

BUILT ENVIRONMENT ATLAS: **Active Living, Healthy Eating** Multnomah County, Oregon



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Health Assessment & Evaluation
Office of Health & Social Justice



**MULTNOMAH COUNTY
HEALTH DEPARTMENT**



Public Health

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Dear Multnomah County Residents,

On behalf of Multnomah County Health Department, I am very pleased to present to you the *Built Environment Atlas: Active Living, Healthy Eating*. This report uses maps to explore how human-made features of the county's physical environment, such as streets, buildings, and even tree plantings contribute to active living and healthy eating.

In the past, public health guidelines have focused on reducing our risk of chronic diseases such as heart disease, cancer, and diabetes by encouraging individuals to be physically active and adopt a healthy diet. More recently, public health recommendations have expanded to include improvements to our human-made environment that make it easier for people to engage in physical activity and eat healthier food. For example, it is much easier to maintain a healthy body weight in places where sidewalks, public transportation, and parks encourage people to move around the neighborhood. Easy access to full-service grocery stores that provide a wide selection of food options including whole grains and fresh fruits and vegetables is also important. The availability of these resources is influenced by decisions made by state and local transportation and planning agencies that shape the neighborhoods and cities in which we live, work, learn, and play. Consequently, an important element of modern public health practice involves advocating for healthy neighborhood design.

The atlas addresses three important built environment features: healthy eating resources, physical activity opportunities, and transportation options. We also include maps about the racial and economic diversity of Multnomah County because race and income are other important predictors of health. Finally, we present maps of health outcomes to show how both health status and built environment features vary across the county.

We hope the information in the atlas will encourage discussions among residents, organizations, and government agencies about our shared built environment and the changes we can make to better support health for all residents. The Health Department is eager to continue collaboration with our partners as we strive to be a county whose built environment makes it easier for all residents to be active and make healthy food choices.

Sincerely,

Lillian Shirley,
Director,
Multnomah County Health Department

**Lillian Shirley, Director
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**Sandy Johnson, Director
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I. INTRODUCTION

A. *Intended audience and purpose*

“Built environment” refers to the human-made aspects of the communities we live in: physical features like streets, buildings, parks, recreational facilities, and more. The unique built environment of a given place results from decisions that residents, property owners, and governments make about how to design homes, businesses, schools, communities, cities, and regions. This atlas is designed to inform programs and policies related to the built environment and health by illustrating current demographic, health, and built environment conditions within 15 areas of Multnomah County. This document is intended for people wanting in-depth information about how the built environment differs across Multnomah County. It was written for residents, community organizations, schools, researchers, policy makers, and other government partners. The goals of this project were to raise awareness about the link between the built environment and health, to start conversations about how resources are spread across the county, and to provide information and maps to groups and organizations that might not have the resources to do this type of work.

The built environment features included in the atlas are the features that have the strongest demonstrated connection to healthy eating and physical activity and, therefore, are important areas of focus in efforts to reduce certain chronic diseases. Expert recommendations from agencies like the Centers for Disease Control and Prevention, the availability of data at the sub-county level, and the novelty of the topic were also

considerations. In some cases we included maps of features that many people around the country are studying, such as access to full-service grocery stores. We also included maps on topics that had not been explored in depth in this county before, such as the location of fast food restaurants in relation to schools.

The built environment is only one of many factors that influence health. Other important factors include genetics, economic means, and education. One reason we study how the built environment affects health is that it is possible for communities to make changes to the built environment that, in time, could lead to improvements in residents’ health.

B. *What this atlas adds to current knowledge*

Most of the following analyses focus on one aspect of the built environment at a time so that the maps are easy to interpret and replicate. The atlas also focuses specifically on measures related to health rather than a broader conception of equity or opportunity. Finally, it uses the most recent population estimates available rather than Census 2000 data. This is a key distinction, since many demographic changes have occurred in the County over the last decade. The ongoing trends of immigration of young people from other U.S. metropolitan areas and people from other countries, African American displacement by gentrification in inner North and Northeast Portland, and rapid growth of the Hispanic population suggest that Multnomah County’s population is different today than when the 2000 Census data were collected. As new data become available, this atlas can be updated and change can be measured.

C. The link between the built environment & health

Health is increasingly viewed in broad terms. The World Health Organization defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” [1] Our health is affected by where we live. While we have long understood that toxins in air, water, and food are harmful to human health, public health practitioners are now realizing that the design of communities and the distribution of resources within them can have dramatic consequences for chronic diseases that are today’s most pressing health problems. As a result, public health professionals are increasingly assessing the built environment and creating programs and policies to influence it.

Scientific research has demonstrated how community design affects both health behaviors and health outcomes. [2-4] For example, urban areas that were developed mainly for car travel that resulted in “suburban sprawl” and diets based on processed foods have been tied to the increased prevalence of diabetes and obesity in the U.S. Diet- and activity-related health problems, which are influenced by community design, have enormous costs. Cancer, stroke, and heart disease caused the premature loss of over 7,000 years of life in Multnomah County in 2006 alone. [5] Diabetes is another rapidly growing health challenge: diabetes-related deaths almost doubled in Multnomah County between

“Suburban sprawl” and diets based on processed foods have been tied to the increased prevalence of diabetes and obesity in the U.S.

1990 and 2006. [5] Eating well and being physically active can help prevent these diseases, or help people diagnosed with them live fuller lives. Yet 59% of adults in Multnomah County don’t meet the recommended physical activity standards and less than a third eat the recommended five servings of fruit and vegetables per day. [6]

D. Health equity and the built environment

When considering health equity, we look at the distribution of community resources and burdens and how they affect health. Community resources include health-promoting places such as parks and full-service grocery stores. Community burdens include barriers to healthy living such as landfills, housing near busy freeways, and vacant or abandoned lots. Built environment conditions both do and do not discriminate. The influence of the built environment operates above and beyond individual characteristics like race, income, and educational attainment that are believed to influence people’s individual behaviors. [7-8] Yet while these effects are independent of individual characteristics, certain groups of people are more likely to be exposed to certain types of built environments.

In many places across the U.S., high-income areas have built

environments with more health-promoting features like parks and full-service grocery stores, while low income areas tend to have fewer. [9-10] This is especially troubling because people living with lower socioeconomic means may have fewer resources to seek out places like recreational facilities and fresh produce stores and these amenities are located further away from their homes. Race and place have similar dynamics: in many areas, predominantly White neighborhoods have better access to health-promoting resources than residents of areas where ethnic and racial minorities are concentrated. [11-13] Put another way, living in a healthy neighborhood can help make anyone healthier . . . but people living on a low income and people of color are less likely to live in healthy neighborhoods.

Because place and socioeconomic characteristics both affect health, areas with fewer healthy resources and more residents living with lower socioeconomic means require the attention of public health workers. Lower socioeconomic status communities have a higher proportion of residents with low incomes, limited English speaking skills, low educational attainment, and/or are of minority ethnoracial status.

E. Multnomah County and its areas

1. The built environments of Multnomah County

The look and feel of different areas of Multnomah County varies substantially. In the Downtown core, Portland is highly urban, with dense mixed-use development, a tight street grid, automobile congestion and extensive mass transportation; virtually all green space is public parks. Portland is the economic and cultural center of the county, and home to the

bulk of the population. The density of population and buildings generally declines with distance from the Downtown core.

Immediately west of Downtown, the hilly topography is traced by curving streets populated with relatively few residents and limited public facilities. In the far northwest is Sauvie Island, an agricultural area and wildlife refuge with limited infrastructure; the northern third of the Island is in Columbia County.

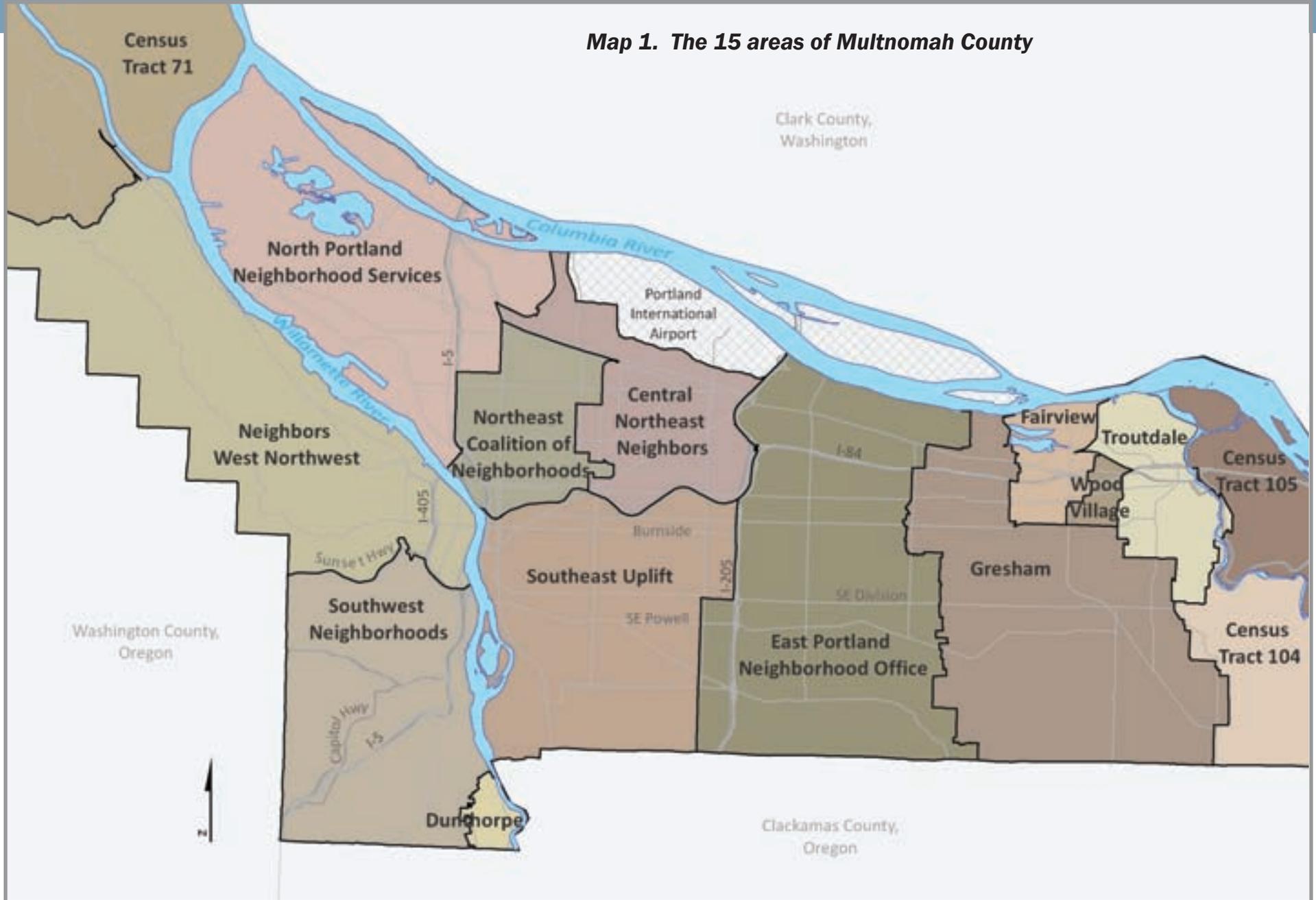
The inner east side neighborhoods were developed along new streetcar lines in the early twentieth century, conforming to the street grid with a housing stock of single-family homes and small apartment complexes. Parks, transit, and commercial districts serve the neighborhoods and most residences have small lawns or gardens.

Moving eastward across the County toward Gresham and Troutdale, development is both more recent and more suburban in character. The car-oriented development pattern is characterized by clusters of townhouses and single-family homes linked to distant large shopping centers by multi-lane roads. The eastern area of the County has seen little recent development. Much of the area retains a rural feel with expanses of state and federal land. One populated area is the community of Corbett, which has a 900-student school district and a small commercial district near the site of a former railroad station. [14]

2. Unit of analysis: areas

To make comparisons between these diverse parts of the County, the atlas uses fifteen areas that are socially and administratively

Map 1. The 15 areas of Multnomah County



II. MAP TOPICS

meaningful. Within the city of Portland, the units are District Coalitions of neighborhoods, as designated by the City's Office of Neighborhood Involvement. Portland's individual District Coalitions have larger populations than most of the other cities in Multnomah County, which are mapped as separate units. The exception is Maywood Park, whose few hundred households were included in the East Portland Neighborhood Office District Coalition figures. The unincorporated areas of the County have been divided into four areas: Dunthorpe – the community in the southwestern part of the County served by the Riverdale School District – and three Census tracts. Census tracts are geographic units whose boundaries are defined by the Census Bureau; they generally have a population of about 4,000 residents and are always located entirely within one county. Census tract 71 includes the Skyline area and the part of Sauvie Island that lies within Multnomah County. Census Tract 104 extends east from Gresham through the Mt. Hood National Forest with the Sandy River as its northern boundary and Clackamas County as its southern boundary. Census Tract 105, extends east from Gresham with the Sandy and Columbia Rivers as its boundaries – this includes the Corbett School District. Few people know which Census tract they live in, yet these are the best established ways of dividing up these unincorporated parts of the County.

II. MAP TOPICS

A. Demographics

The demographic maps serve two purposes. The first is to provide context for the reader to understand who lives in different areas of the county. The second is to show relationships between socioeconomic status and built environment characteristics. In many cases, differences among areas occur in conjunction with – or as a reflection of – differences in populations who live in the area. Socioeconomic differences among the areas may include income or education level and cultural or racial backgrounds. Readers may find themselves turning back to the demographic maps after noticing differences in built environment conditions to answer the question, “So who lives there?”

B. Food access

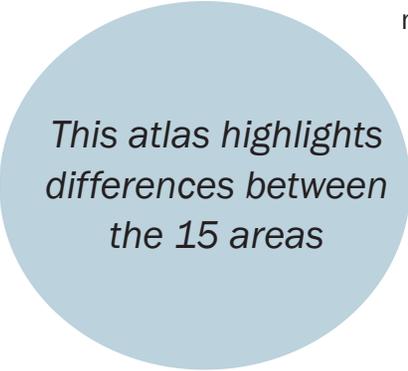
The food available near people's homes influences their diets. Living near full-service grocery stores that sell a variety of produce is associated with eating more fruits and vegetables and maintaining a healthy weight. Conversely, living near convenience stores is associated with an increased risk of obesity. [15] Some areas are so-called “food deserts” because they lack sources for fresh, nutritious food. Residents' only grocery shopping option may be convenience stores, which rarely carry fresh produce and often price it higher than grocery stores when they do. [16]

Another concern is the food environment around schools, where young people who are developing their nutritional habits spend much of their daytime hours. One study found that students with a fast food restaurant within a half-mile of their school ate fewer fruits and vegetables, drank more soda, and were more likely to be overweight or obese than students at schools with no fast food outlets nearby. [17]

C. Physical activity

Community design affects residents' opportunities for recreational physical activity. Parks, trails, and indoor recreational facilities give people options for being active. Indoor recreation opportunities are especially important in the Pacific Northwest, where rainy weather makes outdoor recreation unappealing to many during the winter months.

Neighborhood design also influences people's activity choices. People are more likely to be active when attractive destinations, such as appealing shopping areas, are available. Mixed-use zoning – which allows for residential, commercial, and institutional land uses to be located in the same area – helps encourage this sort of development. Tree canopy coverage not only makes neighborhoods beautiful but helps regulate climate and air quality, creating a more hospitable environment for physical activity.



This atlas highlights differences between the 15 areas

D. Transportation

People who use “active transportation,” such as mass transit, walking, and bicycling, get exercise as they go about their daily routines. People are more likely to use these resources when transit service is frequent, bike and pedestrian routes are protected from cars, and the street grid has high connectivity (i.e., not too many long blocks or dead ends). Residents of neighborhoods where it is easy to use these kinds of active transportation have an easier time meeting physical activity guidelines. For example, one study found that a 5% increase in neighborhood walkability (e.g., having sidewalks, is easy to get places) was associated with a 32% increase in active transportation. [18] But some people may not take advantage of transportation opportunities, even if they are nearby, if they have socio-economic pressures and are pressed for time.

E. Health outcomes

The final set of maps in the atlas show health outcomes, which are likely influenced by the built environment characteristics shown in the previous maps. The number of health maps is limited because it is particularly difficult to get health information at small geographic units. This is because health data are not collected by the Census Bureau and the confidentiality of health data is very carefully protected. However, the atlas includes maps about selected health outcomes for which data are available at the area level.

III. FINDINGS

A. Summary of area scores for built environment and health indicators

The matrix to the right summarizes the findings from the maps in the atlas. Areas are ranked based on their overall built environment score, which is the sum of the three subscores: food access, physical activity and transportation. Each of the subscores was determined by tallying points based on the individual map analyses in that category. The scores were based on how the area compared to the County average. Areas that scored above the County average received up to 2 points for being health-promoting. In the matrix, light green dots represent 1 point and dark green dots represent 2 points. Points were totaled across the rows to create the overall score for each area.

There were differences between areas in terms of food access, physical activity, and transportation opportunities. The sections that follow this matrix present maps illustrating these differences.

Legend:

- most health promoting environment
-
-
- least health promoting environment
- no data

Please see the Appendix for more information about the ranking system

Rating the Areas on the Built Environment

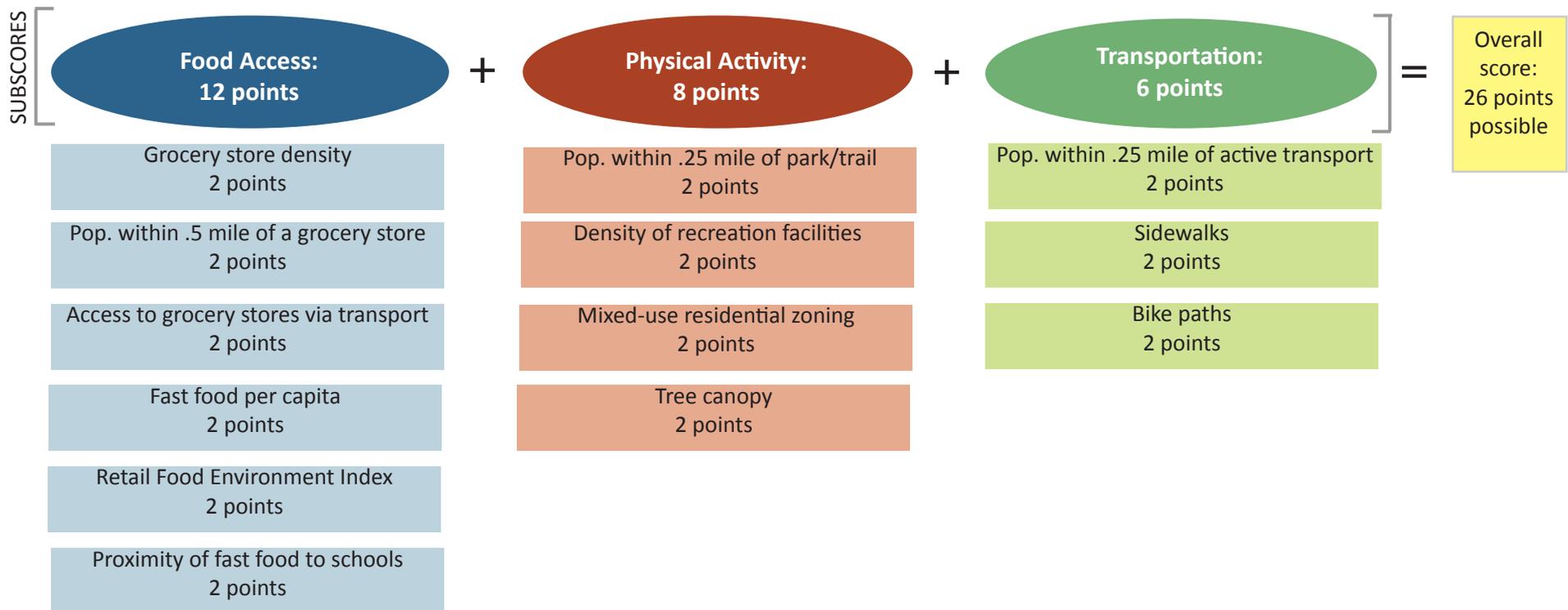


Table 1: Built Environment Rankings by Topic and Area

	Food Access						Physical Activity				Transportation			Overall Ranking
	Grocery store density	Population within .5 mile of a grocery store	Access to grocery stores via public transport	Fast food per capita	Retail Food Environment Index	Proximity of fast food to schools	Population within .25 mile of a park or trail	Density of recreation facilities	Mixed-use residential zoning	Tree canopy	Population within .25 mile of active transport	Sidewalks	Bike paths	
Northeast	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Southeast	●	●	●	●	●	●	●	●	●	●	●	●	●	●
West/ Northwest	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Southwest	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Fairview	●	●	●	●	--	●	●	●	●	●	●	●	●	●
Wood Village	●	●	●	●	●	--	●	●	●	●	●	●	●	●
Gresham	●	●	●	●	●	●	●	●	●	●	●	●	●	●
North Portland	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Central Northeast	●	●	●	●	●	●	●	●	●	●	●	●	●	●
East Portland	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Troutdale	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dunthorpe	●	●	●	●	--	--	●	●	●	●	●	--	●	●

This section describes the key findings shown in the matrix by built environment topic areas: food access, physical activity, and transportation. The table to the right shows how areas rank overall on the built environment and health indicators, and who lives in the area.

Key Findings

1. Food access

- Northeast and Southeast Portland areas rank high on all of the food access measures.
- Though Gresham, Wood Village, and East Portland rank high on access to grocery stores, residents of these areas likely have difficulty getting to grocery stores using public transportation.
- Fairview, Troutdale, and Dunthorpe have few local food sources.
- Though Central Northeast Portland has adequate access to healthy food, the area also has a large number of unhealthy food options such as convenience stores and fast food restaurants.
- Of all the urban areas of the county, North Portland has the lowest density of grocery stores. North Portland also has one of the highest numbers of unhealthy food options. North Portland residents may be relying on convenience stores due to a poor selection of full-service grocery stores.
- Wood Village ranks the highest on fast food restaurants per capita by a large margin.
- Fast food is also prevalent in Downtown Portland, an area where many people work.

2. Physical activity

- The Southwest Portland area ranks high on all of the physical activity indicators.
- The West/Northwest area ranks highest on the measures

regarding access to parks/trails, recreation facilities, and tree canopy.

- The Central Northeast, North Portland, and Dunthorpe areas have environments that are less supportive for physical activity. Central Northeast ranks low on all of the physical activity measures.
- In general, the area east of Interstate 205 has low recreation facility density.

3. Transportation

- The Northeast, Southeast, and Central Northeast areas of Portland rank very high on the transportation indicators.
- Conversely, Dunthorpe, Troutdale, and Southwest Portland rank relatively low on the transportation measures.
- Southwest and Wood Village rank the lowest on access to sidewalks.
- Southwest Portland, Troutdale, and Dunthorpe areas rank poorly on active transportation options.
- Though East Portland has limited sidewalks and access to frequent transit stops, it ranks high on access to active transportation because of its many miles of multi-use paths.

4. Health & the Built Environment

Overall, the Northeast and West/Northwest areas of Portland rank high on both built environment and health indicators while East and North Portland, Gresham, and Wood Village rank low. However, for some areas the relationship between the built environment and health is less clear. For example, Central Northeast Portland and Dunthorpe rank low on built environment indicators and high on health indicators. Fairview ranks relatively high on built environment indicators but ranks low on the obesity indicator (i.e., has a high prevalence of obesity).

Table 2: Built Environment, Health, and Demographics

	Overall Built Environment Ranking	Health		Demographics: Vulnerable Populations				
		All-cause Mortality (crude)	Overweight or Obese	Higher African American	Higher Native American	Higher Asian Pacific Islander Population*	Higher Hispanic Population*	Lower Median Family Income*
Northeast	●	●	●	●				●
Southeast	●	●	●			●		●
West/ Northwest	●	●	●			●		
Southwest	●	●	●					
Fairview	●	●	●		●		●	
Wood Village	●	●	●		●		●	●
Gresham	●	●	●				●	
North Portland	●	●	●	●	●		●	●
Central Northeast	●	●	●	●	●	●	●	
East Portland	●	●	●		●	●	●	●
Troutdale	●	●	●					
Dunthorpe	●	●	●			●		

Legend:

● most health promoting environment

●



●

● least health promoting environment

* compared to Multnomah County overall

IV. DISCUSSION

Many factors influence health and the built environment is only one of them. Socioeconomic factors such as race/ethnicity, income, and educational attainment may influence the relationship between the built environment and health. For example, areas with high Hispanic populations (e.g., Gresham and Wood Village) have poorer health indicators regardless of the built environment. Both Northeast and North Portland have high proportions of African Americans. Northeast Portland fares better on built environment and health indicators than North. Northeast's population has a slightly higher household income and educational attainment. Overall, areas with high proportions of Asians (e.g., East Portland and Dunthorpe) have poorer built environment rankings. In Dunthorpe, residents have the highest income and educational attainment in the County and fare well on health indicators. In contrast, in East Portland there is a substantially lower household income than Dunthorpe (by almost \$50,000/year) and poorer rankings on the health indicators.

These differences could be explained by social factors, cultural practices, and/or limitations of the analysis overall. For example, we don't know how long a person has lived in their residential area so therefore can't conclude whether their health is related to this locale or to some other place, since it takes a while for health problems to develop. Also, adults spend much of their waking hours in the workplace, so the built environments where people are employed may also have health impacts. Lastly, individuals make choices about how to use food and

activity resources. Unless the built environment discourages traveling by car or eating unhealthy food, the benefits of improving access to physical activity and healthy food may be limited.

IV. DISCUSSION

A. Rural vs. urban areas

Multnomah County has both rural and urban areas and comparing them to each other is difficult. In a well-established city like Portland, population density is high and physical infrastructure has built up over the years. As a result, even less wealthy neighborhoods are likely to have public transit and a park or schoolyard. In rural areas, however, population density is too low to justify extensive investment in public transit. In many cases, rural areas fare quite well when resources such as grocery stores or park acres are analyzed per capita. Yet while resources may be sufficient in quantity, they are often far from residents' homes, requiring a car trip and the associated air pollution. In these places, there are fewer opportunities to be active at recreation facilities for children, older adults, and people who cannot afford a reliable car. However, the health benefits of rural environments include better air quality and wider opportunities for contact with nature than is available in urban settings.

Suburban areas straddle these two lifestyles with their moderate population density and modest public facilities. Developments without sidewalks, unincorporated areas with few public parks or community centers, and shopping centers that are forbidding without a car can lead to a less healthy environment. Yet people may choose to live in these environments because they offer

lower housing costs, a reputation for better schools, or a greater sense of privacy or safety than is available in cities.

Public health workers want to improve each of these environments to benefit residents' health. Preserving a sense of place is important to people's well-being, so there is no one ideal built environment to strive for.

B. Healthy built environment policy

Most Americans know that eating nutritious foods and being physically active benefits their health, yet many of us live in areas that provide limited opportunities to engage in such healthy habits. Changing the design of places where we work, live, learn, and play can help create more options for a healthy lifestyle.

These physical changes to neighborhoods and communities can be accomplished through policy changes. Policies can affect all community members, and can also help reduce health burdens on vulnerable populations, including communities of color and people living on low incomes. Policies have a long-lasting impact on people's behavior because they can encourage designs of cities and towns that make healthy options readily available and healthy choices the norm.

This atlas shows that built environment resources like sidewalks, bikeways, frequent public transit, and essential destinations like grocery stores vary widely across Multnomah County. All residents deserve the opportunity to walk safely, travel to their jobs on public transportation, grow or purchase healthy food, have access to drinking water, and engage in recreation close to their homes.

1. Place-based programs and projects
Built environment programs that may encourage health include local business improvement districts, "walking school buses" that help children travel to school safely in a group, or creating facilities to separate bicyclists and motorists.

Developing these programs requires participation from many people, and most importantly those community members disproportionately affected by current conditions or potential changes. Outreach to low-resource communities that is intentional and conducted in ways that are comfortable and familiar to the community can facilitate their participation.

2. Place-based policies
Local, state, and national policies have shaped the built environment of our towns and cities, and are central to assuring public health and economic development. Communities should work with their local governments to create policies to evaluate the health impacts of transportation and development projects before they are built. Public health professionals have an obligation to contribute their expertise to these policy discussions, assuring that policies will both promote health and assure fair distribution of the benefits and burdens of urban development.

Research and practice have identified policies that help make places healthy for living, working, learning, and playing. Key examples include:

- Zoning that encourages commercial and recreational facilities near residences;
- Development standards that encourage street connectivity, bike and pedestrian facilities, and land conservation;
- Transportation facilities created for both motorized and non-motorized travel

- Design guidelines that promote health by incorporating natural light, outdoor space, and availability of stairs instead of elevators;
- Preservation of open space and opportunities for small-scale agriculture and keeping animals that produce food;
- Urban planning that encourages compact development;
- Investment in mass transit;
- Incentives for grocery store development in underserved areas;
- Incentives to encourage food retailers to offer healthier options;
- “Fair share” zoning that distributes unpopular facilities (e.g., landfills) evenly
- Creation and maintenance of affordable housing in all areas;
- Conducting health and equity impact assessments of development projects;
- Tax and zoning incentives for redevelopment of vacant and abandoned properties;
- Access to healthy food and beverages in schools, worksites and public places.

3. Building community capacity

As different areas of the County vary in terms of resources and needs, they will also vary in how they confront their problems. Part of improving where we live, work, learn, and play is helping residents assess and advocate for their community’s needs. Some communities may need more help than others at building the skills necessary to do this type of work.

In many cases, areas with the most health-promoting environments have residents who are politically involved and are socially and economically powerful. For example, the Solarize Portland effort helped homeowners work cooperatively to install solar technology that will reduce utility bills and decrease air pollution. This effort was undertaken by residents of the Southeast Uplift and Southwest Neighborhood Coalitions – predominantly White

areas with high educational attainment, strong neighborhood associations, and health-promoting built environments.

Areas with less health promoting environments often have lower property values, making them more appealing to, or the only option for, people living with limited means. For many people living with low incomes, political participation can be inhibited by mistrust of government, a history of exclusion, and extensive work and family obligations. These areas may also lack the social connections and resources necessary to implement community projects. A lack of gathering places and safe ways to travel through the neighborhood make it difficult for neighbors to meet each other, and the strain of making ends meet leaves little time for civic participation. Due to past experiences many communities may feel powerless to participate in government decisions about the built environment. Building healthy communities requires advocacy for civic engagement in areas with fewer resources.

Many of the programs, policies, and projects mentioned above are already in use in Multnomah County, but additional advocacy may be necessary to continue or expand the efforts. Examples of local work may be found at <http://www.multco-itstartshere.org/>

V. MAPS AND TABLE

This section includes the following demographic information:

1. Population, race, and ethnicity for the County overall and the fifteen areas
2. Non-White population, 2008
3. Median household income, 2008

Map format

The atlas is divided into sections based on topic (Demographics, Food access, Physical activity, Transportation, and Health), with several maps per topic. In general, each map looks at one indicator, or feature of the built environment, across the fifteen areas of the County. The maps all follow the same format, which includes the sections described below.

- a. *Significance*: why the indicator was included in the atlas and how it may reflect health conditions in Multnomah County
- b. *Computation*: the data used to make the map and the calculations that were necessary to prepare the data for mapping
- c. *Limitations*: potential shortcomings of the analysis, including limitations of the dataset and analytical tools
- d. *Findings*: patterns illustrated in the map and their implications for Multnomah County and its areas

A. DEMOGRAPHICS

ABOUT THE DATA:

Census tract population and race/ethnicity estimates for 2008 were provided under contract by the Portland State University Population Research Center. These data were obtained in the spring of 2010. More information about the estimates is available at:

<http://www.pdx.edu/prc/methodology>

HOW THIS INDICATOR WAS COMPUTED:

For each census tract, the 2008 estimate data was split between the blocks in the track. The split was based on where the population within the census tract was located as of the 2000 census. Each block was assigned to one of the fifteen areas based on where its center was located.

LIMITATIONS:

The Portland State University (PSU) estimates are based on a variety of data including birth and death records, school enrollment, payroll, Medicare data, tax returns, voter registration, housing stock, and annexations. Each of these data sources may contain inaccuracies – the extent of inaccuracies is unknown. Estimates regarding people who are multi-racial were unavailable. Ethnicity data are only available for Hispanics. Population distribution within a census tract may have changed since the 2000 census. Because PSU is the state census data center, these are considered the most authoritative estimates.

FINDINGS

Approximately 718,000 people live in Multnomah County. The vast majority of residents are White (86%) followed by Asian Pacific Islander (7%) and African American (6%). Approximately 11% of County residents are of Hispanic ethnicity. Population estimates for the 15 atlas areas ranged from 1,466 (Dunthorpe) to 152,299 (Southeast Uplift).

Table 3. Multnomah County Population and Race/Ethnicity Estimates - 2008

	<i>Estimated Population</i>	<i>White</i>	<i>African American</i>	<i>Native American</i>	<i>Asian-Pacific Islander</i>	<i>Hispanic *</i>
Southeast	152,299	89.1%	2.6%	0.9%	7.4%	7.3%
East Portland	134,727	83.4%	5.4%	1.3%	9.9%	13.8%
Gresham	101,408	91.0%	2.9%	0.9%	5.1%	17.3%
Southwest	68,960	92.1%	2.6%	0.5%	4.8%	4.2%
North	62,457	76.0%	15.1%	2.2%	6.7%	14.6%
Northeast	61,870	76.1%	19.6%	1.0%	3.2%	8.7%
West Northwest	49,416	88.1%	3.4%	1.1%	7.4%	4.5%
Central Northeast	47,480	82.3%	9.6%	1.2%	6.8%	12.1%
Troutdale	15,523	93.4%	1.9%	1.0%	3.7%	10.4%
Fairview	9,280	90.8%	2.1%	1.4%	5.7%	18.9%
Census Tract 105	3,798	97.8%	0.4%	1.1%	0.7%	2.9%
Wood Village	3,286	90.4%	3.1%	1.8%	4.7%	35.3%
Census Tract 104	2,935	93.3%	1.0%	0.2%	5.4%	9.2%
Census Tract 71	2,801	96.1%	0.1%	2.2%	1.6%	7.3%
Dunthorpe	1,466	88.4%	1.1%	0.5%	10.0%	2.9%
Multnomah County	717,880	617,353 (86.0%)	44,671 (6.2%)	7,995 (1.1%)	47,862 (6.7%)	77,774 (10.8%)

* includes people of all races

NON-WHITE POPULATION, 2008 ESTIMATES

SIGNIFICANCE:

There are significant health disparities between racial groups. Multnomah County Health Department has data on the health disparities between non-White populations as compared to White populations. The report is available at: <http://web.multco.us/health/reports>

ABOUT THE DATA:

Census tract population and race/ethnicity estimates for 2008 were provided under contract by the Portland State University Population Research Center. These data were obtained in the spring of 2010. More information about the estimates is available at: <http://www.pdx.edu/prc/methodology>

HOW THIS INDICATOR WAS COMPUTED:

The estimate is based on the following computation:
[total population – White non-Hispanic] / total population.

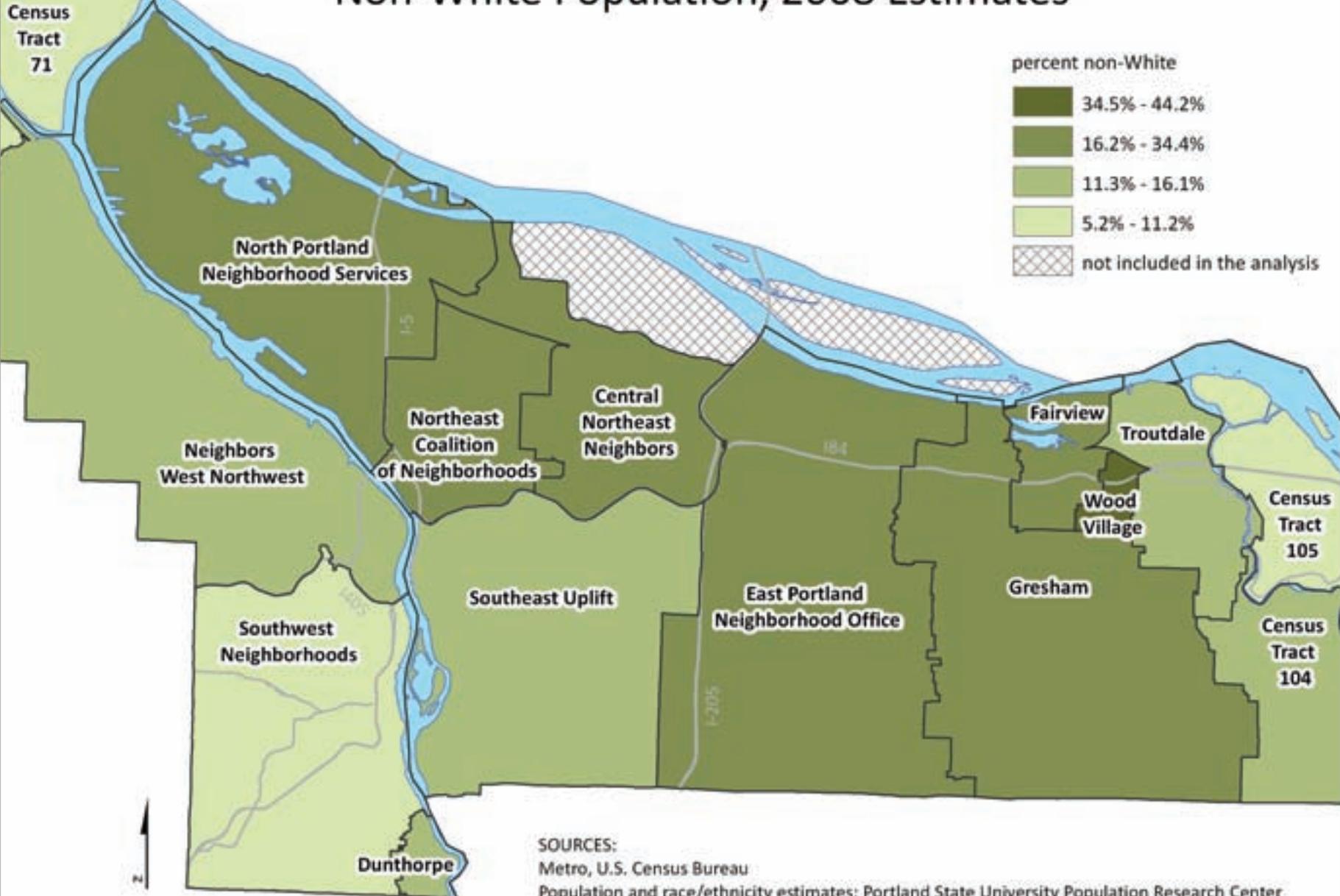
LIMITATIONS:

The Portland State University (PSU) estimates are based on a variety of data including birth and death records, school enrollment, payroll, Medicare data, tax returns, voter registration, housing stock, and annexations. Each of these data sources may contain inaccuracies – the extent of inaccuracies is unknown. Estimates regarding people who are multi-racial were unavailable. Ethnicity data are only available for Hispanics. Population distribution within a census tract may have changed since the 2000 census. Because PSU is the state census data center, these are considered the most authoritative estimates.

FINDINGS

The non-White minority population represented in the map include Hispanic, African-American, Native American, and Asian/Pacific Islander people. The Northeast area is home to several historically African American neighborhoods; Central Northeast includes neighborhoods with African Americans as well as some Native American and Asian/Pacific Islander residents; Dunthorpe's minority population is primarily Asian/Pacific Islander. People of Hispanic origin live in all of the county's areas, with no one area serving as the center for the population. Of the areas, Wood Village has the highest proportion of residents of Hispanic origin. Please see Table 2 on page 13 for additional information.

Non-White Population, 2008 Estimates



MEDIAN HOUSEHOLD INCOME, 2008 ESTIMATES

SIGNIFICANCE:

In general, people living with lower income tend to have worse health outcomes. [19]

ABOUT THE DATA:

The income data were obtained from Geographic Research, Inc.'s SimplyMap online database. The data were downloaded by accessing the Multnomah County Library at: <http://www.multcolib.org/ref/a2z.html>.

HOW THIS INDICATOR WAS COMPUTED:

The Census Bureau determined median household income by sorting all the households in the tract in order of income and selecting the household at the midpoint. Census tract boundaries are determined by the U.S. Census Bureau; each tract usually has about 4,000 residents.

To compute median household income for the atlas areas, we used the average of the median household incomes for all the blocks that fell within the area.

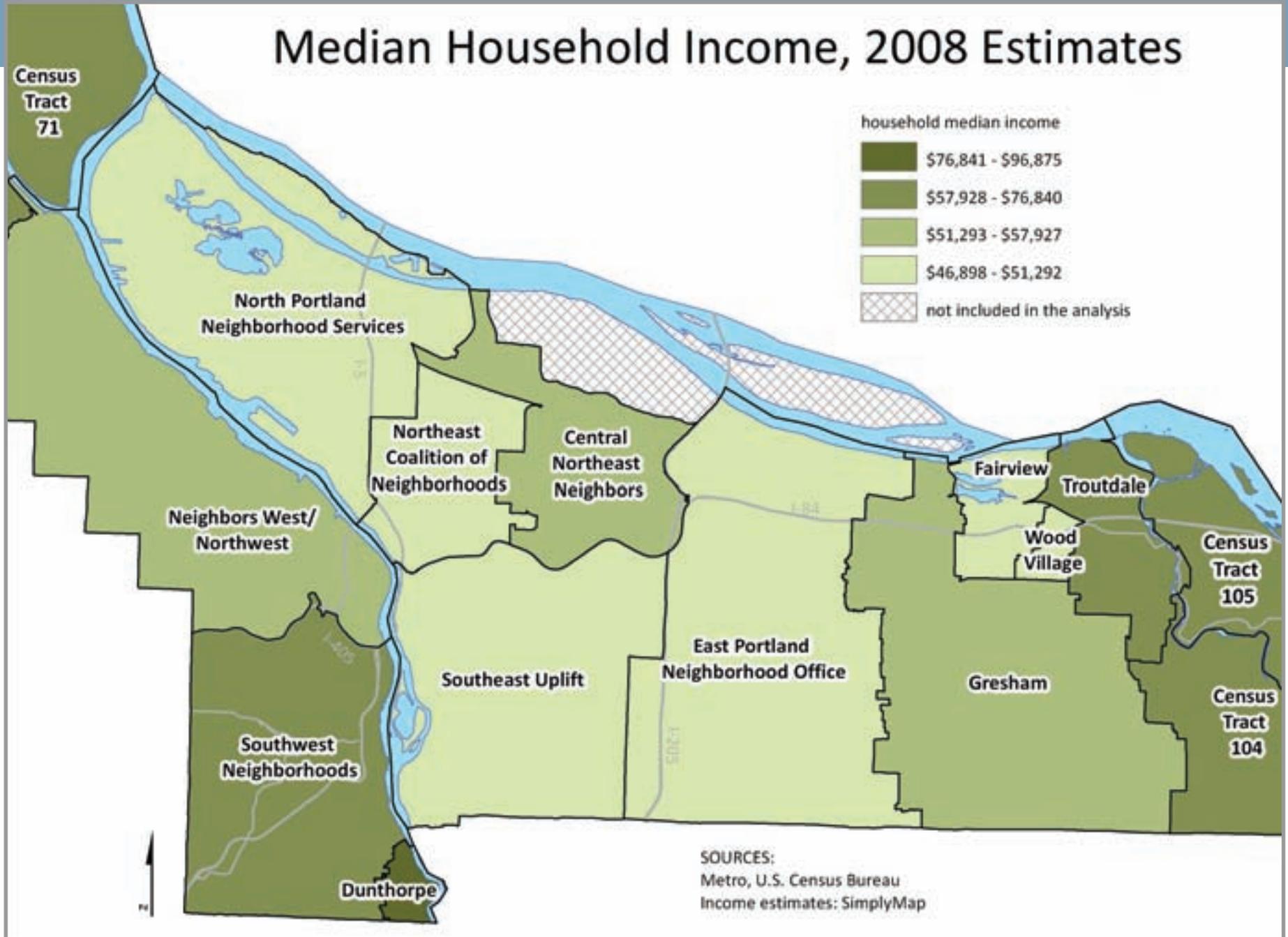
LIMITATIONS:

The SimplyMap estimates are based on a variety of data sources both publicly available and private. Each of these data sources may contain inaccuracies – the extent of inaccuracies is unknown for the proprietary data sets. The average median family income for areas may be skewed because blocks were weighted equally even though the populations differ.

FINDINGS

Dunthorpe has the highest median income, followed by Southwest Neighborhoods, Census tracts 71, 104, and 105, and Troutdale. The lowest income category is from \$46,000-\$51,000 and includes the North Portland Neighborhood Services, Northeast Coalition of Neighborhoods, Southeast Uplift, East Portland Neighborhood Office, Fairview, and Wood Village areas. Please see Table 2 on page 13 for additional information.

Median Household Income, 2008 Estimates



B. FOOD ACCESS MAPS

This section maps the following features of the 15 areas:

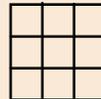
1. Density of full-service grocery stores within a one-mile radius
2. Proportion of population living within a half-mile of a full-service grocery store
3. Average number of frequent transit stops within a quarter mile of full-service grocery stores
4. Fast food outlets per capita
5. Retail Food Environment Index (RFEI) – a measure of healthy vs. unhealthy food availability
6. Average number of fast food outlets within a half-mile of middle and high schools

Limitations Key

The limitations of each map analysis are listed below the summary table in the Limitations Key. Below is a brief key to each limitation symbol.



The calculation is based on population estimates rather than an exact count of residents.



The land area was divided into equal size cells about the size of a Portland city block. The mapping software assigns a value to each cell. This is called a raster analysis.



The data was available at the census tract level. The tract data were distributed to the census blocks based on population patterns as of Census 2000.



Distance was measured “as the crow flies” rather than by traveling over street segments.

Please see the Appendix for more information.

RESULTS AT A GLANCE

	Grocery store density	Population within .5 mile of a grocery store	Access to grocery stores via public transportation	Fast food per capita	RFEI	Proximity of fast food to schools	Overall Food Access Ranking
Northeast	●	●	●	●	●	●	●
Southeast	●	●	●	●	●	●	●
Wood Village	●	●	●	●	●	--	●
Southwest	●	●	●	●	●	●	●
Gresham	●	●	●	●	●	●	●
Central Northeast	●	●	●	●	●	●	●
West/Northwest	●	●	●	●	●	●	●
Fairview	●	●	●	●	--	●	●
East Portland	●	●	●	●	●	●	●
North Portland	●	●	●	●	●	●	●
Dunthorpe	●	●	●	●	--	--	●
Troutdale	●	●	●	●	●	●	●

Legend:

- most health promoting environment
-
-
- least health promoting environment

↑

DENSITY OF FULL-SERVICE GROCERY STORES

SIGNIFICANCE:

The food available in the local environment influences people's diets. Living near full-service grocery stores that sell a variety of produce is associated with eating more fruits and vegetables and maintaining a healthy weight. [20] In these analyses, density represents having a variety of healthy food retail outlets nearby (within 1 mile). Competition among food retailers may encourage retailers to lower prices and provide specialty foods for ethnic groups.

ABOUT THE DATA:

Full-service grocery stores were identified from a list of Retail Food Establishments provided by the Oregon Department of Agriculture in January 2010. The list contained 890 records and full-service grocery stores were not coded distinctly in the dataset. For the purpose of these analyses, full-service grocery stores were defined as national or regional chain stores and independent stores (of any size) that sell a variety of fresh produce. When in doubt, Internet searches were conducted to confirm that a variety of produce (i.e., a minimum of 5 different fresh fruits and/or vegetables) was sold at the store. Convenience stores were omitted because they generally stock less healthy food. Ethnic markets were omitted because they target sub-groups of the population and may not appeal to the general consumer.

HOW THIS INDICATOR WAS COMPUTED:

The County was divided into a grid of uniform cells approximately the size of a Portland city block. A circle with a one mile radius was drawn around each cell. Stores within the circle contributed to the cell's density score. A kernel density analysis was conducted to weight stores closer to the cell center higher than stores located near the outer edge of the 1 mile search radius. Each cell was assigned a value based on the number of stores within the search radius and their proximity to the center. An average of all the cell values in each of the 15 areas was calculated.

LIMITATIONS:

Affordability of stores was not considered in this analysis.

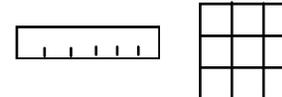
By the numbers	Density score full-service grocery stores
Northeast	1.05
Wood Village	0.98
Southeast	0.90
Gresham	0.44
Southwest	0.40
Central Northeast	0.40
East	0.40
West/Northwest	0.28
North	0.22
Troutdale	0.21
Fairview	0.13
Dunthorpe	0.00

More health promoting environment



Less health promoting environment

LIMITATIONS KEY:

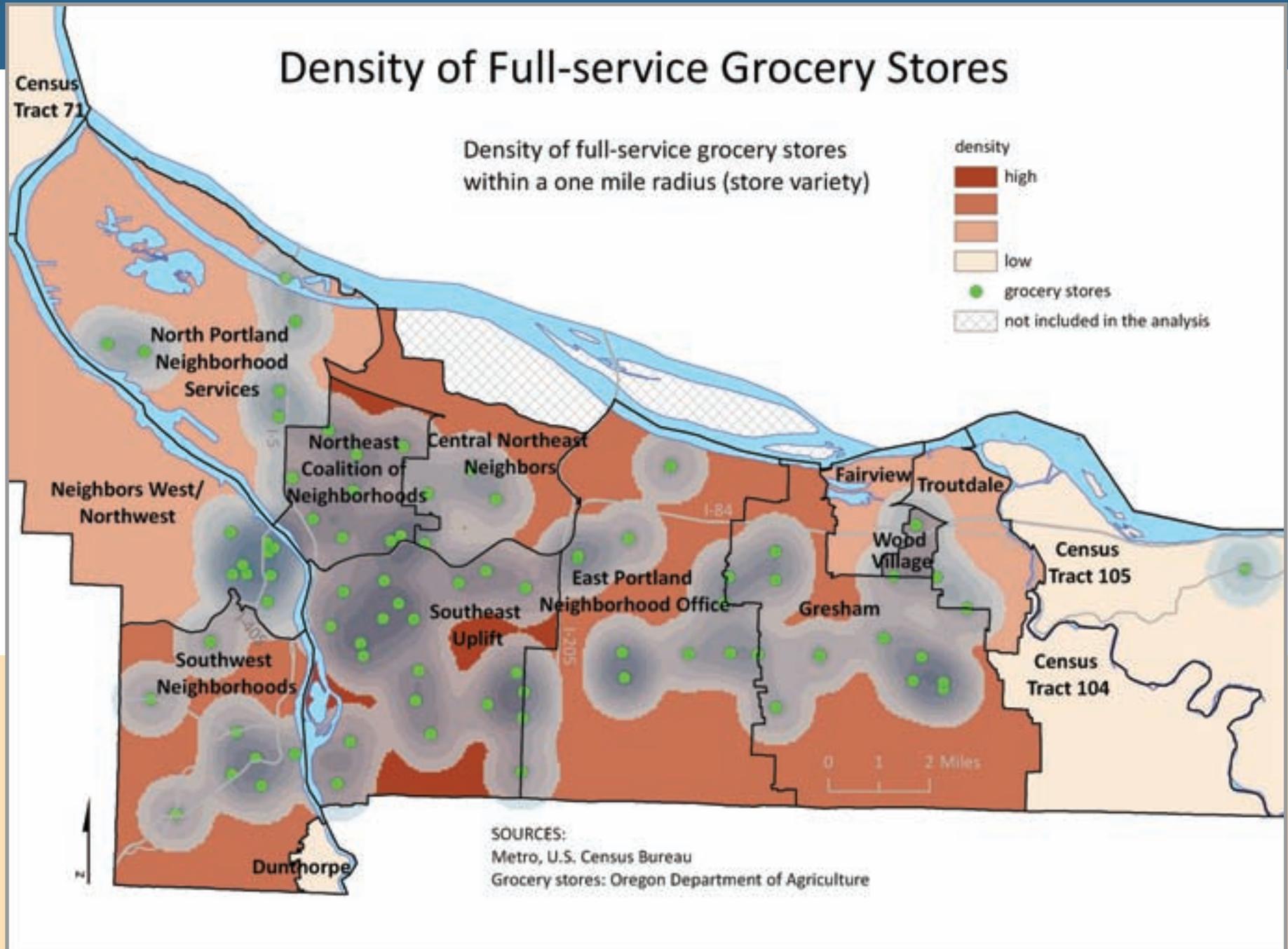


FINDINGS

When looking at the map, the darker the shade of grey, the more grocery stores in the area. Portland's Northeast and Southeast areas and Wood Village had the highest density of grocery stores. This suggests that the residents of these areas have a greater selection of full-service grocery stores within a mile of their homes as compared to other residents of the County. Southeast Uplift and the Northeast Coalition of Neighborhoods have a broad selection of grocery stores including both national and regional grocery chain stores (e.g., Fred Meyer and Safeway) as well as specialty stores such as Whole Foods and New Seasons. Wood Village has national and regional chain grocery stores and a discount super-store which carries produce.

As expected, residents of rural areas (i.e., the unincorporated census tracts) had poorer access than residents of the urban areas. When moving east from the city center to the suburbs of Portland, grocery store density decreases with the exception of Wood Village. The North Portland Neighborhood Coalition also scores relatively low on grocery store density. There are four national/regional chains stores and one specialty store, but no lower-priced or discount stores. The West/Northwest District scores relatively low although there are a good number of full-service grocery stores. They are all located in the southeast corner of the area where most of the population resides. Since the population is not spread evenly across the area of the neighborhood coalition, our analysis may underestimate the density of stores across the area. In the case of Fairview, most of the population lives south of I-84. This city may benefit from a full-service grocery store as there are approximately 9,000 people living there with a high percentage of Hispanics and young children. Dunthorpe has no full-service grocery stores likely because the area is zoned primarily for single family residences and land is expensive. However, residents of Dunthorpe most likely have resources to access to healthy food: it is the wealthiest area in the County (median family income = \$96,875) and only 1% of the households do not have a car.

Density of Full-service Grocery Stores



ACCESS TO FULL SERVICE GROCERY STORES

SIGNIFICANCE:

The food available in the local environment influences people's diets. Living near full-service grocery stores that sell a variety of produce is associated with eating more fruits and vegetables and maintaining a healthy weight. [20] This map shows the proportion of the population with at least one grocery store within walking distance.

ABOUT THE DATA:

Full-service grocery stores were identified from a list of Retail Food Establishments provided by the Oregon Department of Agriculture in January, 2010. The list contained 890 records and full-service grocery stores were not coded distinctly in the dataset. For the purpose of these analyses, full-service grocery stores were defined as national or regional chain stores and independent stores (of any size) that sell a variety of fresh produce. When in doubt, Internet searches were conducted to confirm that a variety of produce (i.e., a minimum of 5 different fresh fruits and/or vegetables) was sold at the store. Convenience stores were omitted because they generally stock less healthy food. Ethnic markets were omitted because they target sub-groups of the population and may not appeal to the general consumer.

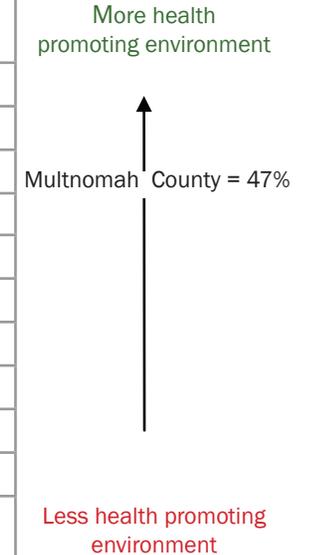
HOW THIS INDICATOR WAS COMPUTED:

A half-mile buffer was drawn around each full-service grocery store. This distance is frequently used in food access research as it is considered a reasonable walking distance for most people. If the census block centroid fell within the half-mile buffer the total census block population was considered to have access to a full-service grocery store. The population with access was divided by the total population of the area to create a percentage.

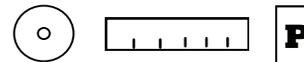
LIMITATIONS:

Affordability of stores was not considered in this analysis.

By the numbers	Population within a half-mile of a grocery store
Northeast	73%
Wood Village	72%
West/Northwest	69%
Southeast	61%
Central Northeast	41%
Gresham	39%
East	37%
North	36%
Southwest	34%
Troutdale	31%
Fairview	10%
Dunthorpe	0%



LIMITATIONS KEY:



FINDINGS

The percentage of the population within a half-mile of a full-service grocery store ranged from zero to seventy-three percent among the areas. Overall, 47% of Multnomah County residents live within a half-mile of a grocery store. As expected, close-in Districts such as Northeast, Northwest, and Southeast had the highest access. Close-in neighborhoods have the highest population density in the County making them appealing to grocery stores. In most neighborhoods residents can easily walk to a grocery store. Wood Village also has high access to grocery stores as there are three stores in or near the city borders. Since the area of the city is small and there is a relatively low population, the percent of the population with access is high.

With the exception of Wood Village, grocery store access decreases when moving east from the city center to the suburbs of Portland. Though North Portland is similar to the other close-in areas, with a densely gridded street pattern and high population density, there are comparatively fewer grocery stores. This area also has a high percentage of African Americans in the population. As expected, rural areas (i.e., the unincorporated census tracts) had poorer access than the urban areas. The city of Fairview ranks low on this measure as the city lacks a full-service grocery store – the closest ones are in Wood Village.

Access to Full-service Grocery Stores



ACCESS TO FULL-SERVICE GROCERY STORES VIA PUBLIC TRANSPORTATION

SIGNIFICANCE:

The food available in the local environment influences people's diets. Living near full-service grocery stores that sell a variety of produce is associated with eating more fruits and vegetables and maintaining a healthy weight. [20] Approximately 11% of Multnomah County residents live in households without a car. Public transportation is an important way for the elderly, disabled, and people who can't afford a car to travel to the grocery store.

ABOUT THE DATA:

Public transportation data were obtained from Metro's Regional Land Information System (RLIS) from the July 2009 data set. The analysis included all MAX and Streetcar stops and stops on the 13 frequent service bus lines as of January 2010. Bus stops in each direction for the same route were included in the analysis.

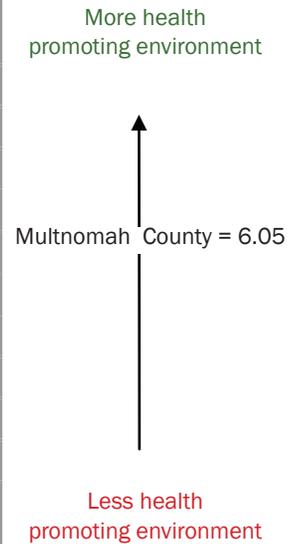
HOW THIS INDICATOR WAS COMPUTED:

A quarter-mile buffer was created around full-service grocery stores. For each area, the number of frequent transit stops within a grocery store buffer was divided by the number of full-service grocery stores to compute the average number of stops near stores.

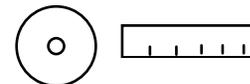
LIMITATIONS:

This analysis does not consider the amount of travel time or transfers required to get to a full-service grocery store on public transit. It also does not take into account the pattern of frequent transit routes in the area. For example, in some areas it may be easier to travel east to west compared to north to south.

By the Numbers	Average number of stops within .25 mile of a grocery store
West Northwest	9.67
Northeast	8.11
North	7.17
Southeast	6.79
Central Northeast	6.75
Southwest	4.13
East	4.08
Gresham	2.00
Wood Village	1.50
Troutdale	0
Fairview	0
Dunthorpe	0



LIMITATIONS KEY:

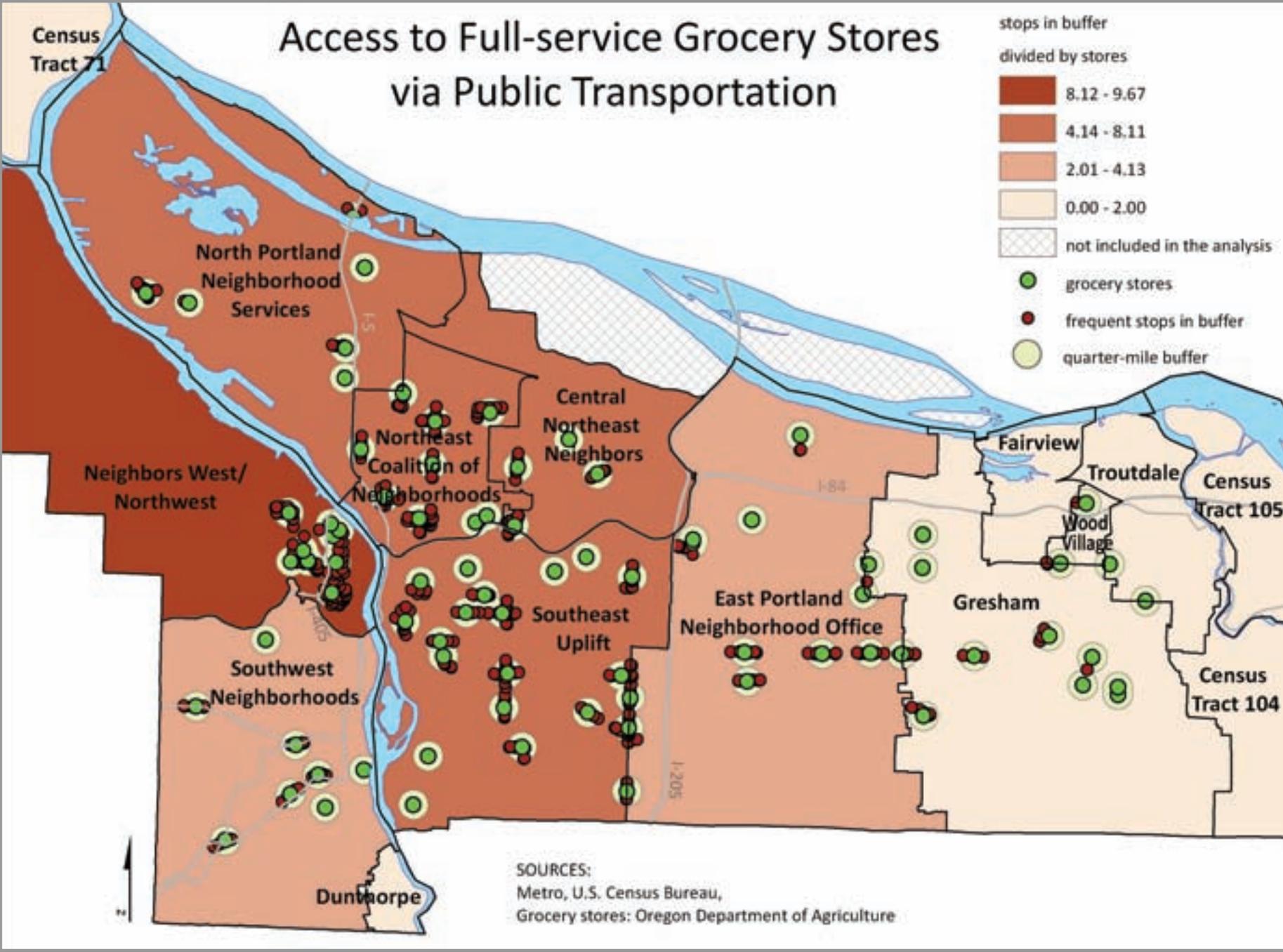


FINDINGS

The average number of frequent public transit stops near grocery stores ranged from zero to almost ten. In the County overall, there are an average of six frequent transit stops near grocery stores. The close-in West/Northwest, Northeast, North, Southeast, and Central Northeast districts ranked the highest on this measure. These areas have multiple frequent service options including light rail, streetcar, and buses. The West/Northwest district is particularly well served by Tri-Met as it includes the Downtown transit mall. In the city of Wood Village and the West Northwest district, all of the grocery stores have a transit stop within a quarter-mile. However, the West/Northwest area has many more transit options than Wood Village. The #12 frequent service bus is the only option to travel to grocery stores in Wood Village.

The eastern part of the county and Dunthorpe have the poorest public transportation access to grocery stores. This is unfortunate as the lower priced grocery stores are in the eastern part of the county. For example, two of the three Winco stores in the County are not served by frequent transit.

Access to Full-service Grocery Stores via Public Transportation



FAST FOOD RESTAURANTS PER CAPITA

SIGNIFICANCE:

The food available in the local environment influences people's diets. Studies have shown that greater access to fast food restaurants and lower priced fast food menu options are related to a less healthy diet. [20]

ABOUT THE DATA:

In March 2010, the Multnomah County Health Department Environmental Health unit provided a list of full-service food facilities in Multnomah County containing 2,894 records. The National Restaurant Association defines fast food as having counter service and providing meals vs. snacks. Based on this distinction, coffee shops and dessert outlets were not included in the analysis. For this analysis, only national chain fast food restaurants were included. It was beyond the scope of this project to review, evaluate, and code food options at independent or regional food establishments.

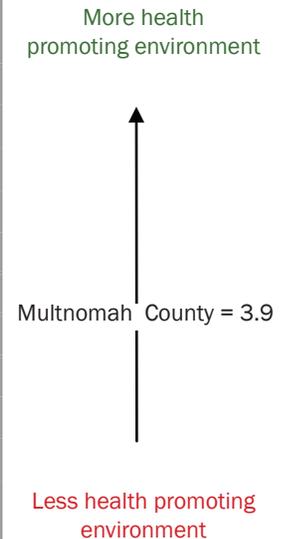
HOW THIS INDICATOR WAS COMPUTED:

For each area, the number of fast food restaurants was divided by the population.

LIMITATIONS:

For these analyses, fast food restaurants are considered an unhealthy food source. However, some national fast food chains do offer a limited selection of healthy items such as salads, yogurts, or apple slices. This analysis may underestimate the prevalence of fast food restaurants as regional or independent establishments are not included. This analysis also does not include food carts, which are gaining popularity in the Portland area.

By the Numbers	Number of fast food restaurants per 10,000 people
Fairview	0.00
Dunthorpe	0.00
Southwest	2.32
Southeast	2.89
Central Northeast	2.95
East	3.49
Northeast	3.56
North	4.00
Gresham	4.24
West Northwest	8.30
Troutdale	8.37
Wood Village	24.35



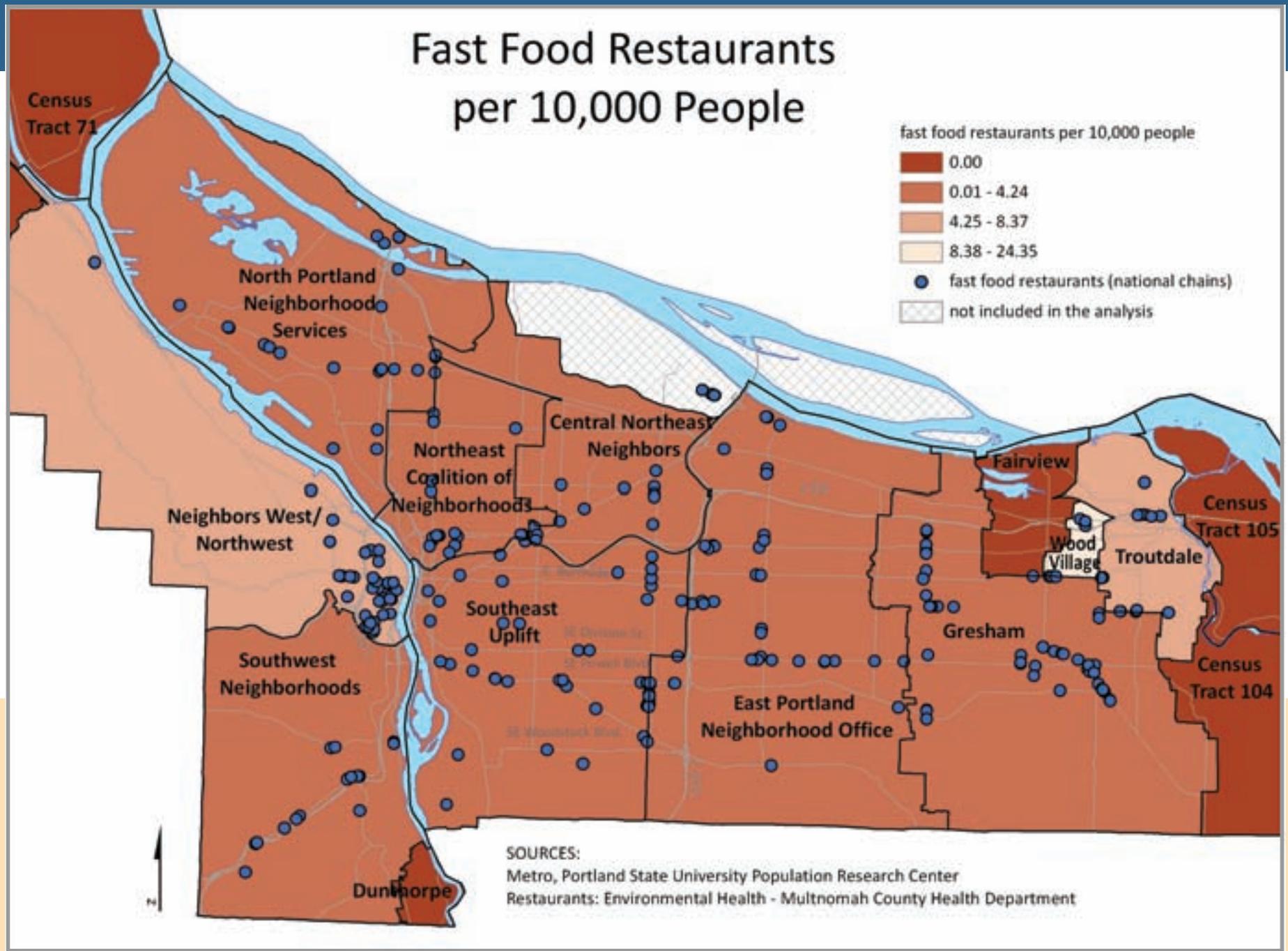
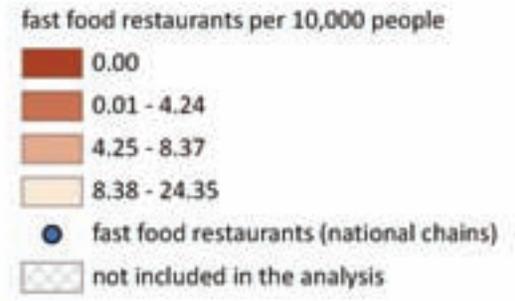
LIMITATIONS KEY:



FINDINGS

Overall, in Multnomah County there are about four fast food restaurants for every 10,000 people. The number of fast food restaurants per capita ranged from zero to 25 among the areas. Fairview and Dunthorpe do not have any national chain fast food restaurants within their boundaries and rank as the most healthy among the areas on this measure. Wood Village and Troutdale rank among the lowest. In both of these areas, there are clusters of fast food restaurants near land zoned for employment and industrial uses – workers in the area may be the target customers rather than residents. The West/Northwest area also ranks low, with the majority of fast food restaurants located in the Downtown area.

Fast Food Restaurants per 10,000 People



PROXIMITY OF FAST FOOD RESTAURANTS TO MIDDLE AND HIGH SCHOOLS

SIGNIFICANCE:

The food available in the local environment influences people’s diets. In general, studies have shown that greater access to fast food restaurants and lower priced fast food menu options are related to a less healthy diet. [20] One study found that students with a fast food restaurant within a half-mile of their school ate fewer fruits and vegetables, drank more soda (which is highly caloric but lacks nutrients), and were more likely to be overweight or obese than students with no fast food outlets nearby. [21]

ABOUT THE DATA:

Fast food: In March 2010, the Multnomah County Health Department, Environmental Health unit provided a list of full service food facilities in Multnomah County containing 2,894 records. The National Restaurant Association defines fast food as having counter service and providing meals vs. snacks. Based on this distinction, coffee shops and dessert outlets were not included in the analysis. For this analysis, only national chain fast food restaurants were included. It was beyond the scope of this project to review, evaluate, and code food options at independent or regional food establishments.

Schools: A dataset of schools was obtained from Metro’s Regional Land Information System (RLIS) February 2011 data set. Middle and high schools, both public and private, were included in the analysis. Schools designated as “various grade levels” were not included as they were mostly kindergarten through eighth grade schools. Secondary schools were the focus of this analysis since students usually can go off-campus for lunch. These older students also may have jobs or allowances which provide discretionary money to spend on food.

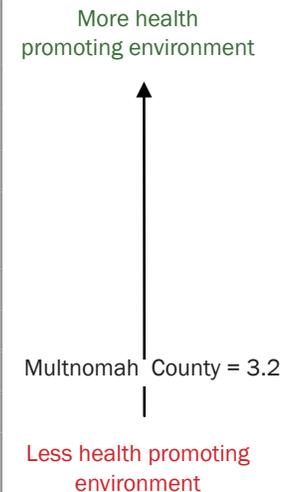
HOW THIS INDICATOR WAS COMPUTED:

A half-mile buffer was drawn around middle and high schools. The national chain fast food restaurants located with the half-mile buffer were counted. For each area, the number of fast food restaurants within the half mile school buffer was divided by the number of schools.

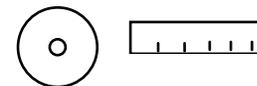
LIMITATIONS:

Dunthorpe and Wood Village were excluded from the analysis because they did not have middle or high schools within their boundaries. This analysis may underestimate the prevalence of fast food restaurants as regional or independent establishments are not included. The coding of fast food restaurants was subjective.

By the Numbers	Average # of fast food restaurants near schools
Fairview	0.00
Northeast	1.67
North	1.83
Southwest	2.00
Central North-east	2.00
Southeast	2.46
Gresham	2.56
East	3.38
Troutdale	6.00
West Northwest	13.00
Dunthorpe	--
Wood Village	--



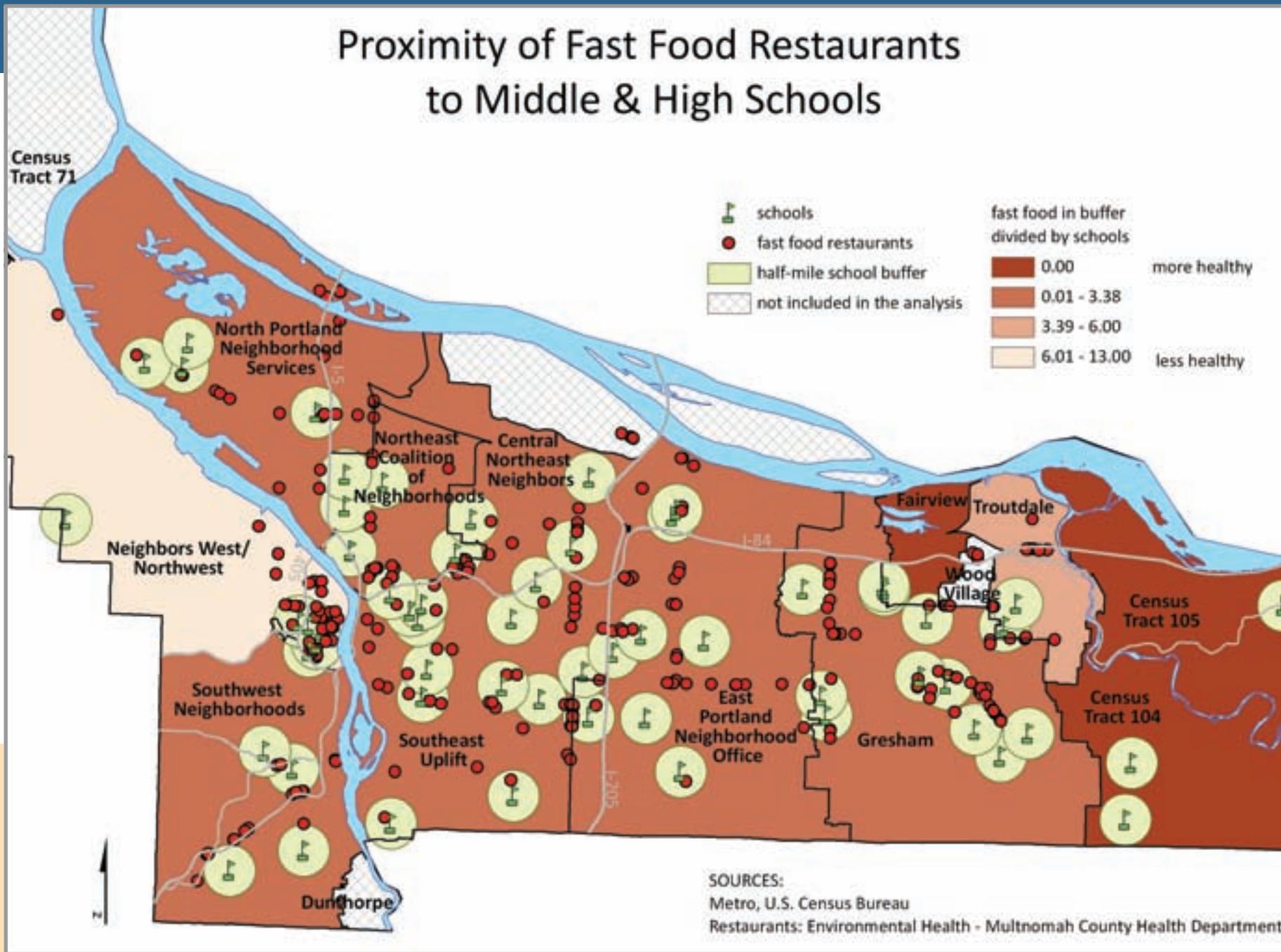
LIMITATIONS KEY:



FINDINGS

Overall, there is an average of 3.2 fast food restaurants within a half-mile of Multnomah County middle and high schools. The average number of fast food restaurants near middle or high schools ranged from 0 - 13 among areas. Fairview ranks the highest because there are no fast food restaurants near its two schools. The West/Northwest area is an outlier and has the least healthy score. This is likely because the schools are located close to the downtown area where there are many fast food restaurants. Thirty-three percent of middle and high schools do not have a fast food restaurant within a half-mile. Fast food restaurants are more likely to be located near high schools than middle schools. The average number of fast food restaurants near high schools is 4.6 as compared to 1.3 for middle schools. Fast food restaurants are also more likely to be located near private schools than public schools. The average number of fast food restaurants near private schools is 8.25 as compared to 2.4 for public schools. The three private high schools downtown are each surrounded by many fast food restaurants.

Proximity of Fast Food Restaurants to Middle & High Schools



RETAIL FOOD ENVIRONMENT INDEX (RFEI)

SIGNIFICANCE:

The food available in the local environment influences people’s diets. Living near full-service grocery stores that sell a variety of produce is associated with eating slightly more fruits and vegetables and maintaining a healthy weight. Conversely, studies have shown that greater access to fast food restaurants and lower priced fast food menu options are related to a less healthy diet. Living near a convenience store may also be a barrier to maintaining a healthy diet, and has been associated with an increased risk of obesity. [20]

ABOUT THE DATA:

Produce markets: Produce markets were identified from a list of Retail Food Establishments provided by the Oregon Department of Agriculture in January 2010. The majority of the markets had “produce market” or “farm market” in the name of the establishment. Internet searches were conducted to inform the coding.

Farmers markets: A list of farmers markets was obtained from the Oregon Farmers Market website in April 2010. [22]

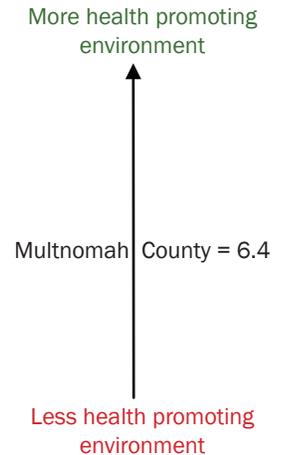
Convenience stores: Convenience stores were identified from a list of Retail Food Establishments provided by the Oregon Department of Agriculture in January, 2010. Stores were coded as a convenience store if they were part of a national or regional chain (e.g., 7 Eleven and Plaid Pantry). The majority of the independent convenience stores had “mart” “market” or “deli” in the name of the establishment. Internet searches and phone calls informed the coding of independent markets. Convenience stores that also sold gasoline were included in the analysis.

HOW THIS INDICATOR WAS COMPUTED:

The Retail Food Environment Index (RFEI) was created by the California Center for Public Health Advocacy to summarize the food environment in highly populated areas. [23] It computes a ratio of unhealthy food sources to healthy food sources. The higher the RFEI score, the poorer the food environment. The following calculation was computed for each area:

$$\text{RFEI} = \frac{\# \text{ CONVENIENCE AND FAST FOOD RESTAURANTS}}{\# \text{ GROCERY STORES, PRODUCE VENDORS, FARMERS MARKETS}}$$

By the Numbers	RFEI score
Southwest	3.5
Southeast	5.3
Northeast	5.4
Gresham	5.7
Troutdale	6.0
Wood Village	6.5
West Northwest	7.9
East	8.4
North	9.0
Central Northeast	9.2



LIMITATIONS:

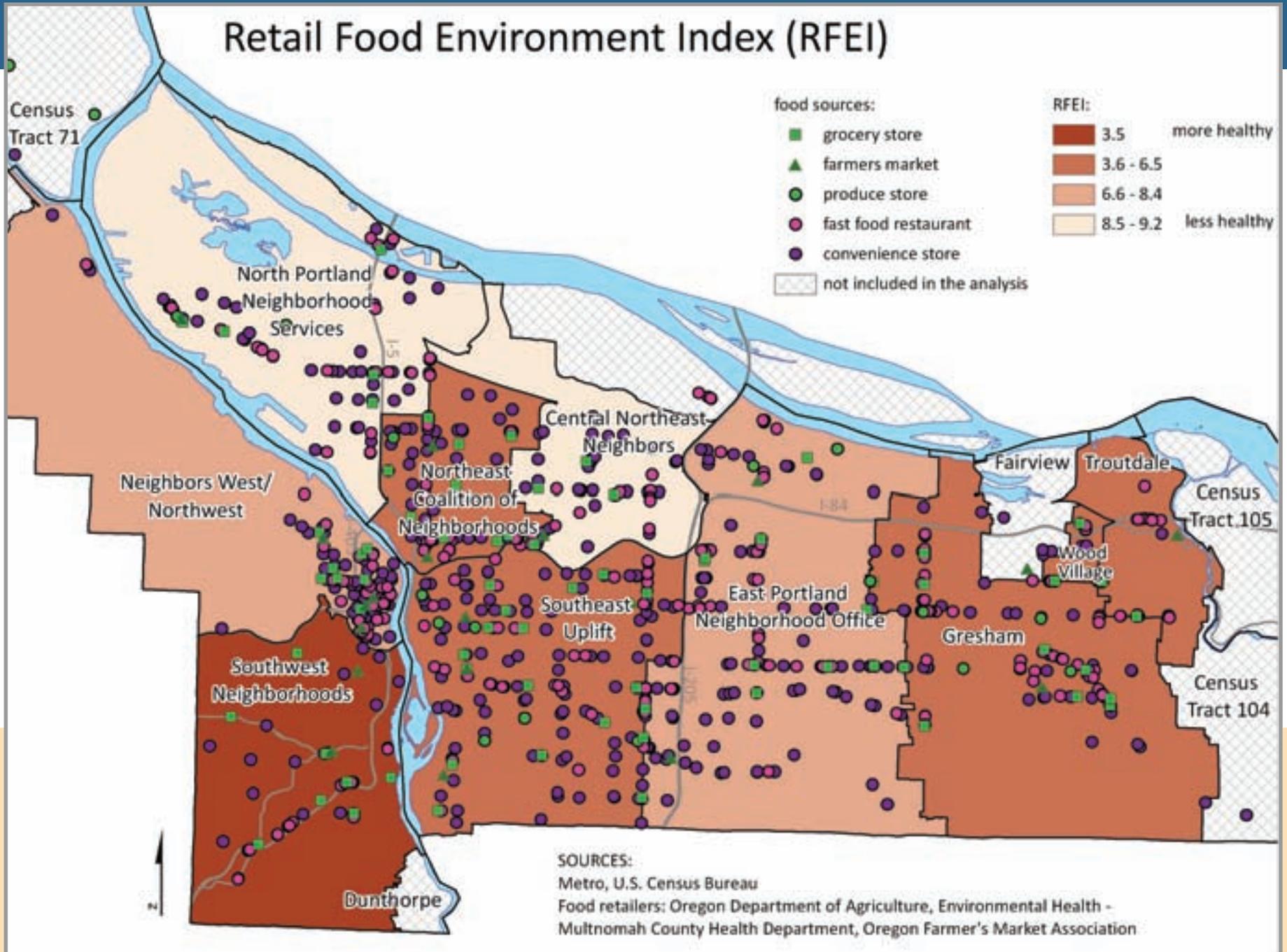
Since independent and regional fast food chain restaurants are not included in the numerator, the RFEI score may be underestimated. Farmers markets are often closed during the winter months - this is not accounted for in the analysis. For some months of the year, when farmers markets are closed, the RFEI may be underestimated. In Dunthorpe, Fairview, and the unincorporated areas of the county (census tracts 71, 104, 105) there were not enough retail food outlets for the calculation to be meaningful. The coding of retail food outlets into categories was subjective and affordability was not taken into account.

FINDINGS

Retail Food Environment Index scores, or ratio of unhealthy food outlets to healthy food outlets, ranged from 3.5 to 9.2 among the areas. Higher scores indicate an unhealthier environment. The RFEI for Multnomah County overall is 6.4. The Southwest Neighborhood Coalition has the healthiest RFEI score by an almost 2 point margin which indicates that it clearly has the healthiest food environment. There is a variety of healthy food retailers including two farmers markets, national chain grocery stores, and specialty stores such as Zupans. Most of the fast food restaurants are located along the I-5 freeway.

The North and Central Northeast Portland Neighborhood Coalitions have the least healthy RFEI scores. In North Portland, most of the fast food restaurants and convenience stores are located along N. Lombard St. In Central Northeast Portland fast food and convenience stores are spread evenly across the area. Both of these areas have a relatively low number of grocery stores per capita compared to other close-in Portland districts. East Portland is the next-lowest ranked area. A combination of relatively few grocery stores per capita and the high number of unhealthy food sources likely accounts for the poorer score. Though East and Southeast Portland have almost the same number of unhealthy food sources, Southeast ranks much better due to the high number of healthy food sources. East Portland does have a good selection of lower-priced full-service grocery options such as Winco and a Walmart superstore.

Retail Food Environment Index (RFEI)



C. PHYSICAL ACTIVITY

This section maps the following features of the 15 areas:

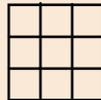
1. Percentage of population living within a quarter-mile of a park or trail
2. Density of indoor recreational facilities within a half-mile of residences
3. Percentage of land zoned for mixed uses
4. Percentage of land covered by tree canopy

Limitations Key

The limitations of each map analysis are listed below the summary table in the Limitations Key. Below is a brief key to each limitation symbol.



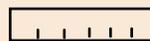
The calculation is based on population estimates rather than an exact count of residents.



The land area was divided into equal size cells about the size of a Portland city block. The mapping software assigns a value to each cell. This is called a raster analysis.



The data was available at the census tract level. The tract data were distributed to the census blocks based on population patterns as of Census 2000.



Distance was measured “as the crow flies” rather than by traveling over street segments.

Please see the Appendix for more information.

RESULTS AT A GLANCE

	Population within .25 mile of a park or trail	Density of recreation facilities	Mixed-use residential zoning	Tree Canopy	Overall Physical Activity Ranking
West/Northwest	●	●	●	●	●
Southwest	●	●	●	●	●
Troutdale	●	●	●	●	●
Northeast	●	●	●	●	●
Wood Village	●	●	●	●	●
Fairview	●	●	●	●	●
Gresham	●	●	●	●	●
Southeast	●	●	●	●	●
East Portland	●	●	●	●	●
North Portland	●	●	●	●	●
Dunthorpe	●	●	●	●	●
Central Northeast	●	●	●	●	●

Legend:

● most health promoting environment

●



●

● least health promoting environment

ACCESS TO PARKS AND TRAILS

SIGNIFICANCE:

Community design affects residents' opportunities for recreational physical activity. Parks and trails give people options for getting active at no cost. Parks are an especially important community asset as they provide outdoor space for social gatherings or quiet activities and therefore may improve mental health. [24]

ABOUT THE DATA:

Three datasets were used in this analysis. Parks and trails data were obtained from Metro's Regional Land Information System (RLIS) in January 2010 (they reflect the ground conditions in 2009). The state parks dataset was downloaded from the Oregon Spatial Data Library in January 2010 and the data reflect ground conditions in 2008. [25] Only parks with free entry to the public were included in the analysis. School yards were included in the analysis as they are available for public use after school hours and are a valuable community asset. Open space or natural areas without amenities were included in the analysis. Cemeteries, special occasion parks/attractions, art centers, and museums were not included in the analysis.

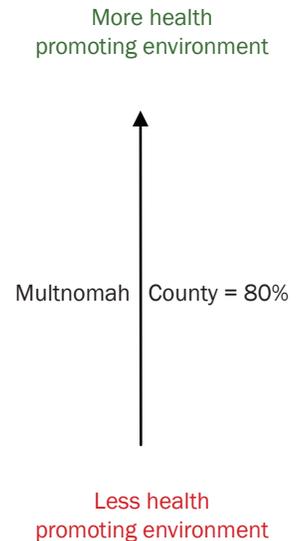
HOW THIS INDICATOR WAS COMPUTED:

A quarter-mile buffer was created around the parks and trails. This distance is frequently used in built environment research as it is considered a reasonable walking distance for most people. The entire census block population was considered to have access to parks and/or trails if the census block centroid fell within the quarter-mile buffer. The population with access was divided by the total population of the area and was transformed into a percentage.

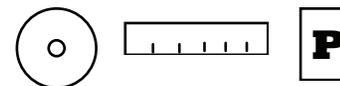
LIMITATIONS:

Some of the parks or open spaces included in the analysis do not have amenities. Lack of parking lots or restrooms could be a barrier to utilizing the park. Park and trail access points were not available. Fences or lack of street access could prohibit park or trail use even if it is nearby.

By the Numbers	Population within .25 mile of a park/trail
Fairview	100%
Troutdale	100%
North	91%
Southwest	87%
West Northwest	87%
Gresham	82%
Southeast	81%
Northeast	78%
Wood Village	76%
East	74%
Central Northeast	67%
Dunthorpe	64%



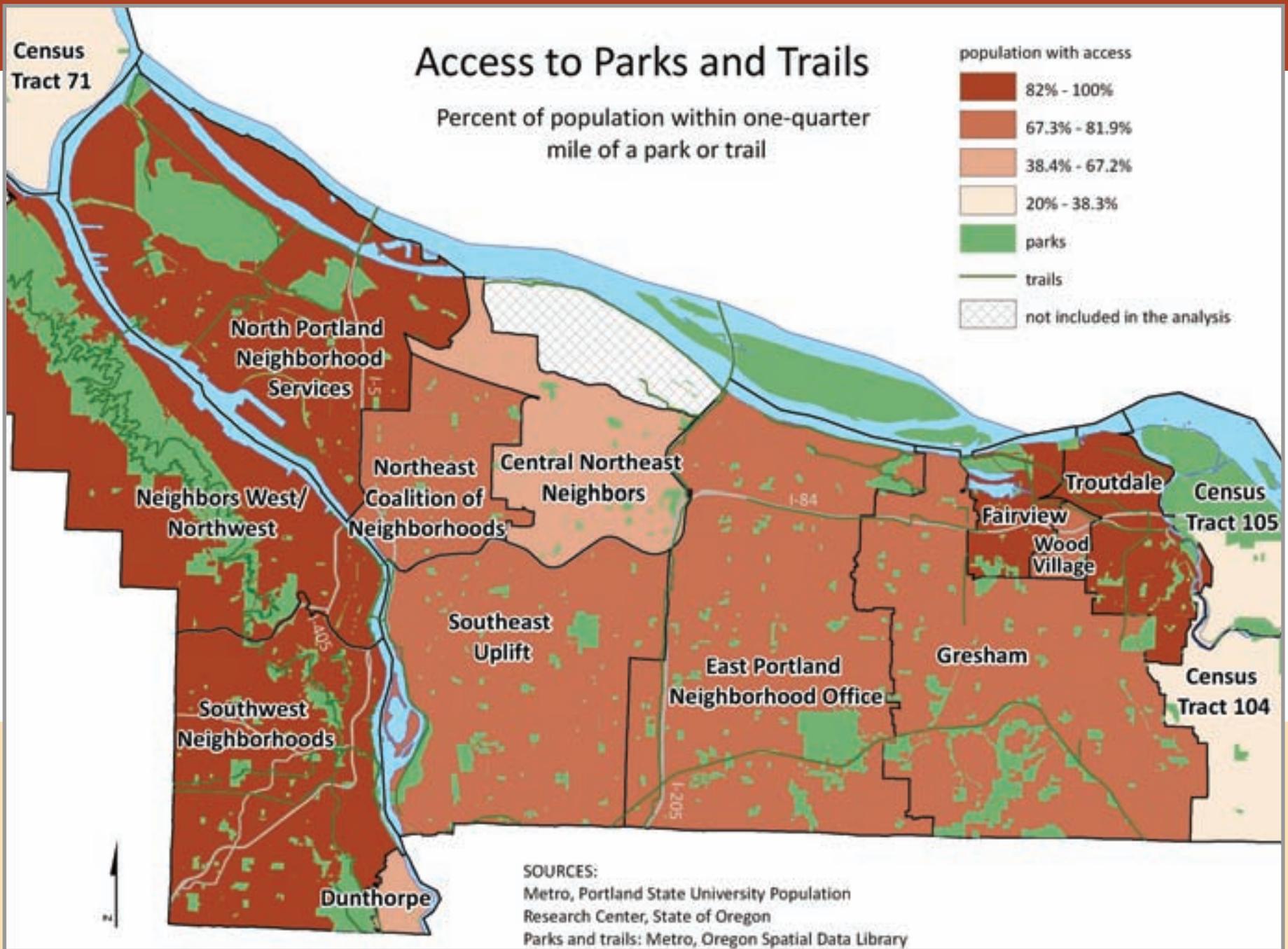
LIMITATIONS KEY:



FINDINGS

The percentage of the population living within a quarter mile of a park or trail ranged from 64-100% among the areas. In Multnomah County, 80% of residents have a park or trail nearby. All residents of Fairview and Troutdale have parks and trails within walking distance of their homes.

The Central Northeast and Dunthorpe areas have relatively low park and trail access. Dunthorpe is primarily comprised of single-family residences, which typically have private yards. Central Northeast has small-to medium-sized parks and virtually no trails.



DENSITY OF INDOOR RECREATION FACILITIES

SIGNIFICANCE:

Indoor recreational facilities give people options for getting active. They are especially important in the Pacific Northwest, where rainy weather makes outdoor recreation unappealing to many during the winter months.

ABOUT THE DATA:

The 2008 Quarterly Census Employment and Wages Data File was obtained in April 2010 from the Oregon Employment Department. This data set was utilized to identify businesses that provide indoor recreation. Employers are categorized according to the North American Industry Classification System (NAICS). The following types of businesses were included in the analysis: fitness and recreational sports centers, bowling centers, all other amusement and recreation industries, sports instruction, fine arts schools, community centers, and all other miscellaneous schools and instruction; the majority were yoga studios. Additional internet searches were conducted to identify facilities that may not be included in the state employment data set such as private yoga and pilate instructors' studios, and community, recreation, and aquatic centers. Recreational goods rentals, recreational and vacation camps, parks (including theme parks), and school gymnasiums were not included.

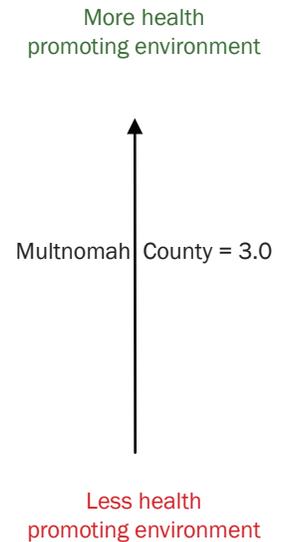
HOW THIS INDICATOR WAS COMPUTED:

The County was divided into a grid comprised of uniform cells approximately the size of a Portland city block. The number of recreational facilities within a half-mile radius of each cell was calculated and assigned to the cell. An average of cell values was calculated for each area.

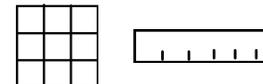
LIMITATIONS:

The coding of indoor recreational facilities is subjective - employers determine which NAICS code to apply to their business. Some of the recreational facilities will not appeal to all populations and/or may be cost prohibitive (e.g., pilates studios).

By the Numbers	Density score - recreation facilities
West Northwest	8.5
Southwest	4.1
Southeast	3.8
Northeast	3.7
Fairview	3.2
Wood Village	3.0
Troutdale	2.6
Central Northeast	2.5
North	2.2
Gresham	2.0
East	1.3
Dunthorpe	0.00



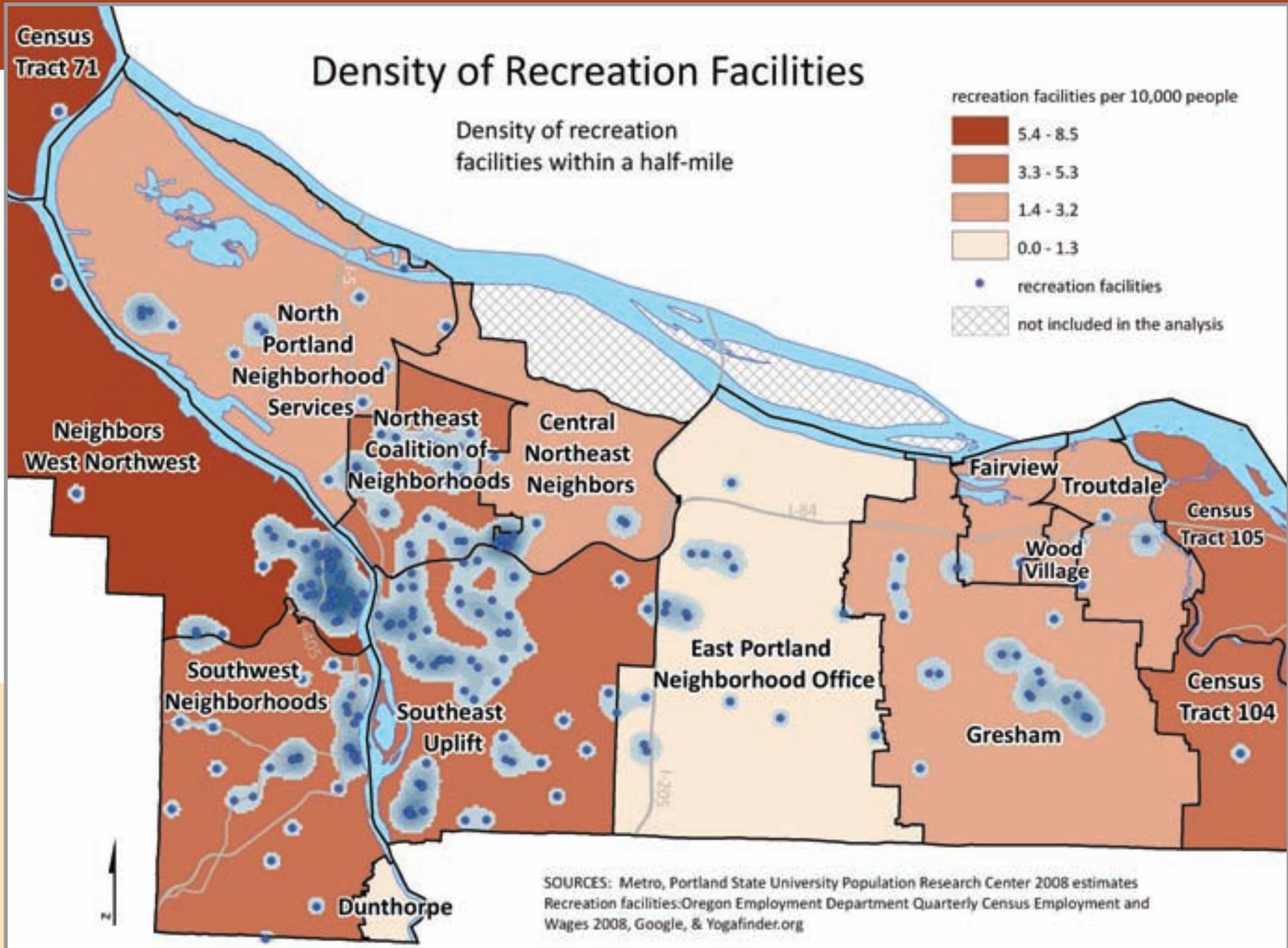
LIMITATIONS KEY:



FINDINGS

When looking at the map, the darker the shade of blue, the more recreational facilities are available in the area. The average number of recreation facilities within a half-mile of residences ranges from 1.3 - 8.5 among the areas. For Multnomah County overall, there are about three recreation facilities within a half-mile of residences. West Northwest Portland ranks highest on this indicator by a large margin. The Downtown area east of I-405 and west of the Willamette River has a large concentration of indoor recreation facilities. Some of these facilities, like fitness clubs, may be targeting workers Downtown.

The areas ranking lowest on this indicator include highly populated urban or suburban areas such as the East, North, and Central Northeast Portland Neighborhood Coalitions and Gresham. Access to recreation facilities may also be overstated in these areas. For example, East Portland ranks in the lowest category for median family income and has the highest percent of population ages 65-84 years. Many of these indoor activities (i.e., gym memberships, dance lessons, etc.) have an associated cost and may not appeal to an older population.



PERCENTAGE OF MIXED-USE ZONED LAND

SIGNIFICANCE:

Community design affects residents' opportunities for recreational physical activity. Mixed-use zoning allows for residential, commercial, and institutional (e.g., public services, schools, and non-profit organizations) land uses to be located in the same area. Having services and retailers near residences may encourage people to walk or bicycle instead of driving a car.

ABOUT THE DATA:

A data set for land zoned for mixed-uses was obtained from Metro's Regional Land Information System (RLIS) in March 2010. The data reflect zoning designated boundaries as of 2007.

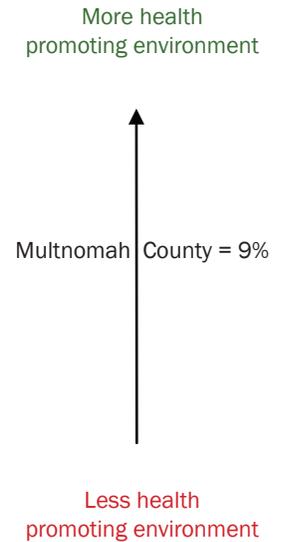
HOW THIS INDICATOR WAS COMPUTED:

For each area, the area covered by mixed use residential zoning was divided by the total zoned area and was transformed into a percentage.

LIMITATIONS:

This map represents the potential for mixed-use residential (MUR) land use. It does not reflect how the land zoned (MUR) is actually used.

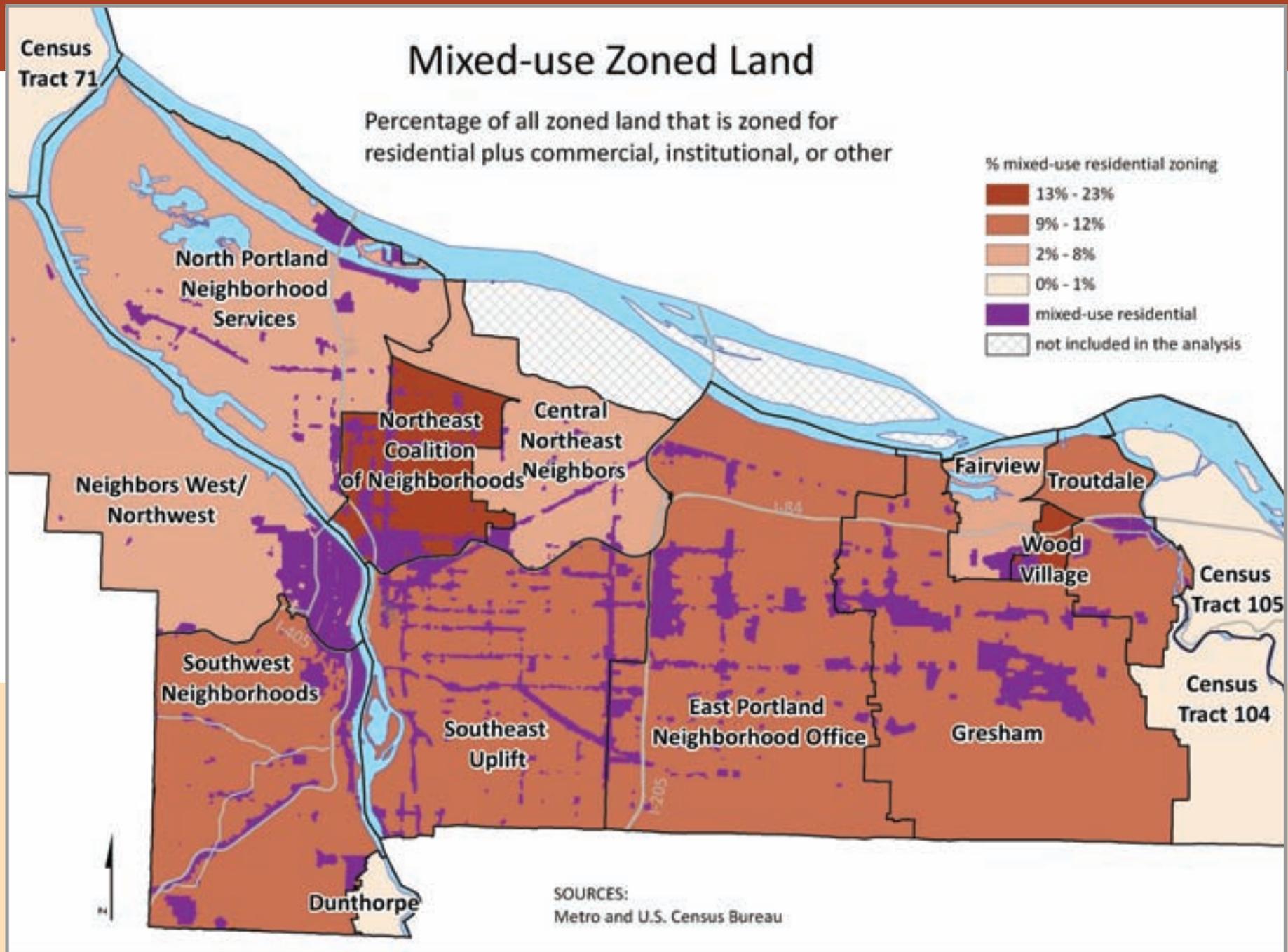
By the Numbers	Land zoned for mixed-use residential
Wood Village	23%
Northeast	20%
Southeast	12%
Southwest	11%
Gresham	11%
Troutdale	9%
East	9%
West Northwest	8%
Fairview	7%
North	6%
Central Northeast	5%
Dunthorpe	<1%



FINDINGS

The percent of land designated for mixed-use residential (MUR) uses ranges from less than one percent to 23%. Overall, about 9% of Multnomah County's zoned land is designated for mixed-use residential purposes. Wood Village and the Northeast Neighborhood Coalition in Portland rank the highest on this indicator by a wide margin. In Wood Village, mixed-use zoning is located in the southwest corner of the city and along NE Halsey St. In Northeast Portland, the area between I-84 and NE Broadway is almost all zoned MUR. There is also MUR zoning along Martin Luther King Blvd., which runs north-south through the area.

Dunthorpe has less than one percent of its land zoned MUR - it is zoned primarily for single family residences. The Central Northeast and North Portland districts also rank low on this indicator. Most of the MUR land is located along Sandy Blvd. and N. Lombard St., respectively. The West/Northwest district has a large area zoned as MUR in the southeast area of the coalition which includes Downtown, Chinatown, and the Pearl District. This area ranks lower than expected because it also includes much forested land.



PERCENT OF LAND WITH TREE CANOPY COVER

SIGNIFICANCE:

Tree canopy coverage not only makes neighborhoods beautiful and inviting but helps regulate climate and air quality, creating a more health-supporting environment for physical activity.

ABOUT THE DATA:

A data set for tree canopy was obtained from Metro’s Regional Land Information System (RLIS) in April 2010. The data set was created using aerial photography from 2002. About 75% of the areas identified as “forest” (called “tree canopy” here) were closed forest canopy with 75-100% coverage, and the remaining 25% were open forest with 51-75% coverage.

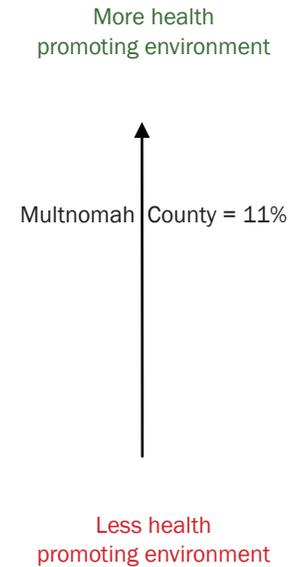
HOW THIS INDICATOR WAS COMPUTED:

The area covered by tree canopy was divided by the total land area and was transformed into a percentage.

LIMITATIONS:

Tree canopy data are not available for the whole county but do go beyond the region’s Urban Growth Boundary (UGB). Since only limited data were available for census tracts 71 and 105, they are not included in the analysis and county wide comparisons. The data are relatively old, but the tree canopy coverage is likely very similar today.

By the Numbers	Land with tree canopy
West/Northwest	53%
Dunthorpe	47%
Southwest	35%
Gresham	16%
Troutdale	11%
East	11%
Fairview	10%
North	7%
Central Northeast	6%
Wood Village	6%
Southeast	4%
Northeast	2%



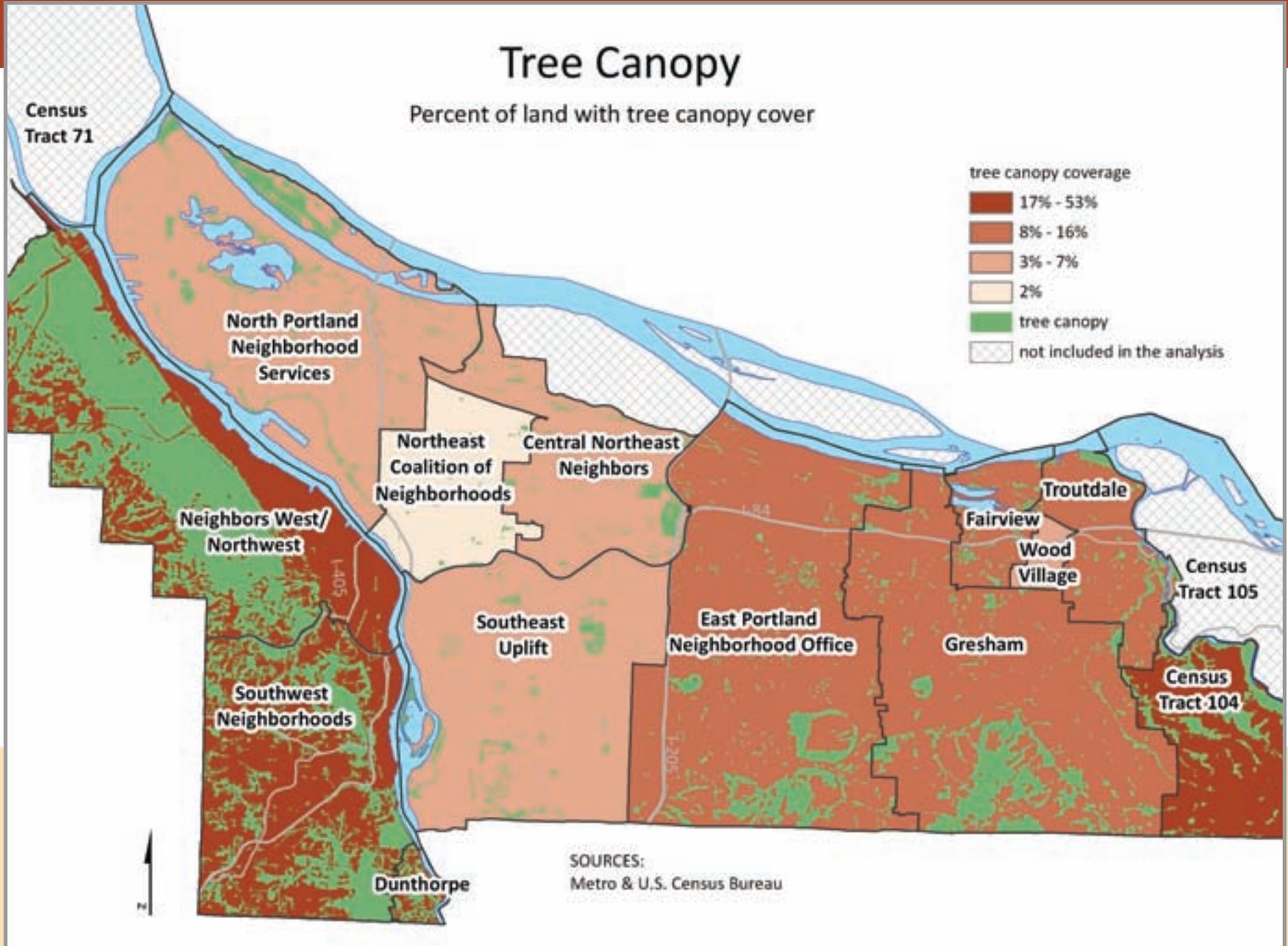
FINDINGS

Overall, approximately 11% of land in Multnomah County has tree canopy. Tree canopy coverage ranges from 2-53% of land among the 15 areas. Not surprisingly, the areas on the west side of the Willamette River rank highest on this indicator: this area includes Forest Park, Washington Park and hilly residential neighborhoods surrounded by dense thatches of trees.

On the east side of the Willamette River, tree canopy coverage increases moving east into less developed areas. Northeast Portland has very little tree canopy, and the coverage is mostly in small patches.

Tree Canopy

Percent of land with tree canopy cover



D. TRANSPORTATION

This section maps the following features of the 15 areas:

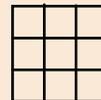
1. Percentage of population living within a quarter-mile of active transportation resources:
 - frequent transit stops
 - bike boulevards
 - multi-use trails
2. Ratio of sidewalk miles to street miles
3. Ratio of bike route miles to square miles

Limitations Key

The limitations of each map analysis are listed below the summary table in the Limitations Key. Below is a brief key to each limitation symbol.



The calculation is based on population estimates rather than an exact count of residents.



The land area was divided into equal size cells about the size of a Portland city block. The mapping software assigns a value to each cell. This is called a raster analysis.



The data was available at the census tract level. The tract data were distributed to the census blocks based on population patterns as of Census 2000.



Distance was measured “as the crow flies” rather than by traveling over street segments.

Please see the Appendix for more information.

RESULTS AT A GLANCE

	Population within .25 mile of active transportation	Sidewalks	Bike paths	Overall Transportation Ranking
Northeast	●	●	●	●
Southeast	●	●	●	●
Central Northeast	●	●	●	●
Fairview	●	●	●	●
West/ Northwest	●	●	●	●
North Portland	●	●	●	●
Gresham	●	●	●	●
East Portland	●	●	●	●
Wood Village	●	●	●	●
Southwest	●	●	●	●
Troutdale	●	●	●	●
Dunthorpe	●	--	●	●

Legend:

- most health promoting environment
 -
 -
 - least health promoting environment
- ↑

ACCESS TO ACTIVE TRANSPORTATION

SIGNIFICANCE:

People who use “active transportation,” such as mass transit, walking, and bicycling, get exercise as they go about their daily routines. People are more likely to use these resources when transit service is frequent, bike and pedestrian routes are protected from cars, and the streets are well-connected (i.e., not too many long blocks or dead ends). Residents of neighborhoods where it is easy to get around using active transportation have an easier time meeting physical activity guidelines and have better access to education, jobs, and healthy food retailers.

ABOUT THE DATA:

For this analysis, active transportation modes included frequent bus and light rail stops, bike boulevards, and multi-use trails.

Frequent transit stops: When transit lines run at every 17 minutes during rush hour, they are considered frequent service. [26] The analysis included all MAX and Streetcar stops and the 13 frequent service bus route stops. Bus stops in each direction for the same route are included in the analysis. Public transportation data were obtained from Metro’s Regional Land Information System (RLIS) from the July 2009 data set.

Multi-use trails: Multi-use trails are paths that are shared by pedestrians and cyclists. A data set for bike paths and routes was obtained from Metro’s Regional Land Information System (RLIS) in January 2010. The data reflects routes and paths included on Metro’s 2007 Bike There! map. Multi-use paths from this data set were included in the analysis.

Bike boulevards: Bike boulevards are streets designated as safe routes for cyclists where car traffic is low. A dataset for bike boulevards was obtained from the City of Portland in February 2010 and reflects ground conditions at that time. The data included multi-use paths that also were included in the analysis.

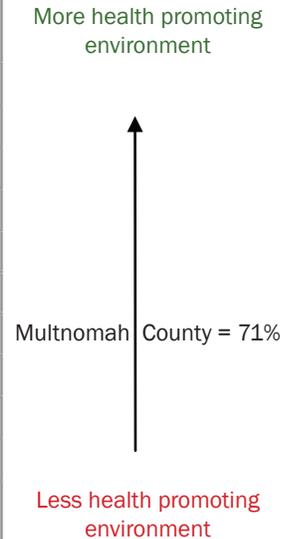
HOW THIS INDICATOR WAS COMPUTED:

A quarter-mile buffer was created around frequent service transit stops, bike boulevards and multi-use paths. One quarter-mile is frequently used in transportation analyses as it is considered a distance people are willing to walk. The entire census block population was considered to have access to active transportation if the census block centroid fell within the quarter-mile buffer. The population with access was divided by the total population of the area and was transformed into a percentage.

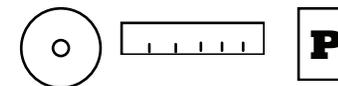
LIMITATIONS:

The data from the City of Portland is more current than the data for the rest of the County.

By the Numbers	Population within .25 mile of active transportation
Northeast	99%
Central Northeast	91%
Southeast	88%
North	87%
Fairview	85%
West Northwest	83%
Wood Village	74%
East	67%
Southwest	51%
Gresham	38%
Dunthorpe	37%
Troutdale	0%



LIMITATIONS KEY:

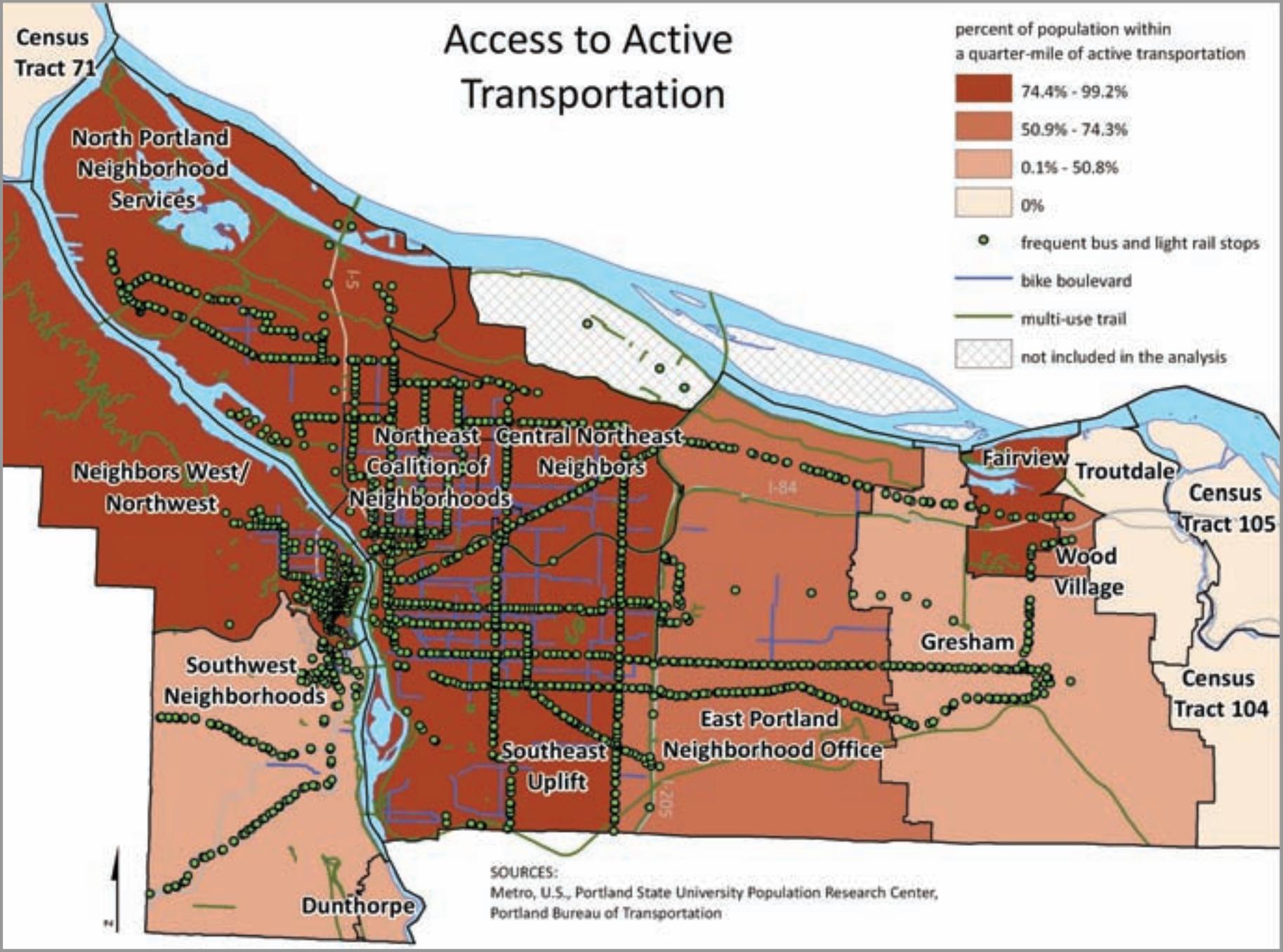


FINDINGS

Overall, the vast majority of Multnomah County residents live within a quarter mile of active transportation. The percentage of the population with access to active transportation ranges from zero to almost 100% among the areas. Close-in Portland areas including Northeast, Central Northeast, Southeast, West/Northwest, and North rank the highest on this indicator. Almost all of the residents of these areas have a selection of active transportation options. Fairview also ranks high due to frequent bus service and multi-use trails.

The city of Troutdale notably has no access to active transportation as we have defined it. Many residents likely drive to where they need to go as the median household income is greater than the county average and most people have cars. Dunthorpe, the city of Gresham, and the Southwest and East Portland areas also rank lower than the county average on this indicator. In Gresham and East Portland there are few options for traveling north-to-south, most of the active transportation routes are east-to-west which may limit area residents’ mobility.

Access to Active Transportation



ACCESS TO SIDEWALKS

SIGNIFICANCE:

Sidewalks provide a safe way for pedestrians to travel to their destinations or walk for exercise. In areas where sidewalks exist, children may be more likely to walk to school. [27]

ABOUT THE DATA:

Sidewalks: Sidewalk data were obtained from Metro’s Regional Land Information System (RLIS) in March 2010. The data reflect ground conditions as of 2002. An estimation of the sidewalk coverage for each street segment, on both sides of the street, was included. Limited data were available for the unincorporated areas of the county.

Streets: A streets data set was obtained from Metro’s Regional Land Information System (RLIS) in March 2010 that reflect ground conditions in 2009. Some street segments were excluded from the analysis (e.g., transportation infrastructure was not appropriate for pedestrians as on freeways and highways, or areas where data were not collected).

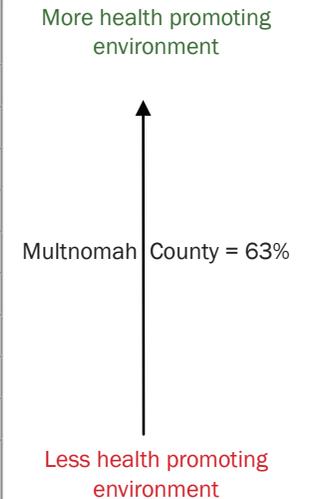
HOW THIS INDICATOR WAS COMPUTED:

The percent of streets with 100% sidewalk coverage on at least one side was calculated. If a street segment only had partial sidewalk coverage (anything less than 100%) it was not considered accessible. This more stringent definition of sidewalk access was applied to determine where it would be safe for children, elderly, and the disabled to travel. For each area, the number of sidewalk miles was divided by the number of street miles.

LIMITATIONS:

Pedestrians’ decision to walk to their destination can be affected by how well the sidewalks are connected and by the condition of the sidewalk. Connectivity means that there are multiple routes to get from place to place. In this case it also means that there is a sidewalk available for the whole route to a destination. A connectivity analysis was beyond the scope of this project. Data regarding the condition of sidewalks are unavailable. Unincorporated areas were not included in the county-wide comparison due to incomplete data. The conservative definition of access may underestimate the extent to which people are likely to use sidewalks.

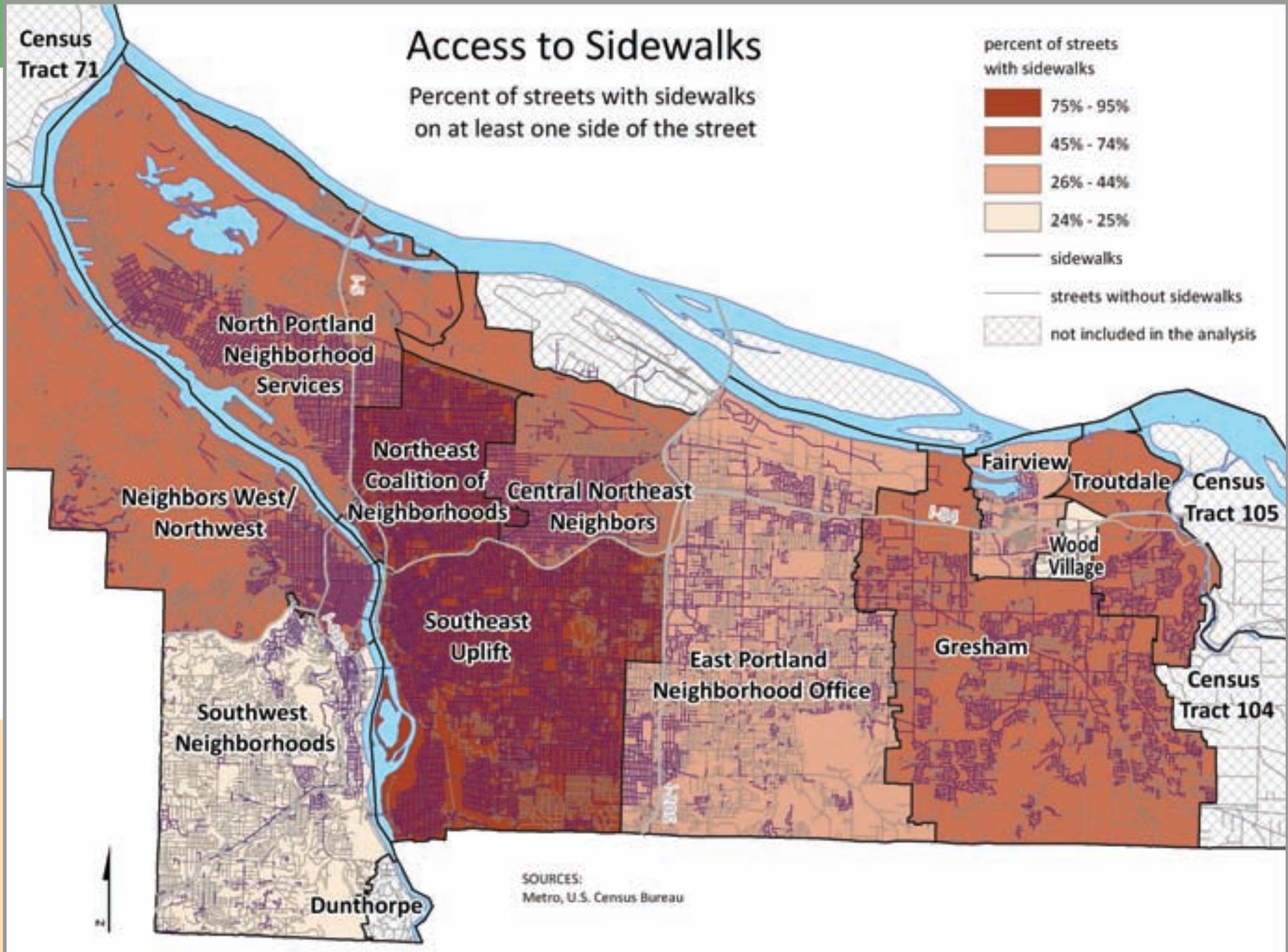
By the Numbers	Percent of streets with sidewalk
Northeast	95%
Southeast	84%
North	74%
Troutdale	71%
Gresham	65%
Central Northeast	60%
West/Northwest	56%
East	44%
Fairview	38%
Southwest	25%
Wood Village	24%



FINDINGS

Overall, 63% of Multnomah County streets have a complete sidewalk on at least one side of the street. The percent of streets with sidewalks ranges from 24-95% among the areas. Southeast and Northeast Portland rank the highest on this indicator. The dense street grid in Northeast has almost complete sidewalk coverage. In Southeast, the area where sidewalks are lacking is located in the southeast area of the district, toward I-205 and Clackamas County.

The city of Wood Village and the Southwest Portland district rank the lowest on this indicator. In the Southwest Neighborhood Coalition, the areas closest to Downtown and the river have the most sidewalks. A combination of lack of sidewalks and the hilly topography may make walking difficult for Southwest residents. Wood Village has very few sidewalks in the residential area in the southeast corner of the city. This area was developed with car-oriented transportation in mind.



ACCESS TO BIKE PATHS AND ROUTES

SIGNIFICANCE:

People who use “active transportation,” such as bicycling get exercise as they go about their daily routines. They are more likely to cycle when bike routes are protected from cars and the streets are well-connected (i.e., not too many long blocks or dead ends). Residents of neighborhoods where it is easy to get around using active transportation have an easier time meeting physical activity guidelines and have better access to education, jobs, and healthy food retailers.

ABOUT THE DATA:

A data set for bike paths and routes was obtained from Metro’s Regional Land Information System (RLIS) in January 2010. The data reflect bike routes included on Metro’s 2007 Bike There! map. Bike lanes, multi-use paths (for pedestrians and cyclists) and low-traffic streets were included in the analysis. Low-traffic through streets include “bike boulevards” in Portland as well as non-arterial streets that are recommended for cyclists. Amenities for more experienced cyclists (e.g., moderate traffic streets and caution areas) were not included in the analysis.

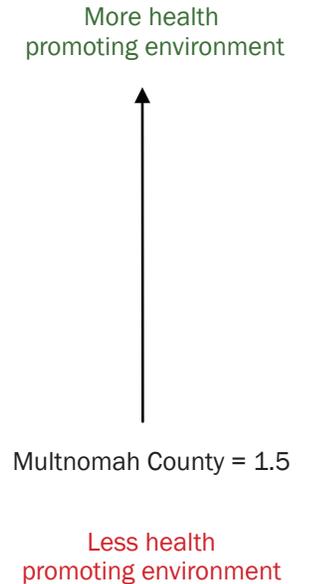
HOW THIS INDICATOR WAS COMPUTED:

For each area, the number of bike route miles was divided by the total land area in square miles. The higher the ratio, the more amenities for the average cyclist.

LIMITATIONS:

The ratio may underestimate bike amenities for more advanced cyclists. Though bike path/routes exist, connectivity of paths for the average cyclist may be lacking and cyclists may not be able to reach their destination traveling solely on these routes. Connectivity of bike routes is not taken into account in this analysis. Some areas (e.g., rivers) may not be appropriate for bike travel but are included in the denominator of the ratio. This results in an underestimation of bike routes in an area.

By the Numbers	Ratio of bike route miles to square miles
Northeast	5.7
Southeast	4.3
Fairview	4.1
Central Northeast	3.2
Southwest	2.9
East	2.8
Gresham	2.6
Wood Village	2.5
West/Northwest	2.3
North	2.2
Troutdale	1.6
Dunthorpe	1.2

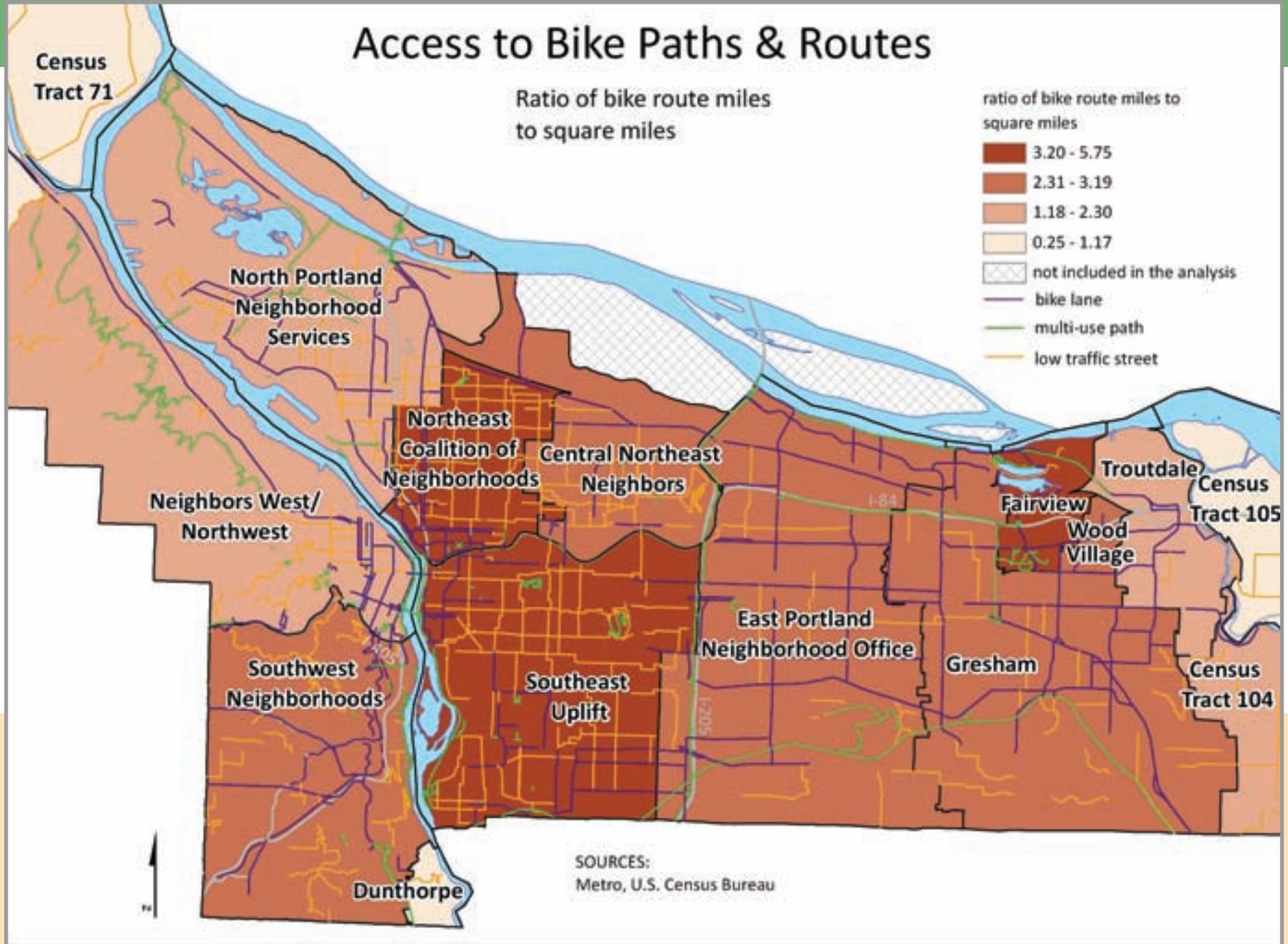


FINDINGS

The ratio of bike route miles to area square miles gives some idea of bike facility coverage in an area. Overall, the ratio for Multnomah County is 1.5. Ratios ranged from 1.2 to 5.7 among areas. Including vast rural areas in the calculation lowered the overall County ratio. Northeast and Southeast Portland and Fairview rank highest for this indicator. In Northeast and Southeast the majority of bike facilities are low traffic through streets, some of which are bike boulevards. In contrast, Fairview ranks high on this indicator due to the prevalence of multi-use paths and bike lanes.

Dunthorpe and the city of Troutdale rank the lowest on this indicator. Dunthorpe has some multi-use paths and low traffic through streets and Troutdale has primarily bike lanes. North and West/Northwest Portland also rank low on this indicator. Most of the bike facilities in these districts are located in the densely populated areas. There are also multi-use paths that go through the more rural areas. Because the North and West Northwest Coalitions cover large areas, they rank lower than might be expected.

Access to Bike Paths & Routes



E. HEALTH

This section maps the following health indicators for the 15 areas:

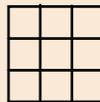
1. Crude all-cause mortality rate
2. Percentage of population who are overweight or obese (estimated)

Limitations Key

The limitations of each map analysis are listed below the summary table in the Limitations Key. Below is a brief key to each limitation symbol.



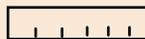
The calculation is based on population estimates rather than an exact count of residents.



The land area was divided into equal size cells about the size of a Portland city block. The mapping software assigns a value to each cell. This is called a raster analysis.



The data was available at the census tract level. The tract data were distributed to the census blocks based on population patterns as of Census 2000.



Distance was measured “as the crow flies” rather than by traveling over street segments.

Please see the Appendix for more information.

RESULTS AT A GLANCE

	All-cause Mortality (crude)	Overweight or Obese	Overall Health Ranking
Dunthorpe	●	●	●
West/Northwest	●	●	●
Central Northeast	●	●	●
Northeast	●	●	●
Southeast	●	●	●
Southwest	●	●	●
Fairview	●	●	●
Troutdale	●	●	●
North Portland	●	●	●
Gresham	●	●	●
East Portland	●	●	●
Wood Village	●	●	●

Legend:

● most healthy population



● least healthy population

CRUDE ALL-CAUSE MORTALITY 2008

SIGNIFICANCE:

The all-cause mortality rate is a standard measure used to gauge the general health of a large population. A high all-cause mortality rate may suggest that some lives were lost prematurely and productivity of the community may be affected. A crude mortality rate does not account for the age distribution of the population in an area. For example, in an area with a large elderly population all-cause mortality would naturally be higher.

ABOUT THE DATA:

Preliminary Multnomah County death data for 2008 were obtained from the Oregon Department of Human Services. The data includes all deaths that occurred in the county for any reason. A total of 5,209 records were assigned to the 15 areas using the residential address (i.e., geocoded).

Census tract population and race/ethnicity estimates for 2008 were provided by the Portland State University Population Research Center. These data were obtained in the spring of 2010. More information regarding the Population Research Center's methodology can be accessed at: <http://www.pdx.edu/prc/methodology>.

HOW THIS INDICATOR WAS COMPUTED:

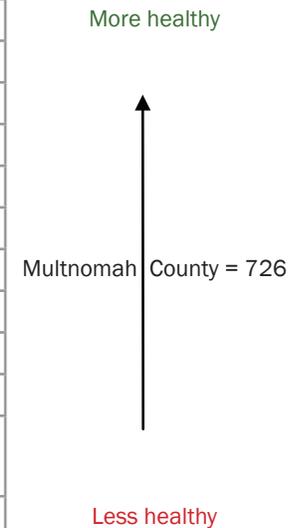
The following calculation was used to determine the mortality rate for each area:

$$[\text{number of deaths} / \text{estimated area population}] \times 100,000$$

LIMITATIONS:

The death data for 2008 was not finalized at the time of the analysis; preliminary estimates were used. Some death records could not be geocoded due to incomplete addresses or post office box addresses. The data reflect all causes of death and are not age-adjusted. The Portland State University (PSU) estimates are based on a variety of data sources including birth and death records, school enrollment data, payroll data, Medicare data, tax returns, voter registration, housing stock, and annexations. Each of these data sources may contain inaccuracies – the extent of inaccuracies is unknown. The two datasets cover different time periods. The mortality data are less recent than the population data.

By the Numbers	Deaths per 100,000 people
Dunthorpe	477
Central Northeast	567
Northeast	577
Troutdale	580
West Northwest	605
Fairview	625
North	658
Southeast	705
Southwest	715
Gresham	727
Wood Village	943
East Portland	978



LIMITATIONS KEY:

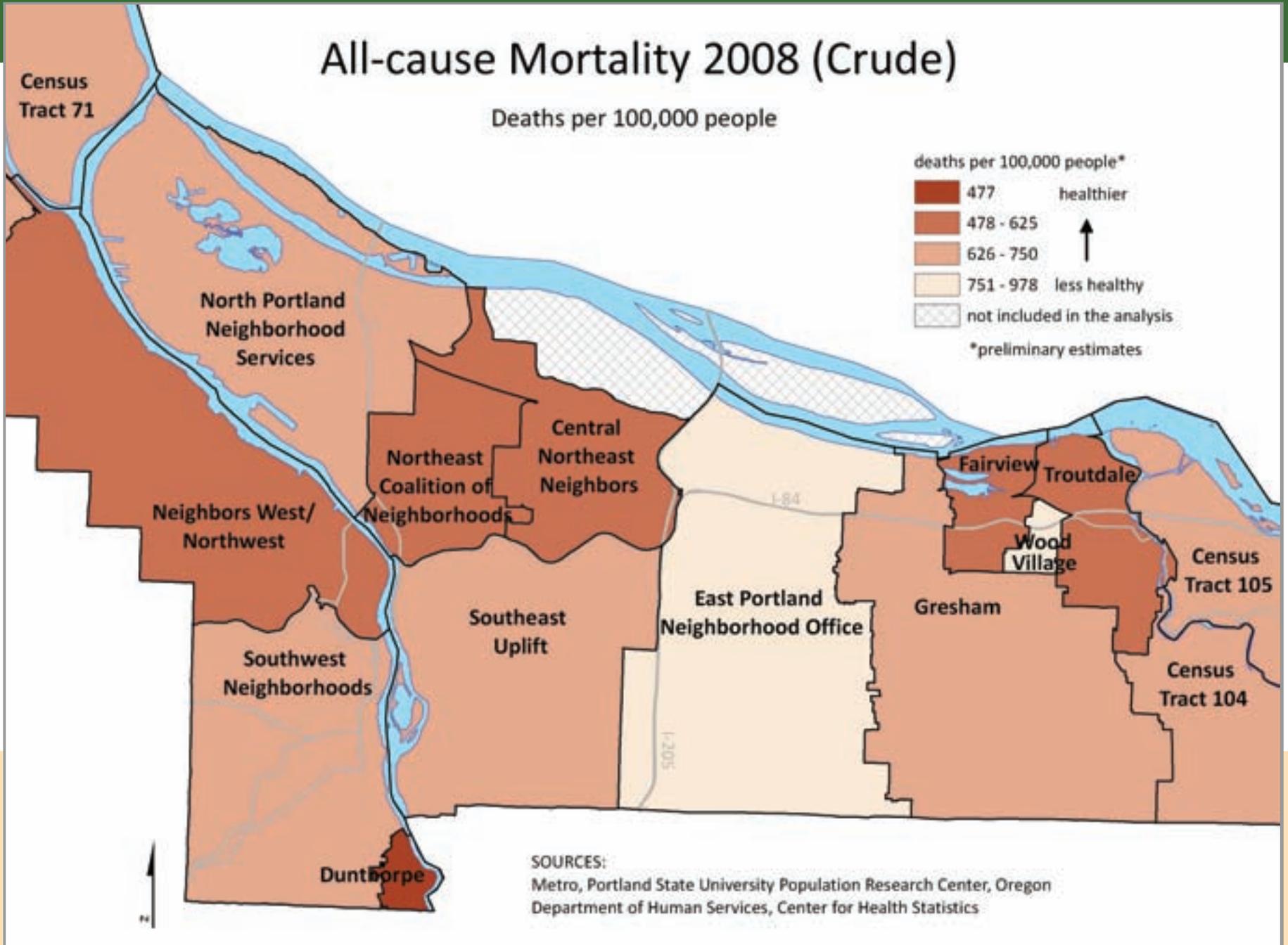
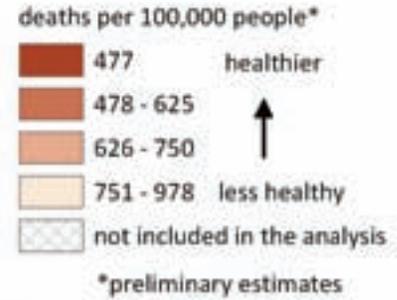


FINDINGS

The map to the right shows the crude all-cause mortality rate, or the number of deaths divided by the number of people living in the area. These figures do not account for the different age distributions of the population within the areas, but are likely to be comparable for the larger areas. Wood Village and the East Portland Neighborhood Office have the highest death rates. Dunthorpe, a wealthy area, has the lowest – at almost half of the highest rate.

All-cause Mortality 2008 (Crude)

Deaths per 100,000 people



PERCENT OF POPULATION OVERWEIGHT OR OBESE, 2008

SIGNIFICANCE:

The Body Mass Index (BMI) is a ratio based on a person's weight and height. People with a BMI of 25 up to 30 are considered overweight, and people with a BMI over 30 are considered to be obese. These standards were initially set by the World Health Organization in the 1995 and the measure is frequently used to characterize the weight status of a population. [28]Determining BMI is important because people who are overweight or obese are more likely to have chronic illnesses such as coronary heart disease and diabetes.

ABOUT THE DATA:

The dataset was obtained from the Oregon Department of Motor Vehicles in 2009. The data include information regarding people issued a new or renewed driver's license or identification card in 2008. The residential address was used to assign records to the 15 areas (i.e., geocoded). A total of 73,658 records were geocoded, including people aged 15-97 years (mean=38.7, standard deviation=15.8).

HOW THIS INDICATOR WAS COMPUTED:

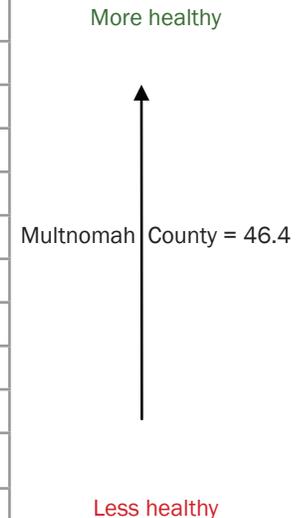
The following calculation was used:
 $BMI = \text{mass (lb)} \times 703 / (\text{height(in)})^2$

The number of overweight and obese people was divided by the number of people in the DMV dataset with residential addresses in the area and was transformed into a percentage. For the purposes of these analyses, a BMI of 18.5 - 25 is considered a healthy weight.

LIMITATIONS:

Weight and height data were self-reported; this may result in an underestimation of BMI. The data may not reflect the general population of the county. The BMI index was created to classify sedentary people of average build. For these analysis, it was applied to all individuals regardless of physical activity status, build, race/ethnicity, or developmental stage of life.

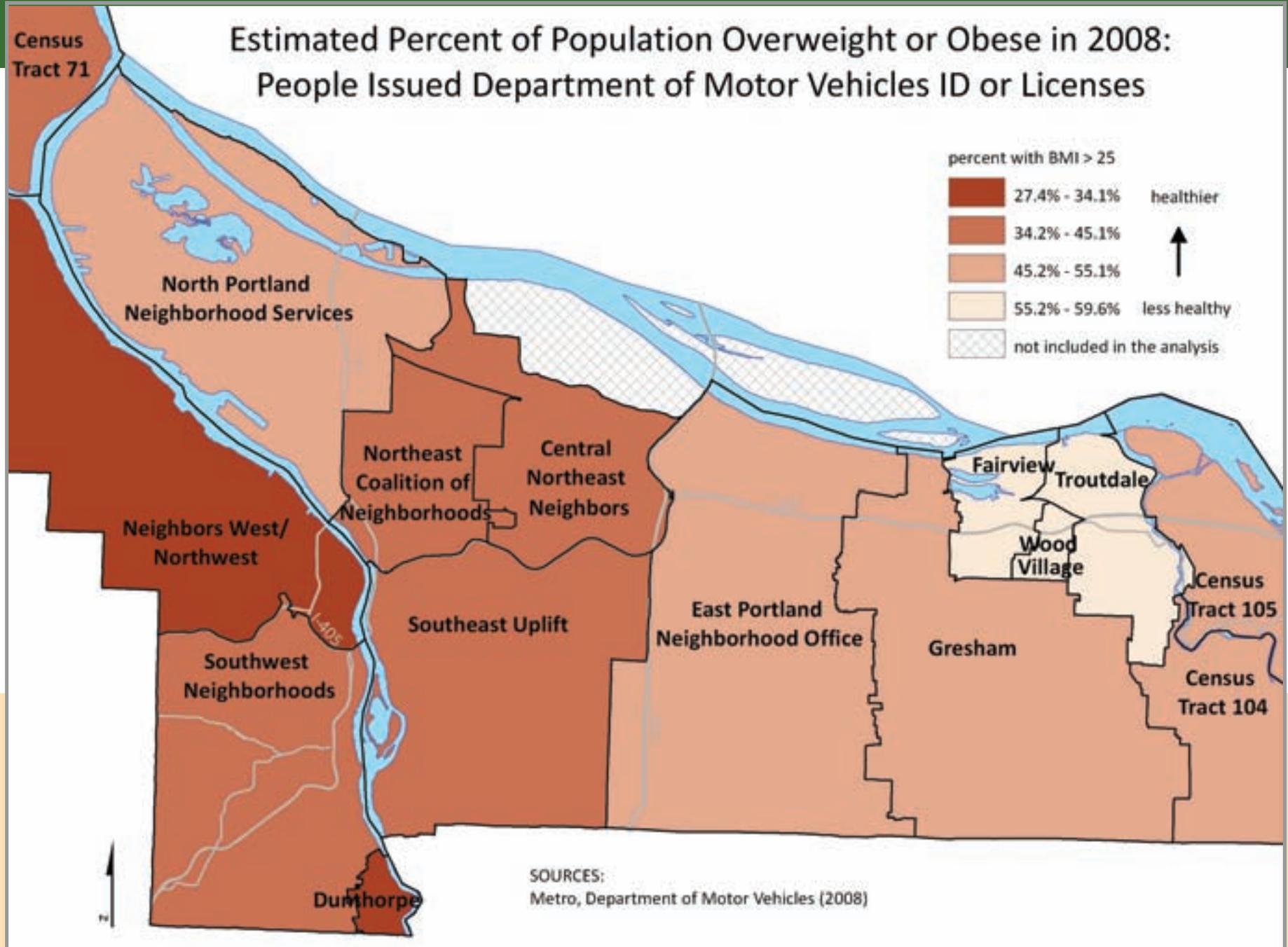
By the Numbers	Population overweight or obese (%)
Dunthorpe	27.4
West/Northwest	34.1
Southwest	38.0
Northeast	41.3
Southeast	41.6
Central Northeast	44.9
North Portland	51.3
East Portland	53.1
Gresham	55.1
Troutdale	57.3
Wood Village	58.2
Fairview	59.6



FINDINGS

Body mass index (BMI) is a computation of the ratio between a person's weight and height which suggests how healthy their body weight is. In general, the lowest rates of overweight or obesity are in the close-in areas of the City of Portland, with one exception - North Portland. Percentages of overweight or obese people increase east of the I-205 freeway. In Troutdale, Wood Village, and Fairview, between 57 and 60% of residents were overweight or obese. By comparison, between 27 and 34% of residents of Dunthorpe and West Northwest Portland were overweight or obese.

Estimated Percent of Population Overweight or Obese in 2008: People Issued Department of Motor Vehicles ID or Licenses



VI. REFERENCES

1. Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, June 19 – July 22, 1946 by the representatives of 61 States (Official Records of the World Health Organization, no.2, p.100) and entered into force on April 7, 1948. The definition has not been amended since 1948.
2. Frank L, Engelke P, Schmid TL. Health and community design: The impact of the built environment on physical activity. Washington, D.C.: Island Press; 2003.
3. Freudenberg N, Galea S, Vlahov D. Cities and the health of the public. 1st ed. Nashville, Tenn.: Vanderbilt University Press; 2006.
4. Frumkin H, Frank LD, Jackson R. Urban sprawl and public health: Designing, planning, and building for healthy communities. Washington, D.C.: Island Press; 2004.
5. Center for Health Statistics, death file.
6. Health Promotion and Chronic Disease Prevention, Oregon DHS. 2004-2007 BRFSS county-level information. Oregon Department of Human Services. Available at <http://www.oregon.gov/DHS/ph/hpcdp/pubs.shtml> [Accessed October 21, 2010].
7. Cubbin C, Hadden WC, Winkleby MA. Neighborhood context and cardiovascular disease risk factors: The contribution of material deprivation. *Ethn Dis.* 2001;11(4):687-700.
8. Duarte CS, Chambers EC, Rundle A, Must A. Physical characteristics of the environment and BMI of young urban children and their mothers. *Health Place.* 2010;16(6):1182-1187.
9. Estabrooks PA, Lee RE, Gyurcsik NC. Resources for physical activity participation: Does availability and accessibility differ by neighborhood socioeconomic status? *Ann Behav Med.* 2003;25(2):100-104.
10. Booth KM, Pinkston MM, Poston WSC. Obesity and the built environment. *J Am Diet Assoc.* 2005;105(5, Supplement 1):110-117.
11. Gordon-Larsen P, Nelson MC, Page P, Popkin BM. Inequality in the built environment underlies key health disparities in physical activity and obesity. *Pediatrics.* 2006;117(2):417-424.
12. Kwate NOA. Fried chicken and fresh apples: Racial segregation as a fundamental cause of fast food density in black neighborhoods. *Health Place.* 2008;14(1):32-44.
13. Smiley MJ, Diez Roux AV, Brines SJ, et al. A spatial analysis of health-related resources in three diverse metropolitan areas. *Health Place.* 2010;16(5):885-892.
14. Schmidt M. History of Corbett. Corbett, Oregon. Available at: <http://www.corbettoregon.com/history> [Accessed December 22, 2010].
15. U.S. Dept. of Agriculture. Access to affordable and nutritious food: Measuring and understanding food deserts and their consequences. Washington, D.C.: U.S. Dept. of Agriculture Economic Research Service; 2009.
16. Chung C, Myers SL. Do the poor pay more for food? An analysis of grocery store availability and food price disparities. *J Cons Aff.* 1999;33(2):276-296.
17. Davis B, Carpenter C. Proximity of fast-food restaurants to schools and adolescent obesity. *Am J Public Health.* 2009;99(3):505-510.

18. Frank LD, Sallis JF, Conway TL, et al. Many pathways from land use to health: Associations between neighborhood walkability and active transportation, body mass index, and air quality. *J Amer Planning Assoc.* 2006;72(1):75.
19. Subramanyam M, Kawachi I, Berkman L, Subramanian SV. Relative deprivation in income and self-rated health in the United States. *Soc Sci Med.* 2009;69(3):327-334.
20. U.S. Department of Agriculture. Access to affordable and nutritious food: Measuring and understanding food deserts and their consequences. Washington, D.C.: U.S. Department of Agriculture Economic Research Service; 2009.
21. Davis B, Carpenter C. Proximity of fast food restaurants to schools and adolescent obesity. *Am J Public Health.* 2009;99(3):505-510.
22. Oregon Farmers Market website. Available at: www.oregonfarmersmarkets.org/directory/directory.html
23. California Center for Public Health Advocacy. Searching for healthy food: The food landscape in California cities and counties. Available at: http://www.publichealthadvocacy.org/RFEI/presskit_RFEI.pdf
24. Kuo FE, Sullivan WC, Coley RL, Brunson L.. Fertile ground for community: Inner-city neighborhood common spaces. 1998;26(6):823-851.
25. Oregon Spatial Data Library website. Available at: spatialdata.oregonexplorer.info/GPT9/catalog/download/download.page
26. TriMet website. Available at: <http://trimet.org/schedules/frequent-service.htm>
27. Ewing R. Can the physical environment determine physical activity levels? *Exercise and Sport Sciences Reviews.* 2005;33(2):69-75.
28. World Health Organization website. Available at: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html
29. Metro Data Resource Center (Portland, Ore.). Regional Land Use Information System. Available at: <http://rlisdiscovery.oregonmetro.gov/> [Accessed December 20, 2010].
30. U.S. Census Bureau. American FactFinder. Available at: <http://factfinder.census.gov/home/saff/main.html> [Accessed December 20, 2010].
31. Annual population estimates. Portland State Population Research Center. Available at <http://www.pdx.edu/prc/annual-population-estimates> [Accessed December 22, 2010].
32. Geographic Research, Inc. SimplyMap. Available at: <http://www.multicolib.org/ref/a2z.html#S> [Accessed December 20, 2010].
33. Zeiler M. Modeling our world: The ESRI guide to geodatabase design. Redlands, Calif.: ESRI Press; 1999.
34. Tsou M. Unit 2: Geographic information science and spatial reasoning (Geog 104). Available at: <http://map.sdsu.edu/geog104/lecture/unit-2.htm> [Accessed December 27, 2010].
35. Adrienko G, Adrienko N, Savinov A. Chloropleth maps: Classification revisited. In: Vol 2. Beijing: Chinese Society of Geodesy; 2001:1109-1119. Available at: <http://geoanalytics.net/and/papers/ica01.pdf>.

VII. APPENDIX

A. *Interpreting the maps*

The maps in the atlas follow several conventions intended to facilitate their interpretation. This section describes map features common throughout the atlas.

B. *Data sources*

The atlas draws on a variety of data sources, with the bulk of the data coming from the Metro regional government and the U.S. Census Bureau. Metro manages the Regional Land use Information System (RLIS), [29] a warehouse of regularly updated geographic data that is a valuable resource for conducting analyses of built environment issues in Multnomah County.

Population data come from the U.S. Census Bureau [30] and the estimates based on these data provided by the Portland State University (PSU) Population Research Center under contract to the Multnomah County Health Department. [31] While the Census Bureau collects data from individual households and provides some information to the public at the block level, many data are available only for census tracts and larger units.

Another valuable data source for the atlas was SimplyMap, [32] a database that is accessible through the Multnomah County Library and other library systems. This subscription service integrates publicly available data with proprietary commercial and economic information from market researchers like Dun & Bradstreet, Nielsen, and Experian. Other data sources are mentioned as appropriate on specific maps.

C. *Data limitations*

Icons next to each map indicate which of certain common limitations described below apply to the map.

a. **Population estimates**

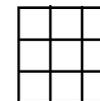
Most of the calculations in the atlas rely on population estimates rather than an exact count of residents. While the decennial



Census conducts a full population count, this extensive (and expensive) survey happens just once every ten years. In the intervening years, the Oregon State Data Center at Portland State University's Population Research Center uses statistical methods to produce estimates of the population at the city and county level in Oregon. The Multnomah County Health Department pays to receive these population estimates at the census tract level from the Population Research Center. Because the most recent decennial Census data available come from 2000, the atlas uses the PSU population estimates.

b. **Rasters**

Several of the maps present data based on raster analyses. These analyses are conducted by dividing a land area represented as a rectangular surface into equally-sized square cells (as the pixels used to display digital images). For the maps in this atlas, the cells were 260 feet square, about the size of a Portland city block. ArcGIS, the geographic analysis software, then computes a value for each of the cells: for example, the number of grocery stores within a mile of the cell's center. The values reported for the areas in atlas maps are the average of the values for the cells falling within that area.



In this way, raster calculations let us draw conclusions about an area without an exhaustive amount of data collection or computation. However, they have two major shortcomings: the rectangular surface offers a crude representation of area boundaries, and they do not account for potential variation within individual cells. For example, a cell might get a score of zero because there is no grocery store within a mile of its center; however, that score would not reflect local conditions very well if the cell's population were concentrated in one corner of the cell, where there are two nearby grocery stores that fell just over a mile from the cell center. In other cases, a cell may receive a score higher than its residents might expect. Smaller cell sizes decrease the degree of this type of error, but it is always a

limitation of raster analysis. Similarly, “rasterizing” a layer from the vector format results in cruder boundaries, since the surface must be comprised of cells with a discrete value as opposed to a continuous surface with an infinite number of points. For example, a cell that has both land and water within it must be classified as one or the other, as illustrated in Figure 1 to the right. [33-34]

In our analyses, this limitation of raster analysis most affects the individual statistics for the fifteen areas, since they are smaller land areas than the county overall and consequently subject to more distortion.

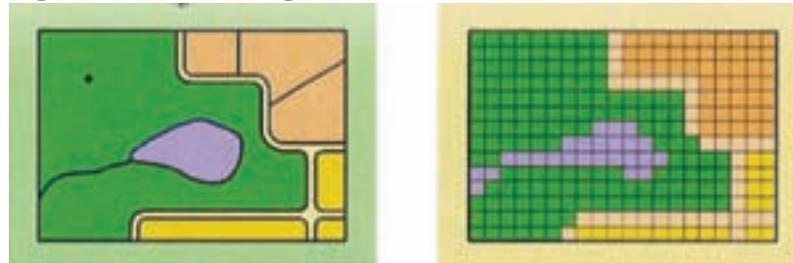
c. Apportioning the population

Population estimates were available at the census tract level. In Multnomah County there are 170 census tracts which vary in land area and population. In an attempt to assess the County at a finer scale than tract level, the tract data were apportioned to the census block level based on the population pattern as of Census 2000. In other words, rather than dividing the tract population evenly among the blocks that comprise the tract, blocks were assigned the proportion of the population they contribute to the tract. For example, some blocks contain high-rise residential buildings. The same-sized block with single family residences or commercial buildings would have less population. So instead of apportioning the same number of people to each of these tracts, more people would be assigned to the block with the residential high rises.

To determine population “with access” to a feature of the environment (such as a transit stop), buffers were created around the feature of interest. For example, if the center of a census block fell into the transit stop buffer, all of the population in that block was considered to have access to the stop. But in some cases, a portion of the block area was outside of the buffer and not all people in the block truly have access. This results in an overestimation of people with access to a stop. In

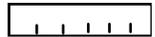


Figure 1. Converting vector to raster



(adapted from Zeiler [33] as cited by Tsou [34])

other cases, the block center fell just outside the transit buffer and residents were considered without access even though a portion of the block area falls within the buffer. This results in an underestimation of access.



d. Euclidean distance

Distances between points described in the atlas, such as “within one quarter-mile of a transit stop,” are based on Euclidean or “as the crow flies” measurements. This describes the distance between points on a geometric (as described by mathematician Euclid) plane as opposed to the length of the street segments connecting the two. The buffers mentioned above were calculated in this way. Street network distance, which also can be thought of as “as the person walks/drives,” best reflects the way people move through space, but calculating these statistics was beyond the scope of the project. Euclidean distance is used by some well-known GIS platforms like Walkscore.com, but does not take account of barriers to movement such as poor street grid connectivity or lack of pedestrian/bike facilities. For our analyses, measuring with Euclidean distance is less problematic in urban areas where there is a dense street grid that generally offers a direct path to reach a destination.

D. Color schemes

Most of the maps include a choropleth, where the areas are shaded to represent different values on a variable of interest.

“Color ramps” show relative values with a lighter and darker shade of the same hue. In the food access, physical activity, and transportation sections of the atlas, maps are designed so that darker, more saturated shades indicate an increasing association with positive health. This means that without even reading a map’s title or legend, a reader would be able to tell which areas are better (dark shades) or worse (light shades) off for the given built environment variable analyzed in the map. For example, on a map of grocery store availability, areas with darker shading would have more grocery stores.

E. Classification strategy / ranking system

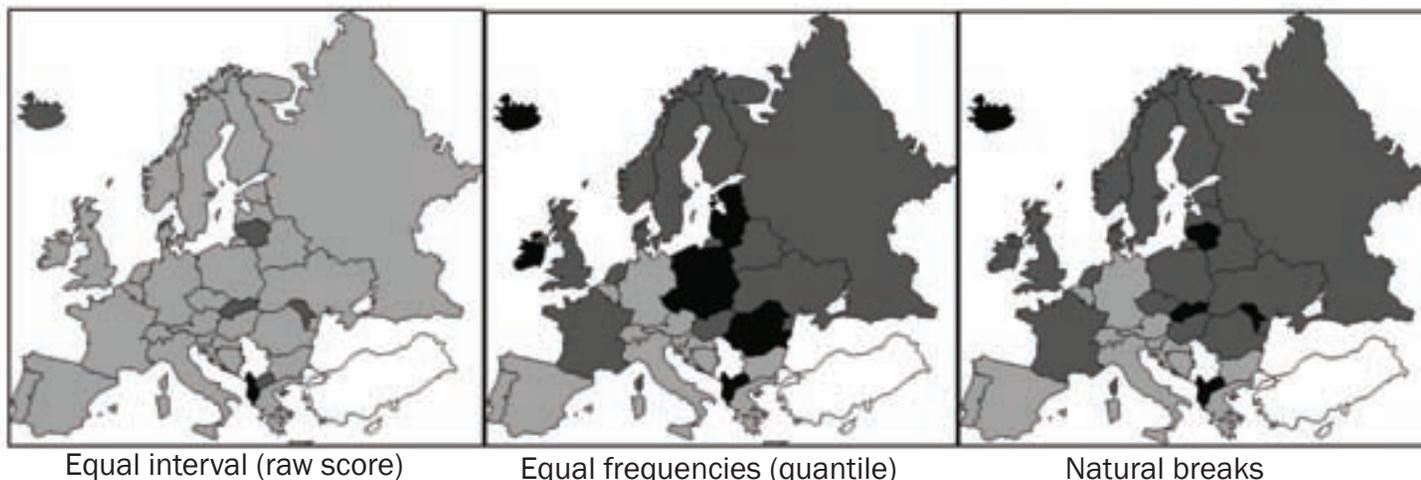
The classification strategy greatly influences how maps look, and consequently how we interpret them. For each of the choropleth maps, the Multnomah County areas are divided into four classes – or four different shades of a color – based on their value. Rather than arbitrarily setting the boundaries of these classes, we used the Jenks Natural Breaks method. Natural breaks classify a set of observations (in this case, statistics about Multnomah County’s areas) into distinctive groups whose members have similar values. Natural breaks allow for more meaningful comparison within the County than would other classification strategies. The statistical calculations (done by the mapping software ArcGIS) produce classes that highlight variation in a way that is not possible with other classification strategies. For example, equal interval classification can obscure difference while equal frequency classification can exaggerate it.

Figures 2 and 3 provide examples of how classification schemes influence the grouping of data. The first shows the classification of a hypothetical dataset and the second shows maps using different classification schemes to display the same data. Figure 2 shows

twelve imaginary neighborhoods’ scores on a hypothetical friendliness test (which runs from 0-200 points). The next three columns show the groups the neighborhoods would be assigned under three different classification schemes, using shading to identify each class. Classifying the neighborhoods into four “equal interval” classes (0-50, 51-100, 101-150, 151-200) based on their friendliness scores would make it appear as though there are only two kinds of neighborhoods: friendly and not. An “equal frequencies,” or quantile, approach would create four classes with three members each. But some classes would include neighborhoods with disparate friendliness levels, so that neighborhoods that were in the unfriendly category under the equal interval scheme would be lumped together with extremely friendly Lilacwood. Natural breaks classification groups the neighborhoods into classes where members are similar to each other: Applewood and Baywood are quite unfriendly places, while Lilacwood is in a uniquely friendly class of its own. Cherrywood, Dogwood, Eaglewood, and Floralwood comprise a group of pretty regular

Figure 2: Neighborhood friendliness score Classification system							
NEIGHBORHOOD	FRIENDLINESS SCORE	EQUAL INTERVAL		EQUAL FREQUENCIES		NATURAL BREAKS	
Applewood	2	2	0-50 points	2	bottom quartile	2	extremely low performer
Baywood	5	5		5			
Cherrywood	30	30		30			
Dogwood	31	31		31	2nd quartile	low-typical performer	
Eaglewood	35	35		35			
Floralwood	35	35		35			
Greenwood	40	40		40	3rd quartile	high-typical performer	
Happywood	40	40		40			
Ivywood	40	40		40			
Juniperwood	45	45		45	4th quartile	top performer	
Knightwood	49	49		49			
Lilacwood	149	149		149			101-150 points

Figure 3: Birth rates in European countries - data classification schemes (adapted from Adrienko) [35]



neighborhoods that fall on the less friendly end of the spectrum. Greenwood, Happywood, Ivywood, Juniperwood, and Knightwood are also typical, but more friendly than the C-F neighborhoods.

The maps in Figure 3 above are a graphical representation of the phenomenon demonstrated in Figure 2: each is a choropleth of birth rates in European countries, with the countries divided into three classes based on their birth rate [35]. Because most European countries have low birth rates, the equal intervals map makes it appear as though there is little variation in birth rates between the countries: Albania is an outlier and Iceland, Lithuania, Slovakia, and Moldova have elevated birth rates. (Turkey and Serbia are white because they are not included in the dataset.) In the equal frequencies map, the countries with higher rates in map A now belong to one class (the highest tertile, or top third of countries) along with Ireland, Estonia, Latvia, Poland, and Romania. Each of the other tertiles includes the same number of nations. In map C, statistical analysis of variance (natural breaks) is used to classify countries into three groups. There is a small group of countries who have a high birth rate compared to other European countries: Iceland, Albania, Macedonia, Moldova, Lithuania, and Slovakia. About a third of the countries (Portugal, Spain,

Bosnia & Herzegovina, Greece, etc.) have extremely low birth rates. The remainder (Ireland, England, France, the Nordic states, most of Eastern Europe, et al.) have low birth rates – this class constitutes about half of the nations. In this case, the natural breaks method shows us that most countries have a low birth rate, some have an extremely low birth rate, and few have a higher rate.

As suggested by the use of natural breaks classification (see “Classification strategy” above), the atlas focuses on comparisons between the County areas rather than evaluating the areas against fixed numerical standards. The atlas describes current conditions and highlights differences between areas within the County, but does not set benchmarks or compare these conditions to other places outside the County. While certain built environment conditions (e.g., availability of sidewalks) have a positive association with health, there are few thresholds established about the extent to which these resources must be provided to assure that residents receive the health benefits (e.g., 90% of street segments should have a sidewalk). This work is likely to be shaped by the local environment and guided by the priorities of residents.



**MULTNOMAH COUNTY
HEALTH DEPARTMENT**



Public Health