K3.10 HEALTH AND SAFETY

The evaluation of impacts on human health is a required component of the National Environmental Policy Act (NEPA) as it pertains to negative and beneficial consequences of the project on potentially affected communities. This appendix contains information on health effects categories (HECs) 1 through 8 supplemental to Section 3.10, Health and Safety. HECs 1 through 4 are the focus of and are detailed in Section 3.10, Health and Safety, because they are the most relevant to the project or are a concern to stakeholders and affected communities; therefore, this appendix presents a brief summary of HECs 1 through 4 and provides their baseline data tables, if generated. HECs 5 through 8 are expected to have lower relevance to the project, and are also presented in this appendix, including baseline data tables, if generated.

K3.10.1 HEC 1: Social Determinants of Health

Factors such as income, education, isolation, and early access to healthcare are termed social determinants of health (SDH) because any changes in these factors, positive or negative, can lead to corresponding changes in the physical, mental, and social health of the population. For those SDH not covered in Section 3.3, Needs and Welfare of the People—Socioeconomics, Table K3.10-1 summarizes the additional SDH that are relevant and important indicators for this HEC because they may potentially be impacted by the project. Overall, the affected communities whose health may be most impacted by the project in the Environmental Impact Statement (EIS) analysis area (or communities that may use the area for residence, subsistence, or recreation) are the remote, rural communities in the Bristol Bay Region (includes the Lake and Peninsula Borough [LPB], Bristol Bay Borough, and Dillingham Census Area) and Kenai Peninsula Region. The remote communities generally have lower levels of employment, income, formal educational attainment, and access to amenities than more urbanized communities. Although they are comparable to the larger urban areas in some areas of health, there are other areas such as alcohol consumption and violent crime, including aggravated assault and rape, where the rural areas may have higher health needs.

Table K3.10-1: Social Determinants of Health (HEC 1)

Determinant	Data Period	Iliamna Lake/Lake Clark Communities	Nushagak/Bristol Bay Communities	Lake and Peninsula Borough	Dillingham Census Area	Bristol Bay Borough	Bristol Bay Region	Kenai Peninsula Region	Anchorage/Mat-Su Region	Alaska	National
Life Expectancy in Years	2009-2013	--	--	--	--	--	71.4 (AN)	71.6 (AN)	71.6 (AN)	70.7 (AN) 78.0 (White)	79.1 (White)
Adequate Prenatal Care in Percent (%)	2009-2013 (unless noted)	63.3 (all races; 2014-2016)	36.1 (all races; 2014-2016)	55.3[a] (all races; 2014-2016)	47.4[b] (all races; 2014-2016)	51.8 (all races; 2014-2016)	35.4 (AN)	64.2 (AN)	63.9 (AN)	50.0 (AN) 54.5 (AN 2013) 68.8 (White 2013) 62 (all races; 2014-2016)	--
Infant Mortality (rate per 1,000 live births)	2009-2013 (unless noted)	--	--	--	--	--	5.9[c] (AN)	--	5.6 (AN)	6.7 (AN) 8.9 (AN 2013) 3.5 (White 2013)	5.1 (White 2013)
Teen Pregnancy (rate per 1,000 births)	2009-2013 (unless noted)	--	70[c] (all races; 2014-2016)	--	44.4[b] (all races; 2014-2016)	--	65.8 (AN)	45.2 (AN)	52.9 (AN)	69.2 (AN) 47.3 (AN 2013) 20.5 (White 2013) 27.5 (all races; 2014-2016)	18.6 (White 2013)
Adult Dental Care (percent with dental visit in past year)	2006-2014 (unless noted)	--	--	--	--	--	66.4 (AN)	56.3 (AN)	63.7 (AN)	58.7 (AN) 56.5 (AN 2014) 65.5 (White 2014)	65.3 (White 2014)
Adult Tooth Loss (percent with 1 or more teeth removed due to tooth decay or gum disease)	2006-2014 (unless noted)	--	--	--	--	--	58.6 (AN)	59.1 (AN)	51.9 (AN)	59.5 (AN) 60.5 (AN 2014) 37.7 (White 2014)	43.4 (all races; 2014)
Adult Mental Health (average days poor mental health per 30 days)	2010-2014 (unless noted)	--	--	2.2 (all races; 2011-2015)	2.8 (all races; 2011-2015)	2.6 (all races; 2011-2015)	3.2 (AN)	4.7 (AN)	4.6 (AN)	3.6 (AN) 3.0 (White) 3.2 (all races; 2011-2015)	3.4 (all races; 2005-2009)
Adult Binge Drinking (percent in past 30 days)	2010-2014 (unless noted)	--	--	16.6 (all races; 2011-2015)	14.1 (all races; 2011-2015)	24.5 (all races; 2011-2015)	14.8 (AN)	27.4 (AN)	19.7 (AN)	19.8 (AN) 19.8 (White) 18.8 (all races; 2011-2015)	17.7 (White)
Adult Alcohol Mortality (rate per 100,000 population)	2012-2015	--	--	--	--	--	49.3[c] (AN)	--	43.0 (AN)	29.8 (AN) 3.9 (non-AN)	3.0 (White)
All Violent Crime (rate per 100,000 population)	2017, all races	N/A	N/A	N/A	1,646	0[c]	N/A	421 (KPB)	733 (MSB) 1,203 (AM)	829	394
Aggravated Assault (rate per 100,000 population)	2017, all races	--	--	--	1,098	0[c]	--	211 (KPB)	624 (MSB) 799 (AM)	575.4	248.9
Robbery (rate per 100,000 population)	2017, all races	--	--	--	127[c]	0[c]	--	37[c] (KPB)	89[c] (MSB) 263 (AM)	128.5	98
Rape (rate per 100,000 population)	2017, all races	--	--	--	422[c]	0[c]	--	173 (KPB)	9.9[c] (MSB) 132 (AM)	116.7	41.7

Notes:

-- = Not Available   AM = Anchorage Municipality   AN = Alaska Native   KPB = Kenai Peninsula Borough   Mat-Su = Matanuska-Susitna   MSB = Matanuska-Susitna Borough

[a] LPB, excluding the eight Iliamna Lake/Lake Clarke Communities
[b] Dillingham Census Area, excluding the three Nushagak/Bristol Bay communities
[c] Rate based on fewer than 20 cases/counts (may not be statistically reliable)

Iliamna Lake/Lake Clark communities include Port Alsworth, Newhalen, Kokhanok, Nondalton, Iliamna, Levelock, Iguigig, and Pedro Bay.
Nushagak/Bristol Bay communities include New Stuyahok, Koliganek, and Ekwok.
Other surrounding potentially affected communities, such as Dillingham, are represented in the information provided for the larger areas in which they reside (Dillingham Census Area, Bristol Bay Borough, and Kenai Peninsula Borough [KPB]).
The Bristol Bay Region includes the LPB, Dillingham Census Area, Bristol Bay Borough, and surrounding area. Kenai Region includes KPB and the surrounding area.
Sources: ANTHC 2016a, b, c, 2017b, c, d, e, f, g, h; FBI 2017; McDowell Group 2018b

K3.10.2 HEC 2: Accidents and Injuries

Accidents and injuries include both fatal and non-fatal incidents that are primarily unintentional and affect the mortality and morbidity rates of a community. Intentional incidents include homicide and suicide (note: overlaps with suicide HEC 1, psychosocial stress). Non-fatal and fatal intentional and unintentional injuries can place a substantial burden on available healthcare resources (such as hospitals, clinics, and ambulances). Table K3.10-2 presents the baseline accident and injury rates for the affected communities. Overall, in comparison to national and state rates, the levels of unintentional deaths and injuries in the potentially affected communities were higher. Suicide mortality rates for the Dillingham Census Area were similar to Anchorage and state rates, while Bristol Bay region rates were higher, and the Kenai Peninsula rates were lower in comparison to the Dillingham Census Area, state, and national rates.

K3.10.3 HEC 3: Exposure to Potentially Hazardous Materials

Environmental exposure to chemicals through the air, land, or water is also considered a health determinant. Baseline data may be qualitative in terms of proximity to known contamination sources, or quantitative through analytical data collection (e.g., water quality data, soil analytical data). Overall, baseline conditions of exposure to potentially hazardous chemicals may include the occurrence of localized poor air quality in some areas from outdoor dust or indoor air pollution, as well as elevated levels of a few naturally occurring metals in soils, surface waters, groundwater, and some food sources. Dust from unpaved roads may circulate contaminants that can be deposited onto surface water and further redistributed to sediments. Exposure to these trace elements through direct and dietary exposure pathways represents baseline hazardous exposure potential for the potentially affected communities in the EIS analysis area. Although there are numerous known contaminated sites in the EIS analysis area, these sites are under active oversight by government agencies, and agency directives are expected to control or prevent exposure to the general public. Additionally, no contaminated site records coincided with or were in proximity to the project footprint. Therefore, the proximity of these sites is not expected to contribute to the baseline exposure to hazardous materials. In the EIS analysis area, background data were obtained for air and are presented and discussed in Section 3.20, Air Quality. Baseline data were collected for soil, surface water, sediment, groundwater, vegetation, and fish tissue, and are provided and discussed in their respective sections: Section 3.14, Soils; Section 3.18, Water and Sediment Quality; Section 3.26, Vegetation; and Section 3.24, Fish Values. In addition, Section 3.23, Wildlife Values, provides a description of the birds, terrestrial mammals, and marine mammals that are known and have a potential to occur in the project area; while Section 3.9, Subsistence, provides information on traditional ecological knowledge, seasonal rounds, and subsistence harvest patterns for each of the potentially affected communities evaluated for subsistence.

Table K3.10-2: Accidents and Injuries (HEC 2)

Determinant	Data Period	Iliamna Lake/Lake Clark Communities	Nushagak/Bristol Bay Communities	Lake and Peninsula Borough	Dilingham Census Area	Bristol Bay Borough	Bristol Bay Region	Kenai Peninsula Region	Anchorage/Mat-Su Region	Alaska	National
Unintentional Injury Deaths (rate per 100,000 population)	2012-2015 (unless noted)	160[c] (all races; 2012-2016)	--	--[a]	180[b] (all races; 2012-2016)	140[c] (all races; 2012-2016)	151.8 (AN)	65.0[c] (AN)	101.7 (AN)	99.4 (AN) 38.9 (non-AN)	42.4 (White)
Unintentional Injury (percent of injuries)	2009-2016	--	--	92.4 (all races)	84 (all races)	--	85.5 (all races)	--	--	83.3 (all races)	--
Unintentional Injury Hospitalization (rate per 100,000 population)	2002-2011	--	--	--	--	--	134.4 (AN)	94.9 (AN)	102.4 (AN)	109.2 (AN)	--
Hospitalizations due to Falls, ranking of cause of hospitalization	2009-2016 (unless noted)	--	--	#1 Leading Cause	#1 Leading Cause	#2 Leading Cause	--	--	--	43.9 (AN; 2002-2011) #1 Leading Cause	--
Hospitalizations due to Vehicles, ranking of cause of hospitalization	2009-2016 (unless noted)	--	--	#2 Leading cause is other land transport	#2 & #3 Leading causes are other land transport and motor vehicle traffic	#1 Leading cause is other land transport	--	--	--	31.5 (AN; 2002-2011 #2 & #4 Leading causes are other land transport and motor vehicle traffic	--
Suicide Mortality (age-adjusted rate per 100,000 population)	2012-2015 (unless noted)	--	--	--	40[b,c] (all races; 2012-2016)	--	58.1[c] (AN)	30.1[c] (AN)	37.0 (AN)	40.9 (AN) 17.9 (non-AN)	14.3 (White)

Notes:
-- = Not Available
AN = Alaska Native
Mat-Su = Matanuska-Susitna
[a] LPB, excluding the eight Iliamna Lake/Lake Clark communities
[b] Dillingham Census Area, excluding the three Nushagak/Bristol Bay communities
[c] Rate based on fewer than 20 cases/counts (may not be statistically reliable)
Iliamna Lake/Lake Clark communities include Port Alsworth, Newhalen, Kokhanok, Nondalton, Iliamna, Levelock, Iguigig, and Pedro Bay
Nushagak/Bristol Bay communities include New Stuyahok, Koliganek, and Ekwok
Other surrounding potentially affected communities, such as Dillingham, are represented in the information provided for the larger areas in which they reside (Dillingham Census Area, Bristol Bay Borough, and KPB)
The Bristol Bay Region includes the LPB, Dillingham Census Area, Bristol Bay Borough, and surrounding area. Kenai Region includes the KPB and surrounding area
Sources: ANTHC 2015, 2017f, i, j; McDowell et al. 2011a; McDowell Group 2018b

K3.10.4 HEC 4: Food, Nutrition, and Subsistence Activity

The role of adequate and high-quality food and nutrition is of paramount importance to health. The cost of living is higher in Alaska than the national average, and the cost of living/food in the EIS analysis area is typically more than two times that of Anchorage (see Section 3.3, Needs and Welfare of the People—Socioeconomics). Table K3.10-3 presents the baseline nutrition, lifestyle, and poverty levels for the affected communities. In Alaska, subsistence activities greatly contribute to community nutrition and food security because they provide dietary items such as fish, game, and berries that are highly nutritious, relatively low in cost, and also support cultural and social cohesion. A large proportion of households in the EIS analysis area participates in subsistence activities and depends on procured wild food resources (see Section 3.9, Subsistence). Percentages of nutritional intake are typically fairly similar between LPB, Dillingham Census Area, Bristol Bay Borough, and Alaska. Overall, LPB, Dillingham Census Area, and Bristol Bay Borough families have lower rates of those living below the poverty level threshold for Alaska Natives state-wide, and fairly similar to national whites (see Section 3.10, Health and Safety, HEC 4). Subsistence activities are the basis of many local economies and are important for nutrition and food security in the communities in the EIS analysis area as compared to the state.

K3.10.5 HEC 5: Infectious Diseases

The role of infectious diseases in the mortality and morbidity rates of a population is well known. Planned project activities include the creation of worker housing and camps during construction and operations, and may bring together various populations of workers under communal conditions that would be managed in accordance with the project's programs for maintenance of clean, hygienic, and sanitary operations. Reportable infectious diseases (influenza and pneumonia) were the tenth leading cause of death to all races in Alaska (ADHSS 2017a). Conditions that may promote the spread of infectious disease include unsafe water, poor personal hygiene, and unsanitary conditions. As discussed under HEC 6, the potentially affected communities in the EIS analysis area have a high rate of water and sanitation service; therefore, baseline sanitary conditions in these communities do not promote the spread of infectious disease. Other infectious diseases impact human health quality and mortality, including sexually transmitted infections, HIV, tuberculosis, septicemia, and viral hepatitis. Immunizations play an important role in decreasing the rates of some infectious diseases.

Table K3.10-4 presents the leading infectious disease rates for Alaska and regions, when available, as well as childhood immunization rates. Regional Alaska Native rates of sexually transmitted infections (as represented by chlamydia and gonorrhea) are comparable to or lower than state Alaska Native rates, while the more urban Anchorage region has rates higher than the state average (ANTHC 2017k, l). However, state and regional Alaska Native sexually transmitted infections rates are two or more times the rates of non-Alaska Native state rates, and three or more times the national rates for whites. Childhood immunization rates in Bristol Bay Borough are lower than state and national rates.

Table K3.10-3: Food, Nutrition, and Subsistence (HEC 4)

Determinant	Data Period	Lake and Peninsula Borough	Dilingham Census Area	Bristol Bay Borough	Alaska	National
Adults Who Have a Subsistence Lifestyle (percent)	2009-2015	78.5 (all races)	79.5 (all races)	74.1 (all races)	30.5 (all races)	--
Adults Who Eat Less Than Five Daily Servings of Fruit and Vegetables (percent)	2007-2015	81.2 (all races)	81.0 (all races)	90.8 (all races)	78.6 (all races)	--
Adults Who Consume One or More Sugar-Sweetened Beverages or Soda (percent)[a]	2011-2015	37.7 (all races)	48.6 (all races)	25.3 (all races)	30.5 (all races)	--
Families Below the Federal Poverty Level Threshold (percent) By Individual Potentially Affected Communities (percent; all races)	2012-2016 (unless otherwise noted)	15.2 (all races) Kokhanok—28.6 Nondalton—25.0 Newhalen—23.5 Levelock—14.3 Iliamna—9.1 Port Alsworth—5.6 Igiugig—0 Pedro Bay—0	14.8 (all races) New Stuyahok—28.1 Ekwok—16.7 Koliganek—5.7	4.3 (all races)	23.2 (2011-2015; AN)	12.1 (2011-2015; whites)

Notes:
-- = Not Available
AN = Alaska Native
Subsistence lifestyle and nutrition determinants are self-reported, and subsistence lifestyle was defined by the respondents
[a]Sugar-sweetened beverages or sodas do not include 100% fruit juice, diet drinks, or artificially sweetened drinks
The federal poverty threshold is updated for inflation, but does not vary geographically, and is based on pre-tax income (ANTHC 2017a)
Sources: McDowell 2018a, b; ANTHC 2017a

Table K3.10-4: Infectious Diseases (HEC 5)

Infectious Disease Indicators (Period)	Bristol Bay Region	Kenai Region	Anchorage/ Mat-Su Region	Alaska	National
Influenza and Pneumonia (mortality age-adjusted rate per 100,000 population) (2012-2015)	--	--	--	21.3 (AN) 9.9 (non-AN)	15 (White)
Tuberculosis (rate per 100,000 population) (2016)	--	--	--	37 (AN) 7.7 (all races)	2.9 (all races)
Chlamydia Cases (age-adjusted rate per 100,000 population) (2015)	1,728.3 (AN)	873.8 (AN)	2,504.4 (AN)	1,653.8 (AN) 452.3 (non-AN)	187.2 (White)
Gonorrhea Cases (age-adjusted rate per 100,000 population) (2015)	169.4* (AN)	184.5* (AN)	792.2 (AN)	436.7 (AN) 70.6 (non-AN)	44.2 (White)
Immunization Rate for Alaskan Children (percent) (2015, unless noted)	40.0 Bristol Bay Borough (all races; 2016)	--	--	75.1 (AN) 66.3 (all races)	72.7 (White)

Notes:
-- = Not Available
* = rate based on less than 20 cases/counts (may not be statistically reliable)
AN = Alaska Native
Mat-Su = Matanuska-Susitna
The Bristol Bay Region includes the LPB, the Dillingham Census Area, Bristol Bay Borough, and surrounding area. Kenai Region includes KPB and surrounding area
Sources: ANTHC 2017a, k, l, m; ADHSS 2017b, 2018; McDowell 2018b

Some regional rates (mortality from influenza and pneumonia, and tuberculosis rates, as well as immunization rates in the Kenai and Anchorage regions) are not readily available. However, deaths from infectious disease were not rated among the top three leading causes of deaths reported for the Bristol Bay, Kenai, or Anchorage regions (ADHSS 2017a; McDowell 2018b). Therefore, the lack of regional infectious disease rates might be due to the low state rates (ADHSS 2017a; ANTHC 2017i), privacy concerns, and/or tracking or reporting methodology.

K3.10.6 HEC 6: Water and Sanitation

The lack of safe water supply (i.e., running water) and suitable sewage disposal can represent a major public health and community development problem. The project would develop, operate, and maintain its own water supply and water treatment facilities. Lack of in-home water and sewer service may cause severe skin infections and respiratory illnesses. Prior to 2004, a large portion of rural Alaska communities were classified as "unserved Rural Alaska Communities," which is defined as a community having 45 percent or more homes that are not served by central wells, and have a mix of central sewage plumbing, septic systems, honey buckets, and outhouses.

In 2016, 83.5 percent of rural Alaska Native communities were served by water and sewer services (a significant increase since 2004). In the Bristol Bay Region (which includes Bristol Bay Borough, Dillingham Census Area, and LPB), 99 percent of households had water and sewer services. In the Kenai Peninsula, service was 100 percent (ANTHC 2017n). However, as discussed in Section 3.3, Needs and Welfare of the People—Socioeconomics, for rural communities that have water and sanitary service systems, operating and maintaining the systems are challenged by the high cost of energy, lower populations to support higher-than-average maintenance costs, and a shortage of experienced maintenance operators (ASCE 2018). See Section 3.3, Needs and Welfare of the People—Socioeconomics, for further details on water, sewer, and solid waste.

K3.10.7 HEC 7: Non-Communicable and Chronic Diseases

Non-communicable and chronic diseases consume a large part of healthcare resources and affect the overall health status of a population. The incidence of such disease is typically associated with multiple contributing factors, including genetics, lifestyle and socioeconomic status, and trends, which may be relatively slow to show increases or decreases. In the context of evaluating an individual project, it may be difficult to attribute a single project-related cause to changes in disease incidence. However, community-wide changes, such as increases in employment rates and economic security or access to healthcare, may result in improved health outcomes related to chronic diseases. Therefore, understanding baseline rates of non-communicable and chronic diseases helps to inform a better understanding of overall community health status, although the impacts related to a single project may not be easily defined.

Similar to state-wide trends, the three recent leading causes of death due to non-communicable and chronic diseases for the potentially affected communities were cancer and heart disease (at community, borough/census area, and regional levels), as well as chronic obstructive pulmonary disease, including chronic lower respiratory disease, at regional level (ADHSS 2017a; ANTHC 2017a, i; McDowell 2018a, b). Table K3.10-5 presents the recent average age-adjusted non-communicable and chronic disease mortality (death) rates for the three leading regional causes, as well as percentage of Medicare recipients with Alzheimer's disease/dementia, and several chronic disease contributing factors.

Heart disease rates (per 100,000 individuals) in the Iliamna Lake/Lake Clark communities, Nushagak/Bristol Bay communities, and LPB are higher than Anchorage and state rates (McDowell 2018b; ADHSS 2017a; ANTHC 2017a, i, p). Overall cancer death rates (per 100,000 individuals) in the Iliamna Lake/Lake Clark communities and LPB are higher than Nushagak/Bristol Bay communities, as well as Anchorage and state rates, which were all fairly similar (McDowell 2018b; ADHSS 2017a; ANTHC 2017a, i, o). Looking at specific cancers, colorectal cancer is higher in the LPB than Dillingham Census area and state rates; while lung and bronchus cancer deaths are lower in the LPB and Dillingham Census area when compared to state rates (McDowell 2018b). Cancer incidence is variable, but generally similar between the regions, state, and national rates; with the exception of lower incidence in the Dillingham Census Area (colorectal as the leading type) and higher in the Kenai Peninsula Region (McDowell 2018b). Although Kenai Peninsula and Anchorage regions have chronic obstructive pulmonary disease rates lower than state levels, the Bristol Bay region has much higher rates than the state (ANTHC 2017a, q).

Table K3.10-5: Non-Communicable and Chronic Diseases (HEC 7)

Disease Type and Metric	Date Period	Iliamna Lake/ Lake Clark Communities	Nushagak/Bristol Bay Communities	Lake and Peninsula Borough	Dillingham Census Area	Bristol Bay Borough	Bristol Bay Region	Kenai Peninsula Region	Anchorage/ Mat-Su Region	Alaska	National
Cancer Deaths (age-adjusted rate per 100,000 population)	2012-2015 (unless noted)	320[c,e] (all races; 2012-2016)	230[c,e] (all races; 2012-2016)	340[a,e] (all races; 2012-2016) 229.3[a] (all races; 2005-2014)	160[b,e] (all races; 2012-2016) 196.4[a] (all races; 2005-2014)	140[c,e] (all races; 2012-2016) 273.7[a] (all races; 2005-2014)	232.4 (AN)	203.1 (AN)	259.2 (AN)	242.7 (AN) 154.5 (non-AN) 175.7 (all races; 2005-2014)	164 (White)
Colorectal	2005-2014	--	--	107.7	73.9	--**	--	--	--	43.1	--
Lung and bronchus	2005-2014	--**	--**	48.5	38.2	--**	--	--	--	59.9	--
Cancer Incidence (age-adjusted rate per 100,000 population)	2010-2014 (unless noted)	--	--	511.9 (all races)	359.9 (all races)	442.7 (all races)	443.4 (AN; 2012-2015)	586.0 (AN; 2012-2015)	526.5 (AN; 2012-2015)	427.0 (all races) 498.9 (AN)	450.3 (White)
Female breast	2010-2014	--	--	--**	--**	213.7	--	--	--	125.6	--
Colorectal	2010-2014	--	--	107.7	107.7	--**	--	--	--	43.1	--
Heart Disease Deaths (age-adjusted rate per 100,000 population)	2012-2015 (unless noted)	280[c] (all races; 2012-2016)	330[c] (all races; 2012-2016)	410[a] (all races; 2012-2016)	190[b] (all races; 2012-2016)	140[c] (all races; 2012-2016)	262.6 (AN)	264.3 (AN)	226.1 (AN)	208.2 (AN) 133.3 (non-AN)	167.7 (White)
Chronic Obstructive Pulmonary Disease Deaths (age-adjusted rate per 100,000 population)	2012-2015	--	--	--	--	--	91.3[c] (AN)	56.3[c] (AN)	61.2 (AN)	68.0 (AN) 35.2 (non-AN)	44.0 (White)
Alzheimer's Disease/ Dementia (percent of Medicare Beneficiaries)	2015	--	--	--	8.2	5.6	--	--	--	7.1	--
Chronic Disease Contributing Factors											
Adult Overweight (percent with a BMI of 25 to 29.9)	2010-2014 (unless noted)	--	--	70.0 (all races; 2011-2015)	71.3 (all races; 2011-2015)	84.7 (all races; 2011-2015)	38.6 (AN)	37.8 (AN)	35.0 (AN)	34.9 (AN)[d] 38.2 (White)[d]	35.9 (White)
Adult Obesity (percent with a BMI of 30 or more)	2010-2014 (unless noted)	--	--				35.1 (AN)	36.3 (AN)	37.4 (AN)	35.2 (AN)[d] 26.9 (White)[d]	26.4 (White)
Adult Physical Activity (percent who meet recommended weekly activity)	2011-2013	--	--	--	--	--	36.9 (AN)	11.3 (AN)	17.5 (AN)	18.5-18.7 (AN) 24.6-26.4 (White)	20.4-20.9 (all races)
Adults Who Believe Get Enough Physical Activity (percent)	2011-2015	--	--	74.3 (all races)	57.2 (all races)	73.2 (all races)	--	--	--	52.0 (all races)	--
Adult Current Smoking (percent who have had 100+ cigarettes and currently smoke)	2010-2014 (unless noted)	--	--	29.1 (all races; 2011-2015)	34.8 (all races; 2011-2015)	27.8 (all races; 2011-2015)	45.3 (AN)	33.9 (AN)	31.1 (AN)	36.4 (AN) 18.3 (White) 20.5 (all races; 2011-2016)	19.0 (White)
Adult Formerly Smoked (percent who had 100+ cigarettes)	2011-2015	--	--	28.3 (all races)	25.9 (all races)	30.1 (all races)	--	--	--	27.5 (all races)	--
Adult Current Smokeless Tobacco Use (percent currently use smokeless tobacco product)	2010-2014	--	--	--	--	--	15.0 (AN)	14.8 (AN)	6.7 (AN)	12.8 (AN) 3.8 (White)	3.4 (2014, all races)
Adult Ever Used Chewing Tobacco (percent)	2011-2015	--	--	29.5 (all races)	30.5 (all races)	35.5 (all races)	--	--	--	21.0 (all races)	--

Notes:
-- = Not Available   ** = Data suppressed due to fewer than six cases   AN = Alaska Native   BMI = Body Mass Index   Mat-Su = Matanuska-Susitna
[a] LPB, excluding the eight Iliamna Lake/Lake Clark communities
[b] Dillingham Census Area, excluding the three Nushagak/Bristol Bay communities
[c] Rate based on fewer than 20 cases/counts (may not be statistically reliable)
[d] Alaska-wide and all races, 66.1 percent of adults are overweight/obese (2011-2015)
[e] Malignant neoplasms (cancerous tumors)
Iliamna Lake/Lake Clark communities include Port Alsworth, Newhalen, Kokhanok, Nondalton, Iliamna, Levelock, Iguigig, and Pedro Bay
Nushagak/Bristol Bay communities include New Stuyahok, Koliganek, and Ekwok
Other surrounding potentially affected communities, such as Dillingham, are represented in the information provided for the larger area in which they reside (Dillingham Census Area, Bristol Bay Borough, and KPB)
The Bristol Bay Region includes the LPB, the Dillingham Census Area, Bristol Bay Borough, and surrounding area. Kenai Region includes Kenai Borough and surrounding area
Recommended physical activity defined as 150 minutes of moderate-intensity activity or 75 minutes vigorous-intensity activity, or an equivalent combination, each week per Center for Disease Control's 2008 Physical Activity Guidelines for Americans
Sources: ANTHC 2017a, o, p, q, r, s, t, u, v; CDC 2016; McDowell 2018a, b

Cancer was one of the top two causes of death in the LPB, while cancer and heart disease were the top two causes of death in the Dillingham Census Area. The three types of cancer with the highest incidence were colon/rectum (17.9 percent), lung (17.2 percent), and breast (15.1 percent) (ANTHC 2017a, o). The highest rate (per 100,000 individuals) of cancer incidence is colorectal cancer in the LPB (107.7 percent) and Dillingham Census Area (107.7 percent), while the highest rate of cancer incidence is breast cancer in Bristol Bay Borough (213.7 percent) (McDowell 2018b). Colorectal cancer and lung and bronchus cancer had the highest cancer mortality rates per 100,000 individuals in the LPB (107.7 and 48.5 percent, respectively), and the Dillingham Census Area (73.9 and 38.2 percent, respectively). Most of these cancer incidence and mortality rates appear higher than those reported for Alaska overall, with a colorectal cancer incidence rate of 43.1 percent, female breast cancer incidence rate of 125.6 percent, and colorectal cancer mortality rate of 43.1 percent; but Alaska's lung and bronchus cancer mortality rate (59.9 percent) is higher (McDowell 2018b; ADHSS 2017a; ANTHC 2017a, i, o).

Chronic disease contributing factors include, but are not limited to weight, physical activity, smoking, and tobacco use. In general, the LPB and Dillingham Census Area have fairly similar rates of adults who are overweight and obese (i.e., a Body Mass Index above 25) compared to the state, while Bristol Bay rates were higher in comparison. The LPB and Bristol Bay Borough self-report much higher percentages of believing they get enough physical activity compared to Alaska overall, while the Dillingham Census Area self-reports rates only slightly above Alaska overall (McDowell 2018b). In general, smoking and tobacco use rates of current smokers, and adults who have used chewing tobacco, are higher in the LPB, the Dillingham Census Area, and Bristol Bay Borough in comparison to state levels.

K3.10.8 HEC 8: Health and Safety Services Infrastructure and Capacity

An important measure of the health-related resilience and support structure of a community is the quality and quantity of healthcare and safety services that are available to the residents. In the context of evaluating project impacts to health, the capacity of existing healthcare and safety services to accommodate baseline health care and safety needs, as well as the healthcare and safety needs of populations that may migrate in or emergency incidents that may occur during project activities may be of concern. For example, if a project is in an area that is already underserved with regard to healthcare services, the addition of more workers who may need to use the services may further strain an already overloaded system. In many cases, project proponents may commit to operating their own healthcare facilities to serve their employees, thereby avoiding any demands on the local systems.

Health Services—The LPB and Bristol Bay Borough report lower or similar access to health plans, medical care, and a personal doctor compared to Alaska overall, but higher medical costs. The Dillingham Census Area reports lower or similar access to medical care, access to a doctor, and medical cost, but reports higher access to health plans than seen in Alaska overall (McDowell et al. 2011a).

These health services findings are summarized on a more regional basis in Section 3.3, Needs and Welfare of the People—Socioeconomics. Healthcare services generally include small local clinics operated by regional providers. Access to the region and most of its communities is limited to small aircraft and boat.

Relatively up-to-date and complete information on baseline health services infrastructure and capacity is available for the eight Iliamna Lake/Lake Clark communities in the LPB, and the three Nushagak/Bristol Bay communities in the Dillingham Census Area, for the LPB, Dillingham Census Area, and Bristol Bay Borough (McDowell Group 2018b). All these communities, with the exception of Port Alsworth, have a health clinic served by 1 to 5 health aides.

Hospitalizations—Hospitals in the area serve a variety of adult and pediatric needs for the surrounding communities. In 2015, the statewide leading causes of diagnosed hospitalizations were pregnancy/childbirth, respiratory diseases, and digestive system diseases (ANTHC 2016d). The following summarizes the leading causes of hospitalizations in 2016 (ADHSS 2017c) and 2017 (McDowell Group 2018b):

- Statewide: Pregnancy/childbirth, newborn/neonate conditions, and musculoskeletal/ connective tissue diseases in 2016. Childbirth, septicemia (except in labor), and osteoarthritis in 2017.
- Southwest Region (includes the LPB, the Dillingham Census Area, and Bristol Bay Borough): Pregnancy/childbirth, newborn/neonate conditions, and respiratory diseases in 2016.
  - o LPB: Childbirth and other complications of birth, including postpartum care of mother in 2017.
  - o Dillingham Census Area: Childbirth, septicemia (except in labor), pneumonia (except that caused by tuberculosis or sexually transmitted diseases), and alcohol-related disorders in 2017.
  - o Bristol Bay Borough: Childbirth and alcohol-related disorders in 2017.
- Gulf Coast Region (includes Kenai Peninsula): Musculoskeletal/connective tissue diseases/disorders, pregnancy/childbirth, and newborn/neonate conditions in 2016.
- Anchorage: Pregnancy/childbirth, newborn/neonate conditions, and musculoskeletal/ connective tissue diseases/disorders in 2016.

Although there are some variations in the top three leading causes of hospitalizations by year and region, pregnancy/childbirth and newborn/neonate and/or complications of pregnancy and childbirth or newborn/neonate conditions are consistently the leading causes.

Adequacy of Health Services—Areas may be designated as having health impact issues for the adequacy of health services, designated as a Health Professional Shortage Area (HPSA) and/or a Medically Underserved Area/Population (MUA/P). HPSA designation may be due to a shortage of primary medical care, dental, or mental health providers; while MUA/P designation may include groups of persons who face economic, cultural, or linguistic barriers to healthcare (HRSA 2018). The LPB (with the eight communities closest to the project), the Dillingham Census Area (with the three other communities geographically close to the project), Bristol Bay Borough, Kenai Peninsula, and Anchorage are all designated as MUA/P (Dillingham Census Area and Kenai Peninsula Borough are designated MUA/P—governor's exception). Table K3.10-6 presents the HPSA ratings (out of 26) for these regions. The rating is used to establish the communities with the greater needs per shortage area, indicated by those communities with higher HPSA ratings.

It should be noted that these designations are most directly comparable when the populations are similar; otherwise, a relatively low population area such as the LPB may appear to have less "need" than a densely populated area, when the difference may be more due to the population disparity than the actual "need." Furthermore, comparing a community to a larger region or state would not be meaningful because the region or state value represents a sum total that includes the communities.

Table K3.10-6: Health Professional Shortage Area Ratings

Shortage Area	Lake and Peninsula Borough	Bristol Bay Borough	Dillingham Cenus Area	Kenai Peninsula Borough	Anchorage Borough
Primary Care	--	15 to 17	13 to 17	8 to 18	3 to 21
Dental Care	16	0 to 16	16 to 20	6 to 23	6 to 20
Mental Health	14	14 to 16	14 to 20	15 to 21	6 to 20

Note:
-- = Not listed.
Source: HRSA 2018

Public Safety Services—Up-to-date information on baseline public safety services infrastructure is available for the eight Iliamna Lake/Lake Clark communities in the LPB and the three Nushagak/Bristol Bay communities in the Dillingham Census Area (McDowell 2018a). Table K3.10-7 summarizes the number of village public safety officers (VPSOs), village police officers (VPO), ambulances, and fire trucks, as well as the number of emergency medical technicians (EMTs) and emergency trauma technicians (ETTs) serving these communities in 2018. Overall, these communities have lower access to safety services than larger nearby communities, such as the city of Dillingham, which has a police department and a hospital (McDowell 2018a, b), and Anchorage. Communities without a VPSO or VPO rely on Alaska State Trooper coverage.

Table K3.10-7: Safety Services

Public Safety Infra-structure	Port Alsworth	Newhalen	Kokhanok	Nondalton	Iliamna	Levelock	Igiugig	Pedro Bay	New Stuyahok	Koliganek	Ekwok
VPSO	0	0	0	0	0	0	0	0	1	1	0
VPO	--	--	--	--	--	--	--	--	1	--	--
Ambulances	0	1	0	1	1	0	1	1	1	0	0
Fire Trucks	0	1	0	1	1	1	1	0	0	0	0
EMT	0	3	--	5	3	0	0	1	1	4	0
ETT	--	--	10	--	--	--	--	--	--	--	--

Notes:
-- = Not Available
VPSO = Village public safety officer
VPO = Village police officer
EMT = Emergency medical technician
ETT = Emergency trauma technician
Communities without a VPSO or VPO rely on Alaska State Trooper coverage
Larger nearby communities have a more robust safety infrastructures, such as Dillingham City, which has a police department
Source: McDowell 2018a