health is available on a borough or community level; a full description of statewide information on oral health is provided in Section 5.1.4 of this report.

6.1.5 Suicide

Suicide is an important health outcome that can indicate the degree of mental health challenge in a population, and was the sixth leading cause of death in the State of Alaska from 2007 to 2009. Age-adjusted suicide rates in the Yukon-Koyukuk Census Area were almost 3 times that of the State of Alaska (Table 52). However, it is important to note that rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution.

Table 51. Suicide Rates in the State of Alaska and the Alaska Mainline Pipeline Study Area, 2007 to 2009

	Number of Deaths	Age-adjusted Rate per 100,000 Population[a]	Leading Causes of Death Rank
State of Alaska	456	22.7	6
Fairbanks North Star Borough	57	21.7	5
Southeast Fairbanks Census Area	1	**	5
Yukon-Koyukuk Census Area	9	60.2*	4

Sources: Bureau of Vital Statistics
[a]Age-adjusted rates are per 100,000 U.S. year 2000 standard population
* Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution
** Rates based on fewer than 6 occurrences are not reported

Suicide is a complicated phenomenon and one with devastating effects on families and communities. In 2004, the suicide rate in Alaska was more than double that of the rate in the U.S., giving it the highest rate in the U.S. and rates have not declined in the last decade (NSB 2012). The northern and western rural regions of the state are most severely impacted (ADHSS Suicide Prevention Council 2010). Below are the suicide summary points from the ADHSS, Bureau of Vital Statistics, Suicide Rate by Year 2000 to 2009 (ADHSS Suicide Prevention Council Undated):

- Alaska's suicide rate dropped in 2009, but between 2000 and 2008, the age-adjusted rate of death by suicide in Alaska averaged almost twice the U.S. rate.

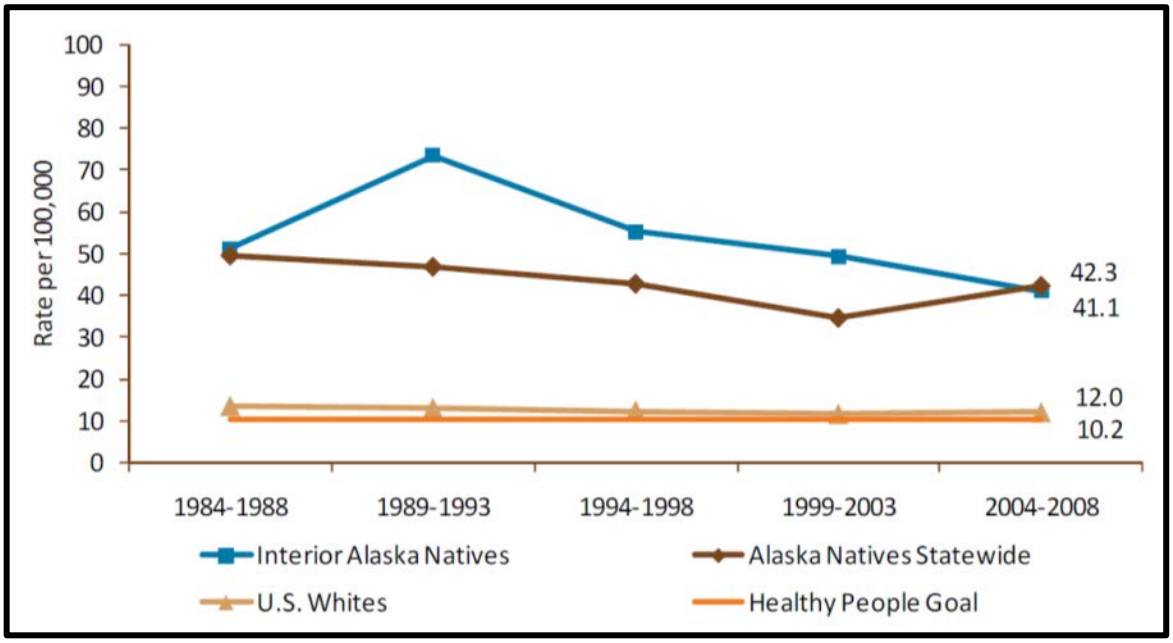
- Most of the suicides in 2009 were in Anchorage, but the highest rates per population were in the Northwest Arctic, Nome, and Bethel/Wade Hampton census areas.
- Between 1999 and 2008, 79% of the suicides in Alaska were by males.
- The highest rates were among those aged 15 to 29 years old. The rate for Alaska Natives was more than twice the rate for non-Natives.
- According to interviews with families of some of Alaska's suicide victims the Alaska rate is
  - More than half of the decedents had a disability or illness that made it difficult for them to take care of normal daily activities.
  - Almost two-thirds of decedents were reported to have had current prescriptions for mental health medications at the time of their death but many were not taking the medications as prescribed.
  - 43% of interviewees said the decedents drank alcohol daily and many said there was a high rate of binge drinking.
  - More than half of decedents had smoked marijuana in the past year.

Statewide by age group from 2007 to 2009, suicide was the third leading cause of death among Alaska Natives ages 5 to 14; the number 2 cause of death for Alaska Natives ages 15 to 24 and 25 to 34; and the third leading cause of death in those age 35 to 44 (ADHSS BVS January 2012).

Suicide is also an area of significant racial disparity. Suicide rates among Alaska Native peoples are higher than for any other ethnicity in the state and roughly twice the rate among white Alaskans. In the 1950s, Alaska Natives had a suicide rate that was considerably lower than that of non-Native Alaskans (NSB 2012). Since 1960, the incidence of suicide among Alaska Natives has increased 500%, almost tripling in the 1960s and 1970s, then essentially leveling off at roughly twice statewide and 4 times national rates. Similar but even more dramatic increases in suicide have occurred among other circumpolar indigenous populations in the past 20–30 years, again reflecting an epidemic rise in suicide among northern indigenous youth (ADHSS SOE Bulletin 28 2010).

According to AN EpiCenter 2011, among Alaska Natives living in the Interior Region deaths due to suicide were 41.1 per 100,000 population for 2004 to 2008. Although suicide deaths have decreased almost 20% from 1984 to 1988 levels, the rate is still over 3 times that of U.S. whites (Figure 25).

Figure 25. Age-adjusted Suicide Death Rates per 100,000 Population, 1984-2008



Source: AN EpiCenter 2011

6.1.6 Substance Abuse

The County Health Rankings, the source of the data presented below, are produced by the University of Wisconsin Population Health Institute and are based on BRFSS survey data (Table 53). The data are for all adult residents and suggest that binge drinking is a problem throughout Alaska but especially for residents of the Yukon Koyukuk Census Area.

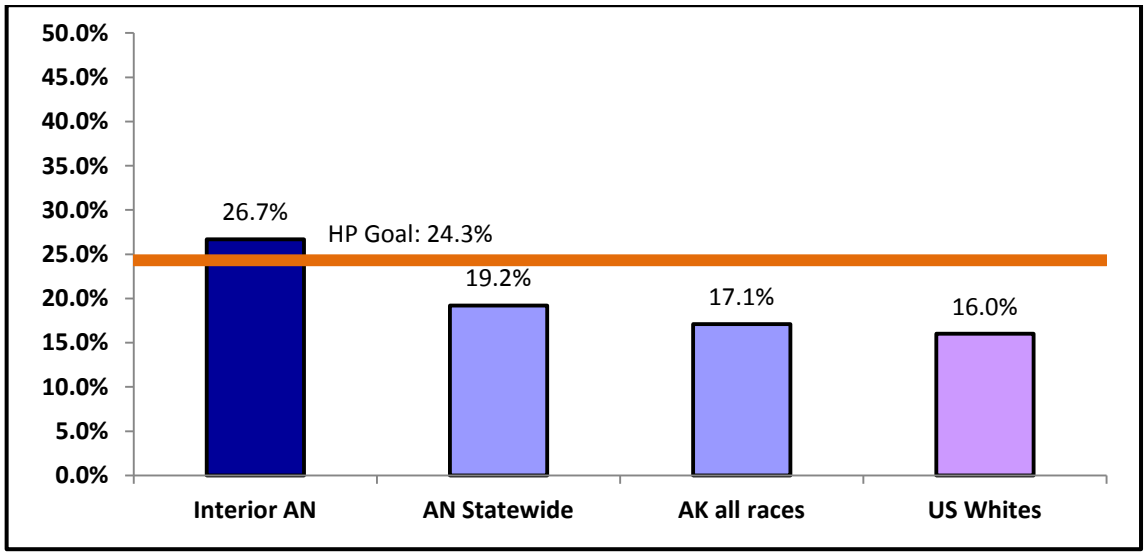
Table 52. Binge Drinking Rates, All Adult Residents for Alaska and the Alaska Mainline Pipeline Study Area, 2010

	Percentage of adults reporting binge drinking (%)
Alaska	18
Fairbanks North Star Borough	19
Southeast Fairbanks Census Area	15
Yukon-Koyukuk Census Area	25

Sources: University of Wisconsin, County Health Rankings, 2011

Between 2007 and 2009, the percentage of Interior Alaska Natives who self-reported binge drinking was higher than for Alaska Natives Statewide (Figure 26); however, data based on self-report typically severely underestimates actual consumption.

Figure 26. Binge Drinking, 18 Years and Older, 2007 to 2009



Source: AN EpiCenter 2011

6.1.7 Economic Indicators

The U.S. Census Bureau collects data on median household income via the American Communities Survey (ACS). Median means that half of the households have higher income and half of the households have lower income. Income includes all monetary sources of income including wages, the Permanent Fund Dividend, Corporation Dividends and Public Assistance. Income does not include any dollar equivalent of subsistence resources. For 2010, the estimated median household income in Alaska was $66,953 (Table 54). The range of median household income in the study area communities ranged from $18,500 to $67,625.

Table 53. Economic Indicators for the State of Alaska and the Alaska Mainline Pipeline Study Area Communities, 2009

Location	Per Capita Income (2010) ($)	Median Household Income (2010) ($)	% of People Living Below the Poverty Limit (2010)
State of Alaska	22,679	66,953	9.0
		Zone 1	
Dot Lake	16,351	41,250	26.4
Dot Lake Village	14,818	39,643-	40.0
Northway Junction	ND	ND	ND
Northway Village	9,086	18,500	55.0
Northway	15,441	35,365	48.8
Tetlin	10,676	41,667	18.9
Tok	20,779	53,986	9.8

Zone 2			
Fairbanks City	20,373	51,320	11.0
Delta Junction	29,964	67,625	8.3
Tanacross	14,167	23,011	38.9
Coldfoot	ND	ND	ND
Livengood	18,750	37,394	0
Wiseman	ND	ND	ND

Sources: Alaska data- Median household income, per capita income, and percent of families living below the poverty line: 2011 American Community Survey 2006-2011 5-Year Estimates
Unemployment Rates will be presented in the final HIA and are based on U.S. Bureau of Labor Statistics. Not seasonally adjusted.

Employment is another key demographic factor that influences health (AN EpiCenter August 2009) but which is highly volatile. No unemployment rates are presented in this assessment but are readily available from the sources listed in Table 22 when the report is finalized.

6.1.8 Dependency Ratio

According to the 2010 Census, the average ratio of residents in the study area (included Fairbanks North Star Borough, Southeast Fairbanks Census Area, and Yukon Koyukuk Census Area) aged 0–15 years or 65+ years to those aged 16–64 is 0.56. This number indicates that there are slightly fewer than 2 people of working age for every person in "dependent" age groups in the study area.

6.1.9 Educational Attainment

Compared to the State of Alaska, Tok, Tetlin, and Northway have a slightly lower percentage of adults with a high school diploma. Many of the study area geographies have and a much lower percentage of adults with a bachelor's degree or higher as compared to the State (Table 55). The percentage of adults who are high school graduates varies considerably within the study area, from a low of 42% in Northway Village to a high of 100% in Dot Lake. The percentage of adults with a bachelor's degree or higher is lower than in the State of Alaska in every community. Literacy rates follow a similar pattern as the high school graduation percentages: 91% of Alaska residents read and write; 92% of the residents of Fairbanks North Star Borough are literate as are 87% of the residents of Southeast Fairbanks Census Area and 86% of the residents of the Yukon Koyukuk Census Area.

Table 54. Education Indicators for the State of Alaska and the Alaska Mainline Pipeline Study Area Communities, 2005 to2009

Location	Educational Attainment of Population 25 Years and Over		High School Drop-out Rate (%)*
	High School Graduate or Higher (%)	Bachelor's Degree or Higher (%)	
State of Alaska	90.7	26.5	7.3
	Zone 1		
Dot Lake	100.0	0.0	0.0
Dot Lake Village	ND	ND	ND
Northway Junction	ND	ND	ND
Northway Village	42.2	0.0	ND
Northway	86.3	0.0	ND
Tetlin	81.8	0.0	ND
Tok	85.5	9.7	1.1
	Zone 2		
Fairbanks City	89.3	18.5	ND
Delta Junction	93.1	21.9	6.17
Tanacross	93.3	6.7	0.0
Coldfoot	ND	ND	ND
Livengood	ND	ND	ND
Wiseman	ND	ND	ND

*In general, the dropout rate reflects the percentage of all students enrolled in grades 7-12 who leave school during a single school year. It is calculated by dividing the number of dropouts by a membership base, which includes all students who were in membership any time during the year. It is not directly related to the percentage of people over 25 years of age who have graduated from high school.
Sources: Educational Attainment: 2009 American Community Survey 1-Year Estimates
High School Drop-Out Rate: National Center for Education Statistics, Public School Graduates and Dropouts 2007-2008, Table 4
Village data: Educational Attainment: 2005-2009 American Community Survey 5-Year Estimates
State of Alaska Report Card, 2009-2010 School Year

6.1.10 Family Stability

One alternative measure of family stability is the divorce rate. The Alaska Bureau of Vital Statistics maintains a database on divorce for the state, boroughs, and census areas, although the numbers of occurrences are not kept for census areas (ADHSS BVS February 2012). Table 56 below presents the divorce rate for females and males in the State of Alaska and the study area, and shows a lower rate of divorce in the Southeast Fairbanks Census Area and the Yukon Koyukuk Census Area than in the State of Alaska, suggesting greater family stability in this region. Fairbanks North Star Borough residents have a higher rate of divorce among both men and women than for the state as whole.

Table 55. Divorce Rates, State of Alaska and the Alaska Mainline Pipeline Study Area, by Gender, 2009

	Female Rate per 1000 Population	Male Rate per 1000 Population
State of Alaska	8.1	7.5
Fairbanks North Star Borough	10.2	9.0
Southeast Fairbanks Census Area	4.7	5.5
Yukon-Koyukuk Census Area	1.9	1.3

Source: Alaska Bureau of Vital Statistics, Marriage and Divorce Rates

Using single parenthood as another marker of family stability, the 7 of the 12 communities in the study area have a much higher percentage of households headed by females with no husband present than the State of Alaska (Table 57). In Dot Lake and Northway Village more than 25% of households are headed by females only, nearly 3 times the statewide percentage. This indicator would suggest decreased family stability in these areas; however, when considering other markers of family stability such as divorce, the statistics may not be conclusive.

Table 56. Household Characteristics for the State of Alaska and the Alaska Mainline Pipeline Study Area Communities, 2010

Location	Number of Households	Average Household size	Percent of Family Households	Female Headed Households, No Husband Present (Percent of Family Households)	Two-Parent Households with own Children Present < 18 (Percent of Family Households)
State of Alaska	258,058	2.7	66.2	10.7	22.7
			Zone 1		
Dot Lake	26	2.88	69.2	26.9	19.2
Dot Lake Village	ND	ND	ND	ND	ND
Northway Junction	20	2.7	75.0	20.0	10.0
Northway Village	30	3.27	63.3	26.7	3.3
Northway	27	2.63	59.3	18.5	14.8
Tetlin	43	2.95	67.4	23.3	7.0
Tok	532	2.36	63.7	9.8	16.7
			Zone 2		
Fairbanks City	11,534	2.5	61.7	13.3	37.1
Delta Junction	377	2.54	61.8	6.4	23.9
Tanacross	53	2.57	66.0	24.5	13.2
Coldfoot	6	1.67	16.7	0.0	16.7
Livengood	-	-	-	-	-
Wiseman	5	2.8	80.0	0.0	20.0

Source: American Community Survey, 2005-2009

6.1.11 Cultural Indicators

Within the Alaska Mainline Pipeline Study Area, there are 4 federally recognized tribes:

- Village of Dot Lake
- Northway Village
- Native Village of Tetlin
- Native Village of Tanacross

The majority of the tribes identify themselves as part of the Athabascan cultural group. Almost 80% of the residents of the Yukon Koyukuk Census Area are Alaska Natives; approximately 20% of the residents of Fairbanks North Star Borough and the Southeast Fairbanks Census Area are Alaska Native. Residents of Northway Village and the Native Village of Tanacross are the most like to speak a language other than English at home (Table 58). This suggests although cultural continuity appears high in a few areas of the Study Area, cultural continuity may not be as strong in most of the area.

Participation in subsistence activities is believed to be high throughout the region although exact numbers are not currently available. Subsistence participation can include use of subsistence resources, harvest activities, sharing, and receiving subsistence resources. Participation rates will be available when the ADF&G Harvest Surveys are complete. Almost half of the communities have a low income population percentage that is at least 10% higher than the percentage of these populations in the State of Alaska including Dot Lake, Northway, Tetlin, and Tanacross suggesting that participation in subsistence activities may be a necessity of survival as well as a voluntary attempt to preserve cultural continuity.

Table 57. Cultural Indicators for the State of Alaska and the Alaska Mainline Pipeline Study Area Communities, 2006 - 2010

Location	Primary Cultural Group(s)	Percent Speaking a Language Other than English at Home (%) (2006 to 2010 5-year average)
State of Alaska		16.5
	Zone 1	
Dot Lake	Athabascan	0.0
Dot Lake Village	Athabascan	16.9
Northway Junction	Athabascan	ND
Northway Village	Athabascan	37.3
Northway	Athabascan	11.7
Tetlin	Athabascan	20.5
Tok		9.7
	Zone 2	
Fairbanks City		13.6
Delta Junction		18.8
Tanacross	Athabasacan	45.2
Coldfoot		ND
Livengood		0.0
Wiseman		ND

Sources:
Alaska Community Database, Custom Data Queries and Alaska Community Database Community Information Summaries (CIS). Available online at http://www.commerce.state.ak.us/dca/commdb/CF_CIS.htm
Speaking a language other than English at Home: American Community Survey, FactFinder2 available online at http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

6.1.12 Summary

The health of residents in many of the potentially affected communities is affected by their economic position:

- The median household income and per capita income of residents in the all but one of the PACs is lower than the same income of the state; only Delta Junction has a higher median household income and per capita income than the state.
- Income levels are lower in those communities which are federally recognized tribes

- Despite low neonatal death rates, post-neonatal death rates, which have been associated with socioeconomic status, are higher in the Yukon Koyukuk Census Area than in the State of Alaska.

Areas of Vulnerability

Alaska Natives in the PACs are faced with more challenges to social determinants of health than non-Natives. Alaska Natives fared worse in every health indicator for which data was available by ethnicity, such as:

- Lower life expectancies
- Fewer women received adequate or better prenatal care
- Percentage of Alaska Natives statewide who had received a dental visit in the past year was lower
- Suicide rates were more than 3 times greater among Alaska Natives in Yukon Koyukuk Census Area than among whites statewide
- The Northern Region (which includes the Alaska Mainline Pipeline Study Area) had the highest rates of child abuse in the state
- Percentage of households with no husband present is higher in the Alaska Mainline Pipeline Study Area than statewide, and is higher still in the majority of the PAC villages.
- A greater percentage of women in the Yukon Koyukuk Census Area reported drinking and smoking during pregnancy than in the state.
- Rates of heavy drinking in the Yukon Koyukuk Census Area are higher than in the state

NOTE: While it appears that the Yukon Koyukuk Census Area had some significant issues in the Social Determinants of Health category, only 3 of the Zone 1 and 2 communities are located within the census area: Coldfoot, Livengood, and Wiseman with a total 2010 population of 37 residents, not all of whom are year round residents. Statistics presented on a census area basis may not be indicative of the PACs.

Areas of Resilience/Success

Despite significant challenges, residents of the villages fared better on several important health indicators and health determinants:

- Residents of the Southeast Fairbanks and the Yukon Koyukuk Census Areas have lower divorce rates than residents of the state
- Rates of cultural continuity are high in most of the Alaska Native villages in the Alaska Mainline Pipeline Study Area.

6.1.13 Data Gaps

- Individual community and household level specific data are not available.
- Participation in subsistence activities are not yet available from the ADF&G studies

6.2 HEC 2: Accidents and Injuries

Accidents and injuries are defined in Section 5.2

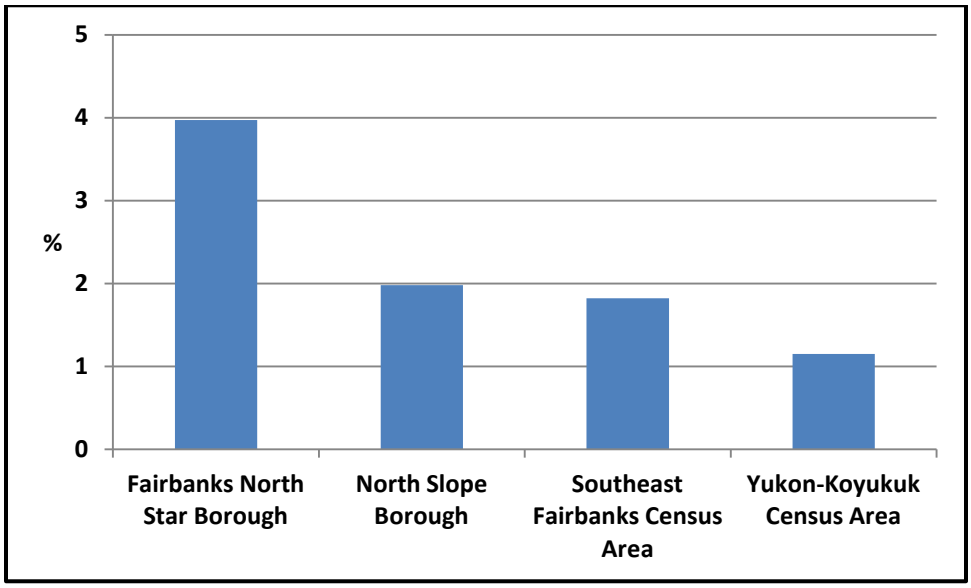
6.2.1 Non-Fatal Accidents and Injuries

Between 2001 and 2010, there were 6,703 injuries reported in the Alaska Mainline Pipeline Study Area. 95% of these were non-fatal, of which falls were by far the leading cause of unintentional accident and injury.

6.2.2 Fatal Accidents and Injuries

Of the 6,703 total injuries reported, 356 resulted in death. shows the percentage of all injuries that resulted in death. Table 59 and Figure 28 show unintentional accident and injury deaths by cause for 2007 to 2009.

Figure 27. Fatal Accidents and Injuries in the Study Area, Percent of Total, 2001-2010



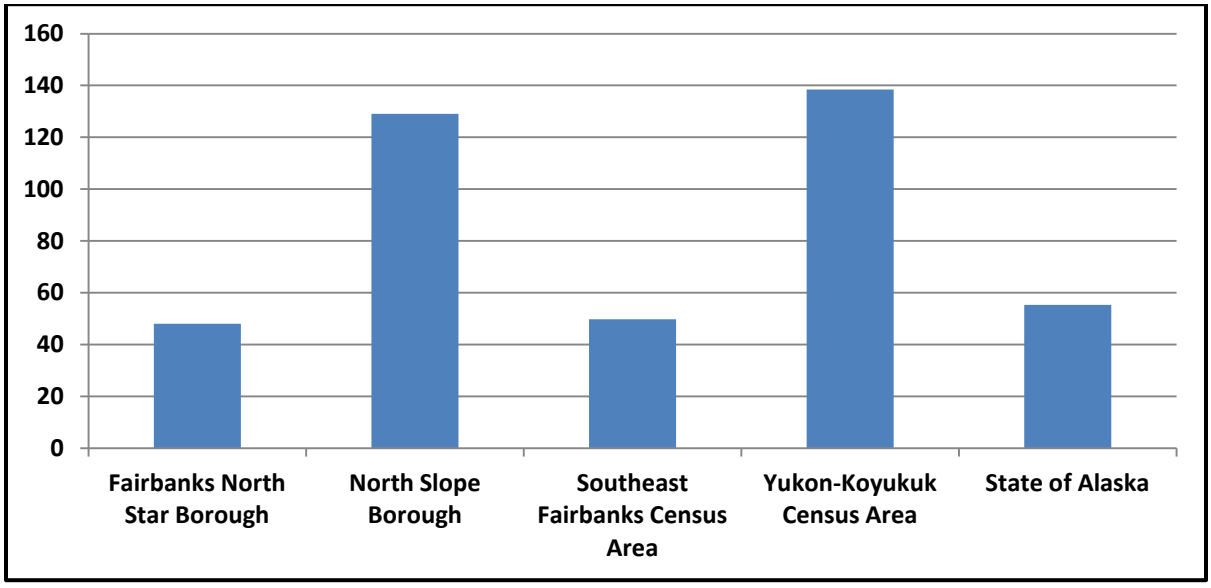
Source: Alaska Trauma Registry

Table 58. Unintentional Injury Deaths by Cause, Foothills West Study Area and State of Alaska, 2007 to 2009

Cause of Death	Fairbanks North Star Borough		North Slope Borough		Southeast Fairbanks Census Area		Yukon-Koyukuk Census Area		State of Alaska	
	Number of Deaths	Age-adjusted Rate[a]	Number of Deaths	Age-adjusted Rate[a]	Number of Deaths	Age-adjusted Rate[a]	Number of Deaths	Age-adjusted Rate[a]	Number of Deaths	Age-adjusted Rate[a]
Unintentional Injuries	**106**	**48.0**	**16**	**129.1***	**10**	**49.7***	**20**	**138.4**	**1025**	**55.3**
Transport accidents	40	15.0	7	43.3*	5	**	6	39.4*	310	15.5
Motor vehicle accidents	39	14.7	7	43.3*	5	**	6	39.4*	263	13.2
Snowmachine[b]	4	**	5	**	1	**	6	39.4*	48	2.5
ATV[c]	3	**	2	**	0	0.0	1	**	21	1.0
Water transport	0	0.0	0	0.0	0	0.0	0	0.0	16	8*
Air transport	1	**	0	0.0	0	0.0	0	0.0	27	1.3
Other transport accidents	0	0.0	0	0.0	0	0.0	0	0.0	4	**
Nontransport accidents	66	33.0	9	85.8	5	**	14	99.0*	715	39.8
Falls	7	4.7	0	0.0	1	**	0	0.0	73	5.6
Accidental discharge of firearms	0	0.0	0	0.0	0	0.0	0	0.0	6	3*
Drowning and submersion	3	**	3	**	1	**	4	**	73	3.6
Smoke, fire and flame	2	**	0	0.0	0	0.0	2	**	39	1.9
Poisoning	33	12.4	3	**	2	**	2	**	348	16.9

Source: ADHSS BVS January 2012
[a] Age-adjusted rates are per 100,000 U.S. year 2000 standard population
[b] Deaths to an operator or passenger related to the use of a snow machine
[c] Deaths to an operator or passenger related to the use of an ATV
* Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution
**Rates based on fewer than 6 occurrences are not reported

Figure 28. Unintentional Fatal Accidents and Injuries in the Study Area, Percent of Total, 2001-2010

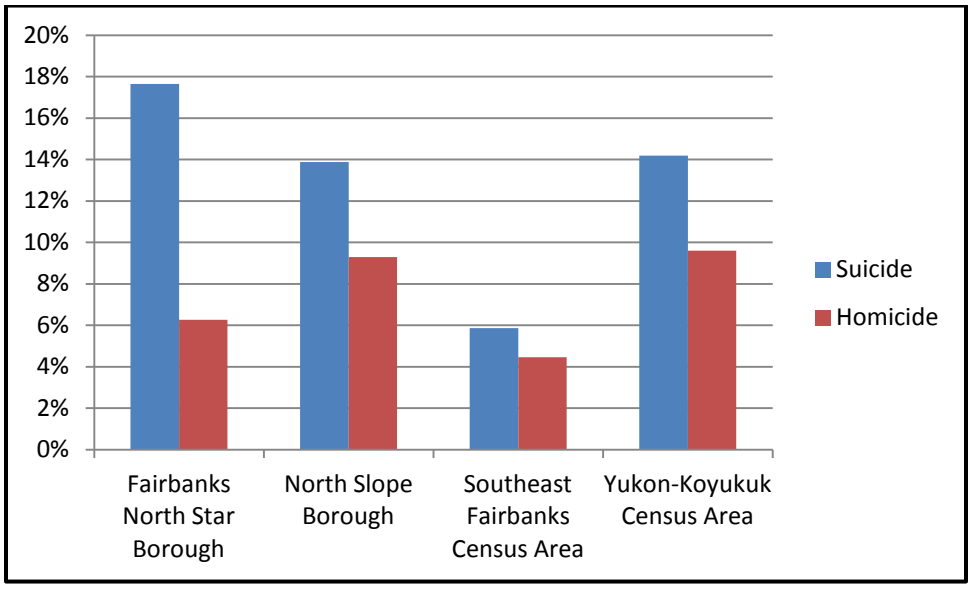


ADHSS BVS January 2012

6.2.3 Intentional Fatal Injuries

The following figure shows the percent of total deaths in the study area caused by suicide and homicide. The percent of total deaths from suicide is much higher in Fairbanks North Star Borough.

Figure 29. Intentional Fatal Injuries in the Study Area, Percent of Total, 2001 to 2010



ADHSS BVS January 2012

6.2.4 Accidents and Injuries among Alaska Natives

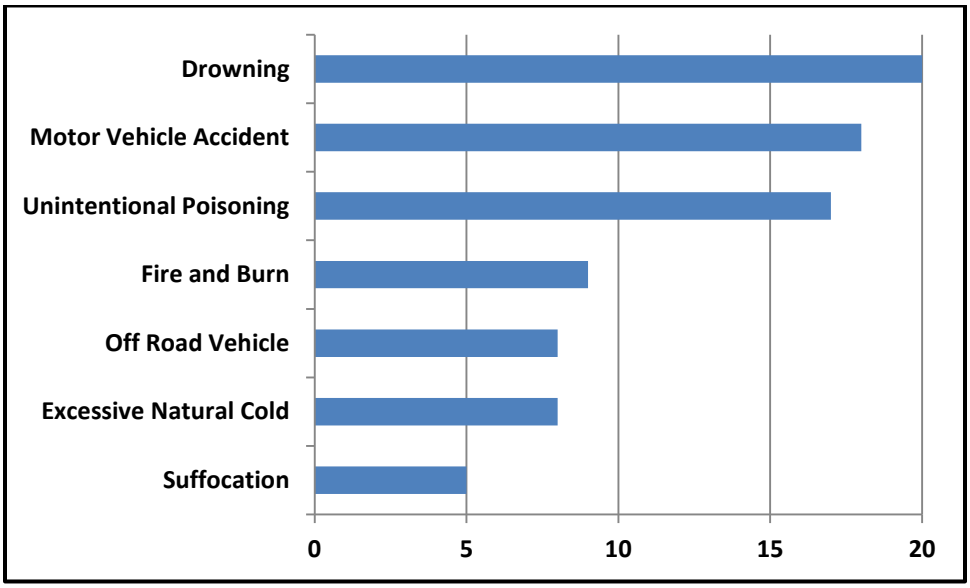
Non-fatal Injuries among Alaska Natives

Falls, suicide attempts, and assaults were the most common causes of injury hospitalization for all Alaska Natives. The rate for Alaska Natives living in the Interior Region was similar to the rate for all Alaska Natives.

Fatal Injuries among Alaska Natives

The average annual age-adjusted unintentional injury death rate among Alaska Natives from 2004 to 2007 is presented in . The rate for Alaska Natives living in the Interior Region is among the highest in the state at 119.2 deaths per 100,000population. This rate is twice as high as for Alaska whites (which was similar to the rate in the Arctic Slope Region) and almost 3 times as high as for U.S. whites.

Figure 30. Unintentional Injury Deaths among Alaska Natives by Cause, Interior Region, 1999-2005

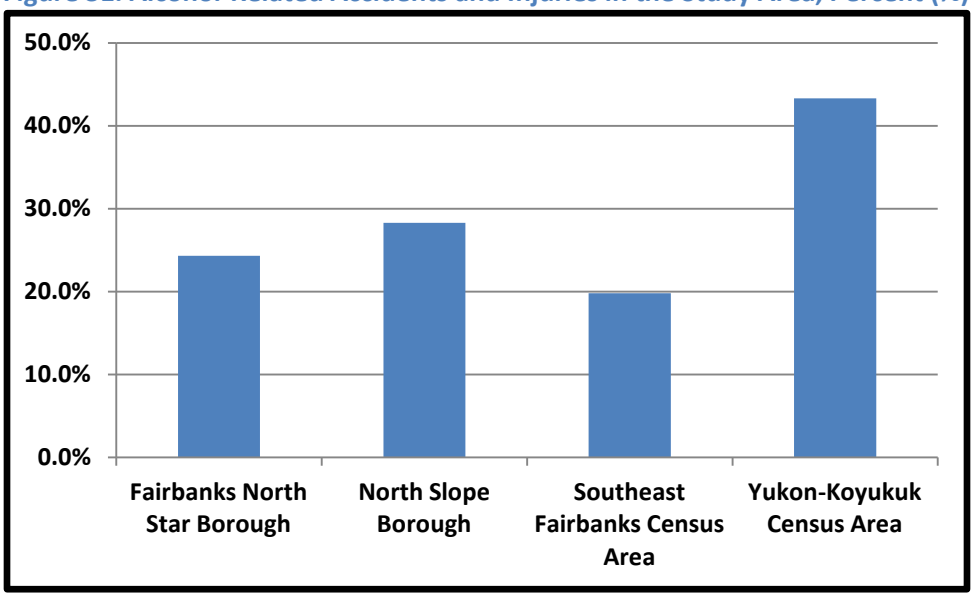


Source: AN EpiCenter August 2009

6.2.5 Alcohol Related Accidents and Injuries

Alcohol consumption and injury death are strongly related as described in Section 5.2.4. shows the percentage of all accidents and injuries that were alcohol related in the study area from 2001 to 2010, indicating a major issue for residents of the Yukon Koyukuk Census Area.

Figure 31. Alcohol-Related Accidents and Injuries in the Study Area, Percent (%) of Total, 2001 to 2010



Source: Alaska Trauma Registry

6.2.6 Traffic and Accidents

Motor vehicles, airplanes, boats and barges, snowmachines, and all-terrain vehicles are common modes of transportation in the area. Pedestrian and motor vehicle injuries are included in the fatal and non-fatal injury figures above. Motor vehicle accidents accounted for 1,472 of the total accidents from 2001 to 2010, or 22% (ADHSS ATR 2012).

Resource Report #5 (APP December 2011) estimates that during the construction phase of the Project, billions of dollars will transported to the Project sites. Transportation routes would be affected by the following:

- The Project would ship the majority of equipment using oceangoing ships and barges to Alaska through ports in the Gulf of Alaska. Once the material and equipment arrives in Alaska, it would be transported by rail and truck to specific predetermined storage areas.
- During early construction of the GTP, approximately 270 construction personnel would be housed at available hotels and contractor-owned facilities in Deadhorse. Staff would commute daily to the GTP work locations via contractor-provided bus service and typical construction crew cab trucks.
- Potable water for the camps would be both trucked in and sourced from on-site wells.

During construction phase highways and access roads would be used to transport equipment, material, pipe and personnel to the right-of-way, compressor stations, borrow sites, and GTP site, and other locations. No road improvements are expected to be required for major public roads that would be used during Project construction. Project construction would result in substantial truck and vehicle movements on certain highways and roads in the state, resulting in increased maintenance and repair costs for the state and local governments.

The affected transportation corridors, and corresponding ranges of equivalent single-axle loads (ESALs) in thousands, would include (Table 60):

Table 59. Equivalent Single-Axle Loads (ESALs) Ranges for Highways in the Study Area, 2009

	Parks HWY	Elliott HWY	Richardson HWY	Steese HWY	Alaska HWY	Tok Cutoff	Dalton HWY
Fairbanks North Star Borough	216.6-309.5	58.2	242.3	104.4-717.5	-	-	-
Southeast Fairbanks Census Area	-	-	64.9-285.2	-	14.2-53.8	21.1-87.0	-
Yukon-Koyukuk Census Area	75.7	22.6	-	-	-	-	38.4-40.4

Source: APP 2011 (Resource Report #5)

The ESALs are figured using the 2009 ADOTPF Annual Traffic Volume Reports for the Northern, Central, and Southeastern Region estimates of average traffic flow and vehicle composition. The range of ESALS at specific points along affected highways, as shown above, represent then, the resulting wear and tear the highway experiences on an annual basis. ESALs are directly related to traffic volume and composition. Higher traffic volume and a higher portion of trucks results in greater road-wear.

It is estimated that approximately 2.1 million ESALs would be applied to Alaska highways over a four-year period as a result of the Project. The fleet of support vehicles required would add an additional 250,000 ESALs during the construction phase (APP December 2011).

The following table lists areas that may experience transportation effects (). It is also likely that airports/airstrips throughout Alaska will see impacts from the Project; a list of these airstrips is included in .

Table 60. Alaska Cities, Census-Designated Places, and Alaska Native Village Statistical Areas Along Highways and Railway Lines That May Experience Transportation Effects[a]

Dalton Highway	**Richardson Highway**	**Klondike Highway**
Deadhorse	Paxson	Skagway City/Skagway ANVSA
Wiseman	Gulkana CDP/Gulkana ANVSA	**Parks Highway**
Coldfoot	Glennallen	Ester
Elliott Highway	Tazlina CDP/Tazlina ANVSA	Nenana
Livengood	Copper Center CDP/Copper Center ANVSA	Anderson
Fox	Valdez	Healy
Alaska Highway	**Tok Cutoff**	McKinley Park
Fairbanks	Gakona CDP/Gakona ANVSA	Cantwell
North Pole	Chistochina CDP/Chistochina ANVSA	Talkeetna (rail)
Big Delta	Slana	Willow
Delta Junction	Mentasta Lake CDP/Mentasta Lake ANVSA	Houston

Dry Creek	**Glenn Highway**	Big Lake
Dot Lake CDP/Dot Lake ANVSA	Sutton	Knik-Fairview
Tanacross	Palmer	Wasilla
Tok	Eklutna	**Seward Highway**
Tetlin	Eagle River	Girdwood
Northway Junction	Anchorage	Whittier
Northway	Chickaloon	Moose Pass
Alcan		**Haines Highway**
		Haines
		Klukwan

Source: APP December 2011 (Resource Report #5)
[a] A city/CDP and the corresponding ANVSA are listed separately only if the populations of the two geographical units
Notes: ANVSA - Alaska Native Village Statistical Area; CDP - Census-Designated Place

Table 61. Alaska Airstrips That May Experience Transportation Impacts

Borough or Census Area	Airport
North Slope Borough	Badami
North Slope Borough	Deadhorse Airfield
North Slope Borough	Franklin Bluffs Airfield
North Slope Borough	Happy Valley Airfield
North Slope Borough	Galbraith Lake Airport
Yukon-Koyukuk census area	Chandalar Airfield
Yukon-Koyukuk census area	Dietrich Airport
Yukon-Koyukuk census area	Coldfoot Airfield
Yukon-Koyukuk census area	Old Man Camp Airfield
Yukon-Koyukuk census area	Five Mile Airport
Yukon-Koyukuk census area	Livengood Airfield
Fairbanks North Star Borough	Fairbanks International Airport
Southeast Fairbanks census area	Delta Junction Airfield
Municipality of Anchorage	Ted Stevens Anchorage International Airport
Valdez-Cordova census area	Whittier Airport
Valdez-Cordova census area	Valdez Airport
Kenai Peninsula Borough	Seward Airport
Southeast Fairbanks census area	Tanacross Airfield
Southeast Fairbanks census area	Tok Airport
Southeast Fairbanks census area	Tetlin Airfield
Southeast Fairbanks census area	Northway Airport

Skagway-Hoonah-Angoon census area	Skagway Airport
Municipality of Haines Borough	Haines Airport
Juneau city and Borough	Juneau International Airport

Source: Resource Report #5, FERC DOCKET NO. PF09-11-000

6.2.7 Law Enforcement

The Alaska State Troopers (AST) 2010 Annual Report provides details regarding the law enforcement in the area (ADPS AST 2010). The AST is a division of the Alaska Department of Public Safety. In addition to State Troopers, the VPSO program was established as a means of providing rural Alaskan communities with needed public safety services at the local level. In 2010, the program had 86 funded positions, 78 which were filled by the end of the year.

In the Interior, AST maintains posts in Fairbanks, Delta Junction, and Tok/Northway. According to the Annual Report, the Fairbanks post includes 4 Sergeants, 25 Troopers, and 2 Administrative Clerks. There is also a rural service unit that serves villages both on and off the road system, including Alatna, Allakaket, Arctic Village, Beaver, Bettles, Birch Creek, Central, Chalkyitsik, Chatanika, Chandalar, Circle, Coldfoot, Evansville, Eureka, Hughes, Fort Yukon, Livengood, Manley Hot Springs, Minto, Rampart, Stevens Village, Venetie, and Wiseman. The rural post includes 1 Sergeant and 3 Troopers. The Delta Junction Post has 1 Sergeant, 4 Troopers, and 1 Dispatcher. The Tok/Northway Post has 1 Sergeant, 3 Troopers in Tok, 1 Trooper in Northway, and 2 Radio Dispatchers.

The Alaska State Troopers Annual Report (ADPS AST 2010) describes Detachment D, which has the most employees of the 5 detachments that make up the Alaska State Troopers with 70 total employees divided into 29 non-commissioned civilians and 50 commissioned troopers.

> "The detachment covers most of Interior Alaska and stretches from the Canadian border in the east an area between the villages of Unalakleet and Kaltag in the west, to Atigun Pass in the north down to milepost 147 of the Parks Highway in the south. Over 111,131 people, or roughly one in every six Alaskans, live, work, travel, or recreate daily within the boundaries of D Detachment. There are eight different trooper posts in the detachment located in Fairbanks, Galena, Nenana, Healy, Cantwell, Delta Junction, Tok, and Northway. Of the 18 Village Public Safety Officer positions within the detachment, only five – Arctic Village, Beaver, Eagle, Huslia, and Tanana – were filled in 2010. Most of the detachment VPSO positions are supervised by the Roving Rural Unit out of the Fairbanks post. D Detachment encompasses approximately 170,575 square miles or roughly one-fourth of the area of the entire state – an area slightly larger than the entire state of California (163,700 square miles). D Detachment includes the Fairbanks North Star Borough and the City of Fairbanks, which is the hub for the economic, medical, and governmental services of dozens of villages and thousands of Alaska natives.
>
> D Detachment plays a key role in the national security of the United States with four military installations (Fort Wainwright, Fort Greely, Eielson Air Force Base, and Clear Air Force Station) located within its boundaries. It is also important to the economic vitality of the state and nation because the detachment is home to hundreds of miles of the Trans-Alaska Pipeline, its pump stations and an oil refinery, highways critical to the state's infrastructure, and the Alaska Railroad. The two largest gold mines in the state –

> Fort Knox and Pogo – are also located within detachment boundaries. The only road access to the oil fields in Prudhoe Bay runs through the detachment."(ADPS AST 2010)

The Fairbanks Patrol Post (1 of 8 posts in the Detachment and in Interior Alaska) has 4 Sergeants, 25 Troopers, 2 administrative clerks, and 3 building maintenance personnel.

The Fairbanks Police Department services the City of Fairbanks and partners with Alaska State Troopers, Department of Defense, and other agencies to service the immediate surrounding areas. The FPD consists of 2 divisions: patrol and investigations. The patrol division oversees the traffic enforcement and highway safety unit and the investigations division oversees property, major crimes, evidence, and the interagency drug investigations units. There are over 38 officers assigned to the patrol division alone (Fairbanks Police Department Annual Report 2008).

The Fairbanks Police Department provides statistics on traffic enforcement and highway safety, major crime and property crime, drug enforcement, and the uniform crime report. Fairbanks Police Department Annual Report 2008 reports the following statistics from January 1 through December 31, 2008:

Traffic Enforcement and Highway

- Exceeding posted speed limits – (600)
- Fail to carry proof of insurance – (550)
- No seat belt – driver – (467)
- Stop sign violations – (341)
- Expired registration – (292)
- Minor Consuming – (271)
- Red Light violations – (267)
- Window Tint – (141)
- Basic speed – (127)
- Failure to exercise due care – (120)

Additionally, FPD handled another 4,759 traffic related calls, resulting in an arrest, report or possibly no action taken by FPD. Some of these traffic related calls include; (108) Auto Thefts, (897) DUI reports of which (313) resulted in arrests, (118) Reckless driving complaints, and numerous other general traffic complaints. FPD also responded to 1,401 traffic collisions that included (898) damage only, (124) injury, and (379) "hit and run" reports.

Major Crime Investigation

- Resolving a 2007 case involving a 21 month old child which resulted in a Murder II charge.
- Investigating a five year long Sexual Abuse of a Minor case which resulted in 29 counts of SAM I against the suspect.
- Arrested subject for Murder (blunt force trauma) after a body was discovered in an apartment complex.
- Arrested subject for 91 counts of Possession and Distribution of Child Pornography.
- Arrested two males in separate cases involving sexual abuse against their daughters which resulted in dozens of charges for SAM I and II.

Property Crime Investigation

During a shortened year, Property Crime addressed 90 cases with a value of $388,754.00. A total of 48 cases were cleared through investigations and $275,141.00 was recovered through investigation and pending prosecutions.

- Successful recovery of stolen firearms from local pawnshop and charges of theft against two suspects.
- Resolved 2007 and 2008 cases involving credit card frauds that also led to involvement with other agencies.
- Arrested subject for over $50,000 theft during an embezzlement investigation.
- Arrested subject on numerous charges wanted for forging prescriptions, falsifying documents, and theft in Alaska and another state.
- Continued investigation on Fraudulent Use of Access Device involving nearly $50,000 in charges in which the suspect was identified and being charged.

Drug Cases

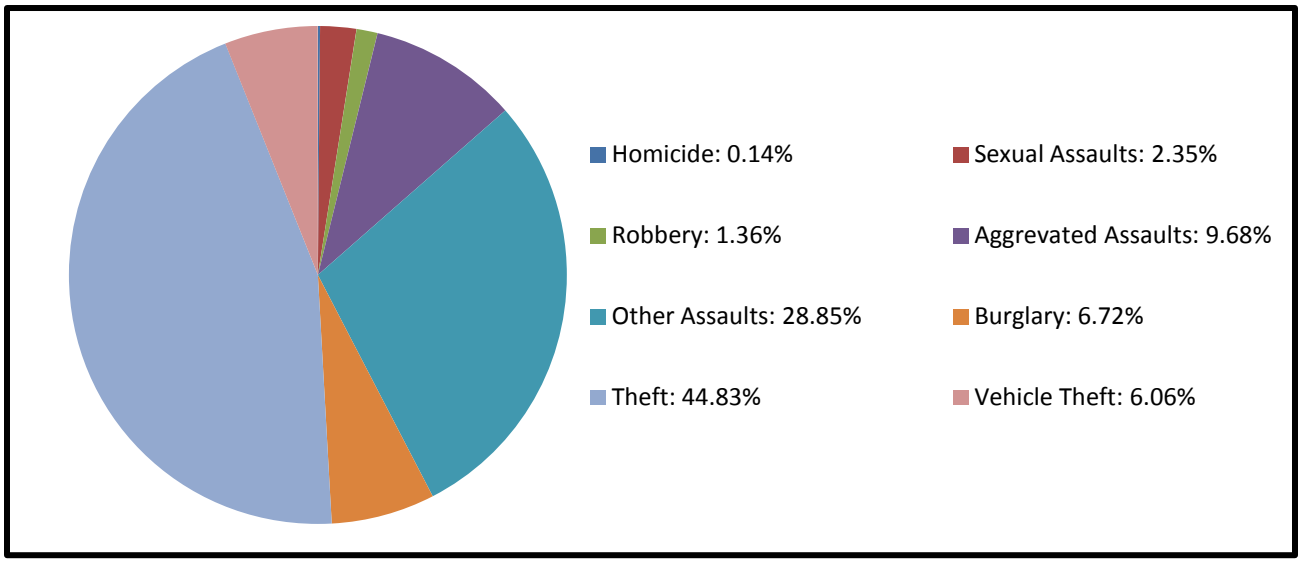
- 874 drug cases initiated
- 96 search warrants obtained/ served
- 3 meth labs eradicated
- 31 marijuana grows eradicated
- 13 drug presentations

Table 62. Crime Statistics, Fairbanks: January 1st through December 31st, 2008

	2002	2003	2004	2005	2006	2007	Previous 5 years average (2003-2007)	2008
Homicide	2	4	2	3	1	5	3	3
Sexual Assault	45	48	54	56	68	42	53.6	50
Robbery	35	41	45	69	47	42	48.8	29
Aggravated Assaults	216	245	152	195	154	179	185	206
Other Assaults	1678	1597	1394	1260	770	744	1153	624
Burglary	233	268	230	243	306	248	259	143
Theft	999	1163	1133	1263	1285	987	1166	954
Vehicle Theft	136	136	153	224	165	164	168	129
Total UCR Index Crimes	3344	3502	3163	3313	2796	2411	3037	2138

Source: Fairbanks Police Department Annual Report 2008

Figure 32. Crime Statistics, Percent of Total, Fairbanks, 2008



Source: Fairbanks Police Department Annual Report 2008

6.2.8 Dry/Wet/Damp Community

Title 4 is the Alaska state law that deals with the regulation, control and distribution of alcoholic beverages throughout the state. This law includes provisions that allow for local options (AS 04.11.491), which determine whether the sale, importation or possession of alcohol is allowed in the community. Many Alaskan Native villages have enacted policies that designate a community as "dry" (alcohol sale and importation prohibited) or "damp" (sale of alcohol illegal, but importation allowed). As of June 2011, the sale of alcohol is not allowed in any NSB communities (ADPS ABC 2011).

As of June 2011, Tanacross, and Tetlin have adopted local option laws to regulate the sale of alcohol (ADPs ABC 2011). The sale of alcohol is permitted in the study area communities, with the exception of those in the NSB.

6.2.9 Summary

Areas of Vulnerability

- Accidents and injuries were among the leading causes of death in the Alaska Mainline Pipeline Study Area between 2007 and 2009. The most common causes of unintentional injury deaths among all residents were:
  - Poisoning (typically caused by alcohol ingestion),
  - Motor vehicle accidents (the majority of which are snow machine accidents), and
  - Drowning and submersion.
- Alcohol was involved in up to 42% of all accidents and injuries, especially among residents of the Yukon Koyukuk Census Area.

Areas of Resilience/Success

- None identified

6.2.10 Data Gaps

- Updated accident and injury data from the Alaska Trauma Registry (2009 to 2011)
- Traffic and accident datasets for the Dalton and Alaska Highways, particularly heavy truck traffic

6.3 HEC 3: Exposure to Potentially Hazardous Materials

6.3.1 Physical Hazards

There are no readily available data on illnesses related to physical hazards such as radiation, noise, vibration, light, or wildlife interactions.

6.3.2 Air Quality

In 1970, Congress created the Environmental Protection Agency (EPA) and passed the Clean Air Act, granting the federal government authority to regulate air quality. Since then, EPA and states, tribes, local governments, industry, and environmental groups have worked to establish a variety of programs to reduce air pollution levels across the country and in Alaska.

The Division of Air Quality, Air Monitoring & Quality Assurance Program within the ADEC operates and oversees air quality monitoring networks throughout Alaska. In particular, they assess compliance with the National Ambient Air Quality Standards (NAAQS) for carbon monoxide, particulates, nitrogen dioxide, sulfur oxide, and lead. ADEC also maintains several Emissions Inventories as described below.

2009 Alaska Wildfire Emissions Inventory

ADEC is also responsible for statewide fire data surveillance and for preparing the annual Alaska Enhanced Smoke Management Plan emission inventory reports. These reports summarize: fire type, start and end dates, locations, and acreages using data provided by the Division of Forestry. Emission factors (tons of pollutant per acre) are used for the various vegetation types with the Division of Forestry data to estimate emissions (MACTEC 2011). The complete report describing the 2009 Alaska Wildfire Emissions Inventory can be accessed online at: http://fire.ak.blm.gov/content/admin/awfcg_committees/Air_Quality_and_Smoke_Management/6_2009AK_WF_EI_rpt_050411.pdf.

ADEC Point Source Inventory

ADEC is required by Federal Regulations 40 CFR 51.321 to submit a statewide point-source emission inventory to the EPA every three years. ADEC requires individual facilities to provide detailed process-level emissions for criteria pollutants and information regarding stack characteristics and location. The ADEC point source inventory can be accessed online at: https://myalaska.state.ak.us/dec/air/airtoolsweb/EmissionInventory.aspx.

EPA National Emission Inventory (NEI)

The NEI is principally based upon emission estimates and emission model inputs provided by state, local, and tribal air agencies, supplemented by EPA generated data. The NEI is developed on a 3-year cycle, with the current version based on 2008 data and commonly referred to as the NEI2008. The majority of the NEI2008 point source inventory is based on data provided directly from the ADEC point source

inventory described above. Other NEI2008 inventory sectors (onroad mobile, nonroad mobile, and area sources) are based on data, methods, and models that were developed primarily for use in the lower 48 states and may not be entirely representative of the conditions in the North Slope Borough. Additional information about the NEI and NEI2008 can be found online at: http://www.epa.gov/ttn/chief/net/2008inventory.html#inventorydoc.

Alaska Rural Communities Emission Inventory

The NEI2008 for non-point sectors may not accurately estimate emissions in Alaska, especially in rural areas. ADEC and Sierra Research, Inc. developed, onroad, and nonroad emission inventories representative of rural areas in Alaska for the calendar year 2005 (Sierra Research 2007). The full report that describes the Alaska Rural Communities Emission Inventory can be accessed online at: http://www.epa.gov/region10/pdf/tribal/wrap_alaska_communities_final_report.pdf.

Rural PACs reporting dust complaints to ADEC include: Barrow, McGrath, Nuiqsut, Nenana, Steven's Village, Tetlin, Tok, and Tanacross. Of these, ADEC only has monitoring data for Steven's Village. A map of dust complaints reported to ADEC throughout rural Alaska can be found at: http://dec.alaska.gov/air/anpms/Dust/Dust_docs/web%20map%2012-2011%20(2).pdf.

In 2010 an ADEC rural dust survey distributed among 250 villages (response rate 33%), most respondents reported that some residents of their communities were highly affected by dust releases. The most frequently reported community health effects were irritation of eyes, nose, and throat (72% of responses); asthma (72% of responses); coughing (68% of responses); chronic bronchitis (56% of responses); shortness of breath (50% of responses); emphysema (48% of responses); and tightness of the chest (44% of responses). More dusty days occur in June, July, and August, with averages above 20 days each month. For May, September, and October, 13-19 dusty days per month is typical. The fewest dusty days occur in winter, an average of 19 dusty days during the six month period from November through April. Dust seasons vary somewhat among different regions of Alaska.

Specific information available on air quality in the PACs is available for ADEC air monitoring stations in Fairbanks, North Pole Wasilla, and Anchorage (https://fortress.wa.gov/ecy/aaqm/Default.htm). In Fairbanks there are air quality alerts for unhealthy levels of particulate matter (PM) throughout the winter months. The EPA began regulating PM 2.5 in 1997. Particulate matter (including PM 2.5 and PM 10) is one of six criteria pollutants for which EPA has set science/health-based limits. EPA initially set the 24-hour limit for PM 2.5 at 65 micrograms per cubic meter and the annual limit at 15 ug/m3. Effective December 2006, EPA reduced the 24-hour limit to 35 ug/m3. Fairbanks was in compliance under the initial rule, however the city came out of compliance with the new, stricter limit for the 24-hour period. The limit applies to the three-year average of the 98th percentile of 24-hour average values, which for Fairbanks was 43 ug/m3 over the years 2004-2006. The EPA process required the state to delineate the nonattainment (i.e. noncompliant) which disagreed with the EPA's larger, proposed area. In response, the state proposed a compromise, and the boundary was ultimately set somewhere between the 2 initial proposals (http://dec.alaska.gov/air/doc/FNSB_PM2-5_NA_map_jan09.pdf). The nonattainment area includes most of the dwellings in and around Fairbanks; Fort Wainwright; and North Pole, but not Eielson Air Force base and rural areas (originally included in the EPA nonattainment area). While the borough currently controls mitigation measures, ADEC is responsible for filing a State Implementation Plan explaining how the Fairbanks area will come into compliance. Fairbanks is required to reach compliance for PM 2.5 by December 2014, although it can apply for one-year extensions from the EPA

for another 5 years, through December 2019 (City of Fairbanks site on PM 2.5 issue: http://www.aqfairbanks.com/

6.3.3 Water Quality

Below are descriptions of water quality violations in specific communities in the Alaska Mainline Pipeline Study Area

Fairbanks*:* In Fairbanks, 70 miles of Goldstream Creek was Section 303(d) listed in 1992 for non-attainment of the turbidity standard. The total area of impairment is approximately 13 miles. Approximately 15 miles of the Chena Slough was Section 303(d) listed in 1994 for non-attainment of the petroleum hydrocarbons and oils and grease and of sediment standards. Suspected sources are nonpoint resulting from the surface water runoff, road construction, site clearing, and dewatering activities from gravel operations. Thirteen miles of the Chena River was Section 303(d) listed in 1990 for turbidity, petroleum hydrocarbons and oils and grease and for sediment. The identified pollutant source is urban runoff. A total area of 7 miles of the Noyes Slough was placed on the 1994 Section 303(d) list for debris. Noyes Slough remains on the Section 303(d) list of impaired waters for petroleum hydrocarbons and sediment standards.

Garrison Slough was placed on the 1996 Section 303(d) list for polychlorinated biphenyls (PCBs). Sediment and fish samples from the slough contained elevated levels of PCBs. The source of the PCBs was traced to a drainage ditch. Eielson Air Force Base vacuum dredged and removed most of the upper 18 to 24 inches of soil in the drainage ditch leading into Garrison Slough. Engineering controls were initiated to prevent fish from entering the slough.

6.3.4 Pre-existing Environmental Hazardous Materials

Section 5.3.4 described the issues surrounding pre-existing environmental hazardous materials and the ADEC, Division of Spill Response and Prevention database on the presence and nature of existing contaminated sites in the potentially affected communities (http://dec.alaska.gov/applications/spar/CSPSearch/default.asp).

Existing Contaminated Sites

Fairbanks*.* There are 158 open contaminated sites listed in Fairbanks, including 2 EPA Superfund sites. Eielson Air Force Base, was established in 1944 to provide tactical support to the Alaskan Air Command. Eielson contains closed and active unlined landfills extending into ground water, shallow trenches where weathered tank sludge was buried, a drum storage area, and other disposal or spill areas. Eielson Air Force Base is participating in the Installation Restoration Program (IRP), established in 1978. Under this program, the Department of Defense seeks to identify, investigate, and clean up contamination from hazardous materials. IRP tests found lead, arsenic, chromium, copper, nickel, and zinc in soil in the drum storage area, as well as trans-1,2-dichloroethylene above the Federal primary drinking water standard in shallow on-site monitoring wells. An estimated 9,000 people obtain drinking water from wells within 3 miles of hazardous substances on the base. Surface water within 3 miles downslope of hazardous substances at the base is used for fishing. The base is in the floodplain of the Tanana River. Remediation activities occurred during the 1990's at many of the contaminated sites on Eielson AFB. Petroleum-contaminated soil was excavated and treated by land farming. Soil caps were installed to prevent human exposure to contamination and limit the transport of contamination. Other sites had active remediation systems installed such as soil vapor extraction, bioventing, and free-product recovery wells.

At Garrison Slough near the base, PCB contamination has impacted the sediments and fish. A portion of the PCB-contaminated sediment has been excavated, and PCB contamination in fish tissue and sediment continue to be monitored. A fishing restriction is in place for Garrison Slough and physical fish gates restrict the passage of fish into and out of the contaminated area. Currently, most of the sites at the base are in a long-term monitoring program to ensure contaminant plumes are stable or decreasing and are not moving offsite or to drinking water wells. Several sites are still being treated by active remediation systems.

Another Superfund site, Fort Wainright, was initially established in 1939 as Ladd Field and served as an Army cold weather station to test aircraft under arctic conditions. The facility was a strategic part of military efforts during World War II from 1942 until 1945. Construction of a 54-acre housing project known as Taku Gardens began in 2005 to provide housing for new personnel and their families. In June 2005, construction workers noticed stained soil and unusual odors during excavation of a building foundation. Laboratory testing of this soil confirmed the presence of PCBs (polychlorinated biphenyls), with concentrations as high as 115,000 milligrams per kilogram (mg/kg). (Alaska's current cleanup standard is 1 mg/kg). Further investigation found that the area had been used for salvage operations and disposal of munitions and explosives. Volatile and semi-volatile organic compounds; chlorinated compounds including solvents, herbicides, pesticides, and dioxin/furans; heavy metals such as lead; and munitions-related compounds such as nitroaromatics and propellants were found. Remediation is mostly complete, but monitoring continues with access to and use of the area restricted.

In 2001, the Fairbanks Areawide Industrial Reclamation (FAIR) project began as a pilot-scale study to investigate the potential for managing contaminated sites on an area wide basis. This approach has allowed the CS Program to address contamination at multiple sites as a whole instead of as individual sites. The FAIR area is located in the midst of an industrial portion of downtown Fairbanks. The area was used in the 1970s at the beginning of the build-up of industry for the pipeline. The Alaska Railroad Corporation (ARRC) owns most of the property that has been divided in lots and leased to a number of tenants over the years. Historic petroleum contamination exists from a number of sources, possibly including four tank farms that leased ARRC property: Van Gas, Willlners Texaco, Saupe's Chevron, and Unocal. Work to characterize and monitor the extent of the contamination in the FAIR area is ongoing. Exposure pathways continue to be evaluated through sampling of groundwater, soil, and soil gas.

At the Fairbanks International Airport, groundwater contamination is the result of surface and subsurface spills of petroleum products such as diesel fuel, aviation gas, lubricants, and chlorinated solvents. Sampling indicated that groundwater contamination has migrated from some of the airport lease lots to several adjacent private properties. As a result, 1 property has been connected to the community water service, and a treatment system has been installed on at least 1 drinking water well.

Decades of commercial/industrial use in the area of Gaffney Road, in the City of Fairbanks, has resulted in multiple areas of soil contamination and area-wide groundwater contamination by chlorinated hydrocarbons, primarily tetrachloroethylene (PCE) and its daughter products - trichloroethylene and the dichloroethylenes. There appear to be 3 potential sources, associated with 2 historical dry cleaning operations and the sanitary sewer lines in the area. The wooden sewer lines may have received contaminants and subsequently distributed them to downstream areas through failures in the line, regular leakage, or vapor migration across the pipe into the surrounding soil and water. While the contamination has not impacted drinking water in the area, there is concern regarding vapor intrusion at several businesses in the area. Dry cleaning operations have caused groundwater contamination in other areas of the city as well. Real estate environmental assessments in 2001 and 2002 revealed soil

and groundwater contamination from dry cleaning solvents in the Wendell Avenue and Griffin Park area. Based on the vapor intrusion assessments at 3 buildings in January and May 2008 and the historical data, ADEC has determined an area wide release investigation is warranted for Wendell Avenue. In addition to continuing to evaluate the possibility of vapor intrusion in the area, ADEC will also investigate the potential for contamination to enter the Chena River. This investigation will evaluate all potential sources of the chlorinated solvent contamination in the Wendell Avenue Area, defined by Noble St to the west, Hall St to the East, 1st Avenue to the south, and the Chena River to the north.

There are 64 active Leaking Underground Storage Tank (LUST) sites in Fairbanks. The majority are associated with current or former fuel retail stations and airports; contaminants of concern include BTEX, GRO and DRO. Most of these sites are in various stages of remediation.

At the former Lucky Sourdough gasoline service station 2 1000-gallon underground storage tanks (UST's) have leaked GRO and BTEX into soil and groundwater. Remediation is mostly complete and long term monitoring is underway. At a former fuel station there are underground storage tanks that have leaked petroleum-based compounds and other chemicals into groundwater and there is concern for the potential of the plume to migrate into neighboring drinking water wells creating health hazard for people of Moose Creek.

At Woodriver Elementary, University Park Elementary, Weller Elementary, Howard Luke Academy / Effie Kokrine Charter School, Tanana Middle School, Pearl Creek Elementary, and Joy Elementary PAH contamination of soils was found when removing an underground storage tank for heating oil. Soils were subsequently removed.

There is a Superfund site located at a surplus/salvage operation (Arctic Surplus) that served as a military bunker from 1957 to 1961. Drums of malathion were found in a filled pit along with other miscellaneous waste. BTEX and chlorinated solvents were found in soil and groundwater. For both residential and monitoring wells, trichloroethylene (TCE, a chlorinated solvent) was detected in 51 wells, trichloroethane (TCA) in 40 wells, and benzene was detected in 19 wells. TCE was at or above the MCL in 17 residential wells (an additional two business wells were above MCL), and benzene above MCL in 4 residential wells. Trichloroethylene was detected in 3 off-site drinking wells above ADEC MCLs. This site was close with institutional controls in place in 2006.

North Pole. There are 43 open contaminated sites listed in the ADEC database for the community of North Pole. Petroleum components are the contaminants of concerns at almost all of these sites. At milepost 6 New Richardson Highway, there is contamination associated with a historical Anti-Aircraft Artillery complex active in the late 1940s and early 1950s. There is area-wide contamination with chlorinated solvents in soil and groundwater. There are several other much smaller areas where the soil is contaminated with petroleum products. At Six Mile Village, a gasoline release of unknown origin contaminated the soil and groundwater. The groundwater contaminant (benzene) plume extended off site for approximately 1200 feet and impacted several residential wells in the subdivision. The benzene plume co-mingled with the area-wide chlorinated solvent groundwater plume. Remediation is still underway.

Flint Hills Refinery (FHR) in North Pole was documented to have contaminated private drinking water wells after a plume of sulfolane (a chemical used in the refining process) migrated off site and was detected in 2009. Impacted residents have been provided with bottles drinking water and, in some cases, hooked to the municipal system. Other contaminants of concern include: benzene, toluene,

ethylbenzene, xylene (total), 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, naphthalene, 2-methyl-naphthalene in soil and benzene, toluene, and 1,2,4-trimethylbenzene in groundwater. In addition, land leased to the GVEA North Pole Power Plant by FHR contains contamination from a decommissioned tank farm previously owned by Mapco. DRO impacted soils were found but impact to groundwater is unknown. A Class C water well is on site. When the refinery was operated by Williams, pipeline failure in 3 locations released heavy atmospheric gaseous oil (HAGO) beyond secondary containment. There is also a record of a 300 gallon gasoline spill and a release of 725 gallons of ethylene glycol.

Just down gradient from Flint Hills Refinery, an unknown quantity of petroleum product leaked to the soil and groundwater over a period of time in the mid-1980s from the Petro Star Refinery, impacting drinking water. Extent of contamination and health impact are unknown and the site is currently under investigation.

There are 12 active LUST sites in North Pole. Most are associated with current or former fuel retail stations; contaminants of concern include BTEX, GRO and DRO. The majority of these sites are in various stages of remediation. At a retail fuel station on Badger Road, there is extensive contamination of soils as well as on and offsite groundwater with GRO, DRO, and BTEX. A soil vapor extraction system has been in place since 2003 and monitoring continues.

The Moose Creek General store operated a fuel station until 1993. In 1990 a resident of Moose Creek complained of a petroleum smell in the drinking water and subsequent testing confirmed petroleum contamination levels well above the State of Alaska limits. Extensive impacts to the groundwater have been identified both on and off-site, and drinking water wells were identified as impacted by petroleum contamination. New domestic drinking water wells were installed to replace those impacted by the petroleum contamination.

The summer of 2011, underground fuel storage tanks were removed at Badger Road Elementary, Ticasuk Brown Elementary, and the North Pole Middle and High Schools in order to install new tanks. PAH contamination of soils was found at all sites. The soils have been removed; however, DRO, benzene, and PAHs were measured in groundwater above DEC cleanup levels at Badger Road Elementary.

At the Henson Subdivision on Dennis Road approximately 35 barrels of what appeared to be waste oil was abandoned at the site. The site has history of waste water and drinking water violations. The extent of contamination and the potential threat to human health have not been characterized.

Approximately 1/4 of all open contaminated sites in North Pole occur at private residences where home heating oil has been released from compromised storage tanks. In most cases, contaminated soil was removed and groundwater was not impacted. At one private residence drums were found buried on the property, and soil testing revealed the presence of arochlor 1254, pentachlorophenol, arsenic, and methylene chloride above ADEC maximum contaminant levels (MCLs).

At the site of a former methamphetamine lab on Joy Drive, an estimated 30-gallon used oil spill was found floating on a large water puddle in the area. Sampling confirmed petroleum hydrocarbons. At the site of a surplus/salvage yard, soil was contaminated with PCBs and a variety of pesticides. In nearby Clear Creek; acetone, methyl ethyl ketone, and toluene were detected.

Northway, Dot Lake, Tanacross, Tetlin, Delta Junction, Tok. There are open contaminated sites in Northway, Dot Lake, Tanacross, Tetlin, Delta Junction, and Tok, associated with the former Haines-Fairbanks pipeline. The Haines-Fairbanks Pipeline was used by the U.S. Army from 1954 to 1973 to

transport petroleum products from the deep-water port of Haines to Fort Greely, Eielson Air Force Base, and Fort Wainwright, in Interior Alaska. The 8-inch pipeline extended 626 miles (300 miles in Canada and 326 miles in Alaska) from the Haines Terminal to the Fairbanks Terminal at Fort Wainwright. The pipeline route followed the Haines Highway to Haines Junction, Yukon Territory (Canada), then along the Alaska Highway to Delta Junction and along the Richardson Highway to Fort Wainwright near Fairbanks. Pumping stations, supporting terminal bulk storage tanks and related facilities in Alaska were located in Haines, Lakeview, Tok, Sears Creek, Big Delta, Timber, Birch Lake, Eielson AFB, and Fort Wainwright. These pipelines often leaked and were sprayed with defoliants for aerial inspection and accessibility. By 1974 the pipeline was no longer in use.

In early 2001, the U.S. Army Corps of Engineers determined that portions of the Haines-Fairbanks pipeline were eligible for investigation and possible cleanup of petroleum contamination by the Formally Used Defense Sites (FUDS) Program. The contaminants of concern are the numerous petroleum constituents of gasoline, and possible dioxin or residual pesticides. Petroleum spills can cause groundwater contamination and the potential impact to drinking water wells. The main contaminant of concern in petroleum is benzene, a known carcinogen which typically migrates further than other gasoline constituents.

In late 2002, ADEC obtained the report "*Without Prejudice: Summary of the Non-Native Activities in the Klukshu Reserve Area and Their Impact on Traditional Life*," compiled by Champagne & Aishihik First Nations. This report contained copies of correspondence from the U.S. Army to Canadian officials stating that herbicides were used to defoliate the pipeline right-of-way in Alaska. One of those herbicides, Esteron Brush Killer, was a mixture of 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T). A similar mixture was used as a defoliant in Vietnam and known as “Agent Orange.” 2,4,5,-T was found to contain dioxin, and its use has since been banned in the United States.

Dioxin degrades slowly in the environment and is a suspected carcinogen. Dioxin is a general term used to describe about 75 chemically related compounds. Some of these compounds have been shown to cause cancer in animals and other harmful effects in people. Health effects on people and animals depend on how much dioxin they are exposed to, how it gets into their bodies, and how long they are exposed. The following link to the Agency for Toxic Substances and Disease Registry (ATSDR) provides more information on the health effects from exposure to dioxins or chlorinated dibenzo-p-dioxins (CDDs): http://www.atsdr.cdc.gov/tfacts104.html. The investigation of the pipeline in 2003 strove to determine if the use of herbicides resulted in levels of dioxin greater than those expected from these sources. Results of the joint investigation of dioxin indicated negligible levels of dioxin contamination in the soil. In the joint press release by the U.S. Army Corps of Engineers and ADEC, issued January 30, 2004, Army Corps project manager Rich Jackson announced, "Neither residual herbicides, nor herbicide-related dioxin were detected in any of the samples taken.” Dioxins were below state cleanup levels at all sampling locations. Here are specific findings of the report:

- The particular dioxin congener - 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) -that is associated with contaminated 2,4,5-T herbicide products (e.g. "Agent Orange") was not detected in any soil sample.
- General concentrations of dioxins were below Alaska's cleanup goal at all sampling locations, and within background levels at all but 7 of the 23 corridor sampling locations.

- The distribution of dioxin congeners in all samples closely resembles the distribution expected of dioxins formed during general combustion processes (e.g. campfires), and not what would be expected from dioxin-containing 2,4,5-T.
- No target herbicides (2,3-D; 2,4,5-T; picloram; or fenuron) were detected in any sample.
- The Corps' report notes that the sampling results do not prove or disprove whether herbicides with dioxin were ever applied along the Alaskan portions of the pipeline, they simply show that no trace of application can currently be detected in the areas sampled (http://dec.alaska.gov/spar/csp/sites/haines_fair_pipe.htm).

Northway. The majority of the contaminated sites associated with the Alaska Mainline Pipeline occur in Northway. In addition to the presence of contamination from the Haines-Fairbanks pipeline, there is contamination in Northway from the Northway Staging Field. The Northway Staging Field was an air base, which served as a refueling and maintenance stop along the string of air bases used to supply troops stationed in Alaska and transport planes to the Soviet Union as part of the lend-lease program. During World War II, the airport served as a refueling depot for aircraft and as a staging area for work on the Alaskan Highway, the Canadian Oil pipeline project, and a defense fuel pipeline. During the height of operations at Northway, hundreds of buildings were built, including aircraft hangars, warehouses, movie theaters, garages, warehouses, a sawmill, powerhouse, machine ship, and dozens of barracks. By the end of World War II the Army no longer used the site, and until 1966 the site was largely owned and operated by the Civil Aeronautics Administration (CAA) and then the Federal Aviation Administration (FAA). In 1966, the FAA transferred the right to use the lands and airport facilities to the State of Alaska.

Since that time the State leased the property to various leaseholders to provide lodging and refueling for planes. ADOT&PF applied to ADEC for an ADEC Brownfield Assessment in 2009 because of the suspected contamination due to the historical use of the site. During the 2009 investigation, significant soil and groundwater contamination was identified throughout the lease lots. Petroleum hydrocarbon-contaminated soil remains at the site with concentrations of GRO, DRO, and benzene above ADEC soil cleanup levels. Groundwater field screening and analytical samples indicated a wide-spread area of benzene contaminated ground water and smaller areas of TCE- and PCE-impacted groundwater.

Most of the sites in Northway associated with the pipeline and staging field were remediated and closed by 2004. Twenty-four (24) sites remain open today, mostly for monitoring petroleum plumes. Contamination in the area has had lasting effects. For example, an aircraft fueling station at the airstrip was acquired by the State of Alaska in 1971 and eventually sold to a private party. The combination motel, restaurant, bar, and fuel outlet was abandoned in 2010 due to contamination (Richardson, 2010).

Tanacross. There is contamination associated the former Tanacross Airfield Site (FUD). The military occupied the airfield from May 1941 through October 1945. After the war ended, the facility was turned over to the CAA and the BLM. Petroleum, oil, lubricant wastes, solvent, pesticides are present in unknown quantities. Twenty five hundred (2500) 55-gallon drums were found buried in a landfill containing flame retardants suspected to be borate. In 1972, the village relocated from the north bank of the Tanana River to the south bank due to water contamination.

Tok. Tok was home to the fuel terminal for the former Haines-Fairbanks Pipeline. The Tok terminal provided a staging area where the fuel passed through a filtration system and was then routed into storage tanks to await delivery to Eielson Air Force Base. The terminal had storage facilities for 281,000 barrels or 11,802,000 U.S. gallons of fuel. There is soil GRO and benzene contamination at 4 businesses in town that handle fuel in and a release of heating oil at a private residence.

Delta Junction. There are 24 open contaminated sites in Delta Junction listed in the ADEC contaminated sites program database. Several of these sites are associated with Fort Greely, which currently serves as part of the Nation's Ballistic Mission Defense System. Fort Greely is also host to the military missions of the Cold Regions Test Center, and by Intra-Service Support Agreement, the Northern Warfare Training Center. For ten years (1962-1972), the Army operated a nuclear reactor at Fort Greely.

Today, there is extensive contamination associated with the base including a chemical munitions test area located at Gerstle River now classified as a FUD site. The Gerstle River expansion area was leased by the state to the army in the 1950-60s for testing of chemical warfare materials. As early as 1959, an unknown quantity of chemical test equipment and munitions were disposed of in 2 pits, 1 near Blueberry Lake (dates unknown). Materials used on site included nerve gases, GB, VX and HD (mustard gas); and a biological agent, tularemia. The extent of contamination and health impact is unknown. There are also numerous leaking drums at dumpsites as well as old tank farms containing asphalt and various petroleum products associated with the base.

There are also 4 contaminated sites associated with the TransAlaska pipeline near Pump Station 09 including a therminol release and petroleum contamination of soils. GRO, DRO, RRO, and BTEX were detected above groundwater MCLs at one location. Diesel fuel contamination of soils is present by the airport and a church. At a local fuel dealer, benzene is present in groundwater. At a gas, diesel, propane, and service center, lead, diesel range organics, residual range organics, and chlorinated solvents have been founding groundwater. Petroleum contamination of soils has been found at 2 locations along the Haines-Fairbanks pipeline. On a privately owned parcel of land that was formerly a part of the Haines-Fairbanks pipeline, there are several waste oil drums containing petroleum products or other engine fluids. A variety of hydrocarbon compounds have been identified in soil at levels with potential to leach into groundwater.

Coldfoot. There are 4 sites in Coldfoot consisting of mercury contamination of soils from a former gold mine, a crude oil spill at pump station 05, diesel spills associated with the airport, and a jet fuel spill associated with the former Haines-Fairbanks pipeline at MP 558.

Wiseman, Dry Creek, Big Delta, and Alcan Border. There are no open contaminated sites listed in Wiseman, Dry Creek, Big Delta, or Alcan Border.

6.3.5 Summary

Areas of Vulnerability

- There are numerous open contaminated sites among the pipeline community PACs, mostly associated with military activity, fuel spills at gas stations, airports, and private residences.
- Fairbanks has extensive groundwater contamination with harmful solvents used by dry cleaning operations.
- Most CERCLA sites in the region are associated with military activity and have not been remediated.
- One large-scale site in North Pole associated with a private industry, Flint Hills Refinery has impacted drinking water of hundreds of nearby residents.
- Fairbanks contains a nonattainment area for PM 2.5; the State is required to reach compliance by 2014.
- Dust complaints have been received by ADEC in the rural villages of Tetlin, Tok, and Tanacross

Areas of Resilience/Success

- ADEC assesses compliance with the NAAQS for carbon monoxide, particulates, nitrogen dioxide, sulfur oxide, and lead.
- Discrete air quality data are only available for the pipeline PAC Fairbanks where real time monitoring stations are present.
- ADEC maintains several emissions inventories and summarized air quality data are available in periodic inventory reports.

6.3.6 Data Gaps

- Human health risk assessments have not been performed for most of the open contaminated sites, thus risks posed to human health by these contaminated events are unknown.
- There are no readily available data on illnesses related to physical hazards such as radiation, noise, vibration, light, or wildlife interactions.
- Indoor air quality is an important public health concern in many rural villages (including in schools), however indoor air quality is not regulated by ADEC and data are unavailable from public sources.
- The magnitude and extent of the health impacts of PM 2.5 in Fairbanks were not examined in this report but represent an important public health concern for this PAC at present.

6.4 HEC 4: Food, Nutrition, and Subsistence Activity

The Alaska Federation of Natives (AFN) describes subsistence as “the hunting, fishing, and gathering activities which traditionally constituted the economic base of life for Alaska's Native peoples and which continue to flourish in many areas of the state today” (AFN 1993).

Subsistence is part of a rural economic system, called a “mixed, subsistence-market” economy, wherein families invest money into small-scale, efficient technologies to harvest wild foods. Fishing and hunting for subsistence resources provide a reliable economic base for many rural regions. Subsistence is focused toward meeting the self-limiting needs of families and small communities. Participants in this mixed economy in rural Alaska augment their subsistence production by cash employment. Cash (from commercial fishing, trapping, and/or wages from public sector employment, construction, firefighting, oil and gas industry, or other services) provide the means to purchase the equipment, supplies, and gas used in subsistence activities. The combination of traditional and commercial-wage activities provides the economic basis for the way of life so highly valued in rural communities (Wolfe and Walker 1987). Traditional fishing, hunting, and gathering are a source of nutrition for residents in areas of Alaska where food prices are high. While some people earn income from employment, these and other residents rely on subsistence to supplement their diets throughout the year. Furthermore, traditional and cultural activities support a healthy diet and contribute to residents’ overall wellbeing.

ADF&G surveyed in 13 communities in 2012: Bettles, Evansville, Allakaket, Alatna, Beaver, Anaktuvuk Pass, Dot Lake, Dry Creek, Tok, Coldfoot, and Wiseman. The HIA team participated in the surveys in 6 of these communities, including Anaktuvuk Pass, Dot Lake, Dry Creek, Tok, Coldfoot, and Wiseman. The HIA team also did a field visit in Delta Junction to complete a community observation survey (including availability and costs of food, as well as the access to health facilities). This Section reports those results that are available; APP will receive the reports directly from ADF&G when the information is available.

6.4.1 Micronutrient Deficiencies

There is no readily available data in the Alaska Mainline Pipeline Study Area on deaths by malnutrition or by nutritional disorders such as scurvy, marasmus, B12, or other deficiencies. Information on clinical visits for conditions related to malnutrition and nutritional disorders–such as scurvy, marasmus, B12, or other deficiencies–is not available at this time, but incidence is generally low and not likely related to involuntary nutritional limitations. Vitamin D deficiency is a common problem for children and adults in Alaska and can lead to bone diseases such as rickets (ADHSS 2003). A full discussion of deficiencies common in northern regions and child growth standards can be found in Section 5.4.

6.4.2 Contribution of Subsistence Activities

Subsistence fishing and hunting are important sources of employment and nutrition in almost all rural Alaskan communities (ADF&G 2007). ADF&G completed the 2011 subsistence Harvest Surveys; the complete harvest data is in draft form and is not available at this time. In summary reviews provided by ADF&G, there were high levels of subsistence participation in 2011, particularly in Native Alaskan communities. Information on using and sharing subsistence resources is not yet available from ADF&G

Many Interior communities utilize store-bought foods, replacing the relatively healthy and nutrient-rich traditional subsistence foods with market foods that are often high in sugar, calories, and unhealthy types of fat. According to the CDC, rural Alaskans without access to potable drinking water have been found to drink 3 times as much soda per day as their urban counterparts, over half (58%) of 2-year-olds drank two or more cups of SSBs (>13 teaspoons of added sugar) per day compared to 21%–26% of 2-year olds in all other regions of the state in 2006 (CDC March 2010).

6.4.3 Food Security

A definition of food security is available in Section 5.4.3. The ADF&G Harvest Survey includes questions on food security; the results are reported in Table 64 below.

Table 63. Food Security in Selected Alaska Mainline Pipeline Study Area Communities, Affirmative Responses (%), 2012 Harvest Studies

Food Security Question	Anaktuvuk Pass	Coldfoot	Dot Lake	Dry Creek	Tok	Wiseman
Did not eat for a whole day	22.5%	0.0%	7.7%	0.0%	3.0%	0.0%
Lost weight, not enough food	27.5%	0.0%	7.7%	0.0%	0.7%	0.0%
Hungry but not eat	25.0%	0.0%	7.7%	0.0%	1.5%	50.0%
Ate less than we felt we should	22.5%	0.0%	7.7%	0.0%	3.0%	0.0%
Cut size of meals or skipped meals	37.5%	0.0%	0.0%	0.0%	11.2%	50.0%
Food(store-bought)did not last	45.8%	25.0%	15.4%	3.7%	9.4%	20.0%
Food(subsistence)did not last	51.7%	25.0%	23.1%	29.6%	37.2%	20.0%
Food did not last, could not get more	33.9%	75.0%	14.3%	0.0%	15.5%	20.0%
Lacked resources to get food	43.5%	25.0%	21.4%	11.1%	20.4%	0.0%
Worried about having enough food	40.3%	50.0%	14.3%	7.4%	20.4%	20.0%

Source: Alaska Department of Fish & Game Subsistence Harvest Surveys 2012.

The County Ranking systems states that "Access to healthy foods is measured as the percent of zip codes in a county with a healthy food outlet, defined as a grocery store or produce stand/farmers' market (University of Wisconsin 2011). The baseline for Alaska in 2011 was that 56% of the residents had access to healthy foods; the individual jurisdictions ranged from 25% (Fairbanks North Star Borough) to 100% (Yukon Koyukuk Census Area) with Southeast Fairbanks Census Area falling in between with an estimated 67% of the residents reporting that they have access to healthy foods (University of Wisconsin 2011). The 100% access in the Yukon Koyukuk Census Area is suspect because many of the communities do not have a retail grocery store; the County Health Rankings are based on self-reporting by community members.

6.4.4 Food Costs

The University of Alaska Fairbanks (UAF), Cooperative Extension Service, performs a Food Cost Survey (FCS) every quarter. Information on the specific vegetables, fruits, grains, carbohydrates and proteins included as well as quarterly results for the last 10 years is available online (UAF 2011).

Costs reported in Anchorage are used as the basis of comparison in Table 65 which presents information on the impact of this cost on rural communities and illustrates the potential inequities in market food costs if a family purchased all of their weekly food supplies at grocery stores. In the reported food cost survey for Delta Junction, costs were approximately 25% higher than in Anchorage. Food costs in Fairbanks were actually lower than they were in Anchorage. Costs in the Alaska Mainline Pipeline Study Area communities were not significantly higher than in other Alaskan communities and because the majority of the communities on are a main transportation corridor, access to food supplies are available.

Table 64. Comparison of Annual Foodbasket Costs as a Percent of Median Family Income

Location	Median Family Income (2010)[a]	Annual Cost of Foodbasket (June 2011)[b]	Percent of Income on Foodbasket (%)
Anchorage	$85,023	$7,420	9.1
Delta Junction	$67,625	$9,743.24	14.4
Fairbanks	$51,320	$7,146.88	13.9

[a] US Census, American Community Survey, 2006-2010
[b] UAF 2011: Weekly cost of the foodbasket in Anchorage ($142.68 with no items missing, June 2011) times 52 weeks = $7,420; Weekly cost of the foodbasket in Delta Junction ($187.37 with no items missing, June 2011) times 52 weeks= $9,743.24; Weekely cost of the foodbasket in Fairbanks ($$13.44 with no items missing, June 2011) times 52 weeks = $7,146.88

While no specific food costs are available for the other communities in the Alaska Mainline Pipeline Study Area, based on an analysis of median household income (Table 65), residents of the Alaska Native villages would spend between 32% (Tanacross) and 40% (Northway Village) of their median household income buying groceries in Anchorage.

Communities surveys by the HIA team during the ADF&G harvest surveys include information from grocery stores in Anaktuvuk Pass (January 2012), Tok (February 2012), and Delta Junction (April 2012). There were no other grocery stores in locations where site visits were completed, including Coldfoot,

Wiseman, Tanacross, Dot Lake, and Dry Creek. These locations obtain food, other than subsistence resources, from grocery stores in Tok, Delta Junction, and Fairbanks. The remoteness of Anaktuvuk Pass makes the price of food significantly higher and the availability of fresh fruits and vegetables scarce. The average cost of food staples are shown in Table 66.

Table 65. Grocery Store Data, Selected Alaska Mainline Pipeline Study Area Communities, 2012

	Anaktuvuk Pass 1	Anaktuvuk Pass 2	Tok	Delta Junction
Date of Visit	**1/23/12 – 1/28/12**	**1/23/12 – 1/28/12**	**2/5/12 – 2/12/12**	**4/17/12**
1. Does the store display that it accepts food stamps or WIC coupons?	Yes	Yes	Yes	Yes
2. Are fresh fruits available?	Yes	Sometimes, but not today	Yes	Yes
3. If so, please list a few of the available fruits and the prices	Bananas; $3.29/lb	Bananas; $3.29/lb	Bananas; $0.79/lb	Bananas; $0.99/lb
	Apples; $2.49/lb	Apples; $2.49/lb	Apples; $2.39/lb	Apples; $1.29/lb
	Oranges; $2.49/lb	Oranges; $2.49/lb	Oranges; $1.49/lb	Oranges; $0.99/lb
4. What is the condition of the fruit?	Average	Average	Excellent	Average
5. Are fresh vegetables available?	Yes	No	Yes	Yes
6. If so, please list several fresh veggies which are available and their prices	Carrots; $1.79/lb	NA	Carrots; $6.29/lb	Carrots; $1.50/lb
	Lettuce; $2.49/lb	NA	Lettuce; $2.99/lb	Cabbage; $0.89/lb
	Onions; $2.89/lb	NA	Potatoes; $1.79/lb	Potatoes; $1.29/lb
	Tomatoes; $6.29/lb	NA	Tomatoes; $1.89/lb	Tomatoes; $1.49/lb
7. What is the condition of the vegetables?	Excellent	NA	Excellent	Excellent
8. Does the store sell the following items?				
a. Fresh or frozen Meat (not canned)	Yes	Yes	Yes	Yes
b. Chicken Eggs	Yes	Yes	Yes	Yes
c. Milk (fresh)	Yes	Yes	Yes	Yes
9. If yes, please choose an item in each category above and list the prices	Ground Beef; $4.95/lb	Ground Beef; $7.95/lb	Ground Beef; $3.89/lb	Ground Beef; $3.50/lb
	Eggs; $4.25/dozen	Eggs; $6.40/dozen	Eggs; $2.89/dozen	Eggs; $2.69/doze

				n
	Milk; $7.89/half gal	Milk; $7.75/half gal	Milk; $3.99/gal	Milk; $2.99/half gal
10. What types of items are located on the endcaps or displayed for impulse buying?	Add water meals (noodles)	Beef Jerky	Beef Jerky	Soda
	Hostess goods (cupcakes)	Cereal	Hostess goods (cupcakes)	Chips
	Hot chocolate mix	Detergent	Soda/Juice	Crackers

6.4.5 Summary

Areas of Vulnerability

- Between 7 to 50% of the households in the Alaska Mainline Pipeline Study Area surveyed by ADF&G worried about having enough food during 2011.
- Market food costs are a larger percent of household income in the Alaska Mainline Pipeline Study Area communities than in Anchorage or Fairbanks

Areas of Resilience/Success

- Fewer than 8% of the households in the Alaska Mainline Pipeline Study Area surveyed by ADF&G felt they had eaten less than they thought they should during 2011.

6.4.6 Data Gaps

- There is no readily available data on illness or deaths by malnutrition or by nutritional disorders in the Alaska Mainline Pipeline Study Area communities.
- Final results from the 2011 ADF&G Harvest Surveys on participation, harvest and consumption
- Full results from the ensuing years ADF&G Harvest Surveys if completed.

6.5 HEC 5: Infectious Diseases including STIs

6.5.1 Infectious Diseases

Reportable communicable diseases were not among the leading causes of death to all races in the Alaska Mainline Pipeline Study Area between 2007 and 2009 (Table 67). Only Fairbanks North Star Borough registered deaths from infectious diseases that allowed an age-adjusted rate to be determined with accuracy. Pneumonia and septicemia were the only causes of death due to infectious diseases (ADHSS BVS January 2012). Over the previous decade, deaths due to infectious and parasitic diseases have remained relatively stable, while the number of deaths due to pneumonia appears to be decreasing slightly. Age-adjusted rates of death from communicable diseases have been similar to those experienced in the State of Alaska since 2000 (ADHSS BVS January 2012).

The Bureau of Vital Statistics does not report infectious disease data by race. Therefore, data from ANTHC is used as a representation of infectious disease burden for Alaska Natives. Overall reportable

infectious disease cases for all Alaska Natives January 2007 to October 2008 are shown in Table 67, with similar diseases causing the most burdens in both populations. Infectious disease is not a leading cause of death among Interior Alaska Natives (AN EpiCenter 2011).

Table 66. Infectious and Parasitic Disease Caused Deaths in the Alaska Mainline Pipeline Study Area, Age-adjusted Rates[a], 2007 to 2009,

Cause of Death	Alaska	Fairbanks North Star Borough	North Slope Borough	Southeast Fairbanks Census Area	Yukon-Koyukuk Census Area
INFECTIOUS AND PARASITIC DISEASE (A00-B99)	14.1	12.7	**	0	**
Tuberculosis (A16-A19)	6*	**	0	0	0
Septicemia (A40-A41)	6.3	6.9*	**	0	**
Viral Hepatitis (B15-B19)	2.9	**	0	0	0
HIV Disease (B20-B24)	1.2	**	0	0	0
All Other Infectious Disease	3.1	**	0	0	0
INFLUENZA AND PNEUMONIA (J10-J18)	12.5	15.2	**	**	**
Influenza (J10-J11)	7*	**	0	0	0
Pneumonia (J12-J18)	11.8	13.8*	**	**	**

Source: Alaska Bureau of Vital Statistics
[a] Age-Adjusted rates are per 100,000 U.S. year 2000 standard population.
*Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution.
**Rates based on fewer than 6 occurrences are not reported.

6.5.2 Sexually transmitted infections (STIs)

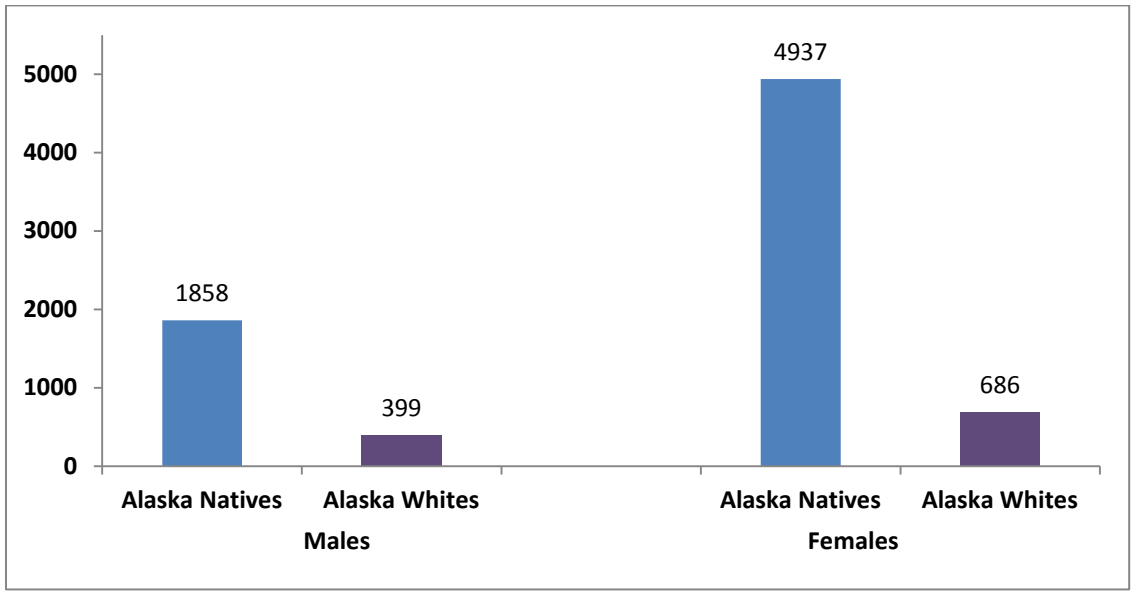
Between 2007 and 2008, STIs comprised 89.4% of all Alaska Native reportable infectious disease cases as shown in Table 34. The Chlamydia rate in 2011 for all residents in the Alaska Mainline Pipeline Study Area is shown below (University of Wisconsin 2011). Rates within the Alaska Mainline Pipeline Study Area are substantially lower than rates in the North Slope Borough (2132 cases per 100,000 population).

- Alaska 711 cases per 100,000 population
- Yukon Koyukuk Census Area 860 cases 100,000 population
- Fairbanks North Star Borough 614 cases 100,000 population
- Southeast Fairbanks Census Area 193 cases 100,000 population

STIs among Alaska residents are disproportionately distributed by race, gender, and age. Alaskan women (66%), adolescents and young adults (68% were under 25 years of age) are disproportionally impacted by Chlamydia. In 2011, the Chlamydia rate for Alaska Native men was about 4.5 times greater than was reported for Alaska white men (Figure 33). The Chlamydia rate for Alaska Native women was about 7 times greater than was reported for Alaska white women (NCHHSTP 2012). The rates of Chlamydia for residents in the Arctic Slope Region generally increased from 2001-2006, and have been decreasing since that time period. The Gonorrhea rate for Alaska Native men was more than 5 times greater than for Alaska white men and over 10 times greater for Alaska Native women than for Alaska white women (Figure 34) (NCHHSTP 2012).

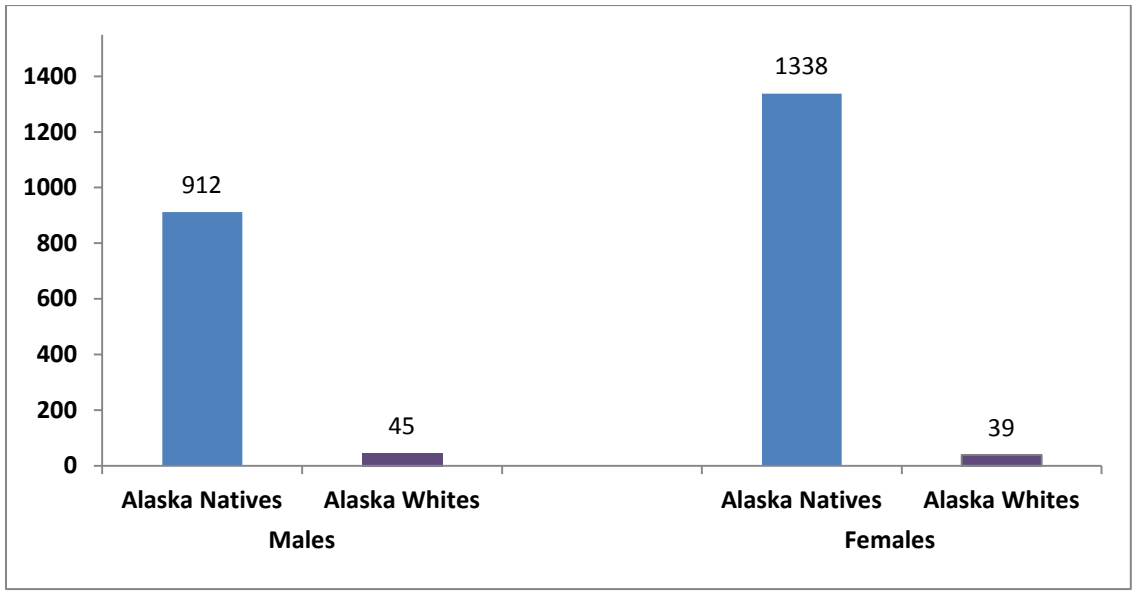
Increases in Chlamydia rates and regional differences in rates may, in part, reflect screening practices, availability of different diagnostic tests, consistency of reporting by providers and laboratories, the level of prevention efforts, and partner identification and testing practices.

Figure 33. Chlamydia Rate per 100,000 Population, Alaska Natives Statewide, 2011



Source: NCHHSTP ATLAS 2011

Figure 34. Gonorrhea Rate per 100,000 Population, Alaska Natives Statewide, 2011



Source: NCHHSTP 2012

Syphilis

Syphilis is an STI cased by the bacterium *Treponema pallidum*. Syphilis is rare in Alaska, with the exception of an outbreak in 2004 affecting Anchorage, Fairbanks, and Southeast Alaska that was not

controlled until the fall of 2007 (SOE Bulletin 4 Feb 21, 2012). As reported in SOE Bulletin 4, 19 syphilis cases were report to the SOE between January 1, 2011 and February 14, 2012. Eleven (11) of the cases involved men, of whom 8 were involved with men having sex with men. The majority of the cases reside in Anchorage and Fairbanks; 1 case resides in a rural Alaska village who was determined to have contracted syphilis in Anchorage (ADHSS SOE Bulletin 4 2012).

Human Immunodeficiency Virus

In Alaska, a cumulative total of 1,317 cases of HIV infection were reported during 1982 and 2009, with 56 cases reported in 2009. A recent bulletin from the ADHSS reported on an outbreak of HIV in Fairbanks where 9 new cases were reported to SOE between January 1, 2011 and January 31, 2012. The vast majority of new cases (89%) were men who had had unprotected sex with other men; 78% of the cases involved men associated with the military (ADHSS SOE Bulletin 3 2012).

HIV is an area of racial health disparity nationwide. African Americans continue to bear the greatest burden of HIV. In 2006, however, American Indian/Alaska Native females had an HIV diagnosis rate that was nearly twice that of white females, and rates among American Indian/Alaska Native males were slightly higher than among whites.

6.5.3 STI Education Efforts and Practices

To address the elevated rates of HIV/STIs in Alaska, several partners in state have sponsored expedited partner therapy as a means to promote safe sexual behavior (ADHSS SOE Volume 14 2011). The SOE regularly warns health care providers to be alert for risks for and symptoms of STIs and to provide testing and prompt reporting of any outbreaks. The NSB Wellness Center conducts HIV/STI risk reduction services and provides HIV/STI testing and STI treatments.

6.5.4 Immunizations

Immunization is the best defense against pneumonia, and immunization rates (with a critical coverage goal of greater than 80%) for both children and adults serve as critical performance indicators. By 2 years of age, it is recommended that all children have received 4 doses of diphtheria-tetanus-pertussis (DTP), 3 doses of polio, 1 dose of measles-mumps-rubella (MMR), 3 doses of Hepatitis B, and 3 doses of Haemophilis Influenza, type B (Hib) vaccines. This recommendation is referred to in shorthand as "4:3:1:3:3."

According to AN EpiCenter 2011, by June 30, 2010, 69.6% of Interior Alaska Native two-years olds received the 4:3:1:3:3:1 series of immunizations. This rate is approximately 10% less than for Alaska Natives Statewide and the Healthy People objective of 80% coverage (ADHSS 2005). In addition, 36.5% of people in the Interior Region service area 65 years and older had received an influenza shot in the past year, and over 90% of people 65 years and older had ever received a pneumococcal vaccination (AN EpiCenter 2011).

6.5.5 Summary

Areas of Vulnerability

- Pneumonia and septicemia were the only causes of death due to infectious diseases

Areas of Resilience/Success

- Reportable communicable diseases were not among the leading cause of death to all races in the Alaska Mainline Pipeline Study Area between 2007 and 2009.
- STIs do not appear to be a vulnerability in the Alaska Mainline Pipeline Study Area. In 2011, the Chlamydia rate for residents in the Fairbanks North Star Borough and Southeast Fairbanks Census Area was lower than or similar to the Alaska rate (711 cases per 100,000 population).

6.5.6 Data Gaps

- Primary data sets from the BVS for the census area does not include years 2010 to 2011.
- Data from the AN EpiCenter for the Interior Region do not include years 2007 to 2011.

6.6 HEC 6: Water and Sanitation

A description of the importance of safe water and adequate sanitation facilities is presented in Section 5.6.

6.6.1 Water and Sanitation

There are several land use activities among the PACs that have a potential to impact water quality: landfills, wastewater treatment plants, honey bucket disposal areas, airports, incinerators, boatyards/marinas, cemeteries, electric power generation, firehouses, gasoline stations, class V injection wells, laundromats, medical facilities, motor vehicle repair shops, petroleum storage.

Drinking Water in Villages

Big Delta. The majority of residences have individual water wells, septic tanks, and plumbing. Refuse is disposed of at the Delta Junction landfill.

***Delta Junction*.** Households have individual septic systems, which range from 150 to 350 feet deep. Some residents use rain catchment systems. The Delta School has its own well-water system. Almost all homes are fully plumbed. Businesses and residences are dispersed over a large area, so a community system is not practical. Refuse is collected by a private firm, Delta Sanitation, and is deposited in the city-owned permitted landfill. The laundromat, Delta Laundry, is also operated privately. The city operates a sewage pit at the landfill site.

Dot Lake*.* Many residents have individual wells; others haul water. Most homes use individual septic systems for sewage disposal; some use privies or honeybuckets. Electricity is provided by a line extension from Tok. The landfill is not permitted, and an upgrade is needed.

Dot Lake Village. A piped water system operated by Dot Lake Utility serves 8 homes. The original utility was constructed in 1970. A new utility building was constructed in 1994 and consists of a well, washeteria, showers, water storage, community septic system, and utilidor with a circulating heat loop providing home heating. Thirteen homes and the school have individual wells and septic tanks. Electricity is provided by a line extension from Tok. The landfill is not permitted, and an upgrade is needed.

Wiseman*.* Several homes have individual wells and septic tanks; others haul water and use outhouses. Individual generators are used for power; some residents use propane lights. Seventy percent (70%) of the cabins in Wiseman are used only seasonally.

Alcan Border*.* Alcan residents derive water from a piped community well system and individual wells. Approximately 60% of the homes have complete plumbing. A piped community sewage system serves the majority of households, and outhouses or individual septic tanks are also used.

Dry Creek. All residents derive water from a central safewater point. As of 2004, 19 homes had septic systems. One home, the church building, and both school buildings have complete plumbing systems. There is a central electrical system.

Tanacross. Piped services have been available in Tanacross since 1976. Water is treated, stored in a 25,000-gal. tank, and piped to most homes. Some residents have individual wells. A piped sewage and septic system serve approximately half of the community; individual septic tanks are also used. The landfill is not permitted.

Tok. There is no central water and sewer in Tok, because businesses and residences are spread out over a wide area. Most homes use individual septic tanks and individual wells at 50- to 125-foot depths. The schools operate individual systems. Most homes are heated with fuel oil or wood-burning stoves, and many residents use propane for cooking, water heating, and clothes drying. A private firm provides household refuse collection and disposal at the landfill, located at mile 120.5, Tok Cutoff.

Northway Junction. Approximately half of all homes use individual water wells and septic systems and are fully plumbed. The rest of the residents haul water from a central point and use outhouses. Refuse is hauled to Northway's landfill.

Northway. Over half of households are not plumbed. Due to high groundwater and deep permafrost, individual water wells and septic systems often freeze. The Northway Village Council operates the local washeteria.

Northway Village. All village households currently lack plumbing facilities. Individual wells and septic tanks have significant freezing problems. Residents currently haul water and use honeybuckets or privies. A community well, water treatment plant, washeteria, and sewage lagoon are operated by the tribe. A flush/haul system is operated in the village and includes holding tanks and household plumbing. Refuse is hauled to Northway's landfill. Electricity is provided by Alaska Power Company.

Coldfoot. Residents use individual wells and septic tanks. There is no community-wide system.

Fairbanks. Fifteen circulating pump stations distribute treated water throughout the greater Fairbanks area. City water, sewer, and electric systems are operated by private companies. The Chena power site has four steam turbines fueled by coal and one oil-fueled generator. Garbage collection services are provided by the city for a fee, and refuse is hauled to the class 1 borough landfill on South Cushman. Fort Wainwright operates its own landfill.

Tetlin. At present, all residents haul treated well water from the school or washeteria and use honeybuckets or outhouses.

6.6.2 Service Rates

The Alaska Native Epidemiology Center included 2008 comparison data on water and sewer service in Alaska in their recent publication Interior Regional Health Profile (AN EpiCenter 2011). As reported in Table 36 (Section 5.6.1), the Tanana Chiefs Conference, the Regional Health Corporation that services Alaska Natives in the Alaska's interior, reported a very low level of water and sewer services (60%). The percentage of housing units served with water and sewer in Tanana Chiefs Conference in the Interior Region was one of the lowest among regions throughout the state in 2008.

6.6.3 Summary

Areas of Vulnerability

- Water and sanitation systems are not uniformly available throughout the Alaska Mainline Pipeline Study Area.
- Less than 60% of housing units in the TCC service area had water and sewer service in 2008.

Areas of Resilience/Success

- None identified

6.6.4 Data Gaps

- Data sets from AN EpiCenter do not include years 2009 to 2011.

6.7 HEC 7: Non-communicable Diseases

6.7.1 Cancer

Malignant neoplasm (cancer) was the leading cause of death in the study area between 2007 and 2009 and throughout the previous decade (Table 68).

Table 67. Top Leading Causes of Death in the Alaska and the Alaska Mainline Pipeline Study Area, Age-adjusted Rates[a], 2007 to 2009

Cause of Death (ICD-10 Codes)	Alaska		Fairbanks North Star Borough		North Slope Borough		Southeast Fairbanks Census Area		Yukon-Koyukuk Census Area	
	Rank	Age-Adjusted Rate	Rank	Age-Adjusted Rate	Rank	Age-Adjusted Rate	Rank	Age-Adjusted Rate	Rank	Age-Adjusted Rate
Malignant Neoplasms (C00-C97)	1	184	1	205.5	1	354.2	1	192.5	1	251.4
Diseases of the Heart (I00-I09, I11, I13, I20-I51)	2	155.9	2	186	2	256.7	2	181.4	3	146.7*
Unintentional Injuries (V01-X59, Y85-Y86)	3	54	3	54.9	3	129.1*	3	49.7*	2	138.4
Chronic Lower Respiratory Diseases (J40-J47)	4	49.2	4	66.6	4	137.6*	5	**	-	-
Cerebrovascular Diseases (I60-I69)	5	40.6	5	35.2*	-	-	4	65.2*	-	-
Intentional Self-Harm (Suicide) (X60-X84, Y87.0)	6	22.7	-	-	5	43.6*	-	-	4	60.2*
Diabetes (E10-E14)	7	21.3	-	-	-	-	5	**	4	71.1*
Chronic Liver Disease and Cirrhosis (K70, K73-K74)	8	11.7	-	-	-	-	5	**	-	-
Influenza and Pneumonia (J10-J18)	9	12.5	-	-	-	-	5	**	-	-

[a] Age-Adjusted rates are per 100,000 U.S. year 2000 standard population.
*Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution.
**Rates based on fewer than 6 occurrences are not reported.

Table 69 presents the age-adjusted rates of cancer deaths in the Alaska Mainline Pipeline Study Area by cancer type in 2007 to 2009. This data shows that cancer death rates are higher than those experienced statewide. Lung cancer is the most common type of cancer at 60.9 deaths per 100,000 persons, followed by colorectal cancers at 35.4 deaths per 100,000 persons (Table 69). These rates should be interpreted with caution due to the small number of occurrences.

Figure 11 (Section 5.7.1) presents the leading causes of cancer death for Alaska Natives between 2001 and 2005. The lung/bronchus cancer rates are strongly related to the extremely high tobacco usage that occurs in Alaska Native populations. Smoking rates in Alaska Natives are significantly elevated versus U.S. white populations. Colon/rectal cancers are also a leading cause of cancer death. There are multiple colon cancer risk factors including age, family history, inflammatory bowel disease,, inherited genetic diseases, and numerous lifestyle factors, e.g., lack of exercise, a high-fat low-fiber diet, obesity, smoking and high intake of alcoholic beverages.

Table 68. Cancer Deaths by Type in Alaska and the Alaska Mainline Pipeline Study Area, Age-Adjusted Rates[a], 2007 to 2009

Cause of Death	Alaska	Fairbanks North Star Borough	North Slope Borough	Southeast Fairbanks Census Area	Yukon-Koyukuk Census Area
MALIGNANT NEOPLASMS (C00-C97)	182.9	101.8	354.2	192.5	251.4
Colon, Rectum, and Anus (C18-C21)	17.5	7.6	**	**	63.4*
Liver and Intrahepatic Bile Ducts (C22)	5.7	3.2*	**	**	**
Lung (C33-C34)	55	30.9	158.4*	72.9*	34.9*
Breast (C50)[b]	24	8.9*	**	**	**
Prostate (C61)[b]	21	14.6	**	0	0
Lymphoid & Hematopoietic (C81-C96)	15.5	9	**	**	**
Non-Hodgkin's Lymphoma (C82-C85)	6.3	3.2*	0	**	0
Leukemia (C91-C95)	6.4	2.9*	**	**	0
All Other Lymphoid and Hematopoietic	2.8	2.9*	0	0	**
All Other Malignant Neoplasms	67.6	39.2	133.8*	46.1*	104.2*

Source: Alaska Bureau of Vital Statistics
[a] Age-Adjusted rates are per 100,000 U.S. year 2000 standard population.
[b*] Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution.
** Rates based on fewer than 6 occurrences are not reported.

6.7.2 Cardiovascular Diseases

Age-adjusted cardiovascular disease mortality rates in the study area are shown in Table 70**.** Diseases of the heart were the second most common cause of death in the study area during 2007 to 2009. Since 1992, the number and rate of deaths due to major cardiovascular disease has remained relatively stable.

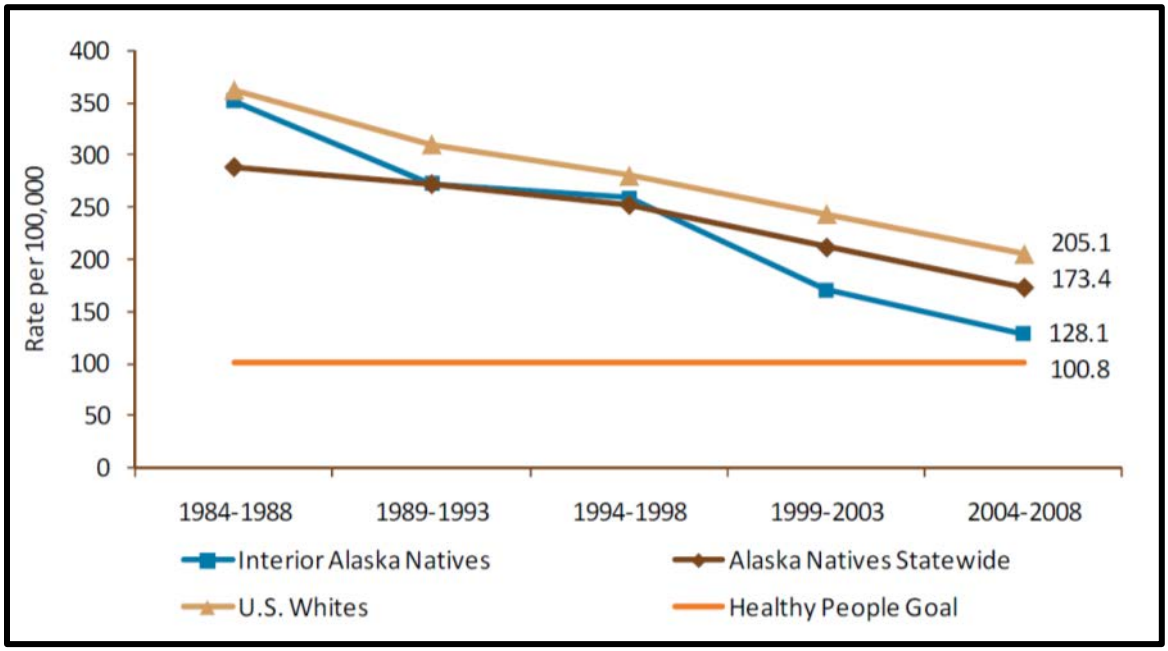
The most current data on heart disease rates among Alaska Natives are shown in Figure 13 (Section 5.7.2). For 2004 and 2005, the rate of heart disease for Alaska Natives in the Interior Region (138.6 deaths per 100,000 population) was lower than the rate for all Alaska Natives and for Alaska whites and all U.S. whites. Mortality rate from heart disease between 1999 and 2003 was 190.9 deaths per 10,000 persons, while the rate for all Alaska Natives was 211.4 during this same time period. Based on this data, there was a 10% lower risk of death due to heart disease in this region compared to Alaska Natives statewide. Heart disease death rates in this region more than doubled between 1979 and 1988, but then remained relatively constant until 2003 (Figure 35). Updated information reveals that the Alaska Native cardiovascular mortality rate decreased by 43% between 1980 and 2007 and that Alaska whites and U.S. whites also experienced a similar decrease during this time period.

Table 69. Major Cardiovascular Disease Deaths in Alaska and the Alaska Mainline Pipeline Study Area, Age-adjusted Rates[a], 2007 to 2009

Cause of Death	Alaska	Fairbanks North Star Borough	North Slope Borough	Southeast Fairbanks Census Area	Yukon-Koyukuk Census Area
MAJOR CARDIOVASCULAR DISEASES (I00-I78)	204.9	200.3	323.9	250.8	216.4
Heart Disease (I00-I09,I11,I13,I20-I51)	151.2	151.9	256.7	181.4	146.7*
Ischemic Heart Disease (I20-I25)	87.6	85.1	98.7*	158.8	56.4*
Acute Myocardial Infarction (I21-I22)	19.2	14.1	**	**	0
Atherosclerotic Cardiovascular Disease (I25.0)	31	36.1	**	52.0*	49.6*
All Other Ischemic Heart Disease	37.5	35	**	94.1*	**
All Other Heart Disease	63.5	66.8	158.0*	**	90.3*
Cerebrovascular Disease (I60-I69)	43.1	37	**	65.2*	52.9*
All Other Cardiovascular Disease	10.7	11.3*	**	**	**

Source: Alaska Bureau of Vital Statistics
[a] Age-adjusted rates are per 100,000 U.S. year 2000 standard population.
* Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution
** Rates based on fewer than 6 occurrences are not reported.

Figure 35. Age-adjusted Coronary Heart Disease Death Rates per 100,000, 1984 to 2008



Source: AN EpiCenter 2011

Cerebrovascular Diseases

Cerebrovascular disease, or stroke, is one of the leading causes of death in Alaska. From 2007 to 2009 the rate for the state for all races was 43.1 deaths per 100,000 people (Table 38), while it was significantly higher in the Yukon Koyukuk (52.9 deaths) and Southeast Fairbanks (65.2 deaths) census area. In general, the prevalence of cerebrovascular diseases has decreased among Alaska Native people; however, the decrease is not significant (Figure 15, Section 5.7.3).

6.7.3 Chronic Lower Respiratory Diseases

Chronic lower respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease, bronchitis, emphysema) were among the fourth leading causes of death in the State of Alaska and the Fairbanks North Star Borough and the Southeast Fairbanks Census Area from 2007 to 2009 (ADHSS BVS January 2012).

Chronic Obstructive Pulmonary Disease

From 2004 to 2007, the rate of COPD seen among Alaska Natives in the Interior Region was 35.1 cases per 100,000 persons, which was lower than the rate for all Alaska Natives and the rate for Alaska whites (Figure 15, Section 5.7.3).

6.7.4 Mental Health Disorders

In 2010, the mean of all Alaska residents self-reported 3.0 days in which their mental health was not good. Within the Alaska Mainline Pipeline Study Area, the number of experiencing poor mental health days ranged from 2.6 days for residents of the Yukon Koyukuk Census Area, 2.9 days for residents of the

Fairbanks North Star Borough and 4.2 days for residents of the Southeast Fairbanks Census Area (University of Wisconsin 2011).

6.7.5 Dietary Diseases

Obesity and Overweight

A description of Obesity and overweight are presented in Section 5.7.5 including statewide information on adults and high school students.

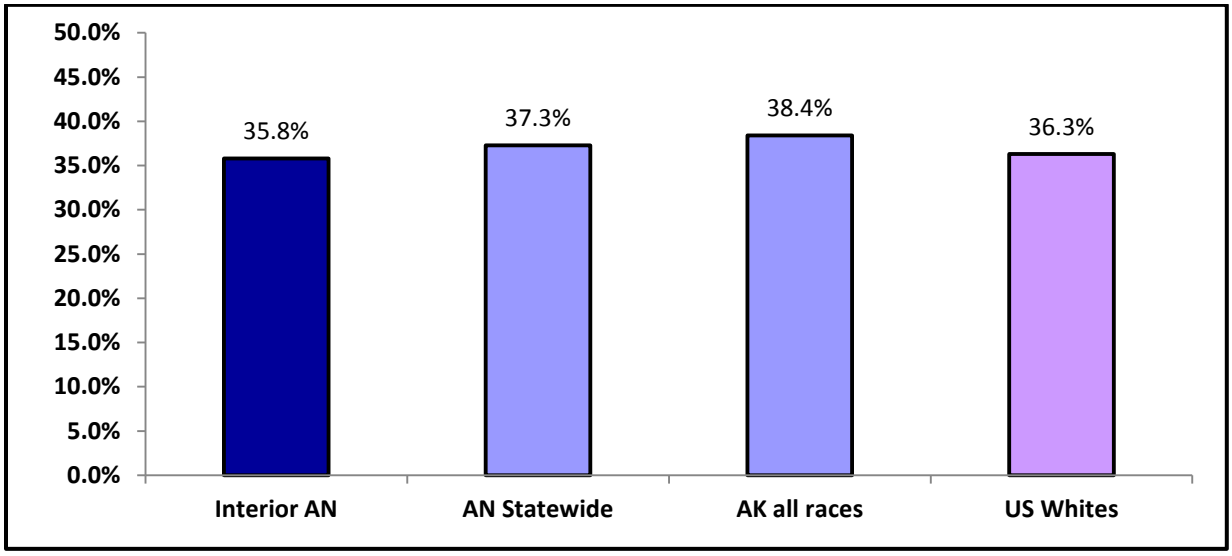
The County Health Rankings, which are derived from BRFSS data, indicated the following percentages of residents who were classified as obese in 2011

- Fairbanks North Star Borough 26%
- Southeast Fairbanks Census Area 31%
- Yukon Koyukuk Census Area 32%

Obesity rates for the state as a whole were listed at 28% (University of Wisconsin 2011).

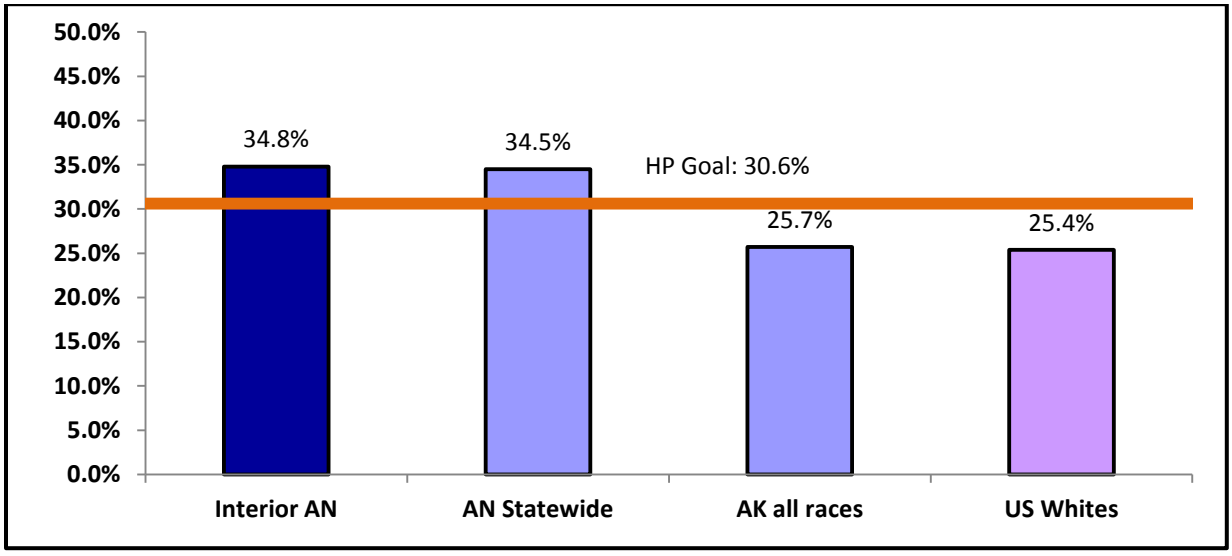
As shown in
Figure 16, Section 5.6.7, from 2005 to 2007, 28% of Alaska Natives living in the Interior Region were classified as obese, fewer than in the Arctic Slope Region but comparable to Alaska Native statewide, Alaska Non-Native, and U.S. White people reported a similar prevalence of overweight persons (range: 25% to 31%). During 2007 to 2009, more than 1 out of 3 (34.8%) Interior Alaska Native adults were obese. Interior Alaska Native people and Alaska Natives statewide (34.5%) had a significantly higher prevalence of obesity than Alaska non-Natives (25.7%) (AN EpiCenter 2011).

Figure 36. Prevalence of Overweight (25 < BMI < 29.9), 18 Years and Older, 2007 to 2009



Source: AN EpiCenter 2011

Figure 37. Prevalence of Obesity (BMI > 30), 18 Years and Older, 2007 to 2009



Source: AN EpiCenter 2007

Diabetes

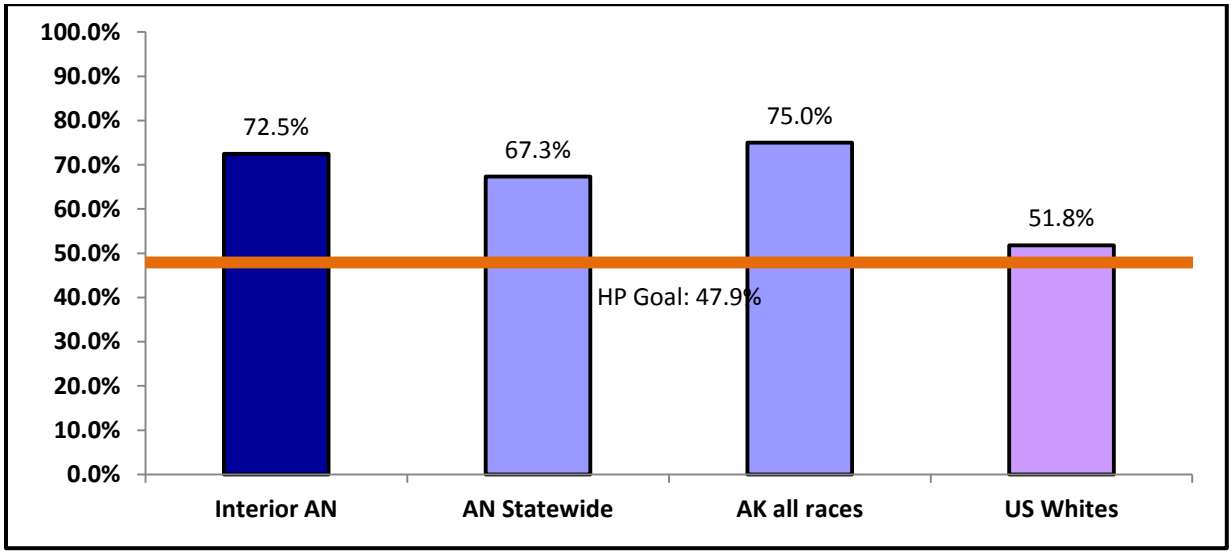
Diabetes mellitus is defined in Section 5.7.5 The Bureau of Vital Statistics reported that deaths caused by diabetes age-adjusted rate for the State of Alaska was 21.3 deaths per 100,000 population. Among all Alaska Native people, the prevalence of diagnosed diabetes in 2007 was 40 per 1000 people. Diabetes prevalence is shown in Figure 17.

6.7.6 Physical Activity

Physical activity is defined in Section 5.7.6. The CDC collects information on trends in physical inactivity for all states by borough/census area. The age-adjusted estimate of percentage of adults (>20 years) who are physically inactive in the Alaska Mainline Pipeline Study Area in 2009 (most recent) was between 24 and 26% of the residents of Fairbanks North Star Borough (24.1%), Southeast Fairbanks Census Area (25.1%), Yukon Koyukuk Census Area (26.3%) (CDC 2012).

The Interior Regional Health Report confirms that Alaska Native adults living within the region are more likely to be physically active than other Alaskan Natives in the state (Figure 38).

Figure 38. Meets Moderate and/or Vigorous Physical Activity, 18 Years and Older, 2007 to 2009



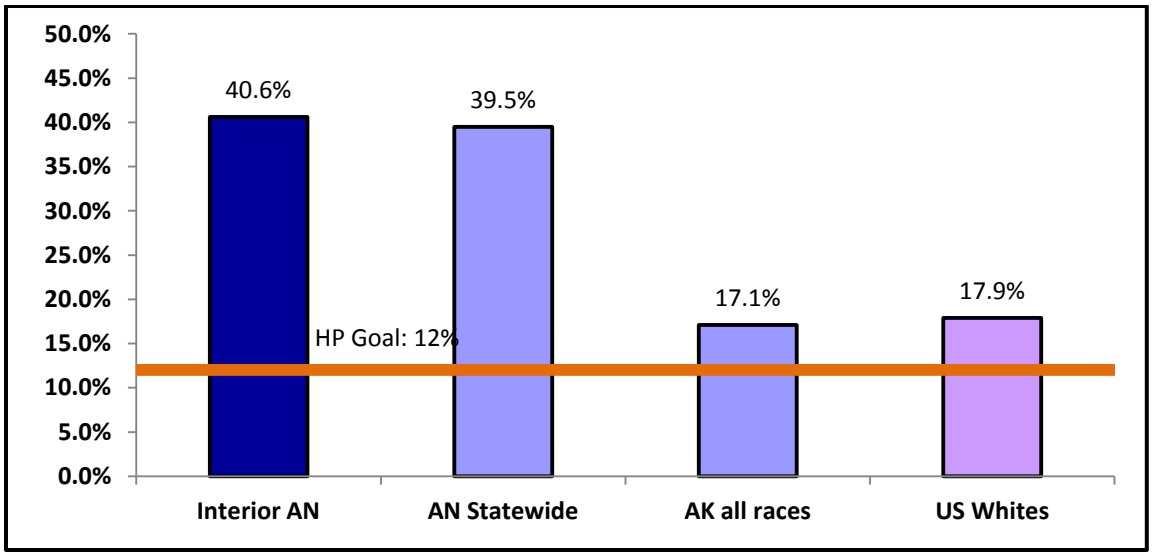
Source: AN EpiCenter 2011

6.7.7 Tobacco Use

The County Health Rankings report (2011), as well as BRFSS defines smokers as adults that currently smoke every day or some days and have smoked at least 100 cigarettes in their lifetime. 23% of all Alaskans were reported as current smokers.

Overall regional smoking rate data for Alaska Natives is shown in Figure 18 (Section 5.7.8). The percentage of adults smoking from 2005 to 2007 for Alaska Natives in the Interior Region (38%) is much lower than the rate for all Alaska Natives (41%) but almost twice the rate of Alaska non-Natives. Figure 39 presents Alaska Native adult smoking data from between 2007 and 2009. Alaska Natives living in the Interior Region are slightly more like to smoke than all Alaska Natives, an increase since the previous reporting period, 2005 to 2007. Smoking rates for throughout Alaska and the U.S. have continued to decrease.

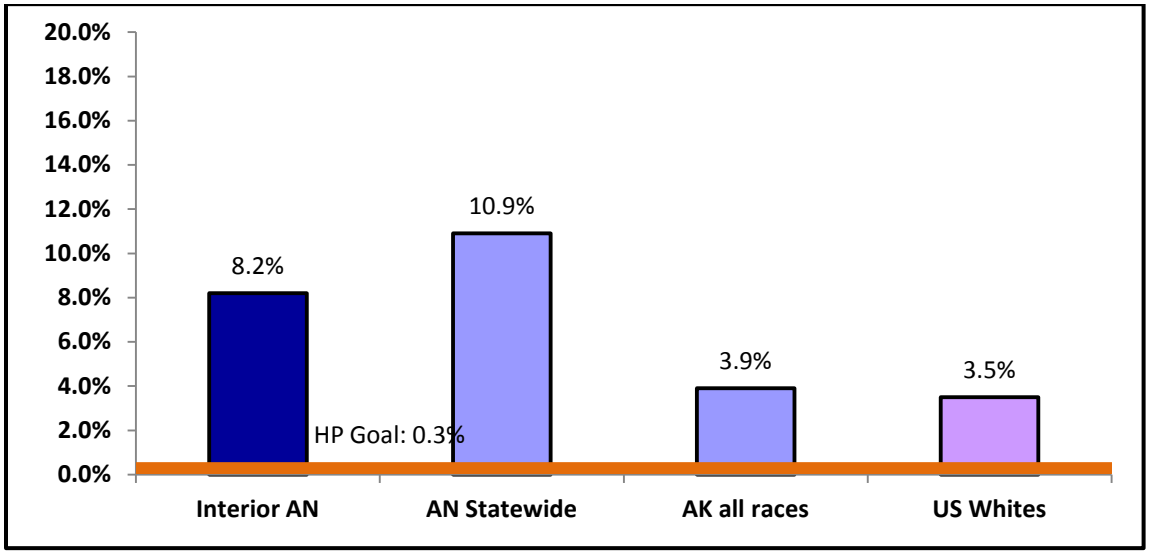
Figure 39. Current Smokers, 18 Years and Older, 2007 to 2009



Source: AN EpiCenter 2011

Over 8% of Alaska Native adults living in the Interior Region between 2007 and 2009 used smokeless tobacco products such as chewing tobacco, snuff, or Iq-mik or Blackbull (brand names for smokeless tobacco products) (Figure 40). This percentage is less than for Alaska Natives Statewide and twice the rate of all Alaska residents.

Figure 40. Current Smokeless Tobacco Users, 18 Years and Older, 2007 to 2009



Source: AN EpiCenter 2011

6.7.8 Cancer Screening

According to AN EpiCenter 2011, during 2008 cancer screening rates in the Interior Region are comparable to all Alaska Natives, Alaska non-Natives and U.S. whites.

- Cervical cancer screening rates: 86.2% of Interior Alaska Native women were screened for cervical cancer. Statewide Alaska Native (86.2%), Alaska non-Native (83.0%), and U.S. white (83.0%) all had similar percentages of women that were screened for cervical cancer in the past 3 years.
- Breast cancer screening rates: 62.8% of interior Alaska Native women reported having a mammogram within the past two years. The percent of Alaska Native women receiving a mammogram in the past 2 years did not differ significantly from Alaska non-Native women.
- Colorectal cancer screening rates: 58.1% of Interior Alaska Native people who were eligible reported ever having a sigmoidoscopy or colonoscopy. A similar percent of eligible Interior Alaska Native, Alaska Native Statewide, and Alaska Non-Native adults reported ever receiving a flexible sigmoidoscopy or colonoscopy.

6.7.9 Summary

Areas of Vulnerability

- Cancer was the leading cause of death in the Alaska Mainline Pipeline Study Area between 1999 and 2009. The most common forms of cancer are lung and colorectal for all residents and for Alaska Natives.
- Heart disease was the second most common cause of death in the Fairbanks North Star Borough and the Southeast Fairbanks Census Area between 2007 and 2009 for all residents and for Alaska Natives; it was the third most common cause of death in the Yukon Koyukuk Census Area as well.
- Chronic lower respiratory diseases were among the leading causes of death in the State of Alaska and the Alaska Mainline Pipeline Study Area.
- Over 40% of all adults in the Interior Region were smokers between 2007 and 2009, over twice the 17% of all Alaskans who were reported as smokers.

Areas of Resilience/Success

- None identified

6.7.10 Data Gaps

- Primary data sets from the BVS for the Alaska Mainline Pipeline Study Area jurisdictions do not include years 2010 to 2011.
- Data from the AN EpiCenter for the Interior Region do not include years 2009 to 2011.

6.8 HEC 8: Health Services Infrastructure and Capacity

In the Interior Region, health services are provided by private and public organizations for both Alaska Native and Non-native residents. Many of the health statistics used in this report for the Region's residents are collected and analyzed by the ADHSS Bureau of Vital Statistics and include Alaska Natives and Non-natives in their totals. Some organizations provide data and statistics only for Alaska Natives.

The following table (Table 71) describes the available health clinics in the communities where site visits were completed.

Table 70. Health Clinics Surveyed in 2012

	Anaktuvuk Pass	Tok	Dry Creek	Dot Lake	Tanacross	Coldfoot	Wiseman	Delta Junction
Is there a health clinic in the community?	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
If present, what services does the clinic(s) offer?	Primary Health Care; Blood/Urine Collection; Basic Pharmacy; Immunizations; EKG, oxygen, defib, life support	Primary Health Care; Blood/Urine Collection; Basic Pharmacy; X-ray/Minor Surgery; Immunizations; EKG, oxygen, defib, life support	Basic First Aid; EMT	Primary Health Care; Blood/Urine Collection; Basic Pharmacy; EKG, oxygen, defib, life support	Primary Health Care	NA	Primary Health Care	Primary Health Care; Blood/Urine Collection; Basic Pharmacy; X-ray/Minor Surgery, some Major Surgery; Immunizations; EKG, oxygen, defib, life support
How far is the nearest facility that can treat severe injuries?	Fairbanks	Fairbanks/ Anchorage	Fairbanks/Anchorage	Fairbanks/ Anchorage	Fairbanks/Anchorage	Fairbanks	Fairbanks	Fairbanks

6.8.1 Banner Health Fairbanks Memorial Hospital

This hospital is owned by the Greater Fairbanks Community Hospital Foundation and is operated by Banner Health, a nonprofit health care system. Fairbanks Memorial Hospital is a qualified acute care facility, which has 162 licensed beds and offers a full array of medical services including: Behavioral Health, Cancer Care, Diabetes, Emergency Care, Heart Care, Home Health, Long-term Care, Maternity Services, Medical Imaging, Orthopedics, Pain Management, Pediatrics, Rehabilitation, and Sleep Disorders.

Tanana Valley Clinic, a Primary Care Clinic operated by Banner Health, offers the following services: Classes, Family Practice, Internal Medicine, OB/Gyn, Occupational Medicine, Pediatrics, Osteopathic Manipulation and Sleep Medicine (Banner Hospital 2012).

6.8.2 Alaska Native Medical Center

The Alaska Native Medical Center (ANMC), in Anchorage, is jointly owned and managed by the Alaska Native Tribal Health Consortium (ANTHC) and Southcentral Foundation (SCF), a non-profit health agency of Cook Inlet Region, Inc. (CIRI), an Alaska Native Corporation which organizes and manages services to Alaska Natives. The medical center is the state-wide referral center and gatekeeper for specialty care for Alaska Natives/American Indians. The Alaska Native Epidemiology Center (AN EpiCenter) maintains health statistics on the Interior Region Health service area which are used in this report.

6.8.3 Tanana Chiefs Conference

The Tanana Chiefs Conference (TCC) is a corporation which organizes and manages services to the Alaska Natives within the Alaska Mainline Pipeline Study Area. The TCC Region covers an area of 235,000 square miles, an area equal to about 1/3 of the State of Alaska. The total population of the region is 86,130, of which 10,623 are Alaska Natives; about 50% of the Native population resides in Fairbanks, which is the only urban area in the region.

The TCC Department of Health Services provides health care services for over 10,000 Alaska Natives living in Fairbanks and in the villages of Interior Alaska. Specific programs managed by the Department of Health Services are outlined below:

The Chief Andrew Isaacs Health Center (CAIHC), located adjacent to the Fairbanks Memorial Hospital, is the major Alaska Native health facility for the region. The CAIHC employs over 100 health care professionals and support staff who provide outpatient services, medical services for patients hospitalized in Fairbanks, and itinerant medical services for 35 Interior villages. Specific functions include medical services, nursing and public health nursing services, pharmacy services, patient education, medical records, nutrition services and social outreach services.

The Sub Regional Health Centers in Fort Yukon and McGrath are staffed by physician assistants. The TCC Department of Health Services also provides funding for locally operated sub regional health centers in Galena and Tok. These health centers provide support for Community Health Aides in surrounding communities, arrange medical evacuations as necessary, and provide routine preventive and treatment services (TCC 2012).

The Community Health Aide/Practitioners Program employs 50 Community Health Aides (CHAs) and Community Health Practitioners (CHPs) in 30 villages, whom provide year-round primary preventive and medical treatment services in locally-operated village clinics. CHA/Ps are supervised by physicians at the Chief Andrew Isaac Health Center and the Alaska Native Medical Center in Anchorage.

CAIHC also provides

- Dental Clinic staffed by 5 dentists and 8 assistants. Services include limited orthodontic care, dental preventive services and itinerant services to Interior villages.
- Eye Clinic provides free eye exams and eyewear at reduced prices for Alaska Native beneficiaries. Three (3) staff members are located in the TCC building in downtown Fairbanks; they also provide itinerant eye care services in the villages.
- Counseling Centers, staffed by psychiatrists, therapists, counselors and case managers, provide a range of counseling services in the areas of mental health, substance abuse and family support.

The TCC Department of Health Services also provides community, school-based health and safety education programs in Interior villages through a staff of 7 educators located in Fairbanks, and in each sub regional office. Specific focus is on HIV/AIDS prevention, substance abuse prevention, fetal alcohol syndrome, injury prevention and general personal health care. The program also provides a video education library and supports village-based youth programs.

6.8.3.1 Hospitalizations

Morbidity (illness) is tracked by following hospitalization and outpatient department data. In the Interior Region service area, the 4 leading causes of hospitalizations were complications of pregnancy and childbirth, diseases of the respiratory system, deliveries and childbirth, and diseases of the digestive system, accounting for almost 75% of all hospitalizations in 2006. In the Interior service area, the primary reasons for outpatient visits included essential hypertension, administration/social admission, other upper respiratory infections, diabetes mellitus without complications, mood disorders, blindness and vision defects, immunization and screening for infectious disease, medical examination/evaluation, and others as shown on Table 72.

Table 71. Leading Causes of Outpatient Visits, Interior Region Alaska Natives, Fiscal Year 2010

Top 15 Outpatient Visits by Clinical Classification Categories	Rank	n	Percent of Totals
Essential hypertension[a]	1	8,678	8.7%
Administrative/social admission	2	6,447	6.5%
Other Upper respiratory infections	3	3,447	3.4%
Diabetes mellitus without complications	4	3,423	3.4%
Mood disorders	5	3,360	3.4%
Blindness and vision defects	6	2,737	2.7%
Immunization and screening for infectious disease	7	2,678	2.7%
Medical Examination/evaluation	8	2,315	2.3%
Other eye disorders	9	2,268	2.3%
Spondylosis; intervertebral disc disorders; other back problems	10	2,130	2.1%
Anxiety disorders	11	2,078	2.1%
Disorders of lipid metabolism	12	1,807	1.8%
Skin and subcutaneous tissue infections	13	1,805	1.8%
Other non-traumatic joint disorders	14	1,763	1.8%
Asthma	15	1,615	1.6%
Total Number of Outpatient Visits		**46,551**	**46.6%**
All Other Causes		53,401	53.4%
Total		**99,952**	**100.0%**

Source: National Patient Information Reporting System – Indian Health Service National Data Warehouse
[a] Essential hypertension refers to increased blood pressure without an identifiable cause.
Note: Data includes outpatient visits from the following clinics: Alatna, Allakaket, Anaktuvuk Pass, Arctic Village, Beaver, Birch Creek, Chalkyitsik, Chief Andrew Isaac Health Center, Circle, Dot Lake, Eagle, Evansville, Fairbanks Memorial Hospital, Galena, Hughes, Huslia, Kaltag, Koyukuk, Manley Hot Springs, McGrath Health Center, Minto, Nenana, Northway, Nulato, Rampart, Ruby, Stevens Village, Tanacross, Tanana Health Center, Tetlin, Tok, Venetie, and Yukon Flats Health Center.

6.8.4 Summary

Areas of Vulnerability

- None identified

Areas of Resilience/Success

- Comprehensive health and emergency services are available in Fairbanks for residents throughout the Yukon-Koyukuk Census Area, Fairbanks North Star Census Area and the Southeast Fairbanks Census Area through Community Health Centers, TCC Health Services (including village health clinics), and Banner Health Fairbanks Memorial Hospital and Clinic Services.

6.8.5 Data Gaps

- There is limited information available on Non-native health except what is disaggregated from the Department of Health and Social Services as provided by the private sector health care providers.
- Data for Fairbanks Memorial Hospital has been requested but not received.

7.0 DATA GAPS

The proposed Alaska Pipeline Project – the gas transmission line from Pt. Thompson to Prudhoe Bay, the gas treatment plant at Prudhoe Bay, and the Alaska Mainline Pipeline—requires multiple permits under State of Alaska and federal regulations including the Federal Energy Regulatory Commission (FERC) and National Environmental Protection Act (NEPA). The HIA will be part of a suite of impact assessments that covers (i) detailed environmental and social analyses and (ii) consideration of alternatives, including a "no action" option. As previously discussed in Chapter 1, preparation of an HIA for the APP is discretionary and is being performed by the ADHSS/HIA Program at the request of the Alaska Department of Natural Resources.

While this Baseline Community Health Data Assessment does not have access to comprehensive environmental and social impact assessments, a substantial body of environmental and social information has been reviewed. The HIA process has uncovered several technical data gaps. This is normal even during the federal NEPA process. The key data points and data gaps are listed below in Table 73 by HEC and Project component.

Table 72. Key Summary Points and Data Gaps by Health Effect Category, by Project Component

Health Effects Category	Gas Transmission Pipeline and Gas Treatment Plant	Alaska Mainline Pipeline
HEC 1: Social Determinants of Health (SDH)	**Summary Points:** The health of residents in many of the potentially affected communities is affected by their economically disadvantaged position: • The per capita income of residents in the PACs is lower than the per capita income of the state; • All villages, except Nuiqsut, had a higher percentage of residents living below the poverty line than the State of Alaska as a whole	**Summary Points:** The health of residents in many of the potentially affected communities is affected by their economic position: • The median household income and per capita income of residents in the all but one of the PACs is lower than the same income of the state; only Delta Junction has a higher median household

Table 72. Key Summary Points and Data Gaps by Health Effect Category, by Project Component

Alaska Natives in the NSB are faced with more challenges to social determinants of health than non-Natives. Alaska Natives fared worse in every health indicator for which data was available by ethnicity, such as:

- Lower life expectancies
- Fewer women received adequate or better prenatal care
- Higher infant mortality rate
- Higher percent of low birth weight babies
- Intimate partner violence and unwanted sexual activity rates are higher
- Percentage of Alaska Natives statewide who had received a dental visit in the past year was lower
- A greater percentage of women in the North Slope Borough reported smoking during pregnancy than in the state.
- Suicide rates were almost twice among Alaska Natives in NSB than among whites statewide
- The Rural region (which includes the North Slope Borough) had the highest rates of child abuse in the state
- Percentage of households with no husband present is higher in the NSB than statewide, and is higher still in the villages.

Despite significant challenges, residents of the villages fared better on several important health indicators and health determinants:

- Residents of the NSB have lower divorce rates than residents of the state
- Rates of heavy drinking and binge drinking in the NSB are lower than in the state
- Residents of the villages report high levels of participation in cultural continuity indicators.

Data Gaps

- North Slope Borough level specific data are not available for several of the variables including life expectancy, child abuse and out-of-home placement, and intimate partner income and per capita income than the state.
- Income levels are lower in those communities which are federally recognized tribes
- Despite low neonatal death rates, post-neonatal death rates, which have been associated with socioeconomic status, are higher in the Yukon Koyukuk Census Area than in the State of Alaska.

Alaska Natives in the PACs are faced with more challenges to social determinants of health than non-Natives. Alaska Natives fared worse in every health indicator for which data was available by ethnicity, such as:

- Lower life expectancies
- Fewer women received adequate or better prenatal care
- Percentage of Alaska Natives statewide who had received a dental visit in the past year was lower
- Suicide rates were more than 3 times greater among Alaska Natives in Yukon Koyukuk Census Area than among whites statewide
- The Northern Region (which includes the Alaska Mainline Pipeline Study Area) had the highest rates of child abuse in the state
- Percentage of households with no husband present is higher in the Alaska Mainline Pipeline Study Area than statewide, and is higher still in the majority of the PAC villages.
- A greater percentage of women in the Yukon Koyukuk Census Area reported drinking and smoking during pregnancy than in the state.

Table 72. Key Summary Points and Data Gaps by Health Effect Category, by Project Component

	violence and sexual violence. • Individual community and household level specific data are not available for many of the variables. • Unemployment data was not gathered because it is calculated each month and would not be valid when the Project resumes. • Participation in subsistence activities is not yet available from ADF&G.	• Rates of heavy drinking in the Yukon Koyukuk Census Area are higher than in the state **Data Gaps:** • Individual community and household level specific data are not available. • Participation in subsistence activities are not yet available from the ADF&G studies
HEC 2: Accidents and Injuries	**Summary Points:** • Accidents and injuries were the third leading cause of death in the North Slope Borough between 2007 and 2009. The most common causes of unintentional injury deaths among all residents and among Alaska Natives were: o Motor vehicle accidents (the majority of which are snow machine accidents), and o Drowning and submersion. o Poisoning (typically caused by alcohol ingestion), • Alaska Natives residing in the Arctic Slope Region have 1 of the lowest age-adjusted unintentional injury death rates in the state • Alcohol was strongly related to over 28% of all accidents and injuries, especially amount all residents and Alaska Natives between the ages of 15 to 24 years. **Data Gaps:** • Updated accident and injury data from the Alaska Trauma Registry (2009 to 2011) • Traffic and accident datasets	**Summary Points:** • Accidents and injuries were among the leading causes of death in the Alaska Mainline Pipeline Study Area between 2007 and 2009. The most common causes of unintentional injury deaths among all residents were: • Poisoning (typically caused by alcohol ingestion), • Motor vehicle accidents (the majority of which are snow machine accidents), and Drowning and submersion. • Alcohol was strongly related in up to 42% of all accidents and injuries, especially among residents of the Yukon Koyukuk Census Area. **Data Gaps:** • Updated accident and injury data from the Alaska Trauma Registry (2009 to 2011) • Traffic and accident datasets for the Dalton and Alaska Highways, particularly heavy truck traffic
HEC 3: Exposure to Potentially Hazardous Materials	**Summary Points:** • There are multiple contaminated sites in the NSB, primarily as a result of military activities which were not remediated • Residents of the NSB, and particularly Nuiqsut, the village closest to active oil and gas extraction activities, are concerned about the health effects of	**Summary Points:** • There are numerous open contaminated sites among the pipeline community PACs, mostly associated with military activity, fuel spills at gas stations, airports, and private residences. • Fairbanks has extensive

Table 72. Key Summary Points and Data Gaps by Health Effect Category, by Project Component

these activities. Preliminary results indicate little evidence of significant air-quality problems associated with oil development near the village.

- The weather in the NSB presents many challenges and risks, from extreme cold to thin ice.

Data Gaps:

- There are no readily available data on illnesses related to physical hazards such as radiation, noise, vibration, light, or wildlife interactions.
- There is limited specific information available on air quality in the North Slope Borough.
- There is limited data on the health effects of active oil and gas extraction activities.

groundwater contamination with harmful solvents used by dry cleaning operations.

- Most CERCLA sites in the region are associated with military activity and have not been remediated.
- One large-scale site in North Pole associated with a private industry, Flint Hills Refinery has impacted the drinking water of hundreds of nearby residents.
- ADEC assesses compliance with the NAAQS for carbon monoxide, particulates, nitrogen dioxide, sulfur oxide, and lead.
- Discrete air quality data are only available for the pipeline PAC Fairbanks where real time monitoring stations are present.
- ADEC maintains several emissions inventories and summarized air quality data are available in periodic inventory reports.
- Fairbanks contains a nonattainment area for PM 2.5; the State is required to reach compliance by 2014.
- Dust complaints have been received by ADEC in the rural villages of Tetlin, Tok, and Tanacross.

Data Gaps:

- Human health risk assessments have not been performed for most of the open contaminated sites, thus risks posed to human health by these contaminated events are unknown.
- There are no readily available data on illnesses related to physical hazards such as radiation, noise, vibration, light, or wildlife interactions.

Table 72. Key Summary Points and Data Gaps by Health Effect Category, by Project Component

		• Baseline air quality data was not analyzed for this report. • Indoor air quality is an important public health concern in many rural villages (including in schools), however indoor air quality is not regulated by ADEC and data are unavailable from publicly sources. • The magnitude and extent of the health impacts of PM 2.5 in Fairbanks were not examined in this report but represent an important public health concern for this PAC at present.
HEC 4: Food, Nutrition and Subsistence	**Summary Points**: • There are no reported deaths by malnutrition or by nutritional disorders in the North Slope Borough. • More than 95% of NSB Inupiat household heads in every age group reported that their households used subsistence foods in 2009. • Consumption of sugar sweetened beverages among Inupiat household heads in the Study Area is generally high. Household heads in Anaktuvuk Pass and Atqasuk were least likely to report drinking 2 or more of these beverages per day. More than 60% of Inupiat household heads in Nuiqsut and Kaktovik reported drinking 2 or more of these beverages per day. • NSB households, particularly Inupiat households, reported high levels of food insecurity in the 2010. • Market food costs are a larger percent of household income in NSB communities than in Anchorage. **Data Gaps:** • Detailed harvest information for Anaktuvuk Pass will not be available until late 2012. Studies in other NSB communities will not be completed under APP but may be available in late 2013 if the ADF&G Harvest Surveys completes the studies for other	**Summary Points:** • There are no reported deaths by malnutrition or by nutritional disorders in the Alaska Mainline Pipeline Study Area communities. • Between 0 and 8% of the households in the Alaska Mainline Pipeline Study Area surveyed by ADF&G felt they had eaten less than they thought they should during 2011. • Between 7 to 50% of the households in the Alaska Mainline Pipeline Study Area surveyed by ADF&G worried about having enough food during 2011. • Market food costs are a larger percent of household income in the Alaska Mainline Pipeline Study Area rural communities than in Anchorage or Fairbanks. **Data Gaps:** • Final results from the 2011 ADF&G Harvest Surveys on participation, harvest and consumption • Full results from the ensuing years ADF&G Harvest Surveys if completed.

Table 72. Key Summary Points and Data Gaps by Health Effect Category, by Project Component

	projects.	
HEC 5: Infectious Diseases including STIs	**Summary Points**: • Reportable communicable diseases were not a leading cause of death to all races in the North Slope Borough, with 3 deaths between 2007 and 2009; septicemia and pneumonia were the only contributors. • In 2010, the Chlamydia rate in the North Slope Borough reached 1733 cases per 100,000 population; the state's rate was 711 cases per 100,000 population; the age-adjusted Chlamydia rate for Alaska Natives the rate was 2113 cases per 100,000 population and for non-Native residents the rate was 1204 cases per 100,000 population. **Data Gaps:** • Primary data sets from the BVS for the census area does not include years 2010 to 2011. • Data from the AN EpiCenter for the Arctic Slope Region do not include years 2007 to 2011.	**Summary Points:** • Reportable communicable diseases were not among the leading cause of death to all races in the Alaska Mainline Pipeline Study Area between 2007 and 2009. • Pneumonia and septicemia were the only causes of death due to infectious diseases. • In 2011, the Chlamydia rate for all residents in the Alaska Mainline Pipeline Study Area was lower than or similar to the Alaska rate (711 cases per 100,000 population). **Data Gaps:** • Primary data sets from the BVS for the census area does not include years 2010 to 2011. • Data from the AN EpiCenter for the Interior Region do not include years 2007 to 2011.
HEC 6: Water and Sanitation	**Summary Points**: • Almost 95% of villages in the Arctic Slope service area had water and sewer service in 2008. • The NSB government has ensured that all villages have safe water, adequate sanitation facilities, and solid waste disposal facilities. **Data Gaps:** Data sets from AN EpiCenter do not include years 2009 to 2011	**Summary Points:** • Water and sanitation systems are not uniformly available throughout the Alaska Mainline Pipeline Study Area. • Less than 60% of housing units in the TCC service area had water and sewer service in 2008. **Data Gaps:** • Data sets from AN EpiCenter do not include years 2009 to 2011.
HEC 7: Chronic Non-Communicable Diseases (NCDs	**Summary Points:** • Cancer was the leading cause of death in the North Slope Borough between 1999 and 2009. The most common forms of cancer are lung and colorectal for all residents and for Alaska Natives. • Heart disease was the second most common cause of death in the North Slope Borough between 2007 and 2009 for all residents and for Alaska Natives. • Chronic lower respiratory disease was the fourth most common cause of death in the	**Summary Points:** • Cancer was the leading cause of death in the Alaska Mainline Pipeline Study Area between 1999 and 2009. The most common forms of cancer are lung and colorectal for all residents and for Alaska Natives. • Heart disease was the second most common cause of death in the Fairbanks North Star Borough and the Southeast Fairbanks

Table 72. Key Summary Points and Data Gaps by Health Effect Category, by Project Component

	North Slope Borough between 2007 and 2009. • The prevalence of diagnosed diabetes in 2007 was 31 per 1000 Alaska Native people in the Arctic Slope Region; less that the rate of 40 per 1000 people for all Alaska Natives, suggesting that traditional diets based on fish and marine mammals may be protective against developing diabetes. • 49% of all adults in the North Slope Borough were smokers in 2010; over twice the 23% of all Alaskans who were reported as smokers. **Data Gaps:** • Primary data sets from the BVS for the borough does not include years 2010 to 2011. Data from the AN EpiCenter for the Arctic Slope Region do not include years 2007 to 2011	Census Area between 2007 and 2009 for all residents and for Alaska Natives; it was the third most common cause of death in the Yukon Koyukuk Census Area as well. • Chronic lower respiratory diseases were among the leading causes of death in the State of Alaska and the Alaska Mainline Pipeline Study Area. • Over 40% of all adults in the Interior Region were smokers between 2007 and 2009, over twice the 17% of all Alaskans who were reported as smokers. **Data Gaps:** • Primary data sets from the BVS for the Alaska Mainline Pipeline Study Area jurisdictions do not include years 2010 to 2011. • Data from the AN EpiCenter for the Interior Region do not include years 2009 to 2011.
HEC 8: Health Services Infrastructure and Capacity	**Summary Points:** • In 2006, the 4 leading causes of hospitalizations were complications of pregnancy and childbirth, diseases of the respiratory system, deliveries/childbirth, and diseases of the digestive system, accounting for almost 75% of all hospitalizations in the North Slope Borough service area. • Comprehensive health services are available in Barrow for residents throughout the North Slope Borough service area. **Data Gaps:** There appear to be a number of areas where health services-related data are particularly lacking: Anaktuvuk Pass, Atqasuk, Kaktovik and Nuiqsut.	**Summary Points:** • Comprehensive health and emergency services are available in Fairbanks for residents throughout the Yukon-Koyukuk Census Area, Fairbanks North Star Census Area and the Southeast Fairbanks Census Area through Community Health Centers, TCC Health Services (including village health clinics), and Banner Health Fairbanks Memorial Hospital and Clinic Services. **Data Gaps:** • There is limited information available on non-Native health except what is disaggregated from the Department of Health and Social Services as provided by the private sector health care providers.

Table 72. Key Summary Points and Data Gaps by Health Effect Category, by Project Component

	• Data for Fairbanks Memorial Hospital has been requested but not received.

While exposures to potentially hazardous materials and food, nutrition and subsistence considerations dominate the data gaps analysis, there are other health-relevant data gaps that would typically be reported by a social impact analysis. The social analysis will inform the HIA and provide both qualitative and quantitative information:

- Household level core welfare indicators survey;
- Economic impact analysis;
- IPV and sexual violence indicators as a measure of family stability;
- Systematic key informant interviews and/or surveys; and
- Community dynamics and power relationship analysis.

Closure of these data gaps would allow for the development of a Comprehensive HIA.

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