The Portland Healthy Mixed-Use Zoning Project

A Rapid Health Impact Assessment

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Executive Summary

As part of the City of Portland's Comprehensive Plan Update the City is currently working on the Mixed Use Zone Project (MUZ Project). The MUZ Project's main objective is to revise Portland's Commercial and Central Employment zoning codes that apply to the Comprehensive Plan's Centers and Corridors outside of the Central City. To assess the potential impacts on health of these new land uses, a rapid health impact assessment (HIA) has been conducted.

There is a breadth of evidence supporting that mixed-use development promotes positive health impacts in a variety of ways. Mixed-use development is most commonly cited to promote more active environments that promote physical activity. This HIA on the MUZ Project aimed to identify any health-promoting elements of the new codes to promote best practices, as well as identify any unforeseen adverse health events that may result, and provide recommendations to alter the code before implementation.

In order to make comparisons of the effects of the MUZ project between the already diverse parts of the county, three neighborhood centers were chosen for this assessment: The Jade District, the Northwest District, and the Killingsworth/ Interstatearea. Each were selected based on the level of mixed-use already existing, as well as their risk for gentrifcation as identified by the Bates Gentrification Tyopology.

The study evaluated the impacts of the following proposed elements of the MUZ code on health:

- **Relation of building height to street/scale transit function**
- **Ground floor use + roofline variety**
- **Street frontage design regulations**
- **Front + street setbacks requirements**
- **Outdoor space requirements**
- **Bonuses for community benefits and affordable housing**
- **Green feature infrastructure guidelines**
- **Centers overlay zones**

The following health pathways were explored in thier relation to the proposed mixed use code elements:

- **Healthy Body Weight**
- **Movement Through Public Space**
- **Neighborhood Social Capital**
- **Air Quality**
- **Displacement**

Overall, this assessment indicated that the most significant health impacts, both positive and negative, would have greater effect in areas deemed as "susceptible" or "dynamic" on the Bates Gentrification Typology Scale. While the MUZ project has the most potential to improve health in these areas, it also has the most potential to displace current residents, and care should be taken to involve the community in inclusive development processes in project implementation.

The following recommendations have been made for the proposed MUZ code:

- To promote community health, the planning and design of neighborhood open spaces needs to place importance on walkable green spaces.
- Streets that are not vital links in the traffic network should be selected for traffic calming and transformed into usable open space with seating opportunities.
- Establish code bonuses/incentives that explicitly call for healthy retail development.
- Prohibit, rather than limit, the establishment of fast food restaurants in established mixed use zones.
- Arts/culture institutions and civic organizations should be formed as a reflection of existing cultures in each proposal area, but especially the Jade District. The bonuses for community benefits element of the proposal should be updated to state this.
- Enhance walkability measures in the centers overlay zone requirements.
- In canyon streets, some traffic lanes should be converted into bike lanes. Sidewalk width requirements should be extended.
- Shared and paid parking elements should be integrated into the centers overlay element, and considered in all the study area neighborhoods.
- Prioritize the development of "community impact zones" in neighborhoods affected by the new MUZ code that are classified as "susceptible" to gentrification. This provides a mean to involve the community to set priorities of inclusive and equitable development.
- Provide further incentives for the prioritization of minority or women owned-businesses in affordable commercial space provisions.

Introduction

What is the Mixed-Use Zone Project?

As part of the City of Portland's Comprehensive Plan Update the City is currently working on the Mixed-Use Zone Project (MUZ Project), an early implementation project. The MUZ Project's main objective is to revise Portland's Commercial and Central Employment zoning codes that apply to the Comprehensive Plan's Centers and Corridors outside of the Central City. The new MUZ codes created aim to accommodate the forecasted growth for the city and address other objectives of the new Comprehensive Plan such as "better integrate design with historical context" and "character of areas, allow feasible mixed-use development", "plan for more affordable housing", and "better correlate commercial and employment uses to the appropriate type of place". To assess the potential impacts on health of these new land uses, a rapid health impact assessment (HIA) has been conducted.

Currently, the proposed framework of zones would reshuffle all Commercial and Central Employment zones into four new categories, Commercial Mixed-Use (CM) 1, 2, and 3, as well as Commercial Employment (CE) and a new Center Overlay zone. The CM codes allow a mix of residential and commercial uses on a small, medium, or large scale with varied height restrictions dependent on distance from Centers and Corridors. These zones are intended to be pedestrian-oriented. The CE zone is intended for a mix of commercial and light industrial uses along Major and Priority Truck Streets, and is dictated to be pedestrian-oriented as well. The new center overlay zone would be applied to properties in the commercial core of Centers identified by the Urban Design Framework map and would prescribe restrictions on land uses and developments not supportive of a pedestrian-oriented environment, such as drive through developments, quick auto service businesses, or single dwelling developments .

What is the Zoning + Health Connection?

There is a breadth of evidence supporting that mixed-use development promotes positive health impacts in a variety of ways. Mixed-use development is most commonly cited to promote more active environments that promote physical activity. In addition, a variety of land uses increase opportunities for access to healthy food options, schools, and sports and recreation centers . Through emphasis on walkability, mixed-use development has shown to reduce driving levels resulting in reduced emissions and improved air quality. "Active" ground floors of mixed-use development often extend into the street space and encourage street life and encounter, enhancing feelings of safety through natural surveillance. A diverse land use and variety of residences and businesses attracts people of all ages and backgrounds to gather, developing social capital and strengthening community networks. Some research has indicated that mixed-use development also may have negative health impacts. Single-use zoned properties adjacent to mixed-use areas have been shown to substantially increase in value, which may increase risk of housing displacement for low-income populations. Overall, there is no evidence, data, or experiences that have investigated the comprehensive health impacts of mixed-use zoning codes or how they interact within the context of urban form dictated by traditional code that separates uses.

Why Health Impact Assessment?

A health impact assessment (HIA) is defined as "a combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population." A health impact assessment is a systematic process that uses an array of data and methods and considers input from stakeholders to determine the potential effect of a proposed policy/plan/program. The focus of an HIA is to aid policymakers in making informed decisions, a process that helps to reduce inequities in health. An HIA also endeavors to promote and protect health by predicting health related consequences that might occur from decisions made without considering the health of populations. One of the factors that makes an HIA effective is the involvement and engagement of community members and stakeholders affected by the proposal.

Introduction

There are normally six steps that an HIA follows and these steps are represented in Figure 1. Screening is the first step that determines whether an HIA is warranted. Scoping is coming up with a work plan and determining your resources. Assessment includes researching the baseline and determining the impact of the proposal. Evidence-based recommendations are made based on the peer reviewed literature available. Reporting is when the findings of the HIA are communicated to the decision-makers and other interested parties before the decision is made. Implementation and monitoring is when the proposal is put into effect and then tracked to understand the impact of the implantation.

During the roundtable discussions conducted as part of the public involvement plan several points of concern came up that can be linked to health outcomes. Business owners have concerns that the new zoning codes may restrict small businesses from expanding and providing livable wages due to high rents associated with mixed-use areas. Developers have concern that inequities will arise in terms of access to auto-restrictive areas for low-income populations who live on the outskirts of the city where driving is much more important. These concerns indicate there are individuals and organizations with a stake in the MUZ project that would likely support an HIA.

Mixed-use development is growing in popularity as a smart growth tactic to build "healthy cities" and is becoming promoted as a best practice approach on the policy level. The MUZ project may further intensify gentrifying forces within Portland, suggesting an HIA should be conducted to investigate and provide recommendations to minimize potential displacement.

The MUZ project is near finishing code development, and near moving into the public hearing phase, with adoption planned for late 2015. The timing is ideal to conduct an HIA and present health impact findings and recommendations at Planning and Sustainability and Portland City Council public hearings. An HIA on the new MUZ code would provide beneficial evidence and recommendations to improve the MUZ codes to help make Portland a healthy, vibrant city for all.

The Health Impact Assessment Process:

Figure 1. A flowchart demonstrating each stage of the health impact assessment process.

Introduction

Study Aims + Objectives

This HIA on the MUZ Project aimed to identify any health-promoting elements of the new codes to promote best practices, as well as identify any unforeseen adverse health events that may result and provide recommendations to alter the code before implementation. These potential negative health effects have been identified through community concern and include the availability of living wage jobs within the new zones as well as the potential of displacement in residential areas surrounding the new zoning areas from increasing property values.

Research Methods

Because this was a rapid/desktop HIA, no stakeholder engagement occurred in any of the phases. The HIA team obtained several drafts of the City of Portland's Mixed Use Zones Project and performed a preliminary analysis of potential health impacts associated with elements of the proposed project during the Screening and Scoping phases. Using Bates' gentrification typology and prior knowledge of the potential project areas, the HIA was able to narrow down its analysis to the Jade District, the Killingsworth/Interstate area, and the Northwest District.

For the Baseline Report, the HIA team utilized various sources including the 2010 US Census and County Health Rankings to delineate health indicators and health-related outcomes that could potentially be linked to elements of the project through various environmental determinants. The Coalition for a Liveable Future's Equity Atlas was utilized to obtain maps displaying geographic distribtion of health outcomes. Figure 1 describes a common score evaluating access to a health-related service within the atlas. The HIA team was able to use results from the Baseline Report to identify the most probable health-related outcomes that could be linked to elements of the proposed project.

During the Assessment phase, the HIA team broke the health-related outcomes into groups and performed literature reviews on the various connections between features mixed-use development, environmental determinants, and the health-related outcomes of interest. The team also used recent HIAs to enhance the quantity and quality of evidence obtained during the literature review process.

Score	Proximity
5	0 to ¼ mile
4	¼ to ½ mile
3	½ to ¾ mile
2	¾ to 1 mile
1	1 mile and over

Table 1. Access scores utilized in this report regard CFL maps.

Introduction

Recommendation Development

Based on the data obtained from the assessment, health impacts were placed in tables organized by health pathways. To demonstrate the distribution of impacts, each health pathway has a section for impacts divided by study area. The following scales were utilized to assess distribution:

Magnitude and severity were ranked on scales from low - medium - high in terms of the number of people impacted and the level of impact for each study area respectively.

The **direction of impact** is given as ↑=increase in health-related condition ↓=decrease in health-related condition ↔=no change in health-related condition.

The **likelihood of impacts** was delineated based on the following criteria:

• Speculative (₁) = may or may not happen; no direct evidence to support;
• Possible (₁ ₁) = more likely to happen than not; direct evidence but from limited sources;
• Probable (₁ ₁ ₁) = very likely to happen; direct strong evidence from a range of data sources collected using different methods; or
• Definite (₁ ₁ ₁ ₁) = will happen; overwhelming, strong evidence from a range of data sources

collected using different methods.

The **strength of evidence scale** was modeled afte the John Hopkins Evidence-Based Research Scale based and includes the following criteria:

•Weak = Opinion based on non-research literature, case studies, little evidence
•Moderate Low = Opinion of expert, based on research, qualitative reviews, meta-synthesis, existing but conflicting evidence
•Moderate = Quasi-experimental studies, substantial evidence, fairly consistent evidence
•Strong = RCT, RCT meta-analysis, robust and consistent body of evidence

Following the Assessment phase, recommendations were drafted to be shared with the City of Portland during the upcoming public comment period in the Summer of 2015.

Study Area Parameters

There are a range of built environments throughout Multnomah County that have formed in response to the variety of transportation systems and zoning ordinances that have occurred within Portland's Urban Growth Boundary. In the Downtown core and Northwest neighborhoods development patterns have followed a tight street grid, forming high density and residential areas with automobile congestion and extensive public transportation. The inner East side areas originated around the streetcar lines and exist of mostly single-family homes around the current street grid. On the eastern side of the county development is more suburban and car-oriented, consisting of single-family homes connected to large shopping centers by multi-lane roads. These environments are intrinsically tied to our health, with our homes and neighborhoods playing a large role in determining what community resources and challenges we have access to.

The MUZ project implementation area will replace existing commercial zones (CN1/2, CO1/2, CM, CS, CG, EX, and CX) in Centers and Corridors outside of the Central City district, identified through the Comprehensive Plan update. In order to make comparisons of the effects of the MUZ project between the already diverse parts of the county, three neighborhood centers were chosen for

this assessment based on two criteria: The number of mixed use development permits issued in the past 10 years and the Bates Gentrification typology. The number of mixed use development permits issued in the past 10 years gives indication to the existing built environment and conditions. Areas with higher level of mixed use permits issued will likely experience less dramatic effects of the new zoning codes than those that have had none. The sites selected were chosen to reflect a range of development patterns, with Northwest representing the higher end of permits issues and the Jade District representing the lower.

The study areas were chosen using Bates' Gentrification typology (Table 2), as differential health impacts associated with mixed-use zoning are likely depending on the shifting demographic attributes of each area. This typology utilizes a risk assessment of indicators that index neighborhoods in different stages of gentrification. The study centers were chosen to represent a range on this scale, with the Northwest District in the continued lass stage, Killingsworth/Interstate in the dynamic stage, and the Jade District in the Susceptible stage.

Study Area 1:
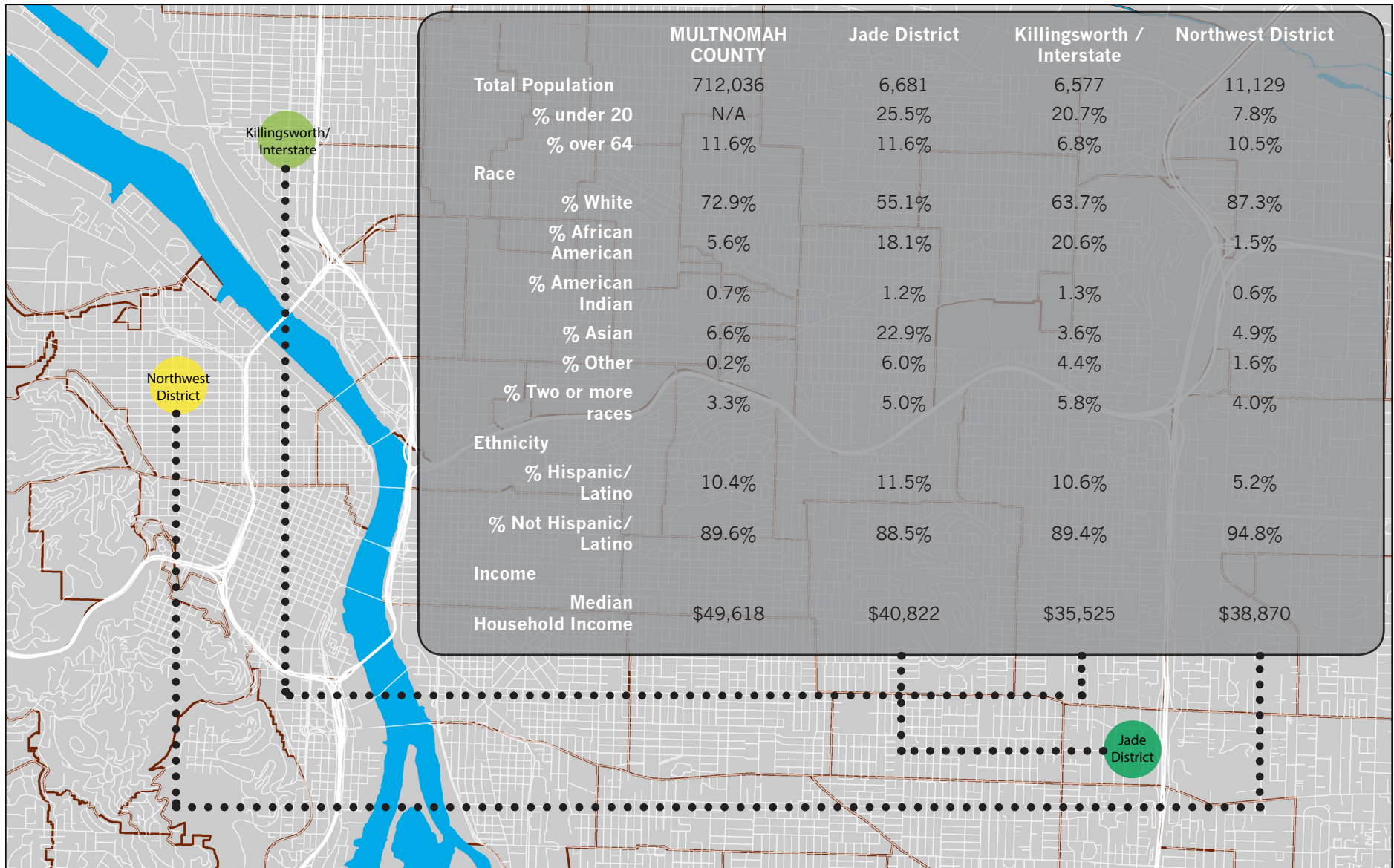## Northwest District

Study Area 2:
Killingsworth/Interstate

Study Area 3:
Jade District

Neighborhood Type	Vulnerable Populations?	Demographic Change?	Housing Market Condition
Susceptible	Yes	No	Adjacent
Early: Type 1	Yes	No	Accelerating
Early: Type II	Yes	Yes	Adjacent
Dynamic	Yes	Yes	Accelerating
Late	Yes	Yes	Appreciated
Continued Loss	No	Has % White and % with BA increasing	Appreciated

Table 2. The table demonstrates the different combinations of nieghborhood variables the make up the six typologies of displacement.

Study Area Demographics

	MULTNOMAH COUNTY	Jade District	Killingsworth / Interstate	Northwest District
Total Population	712,036	6,681	6,577	11,129
% under 20	N/A	25.5%	20.7%	7.8%
% over 64	11.6%	11.6%	6.8%	10.5%
Race				
% White	72.9%	55.1%	63.7%	87.3%
% African American	5.6%	18.1%	20.6%	1.5%
% American Indian	0.7%	1.2%	1.3%	0.6%
% Asian	6.6%	22.9%	3.6%	4.9%
% Other	0.2%	6.0%	4.4%	1.6%
% Two or more races	3.3%	5.0%	5.8%	4.0%
Ethnicity				
% Hispanic/ Latino	10.4%	11.5%	10.6%	5.2%
% Not Hispanic/ Latino	89.6%	88.5%	89.4%	94.8%
Income				
Median Household Income	$49,618	$40,822	$35,525	$38,870

Killingsworth/ Interstate

Northwest District

Jade District

0 0.25 0.5 1 Miles

Study Area Profiles

Killingsworth/Interstate

The Killingsworth/Interstate area straddles I-5 and encompasses several main commercial corridors, including N/NE Killingsworth Street, N Albina Avenue, and N Interstate Avenue. This area has experienced and is still in the process of rapid gentrification, as exemplified by its shrinking racial/ethnic minority populations and skyrocketing housing prices. As to date, this neighborhood center has had four mixed use zoning permits allotted in the past 10 years that has resulted in 154 housing units, roughly ⅓ of the total 450 housing units comprised of mixed use housing and predominantly apartments. The area has many storefront commercial buildings complete with sidewalks and mixed use zoning that applies to many full blocks, as well as those shared with residential housing.
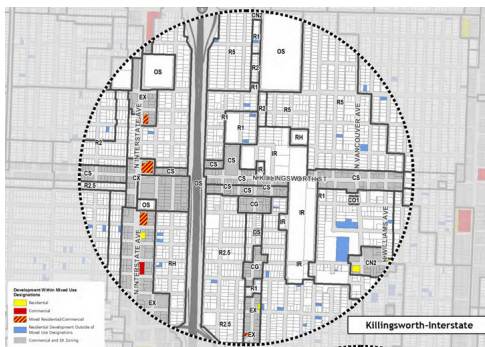
Northwest District

This area encompasses three primary commercial streets: NW 23rd Avenue, NW 21st Avenue, and NW Thurman Street. As to date, this neighborhood center has had 8 mixed use zoning permits allotted in the past 10 years which have resulted in 383 housing units, roughly ⅓ of the total 1145 housing units comprised of mixed use housing and predominantly apartments in the area. This area has thin bands of mixed use zoning along the main streets of 23rd, 21st, and Thurman, typically only one 100' lot deep, with high density housing along them. For this report Census blocks 45, 47, 48, 49, and 50 will represent this neighborhood.
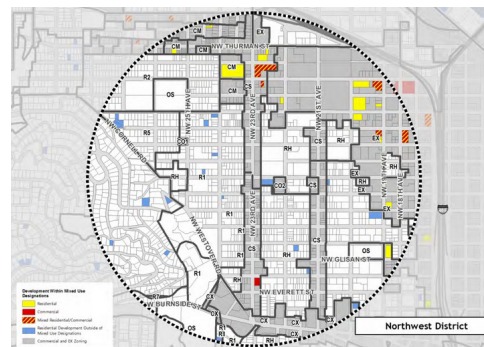
Jade District

The Jade District area is bounded by SE Powell Boulevard, SE Division Street, and SE 82nd Avenue. Of the three areas in our study region, Jade has the highest percentage of racial/ethnic minorities (22.9% Asian & 18.9% African American) and older adults (11.6%) and the lowest per-capita income ($19,056). As to date, this neighborhood center has had no mixed use zoning permits allotted in the past 10 years, but has a total of 218 housing units comprised of apartments, detached housing, and predominantly duplexes. The area contains small to mid-sized auto-oriented shopping centers with single-family residential around the edges.
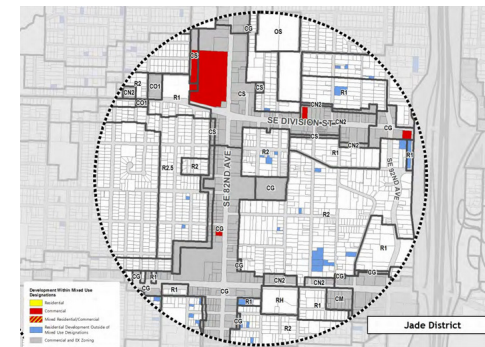
Figures 1-3. New development between 2000-2010 in Mixed-Use Development designated neighborhood centers.

Mixed Use Zone Code Elements

Six elements of the new MUZ project code were identified as potentially contributing to health and consequently assessed in this project. Below is a description of those elements:

Design Elements:

- **Accomodate ground-floor uses and roofline variety** - These provisions allow for additional building height to accommodate ground-level commercial spaces with high ceilings and fosters roofline activity.
- **Street frontages** - This aspect srengthens design-related standards that address the relationship of buildings to public street frontages, including requiring more ground floor window coverage, minimum floor-to-ceiling heights, limiting residential driveways, and applying pedestrian-oriented standards to dispersed commercial development/corner markets.
- **Outdoor space** - Requires private or shared outdoor space for residents to be provided in conjunction with mixed use or residential development.

Incentives:

- **Bonuses for community benefits and affordable housing** - These bonuses provide opportunity for additional FAR or height allowances in return for development that benefits the nearby area and helps the Comprehensive plan reach it's community goals. These projects include affordable housing, affordable commercial space, publicly accessible plaza, historic preservation and high performance green features.

Other:

- **Green features -** This element promotes the crafting of development standards to help accommodate green features and infrastructure as part of development in new mixed use zones.
- **Centers Overlay Zone -** This element is a set of design features aimed at promoting a pedestrian environment through restriction of auto-oriented development uses, such as food retail drive-thrus or quick service auto establishments.

Study Health Outcomes

Selected Outcomes for the MUZ HIA:

Based on the health challenges Portland faces, the design elements of the new MUZ code, and the history of displacement through new development within the city, the MUZ HIA will focus on the following health outcomes:

1. Healthy Body Weight

2. Physical Activity

3. Neighborhood Social Capital

4. Air Quality

5. Displacement

While these pathways may have significant overlap and interaction, this HIA has strived to focus on each individually. For example, the authors acknowledge improvements in physical activity will improve some healthy body weight indicators as well.

Study Area Limitations:

To truly investigate the effects of the MUZ project this study's parameters strive to investigate the potential health impacts of the new mixed-use zoning code on the residents of these areas, as well as within a ¼ mile buffer around each neighborhood district boundary. When possible the data utilized will encompass this population as closely as possible, but often City, County, and Census data do not perfectly align with Neighborhood District Boundaries. The data sets utilized in the report have been chosen to provide a meaningful representation of the current demographic and health composition of these areas.

Healthy Body Weight

Baseline:

The links between obesity and increased mortality due to acute and chronic conditions, including diabetes, stroke, and cardiovascular diseases are well-established in the literature. The prevalence of obesity and the aforementioned obesity-related diseases in the United States have increased significantly within the past three decades, and is projected to continue to increase. While these trends are common among most demographic groups, racial/ethnic minorities and low-income households face a disproportionate share of the risk factors associated with obesity and obesity-related diseases.

According to Behavioral Risk Factors Surveillance System (BRFSS), approximately 35% of Multnomah County residents are currently overweight, and 22.8% are obese. While data are not available on obesity specific to our study regions, we can estimate current conditions using Multnomah County-level BRFSS data and other various environmental determinants and risk factors associated with obesity in the table below.

The Jade District has the lowest concentration of supermarkets and grocery stores, as residents of this area must travel ½-¾ or a mile on average to reach them. The Killingsworth/ Interstate area has the highest concentration
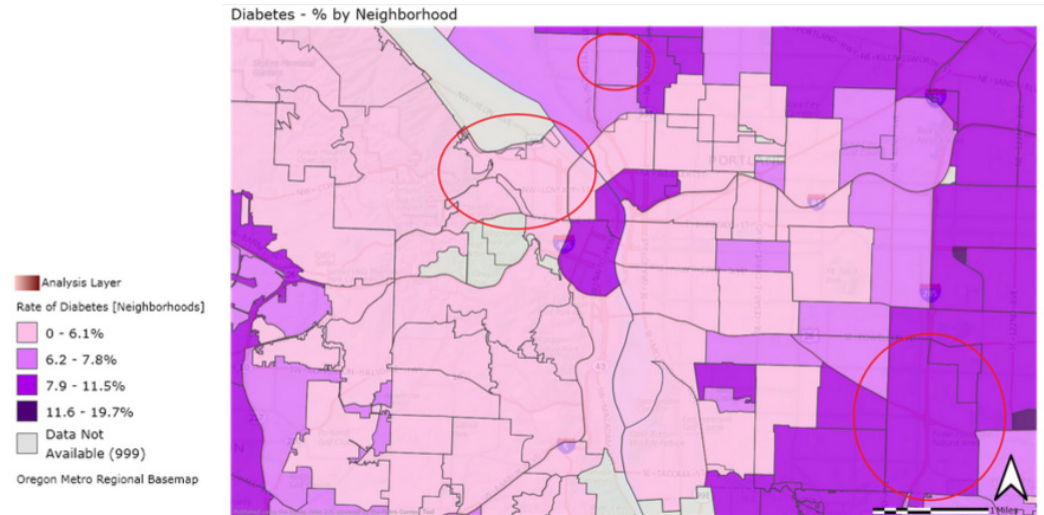

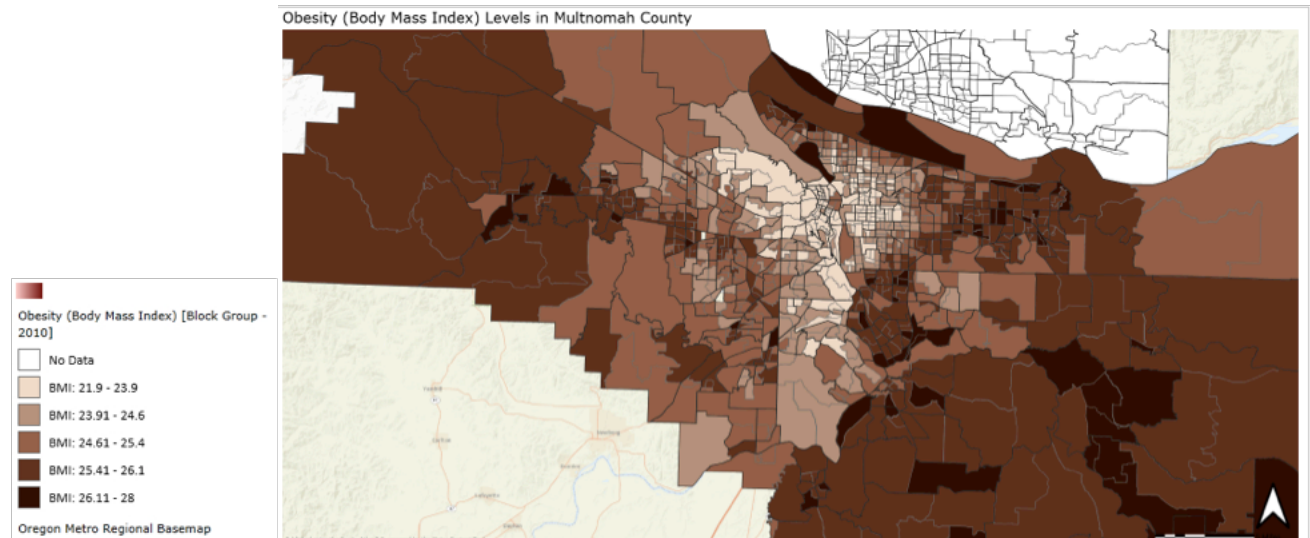**Figure 4.** Multnomah County Equity Atlas - % with Diabetes per Census Tract

Figure 5. Multnomah County Equity Atlas - Obesity Levels per Census Tract

Healthy Body Weight

of supermarkets and grocery stores, closely followed by the Northwest District. In both of these areas, residents must travel approximately 0-½ of a mile to access fresh food.

The Killingsworth/Interstate area has the highest concentration of typical sources of unhealthy food, followed by the Jade District. Residents of these areas must travel approximately 0-½ of a mile to these sources. The Northwest District has a much lower concentration of unhealthy food sources, as its residents must travel over a mile to access them.

Study Area	Proximity to Super-markets and Grocery Stores	Proximity to liquor stores/convenience stores/fast-food outlets
Jade	3.88	4.01
Killingsworth/ Interstate	4.73	4.75
Northwest	4.16	1.52

Source: CFL Equity Atlas

Table 3. Study area proximity to healthy and unhealthy food options

Area Represented	Description	Status	Oregon Overall
Multnomah County	Obesity (BMI): Weight classification by Body Mass Index (BMI)	Obese (BMI 30.0-99.8) - 22.8%	Obese (bmi 30.0-99.8) - 26.5%
Multnomah County	% living with diabetes	8%	9%
Multnomah County	Limited access to healthy foods	% Limited access - 4%	% Limited Access - 5%

Source: Centers for Disease Control

Healthy Body Weight

Assessment:

Obesity and Access to Healthy Retail

The relationships between neighborhood food environment, nutrition, and obesity are well-established in the literature. While these relationships are often complex in nature, researchers are generally in agreement that proximity to grocery stores and supermarkets plays a key role in determining the health status of neighborhoods in terms of obesity and obesity-related conditions. People who live in close proximity to grocery stores are less likely to be obese than those who do not. The presence of supermarkets within neighborhoods is associated with lower prevalence of obesity and overweight status among neighborhood residents. A recent systematic review of studies that geospatially analyzed the relationship between community nutrition environment and obesity in the United States corroborates this evidence, as over 80% of all studies included in the review found positive associations.

Low-income neighborhoods are more likely than affluent neighborhoods to be characterized as 'food deserts,' which are described as areas with little or no access to foods needed to maintain a healthy diet and that are served instead by numerous fast-food restaurants and/or convenience stores. Another systematic review of studies

examining the association between food environments and obesity risk among low-income African Americans indicated that lower rates of obesity, overweight, hypertension, and diabetes occur in neighborhoods with higher concentrations of supermarkets. Further, the presence of at least one healthy grocery store option in low-income neighborhoods is associated with a reduction in BMI/obesity risk relative to no food outlets.

Three design elements of the proposal are conducive to expanding access to fresh food markets and grocery stores:

Active ground floor uses

The building height designations in the proposal provide for accommodation of active/commercial ground floor uses, which will create opportunities to develop grocery stores and other healthy food-oriented retail locations.

Affordable housing bonuses

The affordable housing bonuses in mixed use areas will assist in ensuring that low-income populations in particular will benefit from the potential expansion of access to healthy food retail discussed in the preceding section.

Centers overlay zone

This design element places limitations on drive-through developments, which are integral aspects of fast-food outlets.
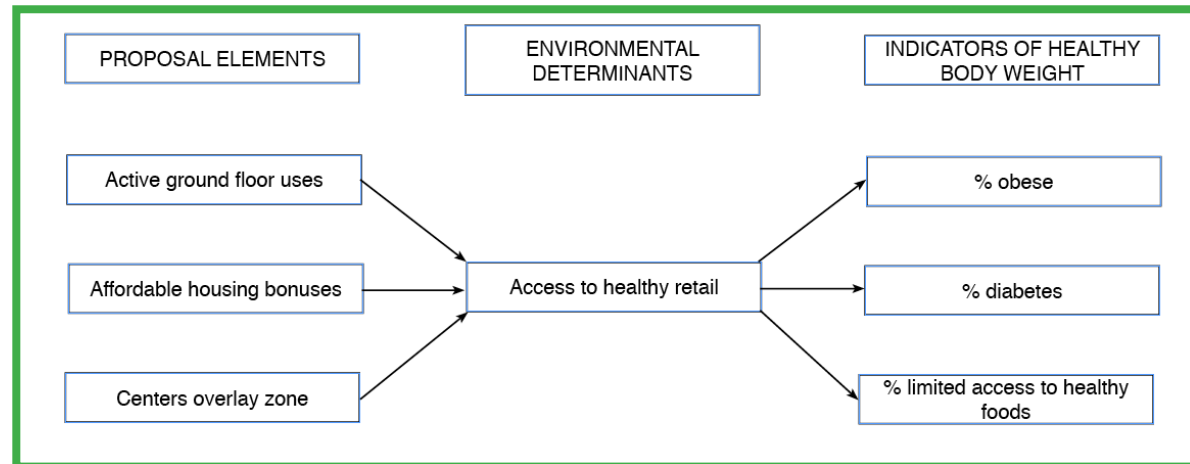

Figure 6. Health pathway diagram relating healthy body weight indicators to MUZ code Elements.

Healthy Body Weight

Impact:

The Lents neighborhood, containing the Jade District, has the lowest concentration of fresh food retail locations, the highest percentage of racial/ethnic minorities, the second highest concentration of fast food restaurants, highest percentage of people living with diabetes, and lowest income per capita among the three study areas. It is likely that this area will experience positive health impacts associated with the three design elements. The Active Ground Floor Uses element will likely increase the concentration of grocery stores and other fresh food options within the area, and the low-income populations in the area will benefit from this increase through the Affordable Housing Bonuses element. The Centers Overlay Zone will limit the number of new fast food restaurants in the neighborhood, further promoting the nutrition profile of the Jade District.

The Humboldt neighborhood, containing the Killingsworth/Interstate District, has the highest concentration of fresh food retail locations, the highest concentration of fast food restaurants, and the second highest percentage of people living with diabetes of the three study areas. This area will likely experience the most significant positive impacts associated with the Centers Overlay Zone, which will limit the further development of fast food restaurants in the area.

The Northwest District has the second highest concentration of fresh food retail locations, the lowest concentration of fast food restaurants, lowest percentage of people living with diabetes, and the highest per capita income of the three study areas. Therefore, it is likely that the design elements of the proposal will have a small to absent impact on the weight status of residents of this area.

Limitations:

As stated in the two cited systematic reviews used as evidence, the majority of studies examining relationships between food environment and obesity are cross-sectional and have differing definitions and uses of terms associated with healthy food retail.

Recommendations:

Establish code bonuses/incentives that explicitly call for healthy retail development, requiring a specific percentage of shelf space alotted to healthy retail items.

Prohibit, rather than limit, the establishment of fast food restaurants in established mixed use zones.

	Magnitude			Direction			Likelihood			Quality of Evidence
	Jade	NW	Inter	Jade	NW	Inter	Jade	NW	Inter	
Active Ground Floor Uses	High	Low	Mod	↑	↔	↔	Δ Δ Δ	Δ	Δ Δ	Strong
Affordable Housing Bonuses	High	Low	Low	↑	↔	↔	Δ Δ Δ Δ	Δ	Δ Δ	Strong
Centers Overlay Zone	High	Low	Mod	↑	↔	↑	Δ Δ Δ Δ	Δ	Δ Δ Δ	Strong

Table 4. Summary table of health impact magnitude, direction, likelihood, and quality of evidence related to healthy body weight.
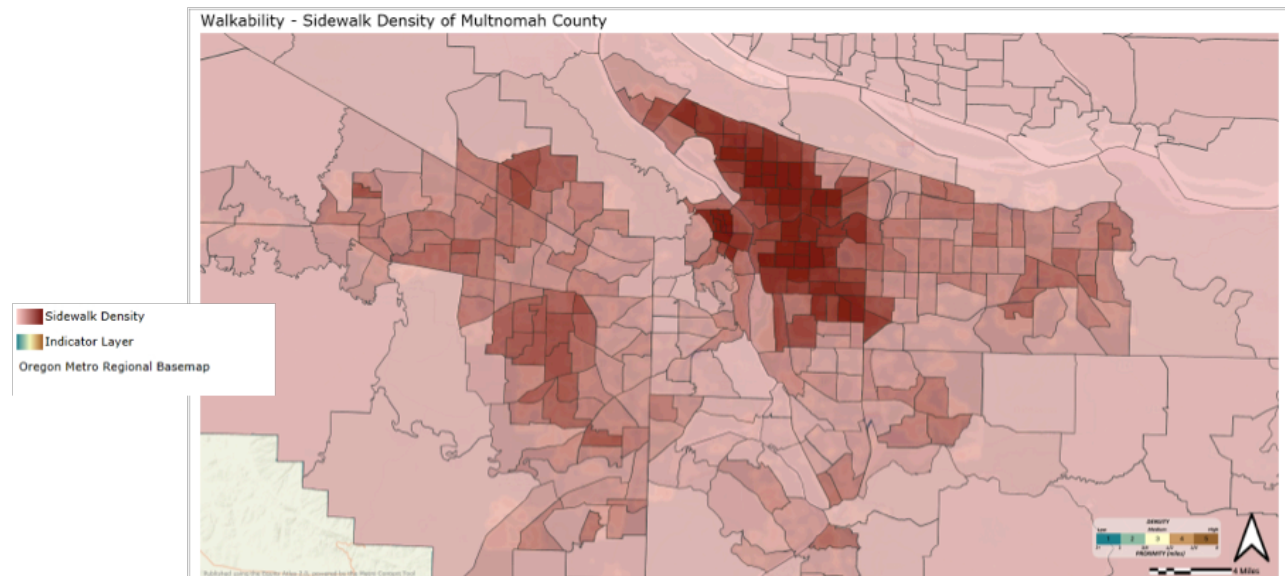
Physical Activity

Baseline:

A significant body of research exists linking regular physical activity with a variety of health benefits across age-groups, including improved cardiovascular health, lower risk of cardiovascular-related disease/cancer, reduced depression, improved cognitive function and better functional health. In contrast, sedentary behavior, too much sitting throughout the day despite meeting recommended physical activity, has been shown to lead to deleterious impacts on fat metabolism, negatively affecting health. There is a wealth of examples that link the built environment to increased physical activity patterns, with urban and regional planning efforts including open space/parks, transportation systems, streetscape urban design, schools, and workplaces all influencing the way communities move.

While 87.2% of Multnomah County residents report participation in a physical activity in the last month, the BRFSS identifies that only 61.1% met the recommended 150 minutes of aerobic activity a week. Beyond these reported measures, several elements of the built environment indicate whether individuals are likely to walk in their environment, accumulating physical activity throughout the day. Availability of connected sidewalk networks encourages more trips by foot. Only

63% of all streets within Multnomah County have a sidewalk on at least one side of the road. Tree canopy along streetscapes provides protection from the elements, a sense of perceived safety, and improved aesthetics of the environment. Only 11% of Multnomah County has sufficient tree coverage.

Area Represented	Description	Status	Oregon Overall
Multnomah County	Physical Activity - Reported 150 Minutes of Aerobic Activity	61.1%	51%
Multnomah County	Access to Sidewalks	63%	N/A
Multnomah County	Tree Canopy	11%	N/A

Source: Centers for Disease Control, Oregon County Health Rankings

Figure 7. Multnomah County Equity Atlas - Sidewalk Density

Physical Activity

Assessment:

Physical activity in the United States has been on a downward spiral in the last several decades. Some studies report that most people fail to meet the recommended amount of physical activity per day. Physical activity is associated with the density and proximity of green features, for example, parks. There is evidence showing that individuals who live within a quarter mile from these green features have a much higher odds of being physically active than those who live a half mile or more from these green features.

It is clear that mixed land use that incorporates greater pedestrian overlay or connectivity enhances physical activity. It has been suggested that it is not merely the availability of parks that increase rates of physical activity, but rather the availability of trees, bushes, gardens, grass and natural settings in these parks that are the positive attributes which attract individuals to these parks. These attributes, which are also defined as green environment, are also associated with walking for recreation. The importance of these green features has been supported by other research focusing at pedestrian overlay. It has been documented that when it comes to retail streetscapes, regardless of the dominance of well-maintained or historic buildings, customers have awarded higher visual quality

ratings to those retail places with full tree canopy.

A significant association between sidewalk availability and an increase in physical activity in neighborhoods has been made. This association is highly enhanced by: proximity of shops to homes or residential areas, bicycle facilities, transit stops, and proximity to less expensive recreational facilities. Other studies have also shown that sidewalk conditions or characteristics such as, if steeply sloped,

have abrupt ending, unevenly paved, and has overgrown weeds, negatively affect an individual's physical activity.

Ground floor uses along the streets such as, "driveways, storage spaces or vacant ground floors" have been shown to be very disadvantageous to public life, as they make the street landscape less attractive for pedestrian activity.
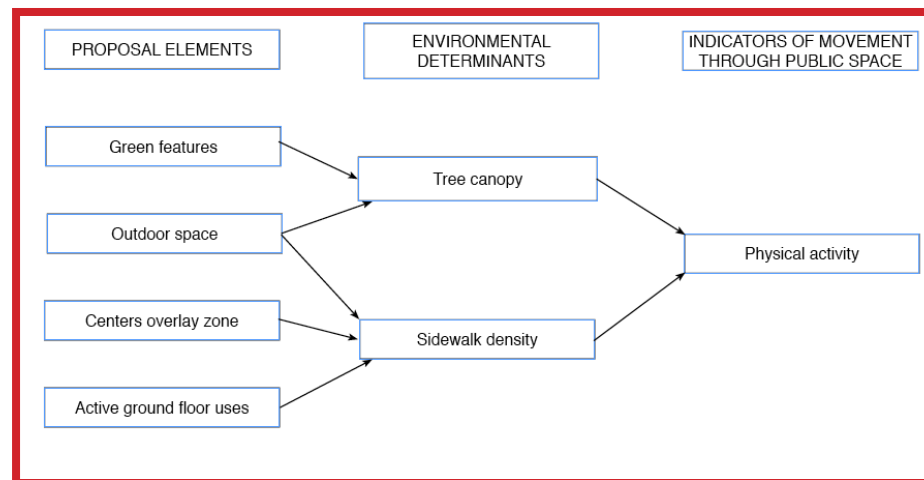
Figure 8. Health pathway diagram relating indicators of movement through public spaces with MUZ code elements.

Physical Activity

Impact:

In our study area, all of the centers in the Northwest district, Jade District and the Killingsworth/Interstate neighborhood fall in between moderate to high in density and proximity to publicly accessible parks. It is expected that these locations would not be negatively impacted health-wise due to parks. In essence, we expect the inhabitants of these neighborhoods to positively benefit in terms of health.

The Jade district and the Northwest districts do not fare very well when tested for the density and proximity to publicly accessible natural areas. Both areas received a score that fell between moderate to low count. The same trend could be seen when testing for the two areas' proximity to recreational facilities. The Killingsworth/Interstate neighborhood tested in the high range. This means the population of Killingsworth/Interstate is not expected to be highly impacted by lack of physical activity since they have a greater number of natural areas as compared to the Jade district and Northwest District. And, the population of the Jade District and Northwest Districts are on the other hand expected to experience negative impacts of lack of physical activity since they do not have enough publicly accessible areas. Looking at the density and proximity to sidewalks in our three study area locations,

the Jade District is the least scoring area, having a moderate number of sidewalks. The Killingsworth/Interstate and Northwest District both score above the moderate score. Assessing these numbers that endeavor to measure the impact on physical activity due to the lack of these factors, we conclude that the Jade district is the most likely to be impacted since they scored generally poorly of these measures. It is expected that this area, Jade District, stand to benefit the most from the proposed mixed land use.

Limitations:

Apart from the studies that show an association between physical activity and green spaces, there are those showing no such association. These mixed findings are thought to emanate from the type of methods used to gather the data. Most of these studies are from cross-sectional studies where participants self-report. Self-reporting is thought to contribute to these mixed findings.

Recommendations:

To promote community health, the planning and design of neighborhood open spaces needs to place importance of walkable green spaces.

Streets that are not vital links in the traffic network should be selected for traffic calming and transformed into usable open space with seating opportunities.

	Magnitude			Direction			Likelihood			Quality of Evidence
	Jade	NW	Inter	Jade	NW	Inter	Jade	NW	Inter	
Centers Overlay Zone	High	Low	Mod	↑	↔	↑	ΔΔΔ	Δ	ΔΔΔ	Moderate
Active Ground Floor Uses	High	Low	Low	↑	↔	↔	ΔΔΔ	Δ	ΔΔΔ	Moderate
Outdoor Space	Mod	Low	Low	↑	↑	↑	ΔΔΔ	Δ	Δ	Moderate
Green Features	Mod	Low	Low	↑	↑	↑	ΔΔΔ	Δ	Δ	Moderate High

Table 5. Summary table of health impact magnitude, direction, likelihood, and quality of evidence related to movement through public spaces.

Neighborhood Social Capital

Baseline:

Social capital is defined as the social networks and interactions that inspire trust and reciprocity within a community. Social capital has been linked to population health through shaping access to network based resources, the positive psychosocial effects of social cohesion, and the ability of residents to mobilize to undertake collective action to protect themselves against harmful impacts. The relationship between social capital and aspects of the built environment has been explored in depth in the literature. Social capital has been found to be closely associated with neighborhood walkability, which is tied to aspects of neighborhood features, such as walkability and mixed-use development .

While Multnomah County has a greater number of membership associations per 10,000 population than Oregon overall, a higher percentage of adults report experiencing inadequate levels of social support than those of Oregon overall.

Area Represented	Description	Status	Oregon Overall
Multnomah County	Social associations: Number of membership associations per 10,000 population	Association rate: 11.2	Association rate: 10.5
Multnomah County	Social support: How often do you get the social and emotional support you need?	% Inadequate social support: 17%	% Inadequate social support: 16%

Source: Oregon County Health Rankings

Study Area	Walkability - Sidewalk Density	Proximity to Arts and Culture Institutions	Proximity to Civic and Community Organizations	Proximity to Publicly Accessible Parks
Jade District	2.92	2.92	3.85	4.42
NW District	4.05	4.48	4.41	4.04
Killingsworth/ Interstate	4.95	4.75	4.74	4.85

Table 6a. CFL Equity Atlas proximity ratings to amenities.
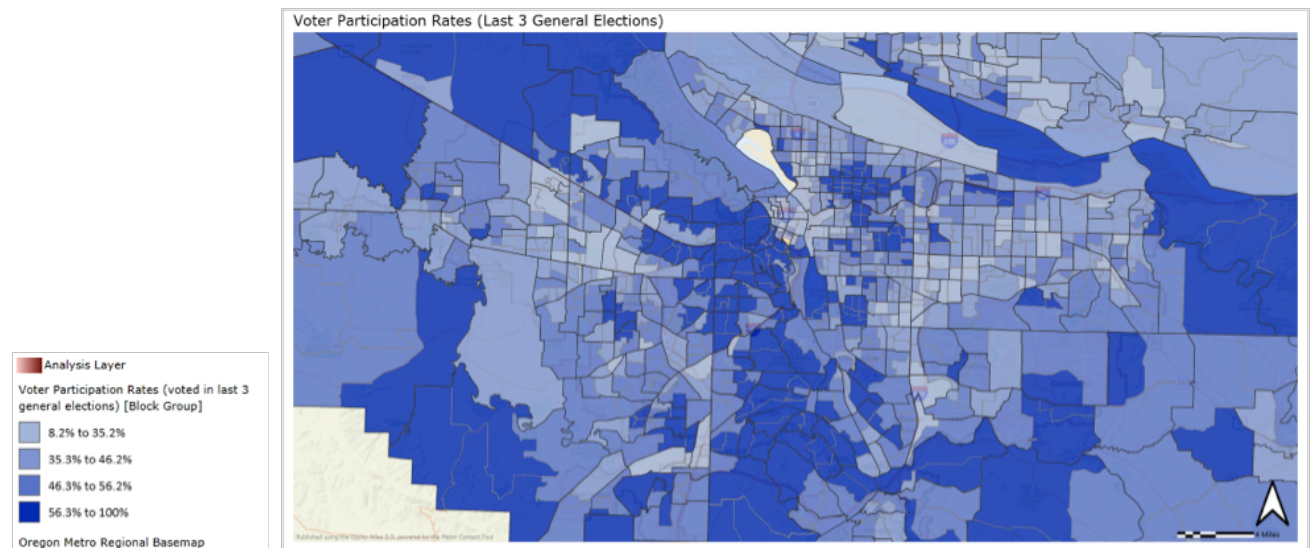

Figure 9. Multnomah County Equity Atlas · Voter Participation Rates

Neighborhood Social Capital

Assessment:

While the complex relationships between social capital and the built environment have not been fully elucidated, those who have investigated these relationships are generally in agreement that aspects of mixed-use development enhance neighborhood social capital. Social capital is positively correlated with neighborhood walkability, which is enhanced through these aspects. Specifically, mixed-use development, through the placement of residential, retail, and commercial uses close in proximity to one another, is thought to encourage people to walk more, spend more time in their neighborhoods and less time in their cars, and can provide opportunities for people in the community to interact more on an informal basis. Neighborhoods characterized by sprawl, on the other hand, incentivize the use of cars over active transportation options to meet daily needs.

Pedestrian-Oriented Overlay & Active Ground Floor Uses

Neighborhoods in which residents live in close proximity to their daily amenities, such as grocery stores, have higher levels of social capital than those in which residents must drive out of their neighborhoods to gain access to their daily amenities. When amenities are placed in close proximity to residences, people are also likely to spend more time in their own neighborhoods, and are more likely to know and trust their neighbors.

Green Features & Publicly Accessible Outdoor Space

Parks and other green features, such as tree canopy, create opportunities for social interaction at the street level by increasing use of the streets and by making streets a more pleasant place for socializing. The concentration of parks within a neighborhood has been found to be positively associated with neighborhood social life. Moreover, independent positive relationships have been found between proximity to parks and collective efficacy, as well as relationships between green space, less loneliness, and enhanced social support. A direct relationship has also been found between sense of community and neighborhood residents' use of parks. Notably, these positive relationships are particularly consistent among young people, the elderly, and low-income people in urban environments, indicating the importance of green space for populations that have less access to mobile transportation and less parks in close proximity to their neighborhoods.

Bonuses for community benefits

The provision of bonuses/incentives for the development of community benefits encourages developers to invest in types of development that promote social capital, such as community centers and places devoted to arts and culture. These services and amenities provide opportunities for daily interaction among community members, leading to greater familiarity among neighbors, more trust, and a greater sense of connection.
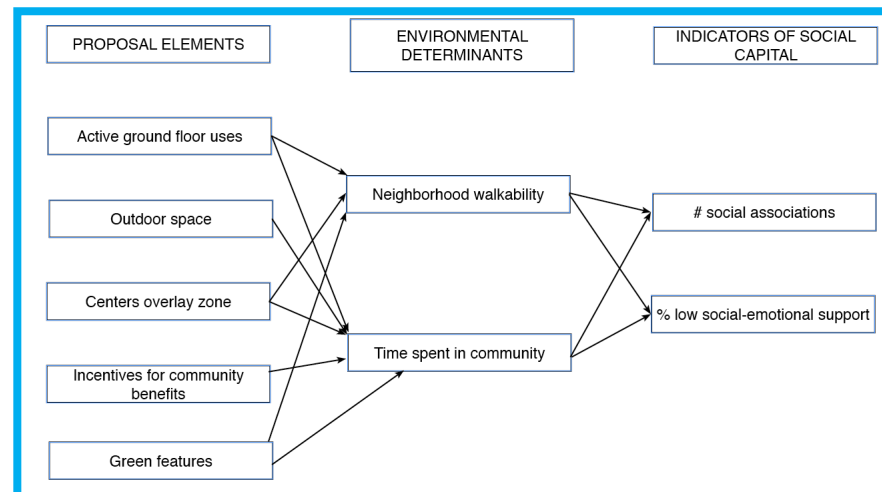

Figure 10. Social capital health pathway diagram related to MUZ code

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Neighborhood Social Capital

Impact:

Low-income neighborhoods tend to have fewer health-promoting services and amenities, such as community centers and grocery stores. As indicated in the Current Conditions section above, the Jade District ranks lowest among the three study areas in proximity to arts and culture institutions, civic organizations, and walkability. Therefore, this area will likely experience the highest increase in social capital associated with the proposal's following design elements: Centers Overlay Zone, Active Ground floor uses, Incentives for Community Benefits. Conversely, the Jade District ranks highly in terms of proximity to parks, and thus will likely not experience a substantial increase in social capital associated with the Green Features and Publicly Accessible Outdoor Space elements of the proposal.

The Northwest District and the Humboldt Neighborhood, which contains the Killingsworth/Interstate area, currently rank highly in terms of proximity to arts and culture institutions, civic organizations, walkability, and proximity to parks. Therefore, these areas will likely experience minor improvements in social capital associated with the design elements of the proposal.

Limitations:

Some conflicting evidence exists in the relationship between social capital and features of mixed-use development. For example, DeToit et al. found that differing sociodemographic factors of populations who choose to live in mixed-use areas rather than car-dependant areas explained the association between mixed-use development and social capital. French et al. found that participants' perception of their neighborhoods explained the relationship between sense of community and features of mixed-use development

The overall strength of the evidence supporting the positive associations between social capital and features of mixed-use development is relatively weak. We did not find any systematic reviews or meta-analyses that examined such associations, and this is likely due to the wide range of definitions and concepts used in exploring them. As typified in the assessment, social capital has various constructs, definitions, and similar concepts. While some have developed a slightly standardized method for measuring social capital, work in this field is still relatively new, and many have not.

Recommendations:

Arts/culture institutions and civic organizations should be formed as a reflection of existing cultures in each proposal area, but especially the Jade District. The Bonuses for Community Benefits element of the proposal should be updated to state this.

Establish code requirements that publi open space developed to meet bonus standards must be truly publicly accessible.

Enhance walkability measures (centers overlay zone)

	Magnitude			Direction			Likelihood			Quality of Evidence
	Jade	NW	Inter	Jade	NW	Inter	Jade	NW	Inter	
Centers Overlay Zone	High	Low	Mod	↑	↔	↑	ΔΔ ΔΔ	Δ	ΔΔΔ	Moderate
Active Ground Floor Uses	High	Low	Mod	↑	↔	↑	ΔΔ ΔΔ	Δ	ΔΔΔ	Moderate High
Outdoor Space	Mod	Low	Low	↔	↔	↔	Δ	Δ	Δ	Moderate High
Green Features	Mod	Low	Low	↑	↔	↔	Δ ΔΔ	Δ	Δ	Moderate
Community Benefit	High	Low	Mod	↑	↔	↑	ΔΔ ΔΔ	Δ	ΔΔΔ	Moderate

Table 6b. Summary table of health impact magnitude, direction, likelihood, and quality of evidence related to social capital.

Air Quality

Baseline:

Air pollution has been connected to detrimental health effects in humans. This is of particular concern in large cities where there are more sources of air pollution. One of the many concerns is that fine particulate matter is linked to wheezing, asthma, and respiratory infections. Some studies have shown that a reduction in air pollution has lead to a significant change in life expectancy.

There is evidence outlining that land use policy changes can alter people's travel behaviors. Some policy changes that separate residential areas from commercial areas can lead to an increase vehicle miles traveled as people travel long distances to get to their place of employment. Vehicle miles traveled is calculated as the total miles traveled by all motor vehicles in a specified time period on particular highways. The increase in vehicle miles traveled have the potential to increase air pollution and greenhouse gas emission. Therefore these studies encourage mixed land use policies in order to reduce vehicle miles traveled.

Some studies have shown that urban trees and vegetation are capable of removing air pollutants. One study showed that when Portland had a 42% tree cover, there was about a 1% improvement in particulate matter as a result.

Area Represented	Description	Status	Oregon Overall
Multnomah County	Air Particulate Matter (average daily density of PM2.5)	9.7	8.9
Multnomah County	Vehicle Miles Traveled	2,895,200,000	543,994,444
Multnomah County	Air Quality (Number Toxins with Levels Above Benchmark)	14	11.8

Source: *Oregon County Health Rankings, Oregon Department of Transportation, Department of Environmental Quality*
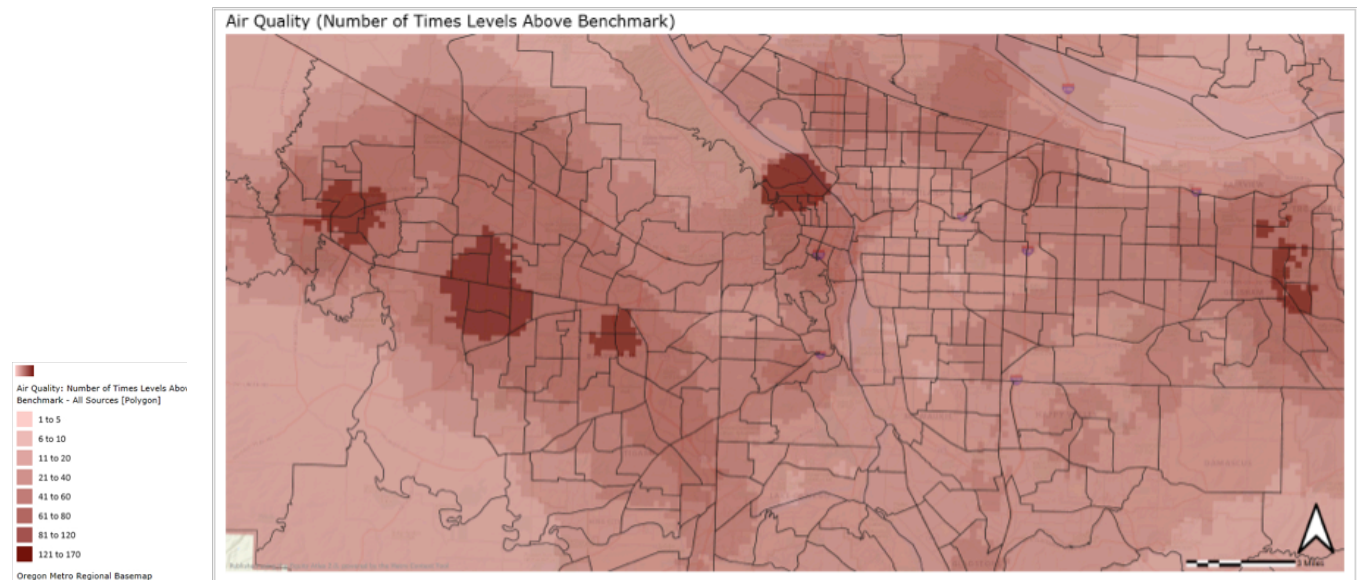

**Figure 11.** Multnomah County Equity Atlas · Air Quality

Air Quality

Assessment:

Reducing vehicle use is positively associated with the reduction of air pollution. Reducing vehicle trips and increasing active travel, for example bicycling and walking, reduces the amount of particulate matter emitted by vehicles. In urban areas, vehicles are the main culprit for increased particulate matter concentrations. The elimination or reduction of particulate matter from the environment is of pivotal importance since there is evidence that no safe threshold exists. Mixed land use as pedestrian oriented urban planning, is very beneficial because it endeavors to increase the density and proximity to walkable areas, provide easy access to transit facilities, creating biking lanes, providing amenities that invigorate public life.

Although there is mixed evidence on this aspect, some studies have shown that shifting from vehicle use to any form of active travel reduces exposure to vehicle particulate matter due to reduced times in proximity to vehicles. This shift is important in reducing the amount of vehicle miles traveled and also the amount of time air pollution levels are above benchmark. Shared parking is another mechanism that helps to bring the number of vehicle miles traveled and levels above benchmark down. Parking lots, especially those that are underused disrupt the streetscape of what could be active and pedestrian-oriented neighborhoods or open space. Some studies have shown that the planting of vegetation in urban street canyon areas has the potential to reduce particulate matter concentrations by more than half. The planted vegetation acts as an air pollution sieve whose benefits will continue beyond the elimination of the traffic source.
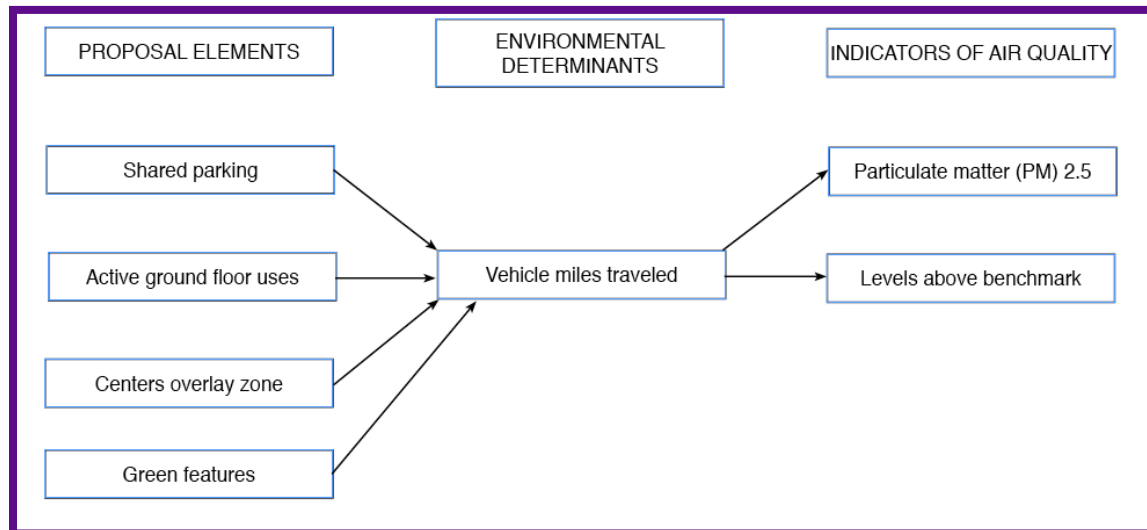
Figure 12. Air quality health pathway diagram relating to MUZ code elements.

Air Quality

Impact:

Assessing the three locations in our study area, it is clear that all of them have moderate to less than moderate transit access. This might be an area that forces the population of these locations to drive more in order to get to their destination. The three locations nonetheless scored very well in terms of proximity to key retail facilities, with all registering a score above the moderate count. There is difficulty in gauging the ultimate impact that air pollution will have in the different neighborhoods of our study area. There is evidence that exercising outside exposes individuals to air pollution. Though having green and open spaces encourages physical activity, the consequence is that as people go outside to enjoy these amenities, they will be exposed to the polluted air in the process.

Limitations:

There is limited literature explaining the relationship between air pollution and shared parking. Though there is evidence that green spaces are important in reducing the amount of polluted air in the atmosphere, there is lack of information on the effective number or quantity of these green spaces to achieve this advantage.

Recommendations:

In canyon streets, some traffic lanes should be converted into bike lanes. Sidewalk width requirements should be extended.

Shared and paid parking elements should be integrated into the Center Overlay element, and considered in all the study area neighborhoods.

	Magnitude			Direction			Likelihood			Quality of Evidence
	Jade	NW	Inter	Jade	NW	Inter	Jade	NW	Inter	
Centers Overlay Zone	High	Low	Mod	↑	↔	↑	ΔΔΔ	Δ	Δ	Moderate
Active Ground Floor Uses	High	Low	Mod	↑	↔	↑	ΔΔΔ	Δ	ΔΔΔ	Moderate
Shared Parking	Mod	Low	Mod	↔	↔	↔	ΔΔΔ	Δ	Δ	Weak
Green Features	Mod	Low	Low	↑	↓	↑	ΔΔΔ	Δ	Δ	Moderate High

Table 7. Summary table of health impact magnitude, direction, likelihood, and quality of evidence related to air quality.

Displacement

Baseline:

The displacement of residents from their original homes is becoming of increasing concern as housing pressures rise and more newcomers move to the city. Displacement occurs through gentrification, when neighborhoods have valuable qualities but remain at low rent and land prices. This gap between actual and potential value attracts higher income households and investors, which slowly begins to raise up the prices as well as cater the developing amenities to them. This process eventually drives out the households of lower-income or color to areas with cheaper rent prices, and often less desirable neighborhood characteristics.

We will assess anticipated changes in median household income, percentages of renters versus homeowners, and percentages of populations of color (and growth among those claiming 'white only') as indicators of displacement. Affordable housing bonuses policy levers may provide health-promoting benefits for populations at risk of displacement in the study areas. Conversely, potentially increasing property values resulting from the proposed project in the study areas may further drive gentrification and displacement.

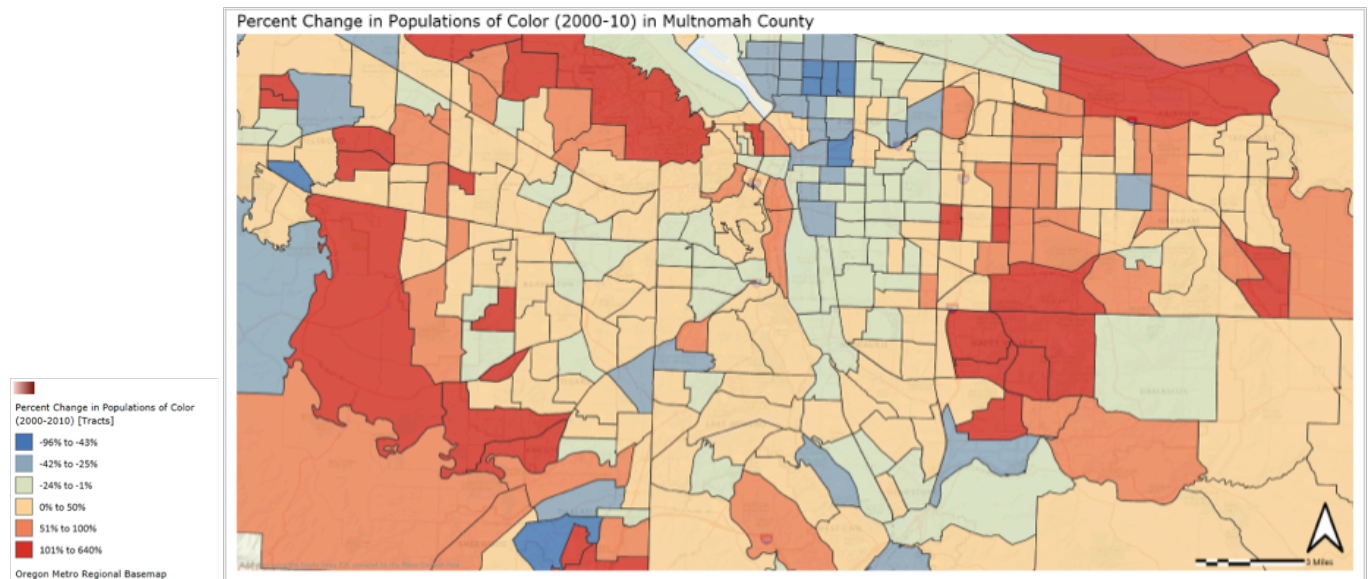| Area Represented	Description	Status	Oregon Overall
Jade District	Median Household Income	$40,822	$50,229
Killingsworth / Interstate		$35,525	
Northwest District		$38,870	
Jade District	% Renter-Occupied Housing Units	56.8%	36.2%
Killingsworth / Interstate		56.6%	
Northwest District		77.2%	

Source: *City of Portland*

Figure 13. Multnomah County Equity Atlas · Percent Change in Populations of Color

Displacement

Assessment:

There is an acute awareness regarding gentrification and displacement within Portland. With a history of redlining within the city and clear geographic demarcations that separate income levels and racial groups, there is a constant weariness among historically marginalized populations that investment in improving neighborhood amenities and services will draw upperclass residents and change the character of the neighborhood. The displacement of residents seeking affordable housing is a public health and social justice issue, because displacement tends to affect lower-income and racial/ethnic minority residents in an area.

Design Elements

Urban design initiatives have been criticized for leading to social exclusion through increasing development costs and diverting public funds and investments towards higher order projects focused on aesthetics rather than provision of needed services such as education or social services.

A foundational element of mixed-use development is that with the greater density of housing and variety of unit types, there is likely to be a greater number of affordable housing units than a low-density neighborhood. However, in the Portland region the rate of affordable housing unit growth has lagged disproportionately in comparison to the growth of mixed use development.

The improved neighborhood quality of mixed use development is also associated with increases in property values of nearby housing units. Song and Knaap identified that mixing neighborhood scale commercial land uses near single family residential housing increased the housing property values within Washington County, OR. They further linked that the closer a house is to a park space or neighborhood store, especially if they are within walking distance, the more the house would sell for. This process is occurring at an accelerated rate in Portland, which had the highest number of census tracts "gentrify" in the nation as defined by Freeman's methodology, which uses increase in median income and percentage of residents with bachelor's degrees to gauge this process. Increases in housing costs often leads to the inability of current residents to afford rent. This creates pressure on residents in developing areas to move away to more affordable neighborhoods.

Even before relocation, the stress of financial burden due to unaffordable housing costs has been shown to negatively health outcomes As a result, these groups also experience an additional disadvantage of increased distance from the resources of the inner city (e.g. transit and social services) and worsening social support due to severance of community connections.

Bonuses for Community Benefits and Affordable Housing:

When enforced and implemented, affordable housing initiatives are effective in preserving communities and promoting a diversity of residents and mix of incomes. While community benefit bonuses are meant to be win-wins for both developers and the community, it is important that the bonuses implemented reflect the true demographics, needs, and desires of the neighborhood. What one community deems as a flourishing local economy area that provides amenities may not meet the standards of a different community in the same area. This is exemplified in the North Portland Alberta District, where the spread of creative class and bohemian stores and public art spaces was viewed as a community asset to the white, college educated groups in the area, while the longtime African American residents tended to disapprove of the neighborhood change. The bonuses for affordable commercial space in MUZ project show promise for mitigating displacement of local mom and pop grocery and corner stores to avoid their displacement.

Displacement

Impact:

The Lents Neighborhood encompassing the, Jade District, has seen significant growth of African American, Asian, and Native Hawaiian/Pacific Islander populations with 194.8%, 76.7%, and 82.2% increases respectively between 2000 and 2010. The neighborhood overall in the same time period has seen a 16.8% increase in renter occupied units. As an area identified as "susceptible" according to the Bates Typology, the Jade District is the most vulnerable of the study areas to displacement through implementation of the MUZ code. With the largest minority population, it has the it faces the largest impact though the most potential residents to be displaced. There also are strong cultural communities in the area, predominantly Asian, whose separation and dispersal would lead to significant loss in social cohesion.

The Northwest District has seen the least drastic demographic changes of three study areas, with decreases in African American (22.9%) and American Indian populations (27.9%) and an increase in those identifying as two races of 64.8%. There has been a 2.6% decrease in the number of renter occupied units the District. As a district defined as a continued loss area, the implementation of MUZ project most likely would have little effect regarding displacement of existing populations.

The Humboldt Neighborhood has seen the greatest demographic influx, with a 56.3% increase in White populations and a 40.5% decrease in African Americans. This area also has had the greatest increase (24.6%) of renter occupied units of the three study areas. As an area defined as "dynamic" on the Bate's Gentrification typology, there is risk of continued displacement and racial/economic transition that could be accelerated due to MUZ project implementation and an associated rise in property values.

Limitations:

Few studies have been conducted that provide strong evidence on elements of development that lead to diaplacement. Furthermore, it is difficult to forsee how well affordable housing requirements will be enforced, limiting assessment reliability.

Recommendations:

Prioritize the development of "community impact zones" in neighborhoods affected by the new MUZ code that are classified as "susceptible" to gentrification. Involve the community to set priorities of inclusive and equitable development.

Provide further incentives for the prioritization of minority or women owned-businesses in affordable commercial space provisions.
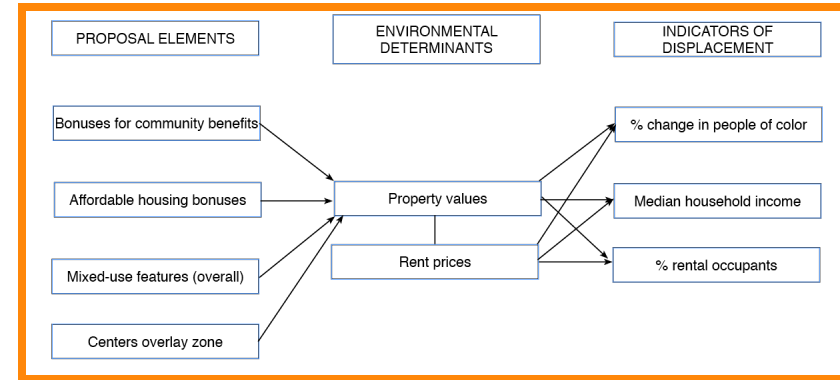
Figure 14. Indicators of displacement health pathway diagram related to MUZ code elements.

	Magnitude			Direction			Likelihood			Quality of Evidence
	Jade	NW	Inter	Jade	NW	Inter	Jade	NW	Inter	
Community Benefits	High	Low	Mod	↓	↔	↓	ΔΔΔ	Δ	ΔΔ	Weak
Mixed-Use Design Features	High	Low	Mod	↑	↔	↑	ΔΔΔ	Δ	ΔΔ	Moderate
Centers Overlay Zone	Mod	Low	Mod	↑	↔	↔	ΔΔΔ	Δ	Δ	Weak

Table 8. Summary table of health impact magnitude, direction, likelihood, and quality of evidence related to displacement.

Establish code requirements that affordable housing built to meet bonus standards must be within the area zoned for mixed-use and within a 1/4 mile of the original development project.

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Recommendation Summary

Summary + Rationale

Overall, evidence from scientific literature on the various relationships between features of mixed-use zoning and health-related outcomes is significant and positive. The design elements, bonuses/incentives for community benefits, and green features in the Portland Mixed-Use Zoning plan are likely to improve the health of current and future residents of the Jade District, Killingsworth/Interstate, Northwest District, and other proposed areas.

Our recommendations serve as enhancements to the current version of the plan. The primary focus of our recommendations is the enhancement of the bonuses/incentives for community benefits to ensure that low-income and other potentially vulnerable populations fully experience the health benefits associated with the plan. We also recommend that the plan expand upon its health-promoting elements through enhancements of elements associated with increased walkability, increased active transportation, decreased concentration of fast food outlets, and decreased incentives for driving.

The following recommendations have been made for the proposed MUZ code:

- **To promote community health, the planning and design of neighborhood open spaces needs to place importance of walkable green spaces.**
- **Streets that are not vital links in the traffic network should be selected for traffic calming and transformed into usable open space with seating opportunities.**
- **Establish code bonuses/incentives that explicitly call for healthy retail development, requiring a specific percentage of shelf space alotted to healthy retail items.**
- **Prohibit, rather than limit, the establishment of fast food restaurants in established mixed use zones.**
- **Arts/culture institutions and civic organizations should be formed as a reflection of existing cultures in each proposal area, but especially the Jade District. The Bonuses for Community Benefits element of the proposal should be updated to state this.**
- **Establish code requirements that publi open space developed to meet bonus standards must be truly publicly accessible.**
- **Enhance walkability measures in the centers overlay zone requirements.**

- **In canyon streets, some traffic lanes should be converted into bike lanes. Sidewalk width requirements should be extended.**
- **Shared and paid parking elements should be integrated into the Center Overlay element, and considered in all the study area neighborhoods.**
- **Prioritize the development of "community impact zones" in neighborhoods affected by the new MUZ code that are classified as "susceptible" to gentrification. This provides a mean to involve the community to set priorities of inclusive and equitable development.**
- **Establish code requirements that affordable housing built to meet bonus standards must be within the area zoned for mixed-use and within a 1/4 mile of the original development project.**
- **Provide further incentives for the prioritization of minority or women owned-businesses in affordable commercial space provisions.**

Magnitude + Direction of Health Impacts in Jade District

Code Element	Healthy Body Weight	Physical Activity	Social Capital	Air Quality	Displacement
Active Ground Floor Uses	High ↑	High ↑	High ↑	High ↑	
Outdoor Space		Mod ↑	Mod ↔		
Green Features		Mod ↑	Mod ↑	Mod ↑	
Community Bonuses	High ↑		High ↑		High ↓
Centers Overlay Zone	High ↑	High ↑	High ↑	High ↑	Mod ↓

Magnitude + Direction of Health Impacts in Northwest District

Code Element	Healthy Body Weight	Physical Activity	Social Capital	Air Quality	Displacement
Active Ground Floor Uses	Low ↔	Low ↔	Low ↔	Low ↔	
Outdoor Space		Low ↑	Low ↔		
Green Features		Low ↑	Low ↔	Low ↔	
Community Bonuses	Low ↔		Low ↔		Low ↔
Centers Overlay Zone	Low ↔	Low ↔	Low ↔	Low ↔	Low ↔

Magnitude + Direction of Health Impacts in Interstate/Killingsworth

Code Element	Healthy Body Weight	Physical Activity	Social Capital	Air Quality	Displacement
Active Ground Floor Uses	Mod ↔	Low ↔	Mod ↑	Mod ↑	
Outdoor Space		Low ↑	Low ↔		
Green Features		Low ↑	Low ↔	Low ↑	
Community Bonuses	Low ↔		Mod ↑		Mod ↓
Centers Overlay Zone	Mod ↑	Mod ↑	Mod ↑	Mod ↑	Mod ↓

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