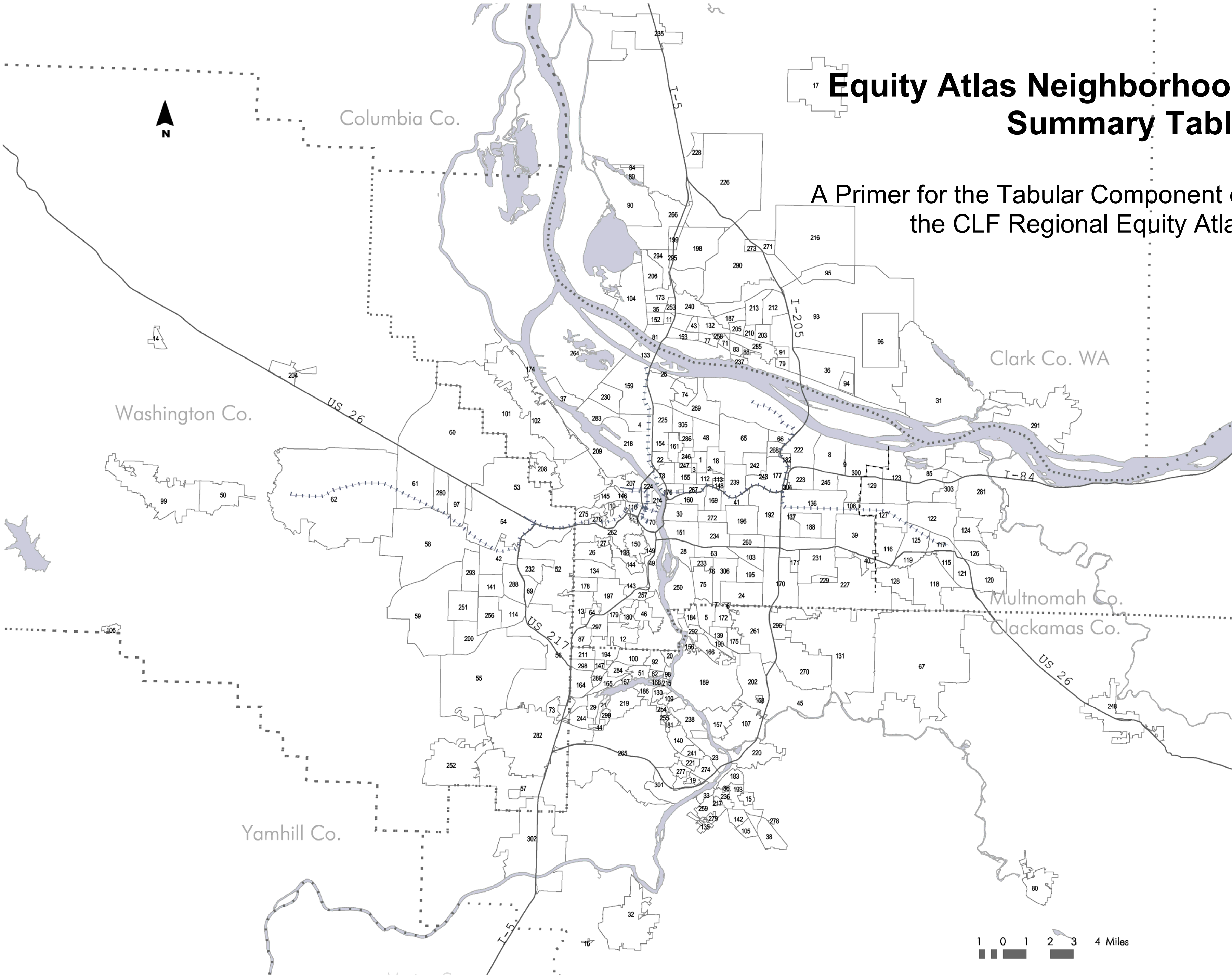
Equity Atlas Neighborhood Summary Table

A Primer for the Tabular Component of the CLF Regional Equity Atlas



Equity Atlas Neighborhood Summary Table

A Primer for the Tabular Component of the CLF Regional Equity Atlas

Prepared by Ken Radin
June 2006,
revised April 2007

CONTENTS

PREFACE

This portion of the Atlas project originally began Spring 2004 as a 'field area paper' (FAP) for the Master of Urban and Regional Planning program at Portland State University (Land Use and Urban/Regional Analysis specializations). On the other hand, one could say that the Master's project originally began as work on the Atlas, with the Coalition for a Livable Future (CLF). After two years working with the Atlas and this part of it I submitted the document June 2006, nearly a year ago. Since then one of the 'access' variables – transit access – has endured a minor overhaul. This revised document primarily reflects changes due to the new transit access variable. It has also been stripped of some academic-speak primarily meant for professors evaluating an academic focus. In most other respects the document has been left alone.

The Atlas is one way CLF is bringing questions of equity and fairness to the regional planning table – primarily by using maps of socio-economic data and of 'access' to 'opportunities', such as to parks, public transportation, and good schools, as graphic illustrations of regional equities or inequities. Based on CLF's working definition of regional equity, overlaying the geographic distribution of people in poverty with access to parks, for example, would reveal the spatial distribution of inequities in parks access relative to income (poverty). My experience with Geographic Information Systems software (GIS) and my planning education made me right for the project.

Spring quarter 2004 I enrolled in a by-arrangement course, GIS: Regional Equity Model, and the following fall I enrolled in the course that would authorize my work as a field area paper/project: GIS Raster Analysis, both of which were sponsored by Dr. Irina V. Sharkova in the School of Urban Studies & Planning. Information that would seem to follow from these course titles was germane to what I was doing with the Atlas at the time, but the Atlas work evolved. Whether due to technical glitches or to difficulties communicating technical information to a non-technically oriented audience, my Atlas work out-grew the "GIS Raster Analysis" title. In short, the type of raster analysis envisioned and developed ended up not making much sense.

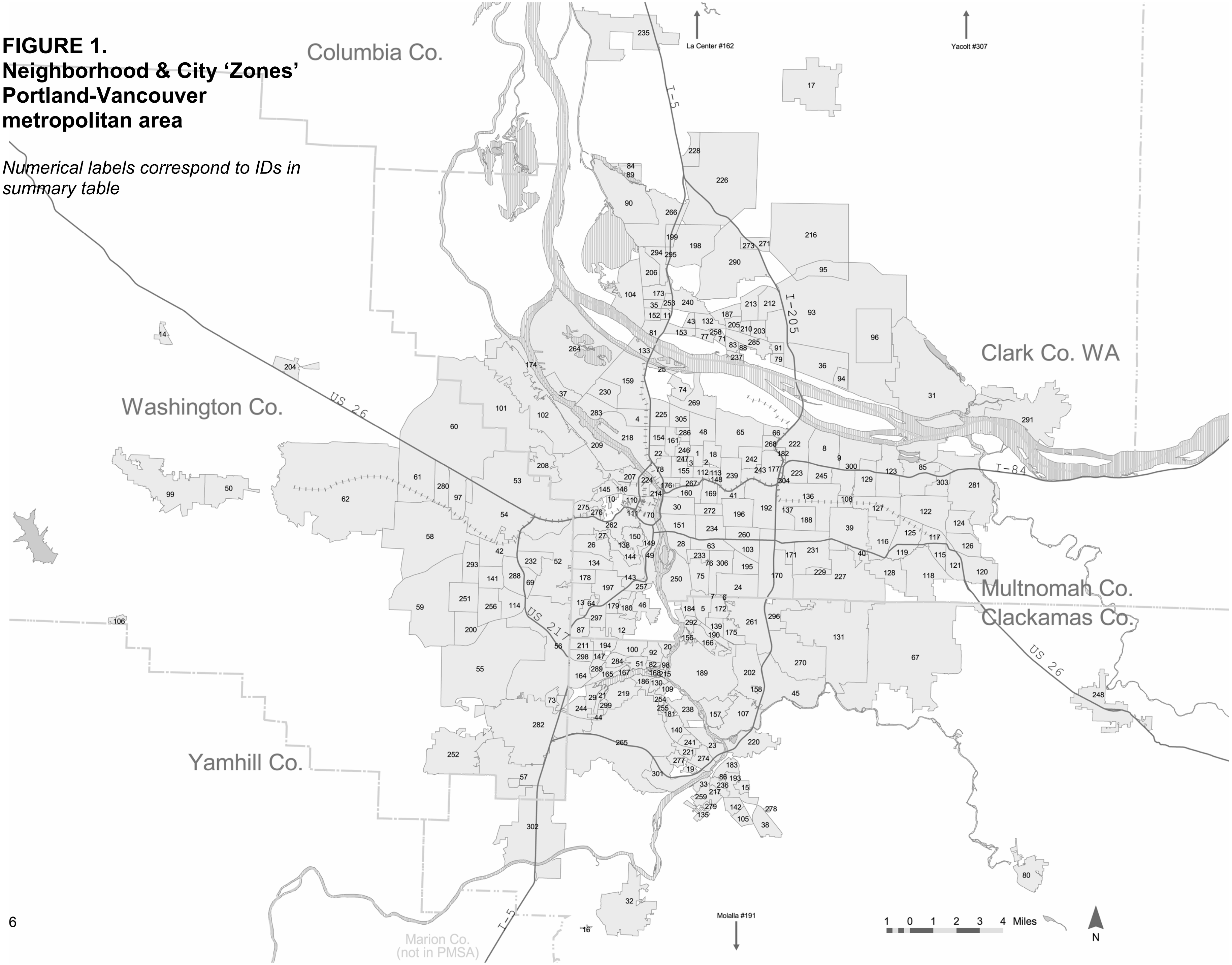
Instead, this document describes the solution to analytical problems I was tasked to solve, originally thinking raster analysis, but ultimately producing something seemingly quite different. The solution – a comprehensive table with various demographic and access variables by Portland-Metro neighborhoods and cities – can be used to cross-reference 'regional tier-scores' for access to public parks, schools, etc., with tier-scores for demographic information, such as poverty and race (among other items). The main difference between this approach and a raster-based analysis is simply a matter of spatial aggregation.

The reference table and documentation are meant to be planning and political tools at both neighborhood and regional levels – to help people identify whether their neighborhood is measuring up to others in the region, and also whether neighborhoods with high poverty rates or with many people of color have levels of access comparable to neighborhoods that are relatively rich and/or white. Despite the datedness of some of the data, the information remains useful in many respects: not only are other more recent data still not available, especially when it comes to demographic variables, but the general framework, the approach, has no alternative at present. At the end of the day, evaluating regional equity needs to be approached from some angle; it needs to start somewhere. This document and the Atlas offer that start.

Ken Radin
PORTLAND, OR
April 2007
kenradin@gmail.com

FIGURE 1.
Neighborhood & City 'Zones'
Portland-Vancouver metropolitan area

Numerical labels correspond to IDs in summary table



INTRODUCTION

This document explains the development and contents of the neighborhood summary table portion of the Coalition for a Livable Future's Regional Equity Atlas – in a manner that will help the reader know how it should or can be used. It is intended for a broad audience including academics, activist/advocates, and the general public, though parts of it may be more important to one group over another. It is less a rationale for a particular way of thinking about regional equity, more a documentation of one product that *embodies ways* of thinking about regional equity.

The document explains each variable – what's measured, why, how, limitations – and provides enough background and context to situate the work within the larger Atlas project. Understanding these will facilitate use of the information condensed in the table.

The table is structured around a few key elements, for which Section I provides an overview. Section II walks the reader through what might be a typical use. Section III provides more detail on components within the overall table structure. It serves as a reference to the table itself and compliments other reference material, both of which are found in the full Regional Equity Atlas document published by the Coalition for a Livable Future and Portland State University (order online at www.clfuture.org).

SECTION I. NBO SUMMARY TABLE STRUCTURE & DEVELOPMENT

STUDY AREA

Although the Atlas project team strived to include analysis for the 6-county "Portland-Vancouver Metropolitan Statistical Area," or "PMSA" as defined by the U.S. Census Bureau in 2000, the Atlas neighborhood and city summary table ("NBO summary table," or simply "table") includes information for neighborhoods or cities within only four of those counties, further limited to the three Oregon Metro counties for some variables. The 4-county area, which includes Multnomah, Washington, and Clackamas Counties in Oregon, and Clark County in Washington State, is usually referred to as the "Portland-Vancouver metropolitan area" (Yamhill and Columbia Counties in Oregon complete the six-county PMSA). The tri-county area, which excludes Clark, is usually referred to as the "Portland-Metro Area."

The spatial extent defined by geographies included in the table shouldn't be confused with what CLF or others ultimately consider 'the Region'. Limitations simply result from lack of capacity, such as lack of data, money, or time, rather than a willful neglect of the fuller region. Hopefully in the future, capacity to cover the full region, starting with cell values recorded as "ND" in the table (none or insufficient data, primarily for neighborhoods in Clark county) will be strengthened. Neighborhoods within the 4-counties, nevertheless, comprise the vast majority of the region's population, and so, from an analytical point of view, the limitation is not too serious.

Neighborhoods and cities were selected from Metro's Regional Land Information System (RLIS) data set (with geographies modified in some cases, discussed in Section III). These geographies are listed down the left side of the table and have a corresponding Map ID, which can be used to locate a given neighborhood on the locator map (Figure 1) or from the map find information in the table for a given neighborhood. Geographies are listed alphabetically, grouped by county (numerical IDs are based on alphabetic order).

The regional nature of the summary table, beyond being a collection of neighborhoods in the region, is expressed by features that allow comparison of neighborhood or city summary values to what's called a "regional value," which is akin to, and in some cases is, an average for the region. Rather than defining absolute thresholds for what constitute 'good' or 'bad' access, for example, or 'little' or 'much' along some other dimension, the table emphasizes comparisons to the region – the regional value treated as a middle ground, setting up standards measured against the region as a whole ("region" meaning the area delimited by neighborhoods or cities included in the table). For each variable, raw values, summary values, or scores can be compared to regional values located at the top of each column of each page. In addition, "tier-scores" (or simply "tiers," 4 of them) simplify the summary values or scores relative to regional values.

Using regional values like this presumes that interpretations of regional equity begin with comparisons to conditions measured for the region as a whole. It also defines the regional study as an *intra*-regional analysis, not an *inter*-regional one. The nature of regional values, how they may differ from averages based on data aggregated by neighborhoods, and how measurement of regional values may differ among the variables, is explained in greater detail in the example use and in Section III.

'BASE' AND 'ACCESS' VARIABLES

The width of the table spans two pages, with left page showing population and household variables – what have become known in shorthand as **base variables**, and right page showing measures of access to various resources, in shorthand simply **access variables**. This format reflects CLF's thinking about equity analyses. During CLF's outreach, participants were asked what they thought an equitable region would look like and CLF, in part, synthesized responses into a 'base vs. access' framework reflected in the table.

The term "base" in "base variables" conveys a notion of how the mapped or tabular information was supposed to be used within a regional equity analysis. The idea was to measure at locations across the region the amount or level of certain 'base' variable traits, primary among which became, over time, people of color and people in poverty, and to compare to levels of access to various resources, such as to parks, transit, and schools. The main question was: "How does access to X resource vary across the region with respect to Y population?" – Y population being **people of color**, **people in**

poverty, or a few other population characteristics, such as **children**, **seniors**, or **households without a car**. The left page of the table represents the "Y", while the right page represents the "X".

If the region were equitable, the logic goes, the distribution of levels of access with respect to levels or amounts of these population characteristics would either be similar from one location to the next or would 'fit' the base population in some fair way, such as places having relatively many households without a vehicle also having relatively high access to public transit. This is a need-based criterion of equity, where those presumably having the most need, i.e. households without cars, should have greater access to public transit, for example. These were the 'base' populations of interest in equity assessments; hence the term "base" variables.

In the table one can find where neighborhoods stand in terms of access to various resources for the general population – simply by looking at the access measures, which incorporate population either explicitly or implicitly by virtue of people sharing space. But a needs-based approach to equity calls for an assessment of access for special populations, generally 'vulnerable' populations – i.e. the base variables (except one of them, upper-income households). Hence, one needs to cross-reference access variables with base variables, most likely comparing access scores for neighborhoods with comparatively large base-variable populations to neighborhoods with comparatively small base-variable populations.

The variable 'Upper income households' has been included with the base variables as a cross-check on the other base variables – primarily on poverty and people of color, which stand in contrast to the high socio-economic status indicated where neighborhoods have relatively many upper-income households. Equity assessments typically assume better access follows higher socio-economic status. The addition of "Upper-income HH" allows a more direct assessment of this assumption.

In sum, the division of the table into a left page with base variables and a right page with access variables reflects a particular conception of how equity should be assessed. In short, everyone should have access to the resources that make places more livable, a condition that's measured under the access variables. But some populations have particular needs, or there are special reasons why some populations deserve more attention, i.e. the base variables. In order to make equity assessments, base variables need to be cross-referenced with access variables in meaningful ways.

Ideally the project team would have developed a meaningful way to summarize a combination of base and access variables, producing the tell-tale measure of equity. But developing criteria that fit every situation in an objective, simple-to-administer calculus is no easy task. There are no measures of equity or inequity; only measures of base variables and access variables that can be compared and combined by the user. CLF and the Atlas document provide analysis – ways of summarizing the data that get at questions of equity (see Figure 2). The table itself gives readers the means to do their own analyses. Some analyses implied here would require a digital dataset and facility with spreadsheet software. An Excel spreadsheet can be downloaded from the CLF website. In addition, for those with facility with GIS software, the neighborhood and city shapefile can be downloaded as well, which provides geographies to which tabular data can be joined.

Figure 2. Summary chart for regional "Food Access"

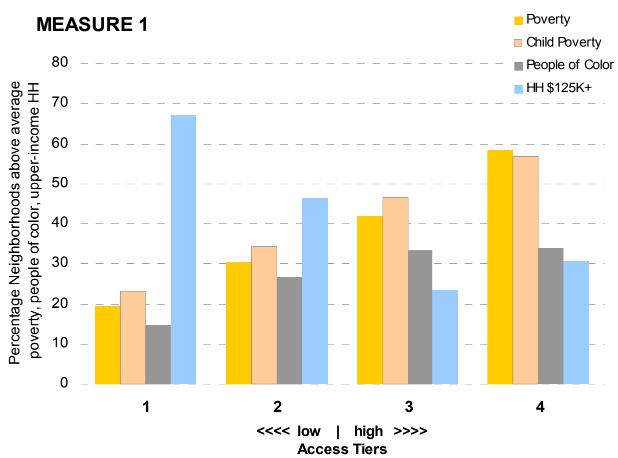


Figure 2 illustrates one way base & access tabular data have been summarized for the region as a whole. Trending bars show how neighborhoods with above average 'vulnerable' base populations are less likely to have below average food access. The pattern is nearly opposite for richer neighborhoods (light blue bars). The chart relies on food access Measure 1 tier-scores.

ACCESS VARIABLES

"Access variables" and the 'issue areas' they stand for are the most complex features in the table and in the Equity Atlas. They need the most explaining. Most of that explanation is provided for each issue area in Section III. Here a brief overview is provided.

Bold headings across the top of the right page of the table are 'issue-areas' (or stand for issue-areas) that CLF and others wanted to focus upon. These include **Housing, Schools**, **Transit**, **Food**, **Public Parks, and Natural Habitat** (although the right page of the table is labeled "Access Measures/Variables," greater precision locates the true access variables and measures underneath these 'issue-area' headings). For each issue-area, the project team moved toward one or two measurable and map-able variables that could stand for access to the resource implied by each issue-area heading. In most cases, the variables can only be called proxies, however – approximations – for the larger issue areas. For example, take the issue-area "healthy food": access to healthy food has been measured via a proxy variable – full-service grocery or natural food stores (the issue-area "healthy food" is simply labeled "food" in the table). One couldn't quite say the team has measured access to healthy food – but it has developed a useful "proxy."

"Access" itself is most often a composite measure of some other variables, such as distance to the closest park plus park acreage and the total number of people likely to share that park once they get there. Although the same analytical approach was attempted for each issue-area, various circumstances make a uniform method inappropriate. Both an access 'score' and, in most cases, component measures of access, are included in the table. And the scores have been further simplified into the 4-tier classification ("1" being low access, "4" being high access). So it is with most of the access variables, each of which is explained in greater detail in Section III.

Keep in mind that table values are summaries of more geographically detailed information, that is, there are 'underlying' data at some other geographic level, which for summary purposes have been aggregated, averaged, etc., by neighborhoods. This is particularly relevant when it comes to access variables, most of which rely on network-distance analyses that transcend neighborhood boundaries.

TIME PERIOD

Data underlying information in the table correspond to dates falling within a five-year period (unless historical data are built into the measure). The underlying base-variable demographic data are all based on the 2000 decennial census (U.S. Bureau of the Census). Access variables are based on the most current data at time of analysis, which began in 2003. For instance, some transit data – trip data for the TriMet service area – are current as of April 2005, the time at which analysis was undertaken. Underlying parks data are based on a portion of Metro's 2003 parks inventory, which was the most current and comprehensive data at time of analysis, in 2005. Two things should be kept in mind regarding the temporal dimension of the information: 1) The information is provided as if it were 'happening' all at the same time, but that's not the case. Section III provides the time period for each data source; for some interpretations knowing a more precise source date may be important. 2) Comparisons of base-variable demographic data to access variable measures always entail comparing 2000 conditions to some period later, usually within the last two years from the time this document was originally published. This may not matter a great deal for some interpretations of the information. For other interpretations, the temporal discrepancy should be closely considered.

For example, one can't say for sure that '20% of the population in X neighborhood is in poverty, and parks access is worst in the region'; one would have to say '20% of the population in 2000 *were* in poverty and parks access, based on these measures, is worst in the region'. The questions are, How likely is it that the value for the particular demographic variable in question has changed appreciably over the past 5 or so years, and how will the answer effect my interpretation? What other factors might influence access to parks? These questions should be kept in mind when using the information in the table.

The Atlas team was as interested in developing a framework as it was in developing useful, contemporary information. In the context of both goals, not getting the dates perfect and not being able to, say, include types of parks in the parks access analysis, were appropriate.

SUMMARY

In sum, the Regional Equity Atlas strived to include analysis for the most common definition of the region – the six-county PMSA. Limited data, capacity, and other things, however, limited the summary table component to the 4-county Portland-Vancouver metropolitan area in most cases, and to only the tri-county Portland-Metro Area in some cases. The Atlas document includes analysis, such as maps, for the PMSA, while the table includes information for neighborhoods or cities within either the 3 or 4 county region only. Grouped by county, neighborhood and city geographies, each of which have been given a Map ID, are listed down the left side of the table.

Values for base-variable demographic data on the left page can be compared to proxy measures of access for particular issue areas, such as housing, education, and nature, situated on the right page. Values include: ‘raw' values, such as counts, percentages, or distances for some variables; scores, which are most often a composite measure based on more location-specific raw values; and tier-scores, which are a simplification of the composite score and based on comparison of a given neighborhood's score on a given variable to the regional value for the same variable (4 classes, 1 being lowest, 4 being highest). Both base-variable values and access measures can be directly compared to regional values listed across the top of each page.

Finally, underlying base-variable data are based on U.S. Census 2000, while underlying access-variable data are based on the most current data available during the project's lifespan (roughly 2003-2006). The temporal discrepancy between base and access variable datasets limits interpretations in certain ways; the information is presented as if it's occurring at a fixed time when that's not the case. Users should try to use the information as actively as possible rather than passively accepting values as gospel. On the other hand, a great deal of care has been taken to produce good measures, so if someone were being lazy no great loss should result.

SECTION II. EXAMPLE USE

Before going into greater detail, it will help to provide an example use for those who wish to quickly reference information for their own neighborhood and make some comparisons. Only a few steps are required. The following text walks the reader through what might be a typical use of the table. It might seem tedious, but working through these few pages will allow you to use the table more confidently. Later, when specific questions arise, you can come back to find more specific information in Section III.

Using pages 1 and 2 of the table (see Figure 3 for page 1), we'll pretend you live in the Alameda neighborhood **(a)**, the first geography listed in the column furthest left (Map ID #1). Say you're interested in knowing how your neighborhood stands relative to the region on a variety of measures, both demographic (base) and access. The first place you want to look to is the tier-scores.

Figure 3. TIER score (b), summary value (c), & regional value (d) for People in Poverty, Alameda neighborhood (a)

Neighborhood / City					Population & Household Variables (								
VARIABLE>	Map ID	Area	Population (2000)	Households (2000)	People in Poverty				People of Color				Ch Pov
UNITS / NOTE>		sq mi	total	total	total (2000)	%	TIER	+- 1990-2000	total (2000)	%	TIER	+- 1990-2000	%
REGIONAL VALUES>		**524**	**1.65M**	**620K**	**153K**	**9.9**		**30K**	**318K**	**20.2**		**125K**	**12.2**
MULTNOMAH COUNTY													
ALAMEDA	1	0.49	4,030	1,620	115	2.9	1	-10	419	10.4	1	80	2.9
ALAMEDA-BEAUMONT-WILSHIRE	2	0.02	170	70	12	7.1	2	10	7	4.2	1	-10	9.5
ALAMEDA-IRVINGTON	3	0.11	790	300	16	2.0	1	10	100	12.7	2	20	1.0
ARBOR LODGE	4	0.87	6,060	2,570	622	10.3	3	-310	1,536	25.3	3	510	15.7
ARGAY	8	2.05	5,810	2,400	535	9.3	2	140	1,927	33.2	4	1,150	16.5
ARLINGTON HEIGHTS	10	0.16	330	140	20	6.2	2	0	20	6.2	1	10	0.0
ARNOLD CREEK	12	1.07	2,920	1,070	84	2.9	1	30	243	8.3	1	130	0.5

The user can quickly look-up neighborhoods in the far left column of the NBO table, then move across the columns and gather summary values or scores, simplified tier-scores, and in some cases 'raw' values and sub-measures.

For each base variable and access issue-area, at least one tier-score is provided. The tier-score is a simplified summary measure of the more detailed value or score just to the left of the columns labeled "**TIER**," in boldface across the top of the columns. Finding Alameda in the first data row and scanning right to the heading "People in Poverty," you'll find that the Poverty tier-score **(b)** occurs in the third sub-column reading left to right. It is based on the value just to its left, which is percentage people in poverty (i.e. the poverty rate) in 2000 **(c)**. The summary value equals 2.9%, which falls within the first regional tier, or "1," the lowest level among the 4-tier classes.

Tier-scores range from 1 to 4: 1 and 2 correspond to a value or score occurring below the regional value ('RV', which generally can be thought of as below average), while 3 and 4 indicate above the regional value. If you scan to the top of the column, just above the 2.9%, you'll find a boldface value in a row labeled "Regional Values": you can confirm that Alameda's 2.9% poverty rate is well below the regional rate of 9.9% **(d)**.

Records (neighborhoods) with values occurring below and above the regional value have been further subdivided by what's called a "nested median," which is one measure of the middle among values falling either below or above the regional value. In a nut shell, we call the regional value the middle, split a sorted (ranked) dataset, then use the nested median to further subdivide: The nested median defines the second division or "break" – the difference between getting a tier-score of 1 rather than a 2, or getting a 4 rather than a 3.[1] Alameda's 2.9% poverty rate is below the regional value and also below the nested median for neighborhoods that have poverty rates below the regional value. Thus it receives a tier score of "1". In sum, Alameda's 2000 poverty rate of 2.9% places Alameda among neighborhoods with the lowest poverty rates regionally, conditions summarized by its tier-score.

[1] Tier-scores for base variables on the one hand, and access variables on the other, have been classified so that one can read 3s and 4's for base variables as "above average," such as "above average poverty," while reading 1s and 2s for access variables as "below average," such as "above average poverty, below average access." In other words, base variable tier 3 is "above regional value;" access variable tier 3 is "at or above" regional value.

If you wanted to dwell a little more on poverty you could look at the other two sub-columns under "People in Poverty" and find that Alameda had about 115 people in poverty in 2000, which is 10 less than it was in 1990. But say you want to see how Alameda stands on a variety of measures, then compare to some other neighborhood you think will be quite different?

You know Alameda has a regionally low poverty rate. You choose the heading "People of Color" (still Figure 3). Looking at the tier-score you find that Alameda is also among neighborhoods scoring low in terms of percentage people of color (a tier-score of 1 based on a value of 10.4%, which is a little over half the regional rate). You then scan over to the heading "Upper Income HH" (households making more than $125,000 per year; Figure 4) and see that Alameda is in the third-tier of regional neighborhoods in terms of percent upper-income households; it's above average but not among the highest. Now, how does Alameda compare to the region as a whole in terms of access to various resources?

Figure 4. Table extract 2: Upper-income households

(2000)

ild erty	NO Vehicle HH		Children (17-)		Seniors (65+)		Upper-income HH ($125K+)	
TIER	%	TIER	%	TIER	%	TIER	%	TIER
	8.9		**25.2**		**10.3**		**7.1**	
1	3.4	1	23.1	2	9.0	2	15.9	3
2	0.0	1	25.0	2	6.5	1	23.2	4
1	2.0	1	26.6	3	9.0	2	21.6	4

Alameda is among third-tier regional neighborhoods in terms of percent upper-income households. The 'Upper-income HH' variable can be used as a cross-check on the other base variables when comparing access scores.

Looking to the right page, the access measures, again you go right to the tier-scores.[2] Figure 5 shows measures for the Housing and Schools issue-areas. In terms of housing affordability, Alameda ranks among the least affordable, with a tier-score of 1. This measure is based on the tri-county median income, how much housing it can buy, and the price of housing in Alameda. If the median income could afford housing in Alameda "index" would equal 1 or more: it equals 0.423 (one could convert this to a percentage, 42.3%, and conclude that the median income could afford, say, 42% of the median priced home in Alameda – maybe the yard, the garage, and the bedrooms, but not the rest of the home).

Looking at the sub-columns under "Schools," you find that Alameda ranks among third-tier neighborhoods in terms of access to 'quality' elementary schools, a measure based on combined scores for teacher training and teacher experience at schools in and around the neighborhood. These two issue areas – schools and housing – and their access measures, are slightly different from the approach taken for the other issue-areas and their measures. A brief discussion will help before continuing with this exercise.

Figure 5. Table extract 3: Housing & School Access Measures

Housing				Schools				
Median saleprice SFR, ~2004	Change Md.SP SFR ~1995-2004	Affordability Index (HH inc=$51K, price=$160K)		Teacher experience (elem. 2002-03)	Teachers, Master's deg. (elem. 2002-03)	Combined score		Pe w/i
2005$ (x1000)	%	index	TIER	years	%	z-score	TIER	%
218.9K	**35.7**	**0.730**		**14**	**45.9**	**0**		**3**
378.0	84.8	0.423	1	15.1	42.7	0.282	3	1
396.1	ND	0.405	1	16.5	38.3	0.497	3	[illegible]
400.7	100.8	0.399	1	15.6	42.7	0.488	3	2
194.6	90.4	0.821	3	12.2	36.4	-1.506	1	3

[2] Access tier-scores should be interpreted as a measure of "access", such as "low access" or "high access" or "above average access" rather than high or low in terms of the value in the column just to its left. A high value or score there doesn't necessarily correspond to high access.

Two summary access variables are provided for "Food," "Transit," "Public Parks" and "Natural Habitat." Scanning to the right you'll find that, below each of these headings, one sub-column is labeled "M1 TIER," another is labeled "M2 TIER" (Figure 6). The first tier-score is a simple measure that's the same for each of these resources ("resources" meaning food stores, transit service, parks, etc.). The measure, call it "Measure 1," is based on the share of a neighborhood's population that is within walking distance of the relevant resource – half a mile for full-service grocery or natural food stores, a quarter-mile for the rest. Measure 1 is easier to grasp than the other measure (call it 'Measure 2'), so we'll start with that.

Figure 6. Access Measures for Food, Transit, Parks, and Habitat: Measure 1

ACCESS VARIABLES / MEASURES																						
Food						**Transit**						**Public Parks**						**Natural Habitat**				**Map ID**
Percent pop. w/in 1/2 mile of store		Average of Network Measures				Percent pop. w/in 1/4 mile of stop		Average of Network Measures				Percent pop. w/in 1/4 mile of park		Average of Network Measures				Percent pop. w/in 1/4 mile of habitat		Habitat-acres		
%	**M1 TIER**	dist. blocks (280')	pop / GNFS (x100)	score	**M2 TIER**	%	**M1 TIER**	dist. blocks (280')	pop / trip / hr	score	**M2 TIER**	%	**M1 TIER**	dist. blocks (280')	pop / park-acre	score	**M2 TIER**	%	**M1 TIER***	per 1,000 pop	**M2 TIER**	
34		**18**	**78**	**4.0**		**58**		**10**	**221**	**5.95**		**49**		**7**	**780**	**7.43**		**64**		**54**		
10	**a** 2	12	83	4.8	3	98	**b** 4	2	41	8.69	4	27	**c** 1	6	860	6.76	2	17	**d** 2	0	1	1
9	1	11	68	5.1	3	97	4	2	39	8.43	4	0	1	6	440	7.00	2	0	1	0	1	2
21	2	11	99	4.4	3	100	4	1	32	9.14	4	0	1	12	900	5.41	1	0	1	0	1	3
32	2	13	145	2.8	2	93	4	2	47	8.61	4	51	3	5	370	7.94	3	25	2	0	1	4

Using Measure 1, we find that Alameda is among second-tier neighborhoods in terms of percent population within a 1/2-mile from a full-service grocery or natural food store (at 10%) (**a**); it's in the top tier of neighborhoods in terms of percent population within a 1/4-mile of a transit stop (at 98%) (**b**); the bottom tier in terms of percent population within a 1/4-mile of a public park (at 27%) (**c**); and among second-tier neighborhoods in terms of percent population within a 1/4-mile of natural habitat (at 17%) (**d**). In English, based on Measure 1, Alameda ranks below average on food access, top-tier on transit access, bottom-tier on parks access, and below average on access to natural habitat. Since the same method for measuring access is used for each of these issue areas – percent population within walking distance of X resource – it is fairly easy to compare access across the different issue areas, which can be advantageous.

Now, in some cases, Measure 1 may be too simplistic to capture access, so an alternative approach offers a second, usually more comprehensive measure. In general, Measure 2 access summaries combine 3 components: distance, the amount of the resource, and total population sharing that resource. However, different characteristics of each resource, including simply data availability, preclude implementation of the exact same approach for all of the issue-areas. This is one reason why both access measures have been preserved in the table.

The advantages of the second measure are easiest to see when it comes to the transit and parks issue-areas, less so for access to full-service grocery stores, and for access to natural habitat, Measure 2 is a strictly alternative, no-added advantage measure. Section III offers more detailed explanations. Here a working knowledge is provided.

We'll make parks access an example. When it comes to assessing the equitable distribution of access to parks we need to be interested in the amount of park provided, not only a fixed distance within which a certain percentage of the population may or may not live. In addition, we need to be interested in the number of people potentially sharing that park once they get there. Most residents of a given neighborhood could live very close to a park and, thus, the neighborhood would score high in terms of Measure 1. But the parks could be very small and shared by 10,000 people, which wouldn't be very good access (or service). Hence, the second parks access measure integrates park acreage and total population likely to share that park (by virtue of living closer to it than any other one), along with a continuous distance measurement ("continuous" meaning 250 feet, 251, 252, 253 and so on distance-units, rather than a fixed distance, set at a 1/4-mile, for example). Access Measure 2 for Food and Transit follow the same logic, yet they are implemented in slightly different ways.

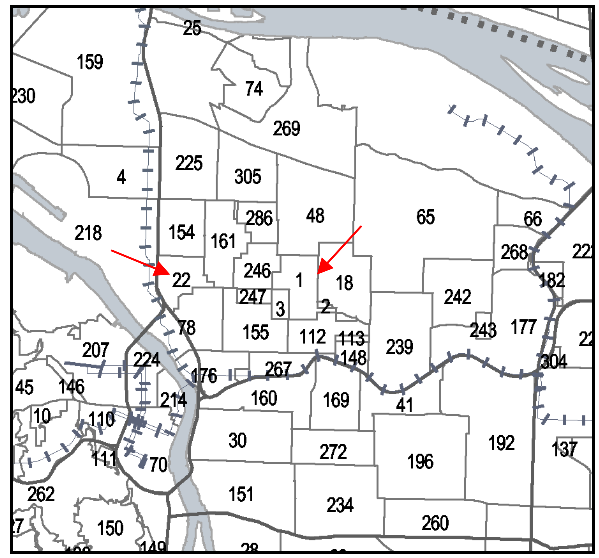
Continuing with the Alameda example, you look to the park's "Average of Network Measures"[3] columns, sub-column "M2 TIER," and find that Alameda ranks among second-tier neighborhoods in terms of parks access using Measure 2, whereas it ranks in the bottom tier using Measure 1. Whether you rely on access Measure 1 or access Measure 2 is up to you; they both have advantages and disadvantages, depending on your overall goals.

For parks, Measure 2 is considered more comprehensive – a better stand-alone measure. For "Food" the same approach is taken, but there is no measure of the 'amount' of the resource, such as store size, as there is for parks (i.e. park acres); only the number of stores nearby is used as the amount of resource in food access Measure 2. It remains debatable whether it is any better or more comprehensive than Measure 1. For "Transit," the amount of the resource is the number of trips at stops within walking distance of locations within neighborhoods. Measure 2 is considered the more comprehensive, better stand-alone measure if access to overall service rather than just to nearby stops is of concern. And for access to habitat, Measure 2 is just a different approach, a 'bonus' measure that doesn't try to be more comprehensive or complete; it is a measure of the habitat-acres within a given neighborhood per 1,000 residents in that neighborhood. There is no distance component – except for the fact that habitat-acres and residents are bounded by the same neighborhood or city boundary for which the summary is made.

[3] "Average of Network Measures" is a catch-all phrase that refers to how values in each of the sub-columns were developed. Before being averaged by neighborhood, values for each sub-variable exist at locations along a rasterized street network. In essence, the measures are developed for locations more specific than the neighborhood geography, but they are averaged by neighborhood in order to simplify the information.

So, with some base and access tier-scores for Alameda under your belt, you're still interested in comparing Alameda to some other neighborhood. Turning to the locator map might be a good place to start; perhaps you're interested in finding a neighborhood that is near Alameda but for which you know the demographic make-up to be quite different. Alternatively, maybe you know a neighborhood name and want to look it up. Here you'll do a little of both.

Figure 7. Alameda (1) and Boise (22) Neighborhoods



Looking at the locator map (or see Figure 7) you find Alameda (1) in the northeast Portland area and move west to neighborhood 22. You look up Map ID 22 in the table and find it a few rows below Alameda: Boise (see Figure 8, next page).

Boise you know to be an historically African-American neighborhood, so you go right to the "People of Color" heading and tier-score. You find Boise is among fourth-tier neighborhoods with respect to percent people of color, the highest tier, based on a value of 67.1%. Looking at the other base variables you quickly find that Boise is also top-tier

Figure 8. Comparing Neighborhoods: Demographic 'Base' Variables

VARIABLE>	Map ID	Area	Population (2000)	Households (2000)	People in Poverty				People of Color				Child Poverty		NO Vehicle HH		Children (17-)		Seniors (65+)		Upper-income HH ($125K+)	
UNITS / NOTE>		sq mi	total	total	total (2000)	%	TIER	+- 1990-2000	total (2000)	%	TIER	+- 1990-2000	%	TIER	%	TIER	%	TIER	%	TIER	%	TIER
REGIONAL VALUES>		**524**	**1.65M**	**620K**	**153K**	**9.9**		**30K**	**318K**	**20.2**		**125K**	**12.2**		**8.9**		**25.2**		**10.3**		**7.1**	
MULTNOMAH COUNTY																						
ALAMEDA	1	0.49	4,030	1,620	115	2.9	1	-10	419	10.4	1	80	2.9	1	3.4	1	23.1	2	9.0	2	15.9	3
ALAMEDA-BEAUMONT-WILSHIRE	2	0.02	170	70	12	7.1	2	10	7	4.2	1	-10	9.5	2	0.0	1	25.0	2	6.5	1	23.2	4
ALAMEDA-IRVINGTON	3	0.11	790	300	16	2.0	1	10	100	12.7	2	20	1.0	1	2.0	1	26.6	3	9.0	2	21.6	4
ARBOR LODGE	4	0.87	6,060	2,570	622	10.3	3	-310	1,536	25.3	3	510	15.7	3	9.0	3	20.4	1	12.5	3	2.1	1
ARGAY	8	2.05	5,810	2,400	535	9.3	2	140	1,927	33.2	4	1,150	16.5	3	5.5	2	22.2	2	20.4	4	5.6	2
ARLINGTON HEIGHTS	10	0.16	330	140	20	6.2	2	0	20	6.2	1	10	0.0	1	10.1	3	21.5	2	12.9	3	44.9	4
ARNOLD CREEK	12	1.07	2,920	1,070	84	2.9	1	30	243	8.3	1	130	0.5	1	1.7	1	29.8	4	8.1	2	27.9	4
ASHCREEK	13	1.22	5,290	2,210	293	5.5	2	170	673	12.7	2	330	5.8	2	2.5	1	23.0	2	7.8	1	12.7	3
BEAUMONT-WILSHIRE	18	0.72	5,160	2,180	227	4.4	1	60	716	13.9	2	280	5.0	1	5.6	2	21.4	1	12.1	3	11.7	3
BOISE	22	0.43	3,090	1,160	908	29.7	4	-100	2,075	67.1	4	140	39.7	4	30.4	4	28.1	3	8.0	2	1.1	1
BRENTWOOD/ DARLINGTON	24	1.75	11,500	4,320	1,357	11.9	3	-480	2,777	24.1	3	1,770	16.2	3	8.6	2	25.9	3	9.5	2	1.3	1

on most of them: top-tier in poverty, child poverty, and households without cars. You find that it's above average in terms of children, below average in terms of senior citizens, and bottom-tier in terms of upper-income households (only 1.1%). What does *Boise's* access scores look like?

You start with Housing affordability (Figure 9). Boise's tier-score is 3 on the Affordability Index, indicating that its housing (single-family) is more affordable than housing throughout the region as a whole. You turn to the other housing measures, however, and find that, over the past decade, change in median sale price for single-family housing has skyrocketed in the neighborhood – increasing about 153%, nearly double the change that occurred in Alameda and more than quadruple the change that occurred within the region as a whole.

You move to the Schools heading. Here you find that Boise ranks among bottom-tier neighborhoods in terms of access to elementary schools with comparatively highly educated and experienced teachers. The Schools sub-measures indicate that most of the deficit relative to Alameda is due to teacher experience: average years of experience for teachers at schools in and around the Alameda neighborhood equals 15.1 years, while it is only 11.5 years for teachers at schools in and around the Boise neighborhood. Values for teacher training for both neighborhoods are nearly the same.[4] Given the high poverty rate and the large share of Boise's population that is of color, it's a disappointment to find that it scores lower on school access than Alameda (despite the fact that you, in this fictional case, are a resident of Alameda). Moreover, looking back at the "Children" base variable, you realize that children make up a larger share of Boise's population than they do for the region as a whole (28.1% vs. 25.2%), while Alameda has a smaller share (23.1%). You continue to the other access measures.

Alameda scores a 2 and a 3 on food access (access to full-service grocery or natural food stores) based on Measures 1 and 2 respectively. Boise scores 1 and 1 on both measures. Boise's Measure 1 value, "percent pop. w/in 1/2-mile of store," which equals 0%, reveals that nobody living in the Boise neighborhood lives within one-half mile network distance of a full-service grocery store.

---

[4] Values in the schools sub-columns are a weighted average of values for schools that intersect each school's 1-mile network-distance service area: the measures are not limited to schools that fall within each neighborhood only. In other words, students in each neighborhood have access to schools beyond the boundary of their neighborhood, defined by whether and how much of a given school's 1-mile service area intersects the given neighborhood.

Figure 9. Comparing Neighborhoods: Access Variables

Housing				Schools				Food						Transit						Public Parks						Natural Habitat				Map ID
Median sale price SFR, ~2004	Change Md.SP SFR ~1995-2004	Affordability Index (HH inc=$51K, price=$160K)		Teacher experience (elem. 2002-03)	Teachers, Master's deg. (elem. 2002-03)	Combined score		Percent pop. w/in 1/2 mile of store		Average of Network Measures				Percent pop. w/in 1/4 mile of stop		Average of Network Measures				Percent pop. w/in 1/4 mile of park		Average of Network Measures				Percent pop. w/in 1/4 mile of habitat		Habitat-acres		
2005$ (x1000)	%	index	TIER	years	%	z-score	TIER	%	M1 TIER	dist. blocks (280')	pop / GNFS (x100)	score	M2 TIER	%	M1 TIER	dist. blocks (280')	pop / trip / hr	score	M2 TIER	%	M1 TIER	dist. blocks (280')	pop / park-acre	score	M2 TIER	%	M1 TIER*	per 1,000 pop	M2 TIER	
218.9K	**35.7**	**0.730**		**14**	**45.9**	**0**		**34**		**18**	**78**	**4.0**		**58**		**10**	**221**	**5.95**		**49**		**7**	**780**	**7.43**		**64**		**54**		
378.0	84.8	0.423	1	15.1	42.7	0.282	3	10	2	12	83	4.8	3	98	4	2	41	8.69	4	27	1	6	860	6.76	2	17	2	0	1	1
396.1	ND	0.405	1	16.5	38.3	0.497	3	9	1	11	68	5.1	3	97	4	2	39	8.43	4	0	1	6	440	7.00	2	0	1	0	1	2
400.7	100.8	0.399	1	15.6	42.7	0.488	3	21	2	11	99	4.4	3	100	4	1	32	9.14	4	0	1	12	900	5.41	1	0	1	0	1	3
194.6	90.4	0.821	3	12.2	36.4	-1.506	1	32	2	13	145	2.8	2	93	4	2	47	8.61	4	51	3	5	370	7.94	3	25	2	0	1	4
216.6	22.3	0.738	3	14.9	49.1	0.764	3	36	3	14	133	2.5	2	84	3	3	74	7.81	3	54	3	5	430	7.75	3	13	1	35	2	8
537.3	68.8	0.297	1	17.0	47.8	1.546	4	18	2	14	30	6.5	4	80	3	2	15	9.40	4	100	4	1	0	9.80	4	100	4	145	4	10
355.4	40.2	0.450	1	14.7	44.0	0.206	3	13	2	18	112	2.4	2	19	1	8	378	3.72	1	25	1	8	100	7.65	3	100	4	107	3	12
257.5	44.2	0.620	2	18.2	42.0	1.556	4	13	2	16	90	3.4	2	56	2	4	219	6.45	3	40	2	6	240	8.03	3	100	4	35	2	13
285.5	75.7	0.560	2	16.2	43.0	0.793	3	77	4	7	76	5.8	3	92	4	2	56	8.27	4	32	2	6	660	7.19	2	33	2	3	1	18
191.6	152.5	0.834	3	11.5	40.9	-1.429	1	0	1	17	124	2.1	1	100	4	2	32	8.88	4	78	4	4	1,390	7.27	2	0	1	0	1	22
152.4	66.4	1.048	4	12.5	40.8	-1.021	1	43	3	11	87	4.8	3	80	3	3	168	7.38	3	37	2	5	990	7.36	2	13	1	2	1	24

Interested in knowing more about this you move to the Food "Average of Network Measures" columns, sub-column "dist blocks (280')," and find that the average street network distance from locations within the Boise neighborhood to the nearest grocery store is 17 city-blocks – which is nearly a mile. Remembering that Boise is top-tier on 'Households without a vehicle' (30.4% of Boise households didn't have a vehicle in 2000), a lack of grocery stores nearby is annoying. In terms of need-based equity you'd hope to find Boise scoring higher in food access. In contrast, Alameda's food access tier-scores are 2 and 3 on each measure, respectively, while only 3.4% of its households didn't have a vehicle in 2000.

You move to the Transit heading, on the other hand, and find some good news: Boise scores a 4 on Measure 1 transit access, with 100% of its population living within a 1/4-mile of a transit stop. It also scores a 4 on Measure 2 transit access, which measure includes the number of trips at those stops and the number of people potentially sharing those trips. If again you compare to Alameda, you'll find that both neighborhoods have about the same level of transit access.

In conclusion, looking-up base and access variables for the Alameda and Boise neighborhoods, you've uncovered some cause for concern. In a neighborhood where such a large percentage of households don't have a car, for example, and where the poverty rate is among the highest, Why living in Boise does one have to travel nearly a mile to get to a grocery store? And where children make up a larger fraction of the population, Why does Boise rank among the lowest in terms of access to elementary schools with comparatively highly educated and experienced teachers? Beyond looking at one or two variables side-by-side, there's a host of ways one might summarize the information. For instance, you could use base variables to help define 'hardship' neighborhoods, tally tier-scores, then do the same for access variables. Boise's 'hardship' tally would be 17 out of a possible 20, where a high tally indicates high need, or high hardship. Alameda, by comparison, is 7. When you tally the access measure 2 tier scores (excluding housing, which doesn't quite fit conceptually), Boise scores 9 out of 20, whereas Alameda scores 13. In an equitable region one might hope to find Boise scoring as high as Alameda, but perhaps higher due to greater need. Now perhaps you will want to look-up other neighborhoods and see if you find any trends. You could begin to build a case to support your theories. Doing so, you'll find more detailed information in the next section if you need to know more about the measures and methods.

SECTION III. SUMMARY TABLE CONTENTS (DETAILED)

Section III offers more detail for components within the table structure. It is divided into the table's main headings (with the exception of "Regional Values"), which include: Neighborhood/City, Regional Values, Population & Household 'Base' Variables, and Access Variables/Measures. Each part or sub-part begins with a general description, followed by source data/dates, measures/methods, and additional discussion where relevant. Note that most information provided under these headings is based on methods heavily reliant on GIS software. The text tries to offer enough explanation so the user understands concepts and measures; it does not offer a step-by-step GIS methodology.

NEIGHBORHOOD/CITY

Neighborhoods or cities for the Portland-Vancouver Metro Area are used as the unit of analysis – the unit by which demographic base variables and access measures are summarized – for the tabular component of the Regional Equity Atlas. Most are 'official' neighborhoods; however, where no neighborhood exists in the source data, or where the neighborhood is a city in the source data, a city is used. And if the city in the city file is more up-to-date than the city in the neighborhood file (where a city is the neighborhood) the city from the city file is used. In a few instances the city geography is privileged over the neighborhood geography – where the two overlap or if the city (or cities) in the vicinity are smaller in area than the neighborhood. Locations with major modifications of this type include Tualatin-Sherwood and Happy Valley-Damascus, where these cities cut into and replace parts of the underlying neighborhoods. Neighborhood IDs in the table should be cross-checked against geographies depicted in the locator map, as the name may reference a geography that has been modified from the source data. Figure 10 illustrates most of the major modifications.

Base data source/s:
nbo_hood.shp and cty_fill.shp: Metro Data Resource Center RLIS May 2005.

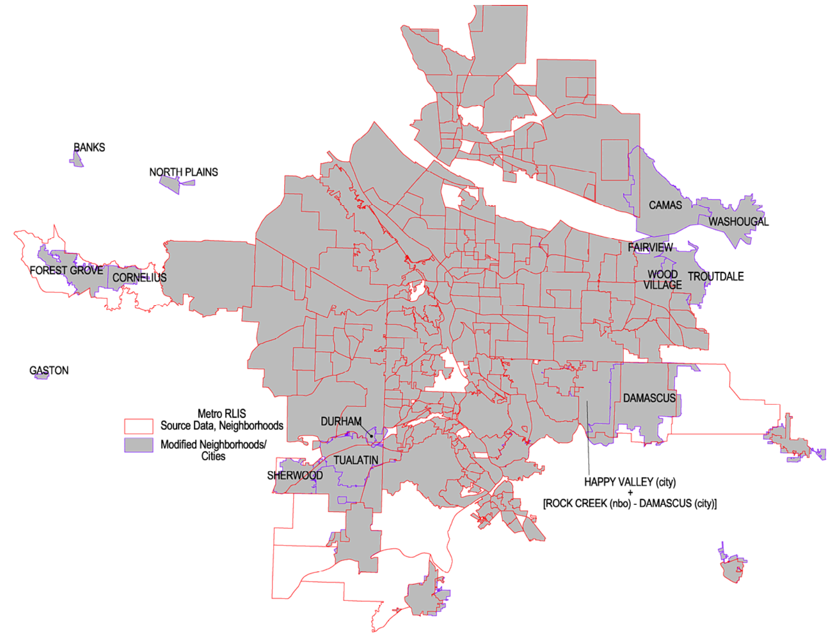


Figure 10. *Red boundaries from neighborhood source data overlay blue boundaries and grey fill of neighborhood & city 'zones' used in tabular summaries. Blue lines identify most areas where changes have been made. Labels apply to grey/blue geos added and/or that alter or take the place of red-bounded geos. A few red-bounded geos were 'dissolved' from 2 or more shapes into one, where multi-hyphenated neighborhoods existed.*

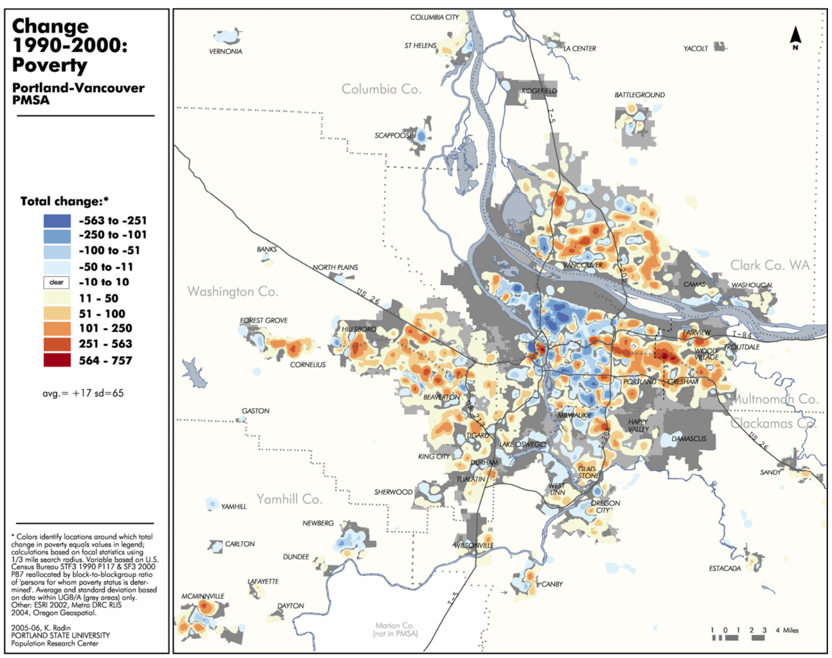
Discussion
After about two years working with data for the Portland-Vancouver Metro region, the Atlas team decided to summarize analyses-to-date and subsequent analyses by neighborhoods. This wasn't a decision made lightly. In the beginning, the team relied on Census geographies – tracts – as the unit of analysis. But Census tracts by many were considered arbitrary or too big and, as a result, obscured some of the things people wanted to know. The team then shifted to raster analysis and surface-statistics mapping.[5] At the time, wanting

[5] A "raster" represents smooth, continuous geographic features with a bunch of squares or cells. Each feature's attributes are 'interpolated' in some manner to the cells; each cell has an X-Y coordinate at its center; and surface statistics mapping generalizes the cell values at the X-Y coordinates over some larger area, such as a 'search circle' with a 1/3-mile radius.

to combine many variables, this kind of analysis, which makes overlaying and combining variables and graphically depicting the result relatively easy, seemed like a good choice. Plus, it offered the potential for location-specific analyses, where location-specific data were available (such as point locations, parcel-level data). But then, other shortcomings arose. Surface-statistical analyses, for example, produce nice maps that illustrate regional spatial patterns (Figure 11). But when it comes to talking about the patterns people want to point to a specific area or location and be able to call it something. In short, the surface-statistical approach turned out to be too general, *too* regional. So finally, the team chose neighborhoods.

Information provided by neighborhoods, either in maps or in tabular form, also comes with pros and cons, however. Chief among the cons is that the neighborhood concept isn't the same or equally important among the region's residents. Portland has a strong neighborhood system by most accounts, whereas Clackamas County by comparison does not. Washington County mixes "Citizen Participation Organizations" (CPOs) with typical neighborhoods (CPOs tend to transcend localness, unlike the typical neighborhood). Clackamas County may submit, say, Sandy the city boundary as Sandy the neighborhood to be used in the RLIS neighborhood file – but use an out-dated city boundary. Meanwhile, in Portland, one hears about neighborhood boundary disputes that go to court, meaning, Portlanders tend to care about their neighborhoods, probably more than residents in other areas.

Figure 11. An example of an Atlas "surface-statistical" map



In sum, neighborhoods are not all equal. Aggregating data by them privileges jurisdictions where neighborhoods are more important. Moreover, the nature of a regional equity atlas tends to be at odds with the nature of people and their neighborhoods, where territorialism rules: the Atlas is supposed to foster a regional perspective and cooperation, not balkanize the region. And, of course, treating territory within neighborhoods as if it were all the same neglects detail found within neighborhood boundaries.

So why choose neighborhoods at all? One, they might make it more likely that individuals will perceive the information as relevant. The presumption is that people do or can identify with their neighborhoods more easily than with the region as a whole. If the neighborhood analysis is, itself, situated within a regional framework, then a regional perspective is fostered – with easier conceptual steps from individual or household, to neighborhood, and then to region. Two, most neighborhoods (and all cities) have some kind of administrative body to which citizens can appeal if they have issues, such as equity issues uncovered in analyses of the NBO summary information. Three, beyond theory, neighborhoods offer a convenient number of units to put into a printed table – and they make OK maps (cities alone, by contrast, make decent tabular data, but crummy maps).

The neighborhood summary table is one component of the larger Atlas; one way to consider the data. Hopefully all material is used together and users don't become too obsessed with particular neighborhoods.

REGIONAL VALUES

A Regional Value is a summary measure for the region as a whole. In the Atlas, Regional Values are used as a 'middle-of-the-road' value to which neighborhood values can be compared – explicitly if using 'raw' values or scores, implicitly if using tier-scores, which already have the regional value built-in. Regional values are listed across the top of the table. For most variables, the regional value is a 'true' regional value, where primarily disaggregated data have been aggregated (summarized) by the regional geography. For some variables, this approach doesn't make sense and an average of neighborhood values or scores is used as the regional value. The regional values for the "schools" access measures, for example, are based on an average of neighborhood values – because a distance weighting has been built into the measures at the neighborhood level. In contrast, regional values for the "housing" access measures are based on disaggregated data (i.e. on individual housing units) summarized by the regional geography.

Base data source/s:
Regional values are calculated from underlying data on which the NBO summaries are based.

Discussion
If we use language loosely, we can say neighborhoods are the unit of analysis for this study and we're interested in comparing one neighborhood to the next. But that's not exactly true. To be more precise, we're most interested in comparing neighborhoods to the region. This is a little hard to explain – so take a concrete example. The regional value for 'poverty' is the poverty rate for the region, not the average of poverty rates for all neighborhoods within the region.

Say a region consists of three neighborhoods, with poverty rates equal to 9%, 15%, and 2%, which produce an average of **8.7%** (9+15+2) / 3. And say those percentages are based on ratios of people in poverty to total population equaling 18/200, 60/400, and 20/1,000. Total poverty in this fictional region equals 18+60+20=98, and total population equals 200+400+1,000=1,600. The regional poverty rate – the regional value – thus equals 98/1,600 X 100, or **6.1%**. That's different than the average of neighborhood values.

The same approach to calculating regional values has been used for the other base variables and access measures – to the extent possible.

When it comes to access measures, which are composite measures of multiple variables, calculation of regional values becomes more complex. Here preservation or emulation of the underlying logic has been attempted as much as possible. Descriptions of each access measure in Section III include identification of the nature of each variable's regional value.

Regional values are one of the key features that make the Atlas's equity analysis a regional one. It is a conservative approach in terms of defining 'good' and 'bad' or 'much' and 'little', in the sense that it begins at a common-sense point of departure, saying, 'this is what it's like for the region as a whole: What's it like in your part of the region?' If your part is worse than what it's like for the region in general, one might say it isn't fair. On the other hand, there are cases where measures reveal that the whole region isn't very good, such as with housing affordability, where the regional value isn't exactly a good value to be at.

It remains debatable whether relative values or absolute thresholds are most important for equity analyses. On the one hand, people argue that it doesn't matter how absolutely bad or good a place is; if it's below average, or at the bottom of all places, resources should be concentrated there to fix the problem. On the other hand, some people argue that we need to use absolute thresholds that define when something is bad or good. The problem is, Where do these thresholds come from? Most often they come from people with power and/or authority, such as 'the federal standard' – as if the federal government, or whoever at such and such institution, knows anything more about standards for this region than the region's residents themselves. In the absence of absolute thresholds, relative values are a good starting place. And in a regional equity analysis, the logical standard for these relative values is the regional value.[6]

[6] Myron Orfield, who has done extensive research and analysis of regional equity, has consistently used 'regional values' in his classification schemes. See Orfield 1997, 1998, 2002 in "Works Consulted."

POPULATION & HOUSEHOLD 'BASE' VARIABLES

"Population & Household 'Base' Variables," within a needs-based equity analysis, are the primary populations of interest with respect to measurements of access to resources associated with access issue-areas. Some need-based regional equity analyses attempt to identify concentrations of these 'vulnerable' populations, either relative to area (i.e. density) or relative to the general population (i.e. percentages) and to assess levels of access. The NBO table uses percentages, and tier-scores based on those percentages, to identify neighborhoods that have concentrations of these base-variable populations. In addition, for those interested in comparing access scores for neighborhoods likely to have contrasting socio-economic status, the variable "Upper-income Households" has been provided. Each base variable tier-score by neighborhood can be cross-referenced with access variable tier-scores also by neighborhood, which have been classified in the same manner.

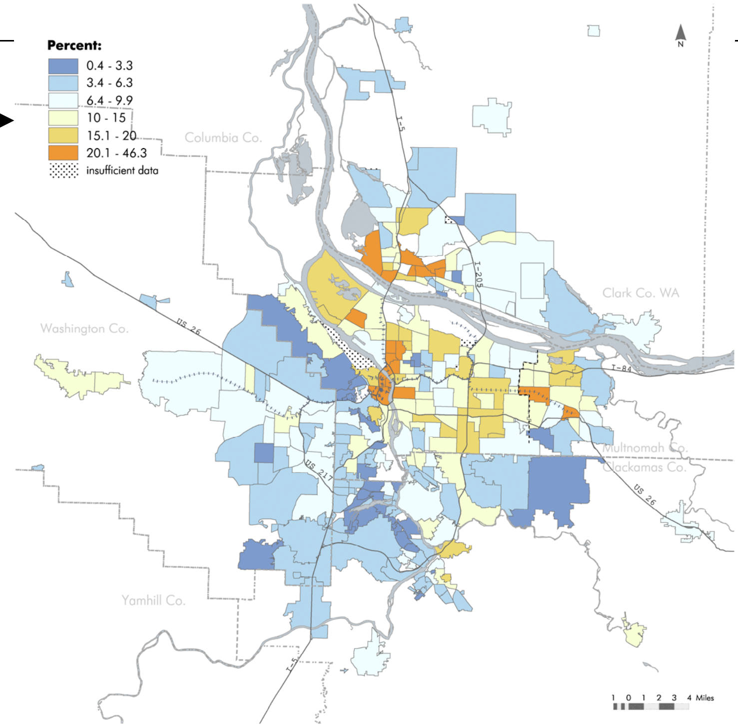
Base data source/s:
Base variables rely on Census 2000 data "interpolated," or allocated, to neighborhood geographies. For "People of Color," "Children," and "Seniors," this produces an estimate by neighborhood of an official 2000 Census block-level count. For "People in Poverty," "Child Poverty," "NO Vehicle HH," and "Upper-income HH," this produces an estimate by neighborhood of an estimate by Census blockgroup. The former values are more reliable than the latter.

The following pages list base variable headings, followed by: the regional value (RV), measures/values included in the table, the denominator in percentage calculations, and the Census table name, number, and title in the source data. Note that percentages can be converted to counts by multiplying percentage-fraction times values in "total population" or "total households" columns (child poverty counts will be rough estimates as the denominator in percent child poverty doesn't include institutionalized group quarters and unrelated children, i.e. not total population).

For more information on underlying Census variables, go to: http://factfinder.census.gov

Select "data sets" "decennial census" from the menu at left of the webpage. Choose year of interest (i.e. 2000) and data set ("SF3," "STF1" for example), then click the "enter a table number" link in the menu to right of webpage and enter the table number of interest (i.e. "P87," "H44," etc.). This sequence of steps will take you to a search page that allows you to insert the place of interest, such as "United States," which is the default. If you click "add," the search will add "United States;" clicking "show result" will take you to a webpage with the table values for the table of interest. From here you can click the table heading, which is a link that takes you to another webpage where various components of the variable are linked to definitions, explanations, methods, etc. There are other ways to navigate to the correct information as well. The factfinder site has a wealth of information superbly documented and easily accessible via the internet.

People in Poverty



- total (2000), Regional Value=153,000
- % denominator= 'people for whom poverty status is determined' (primarily excludes institutionalized group quarters populations); RV= 9.9%
- TIER – regional tier-score based on percentage
- +- 1990-2000 – total change between 1990 & 2000; RV = +30,000

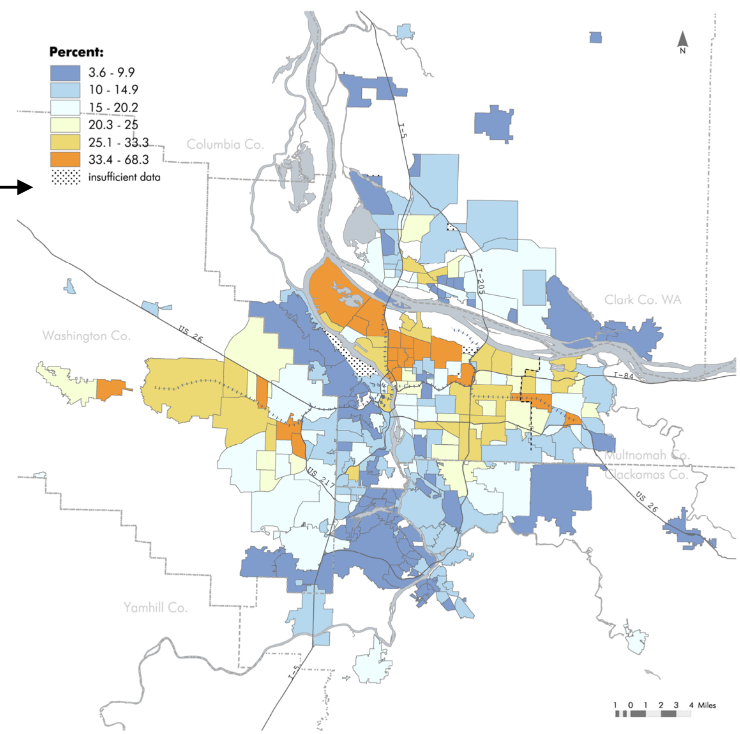
P87. POVERTY STATUS IN 1999 BY AGE [17] - Universe: Population for whom poverty status is determined
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data
P117. POVERTY STATUS IN 1989 BY AGE - Universe: Persons for whom poverty status is determined
Data Set: 1990 Summary Tape File 3 (STF 3) - Sample data

Child Poverty

- Children under 18 years-old
- % denominator= persons under 18 for whom poverty status is determined (primarily excludes institutionalized groups quarters and unrelated children); RV=12.2%
- TIER – regional tier-score based on percentage

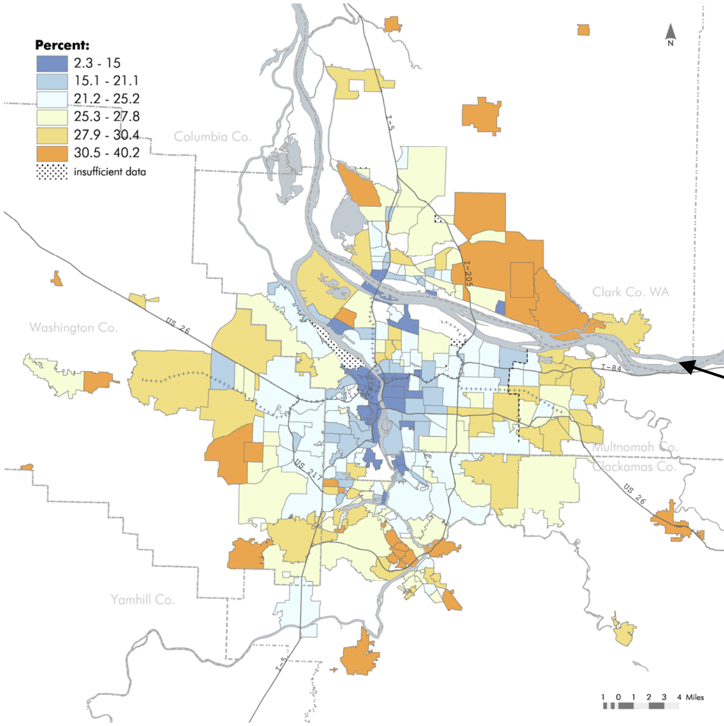
P87. POVERTY STATUS IN 1999 BY AGE [17] - Universe: Population for whom poverty status is determined

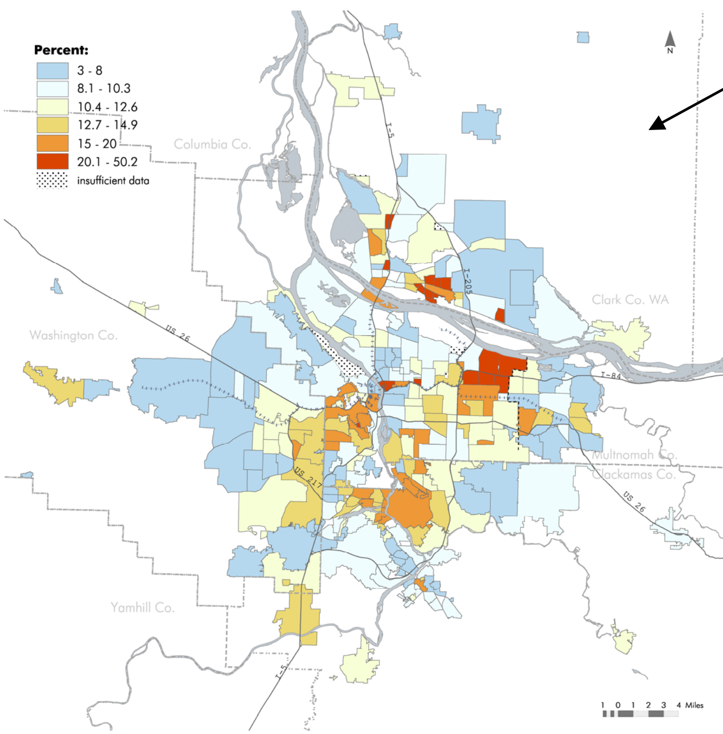
People of Color



- Total population excluding "White, not of Hispanic Origin"
- total (2000), RV=318,000
- % denominator=total population, RV=20.2%
- TIER – regional tier-score based on percentage
- +- 1990-2000 – total change between 1990 & 2000, RV=+125,000

P8. HISPANIC OR LATINO BY RACE [17] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
P010. HISPANIC ORIGIN BY RACE - Universe: Persons
Data Set: 1990 Summary Tape File 1 (STF 1) - 100-Percent data





NO Vehicle HH

- Households without a motor vehicle
- % denominator= Households. RV=8.9%
- TIER – regional tier-score based on percentage

H44. TENURE BY VEHICLES AVAILABLE [15] - Universe: Occupied housing units (i.e. Households)
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data

Children

- Population under age 18
- % denominator=total population, RV=25.2%
- TIER – regional tier-score based on percentage

P12. SEX BY AGE [49] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

Seniors

- Population age 65 and older
- % denominator=total population, RV=10.3%
- TIER – regional tier-score based on percentage

P12. SEX BY AGE [49] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

Upper-income HH

- Households making $125,000 or more in 1999
- % denominator=Households, RV=7.1%
- TIER – regional tier-score based on percentage

P52. HOUSEHOLD INCOME IN 1999 [17] - Universe: Households
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data

ACCESS VARIABLES/MEASURES: HOUSING

In the NBO table, the Housing issue-area has been reduced from various ideas to access to single-family housing, measured by: a summary "affordability index," its accompanying regional tier-score, a sub-component of the affordability index (median sale price in ~2004), and an additional measure – change in median sale price ~1995-2004.

Base data source/s:
Single-family housing units, year built, and sale price extracted from taxlot.shp, Metro Data Resource Center RLIS February 2006. Attributes 'yearbuilt', 'landuse', and various others used to identify single-family units from source data. Anomalous prices, such as $1, removed from dataset. Prices inflation-adjusted to 2005$ using "The Inflation Calculator," http://www.westegg.com/inflation/

Median sale price SFR, ~2004

Median sale price single-family residential housing units, based on sales during the 2003-2005 period.

- in 2005 dollars; cell values x $1,000
- Regional Value=218.9K ($218,900): value reflects true median calculated from disaggregated data (i.e. values for each housing unit)

Change Md.SP SFR, ~1995-2004

Percentage change in median sale price SFR units (see Figure 12). Median in "~1995" calculated from sales during the 1993-1997 period; median in "2004" calculated from sales during the 2003-2005 period. Longer periods are necessary to ensure an ample number of data points, within each neighborhood, on which the median sale price is based. Only neighborhoods with 10 or more sales in each period are included in this historical change calculation.

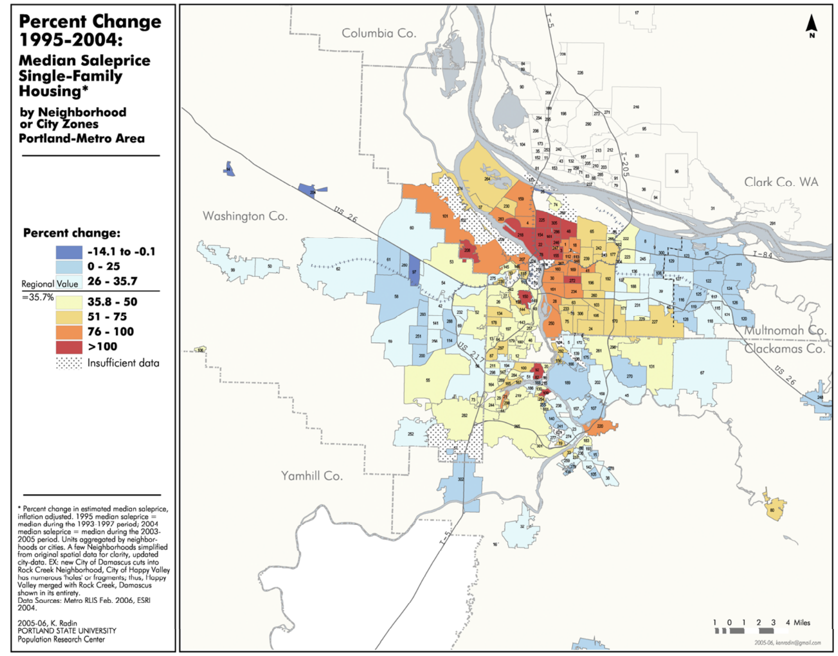


Figure 12. *Northeast Portland neighborhoods experienced the greatest increases in single-family housing prices over the last decade, followed by inner-Portland neighborhoods. Beaverton/Aloha, Gresham, and Oak Grove/Oatfield anchor the majority of neighborhoods that saw the least change.*

Affordability Index (HH inc.=$51K, price=$160K)

The affordability index (Figure 13) is the summary housing access measure accompanied by its regional tier-score. It is based on:

- 2004 tri-county median household income ("HH inc.=$51K")
- housing purchasing power one could expect that income to leverage ("price=$160K"), and
- the sub-component "median saleprice SFR, ~2004" for housing in each neighborhood.

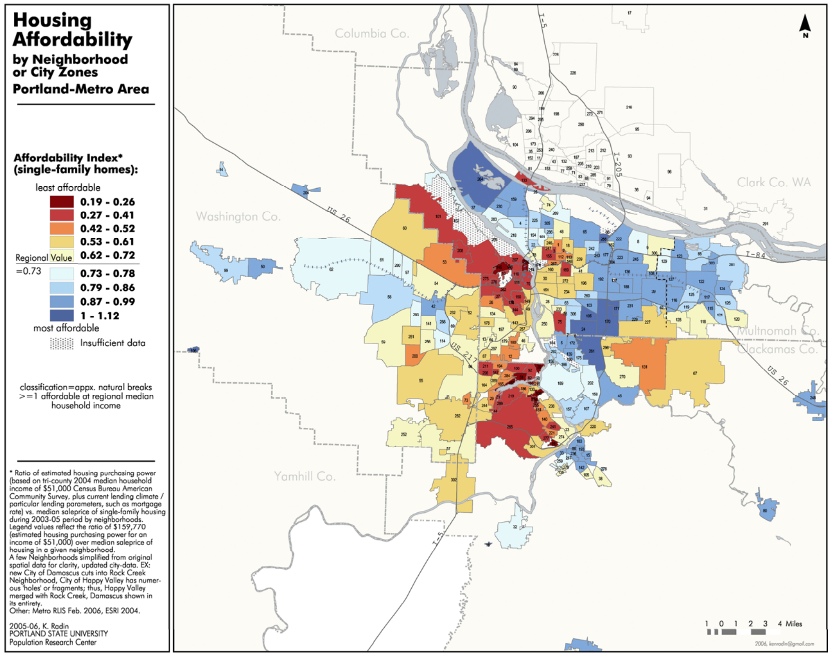


Figure 13. *Single-family housing in very few neighborhoods – only the darkest blue ones – remains affordable to households making at least the region's median income. Based on increases over the last decade, is it likely that all inner-Portland neighborhoods will soon 'turn' orange or red?*

The index is "price" ($160K) divided by the median sale price for SFR units in each neighborhood. Thus, if housing in a particular neighborhood were affordable to households making at least the regional median income, the neighborhood would score an index of 1 or more, i.e. the price of housing in that particular neighborhood would be equal to or less than the amount of money a household could expect to command for a home purchase if it were making at least the region's median income. The regional value equals 0.730, which might be interpreted as: the median income can only afford 73% of the region's median single-family home. In short, the single-family home standard of living isn't affordable to households making the regional median income.

Source data for tri-county median household income: 2004 American Community Survey, "S1903. Median Income in the Past 12 Months (In 2004 Inflation-Adjusted Dollars)." Median household income reported for Multnomah, Washington, and Clackamas Counties; reported values weighted by total households by county and then averaged, producing tri-county median household income used in the mortgage calculation below.

Various parameters, including median household income, were input into an online mortgage calculator to estimate housing 'purchasing power'. Most values below are calculator defaults. Based on these parameters, the tool calculates how much housing one can afford.

Parameters:

Gross Income	**$51,000** ('04 med. income)
Minimum Monthly Debt Payments	$0 (i.e. no outstanding debt)
Funds Available for Home Purchase	$15,000 (personal savings)
Mortgage Rate	6%
Closing Costs	3%
Minimum Down Payment	5%
Property Tax Rate	1.25%
Hazard Insurance Rate	0.5%
Private Mortgage Insurance (PMI)	0.5%
Housing Expense-to-Income Ratio	28%
Long-Term Debt-to-Income Ratio	36%

Results:

Maximum House Price:	**$159,770**
Monthly Payment:	$1,190
Loan Amount:	$149,248
Down Payment:	$10,523 (6.6%)
Closing Costs:	$4,477
Principal Interest:	$895
Taxes:	$166
Hazard Insurance:	$67
Private Mortgage Insurance:	$62

According to Homestore.com, “$159,770 is the maximum house price [because] the housing expense-to-income ratio can't exceed 28%. To afford a more expensive home according to these guidelines, you would need to have greater gross income.” http://www.homestore.com/HomeFinance/calculators/mortgagequalifier

Discussion

Overall, the “Housing Access” measures are easy to calculate, good ‘meat and potatoes’ measures. Data are readily available, tools are easily accessible, and outcomes approximate other sources. For example, median sale price calculated from RLIS taxlot attribute data comes very close to median prices reported elsewhere.

On the other hand, there is no assessment of rental units, yet rental units are *the* affordable housing for most of the region’s residents who need affordable housing. Moreover, housing access has many dimensions that are not easily identified with few variables. For example, the measures say little to nothing about homelessness or availability of subsidized ‘affordable housing’ units.

Parameters input into the mortgage calculation might be a little unrealistic. For example, although the mortgage rate is based on averages at time of analysis (though since then they have increased), and household income reflects real data, “minimum monthly debt” equal to 0 and personal savings equal to $15,000 are optimistic guesstimates. Most households *do* have debt, while most households *don’t* have much savings. The property tax rate of 1.25% and other rates are calculator defaults. True values or estimates for debt and personal savings, as well as for the other rates, could be used in the future.

The housing access measures deviate in terms of methodology from other measures except Measure 2 for Access to Natural Habitat, which, like the housing measures, limits calculations to spatial data that fall within neighborhood boundaries. “Access” for all other measures considers spatial data that fall beyond neighborhood boundaries before calculation of averages by neighborhood. For example, a neighborhood resident would have access to a park, or a transit stop, whether the park or stop were a 1/4-mile on one side of a neighborhood boundary or the other (assuming the resident lives somewhere in between). This concept is built-in to summary measures of access for the other issue areas, where physical access, by virtue of distance, becomes an integral part. The housing access measures, by contrast, are more conceptual and abstract; not as much a measure of physical access. Nevertheless, the nature of the resource – housing – seems to make this approach work for certain purposes; it is not wholly meaningful to measure access to housing within a given neighborhood only for the people who already live there. On the other hand, the affordability index tier-score doesn’t make sense in cross-tabulations of access tier scores for purposes of developing a composite ‘access tally’; in such a case it will be more useful to create tier-scores based on the change in median saleprice variable, where relatively large increases in sale prices may indicate declining access to housing for residents within a given neighborhood.

ACCESS VARIABLES/MEASURES: SCHOOLS

“Schools” is shorthand for ‘access to a quality education’. Schools have been limited to elementary schools (public), mainly because K5 K6 students are the most geographically constrained among all the grades, which makes a neighborhood access analysis more meaningful. “Quality education” has been limited to the quality of *teachers* at schools in and around a given neighborhood; “quality” measured by the average years of experience and the percentage of teachers with graduate degrees at these schools. “Access” itself is reflected in the phrase, “schools in and around a given neighborhood”: schools, along with their associated teacher training and experience values, are assigned to neighborhoods relative to the percentage of a school’s 1-mile network-distance service area that intersects a given neighborhood, i.e. the more a school’s service area covers a neighborhood, the more relevant it is as the neighborhood’s school, and the more heavily its teacher training and experience values figure into the neighborhood’s school access summary score (see Figure 14). This measure of distance-based access is not transparent as with most of the other issue-areas, as it has been used as a weight applied to teacher training and experience values.

Base data source/s:
School spatial information (i.e. location), classifications (ex. “primary,” “regular,” and “public” schools), for attendance year 2002-03: U.S. Department of Education National Center for Education Statistics (NCES) “Common Core of Data” (CCD)
http://nces.ed.gov/ccd/bat/

Teacher experience (field “ExprYrAvgAmt”) and teacher training (graduate degree status, field “GradDgPct”), attendance year 2002-03: School ‘Report Card’ data, Oregon Department of Education, Report Card Media Page.
http://www.ode.state.or.us/data/reportcard/media.aspx

For a detailed description of the underlying data used in school access measures, please consult the reference material available at the source data websites listed above.

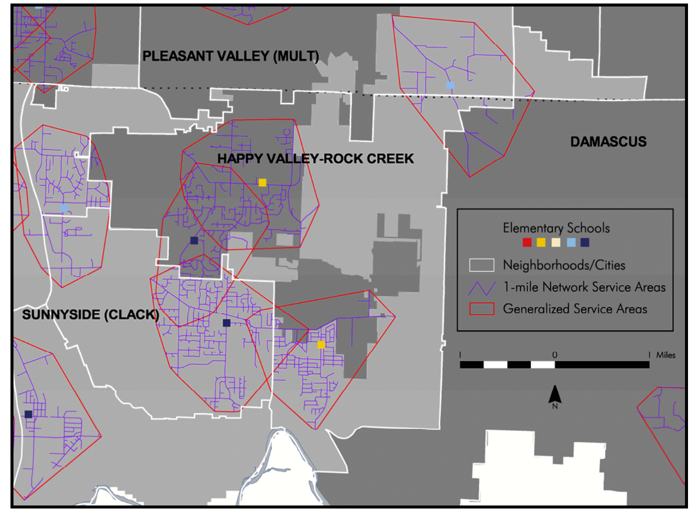


Figure 14. *Average years of teaching experience and percent teachers with master’s degrees, by elementary school, are allocated to neighborhoods relative to the amount of service area intersected. In the illustration, Sunnyside (Clack.) neighborhood’s values on each measure are based on 4 schools, with the dark blue school at center given the most weight.*

Teacher Experience (elem. 2002-03)

Average years of teaching experience for teachers at public elementary schools in and around the neighborhood, attendance-year 2002-03.

- Regional Value=14 years: not a ‘true’ regional value
- 14 years is the average of values summarized by neighborhoods, which values are themselves an areal-weighted average of *average years of teaching experience at each school in and around each neighborhood*. Since the access-distance (“areal”) data are used as weights, access is ‘hard-wired’ at the neighborhood level; thus the only way for this to be reflected in the regional value is to take the average of the neighborhood values.

Teachers, Master's deg. (elem. 2002-03)

Percentage teachers with Master's Degrees at public elementary schools in and around the neighborhood, attendance-year 2002-03.

- Regional Value=45.9% (see regional value note above)
- Percentage teachers with Master's degrees at each school weighted by percent of 1-mile service area/s intersecting given neighborhood

Combined Score

The combined school access score reflects standardized distributions of "teacher training" and "teacher experience" added together, which itself produces a standardized score, or "z-score". In general, z-scores are values that reveal something about their own position in a data distribution: a score of 0 is average, negative scores are below average, positive are above average. The further away a value is from 0, in either direction, the more atypical or extreme it is. If the data distribution is like most data distributions – typical or "normal" – 68% of cases (neighborhoods) have values that fall within 1 of the average (0), leaving 32% with values higher or lower. Using z-scores and the 'built-in', non-transparent distance-access measure are departures from the approach to measuring access for other issue-areas.

Discussion

In terms of measuring access to a 'quality education', the combined school access score is a little narrow. It has reduced "quality education" to the quality of teachers at elementary schools, which itself is based on only two measures – average years of experience and percentage teachers with master's degrees. Limiting the measures to only these two variables is mainly due to a need for simplicity in a sea of possibilities and ideas. Other data could be included in future studies, such as expenditures per pupil (i.e. capital expenditures, on instructional staff, etc.). Earlier ideas included integrating socio-economic status of students via the proxy measure 'students eligible for free or reduced lunch'. This, however, complicates assessment of the schools alone – independent of the student body – as well as equity analyses that combine numerous variables, many of which have socio-economic dimensions.

In addition, the use of weighting conceals the distance-access measure: it would be useful to evaluate physical access to schools independent of the 'quality' of the schools. In this respect the school access measures are like the housing access measures, with no transparent distance-access component. Unlike the housing access measure, however, distance-access for schools is more relevant. Its lack of transparency is an oversight.

Finally, the measures have been created for the tri-county Metro area only. They are based on Oregon State data, which are different from the Washington State data on which assessment of Clark County school access would most likely be based.

ACCESS VARIABLES/MEASURES: FOOD

"Food" is shorthand for the "access to healthy food" issue-area. Like "Schools," "Food" had potential to be represented by a number of variables – from general characteristics of the 'food system' to more specific parts of it. Primarily due to its complexity, to lack of developed source data, and contemporary interest in "food deserts," access to food has been limited to access to full-service grocery or natural food stores ('GNFS'). This issue-area has two summary measures with accompanying regional tier-scores: Percent population within a 1/2-mile of a full-service GNFS and a compound score based on street-network distances, population, and number of stores nearby. Under the "Average of Network Measures" heading, two additional sub-measures are provided: Average street-network distances and average population per GNFS.

Base data source/s:
Food sites compiled from the Oregon Department of Agriculture's list of licensed food retailers by the Multnomah County Food Policy Council (for Multnomah County) and The Coalition for a Livable Future (Clackamas & Washington counties) 2003. The Coalition for a Livable Future applied the same methodology to data for Clark County food retailers from the Clark County Health Department of Licensing Food Access Point Database (2004).

Population based on U.S. Census 2000 block-level data.

Street network used in distance analyses based on "roads.shp" (Clark Co. GIS 2004, "proposed" and freeways removed) and "streets.shp" (MDRC RLIS 2004, freeways and their on- and off-ramps removed).

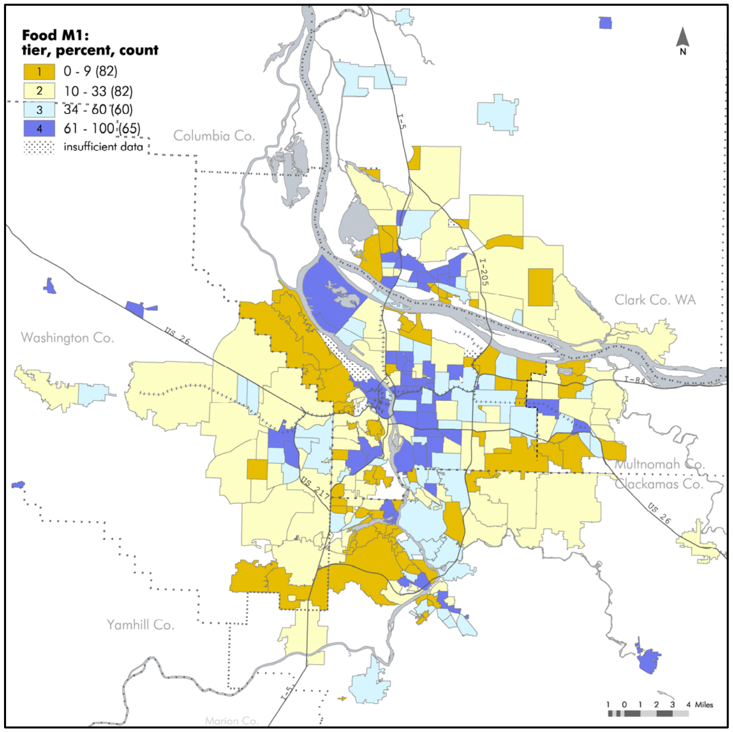
Contact CLF for methods covering store typology. The bulk of stores left out of the analysis include "convenience" (ex. Plaid Pantry), "specialty" (ex. Low Carb Market, Manila Import-Export), and social-services (ex. "congregate meals" or "food drop box") types.

<u>Measure 1: Percent pop. w/in 1/2 mile of store</u>

Percentage population within a 1/2-mile network-distance from a full-service grocery or natural food store.

- Regional Value=34%: this is a 'true' regional value, where locations within a 1/2-mile of a store were identified, estimated population at these locations totaled by region, and the result divided by total population within the region.

- The same procedure is followed to produce the measure for each neighborhood – using the neighborhood geography instead of the regional geography.



Average of Network Measures

To produce neighborhood summaries for location-specific, "network-level" underlying data (Figure 15), averages by neighborhood are taken. This is a little hard to grasp so we'll use the simplest example: network-distances. GIS software allows calculation of distances from locations along the street-network to whatever feature you're interested in, in this case food stores. For locations along the street network (about every 100 feet for these analyses) you're given a distance value – the distance to the nearest grocery store. The *neighborhood*-level summary in the table, **"dist. blocks (280'),"** is an average by neighborhood of distances calculated in this way. Values are expressed in 'city-blocks', which are about 280 feet from intersection-to-intersection (such as in the downtown Portland area). The Regional Value for this measure is 18 blocks; it is an average summarized by the neighborhood regional geography as a whole. Other variables under the "Average of Network Measures" headings follow similar procedures.

"pop/GNFS (x100)" – Population per grocery or natural food store, values in table X100. Average number of people per closest store.

In order to tell whether distance values produced in the first step above are uncharacteristically high or low (or unfairly high or low), it helps to know how many people actually need to be served around the grocery stores. For example, half of a rural neighborhood could be only lightly populated, without much demand for grocery stores nearby. Yet every location along the street network in that neighborhood would figure into the average distance to nearest grocery store measure. In addition, it is important to consider the number of people relative to the amount of the resource to which access is being measured. "Pop/GNFS" considers these issues by using 'mini-service areas' for each store and calculating total population in each of these service areas. One caveat here is that sometimes stores are very close together (1/4-mile or less), in which case they share a service area. That's why total population by mini-service area needs to be divided by the number of stores – because sometimes there is more than one. This assumes 2 stores can serve twice as many people as one; 3 stores can serve 3 times as many people as 1, and so on. Ideally we'd have some measure of the amount of the resource, beyond just the number of stores, such as store size – so we wouldn't have to assume that a given store can serve just as many people as any other store.

- The neighborhood-level summary of "Pop/GNFS" is the average of population per grocery or natural food store values at locations within neighborhoods *after* these locations have been allocated to mini-service areas. It can be interpreted as *the average number of people served by the closest grocery or natural food store, by neighborhood.*

- Regional Value=78 (x100), or 7,800: This can be interpreted as the average number of people served by the closest GNFS, by the neighborhood region.

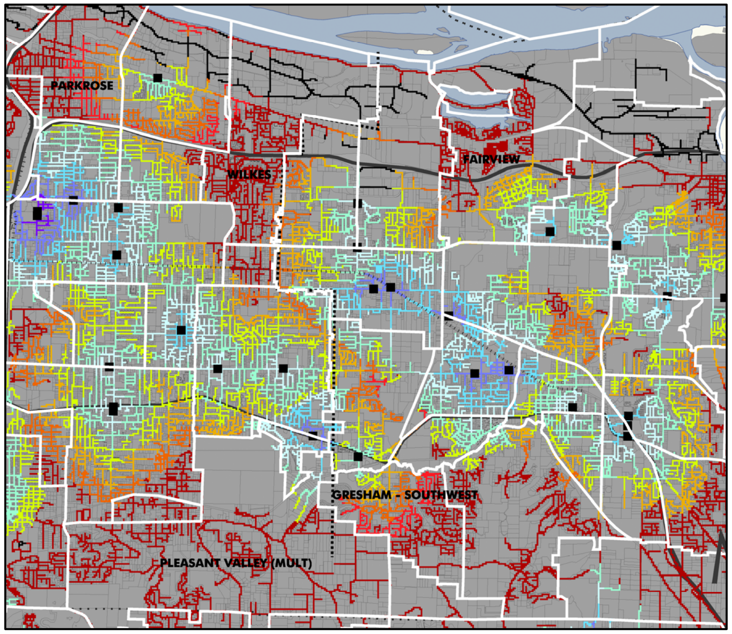


Figure 15. *An illustration of the "underlying" or "network-level" data averaged by neighborhoods. Each 'cell' along the street-network is associated with one or more values – here they are the combined food access score. Black squares are stores, blues are good scores, reds are bad. Neighborhood summaries reflect the sum of cell values for locations within a given neighborhood (white boundaries) divided by the sum of cells within the same neighborhood.*

“Score” and **“M2 TIER” (Measure 2)** – Food access summary score, based on full-service grocery or natural food stores, population, walking-distance scale; regional tier score. Low values equal low access, high values high access.

The summary food access “score” by neighborhoods relies on *underlying* data used in the two sub-measures above (the network-level data for distance to closest store and population per store, not the neighborhood summaries of these variables). Long distances plus relatively large populations per store produce low access scores; short distances plus relatively small populations per store produce high access scores. Each sub-variable’s data distribution, at the network level, has been reclassified according to the following values before being added together to produce a network-level composite score:

- Network distance to closest store or stores:
  0 to 1/4 mile = 5 points
  1/4 to 1/2 mile = 4 points
  1/2 to 3/4 mile = 3 points
  3/4 to 1 mile = 2 points
  1 to 1¼ miles = 1 point
  >1 ¼ miles = no access, period

- Pop/GNFS, by ‘mini-service areas’:
  274-2,400 = 5 points
  2,401-4,179 = 4 points
  4,180-6,129 = 3 points
  6,130-8,379 = 2 points
  8,380-12,022 = 1 point
  >12,022 = 0 points

Note: Pop/GNFS classes reflect “natural breaks” in data distribution. “Natural breaks” is a formal statistically-based classification method that groups values that are more similar to each other than they are to values in other groups.

At the network-level, these two data layers are added together, producing access scores with a range of 0 to 10 for locations along the street network (Figure 15). Locations further than 1¼ miles from a store, however, are assigned zero points regardless of total points based on the Pop/GNFS layer, as it was decided that locations further than 1¼ miles is too far to walk to a store, for groceries. Finally, before taking the average of these network-level data by neighborhoods, which produces the summary scores in the table, locations with no population are excluded from the calculation.

Discussion
Assuming that reduction of the Food Access analysis to access to ‘food sites’ is an appropriate or necessary choice, the major weakness can be found in the typology of the sites themselves. Originally the goal was to have a few different analyses for different types of food sites, such as access to convenience stores versus access to full-service grocery stores, or access to social-service food sites, community gardens, and full-service grocery stores combined. But developing a consistent typology became an undertaking beyond available resources. The Atlas team was very close to having two typologies: “alternative sites,” which would have included everything except full-service grocery or natural food stores, and the full-service grocery or natural food stores themselves. Time simply ran out.

In addition, there is a conceptual incongruity combining ‘full-service grocery stores’ and ‘natural food stores’. Natural food stores should be in a class by themselves, or they should be combined with other ‘alternatives’.

In general, the major obstacle to producing a better food access analysis is development of a comprehensive, detailed food site typology. In addition, a measure that can quantify the level of service offered by stores, such as building square footage, would make the population per store measure more meaningful. Overall, methods used to measure access to stores at point locations work well. Figure 15 does a good job illustrating locations with poor access to grocery stores.

ACCESS VARIABLES/MEASURES: TRANSIT

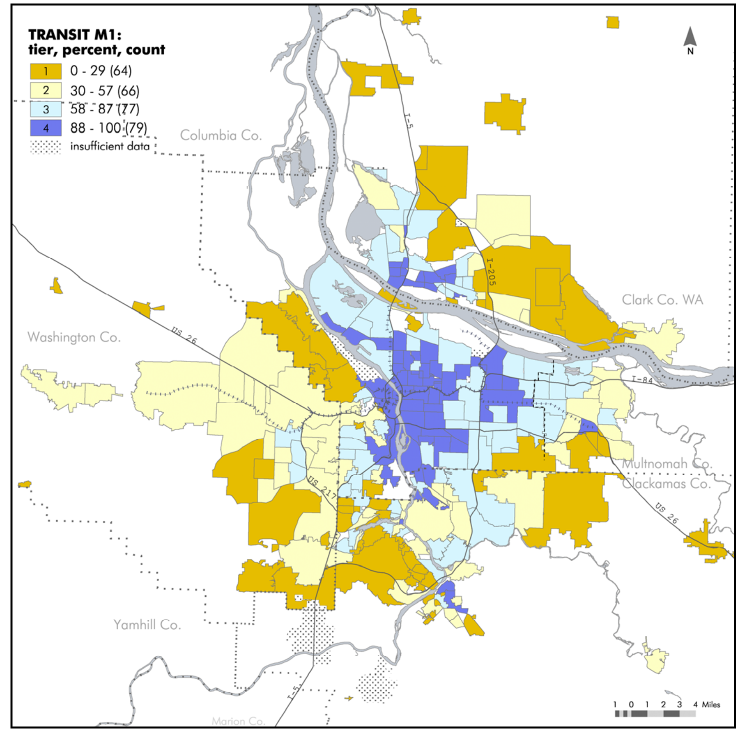
“Transit” is shorthand for the “Transportation choices” issue-area. During Atlas project development the exact issue-area ebbed and flowed among transit, transit equity, commute, transportation choices, and various combinations having to do with ‘transportation’. Nevertheless, from the beginning, the team focused on measuring access to public transit at a pedestrian scale. In the NBO summary table, the transit issue-area is represented by two summary measures and accompanying regional tier-scores: Percent population within a 1/4-mile of a transit stop and a compound score based on street-network distances and population relative to service level. Under the “Average of Network Measures” heading, two additional sub-measures are provided: Average street-network distances to the nearest transit stops, in city blocks, and average population per trip (per hour) within a 1/4-mile search radius. “Trips,” or frequency, have been weighted differently for MAX and Streetcar trips versus bus trips since the former have more capacity.

Base data source/s:
Trip data and stop locations for Multnomah, Washington and Clackamas Counties (Bus, MAX, Streetcar): TriMet, April 2005. Trip data and stop locations for Clark County: C-Tran, January 2005. Population based on U.S. Census 2000 block-level. Street network for distance analyses based on “roads.shp” (Clark Co. GIS 2004, “proposed” & freeways removed) & “streets.shp” (MDRC RLIS 2004, freeways & their on- and off-ramps removed). Wilsonville & Canby provide transit service; however, data formats were too difficult to reconcile with TriMet and C-Tran data. Not included in analysis.

Measure 1: Percent pop. w/in 1/4 mile of stop

Percent population within a 1/4-mile network distance of a public transit stop

- Regional Value=58%: this is a ‘true’ regional value, where locations within a 1/4-mile network-distance of a stop are identified, estimated population at these locations totaled by region and then divided by total population within the region.
- The same procedure is followed to produce the measure for each neighborhood using the neighborhood geography.
- Before performing distance analysis, transit stops are converted to a single point location if more than 1 stop falls within about a 1 block area (here 260 x 260 feet).



Average of Network Measures

The same approach to access to Food (M2) and access to Parks (M2) is used to measure access to Transit (M2). See discussion of ‘average of network measures’ in the Food issue-area section.

“Dist. blocks (280’)” – Distance in blocks, 280ft. Average street network distance from locations along the street network (about every 100 feet) to the closest transit stop, expressed in city-blocks (280 foot increments). Transit stops are first aggregated to a single point location where more than one stop falls within about 1 block (here 260 x 260 feet).

Regional Value=10 blocks: This is a 'true' regional value, interpreted as the average distance one would need to travel along the street network before reaching a transit stop (about half a mile). The same interpretation holds true at the neighborhood-level.

"pop/trip/hr" – Population per trip per hour. Total population within a 1/4-mile search radius divided by total capacity-weighted transit trips within same area, averaged by neighborhood. In simplest terms, the "pop/trip/hr" sub-measure tries to capture the amount of transit service available to residents in a given area. It is part of the general function that describes access as a phenomenon dependent on 1) distance to resource and 2) amount of resource relative to population. It is actually made up of sub-variables itself: 2000 population, transit trip data (frequency), and capacity estimates.

Envision a circle with a 1/4-mile radius (a little less than 10 city-blocks wide). Picture the number of people living in the circle and the number of transit trips passing through it every hour. Now picture locations along the street network, the same 1/4-mile measurements at each of these locations, and all these locations bounded by a neighborhood or city boundary. Calculate the average. That is what the "pop/trip/hr" values are, with the exception that MAX trips are weighted 4 times as much as bus trips, and streetcar trips are weighted 1.5 times as much as bus trips (for carrying more people per trip). The more trips or the fewer people to move, the lower the variable value will be. Picture 10,000 people within a 10-block wide circle with only 2 trips passing through each hour, versus 500 people within the same sized area – with 4 trips passing through each hour. In terms of pedestrian-scale access, the second area is better served. Now again, picture all locations along the street network within a single neighborhood or city having measurements of this kind – and calculate the average to get the neighborhood summary.

Regional Value=221: This is a 'semi-true' regional value, as the data have been aggregated by the 'mini transit sheds' before being summarized by the region. Reading the heading one might interpret it to mean that total population in the region has been divided by total capacity-weighted transit trips per hour in the region. This is not the case. It is "semi" -true, however, because the variable itself aims at measuring population relative to service level for transit-relevant distances. Thus, the regional value must be expressed as an average of a compound variable.

"Score" and **"M2 TIER" (Measure 2)** – Transit access summary score, based on walking-distance to the closest transit stop and population relative to transit service level within mini transit sheds; measure 2 regional tier score.

The measure 2 summary transit access score, by neighborhoods, relies on *underlying* data used in the two sub-measures above. Long distances plus large populations relative to service level produce low access scores; short distances plus small populations relative to service level produce high access scores. Each sub-variable's data distribution, at the network level, has been reclassified according to the following values before being added together to produce a *network-level* composite score:

- Walking distance to closest transit stop:
  locations less than 2 blocks from a transit stop=5 points
  locations between 2 & 3 blocks=4 points
  locations between 3 & 5 blocks (3.000001 to 5)=3 points
  locations between 5 & 8 blocks (5.000001 to 8)=2 points
  locations between 8 & 10 blocks (8.000001 to 10)=1 point
  locations beyond 10 city-blocks=0 points

- Population relative to service level:
  0-25=5 points
  26-75=4 points
  76-221=3 points
  222-500=2 points
  501-1,000=1 point
  >1,000=0

  Note: Since there are no tried-and-true standards that could guide the classification of these data once combined into the 'pop vs. service level' variable, the regional value, which is an average of the variable within the urban area, is used as a middle cut-off.

At the network-level, these two data layers are added together, producing access scores with a range of 0 to 10 for locations along the street network. Results are then averaged by neighborhood, city, and regional geographies to produce the neighborhood/city values and regional values in the table.

ACCESS VARIABLES/MEASURES: PUBLIC PARKLAND

“Public Parks” is a spin-off resource originating in the “access to nature” issue-area. ‘Nature’ became divided into parks, on the one hand, and natural habitat, on the other, access to both of which are presented in the NBO summary table. Unfortunately, neither variable alone captures ‘access to nature,’ nor is there a measure that combines them. Nevertheless, “access to public parks” alone reflects access to community facilities as well, and “access to natural habitat” alone reflects access (or at least proximity) to a well-defined kind of nature. Thus, division of the original ‘nature’ issue-area into the two issue-areas does have advantages. Access to public parks is represented by two summary measures: Measure 1, “Percent pop. w/in 1/4-mile of park,” and Measure 2, “score,” each with its accompanying regional tier-score. Two additional sub-measures are provided under the “Average of Network Measures” heading: “dist. blocks (280’)” and “pop/park-acre.”

Base data source/s:
Tri-county parks: Metro Data Resource Center “2003 Parks Inventory.” Clark County parks: “parks.shp,” Clark County GIS Nov. 2004. Private parks, stadiums, fairgrounds, schools, and select parkways removed from datasets before access analysis performed.

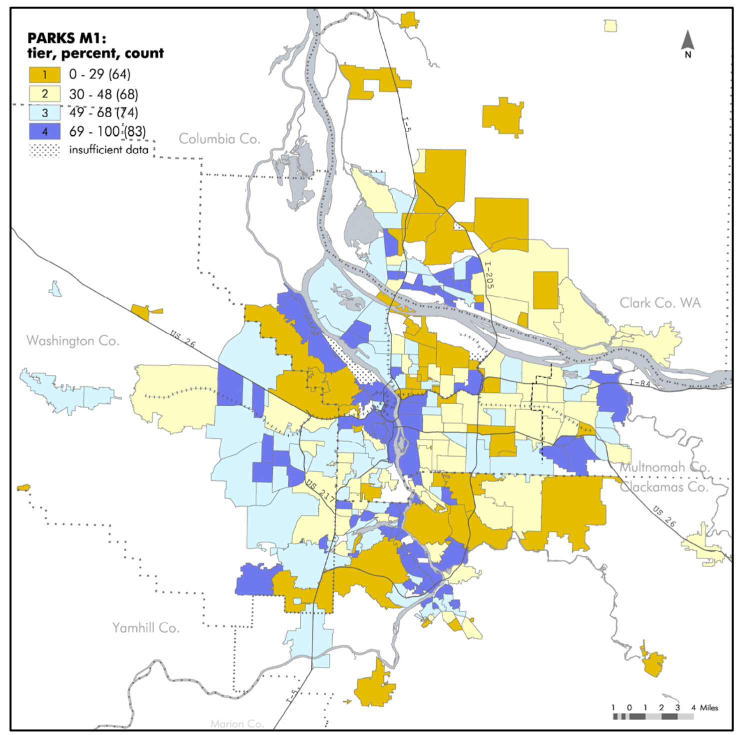
Population based on U.S. Census 2000 block-level data.

Street network used in distance analyses based on “roads.shp,” “Trails.shp” (Clark Co. GIS 2004, “proposed” and freeways removed); “streets.shp” and trails from park theme (MDRC RLIS 2004, freeways and their on- and off-ramps removed).

Measure 1: Percent pop. w/in 1/4 mile of park

Percent population within a 1/4-mile network-distance from a public park.

- Regional Value=49%: this is a ‘true’ regional value, where locations within a 1/4-mile of a public park’s modeled access points were identified, estimated population at these locations totaled by region, and the result divided by total population within the region.
- The same procedure is followed to produce the measure for each neighborhood, using the neighborhood geography instead of the regional geography.



<u>Average of Network Measures</u>

The same approach to access to food (M2) and access to Transit (M2) was used to measure access to parks (M2). See discussion of 'average of network measures' in the Food issue-area section.

"Dist. blocks (280')" – Distance in blocks, 280ft. Average street network distance to modeled access points at public parks, expressed in city-blocks (280 foot increments).

Park access points are approximated, or 'modeled', by identifying locations at which street network intersects park boundary. This is not a precise method, often producing access points along whole parkland boundaries even though only points along it provide access into the feature.

Regional Value=7 blocks: This is a 'true' regional value, interpreted as the average distance one would need to travel along the street network before reaching a park (a little over a third of a mile). The same interpretation holds true at the neighborhood-level.

"pop/park-acre" – Population per park-acre. The neighborhood-level summary is the average of population per park-acre values at locations within neighborhoods *after* these locations have been allocated to park mini-service areas. It can be interpreted as *the number of people potentially sharing an acre of the park to which they live closest, averaged by neighborhood.*

Regional Value=780: This is a 'semi-true' regional value, as the data have been aggregated by service areas before being summarized by the region. Reading the heading one might interpret it to mean that total population in the region has been divided by total park-acres in the region. This is not the case. It is "semi" -true, however, because the variable itself aims at measuring population per park-acre *after* people have been allocated to their closest park. Thus, the regional value must be expressed as an average of service-area values. It can be interpreted as *the number of people potentially sharing an acre of the park to which they live closest, on average for the region.*

"Score" and **"M2 TIER" (Measure 2)** – Parks access summary score, based on public parks, population, walking-distances; regional tier score. Low values equal low access, high values high access.

The summary parks access score, by neighborhoods, relies on *underlying* data used in the two sub-measures above (the network-level data for distance to closest park and population per park-acre, not the neighborhood summaries of these variables). Long distances plus relatively large populations per park-acre produce low access scores; short distances plus relatively small populations per park-acre produce high access scores. Each sub-variable's data distribution, at the network level, has been reclassified according to the following values before being added together to produce a *network-level* composite score:

- Walking distance to closest public park:
  0 to 1/8 mile = 5 points
  1/8 to 1/4 mile = 4 points
  1/4 to 1/2 mile = 3 points
  1/2 to 3/4 mile = 2 points
  3/4 to 1 mile = 1 point
  >1 mile = 0 points

- Pop/park-acre, by 'mini-service areas':
  0-250 = 5 points
  251-500 = 4 points
  500-1,000 = 3 points
  1,001-2,000 = 2 points
  2,001-4,000 = 1 point
  >4,000 = 0 points

Note: pop/park-acre classes reflect intuitive round values and research that identifies 1,000 people per park-acre as a sufficient level of service.

At the network-level, these two data layers are added together, producing access scores with a range of 0 to 10 for locations along the street network. Before taking the average of these network-level data by neighborhoods, which produces the summary scores in the table, locations with no population are excluded from the analysis.

ACCESS VARIABLES/MEASURES: NATURAL HABITAT

As mentioned in the Public Parks general description, measuring access to natural habitat grew out of the larger 'access to nature' issue-area, which had been split into access to parks and access to habitat. Based on preliminary feedback from various audiences, and on methods used, some people prefer the term "proximity" over "access." In the table, access (or proximity) to natural habitat is represented by two summary measures and accompanying regional tier-scores. Measure 1, "Percent pop. within 1/4 mile of habitat," follows the same logic as Measure 1 for "Food," "Transit," and "Public Parks," yet relies on linear distance rather than network-distance to define walking distance (of a 1/4-mile). This difference is due to spatial characteristics of habitat versus those of the other resources: habitat is more ubiquitous, amorphous, lacking a distinct location to which distance measurements can be faithfully made (stores, park access points, and transit stops, by contrast, are distinct locations). Measure 2, "Habitat-acres, per capita x1000," is most similar to the housing access measures in the sense that it limits analysis to resources existing within each neighborhood's boundary. The other measures' methods, by contrast, realize that people can have access to resources whether the resources are located on one or the other side of a political boundary. Here Measure 2 is a 'bonus' measure, akin to some of the sub-measures used for the other issue areas. It isn't more comprehensive like the other Measure 2s; it is in fact less comprehensive than Measure 1.

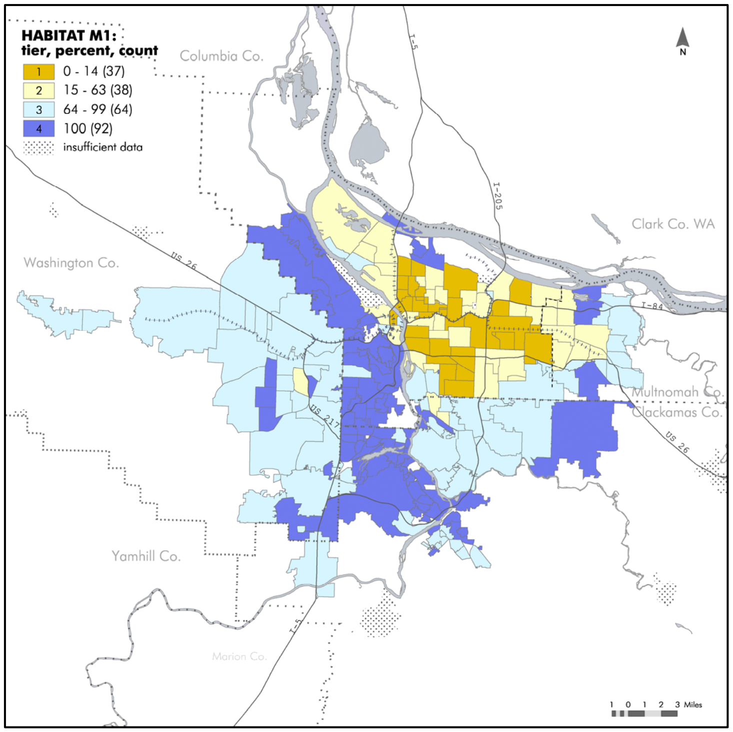
Base data source/s:
Natural habitat based on Metro's 'Goal 5' Regional Riparian Corridor & Wildlife Habitat Inventories 2002: Metro Data Resource Center Sept. 2004. Resource to which access analysis was undertaken includes 6 quality classes of habitat in Metro's data layer, but excludes impact areas. GIS processing includes subtraction of developed floodplains.

Population based on U.S. Census 2000 block-level data.

<u>Measure 1: Percent pop. w/in 1/4 mile of habitat</u>

Percentage population within a 1/4-mile search radius (i.e. linear distance) of natural habitat.

- Regional Value=64%: this is a 'true' regional value, where locations within a 1/4-mile search radius of habitat were identified, estimated population at these locations totaled by region, and the result divided by total population within the region.
- The same procedure is followed to produce the measure for each neighborhood, using the neighborhood geography.



Note: Measure 1's tier-scores break from the standard approach. The value defining whether a value is grouped as a 3 or a 4 is not the nested-median above the regional value, which value is 100%. If 100% were used as a break, only 3 classes would result. Preservation of 4 classes was considered more important; thus, all neighborhoods with a value of 100% are grouped in tier 4, while other values at or above the regional value (i.e. 64-99%) are grouped as a 3.

Measure 2: Habitat-acres, per capita x1000

Total acres of natural habitat per 1,000 residents, by neighborhood.

- Regional Value=54 acres per 1,000 residents: this is a 'true' regional value, where total habitat-acres within the neighborhood region were summed, total population summed, and total habitat-acres divided by total population (x1,000).

CONCLUSION

This document has explained the development and contents of the Atlas neighborhood summary table in a manner that hopefully helped the reader know how it should or can be used. It has been intended for a broad audience including academics, activist/advocates, and the general public, though parts of it may have been more important to one group over another. It wasn't meant to be a rationale for a particular way of thinking about regional equity, but instead, a documentation of one product that embodies ways of thinking about regional equity. The Atlas, in which the table can be found, has developed with input from many people. As a result, the table is a solution to many problems, with multiple rationale.

The document has explained each variable – what's measured, why, how, limitations – and it has provided background and context to situate the work within the larger Atlas project. Hopefully it has increased the reader's understanding of the project, and it will spur continued use of the table, analysis, and dialogue on both measuring regional equity and regional equity itself.

The table and documentation are meant to be planning and political tools at both neighborhood and regional levels, helping people identify whether their neighborhoods are measuring up to others in the region, and whether there are patterns, trends, or indications of systemic biases crippling areas with concentrations of low socio-economic status populations. In the interest of producing a practical document that will help others 'do' analyses, or simply help others find out more about their neighborhoods and the region, this document has limited itself to describing the nuts and bolts of what's included in the table. That has meant withholding its own equity analyses – sticking to the facts.

Information in the table can be used in various ways for various purposes. For example, Section II walked the reader through an example use of the table, which entailed gathering base and access variable information for the Boise and Alameda neighborhoods. It concluded that Boise had poor access to full-service grocery stores and to elementary schools with comparatively highly educated and experienced teachers – despite the fact that Boise has one of the highest poverty rates, a large share of people of color, an above average share of children, and many households without cars. "Equity planning," in the more formal sense used in the field of Planning, is all about increasing opportunities for those who have had the least of them. The 'base' in the Boise neighborhood is most likely among these.

At minimum, the information provided here could be used to spur further studies, which might include physical access to schools, market area analyses for grocery stores, among other things. Overall, the Regional Equity Atlas document, this reference and the table, could become an integral part of planning for the region's future. In the interest of creating a more equitable and sustainable region, hopefully they can play a part.

* * *

WORKS CONSULTED

Baum, Howell S. 2004. “Smart Growth and School Reform: What if We Talked about Race and Took Community Seriously?” Journal of the American Planning Association, Vol. 70, No. 1, Winter 2004.

Bell, Mark et al. 2004. Portland Present. City of Portland Bureau of Planning.

Brewer, Cynthia A. and Linda Pickle 2002. “Evaluation of Methods for Classifying Epidemiological Data on Choropleth Maps in Series”. Annals of the Association of American Geographers, 92(4), 2002, pp.662-681.

Brookings 2003. Portland in Focus: A Profile from Census 2000. Brookings Institution Center on Urban and Metropolitan Policy.

Hawley, Kevin and Harold Moellering (no date). “A Comparative Analysis of Areal Interpolation Methods: A Preliminary Report”. Ohio State University, Columbus, Ohio.

Joassart-Marcelli, Pascale M., Juliet A. Musso, and Jennifer R. Wolch 2005. “Fiscal Consequences of Concentrated Poverty in a Metropolitan Region”. Annals of the Association of American Geographers, 95(2), 2005, pp. 336–356.

Kachigan, Sam 1991. Multivariate Statistical Analysis. Radius Press. New York, NY.

Maantay, Juliana 2002. “Mapping Environmental Injustices: Pitfalls and Potential of Geographic Information Systems in Assessing Environmental Health and Equity”. Environmental Health Perspectives, Vol. 110, Supplement 2, April 2002.

Martin, Mark and Jade Lofton 2005. “Portland neighborhoods by the numbers”. Portland Monthly, March 2005.

Myers, Dowell 1992. Analysis with Local Census Data: Portraits of Change. Academic Press, San Diego, CA.

Oregon Department of Education 2004. Oregon School & District Report Card 2003-2004 Policy Manual. Salem, OR.

Orfield, Myron 2002. American Metropolitics: The New Suburban Reality. Brookings Institution Press.

Orfield, Myron 1998. Portland Metropolitics: A Regional Agenda for Community and Stability. Report to the Coalition for a Livable Future.

Orfield, Myron 1997. Metropolitics: A Regional Agenda for Community and Stability. Brookings Institution Press.

O’Sullivan, David and David J. Unwin 2003. “Chapter 11: Multivariate Data, Multidimensional Space, and Spatialization”. Geographic Information Analysis. pp 315-355.

Phillips, Justin and Eban Goodstein 2000. “Growth management and housing prices: the case of Portland, Oregon”. Contemporary Economic Policy, Vol. 18, No. 3, July 2000, 334-344.

Sánchez, Thomas W., Stolz, Rich, and Ma, Jacinta S. (2003). Moving to Equity: Addressing Inequitable Effects of Transportation Policies on Minorities. Cambridge, MA: The Civil Rights Project at Harvard University.

Seasons, Mark 2003. “Indicators and Core Area Planning: Applications in Canada’s Mid-Sized Cities”. Planning Practice & Research, Vol. 18, No. 1, pp. 63–80, February, 2003.

Slocum, Terry A. 1999. “Chapter 4: Data Classification”. Thematic Cartography and Visualization. pp 60-82.

Talen, Emily 1998. “Visualizing Fairness: Equity Maps for Planners”. Journal of the American Planning Association, Vol. 64, No. 1, Winter 1998.

Upchurch, Chris, Michael Kuby, Michael Zoldak, Anthony Barranda 2004. “Using GIS to generate mutually exclusive service areas linking travel on and off a network”. Journal of Transport Geography 12 (2004) 23–33.

Wolff, Edward N., Ajit Zacharias, and Asena Caner 2003. Levy Institute Measure of Economic Well-Being: United States, 1989 and 2000. The Levy Economics Institute of Bard College, Annandale-on-Hudson, NY.