



A. INTRODUCTION

Public health is the science of protecting and improving the health of people and their communities. Work in this area is achieved by:

- Promoting healthy lifestyles
- Researching disease and injury prevention
- Detecting, preventing and responding to infectious diseases.

Overall, public health is concerned with protecting the health of entire populations, as small as a local neighborhood, or as big as an entire country or region of the world. As such, many experts agree that an assessment of public health must include traditional measures of mortality, as well as disabilities engendered by diseases; or, in other words, consideration of epidemiological risk factors for disease that are influenced by social conditions, such as the neighborhood and communities where people most at risk reside.

The focus of this section is to present information related to certain indicators of public health in the study area cities and comparative geographies, between 1997 and 2019, as well as isolate possible effects from Seattle-Tacoma International Airport operations that may have contributed to adverse circumstances.

Indicators

The scope of work for this study identified statistics related to the following indicators as appropriate measures of public health in the subject area cities: morbidity and mortality, hearing and auditory dysfunction, respiratory disease, cardiovascular disease, neurological disease, and cancer. However, based on information and data sources that monitor and analyze factors associated with this aspect of community quality, it was necessary to address them in the context of the following subject areas.

- Leading causes of death
- Injury and violence-related mortality
- Health risk factors and chronic disease
- Life expectancy (at birth)
- Maternal and child health
- Access to care and preventive services.

The discussion that follows includes a description and analyses of: each of the above indicators; positive, neutral and negative public health effects; comments received from individuals and representatives involved in the study process, along with clarifying responses; and recommendations for ongoing investigation, as well as possible strategies to mitigate adverse influences.

B. LEADING CAUSES OF DEATH

According to the Centers for Disease Control and Prevention (commonly known as CDC) in an August 2016 National Center for Health Statistics Data Brief, the mortality burden of cancer has surpassed that of heart disease in several states. (Rankings are based on the number of deaths and reflect mortality burden rather than risk of death.)

In 2000, there were only two states (Alaska and Minnesota) where cancer was the leading cause of death; in 2014, there were 22. Cancer is also now the leading cause of death for the non-Hispanic Asian or Pacific Islander populations, with the timing varying by group, and it replaced heart disease as the leading cause of death for the Hispanic population in 2009.

Heart disease, on the other hand, remains the leading cause of death for the non-Hispanic white and non-Hispanic black populations, with cancer the second leading cause. In fact, among non-Hispanic black persons, they were more than twice as likely as non-Hispanic Asian or Pacific Islander persons to die of heart disease between 1999 and 2017. Risk factors contributing to high rates of heart disease include hypertension, obesity, diabetes and high total cholesterol. Non-Hispanic black adults, 20 years and older, were the most likely among these groups to suffer from all of these, except high total cholesterol.

Cancer

Incidents have decreased overall between 2012 and 2016, however, the rate per 100,000 population is higher in the study area than in King County or in other areas. The exception was the rate of cancer in Vashon Island in 2012, which was close to the study area rate. Study area 2016 rates are close to those for Washington state and slightly higher than the U.S. national rate.

Figure 12.1
Death Rate Per 100,000 Population for Cancer (2012-2016)

xxx better than King County
 xxx equal to King County
 xxx worse than King County

Area		Cancer	
		2012	2016
Study Area Cities	City of Burien	170.4	159.2
	City of Des Moines	184.9	140.6
	City of Federal Way	180.6	168.6
	City of Normandy Park	184.9	140.6
	City of SeaTac	179.3	163.5
	City of Tukwila	179.3	163.5
Other Areas	Vashon Island	185.3	129.0
	Mercer Island/Point cities	185.3	116.6
State and National	Washington State	170.4	162.5
	United States	166.5	152.5
King County		159.2	150.5

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

Heart disease

Incidents have decreased overall between 2012 and 2016, however, the rate per 100,000 population is higher in the study area than in King County or in other areas, and increased in Des Moines, Normandy Park, SeaTac, and Tukwila. Incidents in all study area cities is above the average for King County and other areas. Study area 2016 rates are close to those for Washington state and slightly higher than the U.S. national rate.

Figure 12.2
Death Rate Per 100,000 Population for Heart Disease (2012-2016)

xxx better than King County xxx equal to King County xxx worse than King County

Area		Heart Disease	
		2012	2016
Study Area cities	City of Burien	150.3	150.1
	City of Des Moines	138.9	156.8
	City of Federal Way	171.2	157.4
	City of Normandy Park	138.9	156.8
	City of SeaTac	140.5	146.8
	City of Tukwila	140.5	146.8
Other Areas	Vashon Island	121.9	100.8
	Mercer Island/Point cities	83.6	79.9
State and National	Washington State	150.3	142.3
	United States	170.5	165.0
King County		138.2	127.2

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

Alzheimer's disease

Incidents have decreased slightly between 2012 and 2016 in King County. The study area remained relatively stable from 2012 to 2016, with only SeaTac and Tukwila reporting lower rates than King County. Study area 2016 rates are lower than the rates for Washington state and the U.S.

Figure 12.3
Death Rate Per 100,000 Population for Alzheimer's Disease (2012-2016)

xxx better than King County xxx equal to King County xxx worse than King County

Area		Alzheimer's Disease	
		2012	2016
Study Area cities	City of Burien	26.7	29.5
	City of Des Moines	45.0	57.3
	City of Federal Way	72.3	24.7
	City of Normandy Park	45.0	57.3
	City of SeaTac	27.6	26.9
	City of Tukwila	27.6	26.9
Other Areas	Vashon Island	30.8	34.5
	Mercer Island/Point cities	33.3	29.8
State and National	Washington State	26.7	44.0
	United States	23.8	31.0
King County		42.3	41.1

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

Chronic lower respiratory disease

Incidents have decreased slightly overall between 2012 and 2016. The study area's rates remain generally higher than King County with the exception of Normandy Park (2012 only). Rates are lower for Vashon Island and Mercer Island/Point cities. Study area 2016 rates are slightly higher than those for Washington state and the U.S.

Figure 12.4
Death Rate Per 100,000 Population for Chronic Lower Respiratory Disease (2012-2016)

xxx better than King County
 xxx equal to King County
 xxx worse than King County

Area		Chronic Lower Respiratory Disease	
		2012	2016
Study Area cities	City of Burien	43.0	35.8
	City of Des Moines	31.5	30.9
	City of Federal Way	47.5	46.9
	City of Normandy Park	31.5	30.9
	City of SeaTac	44.4	43.0
	City of Tukwila	44.4	43.0
Other Areas	Vashon Island	21.2	21.2
	Mercer Island/Point cities	20.3	13.4
State and National	Washington State	43.0	40.8
	United States	41.5	40.9
King County		32.2	29.7

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

Stroke

Incidents have decreased overall between 2012 and 2016, with only the cities of SeaTac and Tukwila showing increased rates during the same period. The study area's rates are close to those found in King County, except for Des Moines, which was lower. Rates are also lower for Vashon Island and Mercer Island/Point cities. Study area 2016 rates are close to those for Washington state and the U.S.

Figure 12.5
Death Rate Per 100,000 Population for Stroke (2012-2016)

xxx better than King County
 xxx equal to King County
 xxx worse than King County

Area		Stroke	
		2012	2016
Study Area cities	City of Burien	38.4	32.9
	City of Des Moines	35.9	28.2
	City of Federal Way	43.4	37.6
	City of Normandy Park	35.9	28.2
	City of SeaTac	30.9	34.6
	City of Tukwila	30.9	34.6
Other Areas	Vashon Island	26.2	21.9
	Mercer Island/Point cities	35.3	26.9
State and National	Washington State	38.4	35.5
	United States	36.9	37.6
King County		36.6	31.4

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

Accidents and external Causes

Incidents have decreased slightly overall between 2012 and 2016, with 2016 study area rates only slightly above King County rates. Rates increased for Vashon Island, with a rate consistent with the study area. The Mercer Island/Point cities rate, while increasing from 2012 to 2016, remained far lower than King County and the study area. Study area 2016 rates are consistent with those for Washington state but lower than those for the U.S.

Figure 12.6
Death Rate Per 100,000 Population for Accidents and External Causes (2012-2016)

xxx better than King County
 xxx equal to King County
 xxx worse than King County

Area		Accidents and External Causes	
		2012	2016
Study Area cities	City of Burien	45.1	32.2
	City of Des Moines	39.0	31.9
	City of Federal Way	28.2	32.3
	City of Normandy Park	39.0	31.9
	City of SeaTac	38.4	37.6
	City of Tukwila	38.4	37.6
Other Areas	Vashon Island	23.7	38.8
	Mercer Island/Point cities	17.7	21.0
State and National	Washington State	45.1	38.4
	United States	39.1	49.4
King County		31.7	30.7

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

As with national trends, the two leading causes of death in the study area cities and King County have been and continue to be cancer and heart disease, followed by Alzheimer’s disease, chronic lower respiratory disease, stroke and accidents (not necessarily in this order).

Between the cities, all but Mercer Island/Point cities exceeded the King County rate for cancer in 2012, and all but Vashon Island and Mercer Island/Point cities (two communities located north of the study area) exceeded the county rate that same year for heart disease. In no other category did rates of illness so conclusively exceed those of the county.

Among the study area cities, the highest incidence of cancer in 2012 was reported in Vashon Island, and in 2016 in SeaTac and Tukwila. Occurrences of heart disease in 2012 were the highest in Burien in 2012, and Federal Way in 2016.

While occurrences of cancer and heart disease in the study area cities and King County declined between 2012 and 2016, rates within all but Des Moines, Normandy Park, Vashon Island and Mercer Island/Point cities exceeded those of King County. Conversely, rates of heart disease in 2016 increased in Des Moines, Normandy Park, SeaTac, and Tukwila. 2016 also saw increases in Alzheimer’s disease and accidents in select cities, and strokes in SeaTac and Tukwila.

Whereas figures published by the CDC demonstrate that some ethnic groups can be more prone to certain illnesses, for the purpose of this analysis, information regarding the ethnic profile of the study area cities were cross-referenced with illness and mortality data.

Based on the ethnic profile of each of the cities in 2017:

- Normandy Park appears to be the least ethnically diverse with fewer than 13% of their residents identifying as something other than Caucasian white. Among the study area cities, Normandy Park is the only community with a less diverse ethnic profile than King County.

- The cities of Tukwila and SeaTac appear to be the most diverse with nearly 70% identifying as something other than Caucasian white.
- Approximately 40% of King County residents identify as something other than Caucasian white.

With regard to ethnicity in the context of a public health discussion, what is most important is the number of individuals within specific ethnic groups who have a higher propensity to contract specific illnesses, not just ethnicity in general. As explained above, non-Hispanic blacks are significantly more prone to developing heart disease than other ethnic groups (Section 13 shows that Federal Way maintains the largest concentration of this group of individuals and is also the city with the highest concentration of this illness).

Also explained above, Asians are most likely to develop cancer. Tukwila has the largest concentration of individuals in this group in the study area and also has the highest concentration of cancer.

Airport-related health effects

A 2015 study by the New Jersey Institute of Technology (NJIT) reported identifying “significant and growing emissions of air pollution, including air toxics” from airports across the country. It explained that pollutants emitted by airports include lead, nitrogen oxides, particulate matter, sulfur oxide and volatile organic compounds (VOCs), some of which are classified as air toxins by U.S. EPA. The area most affected was reportedly was nine miles around the respective airport, wherein pollutants were found to be 10 times higher than in areas outside this zone.

At the time this study was conducted, Seattle-Tacoma International airport was found to be a “top polluter with carbon monoxide levels exceeding federal guidelines.” A recommendation resulting from NJIT’s work included advocating for regulators to reduce the sulfur content of aviation fuel for large commercial aircraft.

Another article that appeared in the Los Angeles Times reported on an air quality study related to “high levels of potentially harmful exhaust particles from jets using Los Angeles International airport” disputed the assumption that a nine-mile area around an airport was the most affected. That study detected a broad swath of contamination in an area up to 10 miles east of the runways. Claiming to be the most comprehensive of its type, the study this article reported on found that takeoffs and landings at LAX are a major source of ultrafine particles. It also likened emission levels from airplane exhaust around LAX to those of many of Los Angeles’s freeways.

To put that in perspective, there are 930 miles of freeway in Los Angeles County, where LAX is located. Scientists have concluded that, “LAX should be considered one of the most important sources of [particle matter] pollution in Los Angeles whereas particles can become embedded in the lungs and enter the bloodstream, worsen existing lung conditions such as asthma and chronic obstructive pulmonary disease (COPD), and contribute to the development of heart disease.”

These study findings were thought to raise health concerns particularly because of the nature of what they describe as “minute particles resulting from the condensation of hot exhaust vapor, similar to those from cars, diesel trucks and aircraft, and their potential to aggravate heart and lung conditions, including asthma and the development of blocked arteries.” In addition, the study authors warned that while emissions of larger exhaust particles are regulated, ultrafine particles are not.

The 1997 study drew no conclusion regarding the need for additional health care services resulting from expansion of Seattle-Tacoma International Airport’s facilities and operations but did acknowledge concern among participants in the study process regarding potential health care related effects. The 1997 study concluded that:

“Factors impacting the cities’ needs for community services and facilities as a result of the Third Runway could come from several sources.”

Further, in terms of psychological factors, it stated that these would have their greatest effect on families and students. Effects on students are presented in the context of a larger discussion about airport-related effects on school facilities and school populations, later in this section.

Despite drawing no conclusions regarding health-related effects resulting from proximity to the airport, the 1997 study did cite the following finding from a Rutgers University study prepared by professors Michael Greenberg and Dana Schneider:

“Airports are associated with traffic jams, airplane crashes, and extraordinarily high levels of noise. When present, low-flying aircraft are an even more distressing source of noise than motor vehicles on highways. Jets, especially jumbo jets that cannot rise quickly, create an extremely high decibel level and a whining sound upon takeoff. Unlike a highway where the noise is relatively continuous and can often be masked by sound barriers and air conditioning, airport noise is discontinuous and is virtually impossible to mask. In addition to task interference and uncontrollable physiological changes observed in people living near highways, those residing near airports suffer from feelings of helplessness and lack of control.”

A final study identified in the context of this effort, the findings of which were publicized in the International Journal of Environmental Research and Public Health in August 2018, identified possible health consequences resulting from the aviation industry’s use of automated flight systems. NextGen, one of these systems, was described as using GPS data from other flights, as well as atmospheric conditions, to optimize flight patterns. At that time, it had been implemented throughout the U.S., including at Seattle-Tacoma International airport, to “reduce pollution, flight time, costs and accidents due to human error.” The study specifically investigated possible health effects to the neighborhoods around LaGuardia Airport in New York resulting from flight patterns dictated by NextGen. The methodology employed was predicated on findings from other studies that found “high levels of exposure to aircraft noise had been linked to development of serious physical and mental health conditions such as cardiovascular disease (CVD) and anxiety.” It also assumed that while additional adverse conditions can result from loud and sustained aircraft noise, among them a lack of sleep, productivity and educational outcomes, due to a lack of verifiable data, the authors would focus on CVD and anxiety. Conclusions from the study found that automated flight systems like NextGen do in fact reduce atmospheric pollution, increase productivity through reduced flight time, and increases in the timely delivery of products and services. However, it also found there to be an increase in disability and death, at least among individuals in the geographies where flights were most concentrated.

In order to understand the magnitude of effect related to NextGen on the study area cities, assuming the findings revealed in the LaGuardia Airport study are accurate, an analysis of flight patterns as measured by the Port’s 24 noise monitors was conducted. That work revealed that approximately 88% of the recorded flights affected the study area cities. Of those flights, 90% were flown at a height below 3,000 feet and 83% above 3,000 feet.

C. INJURY AND VIOLENCE-RELATED MORTALITY

According to the National Center for Injury Prevention and Control of the CDC and U.S. Census Bureau, Washington state is in the 6th percentile for number of age-adjusted death rates per 100,000 population due to injury or suicide among all races and ethnic groups. As reflected in Figure 12.7, the number of motor vehicle accidents in all of the study area cities and two additional cities located north of the airport were higher than King County. Between 2012 and 2016, homicides and deaths from firearms either declined or remained steady in all of the cities except for Burien, as well as King County.

Falls, on the other hand, increased between these two years in all of the cities except Burien. The single outlier in terms of an improved conditions among injury and violence-related causes of death were incidents of suicides. Between 2012 and 2016, the rate of suicides increased in King County, as well as every city in the area except for Tukwila.

Burien also experienced the highest rate of motor vehicle accidents in 2012, Vashon Island the highest rate of falls, SeaTac and Tukwila the highest occurrence of suicides and homicides, and Des Moines and Normandy Park the highest frequency of deaths by firearms. Rankings in 2016 remained constant for motor vehicle accidents and falls, but Vashon Island exceeded all of the other cities in the number of suicides and number of deaths due to firearms, while Burien barely topped the others in terms of numbers of homicides.

Figure 12.7
Injury and Violence-Related Mortality Rate Per 100,000 Population for
Select cities In and Including King County (2012-2016)

xxx better than King County
 xxx equal to King County
 xxx worse than King County

Area	Motor Vehicle Accidents		Falls		Suicide		Homicide		Firearms	
	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016
City of Burien	11.1	7.7	9.8	8.1	11.6	11.7	3.8	4.9	8.0	9.7
City of Des Moines	9.1	4.4	8.6	10.5	12.3	15.0	5.5	4.5	11.1	9.5
City of Federal Way	7.8	5.7	6.5	9.7	11.2	13.0	5.0	3.5	7.8	7.1
City of Normandy Park	9.1	4.4	8.6	10.5	12.3	15.0	5.5	4.5	11.1	9.5
City of SeaTac	8.3	7.6	6.6	9.2	12.5	10.4	6.2	3.6	10.7	3.0
City of Tukwila	8.3	7.6	6.6	9.2	12.5	10.4	6.2	3.6	10.7	3.0
Vashon Island	0.0	---	12.7	13.7	10.0	30.0	0.0	0.0	0.0	15.1
Mercer Island/Point cities	4.3	2.6	7.7	7.7	6.9	8.5	0.0	0.0	4.8	4.4
King County	6.2	5.2	9.3	9.6	10.8	12.1	3.2	2.6	6.7	6.7

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

Suicide

While suicide was not a specific indicator identified in the context of the 2020 study, the following information was uncovered during this investigation.

Based on trends in rates and methods of suicide in the U.S. between 1985 and 2004, suicide was the 10th leading cause of death, fourth leading cause for males under 65 years, and highest among males aged 75 and older. In 2014, suicides outnumbered homicides almost three to one. According to the CDC's National Center for Health Statistics (NCHS), by 2017 recorded suicides reached 47,173. On average, adjusted for age, the annual U.S. suicide rate increased 24% between 1999 and 2014, from 10.5 to 13.0 suicides per 100,000 people, the highest rate recorded in 28 years.

The World Health Organization expanded on these findings, reporting that the highest suicide rates in the U.S. are among Whites, American Indians and Alaska Natives. While the methods vary by gender, more than 75% occur either at or close to home. Further, about 75% of suicide incidents occur at home, with most (85%) individuals dying at the scene and never making it to the hospital (NVISS data). Suicide rates are highest in rural areas, in the west (excluding California), and to a lesser extent, in parts of the south and northern New England regions.

Although the frequency of suicides varies significantly between age cohorts, the most occur among individuals, male or female, age 45 to 54 years. With this understanding, and in order to understand if age is a factor in the study area cities, their age distribution profile was cross-referenced with their suicide rates. What this analysis revealed was that Vashon Island and Normandy Park maintain the highest percentage of residents age 45 to 54 years, and also incurred the highest rate of suicide among the other cities.

D. HEALTH RISK FACTORS AND CHRONIC DISEASE

Risk factors include everyday habits and behaviors that can pose significant risks to human health. Smoking tobacco, excessive alcohol consumption, a lack of exercise and poor diet, drug use, and unprotected sex are common examples. Such activities can increase the risk of numerous diseases, including hypertension, heart disease, cancer, sexually transmitted diseases (STDs), and diabetes. These behaviors and habits not only affect the health of individuals but are also very costly.

As presented in Figure 12.8., in 2012, with the exception of a few anomalies, the percent of residents in the study area cities and other cities north of Seattle-Tacoma International Airport who either participate in or suffer from conditions adverse to their health exceeds those of the King County is consistently higher.

A comparison of city-level figures compared to the state figures are less conclusive. This pattern continued, with a similar number of anomalies in 2016, along with an overall increase in poor health habits between 2012 and 2016 within all of the geographies.

Figure 12.8
Health Risk Factors and Chronic Diseases (2012-2016)

xxx better than King County
 xxx equal to King County
 xxx worse than King County

Area	Excessive Drinking		No Exercise		Obesity		Current Smoker		High Cholesterol		Hyper-tension		Heart Disease		Diabetes		Asthma	
	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016
<i>(comparison years)</i>																		
City of Burien	18%	18%	21%	29%	28%	34%	17%	22%	35%	38%	27%	31%	5%	4%	7%	10%	11%	12%
City of Des Moines	22%	25%	22%	23%	25%	26%	13%	18%	47%	38%	35%	30%	6%	4%	8%	14%	7%	9%
City of Federal Way	16%	20%	21%	22%	32%	27%	21%	17%	34%	38%	28%	34%	5%	3%	6%	12%	10%	12%
City of Normandy Park	11%	25%	11%	23%	25%	26%	13%	18%	47%	38%	35%	30%	6%	4%	8%	14%	7%	9%
City of SeaTac	21%	21%	24%	29%	32%	28%	20%	24%	37%	41%	27%	18%	4%	3%	10%	8%	8%	7%
City of Tukwila	21%	21%	24%	29%	32%	28%	20%	24%	37%	41%	27%	18%	4%	3%	10%	8%	8%	7%
Vashon Island	18%	25%	12%	12%	17%	17%	11%	14%	49%	46%	22%	29%	4%	8%	4%	6%	6%	3%
Mercer Island/Point cities	15%	15%	6%	9%	10%	12%	4%	6%	34%	32%	22%	26%	4%	2%	4%	5%	10%	7%
State of Washington	17%	18%	18%	20%	26%	27%	16%	16%	38%	38%	27%	30%	5%	4%	7%	9%	9%	10%
King County	19%	21%	15%	16%	21%	22%	11%	14%	36%	35%	24%	26%	4%	3%	6%	7%	8%	9%

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

E. LIFE EXPECTANCY

Overall life expectancy at birth compares the average number of years to be lived by a group of people born in the same year, if mortality at each age remains constant in the future. Life expectancy at birth is also a measure of overall quality of life in a country and summarizes the mortality of all ages.

As presented in Figure 12.9 below, Federal Way reported the lowest average life expectancy in 2012, despite having the second lowest median age among the study area cities, and third lowest in 2016. Conversely, while Normandy Park has consistently maintained the highest median age, it has a life expectancy figure comparable to the other study area cities, rather than one that is higher. Compared to King County, the average life expectancy among all of the cities was lower in 2012, except for Vashon Island and Mercer Island/Point cities.

This trend continued in 2016, when life expectancy rates in all of the study area cities remained lower than that of the county (81.8), as well as the state (80.2) and nation (80.0). A review of how ages are distributed throughout the study area suggested that residents are aging in place, and that life expectancies are holding fairly constant, trends that should provide valuable baseline figures for future investigations.

Figure 12.9
Average Life Expectancy – study area cities and King County (2012 and 2016)

xxx better than King County
 xxx equal to King County
 xxx worse than King County

Area		Average Life Expectancy	
		2012	2016
Study Area cities	City of Burien	79.9	80.1
	City of Des Moines	80.0	80.1
	City of Federal Way	78.8	79.2
	City of Normandy Park	80.0	80.0
	City of SeaTac	79.9	80.0
	City of Tukwila	79.9	80.0
Other Areas	Vashon Island	82.8	83.0
	Mercer Island/Point cities	85.9	85.8
State and National	State of Washington	79.9	80.2
	United States	78.8	80.0
King County		81.5	81.8

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

F. MATERNAL AND CHILD HEALTH

Maternal and child health involves the delivery of care and provision of services for mothers and children including:

- Family planning and reproductive health services
- Maternal, newborn, and child health services
- Health communications
- Health commodities and supplies
- Health systems strengthening.

Figure 12.10 below reflects measures of maternal and child health in the study area cities and other cities north of the airport for which information was available, as well as King County and the state of Washington. Across all of the indicators presented here, in 2012, the rate of individuals who were without early prenatal care in all of the cities, except for Mercer Island/Point cities, exceeded both the county and state figures.

City figures for smoking during pregnancy in the cities also exceeded those for the county and state. Trends among babies born at a low or very low birth rate, or who died at birth, were either lower than or consistent with those of the county and state in every community except Burien, SeaTac and Tukwila. Incidents of teen births were also higher than the county and state figures in all of the cities, except Federal Way, Vashon Island and Mercer Island/Point cities. Among the study area cities, Burien, SeaTac and Tukwila were ranked the highest in total factors contributing to adverse health conditions among women and children.

In terms of how conditions may have changed between 2012 and 2016, increases and decreases were realized across all of the indicators in every city, as well as the county and state. By community, Federal Way realized the highest overall improvement with declines in smoking during pregnancy and birth weight, and Burien saw the single largest decline among all of the indicators, with a 50% drop in teen births.

Regardless, the rank among the study area cities across all measures, except infant mortality, either exceeded or were consistent with those of the county and state.

Figure 12.10
Incidents Per 100 Births – study area cities, King County and State of Washington (2012-2016)

xxx better than King County xxx equal to King County xxx worse than King County

Area	Late/No Pre-Natal Care		Smoking During Pregnancy		Low Birth Weight		Very Low Birth Weight		Teen Birth *		Infant Mortality **	
	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016
<i>(comparison years)</i>												
City of Burien	7.6	7.8	6.7	8.0	7.1	6.5	1.2	1.1	24.2	12.4	3.6	4.1
City of Des Moines	7.0	7.4	6.0	7.2	6.2	6.3	0.9	1.0	16.7	10.6	4.8	6.8
City of Federal Way	7.5	9.4	8.4	8.0	6.4	6.3	1.3	0.9	10.0	10.1	3.2	4.9
City of Normandy Park	7.0	7.1	9.0	7.2	6.2	6.3	0.9	1.0	16.7	10.6	4.8	6.8
City of SeaTac	9.1	9.4	4.9	5.7	7.5	6.9	1.2	1.2	26.2	15.1	4.9	5.4
City of Tukwila	9.1	9.4	4.9	5.7	7.5	6.9	1.2	1.2	26.2	15.1	4.9	5.4
Vashon Island	8.1	11.0	5.8	5.4	6.9	5.4	0.6	---	2.7	---	0.0	0.0
Mercer Island/Point cities	2.7	2.2	0.6	6.5	4.6	6.5	0.5	0.8	0.0	---	5.1	---
State of Washington	5.9	6.1	9.9	6.3	6.4	6.3	1.0	1.0	14.8	10.5	4.9	4.6
King County	5.2	5.5	4.2	6.5	6.7	6.5	1.0	1.0	9.6	6.3	4.1	4.2

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

* per 1,000 females age 15 to 17

** per 1,000 live births

G. ACCESS TO CARE AND PREVENTIVE SERVICES

The final measure of public health addresses the residents’ access to care and preventive services, regardless of age or gender. Access to care and preventive services means having the timely use of personal health services to achieve the best health outcomes. Uninsured persons are less likely to receive medical care and are more likely to have poor health status.

Figure 12.11
Access to Care and Preventative Services – study area cities, King County and State of Washington (2012-2016)

xxx better than King County xxx equal to King County xxx worse than King County

Area	Uninsured 16-64 years		Could Not See a Doctor		No Personal Doctor		No Flu Shot		No Pneumonia Vaccine *		No Mammogram **		No Pap Smear ***		No Dental Visit	
	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016
<i>(comparison years)</i>																
City of Burien	22%	23%	14%	22%	22%	29%	62%	63%	27%	29%	11%	25%	15%	24%	35%	41%
City of Des Moines	27%	23%	14%	18%	27%	29%	60%	69%	22%	29%	13%	26%	26%	29%	34%	49%
City of Federal Way	---	23%	13%	20%	22%	27%	58%	60%	33%	23%	7%	30%	29%	29%	22%	32%
City of Normandy Park	27%	23%	14%	18%	27%	29%	60%	69%	22%	29%	13%	26%	26%	29%	34%	49%
City of SeaTac	30%	30%	16%	24%	30%	34%	62%	64%	25%	22%	23%	28%	11%	30%	30%	55%
City of Tukwila	30%	30%	16%	24%	30%	34%	62%	64%	25%	22%	23%	28%	11%	30%	30%	55%
Vashon Island	---	9%	13%	17%	11%	16%	51%	56%	21%	38%	23%	35%	16%	26%	21%	30%
Mercer Island/Point cities	---	4%	5%	4%	9%	16%	41%	46%	25%	23%	12%	22%	16%	21%	13%	12%
State of Washington	19%	18%	13%	15%	22%	25%	62%	62%	29%	27%	20%	29%	20%	32%	27%	33%
King County	16%	15%	10%	14%	20%	26%	58%	60%	28%	28%	18%	28%	15%	22%	23%	29%

Source: Washington State Department of Health, Center for Health Statistics and Ricker Cunningham

* age 65+

** age 50 to 74

*** age 21 to 65

Fewer residents in all of the study area cities, age 18 to 64, have insurance than individuals in this same age cohort in all of King County and Washington state. Similarly, fewer residents in all but Vashon Island and Mercer Island | Point cities, have seen a doctor, have a personal doctor, or received a flu shot. This trend reverses itself among factors including pneumonia vaccines, mammograms, and pap smears, whereas more residents in the cities have accessed this care than those of either the county or state. However, between 2012 and 2016, access to medical care and services among residents of the cities worsened across nearly every indicator, in nearly every city, with figures related to a lack of access to care and preventive services increasing, in some cases significantly.

H. WHAT WE HEARD FROM THE PUBLIC

During this study, the consultant team heard comments from the public during community meetings, stakeholder interviews, and monthly technical advisory committee meetings. The following is a summary of this citizen input by topic area:

- **Airport proximity influences health statistics**

Many community members believed the rates of certain illnesses within their communities were disproportionately higher than either other communities in the study area or elsewhere in the region. Residents of Tukwila and SeaTac zip codes were said to have shorter life spans, more heart issues, and diabetes. Some community members expressed more general concerns such as a belief that that incidents of lung and brain cancer were higher in communities located south of Seattle-Tacoma International Airport, along with a higher frequency of strokes, asthma, COPD and auto-immune disease. In terms of the rates of illnesses being higher in the study area cities, the data presented and analyzed earlier in this section generally confirms that there is a higher occurrence of certain, but not all, illnesses.

- **Airport proximity exceeds appropriate health standards**

Others cited reports or organizations with information that confirmed their contention that illnesses in the immediate vicinity of Seattle-Tacoma International Airport exceeded appropriate standards. One was a Washington Department of Health Study that found cancer rates to be higher in all of the study area cities located closest to the airport, and cancers in children up by 50%. Another said that Seattle Public Health identified an increase in neuroplasticity. A third study was mentioned, prepared by the Department of Ecology in 2001, that reportedly concluded the number of respiratory, cardiovascular, brain and organ diseases were statistically more significant within one mile of Seattle-Tacoma International Airport. The above studies could not be reviewed in the context of this study, and therefore the reported information could not be confirmed.

- **Noise-induced health concerns**

Several community members expressed concern regarding illnesses caused by aircraft-related noise effects, including those resulting from frequent sleep disruption and corresponding stress. One person mentioned the excessive noise produced by late-night flights headed to China. This assumption could not be confirmed nor disputed because data regarding auditory-related effects were not available at levels of geography that would be meaningful to the findings of this study.

- **Port programs and other efforts (Sustainability and Fly Quiet) have been ineffective**

Community members seemed aware of the Port's participation in the Federal Aviation Administration's Sustainability Program and the airport's voluntary Late Noise Limitation Program. Observations, or assumptions, regarding the effectiveness of the Port's efforts to revise certain practices associated with the Sustainability Program were confined to airport properties, and not for the benefit of the surrounding communities. In terms of nighttime curfews, some individuals thought the Port was reluctant to enforce stated goals for fear it could jeopardize their status as a major

gateway to Asia. This assumption could not be confirmed or disputed because available information related to this program was limited to what is presented on the Port’s website.

▪ **Previous noise mitigation packages are ineffective**

As noted previously in this document, many residents of the study area have noted the ineffectiveness and – in some cases – failure mitigation efforts by the Port of Seattle to insulate homes to decrease ambient noise. Complaints ranged from failed window systems to insulation that significantly reduces the home’s air exchange, resulting in mold and stale air. Some residents reported that mold was also affecting their health. Some residents also reported that mitigated homes were not eligible for “re-mitigation” (based on language in state statute RCW 53.54.030). Rep. Tina Orwall has sponsored legislation to address these concerns in the Washington legislature. The Port of Seattle has stated that they support this amendment and have provided testimony in support of the legislation to allow for re-mitigation.

▪ **The Port of Seattle is not responsive to the cities in the study area**

In terms of the Port of Seattle’s governance, a comment was made that meetings of the Authority are held in Seattle and SeaTac, but that commissioners are elected at-large, with the current board occupied by individuals who live in the northern portion of the Metro Area, giving them “no reason to be responsive to South King County residents.” In terms of the commissioners’ willingness to respond to South King County concerns, this information could not be confirmed or disputed.

▪ **NextGen procedures have enhanced adverse effects**

As explained previously, NextGen is an automated system that determines established flight routes in a manner intended to increase efficiencies and reduce costs. According to some community members, however, it effectively concentrates (or intensifies) aircraft-related noise over a narrower area, a geography one citizen described as a “superhighway.” Based on the findings from the study of noise effects on the health of residents in the vicinity of LaGuardia airport, and assuming they are accurate, these comments from community members appear accurate.

Other comments regarding noise relate primarily to the practices of certain airlines and types of flights (cargo versus passenger). For instance, it was suggested that some airlines need to raise their glide slope to 3.0 degrees rather than ascending “low and slow.” Another said the use of reverse thrust to slow aircrafts down was a problem, and that if it wasn’t necessary, they assumed the “some of noise issues would go away.”

Finally, still other community members surmised that air-related noise was louder at night because of the lack of ambient background noise caused by highway traffic during the daytime hours. This assumption could not be confirmed or disputed given the scope of this assignment.

I. PUBLIC HEALTH EFFECTS ATTRIBUTABLE TO AVIATION ACTIVITY

Positive effects on public health

Some national trends have positively affect public health. Nationally, figures for the leading causes of death – cancer, heart disease, and respiratory disease – have been in decline. However, there are no indicators that were investigated by the 2020 study that indicate any positive public health effects as a result of aviation activity.

Neutral effects on public health

The array of diverse health metrics makes it difficult to assign a neutral value on public health effects to any one source. And there are no indicators that were investigated by the 2020 study that indicate any neutral public health effects as a result of aviation activity.

Negative effects on public health

Negative aspects of public health affecting the study area cities include:

- The leading causes of death in the study area cities have been and continue to be cancer and heart disease.
- Between 2012 and 2016, the rate of suicides also increased in the study area cities (except in Tukwila).
- Among the study area cities, Burien, SeaTac and Tukwila were the highest in total factors contributing to adverse health conditions among women and children.
- Access to medical care and services among study area residents worsened across nearly every indicator, with figures related to a lack of access to care and preventive services increasing.
- There was an overall increase in poor health habits between 2012 and 2016 in the study area.

Many of these poor health outcomes may also be attributable to a variety of influences: income level, genetic or family pre-dispositions to certain conditions, poor health habits, etc. While poor health can have a devastating effect on individuals and families, there is no current data that indicates it is attributable to aviation activity at Seattle-Tacoma International airport.

There are reports reviewed by the 2020 study – including the NJIT and University of Washington studies – that point to airports as areas of concern for certain pollutants (such as UFPs). It is recommended that this type of research continue, and if possible, be conducted in and around the study area.

Data gaps

Information regarding the indicators for which there was either a lack of data, incomplete data, or data that was unavailable at the municipal level from the original list identified for this category includes:

- Hearing and auditory dysfunction data for any geography lower than the federal level
- Neurological disease data for any geography lower than the federal level
- Health statistics were reported by King County by combining the cities of SeaTac and Tukwila into one category
- Health statistics were reported by King County by combining the cities of Des Moines and Normandy Park into one category
- Health statistics at a finer grain of detail (such as census tract or enumeration district) for the years 1997 through 2018.

Summary of public health effects attributable to aviation activity

The study area public health effects yielded a mix of outcomes that do not exhibit a discernible pattern. This is due to several issues with how the data was collected:

- Available health data from the Washington State Department of Health was for 2012 to 2016, so it was not possible to evaluate a longitudinal analysis for 1997 to 2019.
- The way that health data was compiled by the Washington State Department of Health combined Des Moines and Normandy Park into one “city” and SeaTac and Tukwila into one “city.” This method of data collection made it impossible to evaluate it on the municipal level.

- Municipal health data for Burien and Federal Way was not reported at a more localized level (such as by address, neighborhood, census tract, or enumeration district). The data could not be compared with over metrics being analyzed (such as noise contours).

Figure 12.12
Summary of Public Health Effects – Study Area Cities Compared to King County (2016)

xxx better than King County
 xxx equal to King County
 xxx worse than King County

Mortality (deaths Per 100,000 population)	King County	Burien	Des Moines	Federal Way	Normandy Park	SeaTac	Tukwila
Heart Disease	127.2	150.1	156.8	157.4	156.8	146.8	146.8
Alzheimer’s Disease	41.1	29.5	57.3	24.7	57.3	26.9	26.9
Chronic Lower Respiratory Disease	29.7	35.8	30.9	46.9	30.9	43.0	43.0
Stroke	31.4	32.9	28.2	37.6	28.2	34.6	34.6
Accidents/External Causes	30.7	32.2	31.9	32.3	31.9	37.6	37.6
Motor Vehicle Deaths	5.2	7.7	4.4	5.7	4.4	7.6	7.6
Death from Falls	9.6	8.1	10.5	9.7	10.5	9.2	9.2
Suicide	12.1	11.7	15.0	13.0	15.0	10.4	10.4
Homicide	2.6	4.9	4.5	3.5	4.5	3.6	3.6
Death by Firearm	6.7	9.7	9.5	7.1	9.5	3.0	3.0
Health Risk Factors							
Excessive Drinking (% of population)	21%	18%	25%	20%	25%	21%	21%
No Exercise (% of population)	16%	29%	23%	22%	23%	29%	29%
Obesity (% of population)	22%	34%	26%	27%	26%	28%	28%
Current Smoker (% of population)	14%	22%	18%	17%	18%	24%	24%
High Cholesterol (% of population)	35%	38%	38%	38%	38%	41%	41%
Hypertension (% of population)	26%	31%	30%	34%	30%	18%	18%
Heart Disease (% of population)	3%	4%	4%	3%	4%	3%	3%
Asthma (% of population)	9%	12%	9%	12%	9%	7%	7%
Uninsured 16-64 years old (% of population)	15%	23%	23%	23%	23%	30%	30%
Could Not See a Doctor (% of population)	14%	22%	18%	20%	18%	24%	24%
No Personal Doctor (% of population)	26%	29%	29%	27%	29%	34%	34%
No Flu Shot (% of population)	60%	63%	69%	60%	69%	64%	64%
No Pneumonia Vaccine (% of population)	28%	29%	29%	23%	29%	22%	22%
No Mammogram (% of population)	28%	25%	26%	30%	26%	28%	28%
No Pap Smear (% of population)	22%	24%	29%	29%	29%	30%	30%
No Dental Visit (% of population)	29%	41%	49%	32%	49%	55%	55%
Life Expectancy (in years)	81.8	80.1	80.1	79.2	80.0	80.0	80.0
Late/No Pre-Natal Care (per 100 births)	5.5	7.8	7.4	9.4	7.1	9.4	9.4
Smoking During Pregnancy (per 100 births)	6.5	8.0	7.2	8.0	7.2	5.7	5.7
Low Birth Weight (per 100 births)	6.5	6.5	6.3	6.3	6.3	6.9	6.9
Very Low Birth Weight (per 100 births)	1.0	1.1	1.0	0.9	1.0	1.2	1.2
Teen Birth (per 100 births)	6.3	12.4	10.6	10.1	10.6	15.1	15.1
Infant Mortality (per 100 births)	4.2	4.1	6.8	4.9	6.8	5.4	5.4

Figure 12.12 compiles the 2016 public health data for the various metrics analyzed in this section. There is no apparent pattern, with all study area cities exhibiting a similar number of negative outcomes (those metrics worse than King County averages). Of the six study area cities, they ranked as follows (from the highest number of metrics worse than the King County average to fewest):

- Des Moines/Normandy Park 27 of 33 metrics (81.8%) worse than the King County average
- Burien & Federal Way (tie) 26 of 33 metrics (78.8%) worse than the King County average
- SeaTac/Tukwila..... 22 of 33 metrics (66.7%) worse than the King County average

(As detailed above, Des Moines/Normandy Park and SeaTac/Tukwila were considered are the same because of the way their data was compiled by the Washington State Department of Health.) Based on the number of metrics performing below the King County averages, the study area is relatively consistent, with SeaTac/Tukwila being relatively less affected.

Figure 12.13 presents a general assessment of public health effects in the study area that may be attributable to aviation activity, categorized into four effect types:

- Positive effect attributable to aviation activity
- Negative effect attributable to aviation activity
- Neutral or no effect attributable to aviation activity
- Inconclusive data/needs additional study.

**Figure 12.13
Summary of Public Health Effects Attributable to Aviation Activity – 1997 to 2019**

 Positive effect attributable to aviation activity	 Neutral/no effect attributable to aviation activity
 Negative effect attributable to aviation activity	 Inconclusive data/needs additional study

PUBLIC HEALTH METRIC	STUDY AREA CITY																	
	Burien			Des Moines			Federal Way			Normandy Park			SeaTac			Tukwila		
	1997	2009	2019	1997	2009	2019	1997	2009	2019	1997	2009	2019	1997	2009	2019	1997	2009	2019
Cancer	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Heart Disease	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Alzheimer’s Disease	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Chronic Lower Respiratory Disease	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Stroke	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Accidents & External Causes	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Suicide	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Life Expectancy	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Maternal & Child Health	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Access to Care	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Figure 12.13 summarizes the effect that aviation activity has on various public health metrics. For example, the city of Tukwila may experience a higher rate of motor vehicle theft, but the data evaluated does not indicate a connection with aviation activity. (In Tukwila’s case, the concentration of retail uses appears to be more linked to certain crimes.) Therefore, the 2020 study has determined that effect Seattle-Tacoma International airport has on various public health metrics is inconclusive and requires further study.

J. RECOMMENDATIONS

To address the principal issues identified in this section, the following recommendations are proposed.

- **Public health recommendation #1 – Establish an independent noise monitoring authority**
Together with the Port of Seattle, the study area cities should investigate the feasibility of establishing an independent noise monitoring authority. Collectively, members could decide if thresholds for noise established by the Federal Aviation Authority are adequate given local circumstances, as well as appropriate strategies for mitigating effects.
- **Public health recommendation #2 – Expand the study area**
In order to determine the comprehensive public health effects of operations at Seattle-Tacoma International airport, public health statistics should also be collected for areas north and northeast of the airport. This would include West Seattle, Beacon Hill, and potentially the city of Renton. Given the presence of two other airports (Boeing Field/King County International airport and Renton Municipal airport), those facilities should also be taken into consideration.
- **Public health recommendation #3 – Develop more detailed public health statistics**
The information reviewed collected data at the municipal level. In some cases, statistics of two neighboring communities were combined (SeaTac/Tukwila and Des Moines/Normandy Park). To get a more accurate depiction of the spatial distribution of various health metrics, this information should be gathered at the census tract or enumeration district level. (While reporting by street address would be ideal, it might be prohibited under HIPAA standards.) Such information could be overlaid with noise contours and flight tracks to see if there are correlations between aircraft activity and certain health outcomes.
- **Public health recommendation #4 – Approve/reauthorize bills to address mitigation**
Request that the state Legislature reauthorize bills associated with the mitigation of residential properties, addressing multiple areas including past efforts that were either insufficient or that have not maintained their effectiveness, as well as properties in other communities that were not included in the initial round of funding. Investigate potential sources of funding to finance improvements (i.e., airport facility fee charged for the benefit of the study area cities.) As of the writing of this report, a draft bill is pending to address homes that were mitigated under the previous Port of Seattle packages.
- **Public health recommendation #5 – Audit local building and zoning standards**
Conduct an audit of the building and zoning codes for all study area cities to identify any inconsistencies between local regulations and federal rules. Establish a unified system of rules in order to ensure equity among the communities.
- **Public health recommendation #6 – Identify new construction potentially affected by airport use**
Identify relevant organizations that should be included as referral agencies for any new construction (residential or commercial) that may be affected by air-related effects (i.e., PSCAA).
- **Public health recommendation #7 – Establish a health effects assessment process**
The study area cities should consider establishing a requirement that new construction projects (of a certain size and type) include preparation of a Health Effect Assessment (HEA). Health is emerging as a significant aspect of many real estate projects, as is how real estate developments affect the health of its users and occupants, along with the community at large. An HEA is an evidence-based process that engages the community, gathers health-related information, and identifies strategies to improve community and individual health. This tool could serve both the developer and city, as well as inform future plans and policies.

▪ **Public health recommendation #8 – Require alternative fuel use for airport users**

Request the state Legislature establish an alternative fuels requirement on users of Port of Seattle facilities that could be phased in as deemed feasible.

▪ **Public health recommendation #9 – Expand the late night noise limitation program**

Encourage the Port of Seattle to expand the Late Night Noise Limitation Program in ways that address community concerns, including:

- Limiting runways and flight patterns that align with the Pacific Highway rather than established neighborhoods, during certain hours
- Accessing a graduated charge for landings and take-offs with lower fees charged during desirable hours and vice versa
- Relocate late-night cargo traffic to an alternative airfield.

▪ **Public health recommendation #10 – Replant trees in the study area**

Whereas construction of third runway reportedly necessitated the removal of several old growth trees, and whereas they were effective at absorbing some level of noise and toxins, consider establishing a replanting program in strategically advantageous locations (ensuring this uses tree and landscape species that repel and discourage bird nesting and feeding).

It is important to note that the Port of Seattle is working on a draft land stewardship plan to add additional trees to the airport, has funded Green cities efforts in the cities of Burien, Des Moines, and SeaTac, and has planted trees at a 4:1 ratio as part of the Flight Corridor Safety Program’s removal of trees obstructing the flight paths. These programs are positive and should be continued.

▪ **Public health recommendation #11 – Expand Port efforts to promote public health**

Based on review of information associated with the Port of Seattle’s efforts to further strategic initiatives associated with the Federal Aviation Administration’s airport Sustainability Program, it appears a limited emphasis has been placed on efforts to enhance the health and welfare of residents in the study area cities, despite the fact that among its stated goals is to “help achieve social progress by advancing a broad set of actions that ensure organizational goals are achieved in a way that is consistent with the needs and values of the local community.” The Port of Seattle Existing should adopt the Noise Compatibility Program and the Voluntary Airport Low Emissions (VALE) program. These and other solutions should be funded through the Airport Improvement Program grant funds.

K. THE FUTURE

Effects on public health are influenced by numerous factors. And in the past two decades, there has been a national increase in the awareness and appreciation of healthy lifestyles. The incidents of some diseases has decreased, while there has been a rise in other issues, such as obesity.

As with other metrics addressed in this report, the future of public health may be affected by the rise of certain technologies and consumer habits:

- **Consumer demands for more walkable communities**

Walkability is one of the top-selling amenities of new and old communities. Encouragement of walking between destinations not only improves health, it can reduce traffic, reduce air pollution, and reduce dependence on fossil fuels.

- **Consumer demands for more parks and open space**

As with walkability, access to nearby parks and open space is a significant selling point, often raising property values or rents by as much as 25%. Access to parks and open space improves health, creates a more cohesive community, and has been found to make people happier. As the study area cities promote more parks and open space, there should be a parallel improvement in certain health metrics.

- **Increased use of health-related wearable technology**

Step counters and activity trackers have been available for several years. The proliferation of smart watches and other wearable technology has raised health awareness and improved outcomes for some users. The increasing sophistication of these devices may also help supplant the need for in-person medical visits, thus saving money and lives. Similar advances in telemedicine and medical consultations video chat can benefit some users who currently do not (or cannot) seek medical attention.

- **Changes in consumer expectations**

There has been an increased demand for locally sourced produce and food (“locavore” culture), including community gardens, farm-to-table dining, and other healthy habits. This movement is expected to continue and increase over time. This should have beneficial consequences within the study area cities.

- **Changes in the provision of health care services**

For many people, the cost of health care services is a major impediment to receiving proper medical attention. And for some, medical debt has been a significant factor in declaring personal bankruptcies. It is unknown at this time if there will be substantial changes in health care and insurance practices to increase coverage for people who are currently under-insured or uninsured.

L. SUMMARY

A widely held narrative in the study area is that the health of the residents is being negatively affected by activities at Seattle-Tacoma International airport. The data available for the 2020 study does not support a direct causation between airport activity and poor health. Without additional detailed data, there appears to be a coincidental relationship at this point, rather than a co-relational one.

The health statistics reviewed for the study area cities point to increased incidences of cancer and heart disease. There are also areas where Alzheimer’s disease and respiratory disease are at or above the average rate for King County. These may be in part due to a higher rate of poor health habits and risk factors in the study area (such as smoking, no exercise, smoking during pregnancy, etc.). Regardless, life expectancy in the study area cities is almost equal to the average for the state of Washington and the U.S. and is only slightly below the King County average.

There are numerous factors that may also be affecting human health outcomes, including but not limited to:

- Genetic/ethnic pre-disposition/family history
- High-risk/high-stress occupations
- Poor health habits
- Ability to pay for medical services
- Under-insured or not insured.

As discussed in Section 7 (Groundwater & Soil Quality), another potential source of health effects is the now-closed Asarco Tacoma Smelter. According to Ecology’s Site Summary Page, “For almost 100 years, the Asarco Company operated a copper smelter in Tacoma. Air pollution from the smelter settled on the surface soil over more than 1,000 square miles of the Puget Sound basin. Arsenic, lead, and other heavy metals are still in the soil as a result of this pollution.”

The health data as reported is not at a detail conducive to a finer grain of analysis. Information is required at a more localized level so it can be mapped and compared with activities associated with Seattle-Tacoma International Airport, including noise contours, air quality, and other external factors. Additionally, information from other potentially affected areas – such as West Seattle, Beacon Hill, and Renton – should also be studied to determine the health profile of all communities in the vicinity of Seattle-Tacoma International airport or similar facilities (including Boeing Field/King County International airport).

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