



**TRANSPORTATION  
NETWORK COMPANIES  
POTENTIAL IMPACT ON  
HEALTH IN MULTNOMAH  
COUNTY**

*A Rapid Health Impact Assessment*

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## Executive Summary

This rapid, desktop Health Impact Assessment (HIA) was conducted over the course of 10 weeks during the Portland State University Spring Term by two graduate students enrolled in Health Impact Assessment through the Toulan School of Urban Studies and Planning. The HIA looks at potential health impacts of the legalization of Transportation Network Companies and proposed regulation.

The HIA began with an assessment of baseline conditions including a review of the policy environment surrounding current transportation options in Multnomah County as well as usage and rates of transit across the County. Demographics of the County population as well as disease patterns related specifically to the assessed health outcomes are reported. The three health outcomes assessed included the following:

**Employment:** This outcome includes job or income generation or loss, as well as an assessment of how positive and negative impacts will be patterned across the Portland population.

**Traffic:** This outcome includes potential effects on traffic-related congestion, air pollution and accident/injury rates in the city of Portland.

**Citywide access:** This outcome includes potential improvements in Portland residents' access to city amenities, resources and services, barriers to access, and how improvements and barriers are distributed across the population.

Based on our literature-centered assessment, TNC legalization and regulation is likely to have the following impacts:

- Improve employment and income for drivers who sign up to participate
- Increase precarious employment and working hours for TNC drivers
- Decrease employment for traditional drivers
- Affect air pollutant levels (direction unclear)
- Affect traffic congestion (direction unclear)
- Improve access to services and resources for TNC users
- Decrease use of active transportation by TNC users

Table 1. Strength and Direction of Health Impact from TNC Regulation

Health Determinant	Health Outcome	Health Impact	Strength of Evidence
<b>Employment Impacts</b>			
Decreased employment (traditional drivers)	Mortality	-	***
	CVD	-	***
Increased employment/income (TNC drivers)	Mental Health	+	*
Increase in precarious employment (TNC Drivers)	Mental Health	-	**
Increase in working hours (TNC drivers)	Weight gain	-	*
	Unhealthy behaviors	-	*
<b>Traffic Impacts</b>			
Increased air pollutants	Asthma	--	***
	CVD	--	***
Decreased air pollutants	Asthma	++	***
	CVD	++	***
Increased Traffic congestion	Traffic injury/death	--	**
Decreased Traffic congestion	Traffic injury/death	++	**
<b>Citywide Access Impacts</b>			
Increased access to grocery stores	Obesity	-	***
	CVD	-	***
Increased access to physical activity	Obesity	+	***
	CVD	+	***
Increased access to jobs	See effects of increased employment/income	-	No direct evidence
Decrease in active transportation	Obesity	-	**
	CVD	-	**

Direction of Health Impact

+++/++/+

High/Moderate/Low magnitude of improvements in health or reductions in illness

---/--/-

High/Moderate/Low magnitude of reductions in health or increases in illness

Strength of Evidence

\*\*\*/\*\*/\*

Strong association/moderate association/weak association

To ensure that negative health impacts of TNCs are mitigated while positive health impacts are enhanced, we recommend the following actions to the City of Portland and Multnomah County:

### Employment and Income

- Partner with traditional taxi companies to assess strategies to mitigate negative employment impacts on traditional drivers.
- Include language in the regulation policy to enhance or enforce positive impacts on Uber drivers, such as ensuring that they are paid a fair wage or placing limitations on wage fluctuation.
- Monitor impacts on employment in the City of Portland and Multnomah County.

### Traffic Effects

- Mitigate potential increases in traffic accidents (for example, by requiring a driving test or additional training for future TNC drivers).
- Regulate vehicle types/emissions tests for TNC drivers to reduce the likelihood of significantly increasing vehicle emissions.
- Monitor traffic accidents and air pollution levels in the City of Portland.
- Tax TNC participants, in order to ensure continued support for road maintenance and other modes of transportation.

### City Accessibility

- Mitigate potential “holes” in access (e.g. incentivize drivers to take routes in outer Portland or regulate vehicles available for populations with disabilities).
- Include language in the policy to enhance benefits to accessibility; for example:
  - Required lower rates during business hours (when people might use TNC drivers to access services, grocery stores, etc.)
  - Incentivize cars with bike racks, to promote active transportation
- Monitor impacts to city access post-regulation.

## Introduction and Report Overview

This Health Impact Assessment (HIA) looks at the potential health impacts of on-demand ride services, known as transportation network companies (TNC) in Portland, OR. These services are online platforms developed by companies such as Uber, Lyft, and SideCar, which allow passengers to “hail” rides from a pool of drivers that use their personal vehicles. This is a new business model that expands upon traditional taxicab services, allowing for private individuals to sell rides to urban customers.

The upcoming plan to implement regulation and legalization of TNCs in the Portland Metro area has unique implications for the for-hire transportation systems currently in place. The current draft regulations include the following requirements for a potential crowd-sourced taxi system:

- Allow city inspection of participating vehicles
- Implement driver background checks, which would ban drivers with recent felonies or high rates of traffic violations
- Require a certain percentage of vehicles be equipped for wheelchair accommodation
- Require drivers to complete a training on driver safety and customer service
- A city-imposed fee on taxi revenue
- Ban surge pricing during city-wide emergencies

This policy has potential to affect many groups in Portland in a variety of ways. These groups include potential Uber or Lyft drivers, potential consumers of TNC services, current for-hire taxi drivers and companies, other drivers who will be “sharing the road” with Uber or Lyft participants, as well as those who live and work in close proximity to the streets traversed by these companies.

This policy has been prominent in the news media, in part due to protests by the traditional taxi industry, and the questionable legal practices of Uber who faces lawsuits from jurisdictions across the country<sup>1</sup>. Because the costs and benefits of this policy on Portland residents is clearly important to many constituents, the timing was right to conduct further investigation into the potential health effects of this policy. Further, because the policy has many potential health implication, the project team elected to conduct an HIA. HIA is a structured decision-support practice to characterize the anticipated health effects, both adverse and beneficial, of societal decisions including projects, plan, programs and policies undertaken by government or private sector. HIA

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<sup>1</sup> Weber, H. (2014, May 8). As Uber battles 13 lawsuits, cabbies & state agencies are out for blood (update). Venture Beat.

makes recommendations for health-attentive policy and project design and may lead to more health responsive decisions<sup>2</sup>.

The project team selected TNC regulations as a policy that met screening criteria for an HIA. The following factors supported the conduct of an HIA:

- The proposed policy affects residents and there is potential for disparate impact;
- There is potential for the policy to have several health effects;
- There is interest broadly (news media) and politically (regulating jurisdictions) in researching the impacts of TNCs;
- There is little available research currently available;
- There is sufficient time to conduct a rapid HIA to support decision-making at the City of Portland.

This HIA has the following objectives:

- Provide the City of Portland TNC decision makers with information about the potential health impacts of the current recommended regulations that will be useful in determining modifications to mitigate risk and enhance public health;
- Follow the minimum standards of HIA;
- Document baseline health factors and related conditions in targeted area;
- Make evidence-based judgments of the magnitude, direction, and certainty of potential health impacts of proposed TNC regulations;
- Recommend policy modifications, decision alternatives, or other mitigations to address potential adverse health impacts, or enhance potential health benefits;
- Report findings clearly.

## Study Area

The area of study for this HIA is Multnomah County, and the population of interest are residents of the Metro area who regularly commute in and out of Multnomah County and the population center of the city of Portland. The time frame of this analysis is 10 years. Because the regulations will be put in place for the Portland Metro area, it is likely that the bulk of potential health impacts will be seen within this region. The growth of TNCs will affect populations that are directly related to the transportation business, but also the population of Portland in general, as all residents will likely be exposed or proximal to some aspect of this taxi system. Looking at the potential effects of this policy over 10 years will allow for some consideration of the social determinants of health (such as employment and disparities).

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<sup>2</sup> Kemm, J., Parry, J., & Palmer, S. (2004). Health impact assessment: concepts, theory, techniques and applications. Oxford University Press.



## Baseline Demographics of Study Area

Multnomah County is the most populous county in the tri-county Portland Metropolitan area, encompassing 431 square miles with a population density of 1,733 people per square mile. Multnomah County is home to 19% of the population in the state of Oregon and is a part of the Portland-Vancouver-Hillsboro Metropolitan Statistical Area, home to 1,816,916 people including residents of Clarke County located in Washington State. The HIA study area is diverse, both economically and racially. Table 2 outlines population indicators, including age, race, and ethnicity of Multnomah County.

Table 2. Population Snapshot for Multnomah County, OR (2013) <sup>3</sup>

Multnomah County, OR		
<b>Overall Population</b>		
2013 Total Population	747,641	-
Percent of Oregon Population	19%	-
Population Density (per sq. Mile)	1,733.5	-
<b>Age</b>		
0-17	151,363	20.2%
18-44	324,686	43.4%
45-64	189,923	25.4%
65-74	45,023	6.0%
75+	36,646	4.9%
<b>Race (Not Hispanic or Latino)</b>		
White alone	538,073	72.0%
Black alone	40,811	5.5%
American Indian or Alaska native alone	4,971	0.7%
Asian alone	49,948	6.7%
Native Hawaiian and other Pacific Islander alone	4,599	0.6%
Some other Race alone	1,348	0.2%
Two or More	26,356	3.5%
<b>Race (Hispanic or Latino)</b>		
White	47,451	6.4%
Black	1,490	0.2%
American Indian or Alaska native	1,481	0.2%
Asian	590	0.1%
Native Hawaiian and other Pacific Islander	81	0.0%
Some other Race	24,752	3.3%
Two or More	5,690	0.8%
<b>Ethnicity</b>		
Not Hispanic or Latino	666,106	89.1%
Hispanic or Latino	81,535	10.9%

<sup>3</sup> U.S. Census Bureau. American Community Survey 2009-2013 5-Year Estimates. Prepared by Social Explorer. Retrieved May 9, 2015.

Table 3 outlines social indicators that are often referred to as “upstream” determinants of community health. This includes education, employment, and income, as well as health insurance coverage, a proxy for access to health services in this instance. 30.6% of the population in Multnomah County has some college and 10.6% of the civilian labor force is unemployed. 17.1% of the population above age 18 lives in poverty, while 12.4% of families live in poverty. 15.9% of the population is uninsured, and 26.1% of the population has publicly funded health coverage including Medicaid (Oregon Health Plan), Medicare, and CHIP (Child Health Insurance Plan). Additionally, 4.4% of the population receives public assistance income.

Table 3. Social Indicators for Multnomah County, OR (2013)<sup>4</sup>

<b>Multnomah County, OR</b>			
<b>Household Characteristics</b>			
Average household Size	2.4	-	
Median Household Income (2013 Inflation Adjusted \$)	\$52,511	-	
With self-employment income	43,930	14.4%	
No self-employment income	262,009	85.6%	
With public assistance income	13,501	4.4%	
No public assistance income	292,438	95.6%	
<b>Educational Attainment (Over 25 Years)</b>			
Less Than High School	54,184	10.3%	
High School Graduate (includes equivalency)	101,291	19.2%	
Some college	161,314	30.6%	
Bachelor's degree	127,473	24.2%	
Master's degree	55,313	10.5%	
Professional school degree	18,104	3.4%	
Doctorate degree	9,204	1.8%	
<b>Labor Force (16 Years and Over)</b>			
Employed	377,598	89.4%	
Unemployed	44,762	10.6%	
<b>Families in Poverty</b>			
Married Couple Family: With Related Child Living Below Poverty Level	4,939	3.0%	
Married Couple Family: No related children under 18 Years	2,635	1.6%	
Male Householder, no wife present:	2,451	1.5%	
With related children under 18 Years	1,803	1.1%	
No related children under 18 Years	648	0.4%	
Female Householder, no husband present:	10,589	6.4%	
With related children under 18 Years	9,268	5.6%	
No related children under 18 Years	1,321	0.8%	
Income in 2013 at or above poverty level	145,492	87.6%	

<sup>4</sup> U.S. Census Bureau. American Community Survey 2009-2013 5-Year Estimates. Prepared by Social Explorer. Retrieved May 9, 2015.

<b>Individuals in Poverty (Age 18-64)</b>			
	Living in Poverty	86,162	17.1%
	At or Above Poverty Level	418,909	82.9%
<b>Health Insurance Coverage</b>			
	No Health Insurance Coverage	118,218	15.9%
	With Health Insurance Coverage	623,375	84.1%
	<i>Public Health Coverage</i>	193,663	26.1%
	<i>Private Health Insurance</i>	499,819	67.4%

## Scoping Key Issues

High-priority outcomes that were considered in the HIA include the effects on Portland residents' income and employment, effects on citywide access, and traffic effects. Selection was based on availability of evidence, subjects of concern in the media and feasibility of modification to affect those issues in the draft policy. A brief overview of the three target issues within the assessment's scope is provided in this section. Figure 1 presents the causal pathway of the proposed policy's impact on the target issues, and in turn, community health outcomes.

### Employment and Income

Because companies such as Uber and Lyft allow most people who drive (barring those with recent driving accidents and felonies) to function as for-hire drivers, the legalization of these TNCs will result in income increases for a portion of the Portland population. A higher income is related to better health, because households with more spending power are more likely to be able to afford health-promoting resources like healthy food, safe housing, and healthcare services<sup>5</sup>. Additionally, increased earning potential for many Portland residents is likely to have an effect on the stress levels and mental health of individuals who may previously have been unable to make ends meet. However, this policy may also have some negative effects on the income of other segments of Portland's population.

One common publicly voiced concern about this policy is that it will force taxi drivers out of work<sup>6</sup>. Many of these taxi drivers may already be having a difficult time earning enough for their families, so losing their employment or being forced to decrease their working hours would be a significant detriment for these individuals and their families. This has implications for the health of these groups; households that lose one full-time job or a significant amount of consistent income are less likely to afford resources that promote health, and may also become at risk of losing the resources they already possess (such as in home foreclosure).

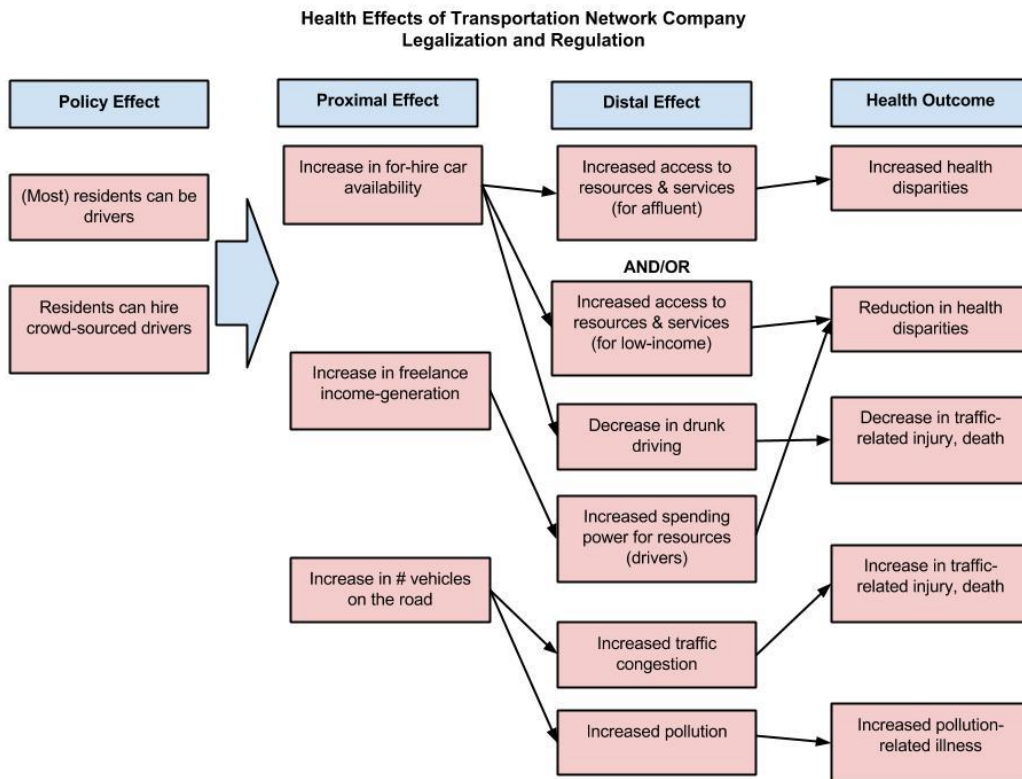
5 Marmot, M. (2002). The influence of income on health: views of an epidemiologist. *Health affairs*, 21(2), 31-46.

6 Rose, J. (2015, January 13). Portland cab drivers protest Uber, city task force with taxi caravan (video). *The Oregonian*.

## Traffic Effects

The increase in for-hire drivers working on the Portland area may have some effect on traffic patterns, congestion and safety. The availability of drivers could mean that some people who would otherwise take public transportation, walk or bike to a location will start hiring drivers instead; this could result in a higher number of cars on Portland roads. This has implications for congestion in the city, as well as increasing stress in drivers and traffic-related accidents. However, alternatively, the availability of drivers may allow for others to transition to a more car-free lifestyle, knowing that for longer trips, they have this option available as their transportation method. This could potentially lead to fewer drivers on roads. Because new for-hire drivers may not be familiar with the city, it is possible that this policy will result in an increase in traffic-related accidents. Additionally, the potential increase in vehicles on the road may lead to increased air pollution, which has implications for outcomes such as acute asthma events and cardiovascular events.

Figure 1. Causal Pathway Diagram



## City Accessibility

The legalization of TNCs is reported to improve access to for-hire car services for residents. Because more drivers are available in the area, individuals are more likely to be able to request prompt and reliable taxi services. This has a number of implications for the health of Portland residents. Some individuals may be able to access health promoting resources in other parts of the city that they would not have been able to otherwise (such as grocery stores, doctors' offices, social services, and job interviews).

This has many implications for these individuals' health, such as prevention of chronic disease, decrease in stress, and management of disease. In addition, people who have been drinking or otherwise should not be driving may be more likely to hire a driver to take them home, reducing risk of harm to themselves or others in the city.

## Stakeholders

If time and resources allowed for a more in-depth assessment, a number of stakeholders would be important to consider. Firstly, the city council and TNCs are key stakeholders, because they are the groups active in proposing and developing this policy. The Portland Bureau of Transportation has also been participating in this process. Current Portland cab companies (such as Radio Cab) would also be sought out for participation in the health impact assessment, because they have voiced strong opposition in recent months. Local organizations concerned with equity (such as the Urban League of Portland) could also be engaged, as this policy has potential to either reduce or increase equity among Portland residents. Finally, Portland residents should also be engaged, because this policy will affect individuals throughout Portland who may use these companies, work for them, or operate on the same roads as drivers.

## Health Impacts of TNCs Regulations: Evidence from the Literature

This section presents the results of the assessment phase of this HIA, which consists of a summary of evidence surrounding the impact of TNC legalization (or similar policy implementation) on target issues, and in turn on health. Methods for analyzing the potential health impacts of this policy in this desktop HIA consisted primarily of an in-depth literature review. Peer-reviewed and grey literature was reviewed in order to establish the likely directions and weight of impact on Portland's population (and subpopulations).

With a greater allotment of time and resources, we might have conducted some secondary data analysis, such as assessing crash data from cities that have legalized TNCs for associations to a higher number of working drivers or test for associations between legalization in those cities and employment or income data (especially for underserved populations). To determine potential effects on employment or income, it may also be beneficial to test for associations between the rise of other sharing economy companies in Portland (such as AirBnB) and employment or income rates.

### Employment and Income

Although median income is comparable to the national median, Multnomah County maintains an unemployment rate and poverty rate higher than national averages<sup>7</sup>. The unemployment rate for the County is 10.6%, a significantly higher percentage compared

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7 United States Census Bureau. (2015). Multnomah County, Oregon. In United States Census Bureau. Retrieved June 1, 2015, from <http://quickfacts.census.gov/qfd/states/41/41051.html>

to the national rate of 5.4%.<sup>8</sup> Similarly, among persons aged 18-64, 17.1% are living in poverty in Multnomah County, compared to 16.2% in Oregon and 14.5% nationally.<sup>9</sup> This overall picture of the County highlights the need to examine the potential impacts of local policy on employment and economic well-being (see Table 3 for additional indicators of economic well-being).

More so than Multnomah County residents overall, the proposed TNC policy is most likely to impact the employment of two groups: current traditional taxi drivers and potential TNC drivers. The City of Portland maintains a limit to traditional taxi vehicle permits. Since 1998, the limit of vehicle permits has been capped at 382 vehicles, which is split between Portland's taxi companies (such as Broadway and Radio). The taxi drivers operating these vehicles are the individuals at risk for losing some amount of income or employment as TNCs are established. While the average gross income of traditional taxi drivers in Portland is \$60,800, they earn an average net income of \$19,200 per year. For a family of four, this is below the federal poverty threshold of \$24,250. A similar measure of hourly wage has found the average hourly wage for Portland taxi drivers to be \$7.35 in 2012, below the Oregon minimum wage of \$8.50 at the time.<sup>10</sup>

The drastic difference between gross and net income for this group is due to the substantial fixed driver expenses they must pay as independent contractors with taxi companies. "Kitty" payments, which are meant to cover the services provided by the company to workers, are flat payments made by taxi drivers that average \$26,000 per vehicle per year. In addition, drivers must pay self-employment tax as independent contractors, fuel expenses, driver permit fees, etc. While drivers at Portland's one driver-owned company, Radio, are slightly higher at an average hourly wage of \$12.31, driver expenses in all of Portland's cab companies continue to have a significant, negative impact on take-home earnings. In addition to low wages, traditional taxi drivers face numerous other issues related to their employment, such as long working hours, lack of health insurance benefits, lack of retirement income, and lack of indoor facilities, food and restroom access.

With the rise of TNC drivers in Portland, traditional taxi drivers are at risk for losing employment or wages as a result of market competition. This, in turn, has major implications for the health of those individuals. Unemployed individuals have an increased risk of all-cause mortality. They also tend to increase their use of alcohol, tobacco, illicit drugs, and have increased likelihood of obesity or unhealthy weight loss.<sup>11</sup>

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8 Bureau of Labor Statistics. (2015, May 8). The U.S. Bureau of Labor Statistics. In The Employment Situation. Retrieved June 1, 2015, from <http://www.bls.gov/news.release/pdf/empsit.pdf>

9 United States Census Bureau. (2014). Poverty: 2013 Highlights. In United States Census Bureau. Retrieved June 1, 2015, from <http://www.census.gov/hhes/www/poverty/about/overview/>

10 City of Portland Revenue Bureau. (2012). 1 Preliminary Findings Taxi Driver Labor Market Study: Long Hours, Low Wages. In City of Portland. Retrieved June 1, 2015, from <https://www.portlandoregon.gov/transportation/article/397492>

11 Roelfs, D. J., Shor, E., Davidson, K. W., & Schwartz, J. E. (2011). Losing life and livelihood: a systematic review and meta-analysis of unemployment and all-cause mortality. *Social science & medicine*, 72(6), 840-854.

Many of these concerns are potentially shared by TNC workers. As an Uber or Lyft driver, an individual is an independent contractor, and is subject to fluctuating hourly rates based on supply and demand in the city. During some hours, drivers might make up to \$30 per hour, but other time periods may result in lower wages. Taking into consideration the self-employment tax that Uber drivers must pay, net earnings could potentially be comparable to those of traditional taxi drivers. TNC drivers also face similar challenges related to health insurance, retirement income, and lack of adequate facilities. However, one benefit of TNCs is that many drivers use their position to supplement another full-time or part-time income; this arrangement ameliorates many challenges related to driving full-time.

As a result of TNC entry, most large cities have seen a rise of active drivers numbering in the thousands.<sup>12</sup> This suggests that in Portland, a large number of future drivers will have the opportunity to reap the benefits of increased employment and earnings. This result has clear links to community health. Higher income is linked to better health, through several potential pathways. Increased income directly affects an individual's ability to obtain resources and services needed for high quality of life. Higher earning potential also affects an individual's ability to control their life circumstances and participate in their community at a higher social status than those with lower income. The effect of income on community health can be seen in the disparate mortality rates between high-income and low-income groups (with low-income groups demonstrating 3.9 times the mortality rate of the highest income group).<sup>13</sup>

However, future TNC drivers in Portland may not experience entirely beneficial effects from their increase in employment. Some preliminary research on "precarious employment," a broad term to characterize many modern, atypical forms of employment, suggests that these types of work arrangements may have negative impacts on worker health.<sup>14</sup><sup>15</sup><sup>16</sup> The unpredictable nature of driving for a TNC also adds an element of job insecurity, which has a variety of detrimental consequences on both physical and mental health.<sup>17</sup> Additionally, the extended hours of work for drivers who maintain primary full-time or part-time jobs may have negative impacts on the health of those individuals, such as reduction in quality and quantity of sleep, poorer mental health, and adverse cardiovascular (CVD) effects, as well as social consequences such as less time spent with family.<sup>18</sup>

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12 Badger, E. (2015). Now we know how many drivers Uber has — and have a better idea of what they're making. The Washington Post. Retrieved June 1, 2015, from <http://www.washingtonpost.com/blogs/wonkblog/wp/2015/01/22/now-we-know-many-drivers-uber-has-and-how-much-money-theyre-making%E2%80%8B/>

13 Marmot, M. (2002). The influence of income on health: views of an epidemiologist. *Health affairs*, 21(2), 31-46.

14 Benach, J., & Muntaner, C. (2007). Precarious employment and health: developing a research agenda. *Journal of Epidemiology and Community Health*, 61(4), 276-277.

15 Lewchuk, W., de Wolff, A., King, A., & Polanyi, M. (2003). From job strain to employment strain: Health effects of precarious employment. *Just Labour*, 3(Fall), 23-35.

16 Lewchuk, W., Clarke, M., & De Wolff, A. (2008). Working without commitments: precarious employment and health. *Work, Employment & Society*, 22(3), 387-406.

17 Sverke, M., Hellgren, J., & Näswall, K. (2002). No security: a meta-analysis and review of job insecurity and its consequences. *Journal of occupational health psychology*, 7(3), 242.

18 LaDou, J. (1982). Health effects of shift work. *Western Journal of Medicine*, 137(6), 525.

Table 4. Strength and Direction of Employment Health Impacts

Health Determinant	Health Outcome	Health Impact	Strength of Evidence
<b>Employment Impacts</b>			
Decreased employment (traditional drivers)	Mortality	-	***
	CVD	-	***
Increased employment/income (TNC drivers)	Mental Health	+	*
Increase in precarious employment (TNC Drivers)	Mental Health	-	**
Increase in working hours (TNC drivers)	Weight gain	-	*
	Unhealthy behaviors	-	*

Direction of Health Impact	High/Moderate/Low magnitude of improvements in health or reductions in illness
+++/++/+	High/Moderate/Low magnitude of reductions in health or increases in illness
---/--/-	
Strength of Evidence	
***/**/*	Strong association/moderate association/weak association

## Traffic Effects

### Congestion

For traffic effects of TNC regulatory policy, we looked at the potential impacts of both an increase in traffic congestion and a decrease in traffic congestion. The field is split on whether an abundance of for-hire car services will in fact increase the number of cars, and importantly the number of trips, on our roads. Further, given that there is so little data that is publicly available from companies such as Uber and Lyft, there are few comprehensive studies looking at traffic effects of increases in TNC availability and use. Therefore, we assess baseline traffic congestion in Portland, and hypothesize the potential health impacts of both an increase and a decrease in trips.

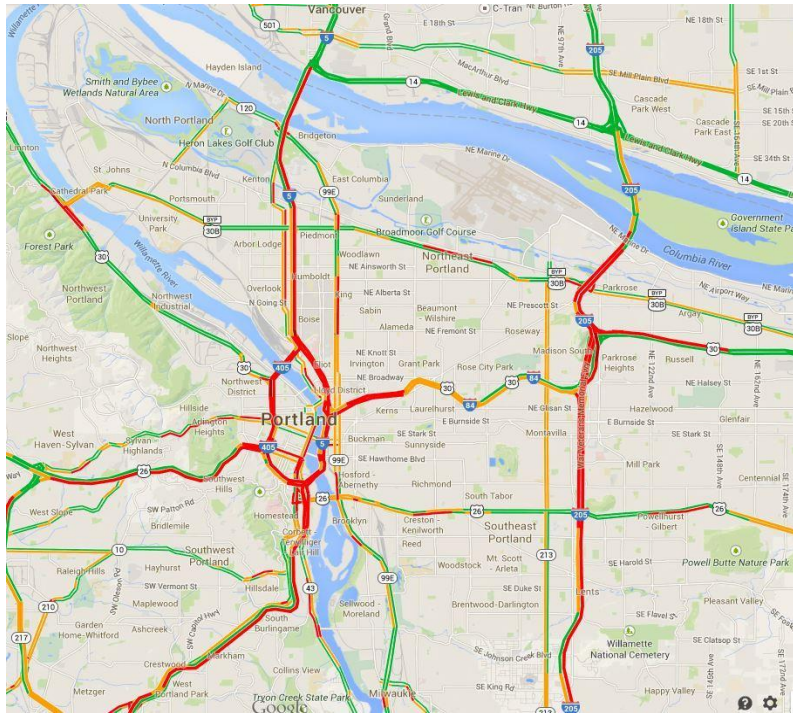
According to numerous news reports, traffic in Portland is bad, and getting worse<sup>19</sup>. One study conducted by the TomTom Traffic Index found that Portland drivers whose commute was 30 minutes in 2013 experienced an increase to 50 minutes by 2014<sup>20</sup>. Although the methodology used traffic congestion studies that have been disputed, the fact is, Portland commuters tend to sit in traffic. Figure 2 displays traffic congestion during a weekday evening rush hour (5:30 PM), with darkest red coloring indicating the slowest travel speeds and green indicating little to no congestion. Both the I-5 and I-205 Corridors, used by many commuters to travel to and from work, experiences very high congestion, as do some parts of other major roads in the area.

19 Blackman, T. (2015, March 31). Study: Portland traffic ranked 10th-worst in U.S. In KGW.com Portland. Retrieved May 11, 2015.

20 TomTom Traffic Index. (2015). TomTom Traffic Index: Measuring Congestion Worldwide. Retrieved May 11, 2015.



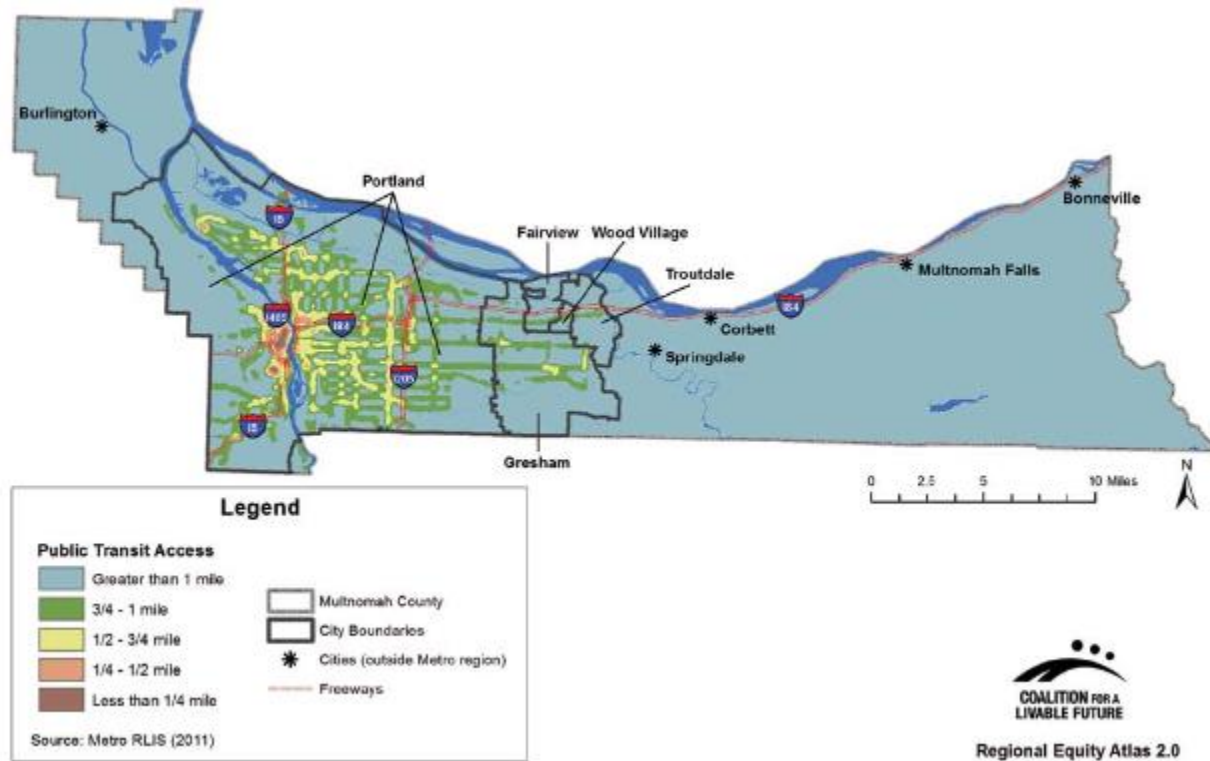
Figure 2. Traffic Congestion during a Weekday evening Rush Hour<sup>21</sup>



One proxy for identifying areas of potentially less traffic is to examine which areas are well-served by public transit. Figure 3 displays public transit access in Multnomah County. Public transit access is best around the city center, but gets sparse further out (such as east of I-205).

<sup>21</sup> Regional Transportation Council (2008). Q & A Discussion. In East County Bridge. Retrieved May 11, 2015.

Figure 3. Public Transit Access, 2011<sup>22</sup>



The argument is made that TNCs would add to the current transit network, increasing options for individuals to make trips through modes other than a personal car, and potentially decreasing the number of individuals who own a car. While carpooling has not always been seen as a viable option for commuters, on-demand ride shares such as Lyft and Uber may provide the needed convenience through their shared or pooled services options<sup>23</sup>. The pooled options act essentially as a carpool, where individuals can request a ride and someone already travelling in that direction can pick them up if there is an available seat. The services offer a more flexible and robust addition to current fixed route forms of transportation such as bus and light rail, and may encourage individuals who currently drive alone to consider sharing a ride with one or more strangers. While this may draw riders away from traditional forms of public transportation, it may still have the effect of decreasing congestion in the city with fewer individual drivers on the highways.

This, of course, depends on current behaviors, and the likelihood that individuals will in fact change their commuting behaviors. Table 5 outlines baseline indicators for current transportation and transit trends among workers in Multnomah County. While this does not capture all trip types taken throughout Multnomah County, to and from work is one potentially impacted factor of the new policy. In 2013, 71% of workers drove in a car,

<sup>22</sup> Multnomah County Community Services Division. (n.d.). 2014 Poverty in Multnomah County. In Multnomah County. Retrieved May 11, 2015.

<sup>23</sup> <http://www.forbes.com/sites/tarunwadhwa/2014/11/13/will-lyft-and-ubers-shared-ride-service-put-public-transit-out-of-business/>

truck, or van to work, while 10.8% took public transportation of some form, including taxicabs. 62% of Multnomah County’s workforce drives alone to work, which is lower than Oregon’s average of 72%<sup>24</sup>, and 28% of these workers commute over 30 minutes to work<sup>25</sup>. The average commute time to work was 25 minutes<sup>26</sup>.

Table 5. Transportation for Multnomah County, OR (2013) <sup>27</sup>

Multnomah County, OR		
Means of Transportation to Work (16 years and over)		
Car, truck, or van	262,768	71.0%
<i>Drove Alone</i>	227,739	61.6%
<i>Carpooled</i>	35,029	9.5%
Public transportation (Includes Taxicab)	39,795	10.8%
Motorcycle	1,425	0.4%
Bicycle	18,846	5.1%
Walked	19,163	5.2%
Other means	2,541	0.7%
Worked at home	25,394	6.9%
Travel time to Work		
Less than 10 minutes	32,410	8.8%
10 to 19 minutes	105,662	28.6%
20 to 29 minutes	88,837	24.0%
30 to 39 minutes	63,310	17.1%
40 to 59 minutes	33,604	9.1%
60 to 89 minutes	14,312	3.9%
90 or More minutes	6,403	1.7%
Average Commute to Work (in min)	25	-

Uber estimates that up to one million vehicles could be removed from New York City streets through ride sharing, however the company did not specify their methodology<sup>28</sup>. One study estimates that the total number of trips in New York City would be reduced by almost 52 million a year if 30 percent of riders facilitated trip sharing through platforms such as Uber and Lyft. Numbers for Portland are not available, however there is potential to save time and money - through decreased need for road maintenance - as well as a reduction in carbon dioxide emissions and fewer traffic accidents if the companies are correct in predicting a decrease in number of cars on the road. This is

24 County Health Rankings & Roadmaps. (2015). Oregon: Driving Alone to Work. Retrieved May 11, 2015.  
 25 County Health Rankings & Roadmaps. (2015). Oregon: Long Commute - Driving Alone. Retrieved May 11, 2015.  
 26 United States Census Bureau. (n.d.). Census Bureau Reports 174,000 Workers Commute into Multnomah County, Ore., Each Day. In United States Census Bureau. Retrieved May 11, 2015.  
 27 U.S. Census Bureau. American Community Survey 2009-2013 5-Year Estimates. Prepared by Social Explorer. Retrieved May 9, 2015.  
 28 <http://dupress.com/articles/smart-mobility-trends-on-demand-car-services/>

contingent on the assumption that TNCs don't in fact take resources away from traditional ridesharing or transit programs, or emerge as a solution to traffic and decrease investment in mass transit options and maintenance.

One clear health impact of more or less cars on the road is an increase or decrease in personal injury due to vehicle crash and collisions with pedestrians or cyclists. Multnomah County recorded 313 motor vehicle crash deaths between 2006 and 2012, with a mortality rate of 6 per 100,000<sup>29</sup>. Between 2009 and 2013, 39% of driving deaths involved alcohol, higher than Oregon's rate of 31%<sup>30</sup>. With fewer cars on the road, we would expect a lower incidence and mortality rate for vehicle-related injury. TNCs also have the potential to reduce injury due to alcohol-related accidents<sup>31</sup>. With more options available for drunk individuals to take a safe ride home, we can reasonably predict that fewer accidents will occur. Currently in Portland, the wait time for a cab can be long and there have historically not been enough cabs to meet demand during peak hours. One study by ECONorthwest found that Portland has fewer cabs per 10,000 residents than 10 comparable cities surveyed, at just 7.5<sup>32</sup>. An increase in options for individuals hoping to get safely home from a bar late at night will only decrease the risk for alcohol related accidents.

However, injury might also increase. If individuals are taking trips in cars when they might otherwise seek transportation through bus or light rail, then more cars are on the road. Automobile travel is riskier than either bus or train/light rail transit. Automobile crashes are one of the leading cause of death among people 1-34 years of age, accounting for 3.2 million nonfatal injuries annually<sup>33</sup>.

## Air Quality

A primary concern of increased cars on the road is air quality. The quality of air we breathe is important due to impacts of poor air quality on chronic health conditions such as asthma and cardiovascular disease (see below), and can also have negative effects on overall quality of life. The State of Oregon, as do other states, sets benchmarks for known air toxins based on the susceptibility of vulnerable groups such as children and seniors<sup>34</sup>. In Multnomah County in 2011, the average daily density of fine particulate matter (PM2.5) was 9.7, higher than Oregon's score of 8.9<sup>35</sup>. Figure 4 presents how Multnomah County compares to other counties in the state of Oregon.

The top 3 air toxics with adverse health effects and cancer risk within the Portland region include diesel emissions - which include PM2.5, benzene and formaldehyde; on-road engines contribute significantly to the levels of these air toxics. Higher

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29 County Health Rankings & Roadmaps. (2015). Oregon: Motor Vehicle Crash Deaths. Retrieved May 11, 2015.

30 Oregon Transportation Development Division. (2014). 2013 Oregon Traffic Crash Summary. In State of Oregon. Retrieved May 11, 2015.

31 <http://dupress.com/articles/smart-mobility-trends-on-demand-car-services/>

32 <http://www.portlandmercury.com/BlogtownPDX/archives/2015/02/11/the-cab-wars-just-got-real-portland-just-approved-the-largest-taxi-deluge-in-its-history>

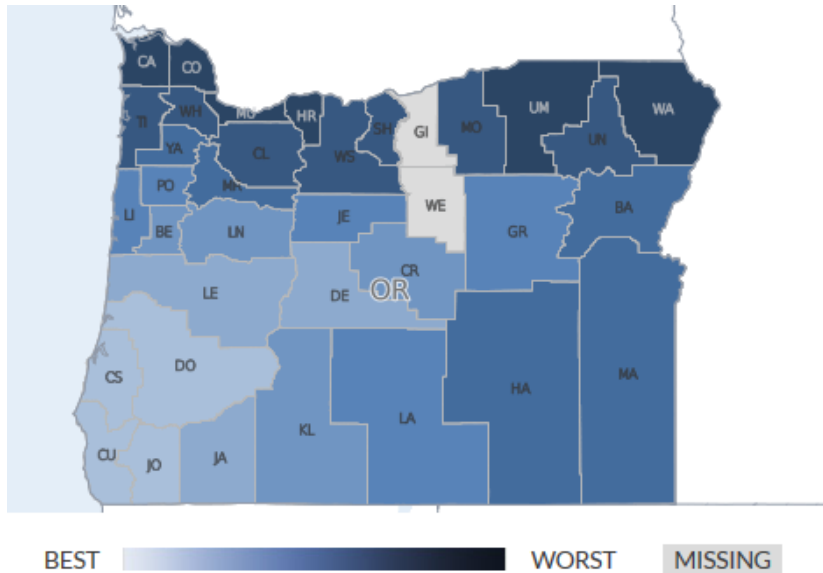
33 Centers for Disease Control and Prevention. Injury. Retrieved from <http://www.cdc.gov/healthyplaces/healthtopics/injury.htm>

34 Coalition for a Livable Future. (2015). Air Quality. In Coalition for a Livable Future. Retrieved May 11, 2015.

35 County Health Rankings & Roadmaps. (2015). Oregon: Air Pollution - Particulate Matter. Retrieved May 11, 2015.

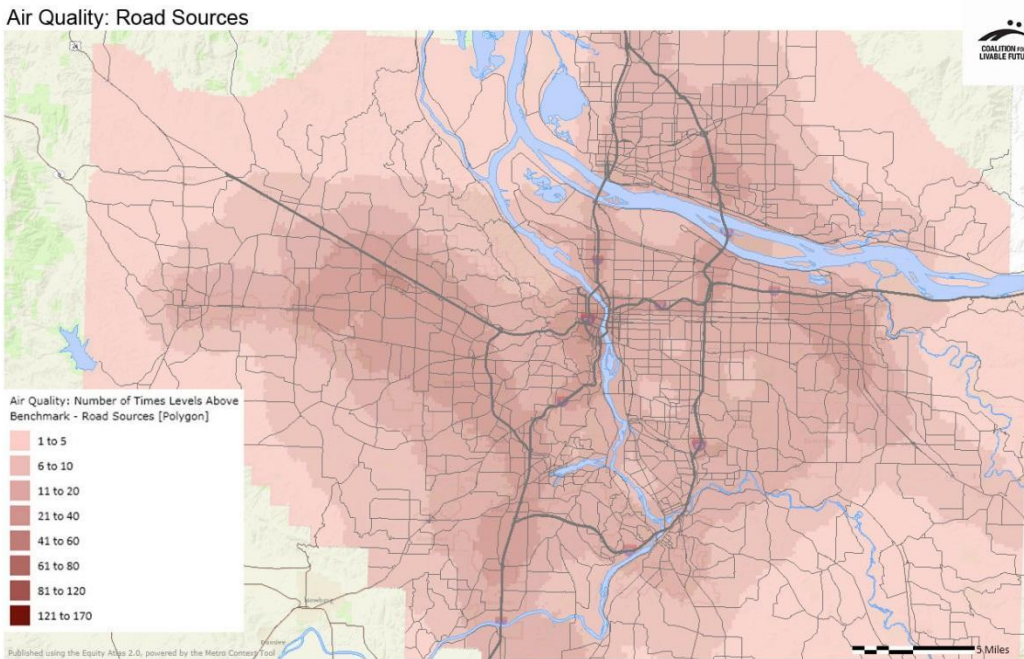
concentrations and elevated cancer risks align with major traffic corridors in Multnomah County, with some hotspots with air toxic levels that are 81 to 120 times above the benchmark<sup>36</sup>. According to the Portland Air Toxics Solutions project, populations of color and low-income populations experience disproportionate impacts from air toxics in the Portland metro region<sup>37</sup>. Figure 5 shows the uneven distribution of poor air quality from road sources in the Portland Metro area.

Figure 4. Oregon's Particulate Matter Density (2011)<sup>38</sup>



36 Coalition for a Livable Future. (2015). Air Quality. In Coalition for a Livable Future. Retrieved May 11, 2015.  
 37 Department of Environmental Quality. (n.d.). Environmental Justice and Sensitive Populations. In State of Oregon. Retrieved May 11, 2015.  
 38 County Health Rankings & Roadmaps. (2015). Oregon: Air Pollution - Particulate Matter. Retrieved May 11, 2015.

Figure 5. Number of Times Road-Sourced Air Toxins Rise Above Benchmark - Portland Metro Area<sup>39</sup>



Asthma is a disease that affects the long-term health and well-being of both adults and children. Asthma is often used as a health equity indicator because research shows significant racial/ethnic and income disparities in asthma rates<sup>40</sup>. Asthma is a chronic disease whose risk factors include environmental exposures to inhaled substances and particles such as air pollution from cars, trucks, and buses<sup>41</sup>.

The average incidence of asthma hospitalizations between 2009 and 2013 in Multnomah County was 7.5 per 10,000, higher than the Oregon average of 5.4<sup>42</sup>. However, the prevalence of adult asthma between 2008 and 2011 was 8.9%, lower than the Oregon estimate of 10.8%<sup>43</sup>. Within Multnomah County, the highest rates of asthma are between 16.13-25%<sup>44</sup>. Asthma rates in Multnomah County tend to be higher in neighborhoods near major freeways and arterials, such as I-5 and along I-84 and I-205 (See Figure 6). These are also areas with more dense populations of people of color, suggesting a disparate impact of asthma in these populations.

39 Coalition for a Livable Future. (2015). Air Quality. In Coalition for a Livable Future. Retrieved May 11, 2015.

40 Coalition for a Livable Future. (2015). Asthma. In Coalition for a Livable Future. Retrieved May 11, 2015.

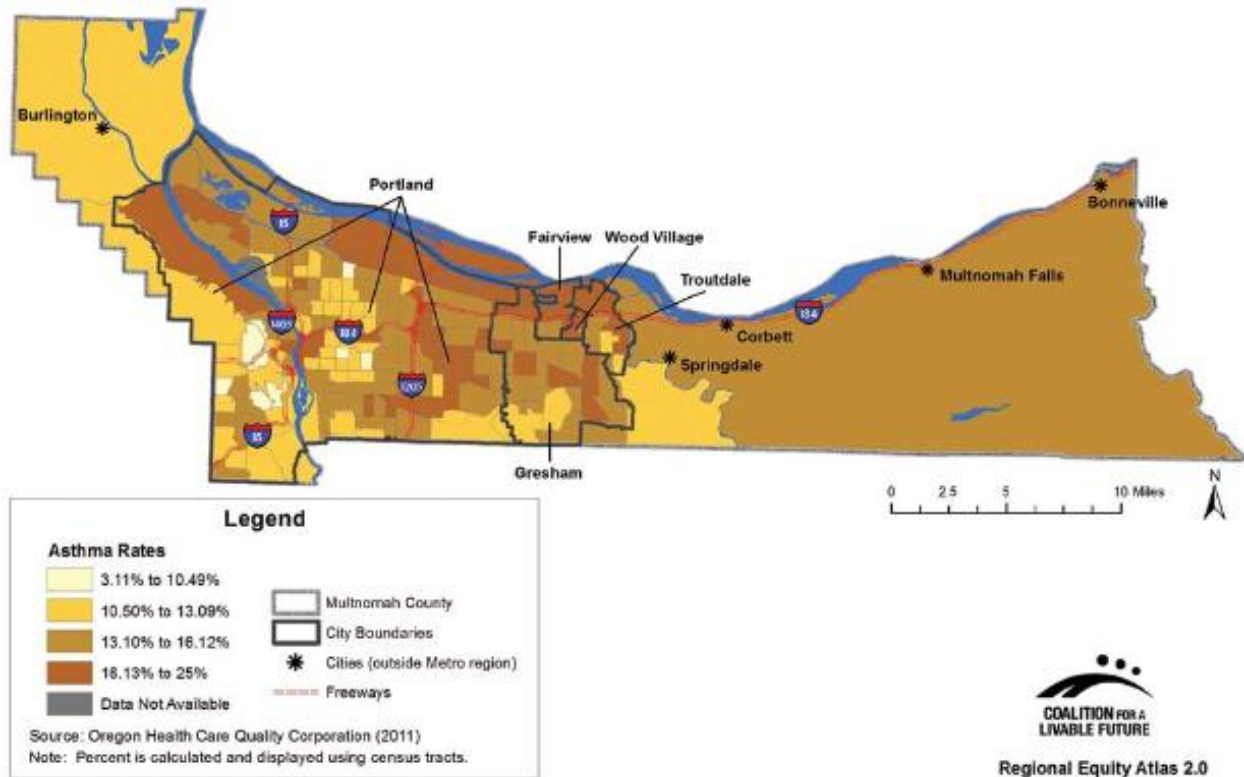
41 Mayo Clinic. (2014, February 13). Asthma: Risk Factors. In Mayo Clinic. Retrieved May 11, 2015.

42 Oregon Environmental Public Health Tracking. (2015). Report: Health Outcomes, Chronic Conditions, Asthma, All counties. In State of Oregon. Retrieved May 11, 2015.

43 Oregon Health Authority. (2013, August). The Burden of Asthma in Oregon. Retrieved May 11, 2015.

44 Coalition for a Livable Future. (2015). Asthma. In Coalition for a Livable Future. Retrieved May 11, 2015.

Figure 6. Asthma Rates in Multnomah County (2011) by Census Tract<sup>45</sup>



The health effects of ozone and particulate matter are well documented. As ozone levels increase, so do the rates of respiratory complications, emergency room visits, hospitalizations, diminished lung capacity, and school absenteeism<sup>46</sup>. Those with asthma, the elderly, and children are most susceptible to these harmful outcomes of poor air quality. Increased car trips lead to more pollution, and therefore increase risk for asthma and adverse asthma events. Further, if TNC vehicles are not regulated as taxis are, there is the potential that drivers will drive older, higher-emission vehicles that further degrade the air quality in the Portland region and increase the risk for adverse asthma events among the population. It is unknown if this risk might outweigh the potential benefits of fewer cars on the road through the potential of TNCs to increase trip sharing.

Another risk of increased air pollutants due to more traffic is cardiovascular disease (CVD). CVD affects the heart and blood vessels, and includes diseases such as heart disease and stroke. CVD is one of the leading causes of disability in the United States<sup>47</sup>, and adverse events related to CVD are also impacted by increased traffic and declining air quality. Currently in Multnomah County, CVD rates are concentrated in Portland's inner east and west sides (see Figure 7). Areas with the highest access to factors that

45 Multnomah County Community Services Division. (n.d.). 2014 Poverty in Multnomah County. In Multnomah County. Retrieved May 11, 2015.

46 <http://www.hiaguide.org/sectors-and-causal-pathways/pathways/air-quality-outdoor>

47 <http://clfuture.org/atlas-maps/cardiovascular-disease-rates>

promote healthy living have lower rates of CVD, including areas that are well-served by transit.

Figure 7. Cardiovascular Disease Rates (2011)<sup>48</sup>

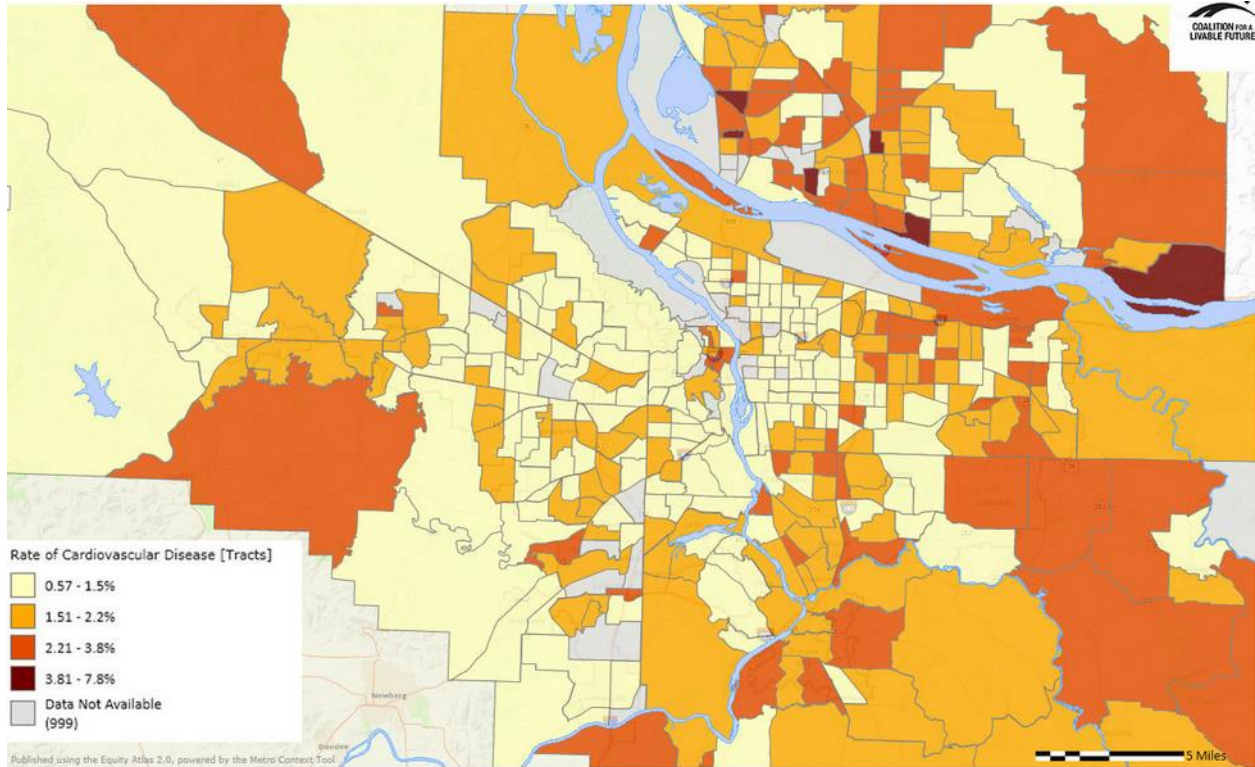


Table 6. Strength and Direction of Traffic Health Impacts

Health Determinant	Health Outcome	Health Impact	Strength of Evidence
<b>Traffic Impacts</b>			
Increased air pollutants	Asthma	--	***
	CVD	--	***
Decreased air pollutants	Asthma	++	***
	CVD	++	***
Increased Traffic congestion	Traffic injury/death	--	**
Decreased Traffic congestion	Traffic injury/death	++	**

Direction of Health Impact  
 +++/++/+ High/Moderate/Low magnitude of improvements in health or reductions in illness  
 ---/--/- High/Moderate/Low magnitude of reductions in health or increases in illness  
 Strength of Evidence  
 \*\*\*/\*\*/\* Strong association/moderate association/weak association

48 <https://clfuture.org/atlas-maps-print-view/cardiovascular-disease>



## City Accessibility

For city accessibility, we looked at the potential for TNCs to provide access to built environment Healthy Eating Active Living (HEAL) resources as well as employment locations. We assessed this impact based on the potential for HIA to supplement the current transit and transportation network in Multnomah County.

### Access to Healthy Eating Active Living Resources

Research shows that when people live in environments where it is easy to access healthful, nutritious food and recreational facilities, they are much more likely to live active, healthy lifestyles that in turn increase their ability to maintain a healthy weight and lower their risk for chronic disease. Specifically, higher food access is associated with lower obesity risk (White, “Food access and obesity”). The “walkability” of a neighborhood, measured by the density of sidewalks, is important for access and might indicate neighborhoods where a higher demand for alternate forms of transportation exist that are not active. There is greater sidewalk coverage in inner southeast, inner northeast, and north Multnomah County compared to mid and east Multnomah County<sup>49</sup>.

Healthy food access can be assessed in several ways. The “Food Environment Index” is one such example; it ranges from 0-10 and weights the percentage of the population that is low-income and does not live close to a grocery store (defined as less than 10 miles from a grocery store in rural areas, and less than 1 mile in non-rural areas) and the percentage of the population who did not have access to a reliable source of food during the past year. In Multnomah County, this Index is 7.2 (2012), slightly lower than Oregon’s overall index score of 7.3<sup>50</sup>. A related indicator, limited access to healthy foods, was measured in 2010 and calculated the county rate at 4% of the population<sup>51</sup>. Figure 8 shows proximity to supermarkets and grocery stores, one variable to consider when determining access to healthy foods.

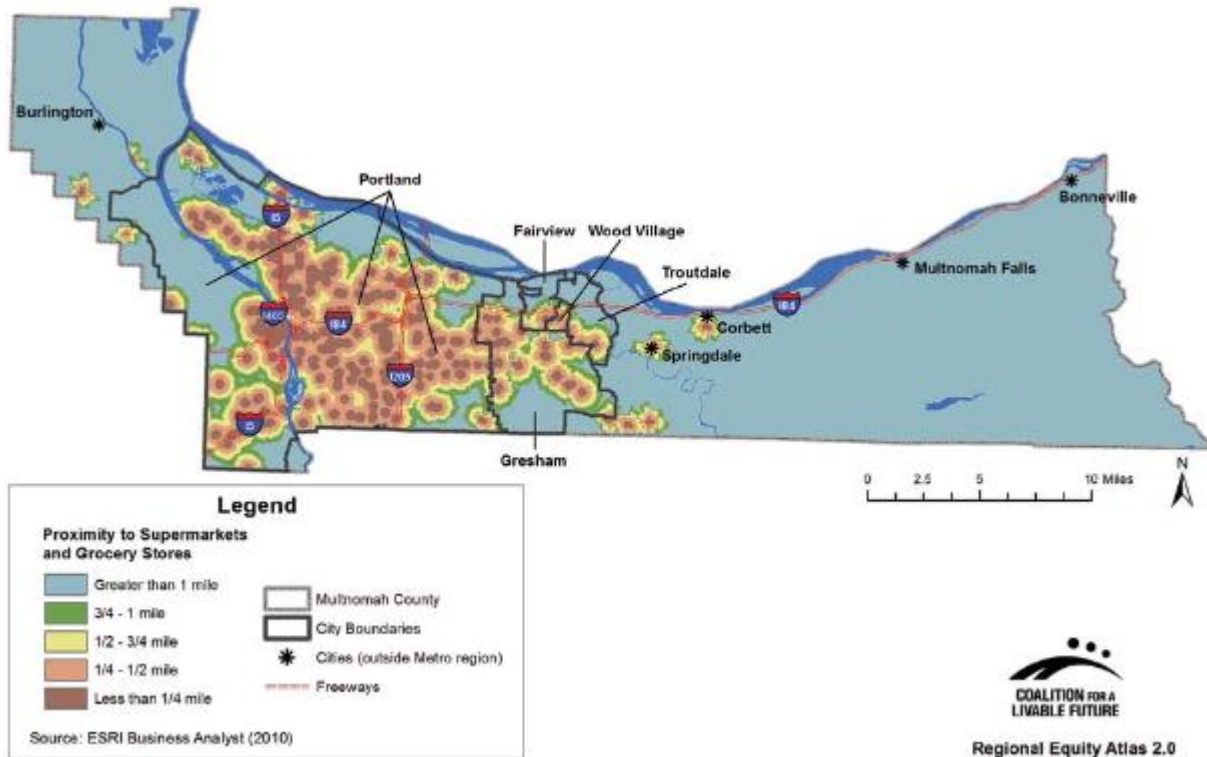
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49 Multnomah County Health Department. (2010). Social Determinants of Health in Multnomah County: Transportation and Health. In Multnomah County. Retrieved May 11, 2015.

50 County Health Rankings & Roadmaps. (2015). Oregon: Food Environment Index. Retrieved May 11, 2015.

51 County Health Rankings & Roadmaps. (2015). Oregon: Limited access to healthy foods. Retrieved May 11, 2015.

Figure 8. Proximity to Supermarket and Grocery Stores, 2010<sup>52</sup>



Physical activity indicators in the built environment are also important for identifying health promoting physical activity options; those who live in environments with more sidewalks, parks and gyms are more likely to exercise. According to the County Health Rankings & Roadmaps program, 99% of the population has adequate access to locations for physical activity (2010 and 2013)<sup>53</sup>. This measure includes those who live in a census block within a half-mile of a park or reside within one mile (urban) or three miles (rural) of a recreational facility.

Because the option of TNC transit may improve access to parks and other physical activity opportunity, it is possible that this policy may have some impact on Multnomah County’s physical activity and health through that pathway. Park access and other built environment accessibility features have been linked to increases in physical activity, which in turn decrease risk of multiple negative health outcomes.<sup>54,55</sup>

Alternatively, the passage of this TNC policy may have the opposite effect on County residents’ physical activity. Because residents may experience more transit access by hiring TNC drivers, they may opt out of more active transportation methods that they

52 Multnomah County Community Services Division. (n.d.). 2014 Poverty in Multnomah County. In Multnomah County. Retrieved May 11, 2015.

53 County Health Rankings & Roadmaps. (2015). Oregon: Access to exercise opportunities. Retrieved May 11, 2015.

54 Humpel, N., Owen, N., & Leslie, E. (2002). Environmental factors associated with adults’ participation in physical activity: a review. *American journal of preventive medicine*, 22(3), 188-199.

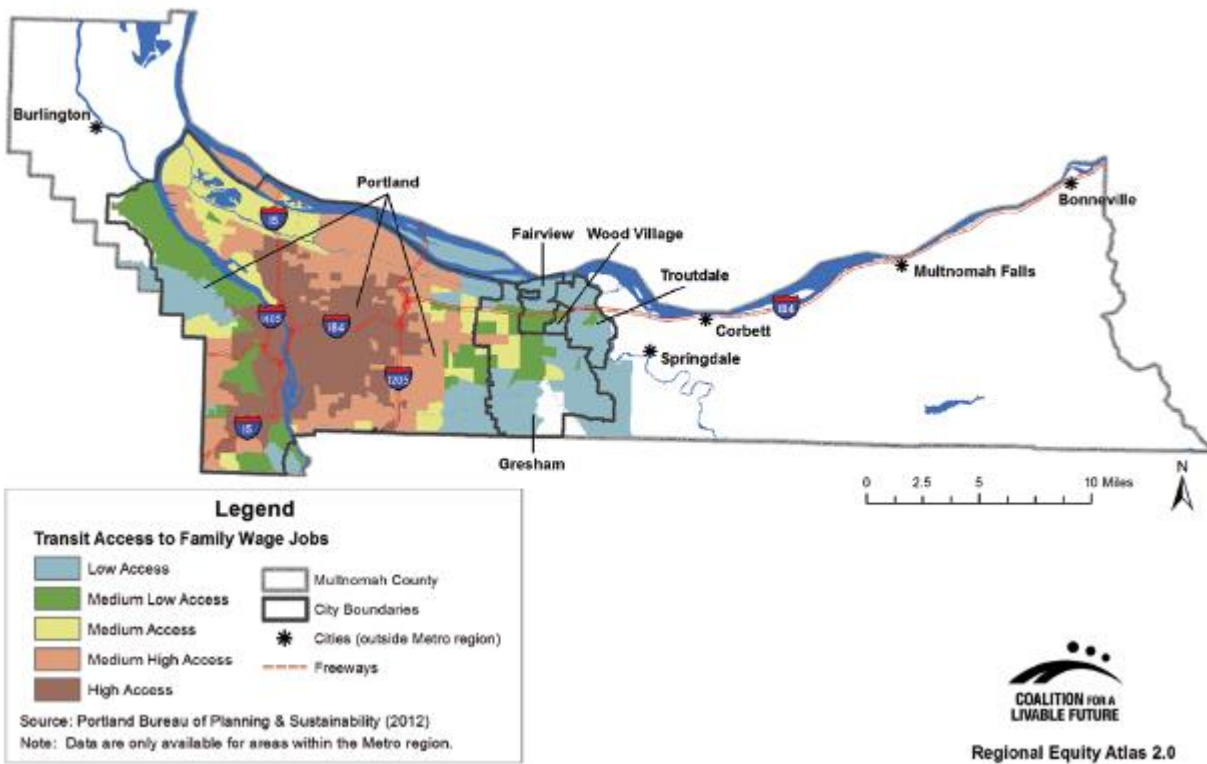
55 Kaczynski, A. T., & Henderson, K. A. (2007). Environmental correlates of physical activity: a review of evidence about parks and recreation. *Leisure Sciences*, 29(4), 315-354.

otherwise would have used. For example, an individual who would typically ride their bicycle to the grocery store may instead hire an Uber driver. At a community level, this would reduce physical activity rates, and in turn increase risk for health outcomes such as obesity and cardiovascular disease.<sup>5657</sup>

### Access to Jobs

Additionally, transit access to family-wage jobs is important for workers who prefer or depend on public transit to get to work. Figure 9 displays that transit access is highest in a central ring of neighborhoods around Portland’s city center, while the eastern part of the county has lower access.

Figure 9. Transit Access to Family Wage Jobs, 2012<sup>58</sup>



Finally, while the literature around workplace and employment access and health outcomes is very sparse, it is a reasonable prediction that if communities have better physical access to jobs (as they might with the availability of TNC drivers), they are more likely to have higher employment and income rates as a whole. This, in turn, results in improvements to health outcomes that are related to stable employment and

56 Frank, L. D., Andresen, M. A., & Schmid, T. L. (2004). Obesity relationships with community design, physical activity, and time spent in cars. *American journal of preventive medicine*, 27(2), 87-96.

57 Frank, L. D., Sallis, J. F., Conway, T. L., Chapman, J. E., Saelens, B. E., & Bachman, W. (2006). Many pathways from land use to health: associations between neighborhood walkability and active transportation, body mass index, and air quality. *Journal of the American Planning Association*, 72(1), 75-87.

58 Multnomah County Community Services Division. (n.d.). 2014 Poverty in Multnomah County. In Multnomah County. Retrieved May 11, 2015.

higher income. By contrast, communities which are geographically far from jobs and experience poor access may experience negative health impacts.

Table 7. Strength and Direction of Citywide Access Health Impacts

Health Determinant	Health Outcome	Health Impact	Strength of Evidence
<b>Citywide Access Impacts</b>			
Increased access to grocery stores	Obesity	-	***
	CVD	-	***
Increased access to physical activity	Obesity	+	***
	CVD		
Increased access to jobs	See effects of increased employment/income	-	No direct evidence
Decrease in active transportation	Obesity	-	**
	CVD		
Direction of Health Impact			
+++/**/+ High/Moderate/Low magnitude of improvements in health or reductions in illness			
---/--/- High/Moderate/Low magnitude of reductions in health or increases in illness			
Strength of Evidence			
***/**/* Strong association/moderate association/weak association			

## Recommendations

Based on the literature review findings of this desktop HIA, we outline several recommendations for the City of Portland during the policy development phase of TNC regulation. Because there is limited evidence around the effects of TNC legalization, it is strongly recommended that the City and County monitor health outcomes related to traffic and employment policy, such as traffic accidents and asthma hospitalizations. We would also suggest that the City or County assess employment and city access in the years following regulation, to evaluate potential impacts on the distribution and overall levels of those factors.

We would also recommend that the City or County partner with other municipalities with TNC regulation policy to develop a monitoring strategy. This would create a framework within which cities could establish more evidence about health impacts of this service.

### Employment and Income

- Partner with traditional taxi companies to assess strategies to mitigate negative employment impacts on traditional drivers.
- Include language in the regulation policy to enhance or enforce positive impacts on Uber drivers, such as ensuring that they are paid a fair wage or placing limitations on wage fluctuation.
- Monitor impacts on employment in the City of Portland and Multnomah County.

## Traffic Effects

- Mitigate potential increases in traffic accidents (for example, by requiring a driving test or additional training for future TNC drivers).
- Regulate vehicle types/emissions tests for TNC drivers to reduce the likelihood of significantly increasing vehicle emissions.
- Monitor traffic accidents and air pollution levels in the City of Portland.
- Tax TNC participants, in order to ensure continued support for road maintenance and other modes of transportation.

## City Accessibility

- Mitigate potential “holes” in access (e.g. incentivize drivers to take routes in outer Portland or regulate vehicles available for populations with disabilities).
- Include language in the policy to enhance benefits to accessibility; for example:
  - Required lower rates during business hours (when people might use TNC drivers to access services, grocery stores, etc.)
  - Incentivize cars with bike racks, to promote active transportation
- Monitor impacts to city access post-regulation.