# Affordable Housing by Zipcode in the Greater Seattle Area

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## Introduction

While the end goal of the author is to spatially understand the spatial structure (or lack thereof) of homelessness in Seattle and greater King County, the subject of this report is the affordable housing climate in King County, WA. The rationale for this decision is based on University of Washington urban economist Greg Colburn's publication Homelessness is a Housing Problem, in which Colburn isolates affordable housing as the primary explanatory variable driving homelessness throughout metropolitan areas in the United States. Colburn emphasizes that understanding homelessness goes beyond statistics on the current number of people experiencing homelessness, but must include an analysis of those at risk for homelessness, or those that are rent-burdened. Colburn follows the U.S. Department of Housing and Development definition of being rent-burdened as when one spends 30% or more of their monthly income on rent, the 30% rule is central to the structure of this report. Following Colburn's direction, this report will focus on those that are currently not homeless, but are exposed to homelessness due to their status as being rent-burdened (while there may be exceptions, in general homeowners are very unlikely to experience homelessness, and would not be an appropriate target population for the goals of this report). Affordable housing for renters is a massive topic that can be approached from many different angles, and this report's lens is specified in the following section.

## Methods

This report applies a lens of spatial accessibility to affordable housing for renters in King County. Before discussing what distance measure is appropriate to use for an accessibility analysis of affordable housing, it is worth noting that the literature on residential mobility establishes that motivations for residential mobility are extremely heterogenous, as the unique stage of the family life cycle or personal course determines particular housing and location needs (Brown and Moore, 1970; Clark and Maus, 2015). This report's response to the consensus that there are various drivers for residential migration is that the target population in this analysis can be grouped under the assumption that affordability of housing is the primary motivation for considering relocating (although this assumption cannot be entirely true). When considering the process of moving from one location to a new one, the "friction of distance," or the cost that overcoming a physical distance entails, is particularly pronounced. Research has established that rural residents tend to be willing to move farther than urban residents (Chai and Lu, 2019), and so when considering accessibility in the urban environment of Seattle and its King County surroundings, a relatively short distance should be used to determine accessibility. However, there is no further consensus in the literature on what the ideal distance for determining the accessibility of affordable housing should be, likely because local environments greatly vary. Moreover, as visualizations of rent burden data show, more than half of the zip codes have a shocking zero other zip codes in which the median rental price is deemed affordable for them (by the HUD definition of 30% of monthly income). As such, it does not make sense to employ an additional distance metric such as a buffer analysis of a certain amount of miles, since for most zipcodes there are zero other affordable zipcodes in all of King County. Thus, this report proceeds by considering, for a given zip code, every other zip code in King County as a resource within accessible range. The accessibility range of all of King County is a reasonable choice - for example, the driving time from Edmonds to Tacoma, two cities on opposite ends

of King County, is less than an hour, and the vast majority of commutes between zip codes will be far less than this. As such, when one relocates from their current zipcode to an affordable zipcode, the commute by car or public transportation to their old place of residence (perhaps their employment location was close to their old residence) and neighboring resources will be quite reasonable. The visualization goal of this report is to generate count maps that illustrate the total number of affordable zipcodes in King County for every zip code. Two such maps are generated - the first is based on the normal HUD classification of rent burden as spending 30% or more of one's monthly income on monthly rent. In technical terms, this means if the median monthly rent in zip code B is less than 30% of the median monthly income in zip code A, then zip code B is considered affordable for zip code A (a major drawback of this method is that it does not account for intra-zipcode wealth variance, and assumed the median income in a zip codeis representative of the income of all its residents). The second is based on the HUD classification of sever rent burden as spending 50% or more of one's monthly income. The methods for gathering the data are now represented.

Data on per capita income (annual) by zipcode was pulled using tidycensus from the American Community Survery for the year 2020, and median rent (monthly) by zipcode was gathered from the Zillow Observed Rent Index (ZORI). The ACS data was only downloadable for the entire US, while the ZORI was downloadable for only Washington, and was then wrangled to only include zip codes in King County. After taking the spatial intersection of the ACS zipcodes and the ZORI zipcodes, 80 zipcodes covering the vast majority of King County were outputted. Annual median income was divided by twelve to calculate monthly median income, and normal and severe rent burden (30% ad 50% ratio) was determined by the ratio of monthly rent to monthly median income.

## Results

A preliminary mapping of rent burden is shown in Figure 1. Note that empty white space within the King County border (bolded outline) is either bodies of water of forest.

Summary statistics of affordable housing count based on the 30% rent/income ratio (HUD definition of normal rent burden) show the median count to be 0, the mean count to be 9, and the max count to be 69, an extremely abnormal and inequitable distribution. A box plot of accessibility of affordable housing based on the 30% rent/income ratio is shown in Figure 2 to visualize extremely abnormal distribution.

Due to the abnormal distribution, to map the count data based on the 30% rent/income ratio the custom breaks are "0-1", "1-7", "7-18", "18-69", in which the first category contains all the zip codes with 0 options for affordable zip codes, the second category goes up till the third quartile of 7 options for affordable zip codes (the actual third quartile is 7.5, but only integer values are possible for number of accessible zip codes), the third category goes until the 18 (3Q + 1.5*IQR), and the fourth quartile contains all outliers (greater than 3Q + 1.5*IQR). The count map based on the 30% rent/income ratio is shown in Figure 3.

Figure 3 is extremely homogeneous, and to get a closer spatial understanding of rent burden by zip code in King County, the report proceeds with an analysis of accessibility of affordable housing based on the 50% rent/income ratio (HUD definition of severe rent burden). The box plot of accessibility of affordable housing based on the 50% rent/income ratio is shown in Figure 4, and as the distribution is much more normal, a natural breaks map of accessibility of affordable housing based on the 50% rent/income ratio is shown in Figure 5.

## Discussion

When looking at Figure 3 (accessibility of affordable housing based on the 30% rent/income ratio), as is suggested by the median equaling 0, the vast majority of zip codes have zero options to affordable rental housing in other zip codes. The zip codes with options for affordable rental housing are congregated in the Northern part of the map, geographically corresponding to North seattle and its eastside suburbs. When comparing the count map based on the 30% rent/income ratio to the mapping or rent burden ratios (Figure 1), the maps are inverses of each other - the Northern part of the map corresponding to the zip codes with

many options for affordable rental housing in Figure 3 are the zip codes in Figure 1 that enjoy low rent to monthly income ratios. On the other hand, in the zip codes with the worst (highest) monthly rent to monthly income ratios in Figure 1, clustered in the Southern portion of the map geographically corresponding to South Seattle, practically all have zero options in other King County zip codes for affordable housing as shown in Figure 3, a very concerning spatial characteristic.

Continuing on to Figure 5 (accessibility of affordable housing based on the 50% rent/income ratio), while in general the same patterns as in the map of accessibility of affordable housing based on the 30% rent/income ratio (Figure 3) are preserved, Figure 5 holds a key insight - the outlier of zipcodes in the southern portion of King County experiencing the highest level of rent burden in Figure 1 are the same zipcodes that fall into the lowest accessibility category in Figure 5. Put simply, the most rent-burdened zipcodes have zero access to rental housing in other King County zip codes that would not classify them as severely rent-burdened, highlight the extreme inequity of rental housing in King County.

## Appendix

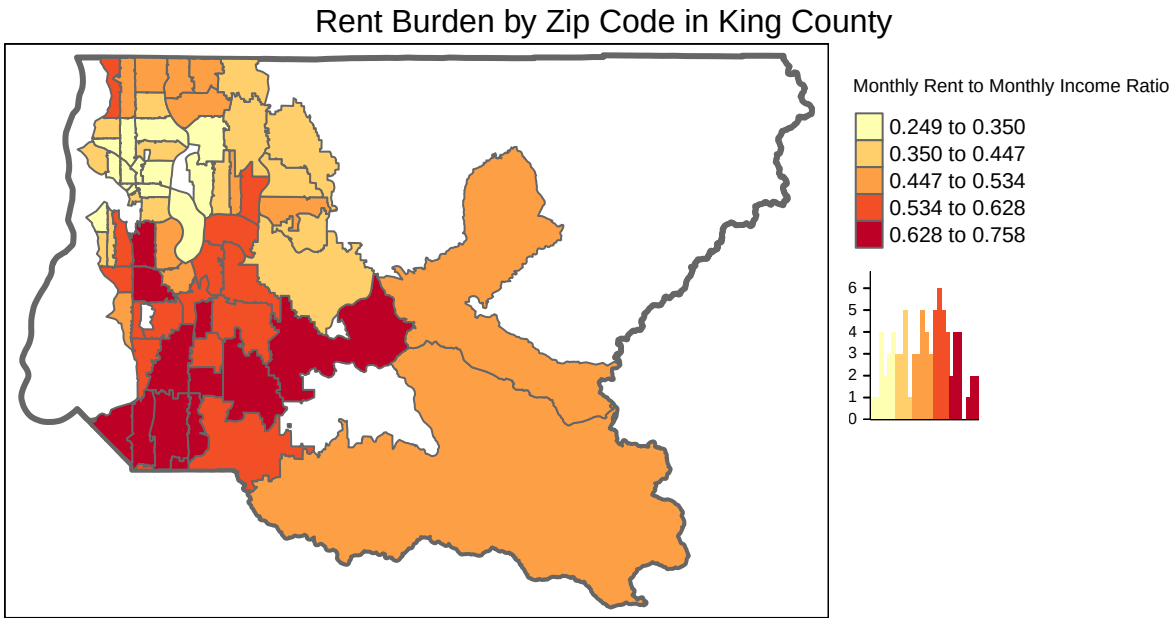


Figure 1

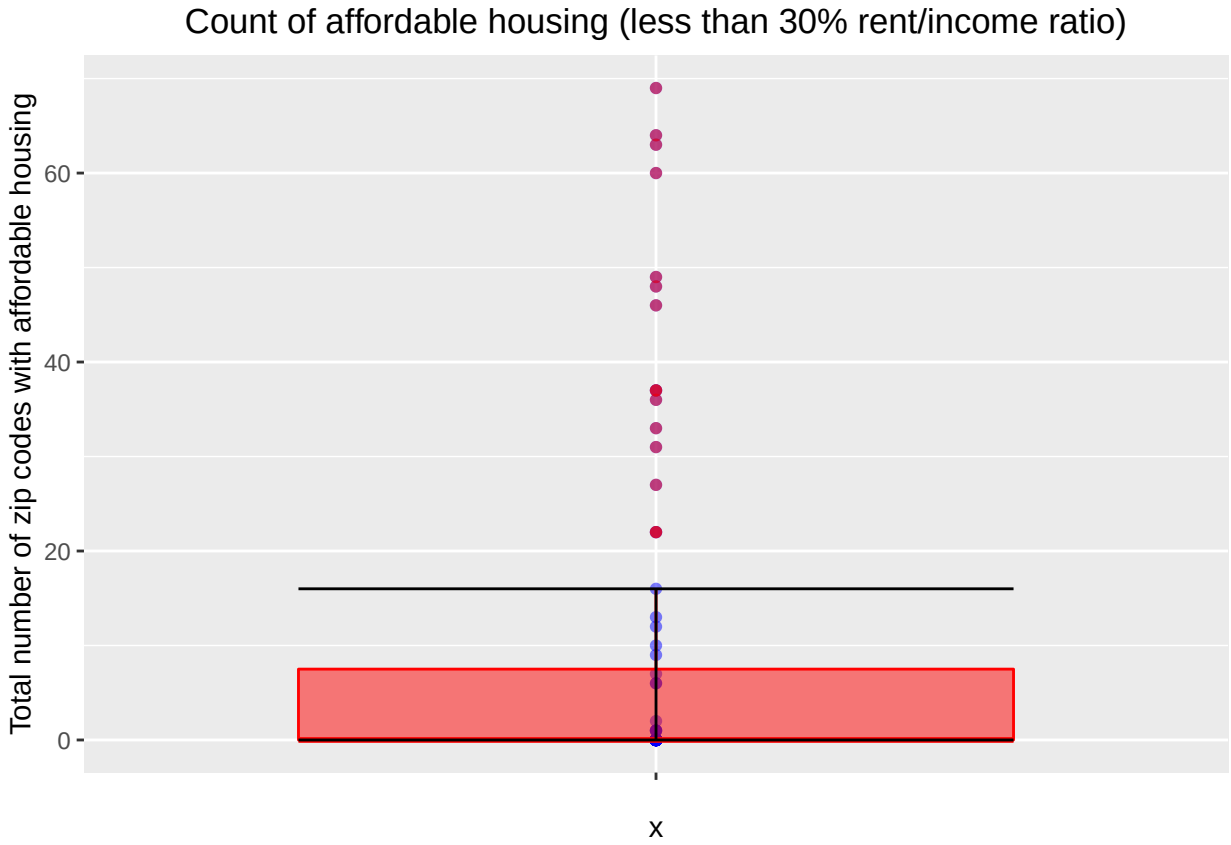


*Figure 2*

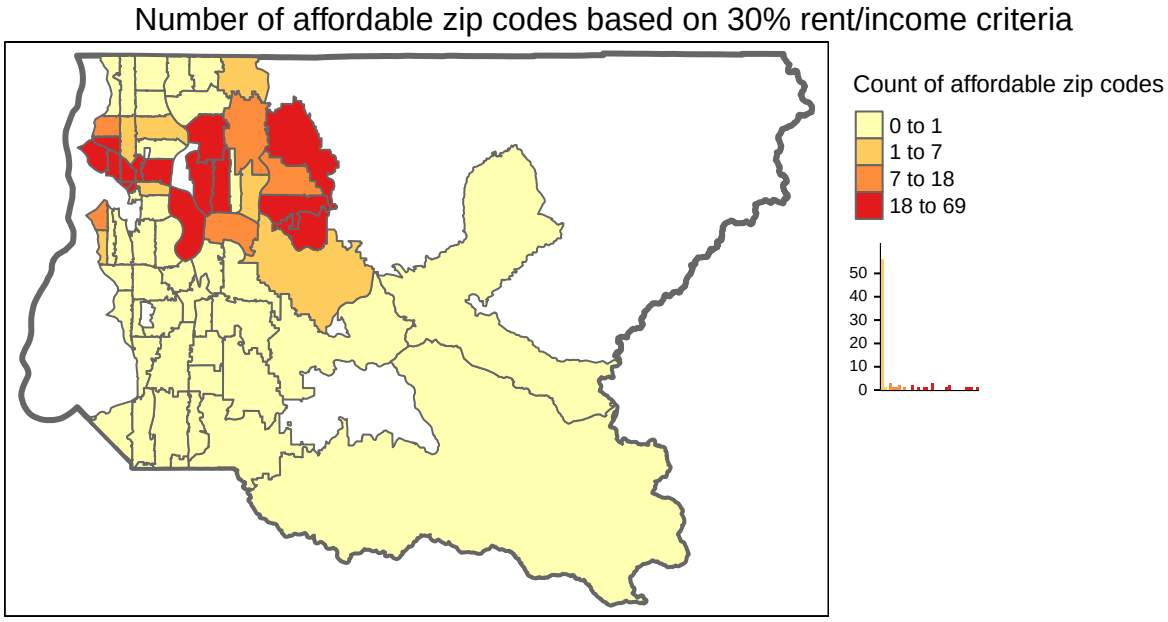
Number of affordable zip codes based on 30% rent/income criteria
Count of affordable zip codes
0 to 1
1 to 7
7 to 18
18 to 69
50
40
30
20
10
0

Figure 3

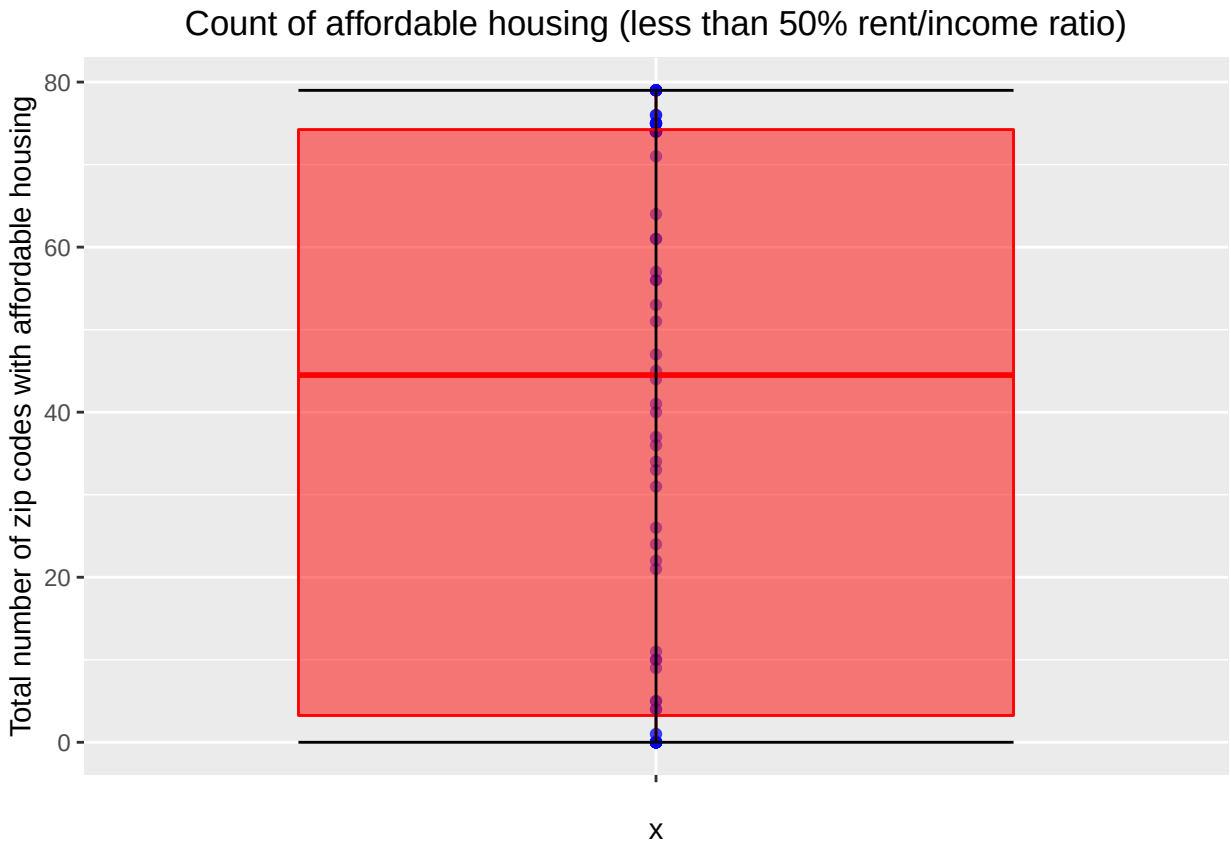
Count of affordable housing (less than 50% rent/income ratio)
Total number of zip codes with affordable housing
80
60
40
20
0
x

*Figure 4*

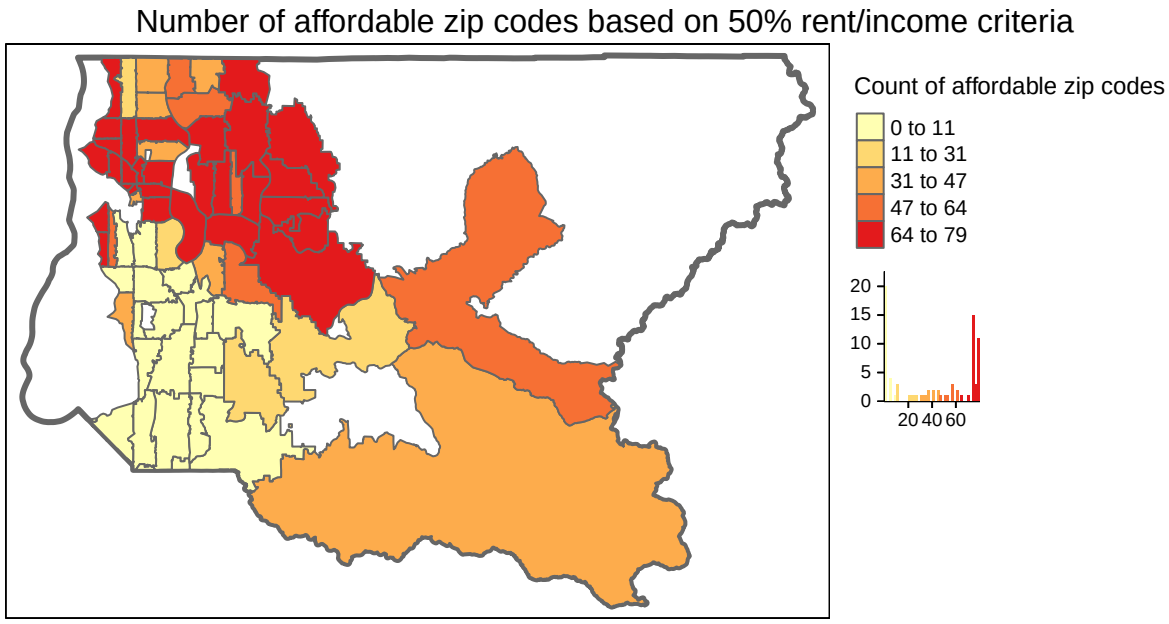


Figure 5 _

## Literature References

Clark and Maus 2015, Interpreting Migration Through the Prism of Reasons to Move https://onlinelibrary.wiley.com/doi/pdf/10.1002/psp.1844 Brown and Moore, 1970, The Intra-Urban Migration Process, https://www-jstor-org.proxy.uchicago.edu/stable/490436 Institute for HousingStudies at Depaul University, Building Community Data Capacity: Developing a Model to Preserve Affordable Housing in Uncertain Times - https://www.housingstudies.org/blog/building-community-data-capacity-developing-model-/

## Dataset Sources

King County Political Boundary, owned by King County Washinton - /datasets/king-county-political-boundary-no-waterbodies-kingco-area/explore?location=47.429618%2C-121.809650%2C10.19 Zillow Observed Rent Index - https://www.zillow.com/research/data/