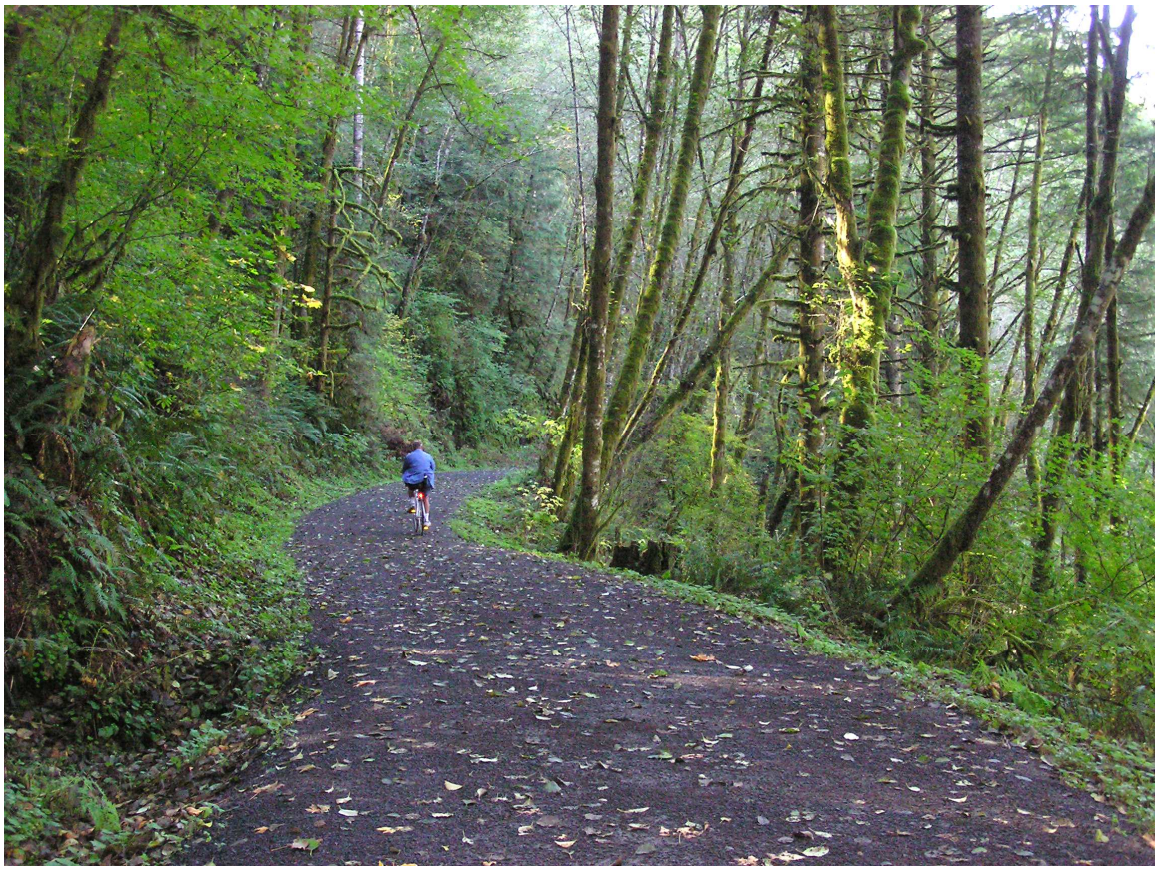
Health Element

Clark County Comprehensive Growth Management Plan

Growing Healthier

Pathways from the built environment to health:

Active Transportation & Land Use



Introduction

In combination with unhealthy diets, physical inactivity is a leading cause of death in the United States, second only to Tobacco.[1,2] Since World War II, many American communities have been developed in a way that necessitates reliance on a privately owned automobile for transportation. This has been a self-reinforcing trend: cars enable low-density sprawl, and low-density sprawl requires cars.[3] Dependence on automobile transportation has led to many negative health effects, and chief among these is the increase in sedentary lifestyles that has accompanied the rise of drivable suburbanism.[4] Daily exercise that was once built into every day by the simple act of moving from point A to B has nearly disappeared from suburban life.

Regular physical activity reduces the risk of obesity and obesity-related chronic diseases, including cancer and heart disease.[5] The Centers for Disease Control and Prevention (CDC) recommend a minimum of 30 minutes of physical activity 5 days per week for adults, with additional health benefits gained with 300 minutes of physical activity each week. Children and adolescents should engage in physical activity 60 minutes each day.[6] Providing opportunities for physical activity assists children and adults in meeting these recommendations. Therefore, creating environments that foster and encourage physical activity is a key strategy to achieve improved population health and well-being.

Lack of physical activity among children is of particular concern, as preventing obesity is most effective early in life. One way that children previously met recommended

physical activity guidelines was walking and biking to school. However, there has been a tremendous shift away from this behavior across the United States, making the need to plan for active transportation more acute.

Defining Active Transportation

Research literature identifies two distinct types of cycling and walking. The first is leisure, also known as recreational travel. This type of cycling and walking is done simply for the sake of the activity and has the strongest associations with the proximity, quantity, and quality of recreational paths.[7] The second type of cycling and walking is for travel, also known as utilitarian travel or **active transportation**. This type of activity is a means to some end and is likely influenced by route directness, proximity of destinations, and cycling and walking facilities.[8,9,10] Examples of active transportation include commuting to work or traveling to reach goods and services such as grocery stores by walking, cycling, or taking transit. In addition, transit use is considered active transportation because of the physical activity achieved by walking to and from stops. Promoting healthy lifestyles through active transportation requires community design that enables exercise built-in to daily routines through transportation. This can be accomplished through community design that encourages walking, bicycling, and public transit.

> **Active transportation** is activity that meets the dual purposes of transportation and exercise. Walking to the bus stop, biking to the store, or skateboarding to a friend's house are examples of active transportation.

The factors that are taken into account in each individual's travel mode choice are complex, and sometimes we're not even aware of them. These can include direct costs, such as gas or transit fare, but can also include less tangible costs, such as time and stress from traffic. Planners and economists refer to this as the generalized cost of travel: the sum of all the various "costs" involved in each trip. For example, the costs for a bicycling trip could be the time, physical effort, a steep hill, a chance of rain, and whether there is a safe place to park your bike. In a joint report on physical activity and the built environment, the Transportation Research Board and Institute of Medicine put it this way: "People would be more likely to walk if walking trips became more pleasant, safer, or in any sense easier, or if alternatives to walking became more costly or more difficult."[11]

People would be more likely to walk if walking trips became more pleasant, safer, or in any sense easier, or if alternatives to walking became more costly or more difficult. – TRB & IOM

Active Transportation, the Built Environment, and Health

Built environments that provide opportunities for physical activity lower the risk of obesity. Measures of the built environment that are correlated with physical activity include presence of bikeways and sidewalks, park proximity, greater street network density, higher residential density, greater land use mix, and quality urban design.[12,13, 14] Bikeways and sidewalks are associated with more adults and children meeting physical activity recommendations through both leisure and transportation-related physical activity.[15,16,17] Studies have found that residents of older, more traditionally designed

neighborhoods (pre-WWII) get more physical activity than residents of newer, auto-dependent suburban neighborhoods.[18] A recent study of neighborhoods in Seattle and Baltimore found that among high–income neighborhoods there are differences in physical activity. In high-income, low-walkable neighborhoods, residents had about a 50% increased risk for obesity compared to high-income, walkable neighborhoods.[19]

Using best practices in urban design promotes physical activity. Complete streets is a term used to describe street designs that meet the needs of all users, including bicyclists, pedestrians, motorists, and public transportation users. They provide multiple opportunities for physical activity by incorporating features that promote walking, cycling and transit use.[20] One widely cited study found associations between walking behavior and the physical features of streets.[21] Physical features that were measured include sidewalk width, street width, traffic volumes, tree canopy, building height, number of people present, and weather. Associations were also demonstrated between walking behavior and qualitative features which are more difficult to measure (Table 4.1).[22] In addition to the design of streetscapes and buildings, the layout of streets themselves is also linked to physical activity. Connected street grids with more thru-routes are correlated with higher rates of walking and cycling, whereas closed-loop and cul-de-sac street patterns are associated with low levels of active transportation.[23,24] (Figure 4.1)

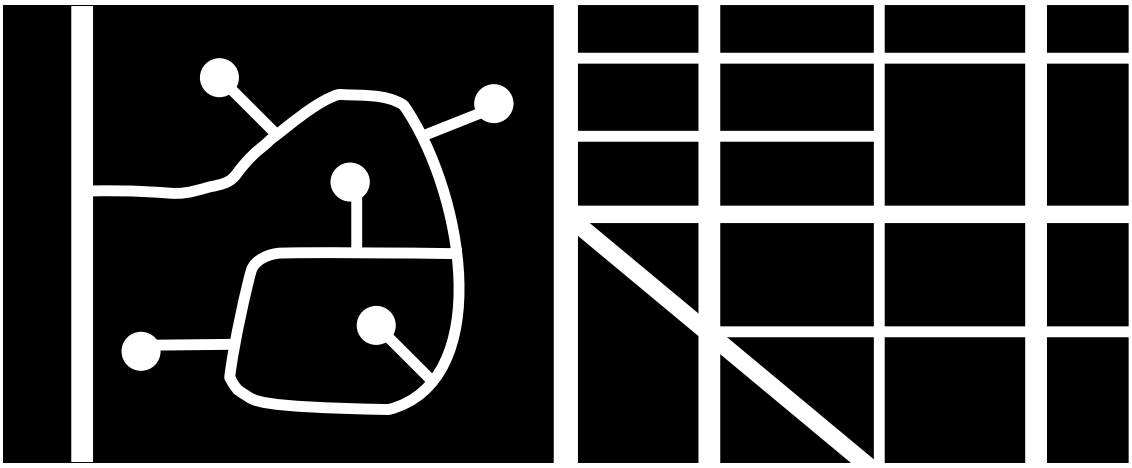
Complete streets is a term used to describe street designs that meet the needs of all users, including bicyclists, pedestrians, motorists, and transit riders.

Table 4.1. Qualitative Elements of Pedestrian-Friendly Urban Design

Element	Definition	Example
Imageability	The quality that makes a place recognizable and distinct	
Enclosure	The degree to which streets and spaces are defined by buildings, trees, and other elements	
Human Scale	The size, texture, and articulation of physical elements that match the size and proportions of humans and match the speed at which humans walk	
Transparency	The degree to which people can see or perceive what lies beyond the edge of a space, especially the degree to which they can see other human activity	
Complexity	The visual richness of a place, defined by variety in the physical environment	

Source: Ewing et al. (2006)

Figure 4.1 Closed Loop and Cul-de-sac Street Pattern (left) and Traditional Grid (right)



Density and mixed land use promote active transportation. Many studies have found a positive association between density and active transportation, indicating that both population density and a dense mix of land uses promote physical activity. An early study on the subject found increased walking related to density, land use diversity, and urban design.[25] Saelens et al. report that density is among the most consistent positive correlates of walking and cycling.[26] This reflects the consistent observation that more destinations closer together lead to more walking and cycling. For example, adults who perceive that they have access to parks are almost twice as likely to meet physical activity recommendations.[27] One study found that for each 1 percent increase in park area within a community, there was a 1.4 percent increase in physical activity.[28]

Transit use is associated with physical activity. Research findings demonstrate that transit use is associated with an increase in physical activity.[29,30] One study found that nearly a third of transit users met daily physical activity recommendations simply through accessing transit by walking or cycling.[31]

Auto-dependent development reinforces sedentary lifestyles. In a study of counties across the United States, researchers found that residents of the most sprawling counties walk less, weigh more, and have a greater prevalence of hypertension than their counterparts in more densly built counties.[32] Each additional hour per day spent in a car increases the odds of obesity by 6%, while each additional kilometer walked results in about a 5% reduction in the odds.[33]

The benefits of active transportation go beyond increasing opportunities for physical activity. Active modes of transportation such as walking and biking are important ways to decrease rather than contribute to issues of traffic congestion, oil dependency, and climate change.[34] Transportation accounts for approximately one third of all US greenhouse gas emissions contributing to climate change.[35] The benefits of increased physical activity through active transportation translate into monetary savings. Among the many benefits of bicycle and pedestrian-friendly development are health-related savings. These come in the form of reduced long-term healthcare costs and reduced mortality. A study of Portland's bicycling investments applying a World Health Organization cost estimation model found that for an investment of $138 million to $605 million, the city will save up to $594 million in health care costs and up to $12 billion as a result of reduced mortality by 2040.[36] Another study found that for every $1 invested in trails, about $3 was saved in direct medical costs from obesity and related chronic diseases.[37] Studies outside the US have found returns on investment ranging from less than one to a ratio of 5-to-1.[38]

Real and perceived danger to pedestrians and bicyclists can deter individuals from choosing active transportation. Over the past decade, research has more closely examined features of our built environments that may increase risk of pedestrian and bicyclist injury. (Table 4.2) Some approaches looking at area characteristics found that traffic volume, street width, speed limits, arterial streets without transit, the proportion of land area zoned for neighborhood commercial use and residential-neighborhood commerical use, and population characteristics (socioeconomic and demographic factors) were all significant predictors of pedestrian injury.[39,40,41] Additional studies have found that crash risk is higher around schools, and greatest among non-White populations.[42,43,44] Creating safe pedestrian and bicycle infrastructure in school areas and developing programs that support biking and walking to school can decrease child cyclist and pedestrian crashes by up to 50%.[45] An examination of traffic corridors in King County, Washington found that increased use of transit stops is associated with more pedestrian-motor vehicle collisions.[46] Although much research associates certain features of the built environment with the absolute number of crashes, these associations do not mean that such locations are inherently unsafe or that they should be avoided. Rather, they reflect the greater amount of pedestrian traffic at these locations and emphasize the need for safety features such as crosswalks and signals. Several cities have observed what appears to be a phenomenon of safety in numbers, in which the rate of bicycle or pedestrian crashes decreases as the absolute number of trips increases.[47]

Table 4.2. Risk Factors Associated with Pedestrian Injury

Category	Risk Factors
Street Characteristics	Increased traffic volume, arterial streets without transit, increased street width, higher traffic speeds
Land Use Characteristics	Neighborhood commercial, residential-neighborhood commercial
Population Characteristics	non-Whites, low SES, ≥65 years

Source: Wier et al., 2009, Swift et al., 2006, NHTSA, 2008

Greater perceived safety and comfort is associated with higher levels of active transportation. Evidence shows that a variety of facility types, especially low-speed traffic designs, are more effective in increasing active transportation.[48,49] Importantly, simply having a sidewalks and bikeways in place may not fully meet the safety and comfort needs of users. For example, even experienced cyclists may not feel comfortable in bike lanes on high-volume, fast-moving arterials. Research suggests that a greater degree of separation from automobile traffic results in greater gains in active transportation use.[50] In one study of cyclist behavior, travelers went out of their way to use separated facilities, even when faster, more direct routes were available. The study concludes that, "A network of different types of infrastructure appears necessary to attract new people to bicycling. Simply adding bike lanes to all new major roads is unlikely to achieve high rates of bicycling."[51] It is clear from this research that while bike lanes are important, they are not the only type of facility that should be considered.

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Disparities

Socioeconomic Status (SES)

Low SES individuals face more barriers to engaging in physical activity and active transportation. All groups can benefit from opportunities for active transportation. Low-income groups are especially important to consider as active transportation is generally free or very low-cost. Findings suggest that low-income groups are more likely to use public transit compared with other income groups. The Transportation Research Board reported that individuals living in households earning less than $20,000 per year were more likely to use transit.[52] Children from low-income families are twice as likely to walk to school compared to children with higher-income families.[53] While active transportation use is greater among low-income groups compared with other income groups, overall use remains low. Households tend to abandon active transportation options as soon as they own a car. Approximately 73.5% of American households earning less than $20,000 per year own at least one car, and three-fourths of their trips are by car.[54] Low-income groups face similar barriers to engaging in active transportation as other income groups with less options and financial resources to overcome them. Studies suggest that even walkable low-income neighborhoods do not experience the same benefits experienced by high-income walkable neighborhoods.[55] This suggests that there are other necessary preconditions that must be satisfied, such as safety improvements, for this population to fully realize the health-promoting effect of a walkable neighborhood. Some of the commonly cited barriers to active transportation among low-income groups are listed in the following box.[56]

Common barriers to active transportation among low SES populations:

- Distance to daily destinations
- Lack of transportation choices
- Unsafe neighborhood conditions
- Unsafe traffic conditions
- Lack of time
- Poor health
- Lack of sidewalks
- Perceived lack of neighborhood physical activity opportunities
- Perceived lack of neighborhood safety

Age

Active transportation use varies by age group. Children under 15 years, seniors over 65 years, and ethnic minorities are at highest risk for pedestrian and bicycle injuries. Pedestrian fatality rates are highest in older adults. Older adults are 96% more likely to be killed while walking than those under the age of 65 years. Pedestrian injury is the third leading cause of unintentional injury death for children 15 years and younger.[57] The number of children walking and biking to school has gone from nearly half of all students in 1969 to just about 15% in 2001.[58,59] This shift is due in part to a number of environmental barriers that were created by suburban sprawl. Distance to school is one such barrier. When students walk or bike one mile to and from school they can meet two-thirds of their daily physical activity requirements, yet only 25% of students across the nation live within one mile of their school.[60] Other potential barriers include weather, lack of sidewalks, and safety concerns. The reduction in students using modes of active transportation has accompanied an increased number of parents driving their children to school. This has become a self-reinforcing trend as more parents driving children to school causes increased traffic danger, resulting in even more parents driving

their children to school. By some estimates, about 20 to 25% of all morning rush hour traffic is related to trips to school.[61]

Race and Ethnicity

Active transportation use varies by race/ethnicity. The 2001 National Household Travel Survey found that among individuals walking to and from transit, there were more minorities compared to Whites, indicating a greater exposure to traffic crashes among minorities.[62] A recent study found that pedestrian fatality rates are highest in Hispanics and African Americans.[63]

Geography

Individuals in rural areas face different transportation challenges compared with urban areas. Rural areas are characterized by high-speed roads, and are less likely to have sidewalks, crosswalks and other pedestrian infrastructure.[64] More than 27% of pedestrian fatalities occur in rural areas even though only 24% of Americans live in these rural areas.[65]

Conditions Needed to Thrive

Every Clark County resident needs the choice of a walkable and bikeable neighborhood that reinforces daily physical activity through opportunities to build in exercise as part of daily life. Well-connected street grids, complete streets, a dense mix of land uses,

access to transit, and best urban design practices lead to more people meeting physical activity recommendations more often.

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Health Element

Clark County Comprehensive Growth Management Plan

Growing Healthier

Current Conditions:

Active Transportation & Land Use

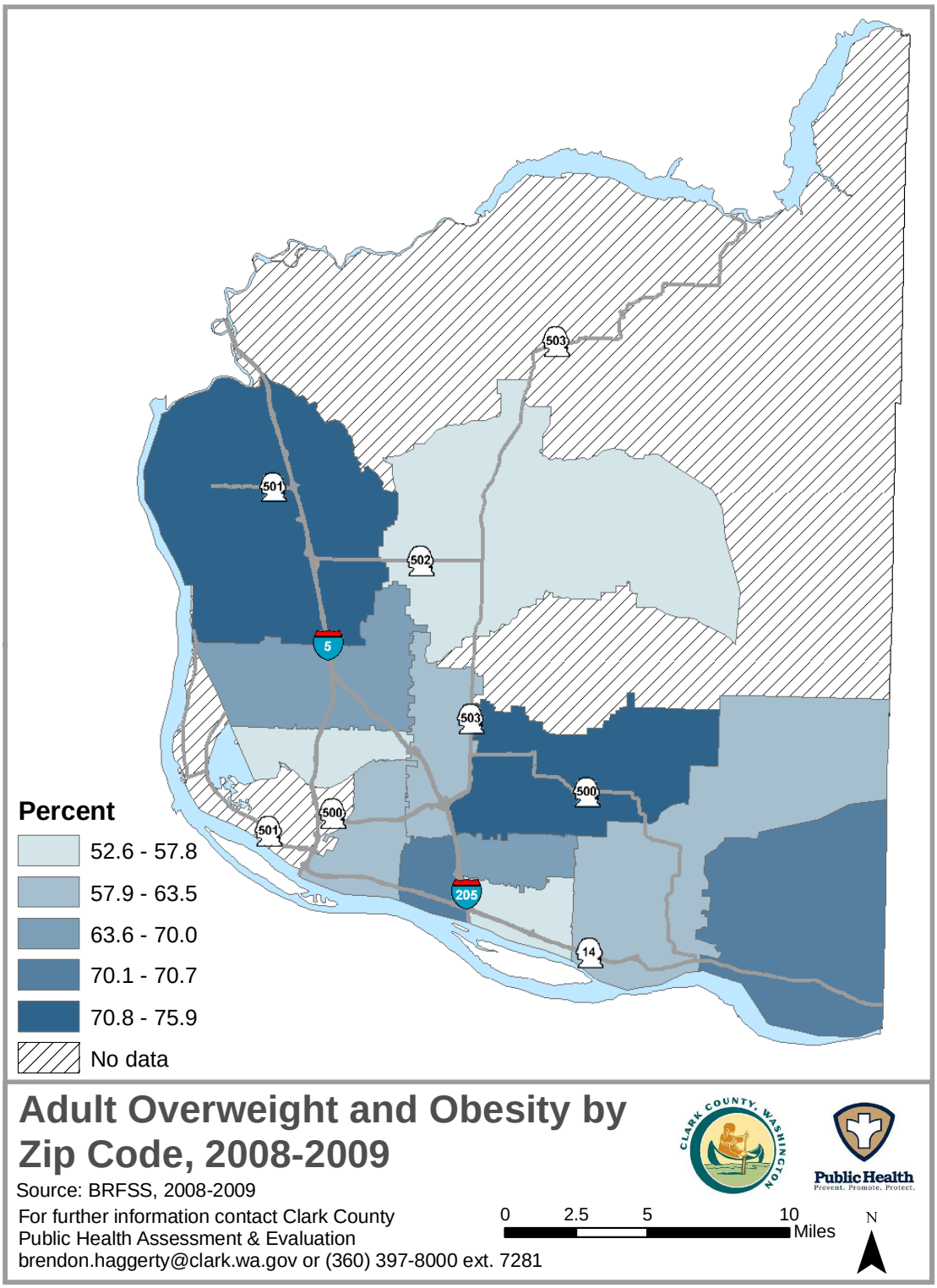
Health data

In Clark County, an estimated 32% of adults are obese (**BMI** ≥30) and 67% of adults are overweight or obese (BMI ≥25), similar to the rates for Washington State.[1] Statewide adult obesity rates have increased from about 10% in 1990 to about 26% in 2010.[2] In 2010, 22% of Clark County tenth graders were overweight and an additional 10% were obese.[3] Youth overweight and obesity rates are similar to the statewide rates and have not changed significantly since 2004.[4] Among tenth graders, overweight and obesity rates are higher among Hispanic and Black students compared with Whites. For both youth and adults, obesity rates decrease with higher SES as measured by education level. Overweight and obesity rates by zip code indicate that rates are not equal throughout the county (Map 4.1) .

Body Mass Index (BMI), is a widely used measure of population obesity based on the ratio of a person's weight to height. While not necessarily accurate for each individual, BMI is the best available measure of population obesity.

Regular physical activity reduces the risk of obesity and many obesity-related diseases.[5] In a 2009 survey of Clark County residents 81% of adults reported participating in some leisure time physical activity in the past month.[6] An estimated 41% of tenth graders reported daily physical education attendance, and 44% met the physical activity recommendation of 60 minutes or more of physical activity each day.[7]

Map 4.1. Adult Overweight and Obesity by Zip Code, 2008-2009



Weight status varies by area within the county with a higher percent of overweight/obese persons living in the 98642 and 98682 zip codes.
Source: Behavioral Risk Factor Surveillance System, 2008-2009

Walkability

The presence of **pedestrian infrastructure** (e.g., sidewalks, benches, etc.) is associated with an increase in physical activity.[8,9,10] Clark County is responsible for the planning, construction, maintenance, operations, rehabilitation, and improvements of rural roadways (excluding state highways), urban roadways outside of incorporated cities, and bridges. The county is also responsible for planning and maintenance of urban streets in the UGA. The county's policy is to construct sidewalks on both sides of the street, and a recent sidewalk inventory project confirms that many main streets through areas with pedestrian destinations have sidewalks on both sides.[11] The County Public Works department administers a sidewalk infill program that focuses on gaps in the system. Additionally, state law requires that 0.5% of the County's gas tax allocation be used for special projects such as bicycle and pedestrian infrastructure.

> **Pedestrian infrastructure** consists of the built elements that we use for walking, such as sidewalks, trails, ramps, and crosswalks.

> The **walkability index** is a composite measure of several aspects of the built environment. It was developed by researchers to determine how the built environment influences walking.
>
> **Connectivity** is a measure of how easy it is to traverse the street network.

Research has linked the **walkability index** with physical activity through active transportation. The walkability index is a combined measure of net residential density, street network connectivity, retail floor-area ratio, and land use mix to measure walkability of an area. Each component of the walkability index is independently associated with physical activity.[12]

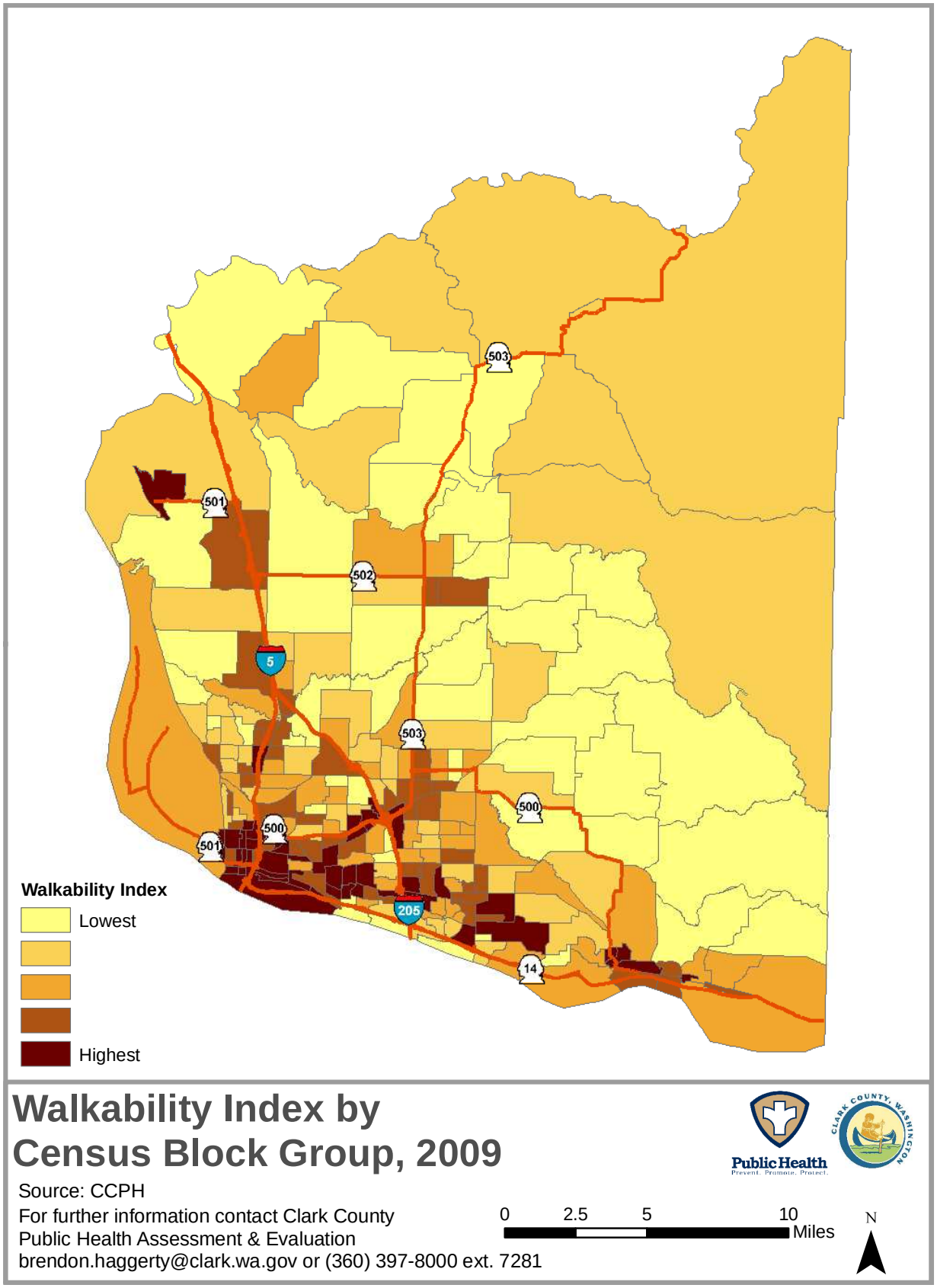
Connectivity is measured as the number of intersections that are 3-ways or more per

acre. Residential density is calculated as the number of people per net residential acre (only land that is used for residential development). Land use mix is a measure of the proportion of total building square footage within each area that is dedicated to different uses. Finally, retail floor-area ratio (FAR) is a measure of urban design that approximates the degree of enclosure or continuous building frontage that conveys a sense of a corridor. Map 4.2 displays walkability in Clark County. The most walkable areas are near downtown Vancouver, and there are several pockets of walkability distributed around the county, generally coinciding with hubs of activity such as Hazel Dell and Orchards.

Bikeability

Bicycles are permitted on all roads in Clark County, with two exceptions in the Vancouver area – a portion of Interstate 5 from the Columbia River to the junction with Interstate 205 and Interstate 205 from the state line to SR 14.[13] Bikeways are roadways that accommodate bicycle travel by providing signage, markings, or separated facilities. Bikeways encourage bicycling by improving comfort and safety for bicyclists and by serving as a reminder to motorists that cyclists are present.

Map 4.2. Walkability Index by Block Group, 2009



There are many types of bikeways, including bike lanes, shared lanes, off-street paths, and bicycle boulevards. The most common types of bikeways in Clark County are:

Shoulder bikeways - paved roadways with a striped shoulder wide enough for bicycle travel. They often include signage alerting motorists to expect bicycle travel along the roadway.

Bicycle lanes – designated exclusively for bicycle travel, they are separated from vehicle travel lanes with striping and pavement stencils.

Shared roadways – accommodate both vehicles and bicycles in the same travel lane. Shared roadways are the most common type of bikeway.

Clark County has 26 miles of shoulder bikeways and 43 miles of bike lanes (Map 4.3).[14] In many areas of the county shoulders are wide enough to serve as bikeways, but are not designated as such. The Clark County Regional Trail and Bikeway Systems Plan, approved in 2006, serves as a guide in the development and design of an interconnected trail and bikeway system within Clark County.

Whereas the growing network of off-street trails provides a safe and comfortable route for bicyclists, on-street facilities are often lacking. In many areas of the county, the only through-routes are major arterials, meaning that bicyclists must use highly-trafficked, fast-moving roadways to access destinations. In these circumstances, research shows that bike lanes alone will not likely achieve higher rates of cycling.[15] To increase cycling

rates, additional measures should be taken to separate bicycle traffic from car traffic, such as buffered bike lanes or off-street paths.

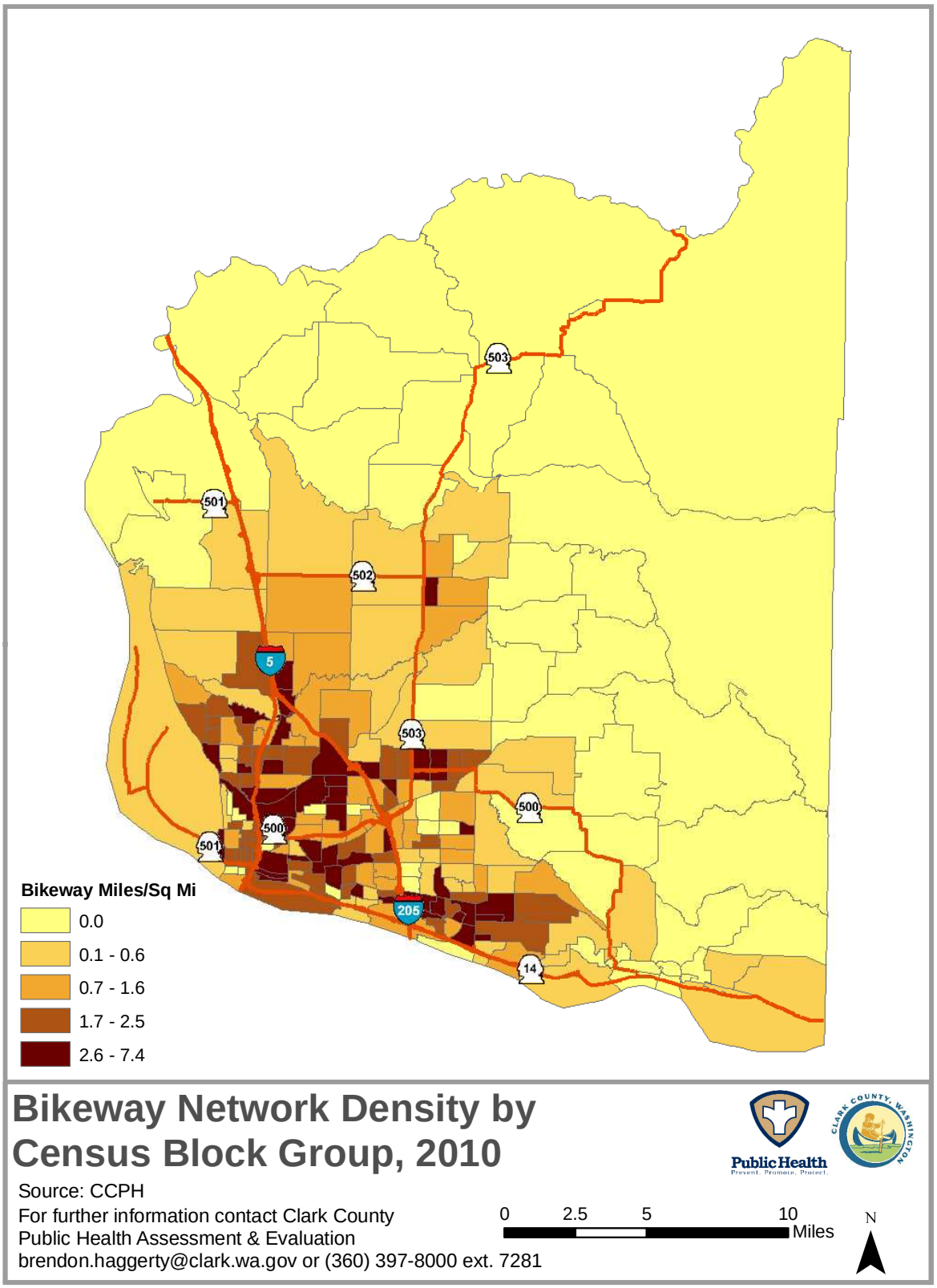
Bicycle network density is one way to measure the presence of bicycle facilities, calculating bikeway miles per square mile. Map 4.4 shows the density of bikeways by census block group, reflecting greater access to bikeways in more populated areas.

Clark County adopted a Bicycle and Pedestrian Master Plan in 2010 to serve as a 20-year vision and implementation strategy to increase the number of people walking and bicycling throughout the county. The major goals were: develop a bicycle and pedestrian network, jurisdictional coordination, traffic management/demand management, education, encouragement and safety programs, funding, active transportation planning, and bicycle and pedestrian supportive land uses. A health impact assessment of the plan found that the projects, policies, and programs will positively impact health by increasing opportunities for physical activity.[16] Table 4.1 displays findings from the comprehensive health impact assessment on the potential impacts of projects proposed by the Bicycle and Pedestrian Master Plan.

Map 4.3. On-street Bikeways Inventory in Clark County

Source: Clark County and City of Vancouver

Map 4.4 Bicycle Network Density by Block Group



Goals of the Clark County Bicycle and Pedestrian Master Plan

- Develop a bicycle and pedestrian network
- Jurisdictional coordination
- Traffic management/demand management
- Education, encouragement and safety programs, funding
- Active transportation planning
- Bicycle and pedestrian supportive land uses

Table 4.1. Potential Impact of Projects Addressed in the Bicycle and Pedestrian Master Plan

Facility Type	Impact on Physical Activity	Strength of Evidence	Potential Magnitude			
			Residential Population Served	School population served	Parks population served	Neighborhood services population served*
Bikeways	Positive	Moderate	31,073	22,876	11,338	12,376
Restriping	Positive	Moderate	17,242	15,078	8,413	4,966
Trails	Positive	Strong	62,540	31,652	21,241	13,348
Sidewalks	Positive	Moderate	4,655	3,973	1,909	2,401
All Projects	Positive	Moderate	94,969	53,805	33,428	28,797

*Supermarkets and grocery stores serve as proxies for neighborhood services

Trails

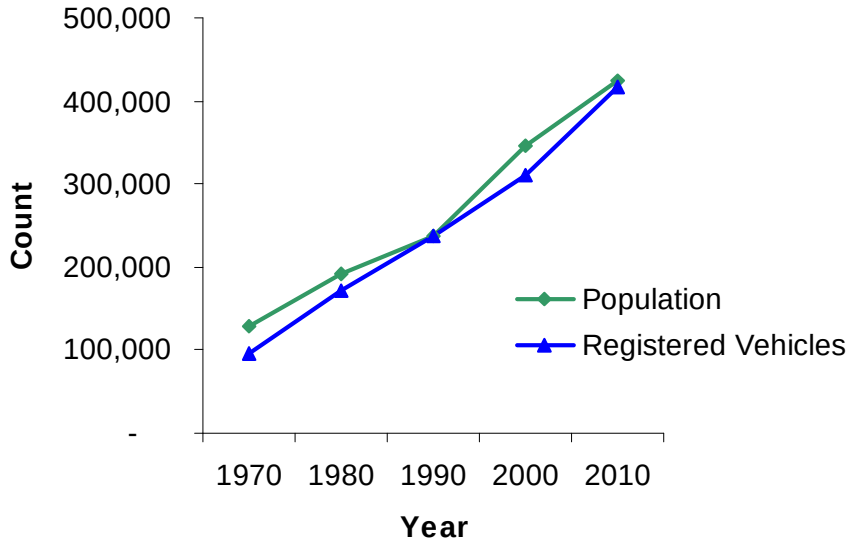
Trails can be used for recreational travel as well as by commuters to connect destinations in Clark County. Each city within Clark County has at least one trail.[17] The 2010 Clark County Trail Use Snapshot examined visitor counts and surveys of trail users at six trails from September 14-19, 2010. Since 2008, the combined total number of users counted on the six trails and interstate pathways has increased.[18] The Trail Use Snapshot counted 2,018 visits on the six trails and two interstate pathways. After being adjusted to annual figures, the estimated number of combined annual trail visits is over 2.5 million. A subset of trail users were surveyed (n=286) to learn more about trail use

and perceptions. The majority of respondents indicated they used the trails because they were close to work or home and easily accessible. This is consistent with the VCPRD Trails Master Plan, which recognize the importance of extending regional trails and connecting them to community destinations. The Snapshot identified persons aged 46-64 years as the primary users of the trails, and a zip code analysis of respondents indicated that the majority of users live within close proximity to the trails. Among trail users observed, 80% were on foot and 20% were on bicycles.[19] Although this is only a snapshot, it gives a good idea about how the trails are being used in Clark County.

Automobile Use in Clark County

Auto-dependent development reinforces sedentary lifestyles.[20,21] The Southwest Washington Regional Transportation Council (RTC) estimated that Clark County residents travel an average of 17.5 miles by vehicle every day.[22] RTC administered a household travel survey in 2009, estimating that Clark County residents average 2.1 vehicles per household.[23] The number of registered vehicles in Clark County has continued to increase from 1970-2010 and is approaching the population estimate , meaning that there are approximately as many cars as people (Chart 4.1).[24]

Chart 4.1. Population Growth and Vehicle Registration in Clark County, 1970-2010

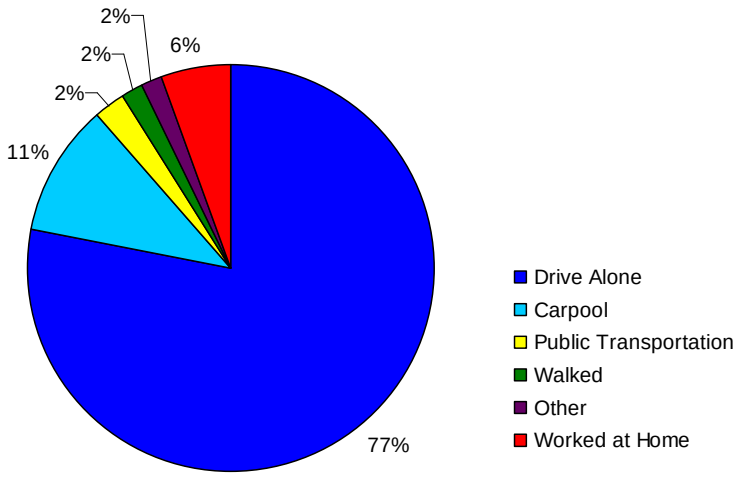


Source: Washington State Department of Licensing, OFM, U.S. Census

Transportation to Work

According to the U.S. Census Bureau, the mean travel time to work in Clark County is 24.9 minutes.[25] Nearly 25% of work trips involved travel between Clark County and Oregon, and approximately 77% of work trips were single occupancy vehicles (Chart 4.2).[26,27]

Chart 4.2 Clark County Residents Journey to Work, 2005-2009



Source: U.S. Census: American Community Survey, 2005-2009 estimates

Among the nine most populous counties in Washington, Clark County ranks second highest in the percent of commuters who drive single occupancy vehicles.[28] In addition, Clark County has the second lowest percent of commuters engaging in active transportation (Table 4.2).

Table 4.2 Commute Trip Data in Washington by County, 2005-2009

County	Commuters	Percent single occupancy vehicle	Percent auto	Percent active transportation
Yakima County	93,612	78.2%	91.8%	3.6%
Clark County	189,117	78.0%	88.7%	4.6%
Spokane County	207,635	77.5%	87.7%	6.2%
Thurston County	114,347	77.2%	88.9%	5.7%
Pierce County	361,280	75.6%	87.2%	7.2%
Snohomish County	336,556	74.7%	87.8%	6.6%
Washington State	3,056,066	72.4%	84.1%	9.7%
Whatcom County	92,113	72.4%	83.0%	9.8%
Kitsap County	109,688	67.7%	80.8%	12.0%
King County	974,509	66.3%	77.4%	16.2%

Source: US Census, 2005-2009

The Clark County Commute Trip Reduction (CTR) program promotes alternatives to driving alone through walking, bicycling, sharing rides, and riding the bus. The major goals of the program are to improve transportation system efficiency, conserve energy, and improve air quality. Participation in the CTR program is regulated by a Washington State law requiring participation from employers with 100 or more employees starting work between 6:00 and 9:00 AM. As of September 2011, 58 employment sites in Clark County were required to participate in this program.[29] In addition to efforts with specific employers, the CTR website ClarkCommute.org provides carpool matching services and information on travel options to the community at large.

Transportation to School

Most studies of children and adolescents find that walking or bicycling to school is associated with higher levels of physical activity.[30] Maps 4.5 and 4.6 show the average distance from a school in Clark County to each residential parcel within the school attendance area. Schools with lower average distances to homes have greater potential for walking or cycling, such as many elementary schools located in and around Vancouver.

As students transition to middle school, the distance from home typically increases, resulting in a decrease in walking and cycling. This is reflected in the larger middle school attendance areas and higher average distances from homes to school.

Compared to Washington State 6th graders, Clark County 6th graders report less walking to or from school (Table 4.3). The percent of Clark County 6th graders who bike to or from school is similar to that of the Washington State figure (Table 4.4).[31]

Table 4.3. Walking Among 6th Grade Students to School, 2010

	Clark County	WA State
Never walk to or from school	74.5%	64.8%
Walk to or from school every day	11.7%	18.5%

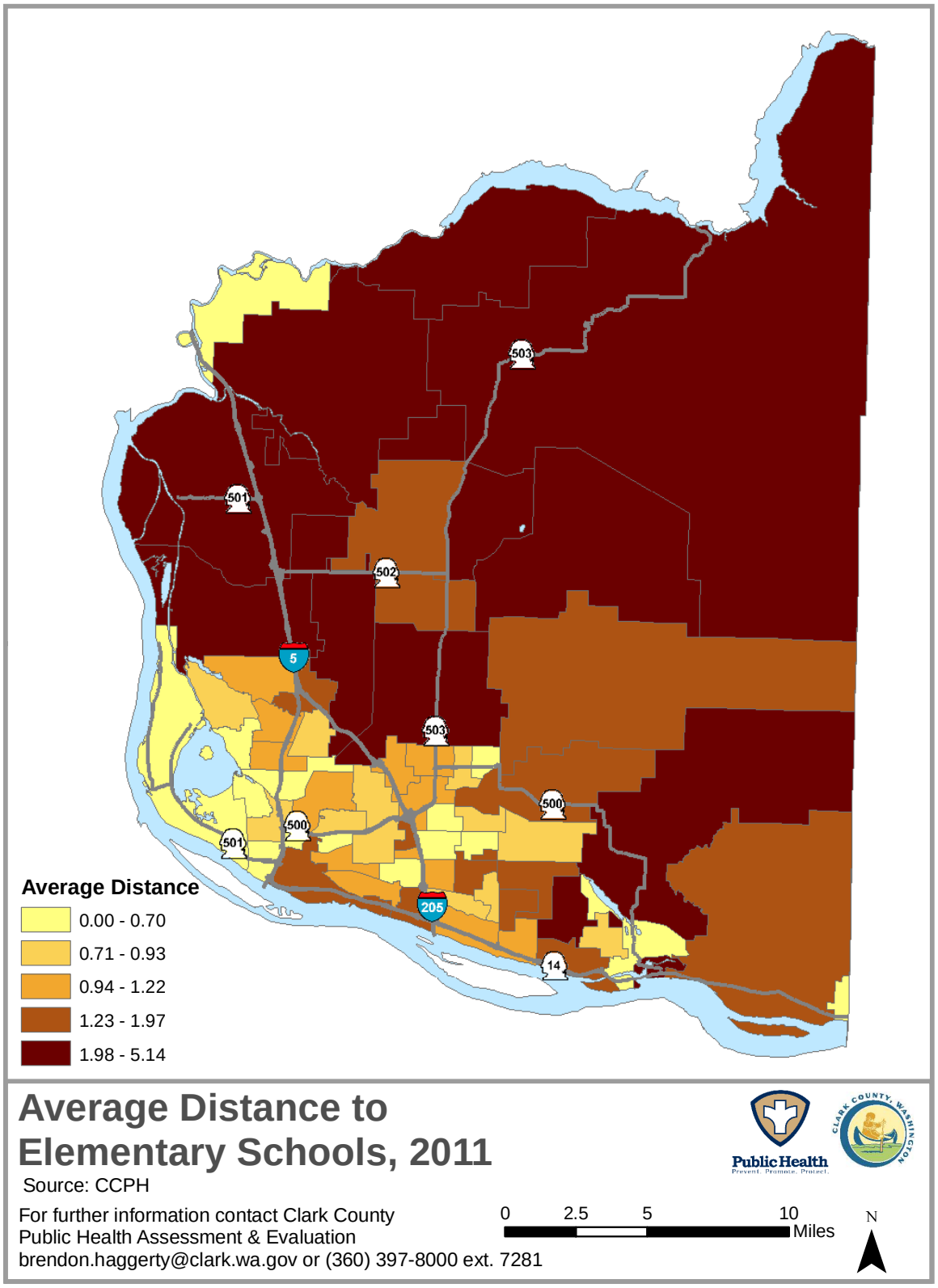
Source: Washington State Department of Health, Healthy Youth Survey, 2010

Table 4.4. Bicycle Use Among 6th Grade Students to School, 2010

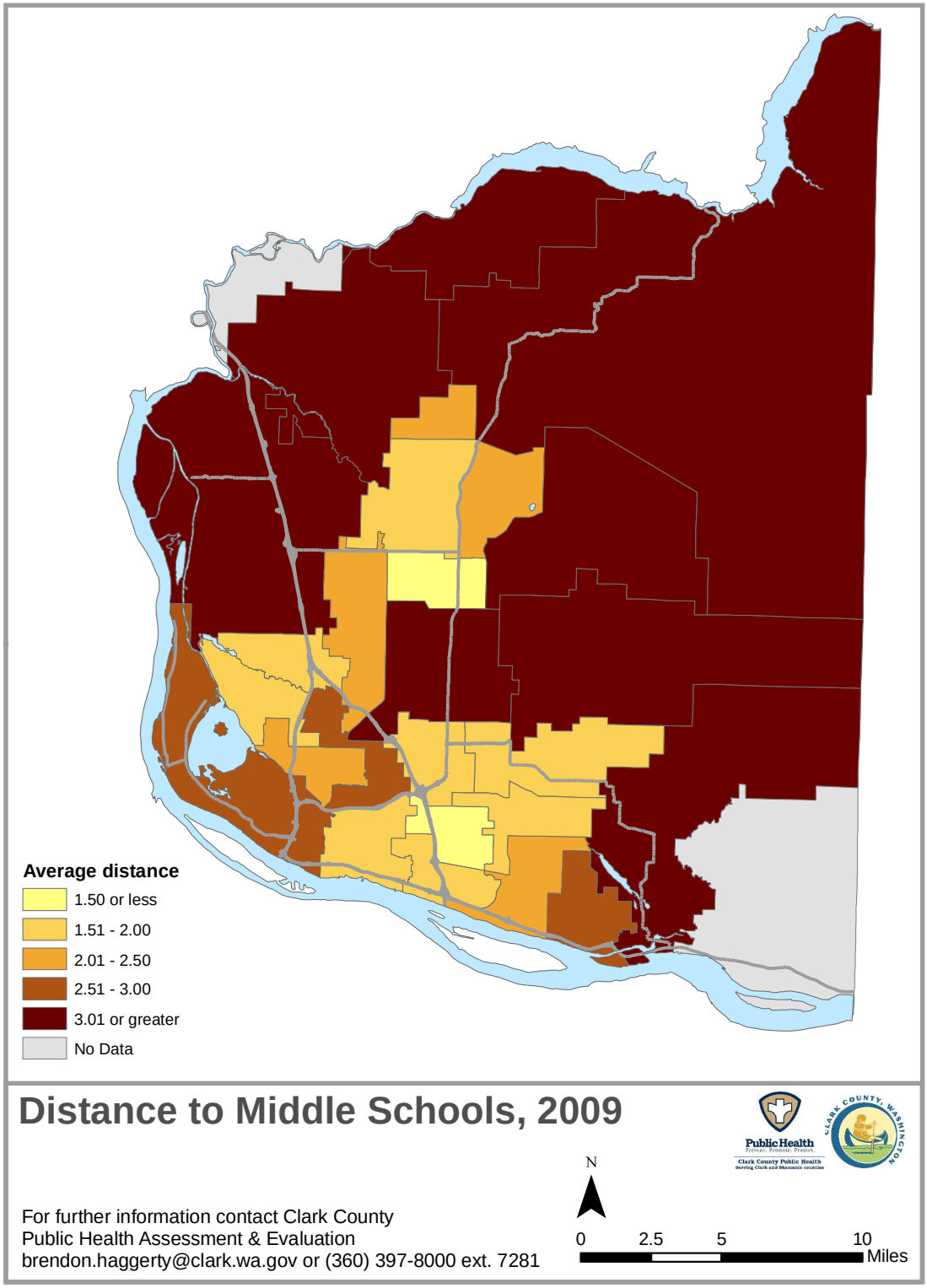
	Clark County	WA State
Never ride a bicycle to or from school	91.3%	91.9%
Ride a bicycle to or from school every day	2.5%	2.0%

Source: Washington State Department of Health, Healthy Youth Survey, 2010

Map 4.5. Distance (miles) to Elementary Schools



Map 4.6. Distance (miles) to Middle Schools

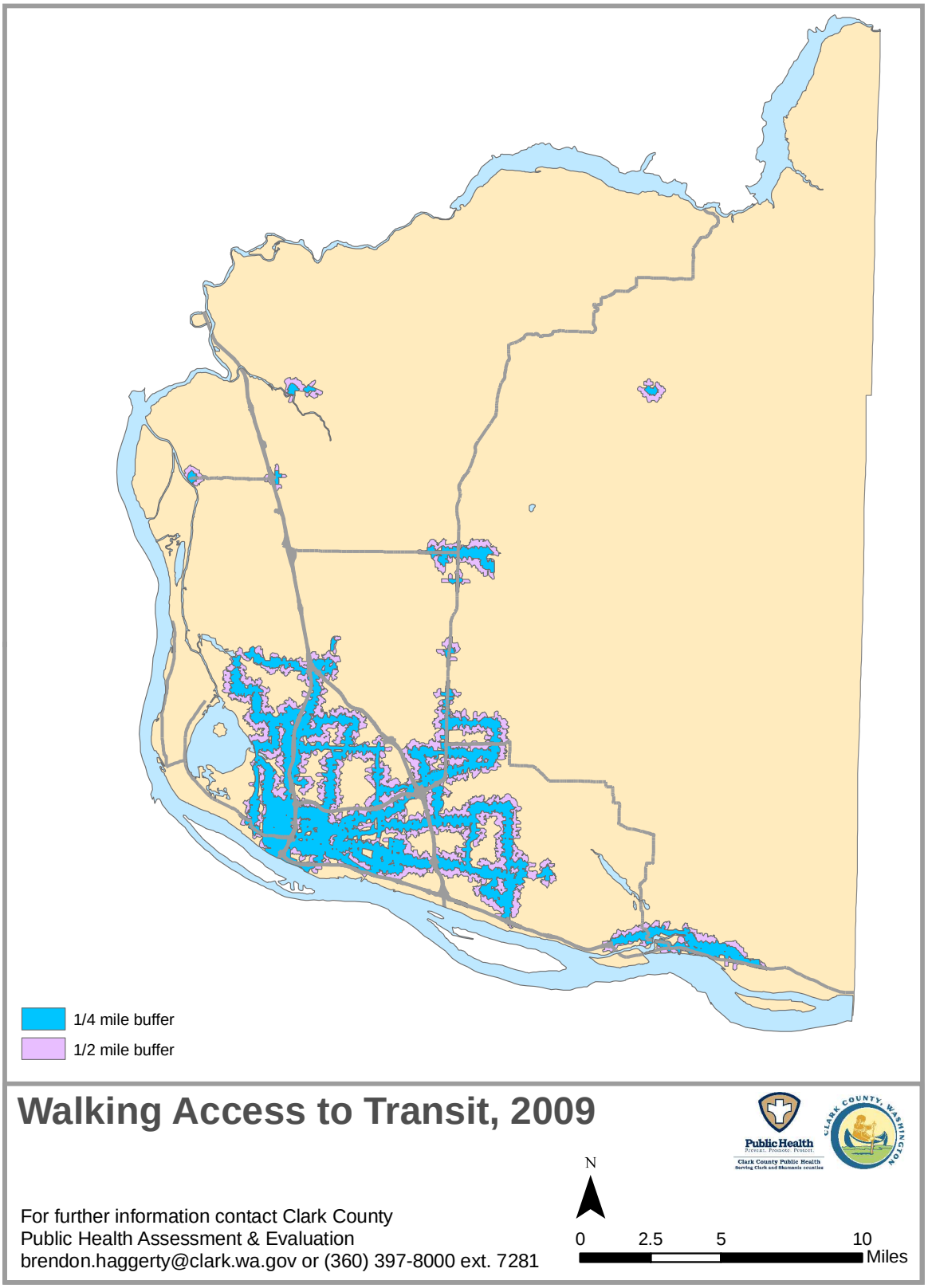


Although the county does not have an established Safe Routes to School Program, some encouragement and safety programs are in place, particularly with schools in highly urbanized areas. Most school districts have crossing guard programs to improve safety for children walking and biking to school. Walking School Bus Programs are established at the Daybreak school in Battleground and Washington and Washington and Sacajawea elementary schools in Vancouver. Bike rodeos are held throughout the county at multiple elementary schools, and Legacy Salmon Creek hospital sponsors a traffic and bike safety program through Trauma Nurses Talk Tough. A bike safety program is in place in two middle schools and there are currently efforts underway to expand this program. These programs promote active transportation that is safe and encourages physical activity among youth.

Public Transit

People who use public transportation are more likely to meet physical activity recommendations and are less likely to be obese when they access transit by walking or bicycling.[32] The Clark County Transit Benefit Area Authority (C-TRAN) is a publicly funded transportation system that serves the transportation needs of Clark County with connections to Portland, Oregon. During 2008, there was a 19% increase in ridership with 7 million passenger trips. Because of this increased demand, C-TRAN has developed a 20 year transit development plan, C-TRAN 2030, to enhance public transportation for Clark County residents. Discounted fares are available to residents who qualify as low-income, seniors, disabled, Medicare recipients, and youth.

Map 4.7. Walking Access to Transit



Map 4.7 shows the areas within Clark County that are within ¼ and ½ mile of a transit stop. Approximately 27% of Clark County residents live within ¼ mile of a transit stop, and about 52% live within ½ mile. Central Vancouver has service throughout, while eastern and northern Vancouver have sparse service or none at all. Proximity is one way to measure availability, but quality and frequency of service are also important. Large areas of Clark County have infrequent service or none at all.

C-TRAN administered a Rider Satisfaction Survey in 2008 that included on-board interviews with riders on six bus routes. Respondents reported taking a C-TRAN bus an average of 13 one-way trips in the preceding week. Younger riders aged 16-24 years averaged 14.9 trips per week compared with an average of 11.3 trips for those aged 55 years and older. Express pass (convenient day, month and annual passes that allow travelers to ride anywhere when service is available) holders averaged 9.5 trips per week compared with 13.2 trips per week for non-express riders. Had C-TRAN not been available, 25% of non-express riders reported they would not have taken the trip. Twenty-eight percent of respondents reported choosing C-TRAN because they didn't have a car, 15% did not drive, and 6% did not have any other options.[33] A total of 49% of C-Tran riders could be considered transit-dependent. This compares to 16% of TriMet riders and 30% of King County Metro riders. [34, 35]

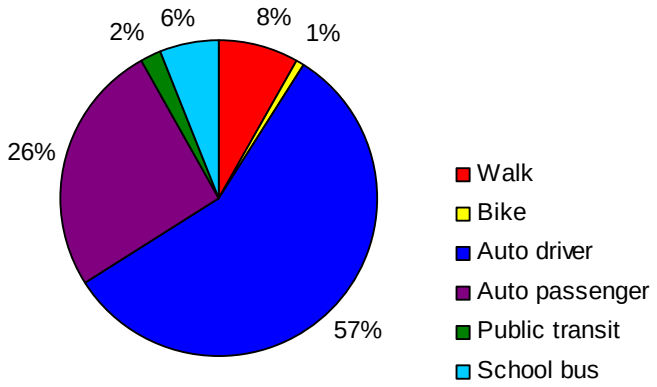
C-TRAN's Bike and Bus Program provides bike racks located on the front of all C-TRAN fixed route buses. In addition, bike racks or lockers are located at most park and ride

facilities and transit centers. This encourages riders to use bicycles for the difficult "last mile" link to their destination. All C-TRAN routes meet the Americans with Disabilities Act (ADA) accessibility requirements. Translators and translated materials can be provided upon request; however, materials are not readily available in languages other than English. In addition to providing transportation in Clark County, C-TRAN connects directly to TriMet, a transportation system that provides bus, light rail and commuter rail service in the Portland metro area. This is an important option for the approximate 25% of Clark County residents who travel to Oregon to work.[36]

Non-Commute Transportation

The majority of trips made by Clark County residents are vehicle trips, with non-motorized trips accounting for about 9% of all trips and transit accounting for 2% of all trips (Chart 4.3).[37] Thirty-seven percent of surveyed households reported making at least one trip to a non-Washington destination for any reason in a 24 hour weekday period.[38] Opportunities to access key destinations in the county through walking, biking and using public transit increases opportunities for

Chart 4.3. Mode of Transportation to non-Work Locations



Source: RTC Household Survey, 2009

physical activity. There are three important categories of destinations that are especially important to preventing chronic disease related to obesity: parks, food sources, and health services. Parks provide access to opportunities for physical activity, and access to healthy foods improves residents' ability to balance their activity level with a healthy diet. Additionally, access to supermarkets and grocery stores is incdicative of access to other services and retailers that often cluster around food stores. Finally, access to health services is critical for preventive care and treatment.

Parks

About 56% of Clark County residents live within ½ mile of a park. As evident in Map 4.9, park access is greater within the within the UGA, where 66% of residents live within ½ mile of a park.41%

Table 4.5. Percent residents within ½ mile of food retail

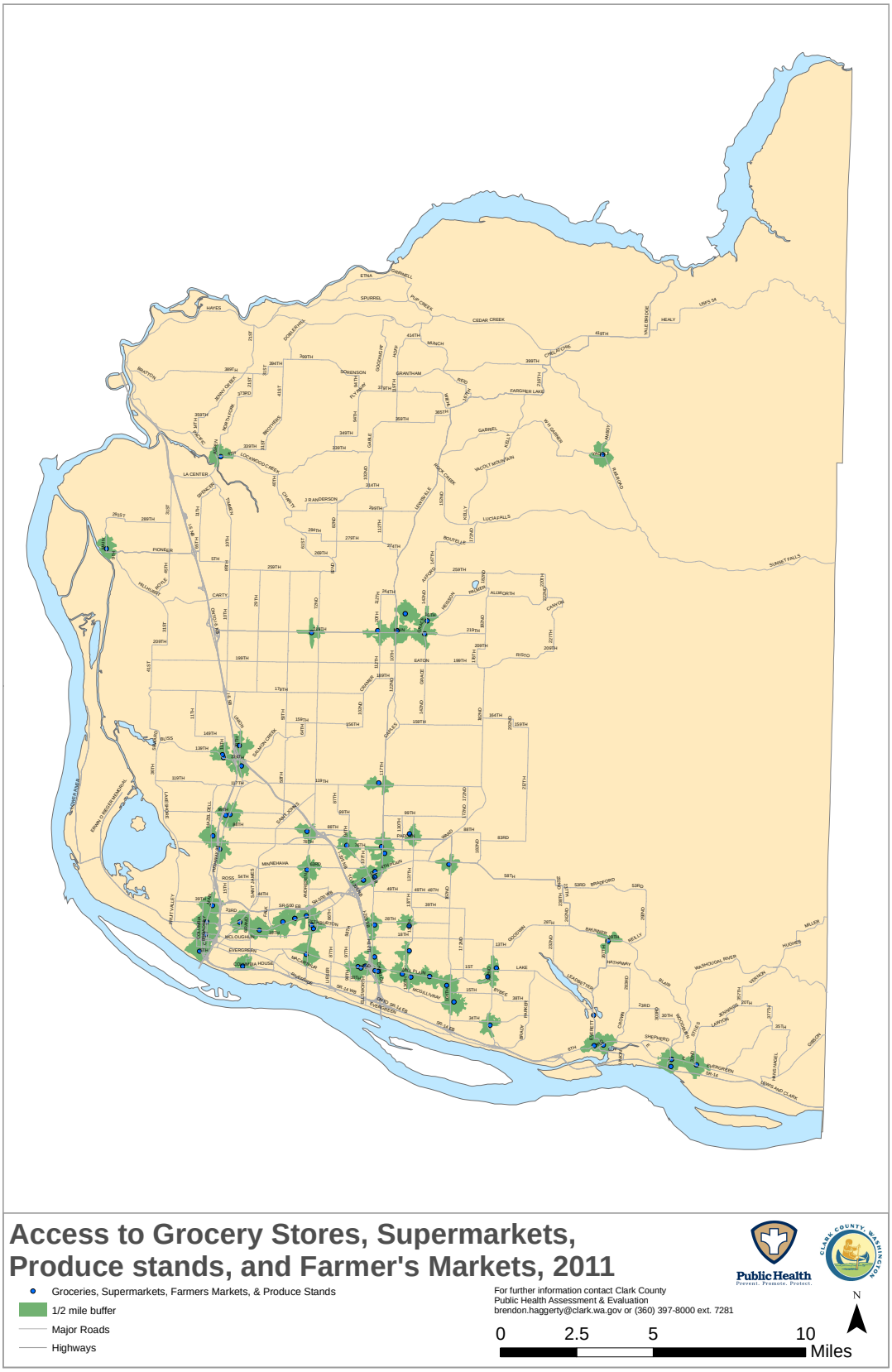
Type of nearby food source	Percent of residents within ½ mile walking distance
Healthy food retail	17%
Fast Food & Convenience	41%
Any food retail	46%

Source: Clark County Public Health, Food Outlets Data File, 2011, US Census 2005-2009

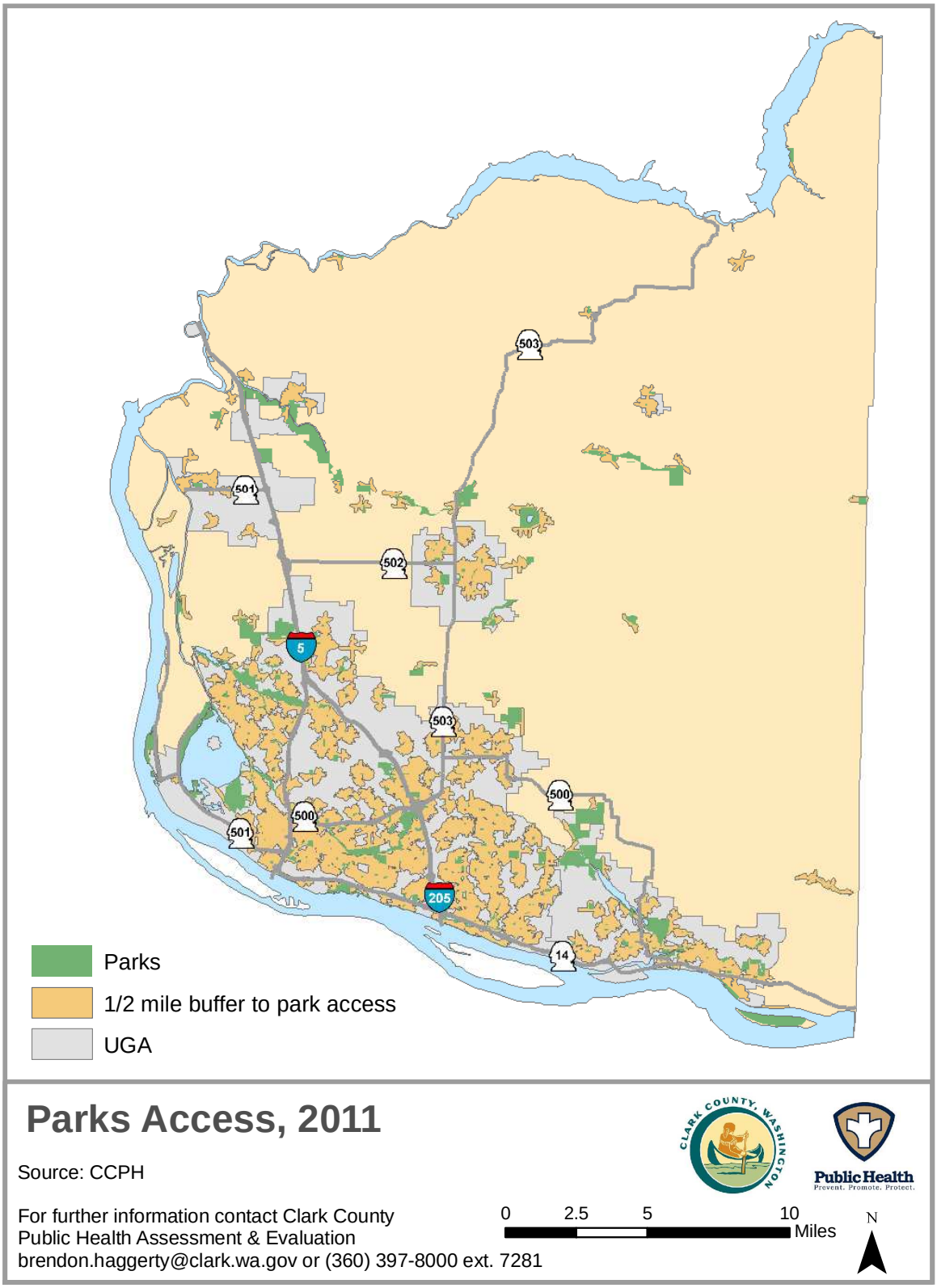
Healthy Food Retail

About 17% of Clark County residents live within ½ mile of a healthy food source such as a produce stand, farmer's market, grocery store, or supermarket (Map 4.8). This compares to about 60% of residents within ½ mile of a full-service grocery store in nearby Portland.[39] Table 4.5 indicates that residents have greater access to fast food restaurants and convenience stores than to healthy food stores such as those listed above.

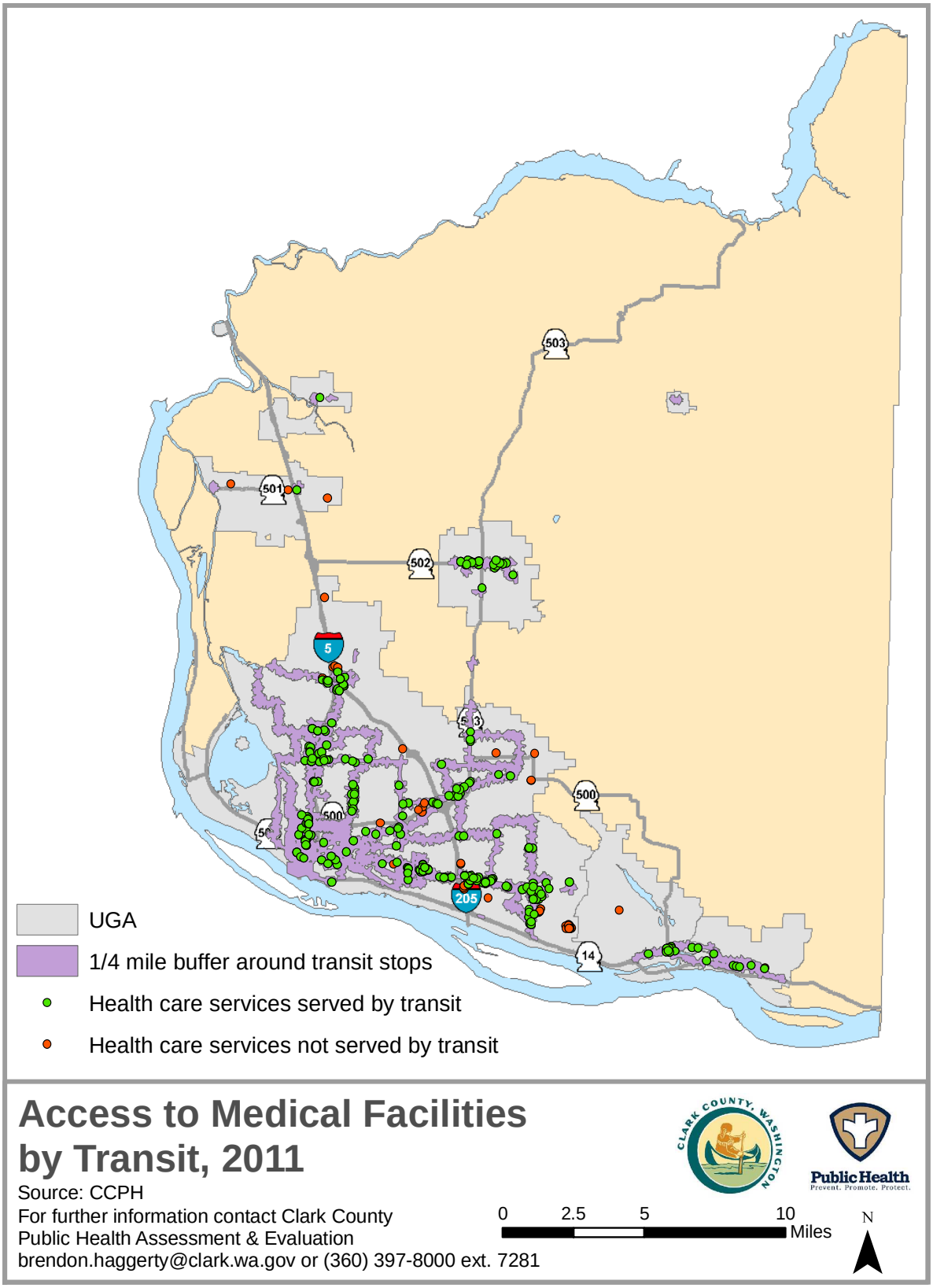
Map 4.8. Access to Grocery Stores, Supermarkets, Produce Stands, and Farmer's Markets



Map 4.9. Clark County Residents that Live within ½ Mile of a Park



Map 4.10. Access to Health Services in Clark County



Health Services

A healthy community facilitates ease of access to facilities that provide reliable and quality health care services. The availability of primary care has a role in preserving good health and preventing morbidity and hospitalizations from chronic and communicable diseases including asthma and diabetes. People often consider individual level factors such as medical coverage when thinking about health care access. However, regardless of a person's ability to pay, there are many community-level factors that can influence access to care. Health care facility locations that allow people to use public transit or walk have the added health benefit of promoting physical activity. In Clark County, approximately 84.9% of health care facilities are within ¼ mile of a transit stop (Map 4.10). Excluding dental and alternative health care facilities, 83.7% of medical facilities are within ¼ mile of a transit stop.

Safety and Comfort

Not only do people need opportunities to engage in active transportation, but they should feel safe when doing so. Real and perceived danger to pedestrian and bicyclists can deter individuals from choosing non-motorized methods of transport.[40] Creating a more pedestrian and bicycle friendly environment increases the perception of safety in addition to reducing the actual risk of injury.

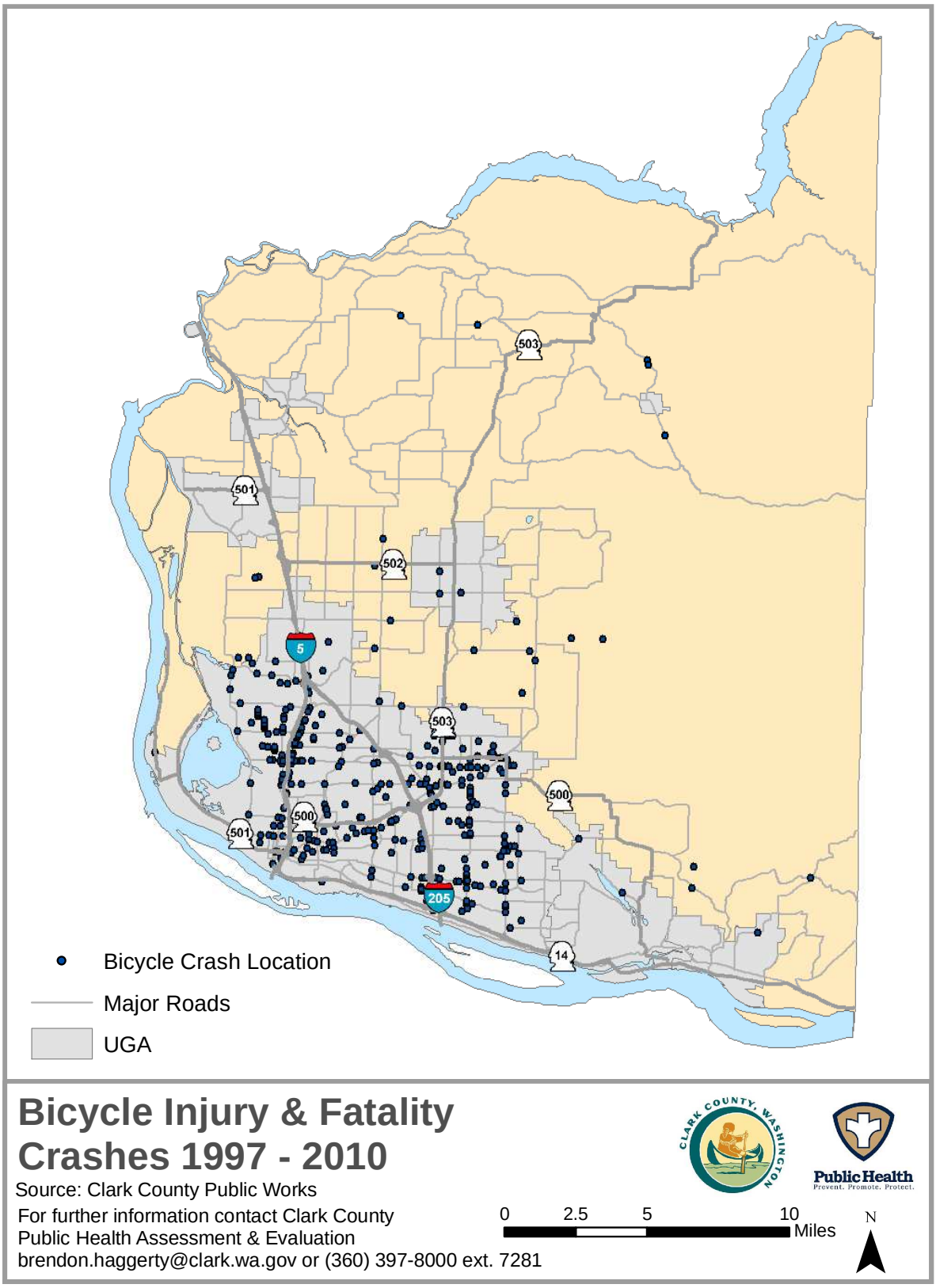
Users' perception of safety is as important as the actual safety record. The 2010 Clark County Trail Use Snapshot estimated that 90% of trail users thought that safety

conditions of the path were rated as “good” or “excellent,” and approximately 85% rated the trail surface conditions “good” or “excellent.”[41] Throughout the parks and trails systems there is little data on pedestrian amenities such as benches and lighting to promote walking and enhance safety and comfort in Clark County.

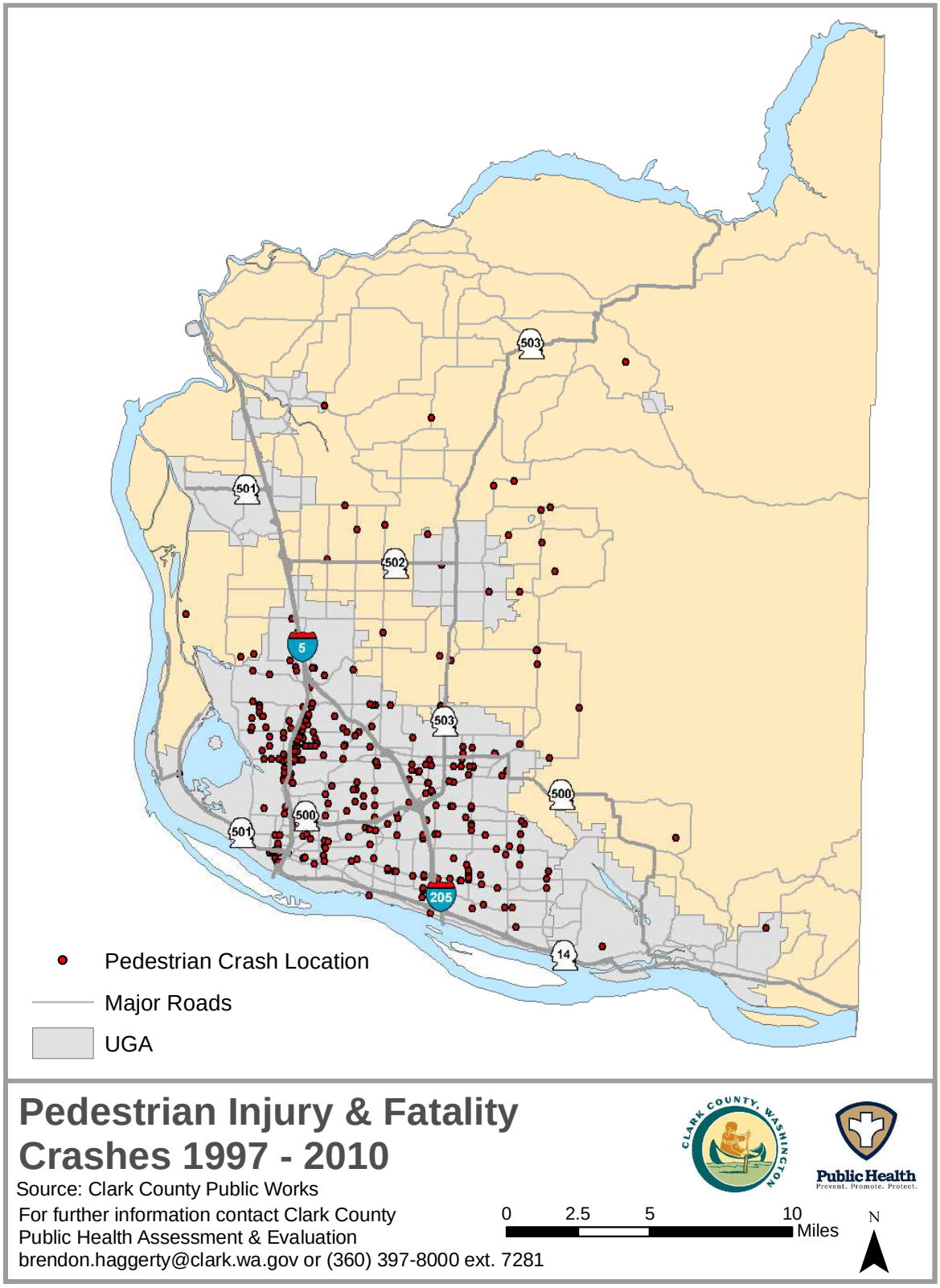
Within the public transit system, C-TRAN has provided shelter at 17.4% of all transit stops.[42] Beyond those locations, stops have not been evaluated for shade or overhead cover. As of 2011, C-TRAN is in the process of reviewing bus stops on a route by route basis to evaluate service, including safety. They have also implemented a system to notify riders of the next arrival for each stop in real time by phone. Sidewalks are maintained by the jurisdiction in which the sidewalk is located, and safety concerns are reported to the jurisdiction. There are limited data on safety conditions related to sidewalks and bikeways in Clark County.

In Washington, the rate of pedestrian and bicycle injuries decreased from 2008 to 2009. Statewide, 85% of pedestrians and cyclists are killed in urban areas on state highways and city streets. Maps 4.11 and 4.12 show the locations of bicycle and pedestrian crashes from 1997-2010 in Clark County. The highest number of crashes at any single place occurs at the intersection of NE 78th Street and Highway 99, with ten pedestrian and three bicycle crashes.

Map 4.11. Clark County Bicycle Injury and Fatality Crashes, 1997-2010



Map 4.12. Clark County Pedestrian Injury and Fatality Crashes, 1997-2010



Disparities

Socioeconomic Status (SES)

Approximately 4.3% of Clark County households do not own a vehicle, and consequently must rely on other modes of transportation.[43] While the low SES population is more likely to ride transit compared with high SES, overall the rate of public transit use is low. Low-income groups are more likely to face barriers to engaging in active transportation and meeting recommendations for physical activity. Approximately 47.5% of Clark County residents live within ½ mile of a public transit stop. There is a moderate significant correlation ($p<.01$) between walkability and poverty (Pearson correlation .504) in Clark County. Low SES households are more likely to live in walkable neighborhoods compared with high SES groups. This is likely because low-income households tend to live in older housing, located in older, more walkable areas of the city.

Age

Approximately 31% of Clark County youth and 35% of residents aged 65 years and older live within ¼ mile of a transit stop. There is a weak correlation between residents aged 65 years and older and walkabilty in Clark County (.187). Older persons are slightly more likely to live in walkable neighborhoods compared with youth aged less than 20 years.

Race and Ethnicity

Approximately 31% of Whites live within walking distance of a transit stop compared with 38% of non-Whites. There is a weak significant correlation between walkability and percent non-White (.316) in Clark County. Non-Whites are more likely to live in walkable neighborhoods compared with Whites.

Geography

Because public transit routes are offered in the urban areas with increased density, opportunities for active transportation are greater in urban areas compared with rural areas.

Summary

Table 4.6 below summarizes findings from the literature compared to current conditions in Clark County.

Table 4.6. Summary: Literature Findings Compared to Current Conditions

Finding	Conditions in Clark County	Level of Concern
Built environments that provide opportunities for physical activity lower the risk of obesity.	Clark County is dominated by drivable suburban development. 89% of Clark County commuters get to work in a car.	**High**
Using best practices in urban design promotes physical activity.	In many areas, large arterials are the only through-routes. Buildings have a low FAR.	**High**
Density and mixed land use promote active transportation.	Clark County is dominated by drivable suburban development.	**High**

Real and perceived danger to pedestrians and bicyclists can deter individuals from choosing active transportation.	From 2008 to 2009, the bicycle and pedestrian injury rate decreased in Washington State. 85% of pedestrians and cyclists are killed in urban areas on state highways and city streets.	**High**
Auto-dependent development reinforces sedentary lifestyles.	Clark County residents average 17.5 vehicle miles per person per day, and 2.1 vehicles per household.	**High**
The benefits of active transportation go beyond increasing opportunities for physical activity.	Non motorized trips account for 9% of all trips in Clark County.	**Medium**
Transit use is associated with physical activity.	Only 2% of Clark County commuters use transit. 27% percent of Clark County residents live within ¼ mile of a transit stop.	**Medium**
Greater perceived safety and comfort is associated with higher levels of active transportation.	90% of trail users thought safety conditions on trails were good or excellent. C-Tran provides shelter at 17.4% of all transit stops. There is a moderate correlation between walkability and poverty. In many areas, large arterials are the only through-routes.	**Medium**
Low SES individuals face more barriers to engaging in physical activity and active transportation.	Low income households are more likely to live in walkable neighborhoods than high SES households. About 4.3% of Clark county households to not own a car.	**Medium**
Active transportation use varies by age group.	Approximately 31% of Clark County youth and 35% of residents aged 65 years and older live within ¼ mile of a transit stop.	**Medium**
Active transportation use varies by race/ethnicity.	Approximately 31% of Whites live within walking distance of a transit stop compared with 38% of non-Whites.	**Low**
Individuals in rural areas face different transportation challenges compared with urban areas.	Public transit service is much greater in urban areas and does not serve many rural areas.	**Low**

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