Metropolitan Center for
Applied Research & Extension

WASHINGTON STATE UNIVERSITY
EXTENSION

City of Yakima
Equity Study Analysis

Conducted by the WSU Metropolitan Center for
Applied Research & Extension

Draft Final Report, Revised
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Contents

Executive Summary

Washington State University's Metropolitan Center for Applied Research and Extension (Metro Center) was contracted by the City of Yakima to conduct of an analysis of a specified range of variables using data compiled for the City of Yakima's Equity Study. This report presents the principal findings from the analysis (Appendix A – Complete City of Yakima Equity Study Analysis) and an overview of the city's methods for collecting, storing and sharing that information. This analysis of the Equity Study data is one of a "series of actions the Yakima City Council has taken to address equitable distribution of resources throughout the City of Yakima related to social, racial and economic benefits" (https://www.yakimawa.gov/council/equity-study/).

On June 6, 2017, the Metro Center met with Yakima City Council members on the Neighborhood and Community Building Committee: Chair Dulce Gutiérez, Carmen Méndez and Avina Gutiérez, to clarify the scope of work, define the specific variables and geographic dividing line to be analyzed, and the overall intent of the study. Data used in the analysis came from existing sources, including data collected by the city and census data. The Metro Center was not contracted to collect additional data for this analysis.

This report includes characterization and analysis of data sets specified in the scope of work which follows, and provided to the Metro Center by city staff:

- Public safety calls for service
- Streetlights
- Code compliance requests
- Parks (excluding privately funded parks, or those that charge for use)
- Transit ridership, shelters, benches

These data were compared across demographic variables obtained from U.S. Census Bureau and the geographical dividing line of 16th Avenue. In addition to examining the applicability of the data for the purposes of the Equity Study, the Metro Center team also documented the methods of collection, storage, and sharing of these data between departments.

On September 15, 2017 the Metro Center submitted an initial report (Appendix B – City of Yakima Equity Study Analysis – Task 1 Report) which concluded that City of Yakima has a professional and appropriate process for collecting, storing, and analyzing data, and a staff knowledgeable in the data infrastructure. Additionally, the data is recorded and handled in a reasonable and professional manner for its original intent: to support the city's geospatial data and land use planning.

However, our examination revealed that while most of data sets assessed in this contract were developed using best practices, and are a professionally appropriate resource for the operations of their associated departments, with the exception of the Parks and Recreation and Parcel data, the data did not include date attributes. For example, the data indicated the presence of a streetlight, but did not indicate the date it was installed. As a result, while the data are appropriate for their designated use in city asset management, they could not be used to evaluate budgetary decisions and resource allocation over time, making it difficult to use the data to address the equitable distribution of resources throughout the city. The specific details of the utility of the data, and a summary of the analysis of the data sets, appear in the body of this report.

Findings and Recommendations

Demographic Change over Time

The City of Yakima has undergone many changes since it was incorporated in 1883. Yakima's population has become more diverse, more educated, and median family incomes have risen (Appendix C – Demographic Variables Over Time). However, although social conditions in Yakima improved overall, they have not been shared by all residents as demonstrated by the ethnic segregation marked by 16th Avenue:

- The proportion of residents who are of Hispanic origin has increased at a greater rate on the east side.
- Median family incomes have increased at a greater rate on the west side.
- College graduation rates have increased on the west side and decreased on the east side.
- The proportion of youth has increased over time on the east side. Whereas the number of seniors has steadily decreased on the east side and steadily increased on the west side over the same period.

City of Yakima's Data Collection Methods

Our analysis suggests the City of Yakima has a professional and appropriate process for collecting, storing, and analyzing data, and a staff knowledgeable in the data infrastructure. We found no major sources of explicit bias in the collection, handling or storing of data. However, we did find several opportunities to improve data quality and quantity related to equity analysis

- Develop the Yak Back application in Spanish to meet the needs of more residents
- Develop an anonymous way to determine the status of Yak Back complaints to eliminate duplicate complaints and illustrate the city's responsiveness
- Create a system to allow residents to request additional street lights
- Create criteria for prioritizing code compliance requests, including those that do not threaten public safety.
- Creating a formal system of reporting the conditions of bus benches and shelters
- Add the condition of park amenities to the data currently collected

Process and Accuracy Audit Site Visit

Our team was able to confirm the accuracy of the parks data provided for the Equity Study. Using the parks data as an indicator of overall quality, and in combination with the assessment of data collection methods, we can infer the general reliability of the city's data. We also identified the opportunity to provide park improvements with an increased emphasis on equitable distribution of parks and amenities.

- Add qualitative data (condition of amenities) to supplement the quantitative data (existence of an amenity)
- Develop a set of criteria for prioritizing park improvements that include indicators of equity, in addition to the current practice of informing service organizations of planned capital improvements
- Provide the prioritized list, and suggestions, to private entities seeking to fund park improvements
- Develop a policy whereby the city keeps a percentage of private contributions for parks to support park improvements and amenities across the city.

Statistical Analysis of Historical Data – Parks

Parks were the only data that included an attribute storing the year of establishment, allowing for an analysis from 1980-2015. Much of the data needs to be considered in historical terms; the east side was developed earlier, following typical pre-WWII patterns (smaller parcels on regular street-blocks),

whereas the west side was more recently developed, with more suburban forms (larger parcels, some irregular street patterns). More recent developments often include parks as formal design elements, whereas older developments frequently did not include similar land set aside for parks.

- When stratified by 16th Avenue, it appears that far more persons on the east side reside within ¼-mile of parks than on the west side
- While many demographic variables showed little change over the years, it appears that within the ¼-mile area around parks, there were lowering proportions of persons of Hispanic origin, younger and older persons, married persons, and home owners.
- Some notable trends are the decrease in the number of persons residing within 1/4 mile of a park on the east side, and an increase on the west side; a drop in younger persons within buffers on the east side; and changes in the proportion of Hispanics that seem to mirror general demographic shifts over time.

Statistical Analysis of Current Data

Most of the GIS data sets were not encoded for longitudinal analysis (that is, the features in the GIS do not contain attributes representing the time at which the real-world features were created/installed/developed). Therefore, analyses for specific data sets were restricted to examination of *current* features and data sets with respect to *current* demographic data. These data sets therefore represent a benchmark more than allowing for analysis. No regression trend lines were added to the graphs, and formal statistical tests were performed due to the small sample size; due to the small sample size, trend lines are easily leveraged by outlier points, and correlation coefficients and p-values are unstable. Findings include:

- Police department calls for service
  - The tracts with the greatest number of per-capita calls were on the east side, but there appeared to be no association between demographic characteristics and counts of calls per capita.
- Fire department calls for service
  - There is no consistent trend of more calls coming from tracts with differential income, percent of residents of Hispanic origin, or renters
- Street lights
  - There appears to be no general association between streetlight density and demographic variables that cannot be explained by basic principles of urban form and historical development.
- Code compliance requests
  - Code compliance requests per capita appear to occur in greater numbers on the east side
  - The data do not indicate whether the resident who submitted the code compliance request is a neighbor, landlord, or someone who is just driving by. Therefore, the origin of the request cannot be directly ascribed to any difference in services provided.
  - The data did not include any consistent record-level information on either status or date of resolution, it is not possible in this analysis to make any conclusions on questions of equity related to how the City responds to such requests.
- Transit ridership
  - Patterns in transit ridership are similar to those of streetlights, and are likely due to similar underlying urban characteristics.
  - There is also slightly higher ridership in tracts containing lower proportions of persons under 18 years of age, pointing to a potential mismatch between level of service and need

○ The patterns of bus stop bench density are similar to those of transit ridership, likely indicating that benches and shelters are placed in locations with greater ridership.
○ Bus stop bench density appears to be higher in tracts with lower proportions of persons 65 years or older on the east side.

Conclusion and Additional Recommendations
Over the course of this project the Metro Center found that the city is doing professional work in the development and management of the various data sets under their purview, gathered for specific purposes related to city and department management. The data sets are useful for their original purpose but, as this analysis has shown, the data sets within the scope of this study cannot adequately provide an assessment of whether city resources have been equitably distributed. While this determination cannot be made, we believe that information in this analysis, and the act of engaging in this analysis, can prove valuable to the city.

City Council approved this analysis of the Equity Study data with the intention of using it as a tool to move forward, and to inform data driven decisions to benefit the city. Data driven decisions cannot be made without reliable data and proper systems for handling them. Our study concluded that Yakima has both the staff and the systems to support the use of data as a powerful tool for decision making, and data that can be used as an initial conditions statement and a base upon which to build. This is a tremendous asset for the city. The city can now determine what additional data it needs to collect - date and time attributes, for example – based on the questions the city wants to address in the future.

We provide the additional recommendations to assist the city:
- In order to look forward, the city may benefit from also examining its history and the current conditions that evolved from typical patterns of growth.
- As a reference for understanding the forces leading to modern inequities in the City of Yakima, it may be useful to place Yakima in the larger context of other cities across America that are facing similar situations.
- Many cities, large and small, have developed criteria for making decisions that include equity, typically called an Equity Lens. An Equity Lens is a practical tool to help insure that planning, decision making and resource allocation lead to policies and programs that help to achieve equity across the community, racially, socially and economically
- To evaluate progress toward equity, each city determines what it should measure. Hence, the value of a reliable system of collecting and managing data, which this study concluded the city possesses, becomes critically important.
- A cornerstone of equitable decision making is authentic community and stakeholder engagement. It, too, is a process that requires care and commitment to insure that engagement sparks lively civil discourse without resulting in acrimony and deep divisions.

Scope of Work

The Metro Center's Scope of Work consisted of the two tasks listed below, as specified by the City Council. The findings of this report are organized by these tasks. The complete project proposal is found in Appendix D – Project Proposal.

Task 1: Validate Equity Study data
Methods

Confirm with City Council up to 6 data sets identified in Task 2 B, excluding US Census Bureau data, to assess the validity of those data. For each data set selected we will conduct, as appropriate:

A. A process audit by interviewing City staff and reviewing documents associated with how these data were collected, compiled, summarized, and made accessible to the public.
B. An accuracy audit of the data by randomly selecting a representative sample of data points, and independently determining the accuracy through direct observations.

Task 2: Analyze existing Equity Study data to assess the geographic distribution of public resources and funds (e.g. city, State, or Federal)
Methods

A. Assess the quality of the data to understand any qualitative concerns and limitations that would impact data analysis or interpretation (i.e. period of time collected, geographically resolution of the data, etc.).
B. Confirm the input and output variables for the analysis, and the geographical dividing line. Initial request included the following 6 data sets, upon which this estimate is based:
   - Input variable:
      o Demographics, to include income, race, education level, marital status, home owner or renter, property value and age
   - Output variables:
      o Public safety calls for service (location, response time)
      o Streetlights
      o Code compliance requests
      o Parks (exempt parks that are privately funded or charge for use)
      o Transit ridership, shelters, benches
   - Geographical dividing line
      o 16th Avenue
C. Perform the appropriate statistical analyses to assess any relationships amongst the input and output (i.e. response) variables.

16th Avenue – demographics over time

The City of Yakima has undergone many changes since it was incorporated in 1883. Economic and demographic transitions, as well as geographic changes have been ongoing for the City as it adapts to regional, and national influences. In the past thirty-five years, Yakima's population has become more diverse, more educated, and median family incomes have risen (Appendix C – Demographic Variables Over Time). However, although social conditions in Yakima improved overall, they have not been shared by all residents as demonstrated by the ethnic segregation marked by 16th Avenue. The following four sets of graphs in particular show the different trends that residents in eastern versus western Yakima have experienced between 1980 and 2015. These figures show the significance of the dividing line of 16th Avenue, which was identified by the City Council as a demarcation line for this project.

Figure 1 shows that the proportion of residents who are of Hispanic origin has increased at a greater rate on the east side; Figure 2 shows that median family incomes have increased at a greater rate on the west side, and Figure 3 shows increasing college graduation rates on the west side and decreasing rates on the east side. Figure 4 shows dramatic changes in age profiles; the proportion of youth has increased over time on the east side, particularly from 2000 onward. Whereas the number of seniors has steadily decreased on the east side and steadily increased on the west side over the same period.
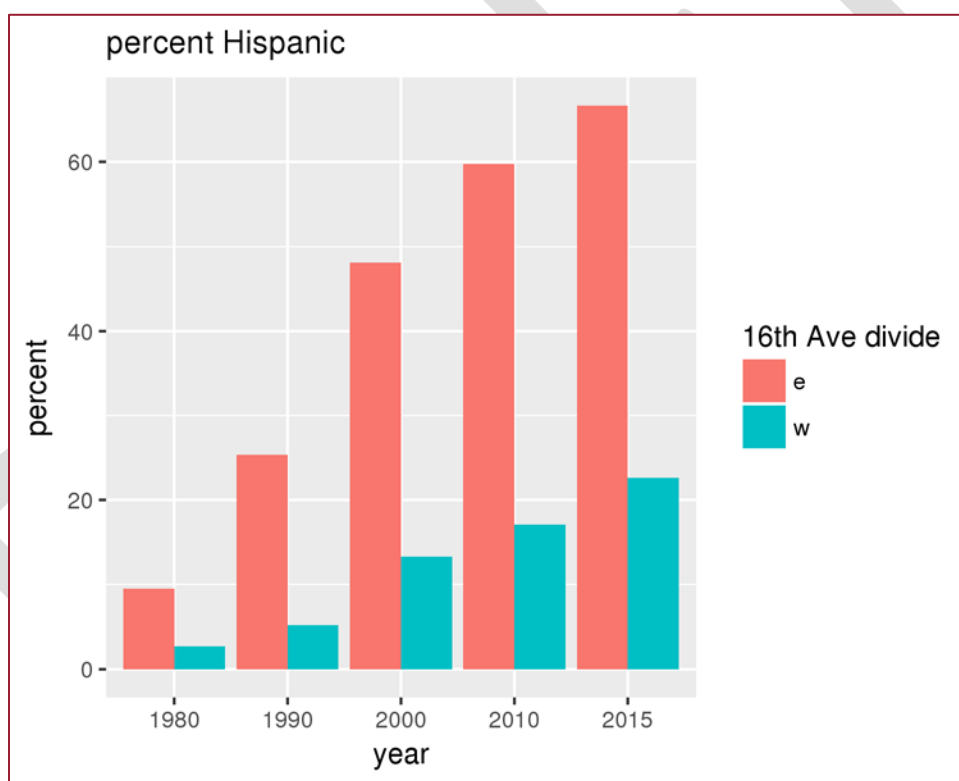

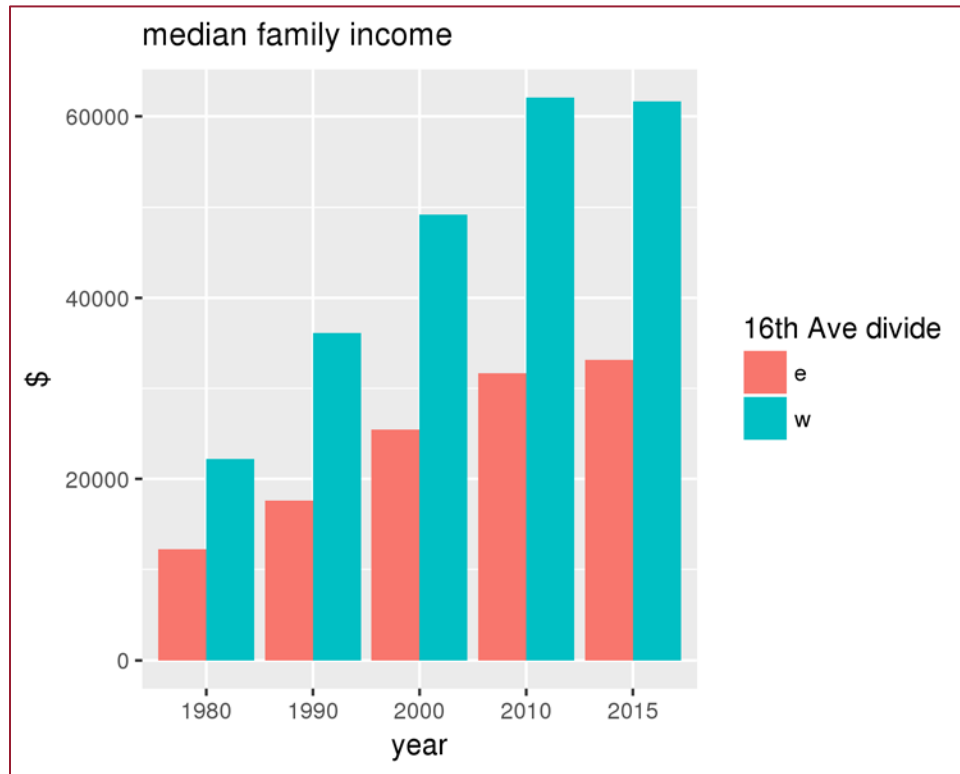Figure 1: Percent Hispanic, east and west of 16th Avenue

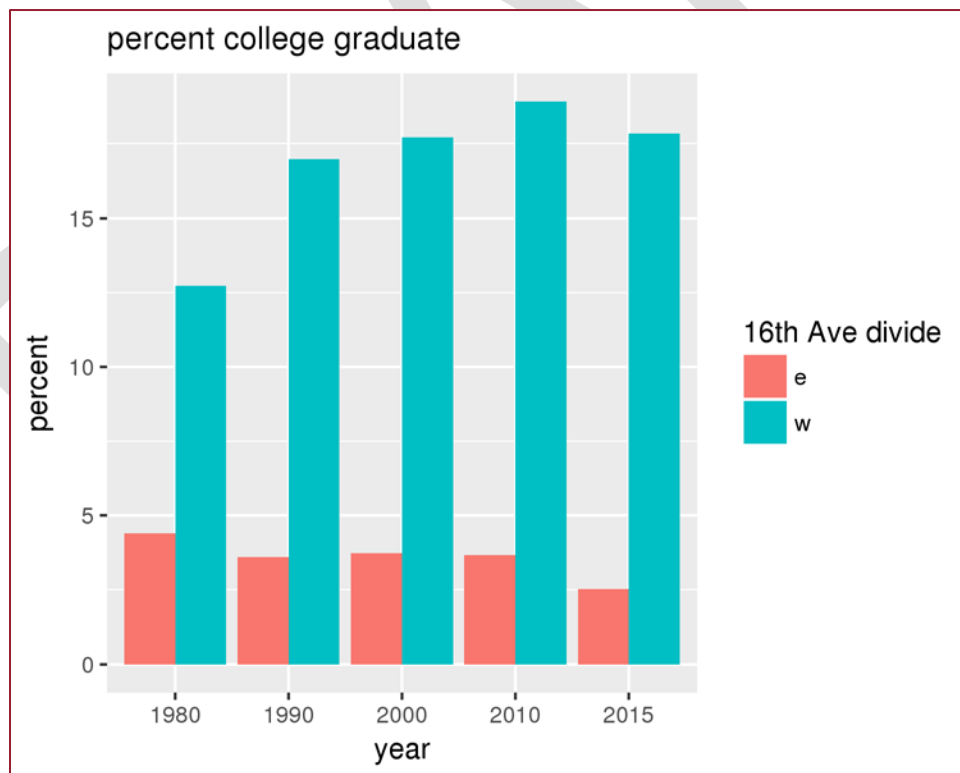Figure 2: Median family income, east and west of 16th Avenue

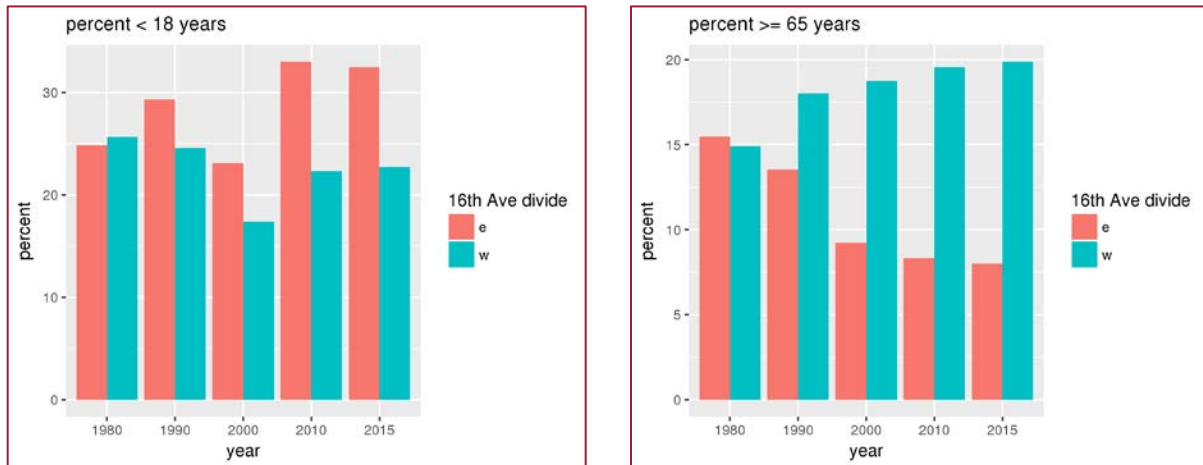Figure 3: Percent of residents who are college graduates, east and west of 16th Avenue

Figure 4: Percent of residents by age (< 18, left; ≥, right), east and west of 16th Avenue

Task 1, Part A: Summary of the City of Yakima's Data Collection Methods

This section provides an overview of the methods used by City of Yakima employees to collect, store and share data for five city-provided data sets: public safety calls for service, streetlights, code compliance requests, parks, and transit (ridership, benches, and shelters).

Terminology

Throughout this report the following terms: equity, equality and bias will be used. As it relates to the scope of work of this project, the following definitions will be used.

- Equality – an equal service level regardless of need.
- Equity – a service level appropriate to need, regardless of the absolute amount of service.
- Bias – intentional or unintentional (systematic) treatment or distortion of either equity or equality in favor of or against one group as compared with another

Methods

After receiving portions of the data and conducting an initial review, the Metro Center team met by phone with City Manager Cliff Moore, Community Development Director Joan Davenport, and city staff to clarify the intent of some portions of Task 1 of the Scope of Work, and to make sure there was an understanding of the city's interest in positive strategies for the future. Through this discussion we came to understand that the language of the scope required clarification. Task 1 "Validate Equity Study data" means something different in the academic realm and the applied real-world one. A technical data validation process would be overly statistical, particularly with a "representative sample of data points" across the various datasets, and would be both prohibitively expensive and, most important, would not achieve the city's objectives. Instead, we decided that we needed to know if the city's data are being collected and recorded in appropriate ways (Task 1, part A), and whether it is useful to the current analysis (Task 1, part B). Then, as appropriate, we would check for accuracy of the acceptable data by ground-truthing through site visits (Task 1, part B) to complete Task 1.

For our process audit we reached out to city staff in multiple departments to learn about the internal processes used to gather, compile, and store data for the Yakima Equity Study. Staff were uniformly open and helpful in sharing with us their processes for data collection and handling, as well as the data itself.

The Metro Center team contacted the City of Yakima's Supervising Senior Analyst, Tom Sellsted, to obtain the five datasets of interest. After reviewing the data available, a Metro Center team member spoke with Tom Sellsted and Jill Ballard to discuss the methods used to collect and display datasets in the Equity Study's ArcMap Online Story Maps (https://yakima.maps.arcgis.com/apps/MapJournal/index.html?appid=edb33521fed7400e839ae1b1e7a d3fcc). Mr. Sellsted also provided the Metro Center team with contact information for the city data steward(s) of each of the five datasets, and the team scheduled one-hour phone calls with each data steward. During these calls we asked questions to identify and clarify our understanding of the methods used to collect the data used in the Equity Study. We took detailed notes during the call and, in some cases, followed up with additional emails or calls for clarification.

Findings

Public Safety Calls for Service

Public safety calls for Yakima Fire and Police services are recorded by the 9-1-1 dispatch center operated by Yakima County's Suncomm, which operates county-wide. When a call is received by Suncomm, the call taker confirms the physical address and inputs it into a database shared with city staff. As call takers

continue gathering more information from callers, a dispatcher simultaneously contacts the appropriate agency to provide services to the caller. The location, type of response, services provided, and department providing the services are all recorded in real time. Because this information is being input directly into a database shared with the City of Yakima, current data on public safety calls for service are continuously being recorded. This is the method used to record all calls received by Suncomm, from all City of Yakima locations, and for all types of service needs. Data for the Fire Department and Police Department calls for service are both recorded in the same way.

The data displayed in the story maps of the City of Yakima's Equity Study is populated by the data in the database shared by Suncomm and the City of Yakima. A programming code (using Python, the same coding language used by ArcMap, a geographic information system software) collects the real-time data being input into the database by Suncomm call takers, and displays it on the Equity Study story map. Although the story maps only display the most recent month of data, Suncomm has been recording data for Public Safety Calls for Service in a way that can be displayed on GIS maps since 2012. Calls that are made directly to the Yakima Police Department are manually added to the database shared by the City of Yakima and Suncomm. This is also the case for service requests from walk-in visitors to the Police Department offices.

Streetlights

Digital maps of streetlight locations were developed over 15 years ago, and display the current locations of streetlights throughout the City of Yakima. At that time satellite photography was analyzed to identify and geolocate streetlights within the city. Since then, the digital maps have been updated as needed to show the addition of new streetlights, or the acquisition of streetlights formerly owned by Pacific Power.

The Public Works Department identifies damaged or non-functioning streetlights in two ways. The first way from phone calls and submissions on Yak Back (the city's web application to report potholes, graffiti, etc.) from residents who observe a streetlight that needs repair. There is no documentation of how many residents call rather than use the Yak Back application. The second way that staff identify streetlights that need maintenance is by driving along portions of the City of Yakima street grid after dark between November and March. Starting with main arterials, and streets around schools, and working their way along the grid to residential streets, Public Works staff identify whether the streetlights are functioning. In this way, all streetlights are assessed for maintenance by City staff annually. In 2017 the Public Works Department is overseeing the installation of LED light bulbs in all of the City's streetlights. During this upgrade process the GIS locational data is being updated and revised.

Residents can request a new streetlight be added to their street by contacting the City. Those requests are prioritized by the City's transportation engineers, who review crime statistic data, the cost of installation, and the length of time a request has been on the list. The target for the spacing of streetlights is between 200 and 250 feet, but can be as far as 400 feet apart, depending on the dispersion of the light by a given streetlight.

Code Compliance Requests

Data used in the Equity Study to show the locations and type of code compliance request are recorded by the Yak Back web application. Only complaints made by the Yak Back web application are displayed on the Equity Study story maps; those data do not reflect the code compliance requests made by phone, or those initiated by Yakima Code Compliance Officers or other City staff.

When Code Compliance Officers receive code compliance requests, from either the Yak Back application, phone calls, or from other city departments, that information is entered into the SMARTGOV database used by the Code Administration Division. Because the code compliance cases managed in SMARTGOV do not have a method for tagging whether a case was submitted by Yak Back or other means, it is not clear how many cases are initiated by phone versus Yak Back. However, city staff report that requests submitted via Yak Back make up the majority of requests. Yak Back provides an anonymous means of contacting the City and can be used by anyone with internet access. However, Yak Back is only available in English, and no other languages spoken by City residents. Both of these characteristics are potential limitations to this type of request system.

After a code compliance request is made and a case is opened by Code Compliance Officers in SMARTGOV, the officers update the information related to the case on a daily basis until the case has been resolved. When resolved, cases are marked as "closed" in the SMARTGOV database, and no longer receive updates unless re-opened. In this way, up-to-date information on the progress of code compliance requests is available to city staff, and can be used to develop GIS maps as needed. The code compliance data used for this analysis is a complete dataset from the year 2015.

Code Compliance Officers prioritize their responses to code compliance requests based on the degree to which the case threatens public safety. There is no formal criteria to prioritization decisions made by the officers, this is left to their judgment.

Parks

The Yakima parks inventory is updated in every Comprehensive Plan cycle. During Comprehensive Plan updates, the Yakima Parks and Recreation department (YPR) surveys the parks and their amenities, takes note of needed improvements, and assesses current conditions. The updated inventory of parks and their amenities is then compiled by YPR into a report, which is shared with the data analysts who created the online Equity Study maps. The data analysts translate the parks data into GIS format, and develop ArcGIS maps with attribute tables that describe information about each park, such as Capital Improvement Plan spending, types of amenities, and completed projects. However, details about the condition of the amenities are not recorded.

Transit (Ridership, and shelters/benches)

Transit ridership in the City of Yakima is recorded by the bus drivers themselves by entering rider information into an application on an iPad. Drivers enter rider information including the method of payment and the number of passengers entering. The iPads on city buses run a JavaScript application that submits data to a database shared by Yakima Transit and the city GIS analysts. These data were used to populate Equity Study maps with ridership information as soon as it is recorded. There is no alteration or editing of the data between when they are taken from the recordings of the bus drivers and uploaded onto the Equity Study maps.

In the event of failure of an iPad or the network, manual devices for counting ridership are also available to bus drivers. These manually recorded data are later entered into the database by Transit staff to maintain accurate ridership data.

The transit benches and shelter location data are the product of annual inventory surveys that Yakima Transit conduct. The GIS data are also updated to reflect the removal or addition of benches and shelters between annual surveys. The condition of benches and shelters is informally observed both by riders and bus drivers, who typically notify Yakima Transit maintenance crews if a bench or shelter is

damaged or needs maintenance. By creating a formal system of reporting, the possibility of bias would be diminished.

Residents or Yakima Transit employees can suggest the placement of a bench or shelter. The criteria for approving the addition of a bench or shelter focus primarily on the availability of space in the public right of way and condition of the sidewalk, as well as the volume of riders who use that bus stop.

Conclusion

Our analysis suggests the City of Yakima has a professional and appropriate process for collecting, storing, and analyzing data, and a staff knowledgeable in the data infrastructure. We found no major sources of explicit bias in the collection, handling or storing of data. Additionally, most of the data is recorded and handled in a reasonable and professional manner for its original intent: to support the city's geospatial data and land use planning. We note that the city's GIS architecture has been developed over more than 30 years, a positive quality which means that the city has a mature system in place.

Task 1 Part B: Process and Accuracy Audit Site Visit

To complete the accuracy audit described in Task 1, part B, the Metro Center team reviewed the Yakima Parks and Recreation (YPR) parks data. This data set was selected in part because of its general applicability to the City's Equity Study, specifically the ability to track parks over time. The accuracy audit was conducted to verify by ground truthing the parks data provided by YPR, and to further assess differences in parks on either side of 16th Avenue that may not be recorded, or obvious, in the data. It should be noted that privately funded parks were included in this process and accuracy audit as a possible point of comparison and provide a more comprehensive assessment however, per the scope of work, privately funded parks are not included in the statistical analysis.

On September 12th, two members of the Metro Center team visited the City of Yakima. During this visit, the team members were accompanied by Yakima Parks and Recreation staff, who provided information and support. The objective of the visit was to review a sample of ten parks within the City to assess the accuracy of the parks data provided to the Yakima City Council for use in the Equity Study. This section details our methods and findings.

Methods

The WSU team developed a set of criteria for selecting which parks to visit and perform direct observations. The purpose of these direct observations was the confirmation of the amenities that are listed in the parks data, and to compare the accuracy of the data on either side of 16th Avenue. The following criteria were used to select ten parks for onsite observation:

- Geographic Location: Select parks that are entirely located on either the west or east side of 16th Avenue, and do not span across that dividing line.
  - For eight parks: select only parks that have not received funding from private donations
  - For contrast, select two additional parks, one on each side of 16th, that were built using private donations
- Data Enumeration or Completeness: select parks for which data was not richly recorded and amenities enumerated, to possibly provide the Yakima Parks Department with a more complete inventory. This would include for example:
  - Counts of amenities rather than binary observation of presence vs. absence of an amenity

- ○ Presence of parking lots
- ○ ADA parking compliance
- Variability: Select parks with different types of amenities (fields, usage type, bathrooms, courts, etc.) as well as variations in size and age of park.
- Amenities: Parks in our sample were selected in pairs, one on the east side of 16th and one on the west side that have the same type of amenity, and could have their condition and quality assessed and directly compared.

Ken Wilkinson, Yakima Parks and Recreation Manager, and Jenise Sanders, Parks and Recreation Administrative Assistant, showed the Metro Center team each park and answered questions pertaining to the current information for parks, and the history of park development. During the visits to each park the Metro Center team members walked through the park, and recording notes on data collection sheets. The team members paid specific attention to the amenity that was selected for comparison (e.g., horseshoe pits at both Milroy Park and West Valley Community Park). Additionally, the Metro Center team members took photographs of the parks and the built environment of the surrounding neighborhood. Table 1 shows the complete list of the parks visited. Appendix E – Summary of Accuracy Audit Findings shows a summary of findings at each park.

Table 1: Summary of parks visited, and the amenities of interest

Side of 16th	Council District	Park Name	Amenity Comparison
E	1	McGuinness	Picnic Shelters
W	3	Emil Kissel	Picnic shelters
E	2	South 2nd St	Open space
W	6	Gilbert Park	Open Space
E	1	Milroy Park	Horseshoe pits
W	7	West Valley Community park	Horseshoe pits
E	2	Yakima Arboretum	Arboretum (landscape, maintenance)
W	3	Fisher golf course	Golf course (landscape, maintenance)
E	2	Kiwanis park (private funding)	Recreation facilities - baseball fields
W	4	Franklin Park (private funding)	Recreation facilities - Pool

Findings

The direct observations of the selected parks confirmed the accuracy of the documentation of the amenities, approximate size, and location of the parks. Appendix B provides a summary of the audit findings. While these data might be used for the Equity Study, there are observable differences in the age and size of amenities between parks that are not described by the data. For example, while both McGuinness Park and Emil Kissel Park each have one picnic shelter, the available data does not describe

the size, age, or condition of each picnic shelter. By adding qualitative data to supplement the quantitative, primarily binary data, the Equity Study can be better informed about the conditions that residents in Yakima experience.

It is clear from the YPR parks data and conversations with staff that a portion of the improvements to Yakima's parks have been made possible by contributions from several non-profit and service organizations. Those improvements also do not appear to have been made with any intentional geographic bias, and the city benefits from the generosity of those organizations. However, those contributions have been accepted by City of Yakima without prioritization for which projects are to be completed.

This means that improvements to parks by donation throughout the City have been made based on the interest of the group providing the donations, and has not been intentionally directed to provide improvements based on some equity criteria. Importantly, this finding provides an excellent opportunity to move forward with future allocation decisions that increase the equitable distribution of parks amenities. One essential component to realizing this opportunity is the development of prioritization criteria for determining the order in which parks receive funding for improvements (from both public, and private sources). Including meaningful considerations of equity in these prioritization criteria provides the YPR with a valuable tool for guiding the donations and volunteer efforts of Yakima's highly engaged service organizations.

Conclusion

Given that the parks data can be analyzed to show its relationship between demographic "input" variables over time, it is likely the only directly applicable dataset of the five "output" variables provided to the Metro Center team. This was an important factor in choosing parks as the dataset for which to conduct an accuracy audit. By making direct observations at ten parks with the assistance of Yakima Parks and Recreation staff, the Metro Center team has been able to confirm the accuracy of the parks data provided for the Equity Study. Using the parks data as an indicator of overall quality, and in combination with the assessment of data collection methods in the previous section, we can infer the general reliability of the City of Yakima's data.

Although intention bias was not observable, we identified the opportunity to provide park improvements with an increased emphasis on equitable distribution of parks and amenities by providing guidance or suggestions regarding donations and efforts of service groups. This would likely entail developing a set of criteria for prioritizing parks investments that includes indicators of equity (such as income, educational achievement, property value, race, and distance to parks). This could be in addition to the YPR's current method of sharing comprehensive planning documents with service organizations to inform them of all planned capital improvements to parks.

Task 2 Part A: Data Quality and Limitations

The city is to be commended for its long commitment to a citywide Geographic Information System. However, it is important that staff and council recognize the limitations of that data to answer questions for which it was not originally designed. Because the datasets were collected and developed for purposes other than to assess equity, they are insufficient to do so because they lack necessary elements including but not limited to: an accurate recording of the date of resource development (e.g. the date a streetlight was installed), qualitative characteristics of variables, or the method that data are collected by the city (e.g. Yak Back).

In Appendix B, we provide a summary table of the data sets and the possible usage of each. We hope this will help council understand possible approaches they might take, and what analyses are not supported by the data as composed.

Task 2 Part B: Confirm the input and output variables for the analysis

Methods

Because the data provided were rather limited with regard to being able to answer questions of equity, the Metro Center team developed additional datasets. We compiled Census data from the decennial and American Community Survey (ACS) data sets for each of the demographic "input" variables: income, race, education level, marital status, and homeowner or renter. These data sets were collected for years 1980, 1990, 2000, 2010, and 2015. It should be noted that the 1970 Census data contained no values for Yakima County, so analyses for 1970 were not possible. Census data came from three distinct sources:

- 1970, 1980, 1990-time series data: NHGIS (https://www.nhgis.org/)
- 2000 Decennial data, US Census: Summary File 3, 2000 (https://www.census.gov/mp/www/cat/decennial_census_2000/summary_file_3.html)
- 2010, 2015 American Community Survey data: censusreporter.org (http://censusreporter.tumblr.com/post/73727555158/easier-access-to-acs-data)

The Census data collected included:
- Total population
- Persons by sex
- Persons by age, with specific classes <18 and ≥65
- Persons by race (white, nonwhite)
- Persons of Hispanic origin
- Total households
- Total families
- Persons by nativity
- Persons 25 years and over by educational attainment
- Household income in previous year
- Family income in previous year
- Occupied housing units by tenure
- Marital status
- Poverty (percent of population below poverty level)

These data sets were used as input variables to perform statistical analysis of output variables (Task 2, part B), as well as to tell the demographic story of Yakima over time (Appendix D). Data for property value and age was also obtained from city GIS staff. Since these data include time stamps (i.e. a specific date and / or time associated with the variable), they allowed for a longitudinal analysis of age and value through the years of census data available.

Data obtained from city GIS staff were converted to a PostgreSQL/PostGIS database, used to run tabulations, and then used to determine any correlations. For each data set and each field of interest, tabulations of values were generated. These tabulations should prove useful as guidance for City of Yakima staff in forming particular questions about data sets.

Overlay analyses were performed (e.g., point-in-polygon) to generate summaries by administrative unit. Administrative units were represented by sociodemographic variables, and bivariate scatter plots were generated for each pair of variables of interest.

Task 2 Part C: Statistical Analysis

Results are presented in two sections, one for data that were encoded with temporal data (i.e., date of infrastructure installation), and one for current data that did not have attributes representing date of installation. In order to perform longitudinal analysis of infrastructure data stored in the GIS, it is necessary to have GIS data sets that include variables that represent when a feature of infrastructure was created or installed (e.g., installation date for a streetlight or patch of sidewalk).

Throughout this report, graphs were selected that best illustrate the findings. All of the graphs for parks created for this study can be found in the online Appendix A at http://gist.gis.washington.edu/yakima_equity. It should be noted that the data and analysis in Appendix A will be transferred to the city in the near future, and this URL will no longer be active. The city will determine how to make this information available.

Scatter plot graphs illustrate results of the statistical analysis. Scatter plot graphs present demographic variables of interest on the X-axis (horizontal) and compared to quantities, such as per-capita area of parks on the Y-axis (vertical), time-matched by year. The dots indicate individual census tracts (or tracts that were bisected by 16th Avenue), with census tracts east of 16th represented by orange dots, and west of 16th indicated by blue dots. In cases where a census tract crosses 16th Avenue, some pairs of points represent the same tract ID, but the E and W portions, respectively.

Methods

In the first set of analyses, historical boundaries (i.e. annexations) of City of Yakima were overlain with contemporaneous Census data to provide estimates of the demographic conditions of Yakima as a whole, and also stratified by the 16th Avenue geographical dividing line. In the GIS overlay process, census tracts that are straddled by the city limits are "clipped." The ratio of clipped area to original area gives a value that can be multiplied by the original census values to produce an estimate of the enumeration within the clipped area (assuming a uniform distribution across the census tract). For example, if a census tract had 4000 persons, and 75% of the tract was within the city limits, the estimate of the number of persons in the portion of that tract within the city limits would be 3000 (4000∗0.75=3000). For enumerated variables (i.e., counts of persons), the sum of these area-weighted estimates was generated.

Results: Analysis of Historical Data - Parks

Parks were the only data encoded for historical analysis, with an attribute storing the year of establishment. For these analyses, the park data were selected to match the year of the census data, such that the GIS data selection represented those infrastructure features that existed at the time of the census. The park polygon data were then overlain on the census polygon data to generate tables that were then graphed, allowing comparison of potential park accessibility and demographic patterns.

Parks

Historical analysis of parks was done using two separate methods. For both methods, per the scope of work, parks which received private funding in the past were excluded from the analysis. The following parks were <u>not</u> included in the analysis:

- Chesterly Park
- Franklin Park & Pool
- Harman Center at Galleon Park
- Kiwanis Park & Gateway Sports Complex
- Larson Park
- Miller Park
- North 44th Ave. Park
- Randall Park
- Rosalma Garden Club Park
- Southeast Community Park

The parks within Yakima City limits are shown in Figure 5. It should be noted that some of the parks did not have a value for the "year created" field and were not included in this analysis; results would differ with the use of a fully attributed data set. Note that there are generally larger and fewer parks in west side tracts, and smaller, but more dispersed parks on the east side. This is consistent with parks distribution in other cities where more space and larger parcels of land are available in the newer, expanding, portions of the city, compared to smaller parcels in the older, original portions.
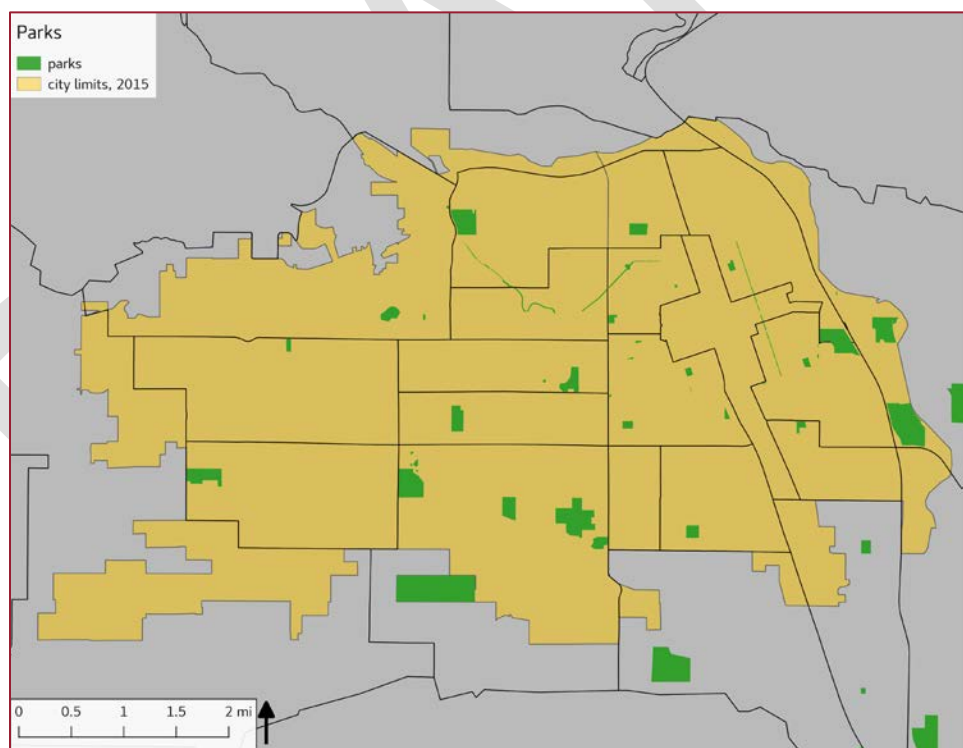
Figure 5: Parks in Yakima with 2015 city limits

For parks and census data sets, years were matched (e.g., for the 1980 census, only those parks that existed in 1980 were selected). A GIS intersection was performed to tabulate the total area of parks within each census tract. Demographic characteristics of the tract and the area of parks within the tract graphed as XY scatter plots. Also, because many tracts had no parks overlapping their boundaries, the number of available points is small, therefore no formal statistical tests were performed.

The area of park per capita across 1980-2015, stratified by the 16th Avenue divide, is shown in Figure 6. Overall, there was more park area per capita on the west side versus the east side. The other trend seems to be that the amount of park area per capita was greater for western Yakima in 1980, but as the City grew over subsequent years, the area of park per capita became more uniform across the 16th Avenue dividing line. It should be noted that the calculation of per-capita area of park is dependent on both the total area of park as well as the number of residents. Additionally, the area of park does not necessarily reflect actual accessibility, and cannot reflect quality or amenities.
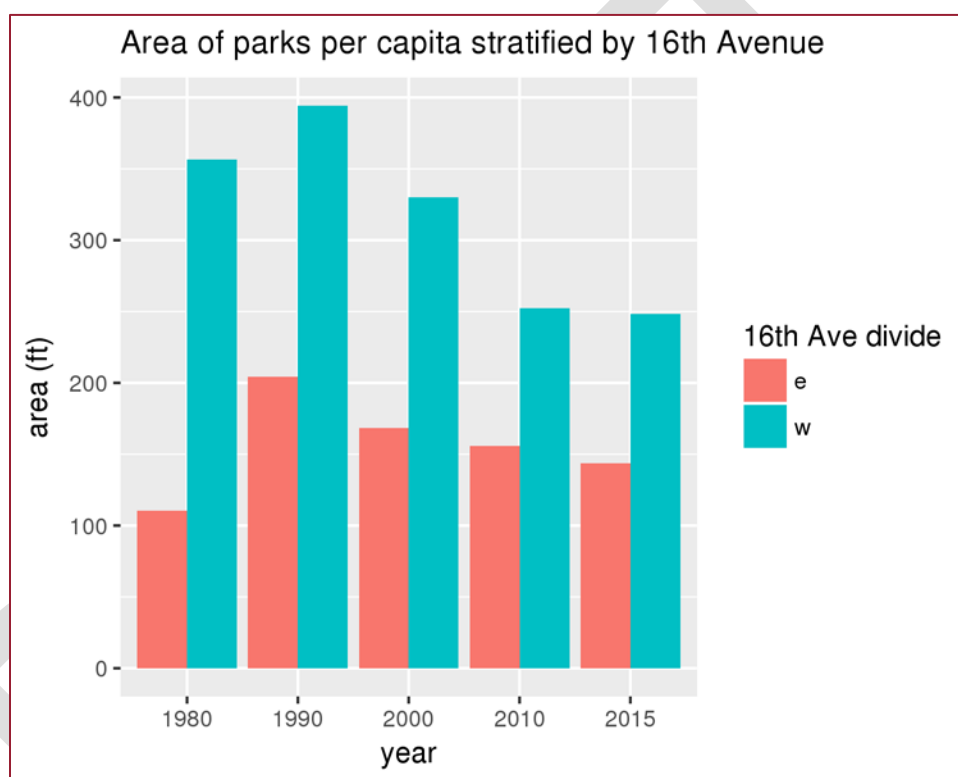
Figure 6: Area of park per capita, 1980-2015

Figure 7 and Figure 8 show park data from 1980, plotting per-capita park area on the Y-axis (vertical) against the percent of residents on the X-axis (horizontal) who were Hispanic and median family income, respectively (including all data (left panel) and with a large "outlier" removed (right panel)). The obvious stratification in the X-axis (percent Hispanic and median family income) reflect the general segregation of ethnicity and income across the 16th Avenue divide.

Overall, the amount of park per capita is uniform across census tracts (meaning that the data values (dots) are distributed vertically similar regardless of their location along the horizontal axis). Yet, there is an overall greater variation on the west side, and with a single west side tract having a relatively large area of park within the tract. This is tract 1100, at the southern end of the City, intersecting Fairbrook Islands, Kissel Park, and Tahoma Cemetery, and with an estimated population of 2,244 persons. The three tracts with the greatest per-capita area of park are on the west side which also have a relatively

low Hispanic population, although one tract on the west side with the lowest Hispanic population also has the lowest per-capita park area. Figure 8 should be interpreted with caution since per-capita values are highly dependent on the denominator (i.e., tract population); two tracts with the same park area but different populations will have different per-capita area—which is not necessarily a good proxy for accessibility.
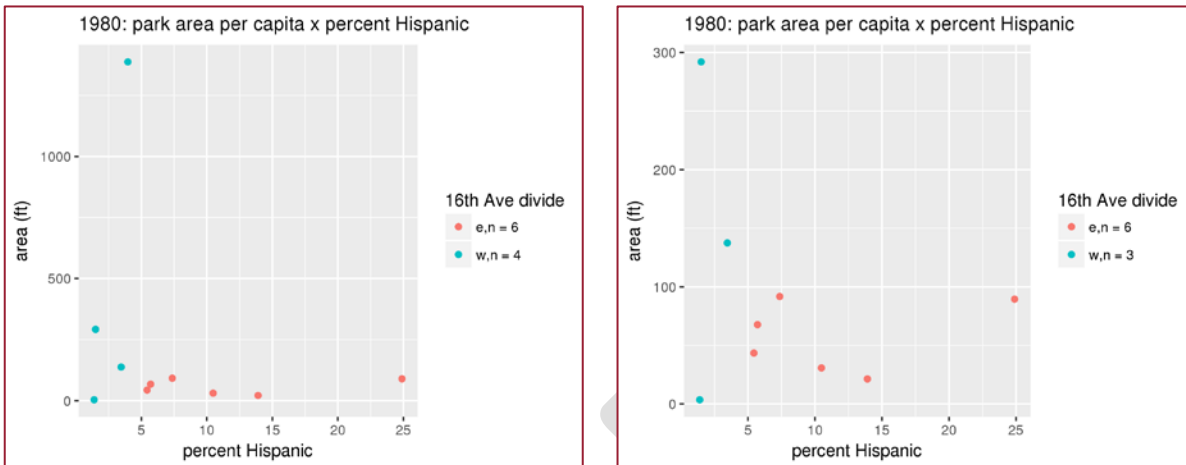
Figure 7: Park area per capita by percent Hispanic, 1980. All data (left); outlier removed (right)

Figure 8 is more or less a mirror of Figure 7, since median family income and percent of residents with Hispanic origin are strongly correlated.
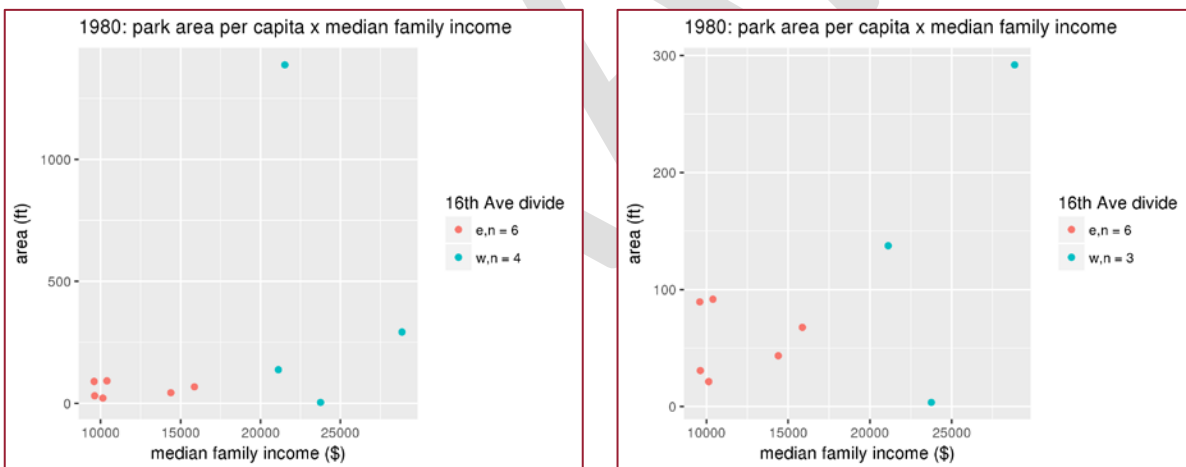
Figure 8: Park area per capita by median family income, 1980. All data (left); outlier removed (right)

The same data are shown for 2015 in Figure 9, and Figure 10. There are more data values, reflecting both the geographical growth of the city as well as some census tracts being subdivided, this is indicated by the larger number of both orange and green dots.

Comparing 1980 data with those for 2015 show similar patterns, but now with a single east side tract having a relatively large per-capita area in park land. This represents tract 1602 at the far eastern side of the City, containing the large areas of Sarg Hubbard Park and the Yakima Area Arboretum, but with an estimated population of only 791 persons. Therefore, while this city has grown geographically and in the number of residents, the general uniform distribution of park area per capita relative to percent Hispanic and median family income has not changed overtime.
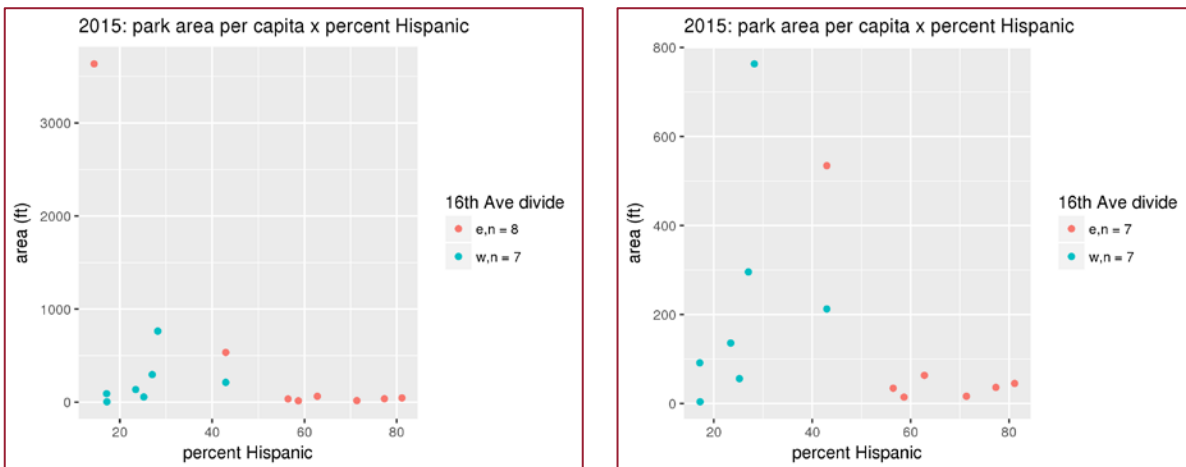
Figure 9: Park area per capita by percent Hispanic, 2015. All data (left); outlier removed (right)

Figure 10: Park area per capita by median family income, 2015. All data (left); outlier removed (right)

One method to assess accessibility and equitable distribution or access is look at how close individuals live to a park. Therefore, **Buffers** of 1/4-mile, as a proxy for locations within reasonable walking distance, were generated for the parks polygons; these buffers were then overlain on the census tracts to obtain estimated demographic counts (converted to percentages using total tract population as the denominator) within and outside the buffers. This is similar to the approach used to assign absolute population numbers to census tracts that crossed the 16th Avenue dividing line in the above analyses. The relative proportion of persons in each demographic category was tabulated using the same year-to-year matching. Total area of parks per capita was tabulated for each year with stratification by 16th Avenue.

Figure 11 presents demographic characteristics of the population residing within 1/4 mile of any park. For example, about 45% of Yakima residents have their home within the ¼ mile buffer (upper left corner graph), and between 40% and 45% of residents whose homes are within the buffer are of Hispanic origin (upper right graph). While many demographic variables showed little change over the years, it appears that within the ¼-mile area around parks, there were lowering proportions of persons of Hispanic origin, younger and older persons, married persons, and home owners.
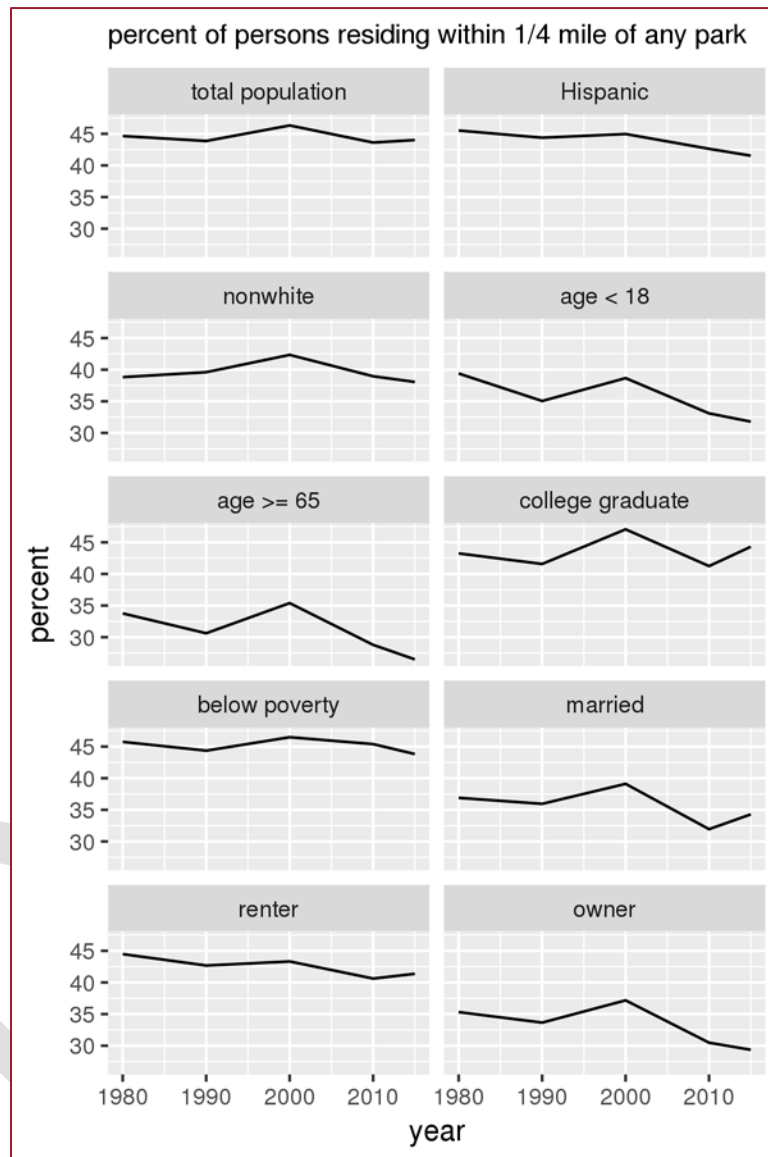
Figure 11: Demographic characteristics of the area within 1/4 mile of parks, 1980-2015

When stratified by 16th Avenue, it appears that far more persons on the east side reside within ¼-mile of parks than on the west side (Figure 12). This appears to be due to larger parks on the west side that are not uniformly distributed; whereas on the east side there are more parks that are both smaller and more uniformly distributed over space (see Figure 5). Trends generally follow overall demographic patterns with respect to the east and west sides. Some notable trends are the decrease in the number of persons residing within 1/4 mile of a park on the east side, and an increase on the west side (top of graphs); a drop in younger persons within buffers on the east side; and changes in the proportion of Hispanics that seem to mirror general demographic shifts over time.
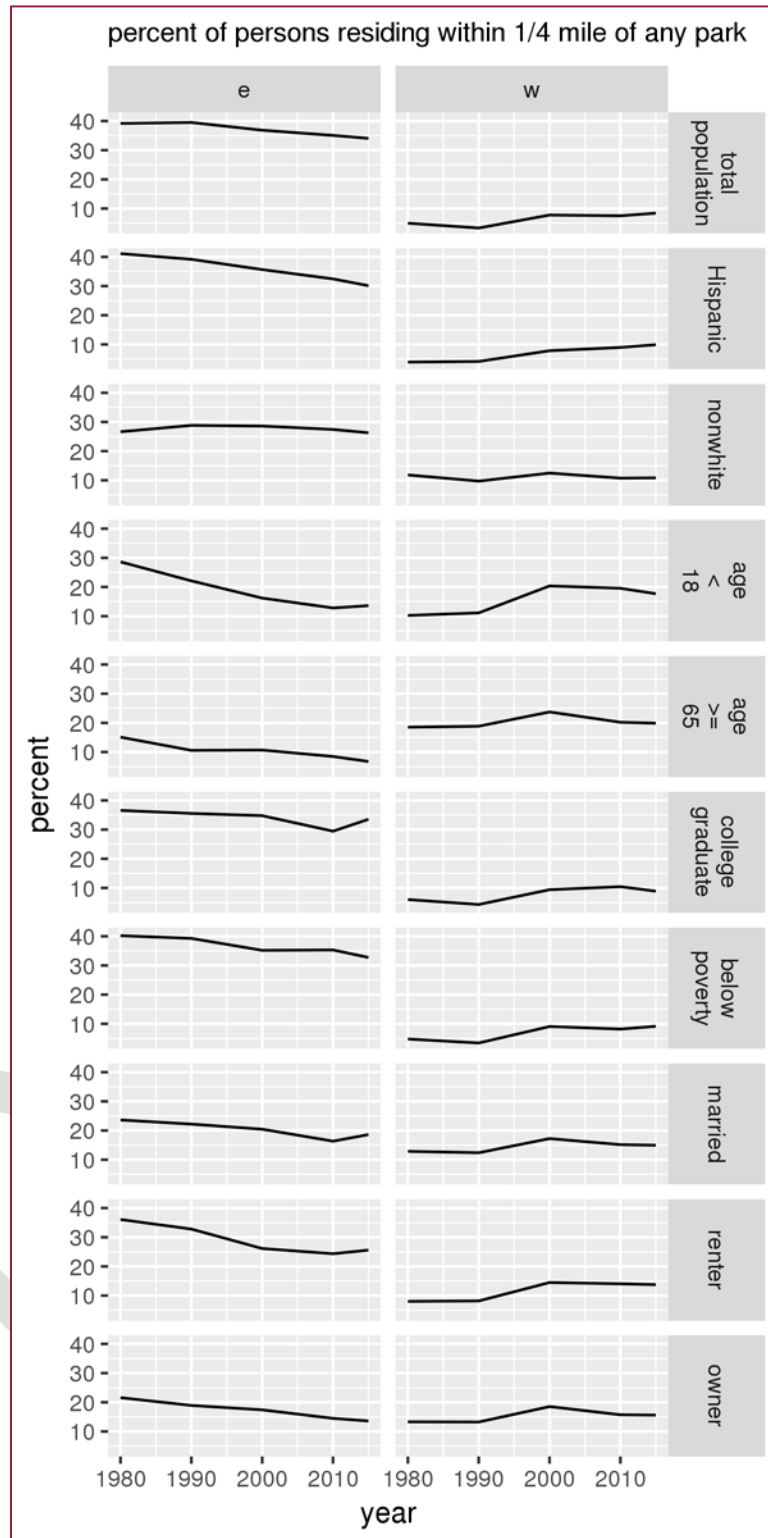
Figure 12: Demographic characteristics of the area within 1/4 mile of parks, stratified by 16th Avenue 1980-2015

Results summary - parks

The results presented above should be interpreted with some caution for several reasons, a few of which are enumerated as follows. First, the use of census areas in a GIS overlay analysis assumes that there is a uniform distribution of persons across the census unit, which is generally not true. Second, not all parks are equal in terms of the amenities they provide as attractors of activity. For example, use of a cemetery is likely to be very different from use of a sports complex. Third, simple overlay ignores actual location; having a park overlapping a census unit at one side of the unit does not provide equal accessibility to all persons residing in the unit. Fourth, residents of a census unit that has no overlap with a park may actually reside close to a park that lies in an adjacent census unit; in fact, some of these persons may reside closer to a park than some of the residents in the adjacent unit but whose homes are relatively far from the park.

In addition, these data need to be considered in historical terms; the east side was developed earlier, following typical pre-WWII patterns (smaller parcels on regular street-blocks), whereas the west side was more recently developed, with more suburban forms (larger parcels, some irregular street patterns). More recent developments often include parks as formal design elements, whereas older developments frequently did not include similar land set aside for parks.

Results: Analysis of Current Data

Most of the GIS data sets were not encoded for longitudinal analysis (that is, the features in the GIS do not contain attributes representing the time at which the real-world features were created/installed/developed). Therefore, analyses for specific data sets were restricted to examination of *current* features and data sets with respect to *current* demographic data. These included public safety calls for service, streetlights, code compliance requests, and transit (ridership, benches, and shelters). These data set therefore represent a benchmark more than allowing for analysis.

The scatter plots presented on the following pages are the result of performing the GIS and statistical analyses per Task 2, Part C. These plots also include the stratification by the 16th Avenue geographical dividing line. The scatter plots here are a representative sampling of the demographic variables. The complete set of graphs for each selected GIS data layer and demographic variable are provided in Appendix A. Maps showing changes in demographic variables over time are presented in Appendix D.

A general trend to be noted in these graphs is the obvious stratification between west and east sides of Yakima in the X-axis (horizontal axis). This is a reflection of the city's underlying sociodemographic stratification. While segregation itself is of concern, these graphs would indicate inequity in city-provided service only if there appears to be increasing or decreasing trends (i.e., a visible slope in the point pattern); if the point pattern appears to be uniform (equally distributed across the horizontal axis) or random, that would not indicate inequity in services. It should also be noted that no regression trend lines were added to these graphs, and no formal statistical tests were performed; due to the small sample size, trend lines are easily leveraged by outlier points, and correlation coefficients and p-values are unstable.

Police Department calls for service

Police Department calls for service per capita are graphed in Figure 13, Figure 14, and Figure 15 (median family income, percent Hispanic, and percent housing renter occupied respectively). The tracts with the greatest number of per-capita calls were on the east side, but there appeared to be no association between demographic characteristics and counts of calls per capita. There is no consistent trend of more calls coming from tracts with lower or higher incomes, percent of Hispanic residents, or renters –

other than the four tracts with high values, the other tracts are uniformly distributed in terms of the count of calls per capita (y-axis) and the demographic variable (x-axis).
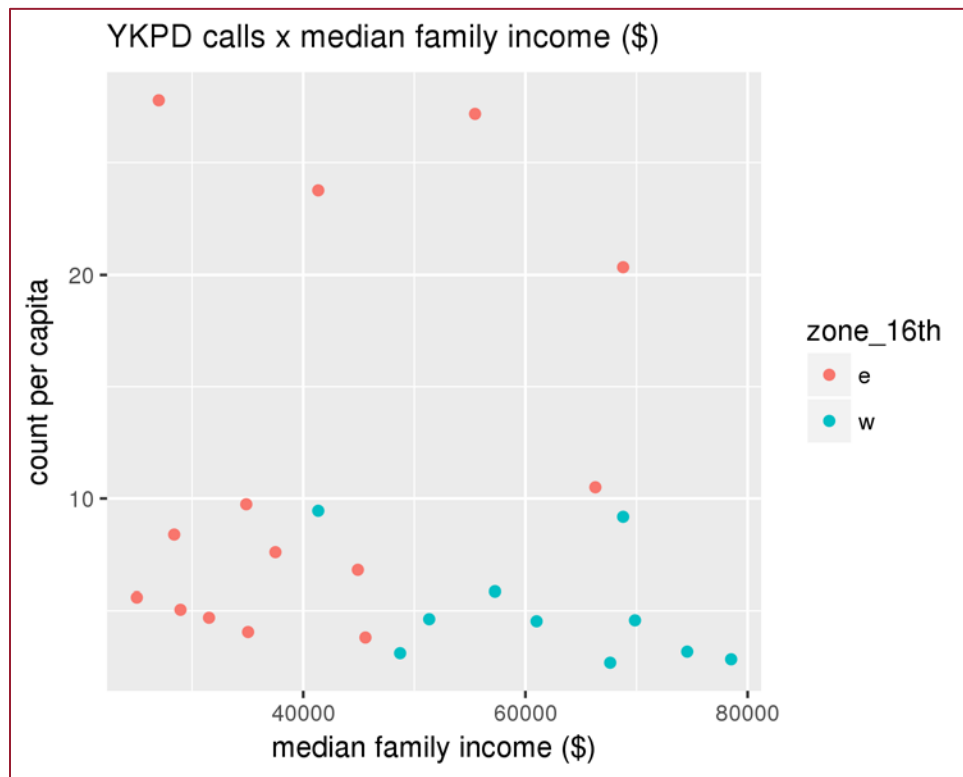
Figure 13: Police Department calls for service by median family income
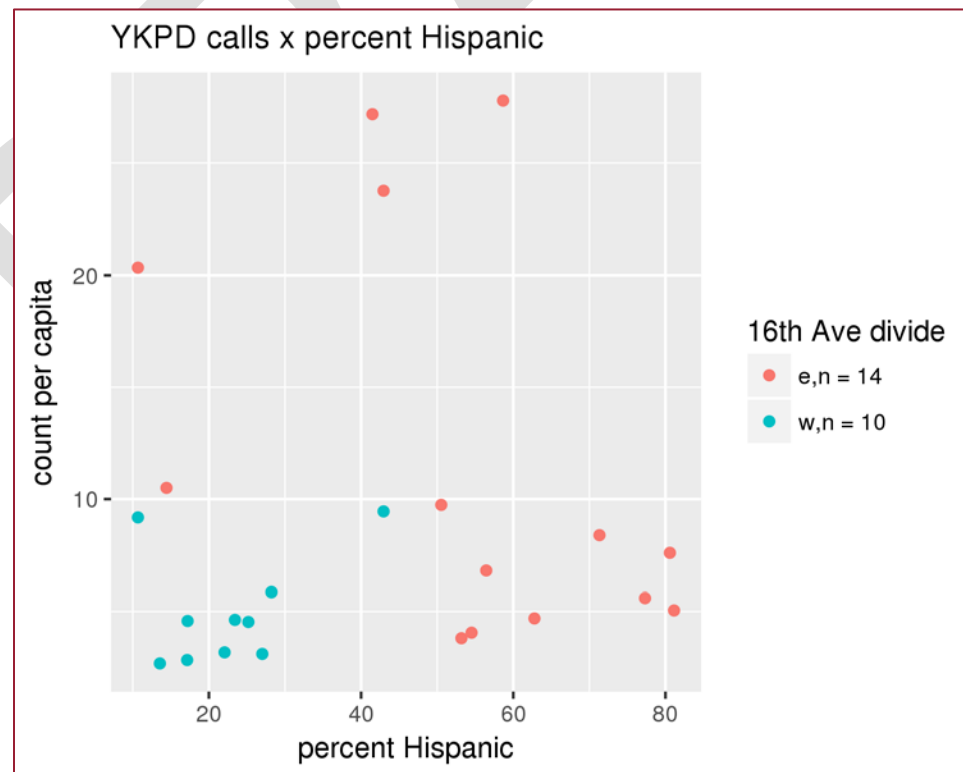
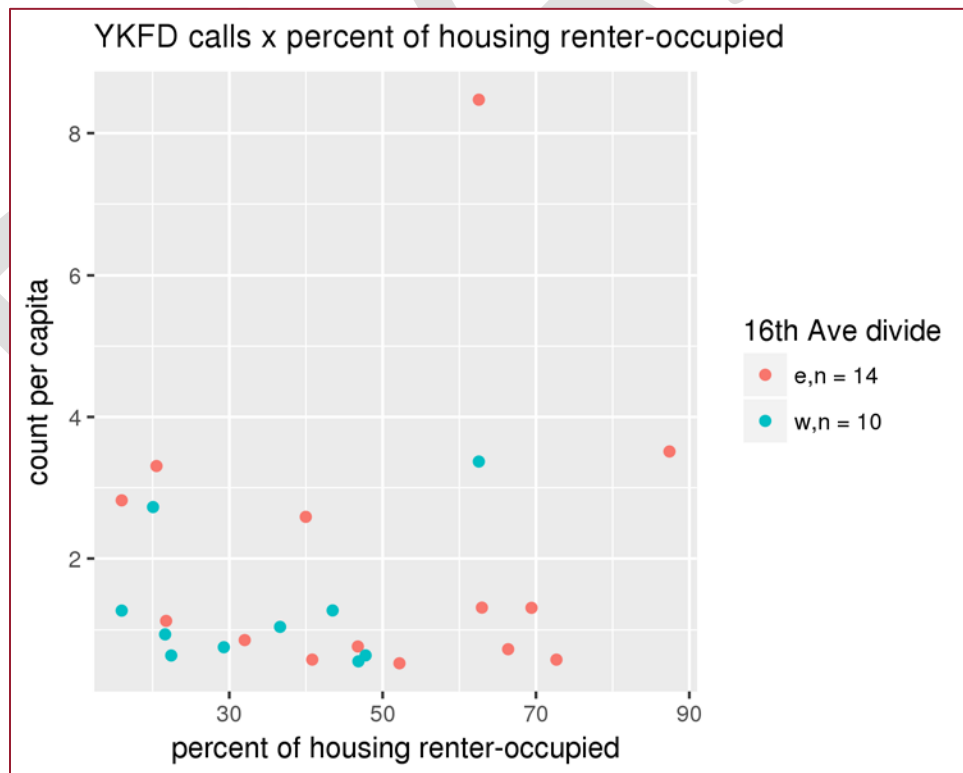Figure 14: Police Department calls for service by percent of residents who are of Hispanic origin
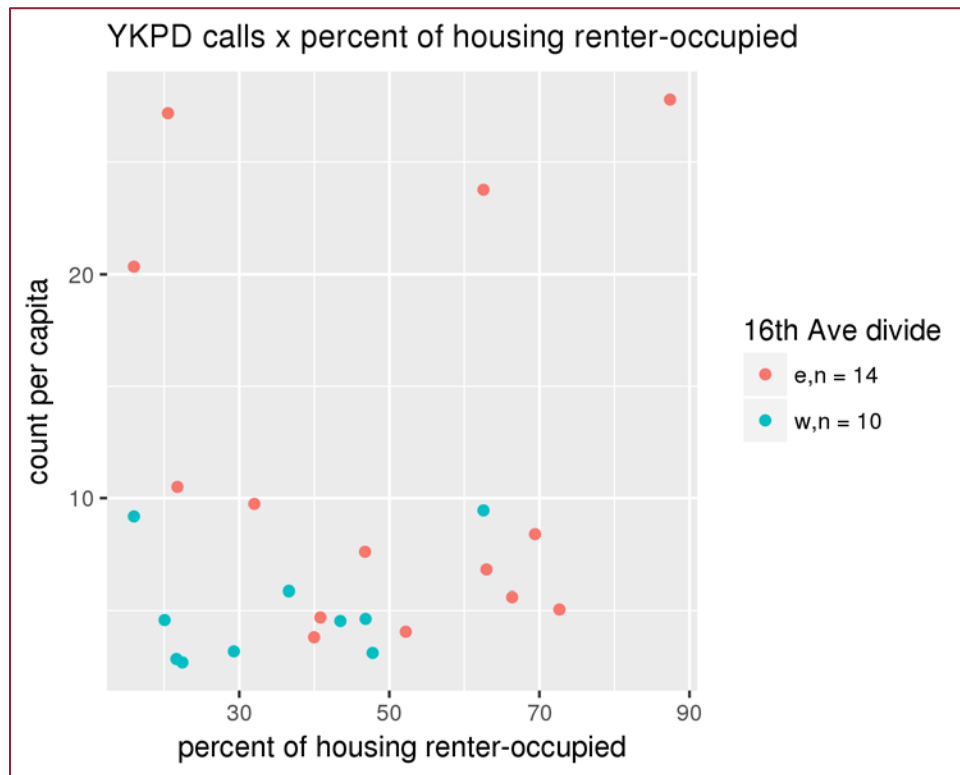
Figure 15: Police Department calls for service by percent of residents who are renters

Fire Department calls for service

Similar to Police Department calls for service, there appeared to be no association between demographic characteristics and count of Fire Department calls for service (Figure 16, Figure 17, and Figure 18). It should be noted that there is one tract on the east side that had a relatively high number of calls per capita. Other than this one "outlier," there is no consistent trend of more calls coming from tracts with differential income, percent of residents of Hispanic origin, or renters.
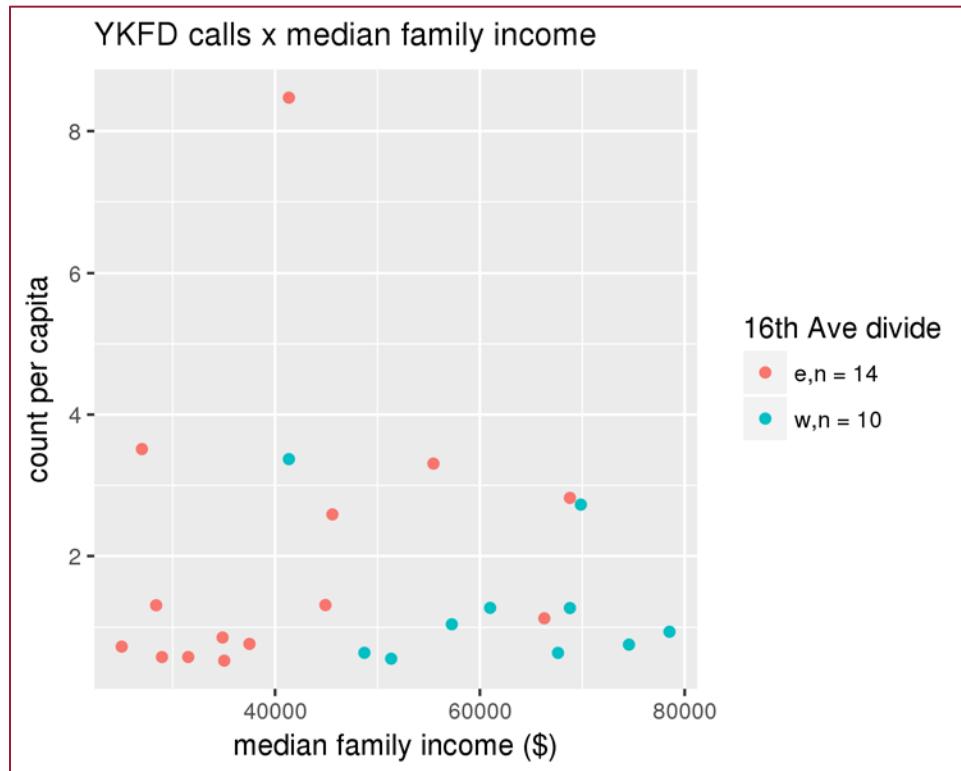
Figure 16 Count of Fire Department calls for service per capita by median family income
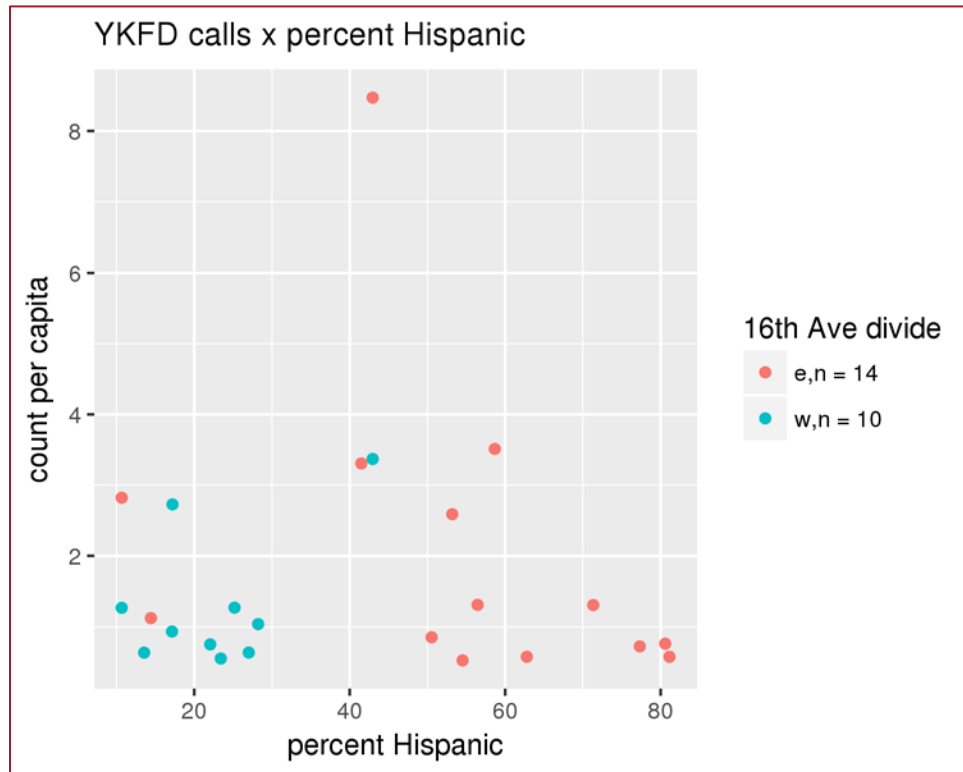
Figure 17 Count of Fire Department calls for service per capita by percent of residents who are of Hispanic origin

Figure 18 Count of Fire Department calls for service per capita by percent of residents who are renters

Streetlights

There appears to be a greater number of streetlights per square mile in tracts on the east side (Figure 19, Figure 20, and Figure 21). Streetlight density was greater in tracts with lower college graduation levels, which is also mirrored in ethnic composition and median family income. These differences are likely due to the greater street density in the older part of Yakima that was developed previous to the newer areas on the east side. There appears to be no general association between streetlight density and demographic variables that cannot be explained by basic principles of urban form and historical development. It should be noted that this analysis did not include any consideration of streetlight type or condition (type and condition were not available consistently for all streetlight records).
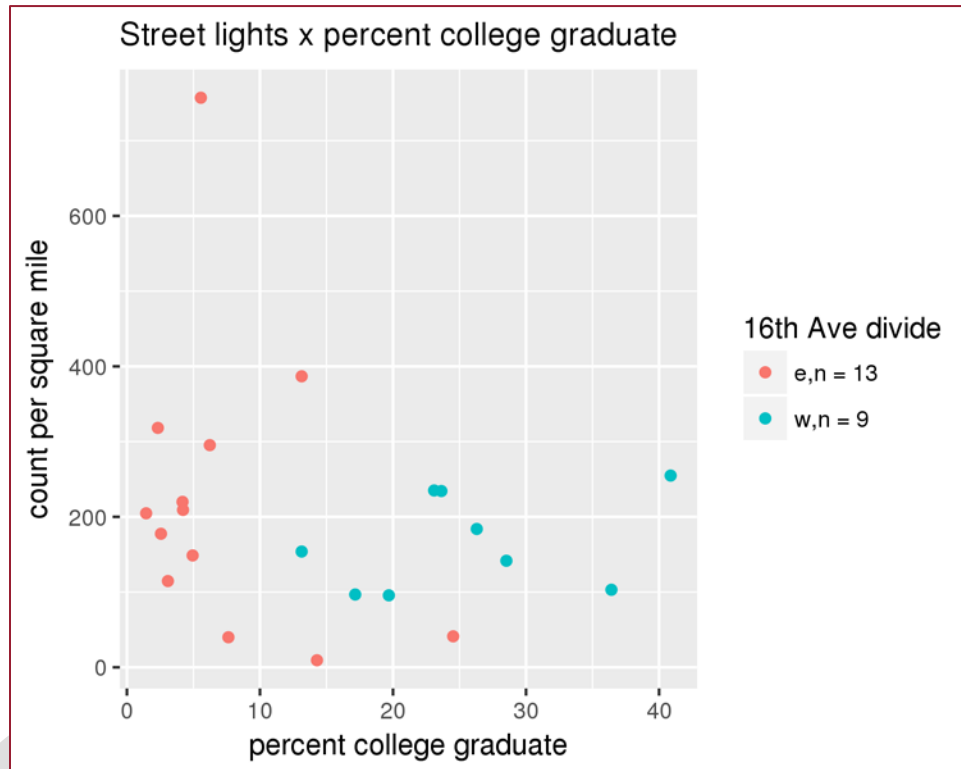
Figure 19: Streetlight density by percent of residents who are college graduates
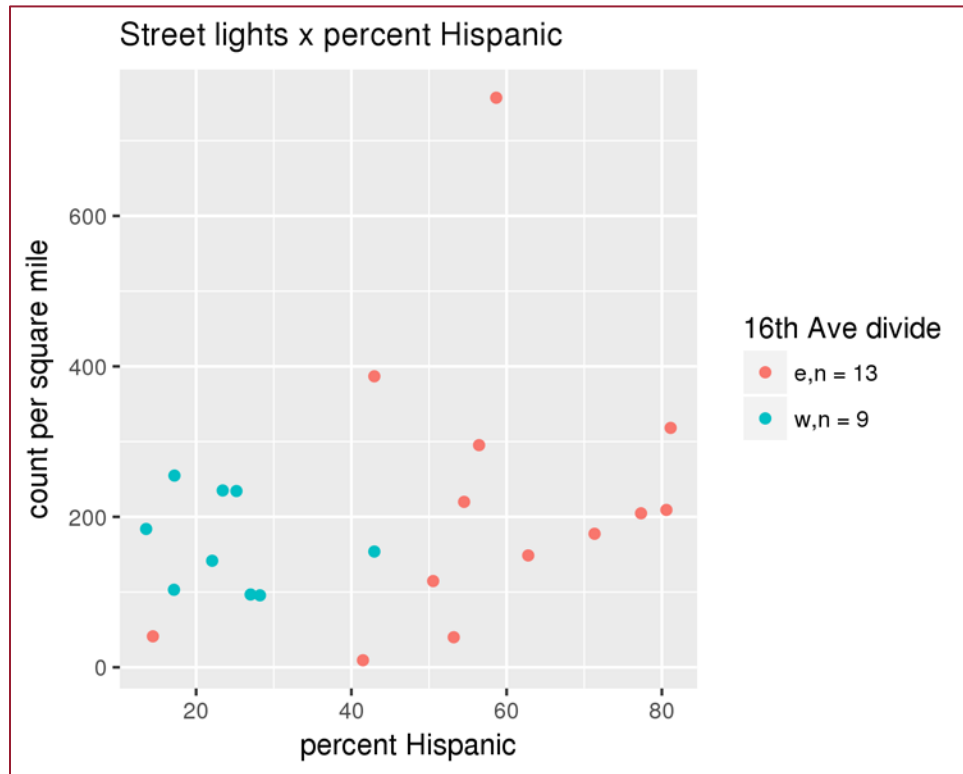
Figure 20: Streetlight density by percent of residents who of Hispanic origin
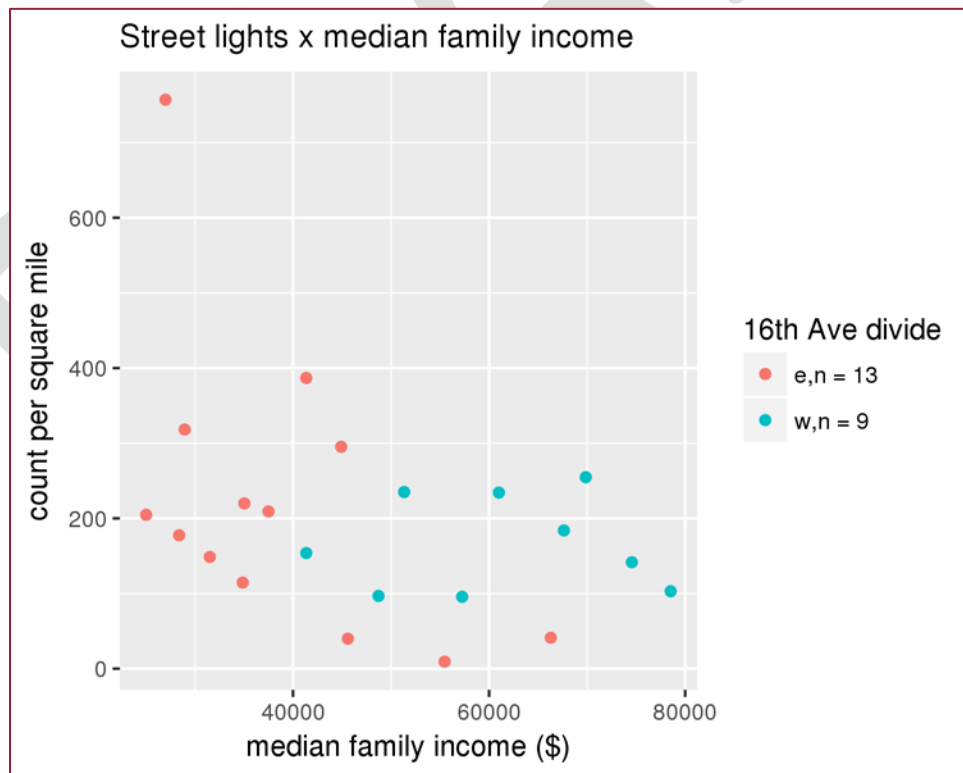
Figure 21: Streetlight density by median family income

Code compliance requests

Code compliance requests per capita appear to occur in greater numbers on the east side, which is also mirrored by east side tracts having lower median family income, with higher proportion of residents of Hispanic origin, and who are renters (Figure 22, Figure 23, Figure 24). Code compliance requests originate from residents; however, the data do not indicate whether the resident who submitted the code compliance request is a neighbor, landlord, or someone who is just driving b. Therefore, the origin of the request cannot be directly ascribed to any difference in services provided. Additionally, as the data were delivered without any consistent record-level information on either status or date of resolution, it is not possible in this analysis to make any conclusions on questions of equity related to how the City responds to such requests.
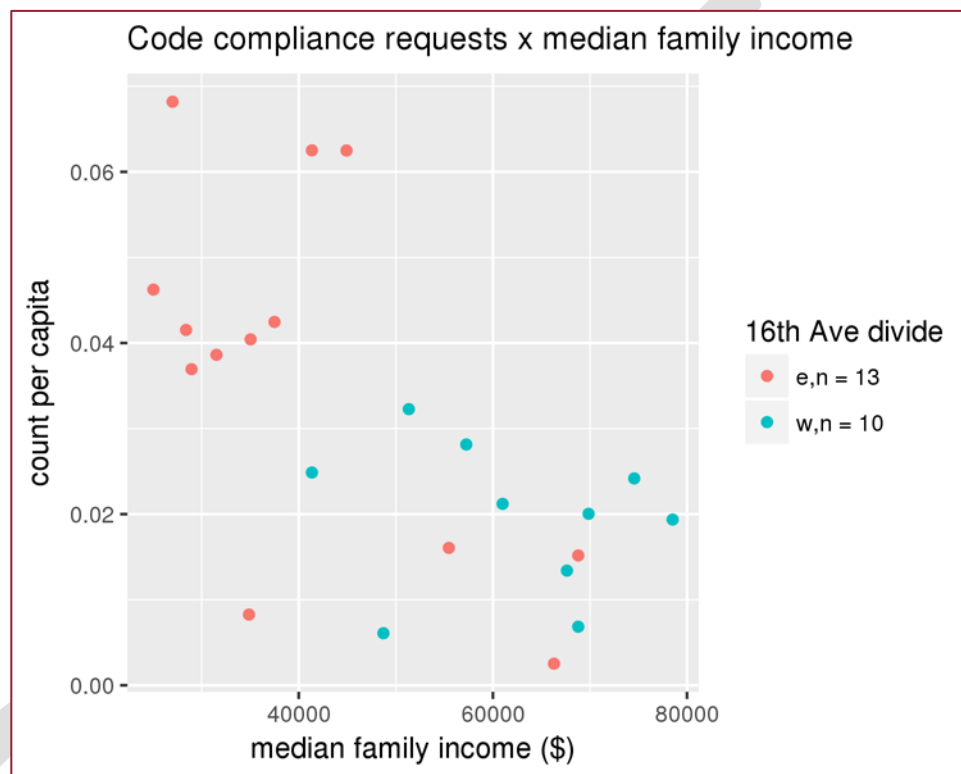
Figure 22: Code compliance requests by median family income
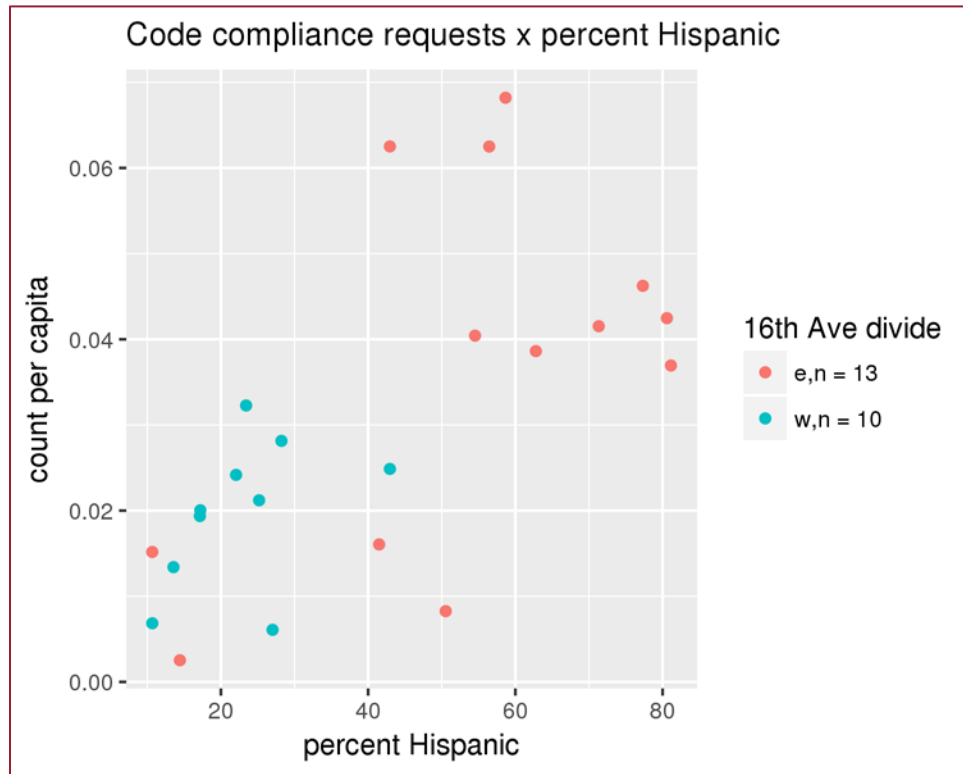
Figure 23: Code compliance requests by percent of residents who are of Hispanic origin
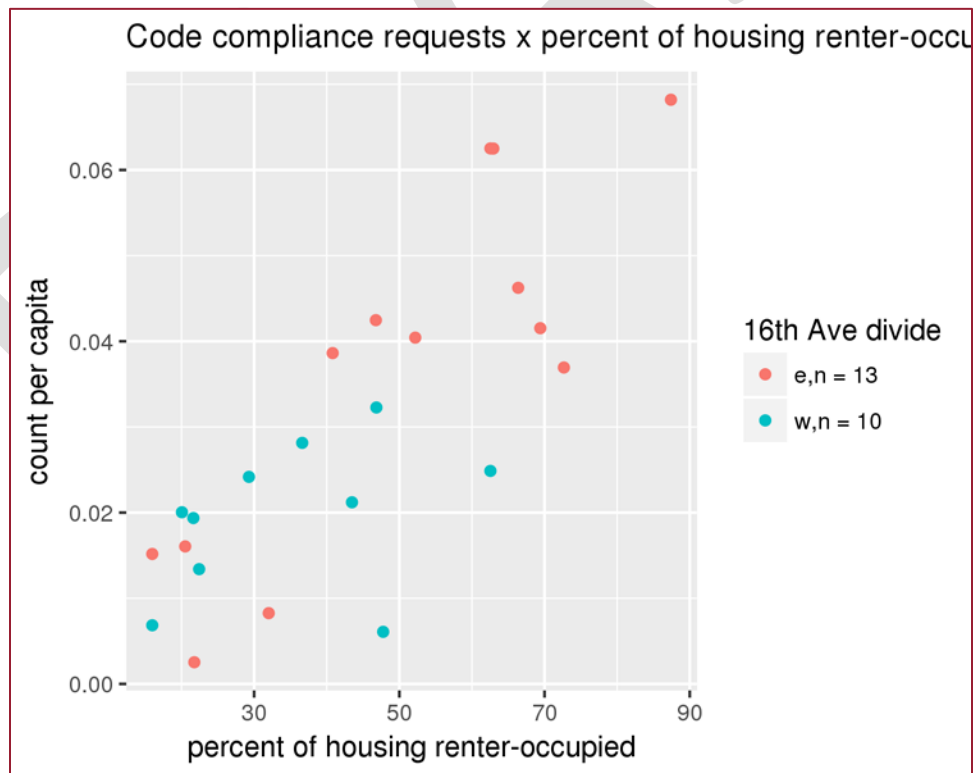
Figure 24: Code compliance requests by percent of residents who are renters

Transit ridership

Patterns in transit ridership (Figure 25, Figure 26, Figure 27, Figure 28, and Figure 29) are similar to those of streetlights, and are likely due to similar underlying urban characteristics. Transit is economically feasible only in areas of relatively high residential density, which usually includes older developments. Newer, lower density, and more car-dependent communities are generally not served by transit. These types of newer developments also tend to have demographic characteristics that are different from areas that are well-served by transit. For this probable reason, there is generally higher ridership in tracts with lower median family income, lower rates of college graduation, and greater rental rates. There is also slightly higher ridership in tracts containing lower proportions of persons under 18 years of age, pointing to a potential mismatch between level of service and need, since younger persons tend not to have access to cars and rely more heavily on public transportation. It should be noted that the transit data did not include school buses, which may confound interpretation of bus service to youths.
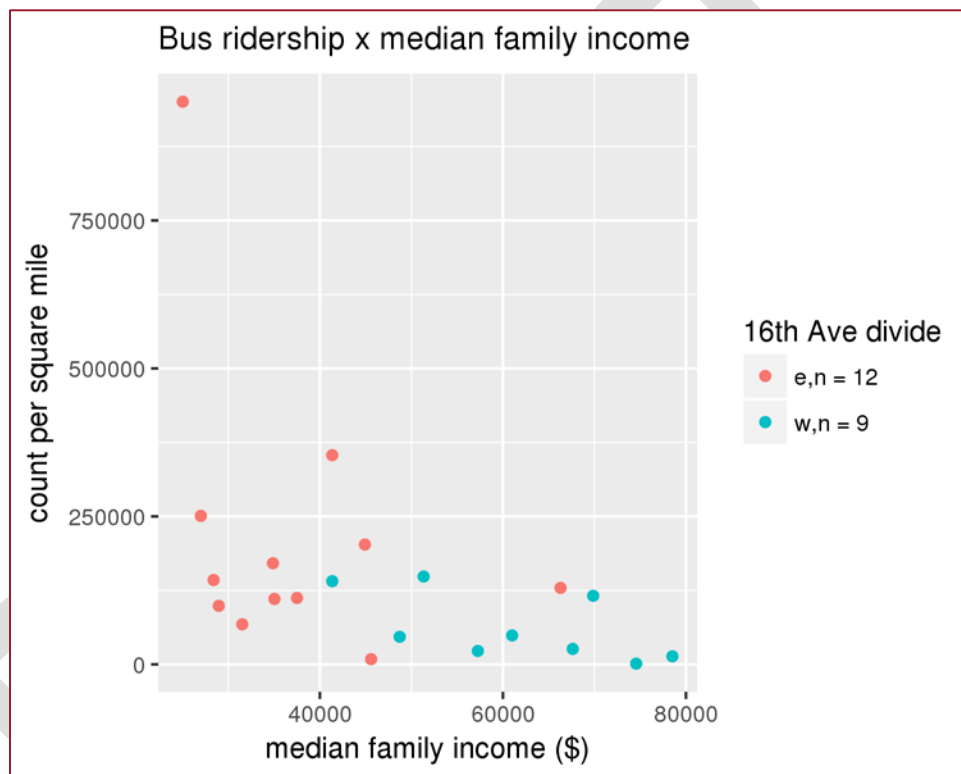
Figure 25: Transit ridership by median family income
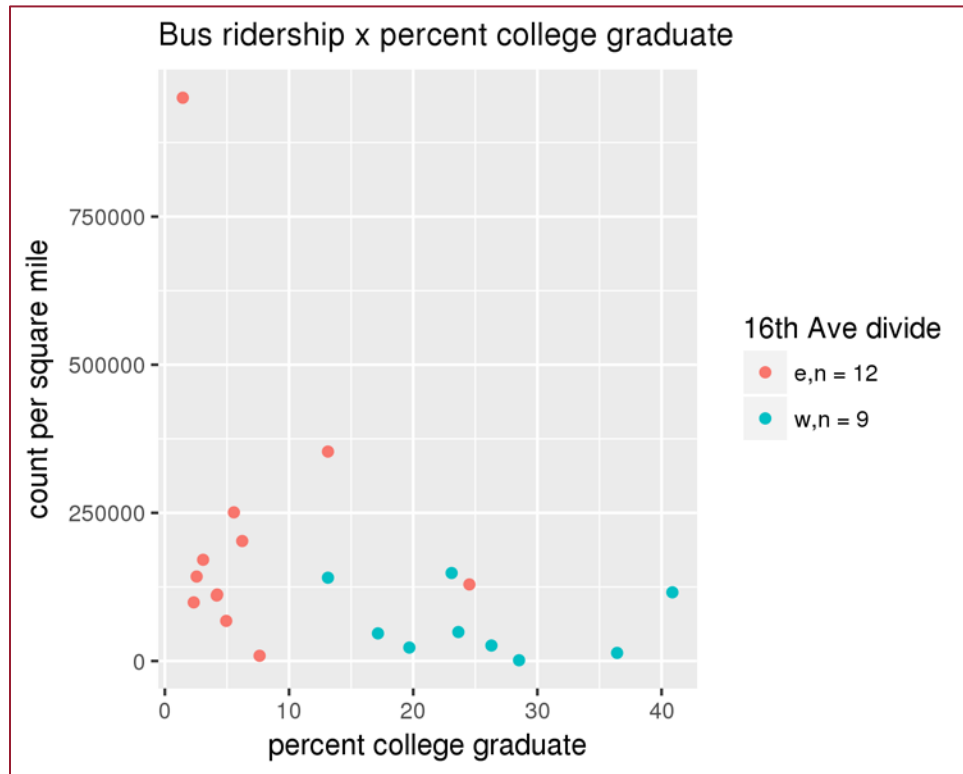
Figure 26: Transit ridership by percent of residents who are college graduates
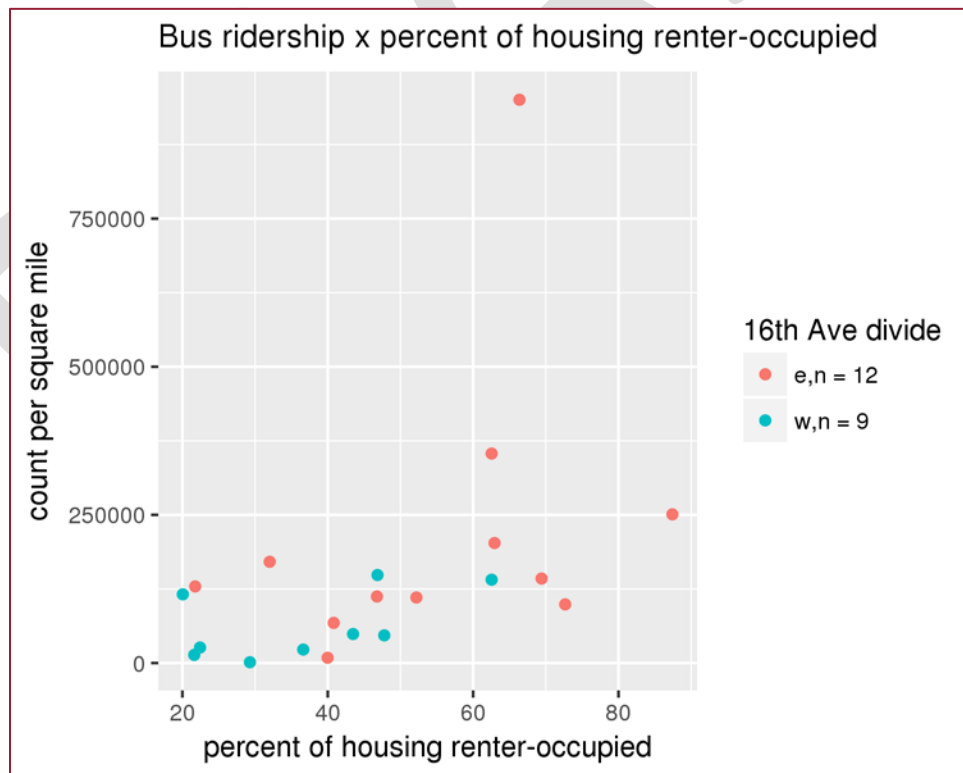
Figure 27: Transit ridership by percent of residents who are renters
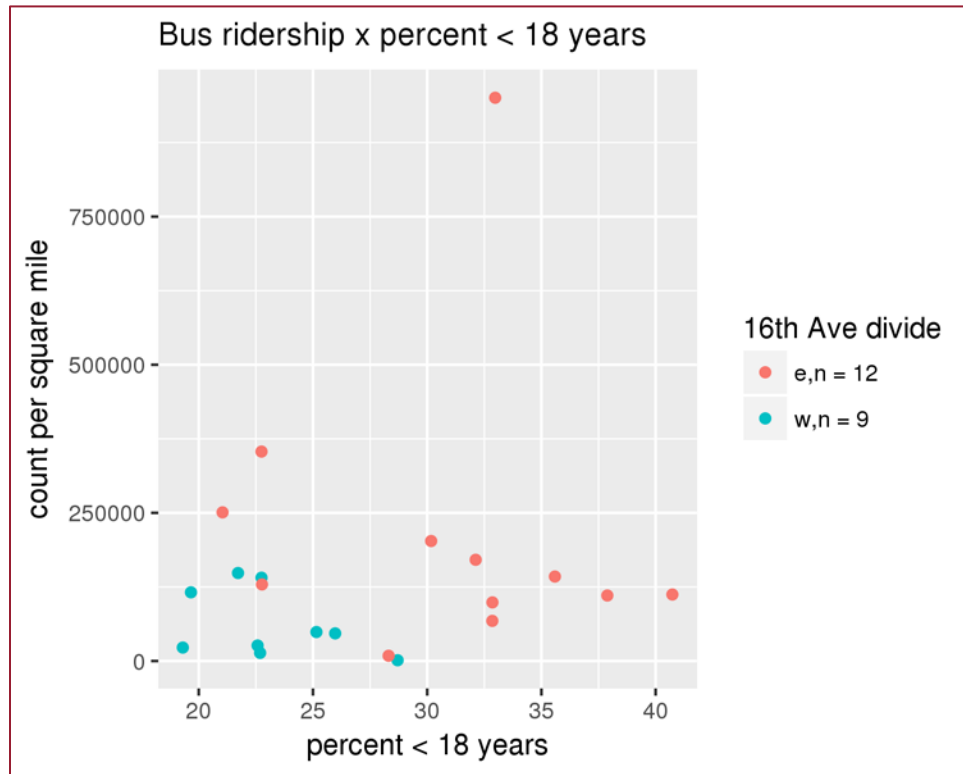
Figure 28: Transit ridership by age (< 18 y) under 18 years of age
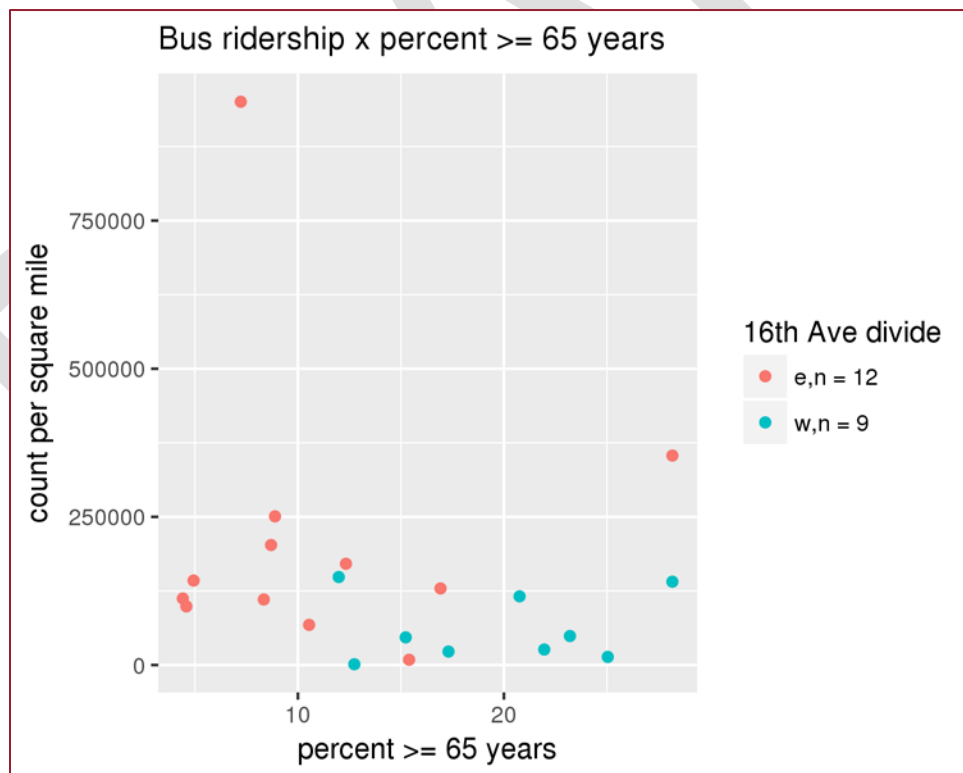
Figure 29: Transit ridership by age (≥ 65 y) 65 and older

Bus stop benches
Not surprisingly, the patterns of bus stop bench density (Figure 30, Figure 31, Figure 33, and Figure 32) are similar to those of transit ridership, likely indicating that benches and shelters are placed in locations with greater ridership.
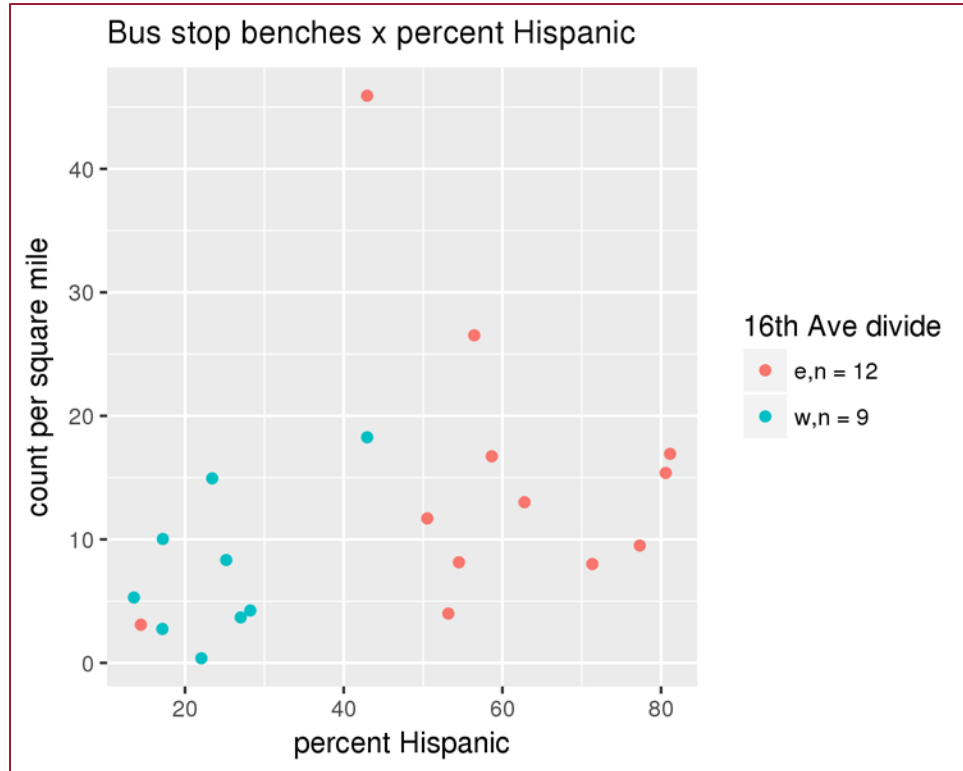
Figure 30: Bus stop bench density by percent of residents who are of Hispanic origin
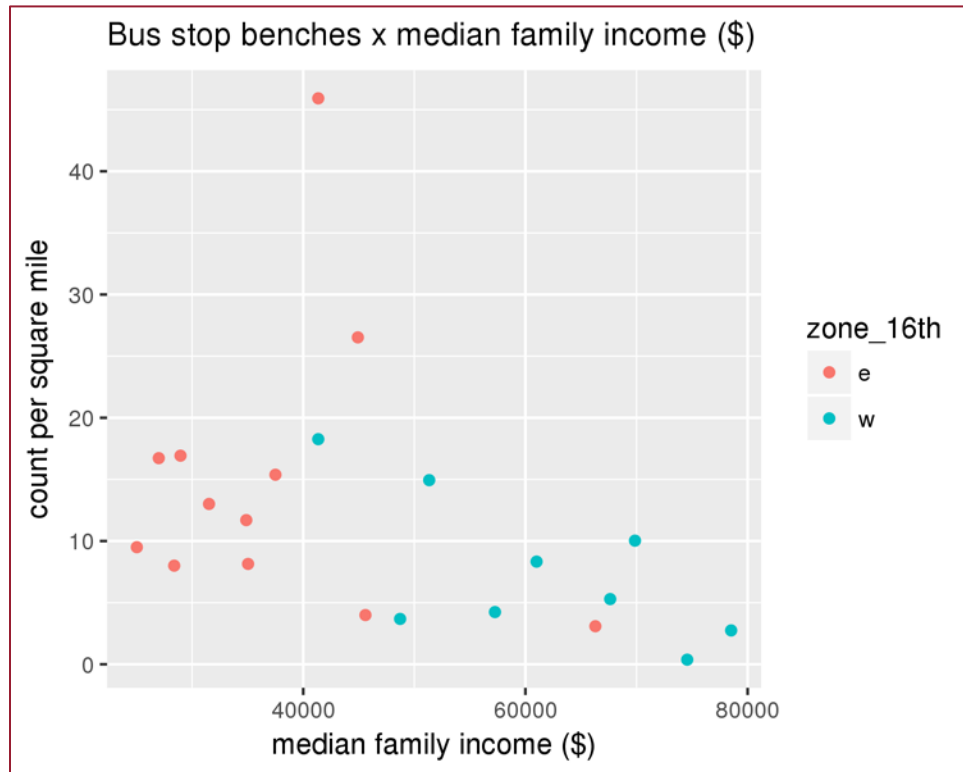
Figure 31: Bus stop bench density by median family income

Bus stop bench density appears to be higher in tracts with lower proportions of persons 65 years or older on the east side with one exception (Figure 32). If a large number of riders are older, this could point to an opportunity for providing better service for these age groups. However, the proportion of elderly is also greater on the west side, where transit usage is lower, and where higher socioeconomic levels point to potentially less need for transit (if the elderly have access to cars). In order to come to any conclusions on whether the elderly are underserved in terms of bus stop benches, more data would be needed on the characteristics of individual transit riders. Likewise, the number of youths is greater on the east side.
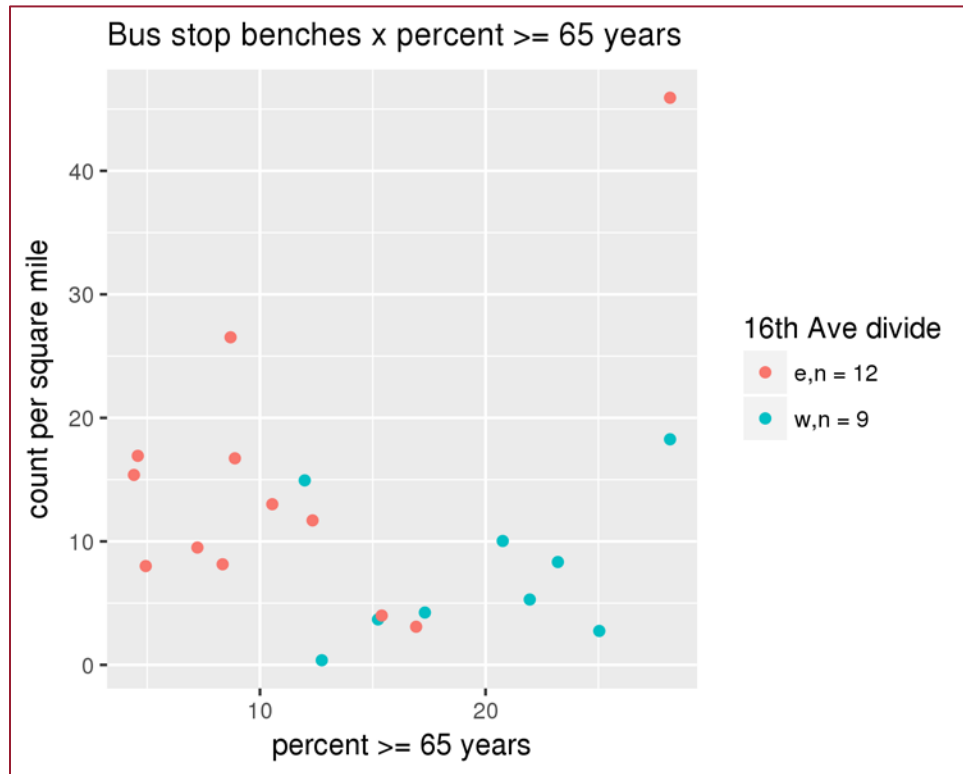
Figure 32: Bus stop bench density by percent of residents who are 65 years or older
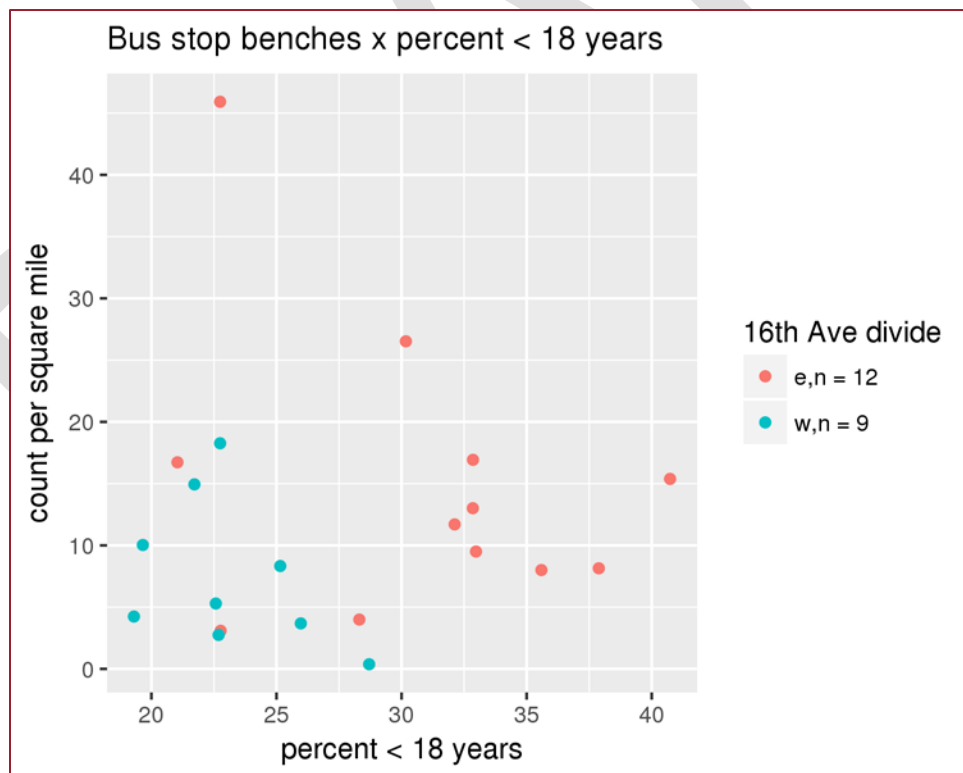
Figure 33: Bus stop bench density by percent of residents who are less than 18 years old

Bus stop shelters

Bus stop shelters have patterns very similar to bus stop benches: they tended to have greater density in tracts with lower median family income (Figure 34), and higher proportion of youths (Figure 35, with one outlier having very high ridership but about 23% of younger residents). Shelter densities were slightly greater in areas with lower proportions of seniors (Figure 36). There were also more shelters in tracts with a higher proportion of persons of Hispanic origin (Figure 37).
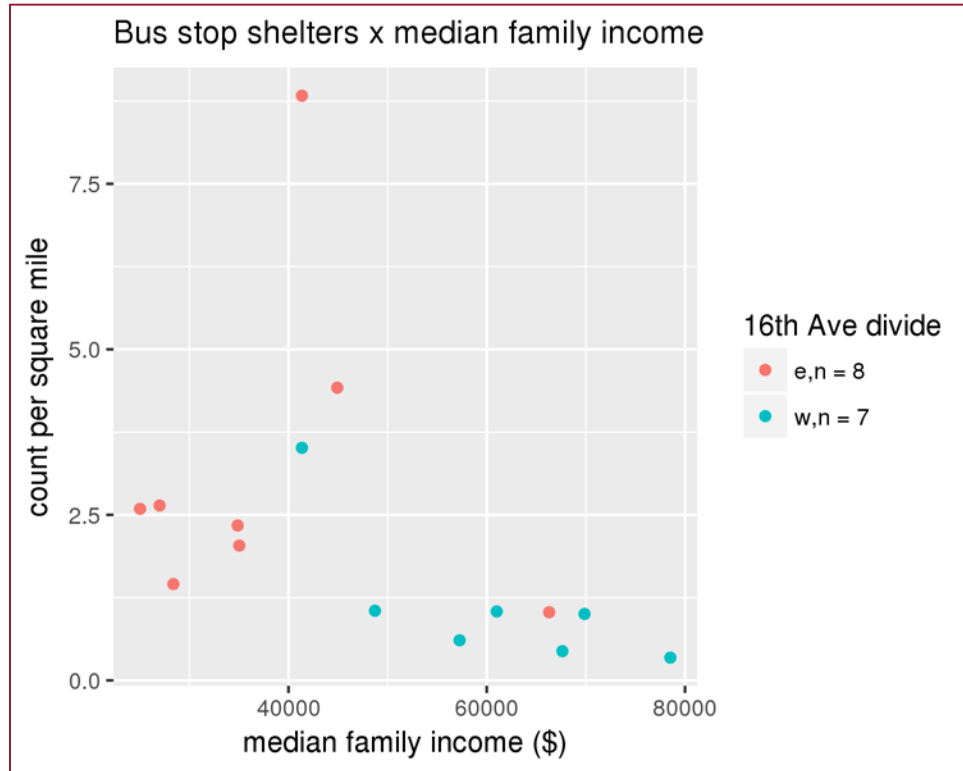
Figure 34: Bus stop shelter density by median family income
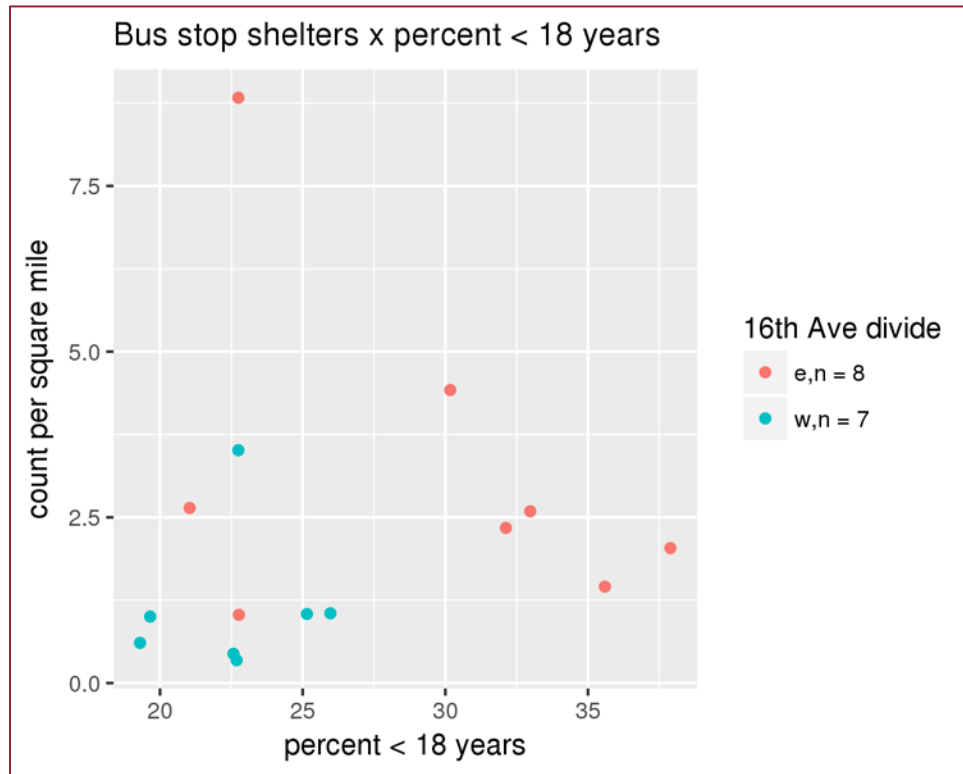
Figure 35: Bus stop shelter density by age (< 18 years)
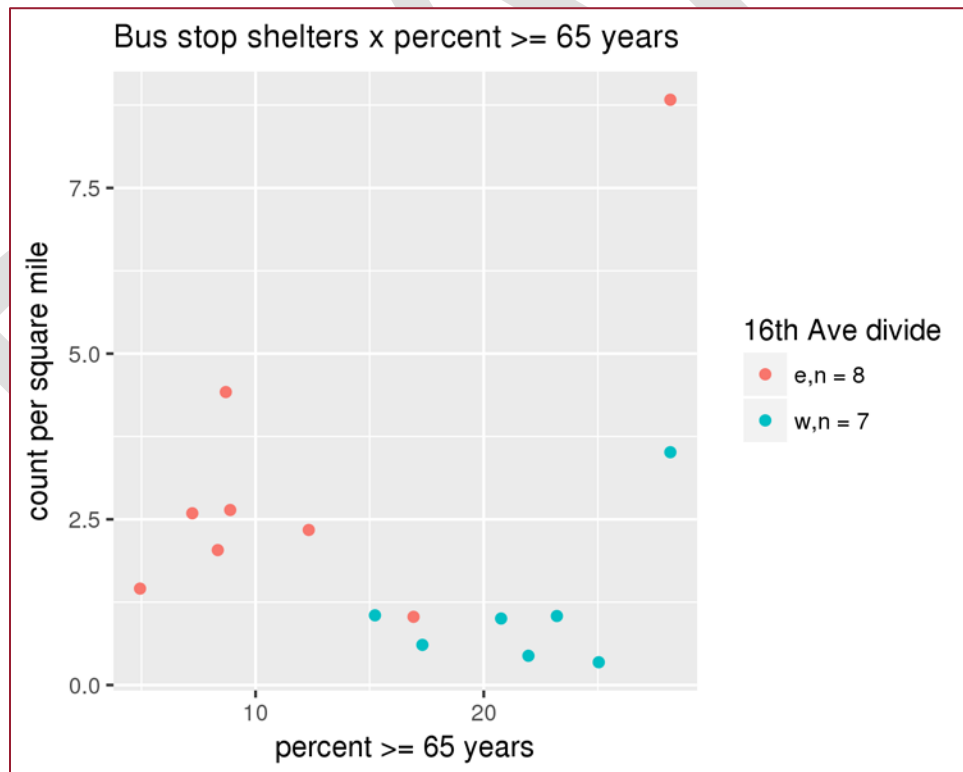
Figure 36: Bus stop shelter density by age (>= 65 years)
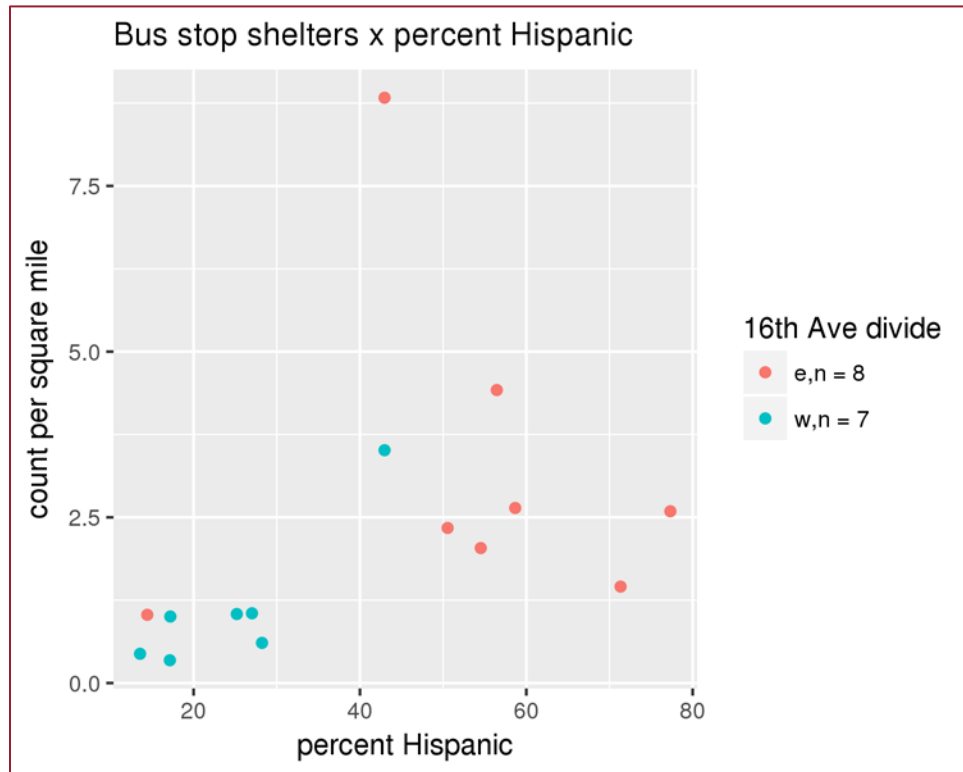
Figure 37: Bus stop shelter density by percent Hispanic

Conclusion and Recommendations

Over the course of this project the Metro Center found that the city is doing professional work in the development and management of the various data sets under their purview, gathered for specific purposes related to city and department management. The data sets are useful for their original purpose but, as this analysis has shown, the data sets within the scope of this study cannot adequately provide an assessment of whether or not city resources have been equitably distributed. While this determination cannot be made, we believe that information in this analysis, and the act of engaging in this analysis, can prove valuable to the city.

City Council approved this analysis of the Equity Study data with the intention of using it as a tool to move forward, and to inform data driven decisions to benefit the city. Data driven decisions cannot be made without reliable data and proper systems for handling them. Our study concluded that Yakima has both the staff and the systems to support the use of data as a powerful tool for decision making, and data that can be used as an initial conditions statement and a base upon which to build. This is a tremendous asset for the city. The city can now determine what additional data it needs to collect - date and time attributes, for example – based on the questions the city wants to address in the future. As an example, we suggest the following improvements may provide the city with both additional data and benefits.

- The Yak Back application is an excellent tool for getting information from residents. However, it is only provided in English. Consider developing the app in at least Spanish to meet the needs of both a significant number (and percentage) of the population and the east side of the city more generally.

- Develop an anonymous way to find out the status of Yak Back complaints. Perhaps this is a case number that someone could enter into the app to track it and see whether and how the case had been resolved. This will provide closure and increase the perception of responsiveness by the city. It may also reduce the number of duplicate or follow-up complaints.

In order to look forward, the city may benefit from also examining its history and the current conditions that evolved from typical patterns of growth. The legacy of annexation and other development patterns is both a benefit and a challenge to overcome. For example, parks are larger on the west side, likely because of the later annexation of larger, county, parcels. It is unlikely though not impossible, that the city would be able to agglomerate significant park acreage in the east side to match the west if residents prefer fewer, larger parks relative to more numerous, smaller parks, and there may be better strategies identified by council to address this disparity in more strategic ways. Understanding the existence and some of the likely reasons for current conditions, without the major expenditure required for historical analysis, can help productively move to a different state.

The challenges of growth and equity facing Yakima are shared by many cities and echo national trends described in a report issued by the Lincoln Institute of Land Policy, Planning for Social Equity (2017) authored by Kathleen McCormick (http://www.lincolninst.edu/publications/articles/planning-social-equity). In this report, it is noted that inequality is now at levels the U.S. has not seen since the 1920s. As a reference for understanding the forces leading to modern inequities in the City of Yakima, it may be useful to place Yakima in the larger context of other cities across America that are facing similar situations.

Many cities, large and small, have developed criteria for making decisions that include equity, typically called an Equity Lens. An Equity Lens is a practical tool to help insure that planning, decision making and resource allocation lead to policies and programs that help to achieve equity across the community, racially, socially and economically. The foundation of an Equity Lens is a set of values or principles. Each new policy or program is evaluated to see whether it upholds those values or principles using a set of questions or procedures that include equity. For example: "What is the impact of the policy or program on diverse groups?" While the questions may seem simple, the process of preparing for, and developing and Equity Lens takes time and commitment.

To evaluate progress toward equity, each city determines what it should measure. Hence, the value of a reliable system of collecting and managing data, which this study concluded the city possesses, becomes critically important.

Although each city must develop its own Equity Lens, the examples below provide some insight into the process.
- City of Seattle Racial Equity Toolkit -"lays out a process and a set of questions to guide the development, implementation and evaluation of policies, initiatives, programs and budget issues to address the impacts on racial equity." http://www.seattle.gov/Documents/Departments/RSJI/RacialEquityToolkit_FINAL_August2012.pdf
- City of Portland – Racial Equity Toolkit https://www.portlandoregon.gov/oehr/71685
- All-In Cities Policy Toolkit - Building an Equitable Economy from the Ground Up, an initiative of PolicyLink http://allincities.org/toolkit

To explore a practical example of how an Equity Lens could influence policy decisions in Yakima, we turn to parks. The city has long benefitted from private funding for parks and other amenities. As part of an

Equity Lens, the city could develop a set of criteria for parks around equity and inclusion. This criteria would rank possible investment opportunities for philanthropy, and provide this rank ordered list or some part of it to community partners. The city could also develop a policy that dictates that for any donation to a specific project the city takes a percentage for the general funding of that project amenity across the city. For example, if the city took ten percent of such park donations for general use for parks across the city, a $10,000 gift towards a particular project would lead to $9,000 for that project and $1,000 for the parks general fund.

A cornerstone of equitable decision making is authentic community and stakeholder engagement. It, too, is a process that requires care and commitment to ensure that engagement sparks lively civil discourse without resulting in acrimony and deep divisions. The Metro Center provides tools that promote understanding and assist communities in making choices about difficult decisions.

- The Poverty Immersion, facilitated by the Metro Center, is an interactive workshop that changes attitudes and challenges stereotypes about the working poor. Through this experience, participants develop a better understanding of community needs, ultimately improving policy and program development and decision making.

- The Metro Center is part of a nationwide project with the Kettering Foundation to frame complex issues for public discussion. Using structured deliberative dialogue, the Metro Center facilitates productive community conversations aimed at understanding residents' perspective on their community and the issues that are of greatest importance to them.

Throughout the course of this project, the Metro Center team has engaged with Yakima City Council members, city staff, and concerned residents. To a person they have shown a strong commitment to their work, and a deep affection for the city. Addressing equity is difficult under the best of conditions, and we commend the city for the progress you have made, and welcome the opportunity to support your efforts in the future.

About the Metro Center

The WSU Metro Center connects decision-makers in Washington's cities with the expertise of Washington State University to produce practical solutions to the challenges of growth. Using a project-based and client centered approach, the Metro Center responds to emerging needs, and helps communities build capacity to create sustainable solutions for the future. The Metro Center works at the direction of clients, and follows a defined scope of work which is negotiated with the client. The Metro Center compiles a unique team for each project with the necessary expertise and attributes to successfully complete all project goals. Team members include WSU faculty and staff; however, we also utilize external partners as needed to implement the project.

This analysis was conducted, data compiled, and this report written by the following team assembled because of their expertise in urban planning and geospatial analysis. In particular we wish to acknowledge the work of Dr. Branden Born, with whom we have often worked on community based projects, and Dr. Philip Hurvitz, who led the data analysis.

WSU Metropolitan Center for Applied Research and Extension
- Martha Aitken, Senior Associate and Project Manager
- Brad Gaolach Ph. D., Director

University of Washington, Department of Urban Design and Planning
- Branden Born Ph.D., Associate Professor
- Philip M. Hurvitz Ph. D., Research Assistant Professor
- Connie Combs MUP
- Kizz Prussia, MUP candidate

Appendices

- Appendix A – Complete City of Yakima Equity Study Analysis
- Appendix B – City of Yakima Equity Study Analysis – Task 1 Report
- Appendix C – Demographic Variables Over Time
- Appendix D – Project Proposal
- Appendix E – Summary of Accuracy Audit Findings

Appendix A – Complete City of Yakima Equity Study Analysis
http://gist.gis.washington.edu/yakima_equity/ (It should be noted that the data and analysis in Appendix A will be transferred to the city in the near future, and this URL will no longer be active. The city will determine how to make this information available.)

Introduction:

On June 28, 2017 the City of Yakima entered into an agreement with WSU's Metropolitan Center for Applied Research and Extension (Metro Center) to analyze data from the city's Equity Study (http://www.yakimawa.gov/council/equity-study/) for the purpose of helping inform the 2018 budget and future budget decisions. The contract's Scope of Work included two tasks listed below, with variables to be used in the analysis, and the geographical dividing line specifically stated.

The Metro Center assembled a team comprised of experts in urban planning and geospatial analysis to perform the activities required to meet the deliverables of the project. This report serves as the Task 1 deliverable and provides an overview of the Metro Center's activities to analyze the data collection and handling processes the City of Yakima employs with regard to the data used in the Equity Study, and a preliminary summary of findings. This report also addresses aspects of Task 2, Parts A and B, much of which could most efficiently and appropriately be implemented concurrently with Task 1.

Review of Scope of Work:

Task 1: Validate Equity Study data
Methods
Confirm with City Council up to 6 data sets identified in Task 2 B, excluding US Census Bureau data, to assess the validity of those data. For each data set selected we will conduct, as appropriate:
   A. A process audit by interviewing City staff and reviewing documents associated with how these data were collected, compiled, summarized, and made accessible to the public.
   B. An accuracy audit of the data by randomly selecting a representative sample of data points, and independently determining the accuracy through direct observations.

Task 2: Analyze existing Equity Study data to assess the geographic distribution of public resources and funds (e.g. city, State, or Federal)
Methods
   A. Assess the quality of the data to understand any qualitative concerns and limitations that would impact data analysis or interpretation (i.e. period of time collected, geographically resolution of the data, etc.).
   B. Confirm the input and output variables for the analysis, and the geographical dividing line. Initial request included the following 6 data sets, upon which this estimate is based:
     o Input variable:
        o Demographics, to include income, race, education level, marital status, home owner or renter, property value and age
     o Output variables:
        o Public safety calls for service (location, response time)
        o Streetlights
        o Code compliance requests
        o Parks (exempt parks that are privately funded or charge for use)
        o Transit ridership, shelters, benches
     o Geographical dividing line
        i. 16th Avenue
   C. Perform the appropriate statistical analyses to assess any relationships amongst the input and output (i.e. response) variables.

Methods:

Clarify Intent

WSU Metro team first met with Yakima City Council members on the Neighborhood and Community Building Committee: Chair Dulce Gutiérez, Carmen Méndez and Avina Gutiérez, to further clarify the scope of work, define the specific variables and geographic dividing line to be analyzed, and the overall intent of the study. After receiving portions of the data and conducting an initial review, the Metro Center team met by phone with City Manager Cliff Moore, Community Development Director Joan Davenport, and city staff to clarify the intent of some portions of Task 1 of the Scope of Work, and to make sure there was an understanding of the city's interest in positive strategies for the future.

Through this discussion we came to understand that the language of the scope required clarification. Task 1 "Validate Equity Study data" means something different in the academic realm and the applied real-world one. A technical data validation process would be overly statistical, particularly with a "representative sample of data points" across the various datasets, and would be both prohibitively expensive and, most important, would not achieve the city's objectives. Instead, we decided that we needed to know if the city's data are being collected and recorded in appropriate ways (Task 1, part A), and whether it is useful to the current disparity analysis (Task 1, part B). Then, as appropriate, we would check for accuracy of the acceptable data by ground-truthing through site visits (Task 1, part B) to complete Task 1. We hope this clarification is helpful.

If the city would like to pursue the academic level of statistical validation of their collected data, the Metro Center could assist in providing suggestions about how that could be done.

City of Yakima Data

For our process audit we reached out to city staff in multiple departments to learn about the internal processes used to gather, compile, and store data for the Yakima Equity Study. Staff were uniformly open and helpful in sharing with us their processes for data collection and handling, as well as the data itself.

The Metro Center team contacted the City of Yakima's Supervising Senior Analyst, Tom Sellsted to obtain the five datasets of interest. After reviewing the data available, a Metro Center team member spoke with Tom Sellsted and Jill Ballard to discuss the methods used to collect and display datasets in the Equity Study's ArcMap Online Story Maps. Mr. Sellsted also provided the Metro Center team with contact information for the city data steward(s) of each of the five datasets, and the team scheduled one-hour phone calls with each data steward. During these calls the Metro Center team asked questions to identify and clarify our understanding of the methods used to collect the data used in the Equity Study. We took detailed notes during the call and, in some cases, followed up with additional emails or calls for clarification. The description of the methods used by the City of Yakima will be included in the final report.

Additional Data

To supplement city data from the Yakima Equity Study, we compiled census data from the American Community Survey (ACS) for each of the demographic "input" variables: income, race, education level, marital status, and homeowner or renter. These data sets were collected for years 1980, 1990, 2000, 2010, and 2015. These data will be used as input variables to run statistical analysis of output variables (Task 2, part B), as well as to tell the demographic story of Yakima over time as discussed in the Metro Center/City staff telephone conversation mentioned above.

Data for property value and age has also been collected. Since these data include time stamps, they will allow for a longitudinal analysis of age and value through the years that we have census data.

Results and Analysis

Process and Accuracy Audit

Our analysis suggests the City of Yakima has a professional and appropriate process for collecting, storing, and analyzing data, and a staff knowledgeable in the data infrastructure. Additionally, most of the data is recorded and handled in a reasonable and professional manner for its original intent: to support the city's geospatial data and land use planning. We note that the city's GIS architecture has been developed over more than 30 years, a positive quality which means that the city has a mature system in place.

An accuracy audit was conducted on a sample of city parks, on both the east and west sides of 16th Avenue, to assess parks data - one of the most complete and historically available datasets provided. This audit will also add richness to the binary nature of the parks data, and will help us understand whether there are qualitative differences in park resources across that geographic dividing line. The results of that audit will be presented in the final report.

We found no major sources of explicit bias in the collection, handling or storing of data, but we do recognize some sources of potential unintended consequences that may insert bias into the city's data collection for some of the datasets provided. These will be detailed in the final report.

Data Quality and Limitations

While the city is to be commended for its long commitment to a citywide Geographic Information System, staff and council should understand that, because the datasets were collected and developed for purposes than an analysis, or to assess disparity, most are insufficient to demonstrate either disparity/inequity or associated causation. The original intent of the data collection ultimately limits our ability to use the data to answer some of the current equity questions regarding past city practices: it is simply invalid for those purposes based on the time period, scale, or collection method used.

In the Table 2, we provide a summary table of this data and its possible usage. We hope this will help council understand possible approaches they might take, and what analyses are not supported by the data. Much of this work is part of Task 2, part A.

Recommendations

We note that while the data is too variable in quality, especially with regard to availability over time, to do historical examination of whether city resources have been distributed equitably, we think that a current "snapshot" or examination of existing conditions is appropriate and warranted.

Most of the contemporary data statistical analysis on the correlation of demographic variables (such as poverty, race, etc.) with geographic location is appropriate. And, when compared or cross-checked with a historical analysis of the growth of the city through annexation and demographic change over 30 years, we think a reasonable story can be developed to answer some of the equity questions. Moreover, we will be able to point to areas where the city may be able to implement future strategies that will lead to positive outcomes.

Our understanding of the Code Compliance data, though, suggests that this dataset remains problematic for analyzing equity due to the anonymous nature in which the data is collected. However, further

conversations with city staff might clarify for us some possible lines of inquiry for which the Code Compliance data could be used.

Next Steps

We will complete any remaining portions of Task 2 Parts A and B, and complete the analysis in Task 2 Part C including the accuracy audit on parks data, historic and contemporary demographic maps and historic demographic summary tables, and contemporary disparity/equity statistical analyses as appropriate. The demographic maps will show "input" variables across the period 1980-2015. We will then draft a final report of our findings for the city.

Timeline to Completion

Due to some of the challenges presented by the data, we request an extension of the contract to October 31, or a mutually agreeable date.

Attachments
Summary of Data Utility

Table 2: Summary of data utility

Output Variable	Recommended use in Equity Study	Limitations	Recommendations
Public Safety Calls (for Service)	● Analyze current disparities in response times for both Fire and Police Services ● Analyze Fire and Police services by council district and by 16th Avenue dividing line	● GIS Data are only available from 2012 to present day (not suitable for historical analysis) ● Walk-in cases to YPD are not consistently tracked. The database is shared with SunComm	
Streetlights	● Analyze current disparities in streetlight presence per council district, by demographic output variables	● Historical data not available in GIS format	● Define levels of service (LOS) standards for streetlights throughout the City of Yakima
Code Compliance Requests	● Display the data spatially to identify possible disparities	● Data in GIS format are only available from 2015 to present day (not suitable for historical analysis) ● There are many confounding factors that could lead to disparities in types of code complaints, and responses	● Create tag to identify which code compliance cases were received by Yak Back, phone calls, emails, or other methods ● Develop documentation of response prioritization criteria
Parks	● Analyze the development of parks in each council district over time, by population ● Analyze the development of parks in each council district over time, by demographic characteristics		
Transit (Ridership)		● Historical data not available in GIS format	● Obtain data for analysis of disparities in level of service for transit
Transit (Benches)			● Review criteria for placement of benches to prioritize need as well as feasibility, and ridership
Transit (Shelters)			● Review criteria for placement of shelters to prioritize need as well as feasibility, and ridership

Appendix C – Demographic Variables Over Time

All maps are available at http://gist.gis.washington.edu/yakima_equity/

Income - Median household income
1980 - 2010

1980

1990

2000

2010

2015
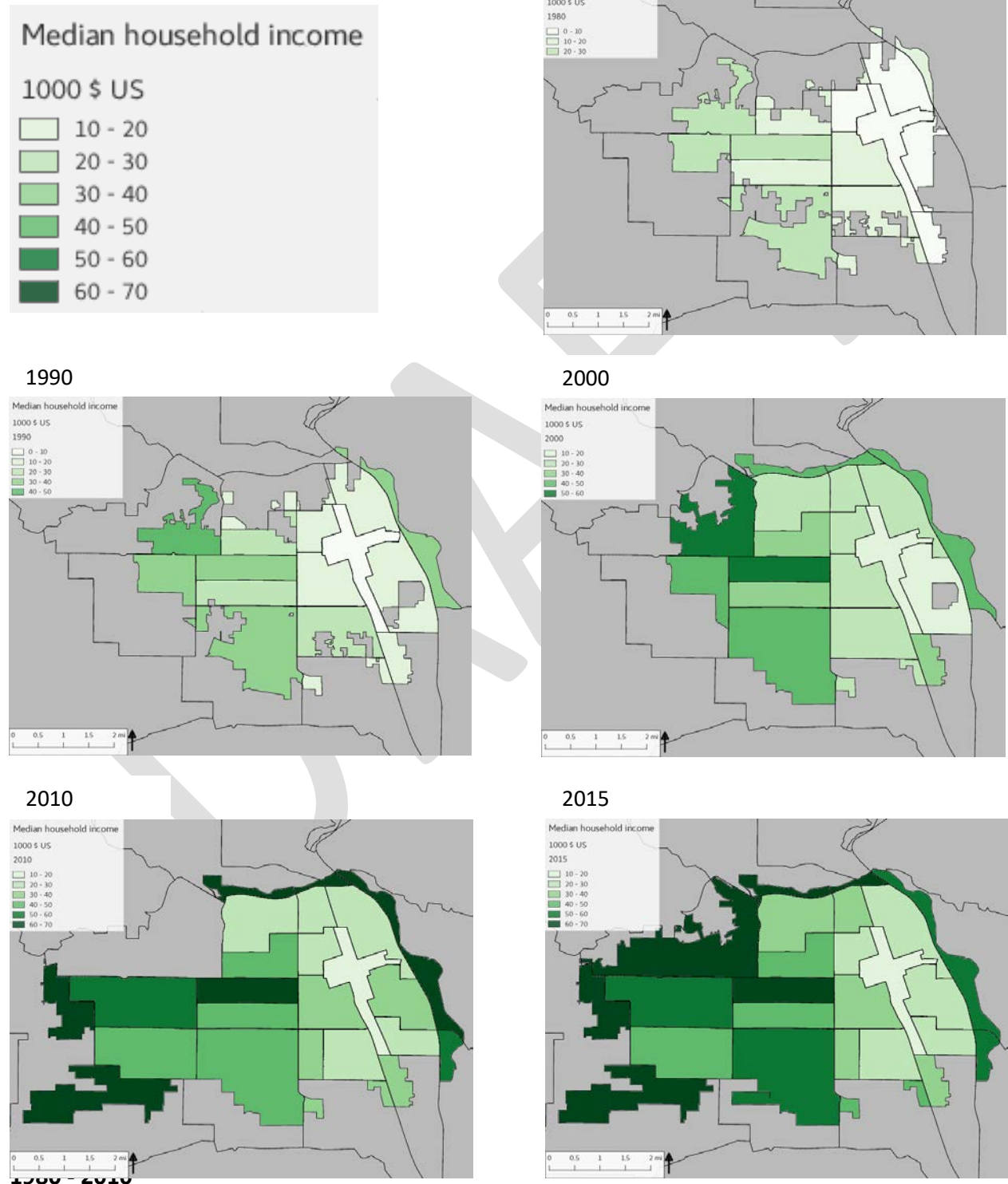
1980 - 2010

1980

Percent married

- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
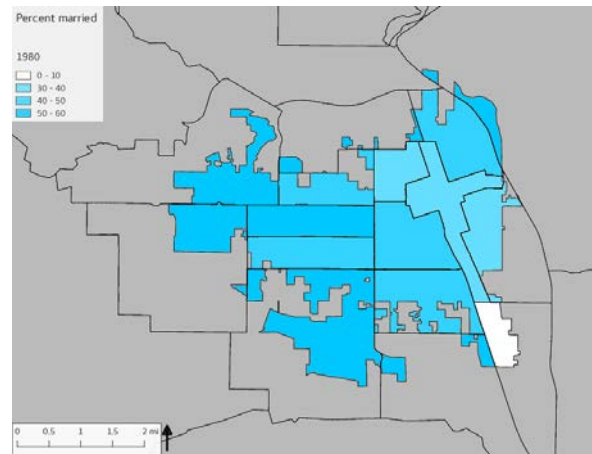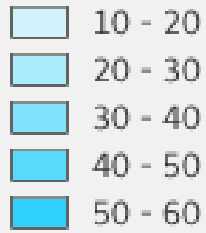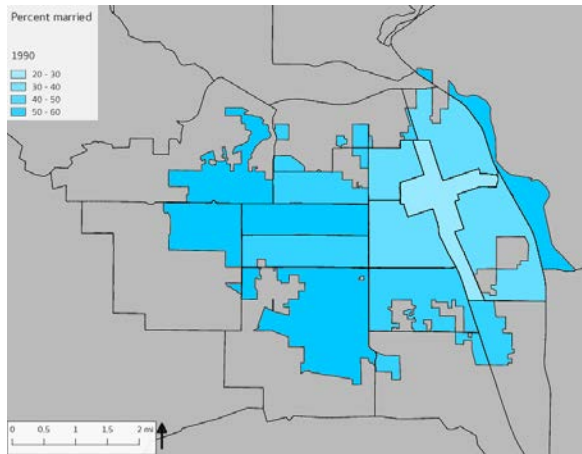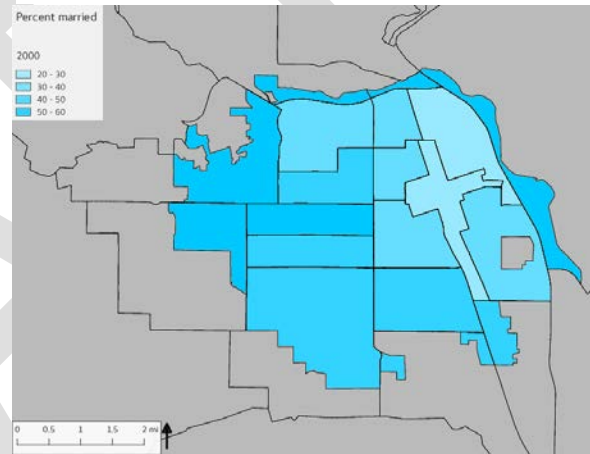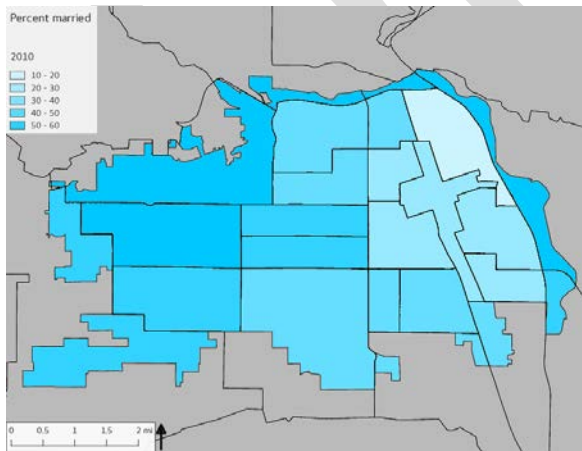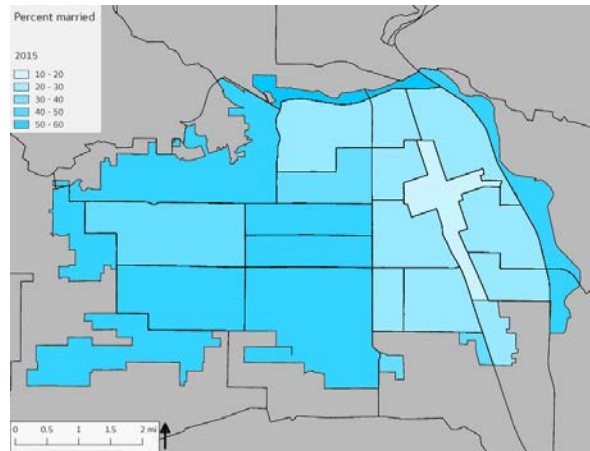
1990

2000

2010

2015

Income – Percent living below the poverty line
1980 - 2010
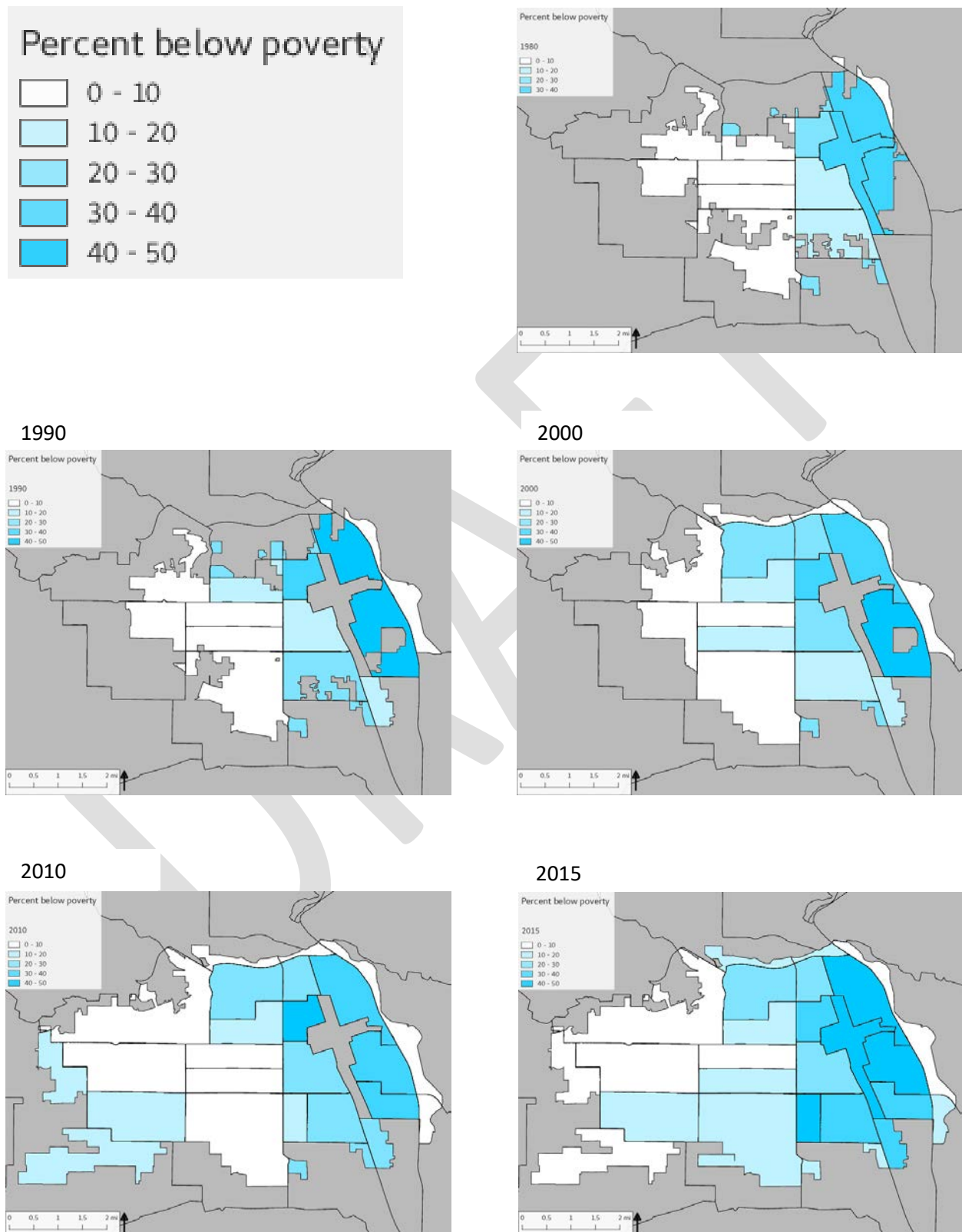
**Percent Non-White
1980 - 2010**
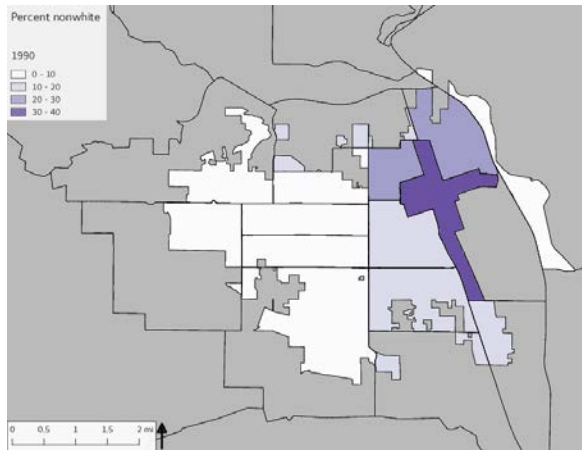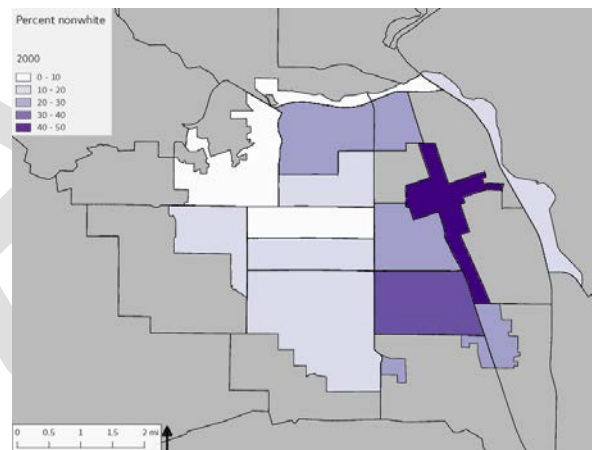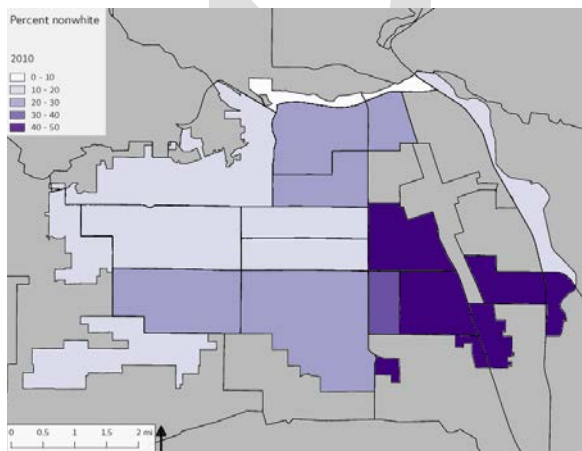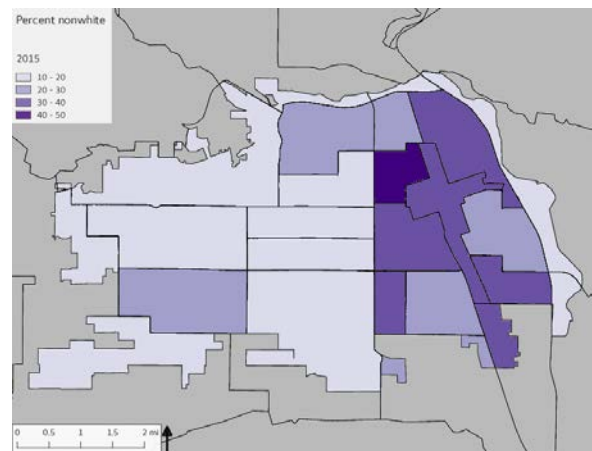
Percent Hispanic
1980 - 2010
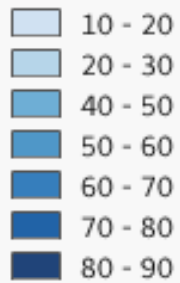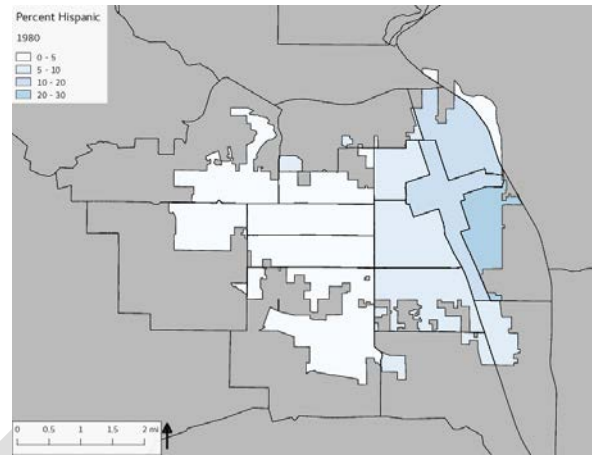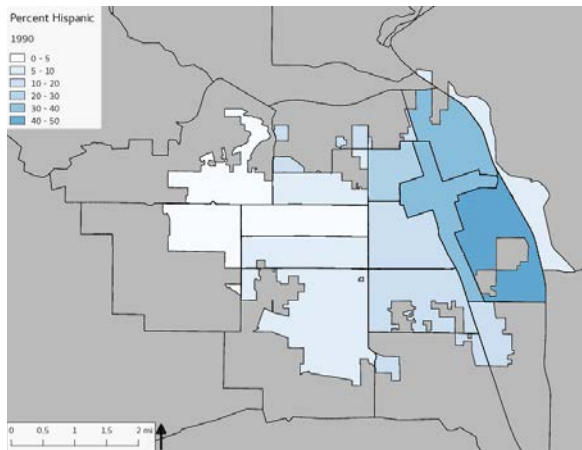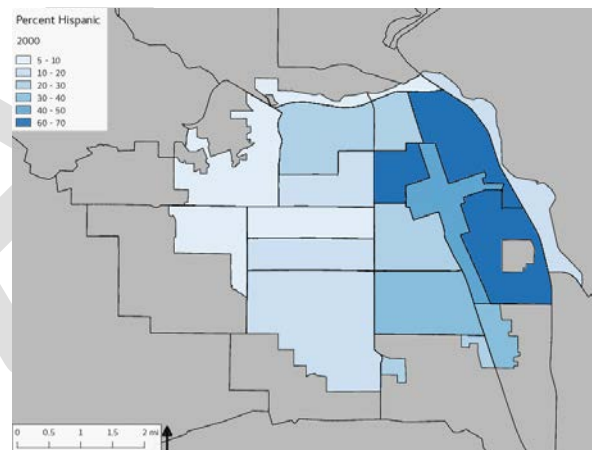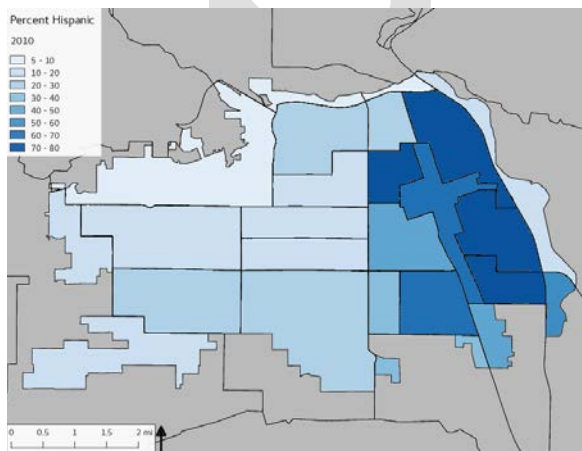
1980
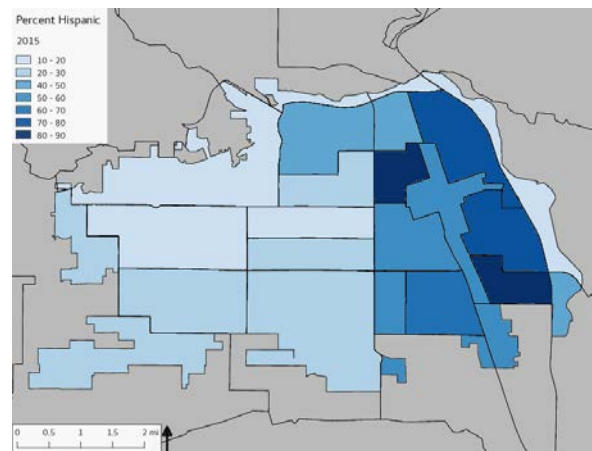
1990

2000

2010

2015

Education Level - Percent college graduate
1980 – 2010
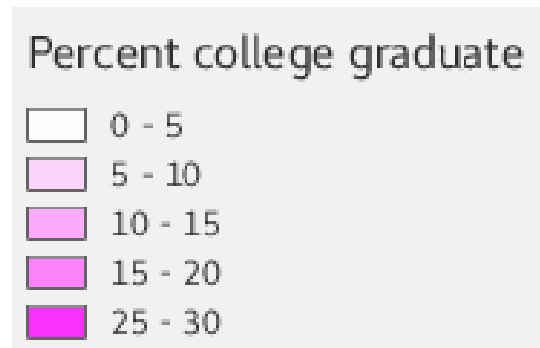
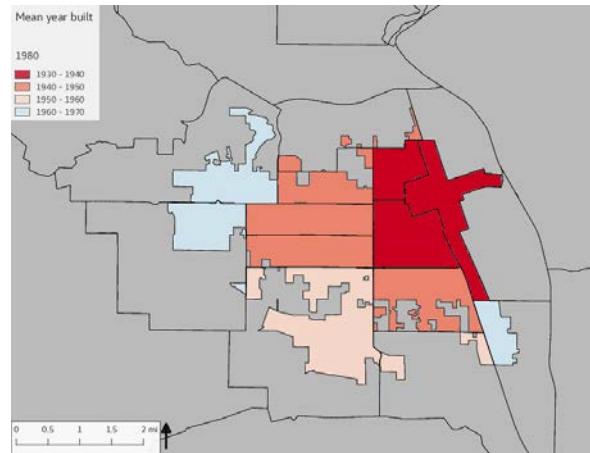1980
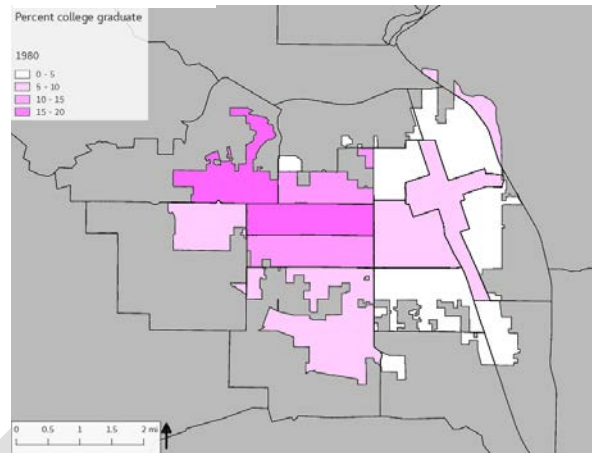
1990
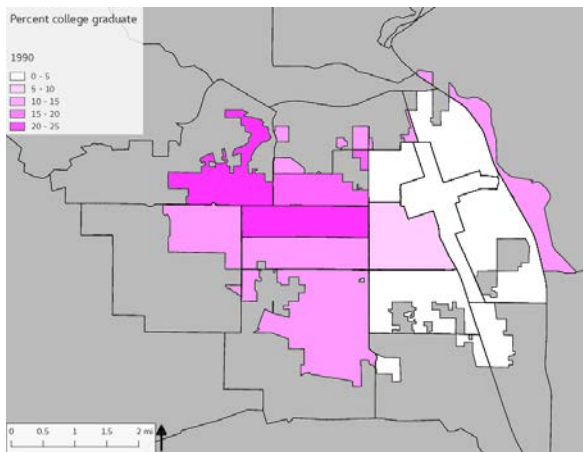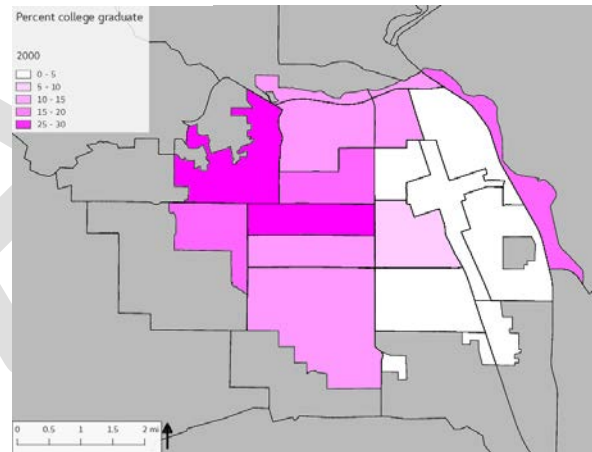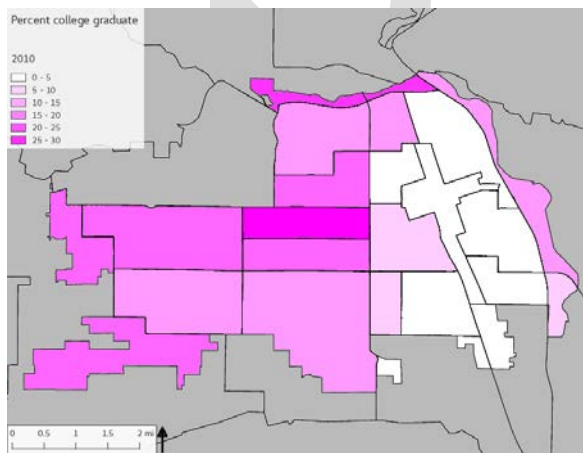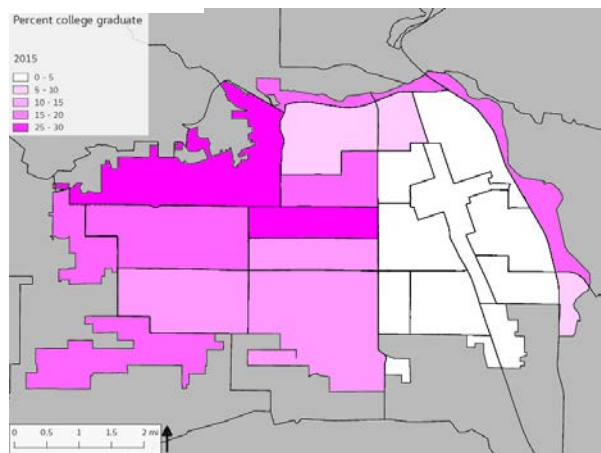
2000

2010
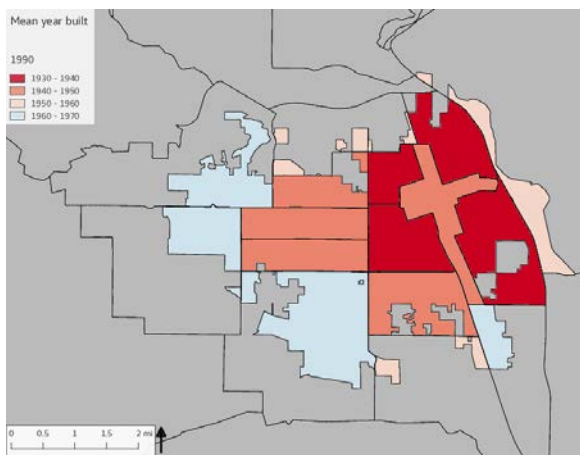

2015

Percent Renter Occupied
1980 - 2010
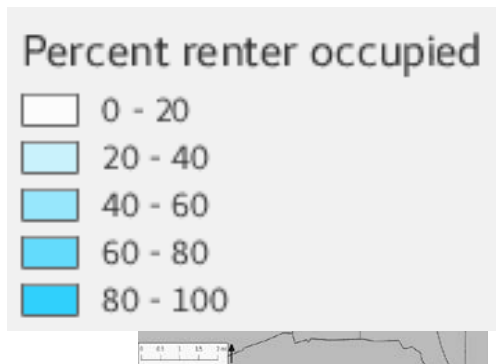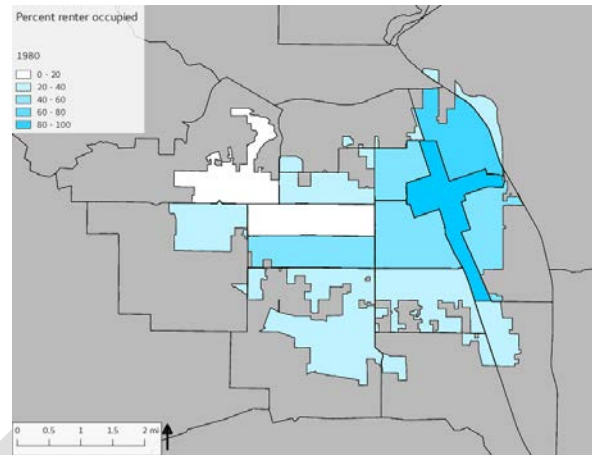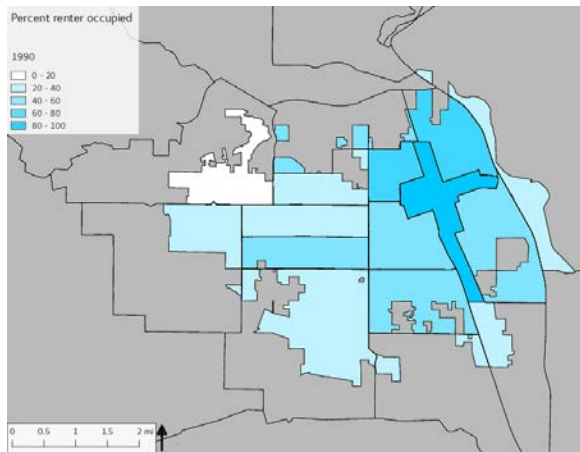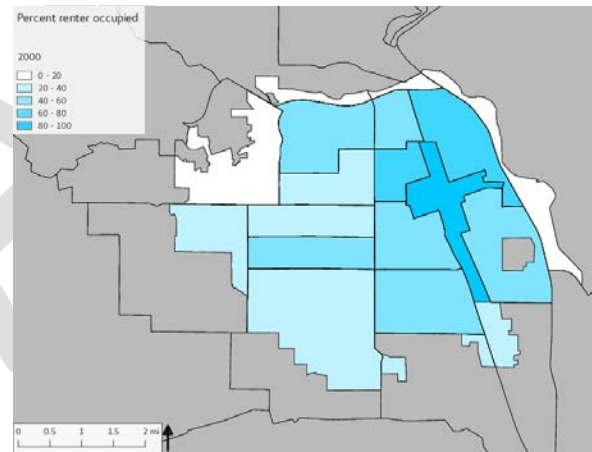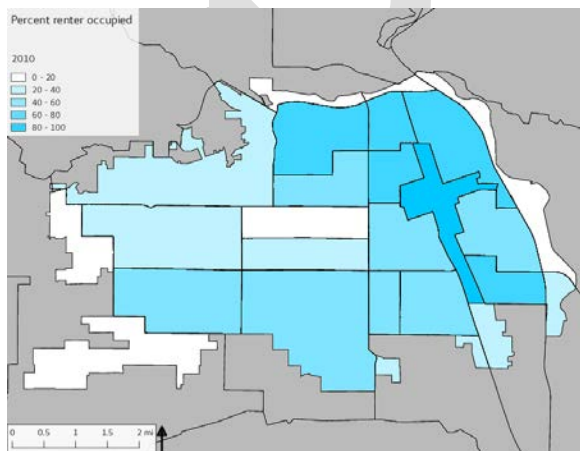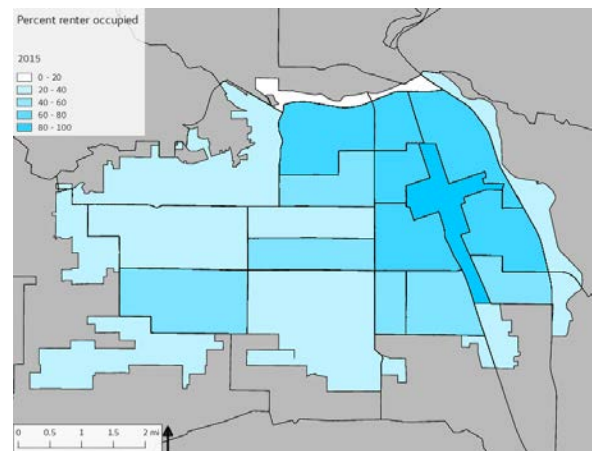
Mean year home built
1980 - 2010
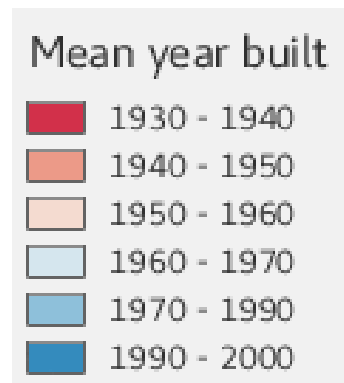
1980

1990
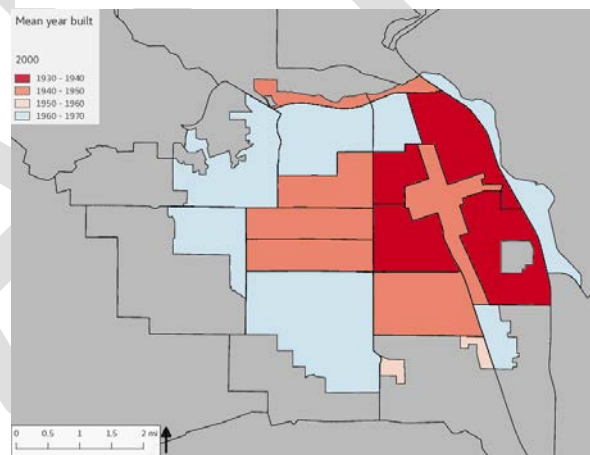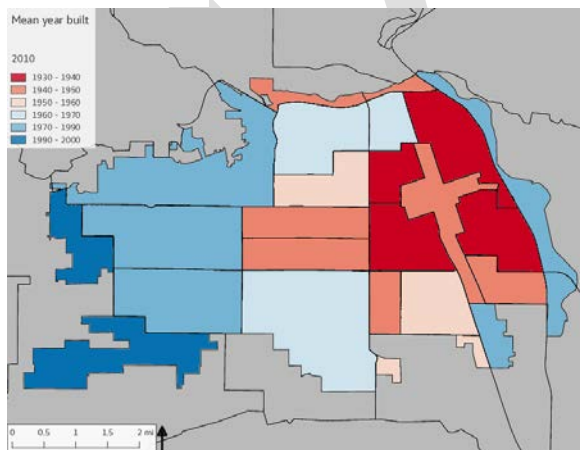
2000

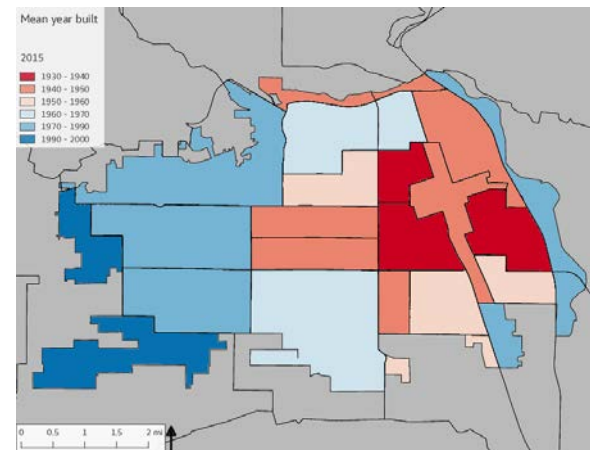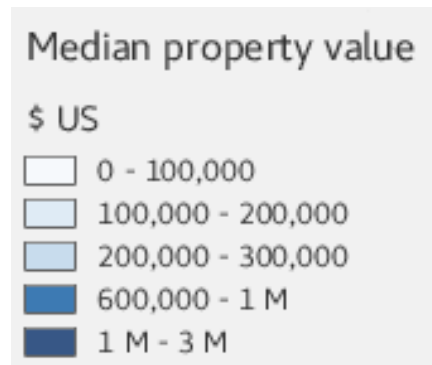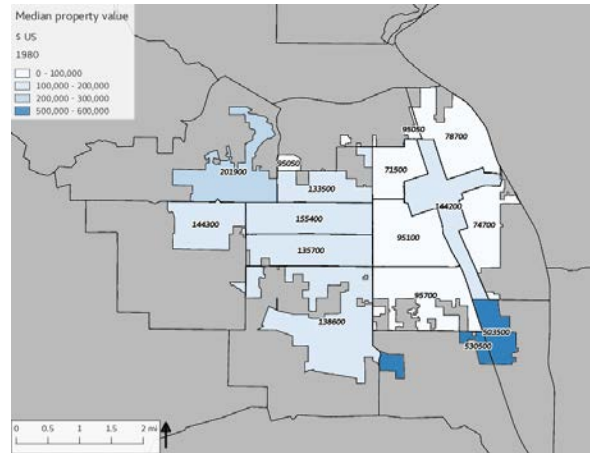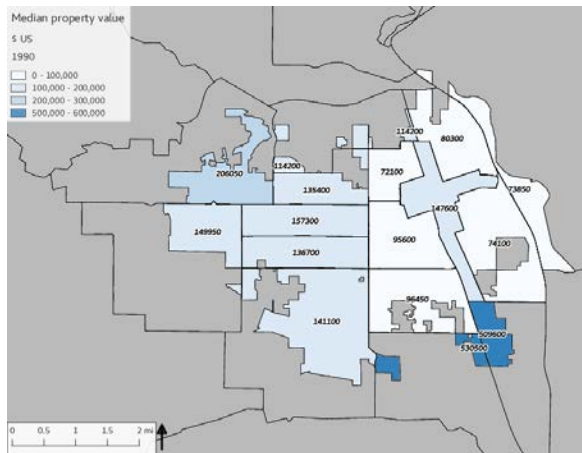
2010

2015

Median Property Value
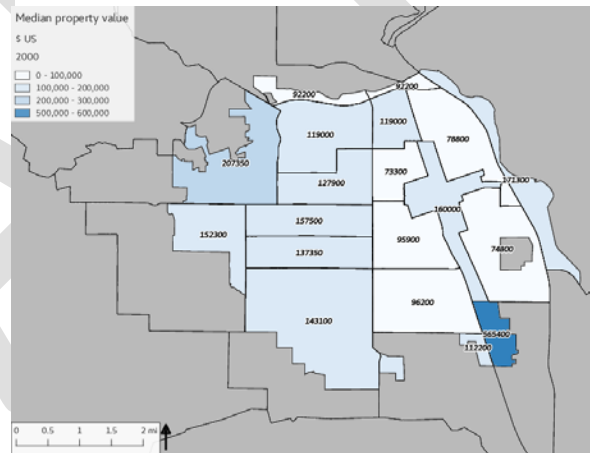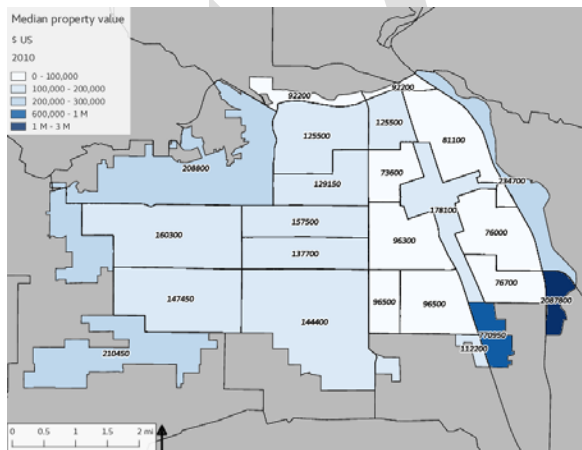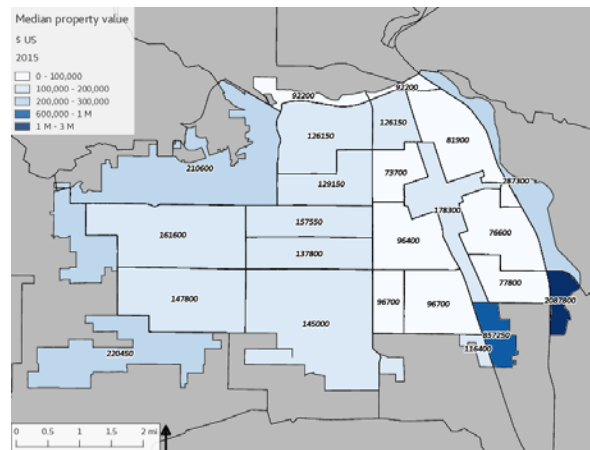**1980 - 2010**

1980

1990

2000

2010

2015

Appendix D – Project Proposal

Objective:
To analyze data from the City of Yakima's Equity Study to help inform the 2018 budget and future budget decision.

Background
In May 2016, the Yakima City Council directed City staff to begin an Equity Study to research the distribution of city funded services and improvements. This study was launched through the encouragement of a private non-profit organization. The data collected to date have been made available to the public on the City's website at https://www.yakimawa.gov/council/equity-study/.

Representatives from the City of Yakima contacted WSU's Metropolitan Center for Applied Research and Extension (Metro Center) to assist the City with addressing equity concerns of Council Members around resource allocation.

About the Metro Center
The Metro Center helps Washington's cities and metropolitan communities create vibrant economies, healthy communities, and sustainable environments. We do this by connecting decision-makers with the expertise of Washington State University to produce practical solutions to the challenges of growth. Using a project-based and client centered approach, the Metro Center remains flexible to respond to emerging needs, and help communities build capacity to create sustainable solutions for the future.

About our process
The Metro Center compiles a unique team for each project with the necessary expertise and attributes to successfully complete all project goals. Team members include WSU faculty and staff; however, we also utilize external partners as needed for a project. Potential partners were contacted during the creation of this draft to ensure that the Metro Center has the ability to undertake and fulfill the actions proposed below. Their input and expertise is incorporated into this proposal.

Project Tasks:

Task 1: Validate Equity Study data

Methods
Confirm with City Council up to 6 data sets identified in Task 2 B, excluding US Census Bureau data, to assess the validity of those data. For each data set selected we will conduct, as appropriate:
   A. A process audit by interviewing City staff and reviewing documents associated with how these data were collected, compiled, summarized, and made accessible to the public.
   B. An accuracy audit of the data by randomly selecting a representative sample of data points, and independently determining the accuracy through direct observations.

City of Yakima Responsibilities
City staff will make original data available for an audit and staff members will be available for questions.

Metro Center Deliverable

We will provide a written report of our findings to the City with an option for an in-person or remote presentation.

Task 2: Analyze existing Equity Study data to assess the geographic distribution of public resources and funds (e.g. city, State, or Federal)

Methods

A. Assess the quality of the data to understand any qualitative concerns and limitations that would impact data analysis or interpretation (i.e. period of time collected, geographically resolution of the data, etc.).

B. Confirm the input and output variables for the analysis, and the geographical dividing line. Initial request included the following 6 data sets, upon which this estimate is based:
   a. Input variable:
      o Demographics, to include income, race, education level, marital status, home owner or renter, property value and age
   b. Output variables:
      o Public safety calls for service (location, response time)
      o Streetlights
      o Code compliance requests
      o Parks (exempt parks that are privately funded or charge for use)
      o Transit ridership, shelters, benches
   c. Geographical dividing line
      o 16th Avenue

C. Perform the appropriate statistical analyses to assess any relationships amongst the input and output (i.e. response) variables.

Metro Center Deliverable

We will provide a written report of the process we used for the analyses, results of the analyses, and an interpretation of the data, with an option for an in-person or remote presentation.

City of Yakima Responsibilities

City staff will make all data sets, including any meta-data available to the WSU team in mutually agreed upon format(S), documentation as to how data were collected, accessed, and / or manipulated as well as being available to answer questions as needed.

Timeline

Completion by 90 days from initiation of the contract, or mutually agreeable date.

Budget: $25,100

The budget includes personnel, materials, travel, and WSU's required 26% indirect costs.

Personnel

Includes all salaries, wages and benefits of project personnel required to implement project tasks as well as administrative aspects of the project including, but not limited to, meetings, reporting, and communication.

Materials

Materiel costs will be minimal and may include photocopying and binding of final reports.

Travel

Travel costs will be incurred only as necessary to complete project tasks and will include: travel to and from Seattle and Yakima, hotel and meals while in travel status, and local ground travel, as set by the U.S. General Services Administration.

Indirect Costs
A Facilities and Administration (F&A or Indirect Cost) rate of 26% is added to all direct project costs.

NOTE: These are preliminary estimates only, and have not been reviewed by WSU contracting or finance offices. As such, they are subject to modification as part of the formal contracting process. These estimates include a good faith assessment of the appropriate Facilities and Administration (F & A or Indirect Cost) recovery rates (26% for most activities herein), which may also be changed after formal review. These estimates are provided to facilitate discussion and negotiation, but do not constitute a formal offer or the basis of a formal contract – which may only be executed by the WSU Office of Research Support and Operations. All expenses regarding the venue, food, and rentals are to be paid for by the funder.

Appendix E – Summary of Accuracy Audit Findings

Table 3: Park audit details

Park Name	Data Errors (Y/N)	Reported Location and Amenities	Observed Location and Amenities	Notes
McGuinness Park	N	14th Ave & Swan Ave • Playground • Picnic Shelter • Basketball court • Asphalt pathway	14th Ave & Swan Ave • (1) Playground • (1) Picnic shelter • (1) basketball court • Asphalt pathway	Shelter fits four picnic tables
Emil Kissel Park	N	3000 W Mead Ave • Tennis Center (12 courts) • (1) Restroom • Playground • Asphalt path • Picnic Shelter • Basketball court	3000 W Mead Ave • (12) Tennis Courts • (1) Restroom • (1) Playground • Asphalt path • (1) Picnic Shelter with grill • (1) Basketball court • Parking lot (estimated* 83 stalls)	Picnic shelter with grill, wall on two sides providing shelter from wind.
Gilbert Park	N	500 W Lincoln Ave • Open Space • Parking lot	500 W Lincoln Ave • Open Space • Parking lot (estimated* 87 stalls)	
South 2nd St Park	N	706 E Race St • Open space	706 E Race St • Open space	
Milroy Park	N	SE Corner of 16th & Lincoln Ave • Playground • Restroom • Volleyball court • Horseshoe pits	SE Corner of 16th & Lincoln Ave • Playground • Restroom • Volleyball court • Horseshoe pits • Parking lot (estimated* 29 stalls)	horseshoe pits missing the posts, inoperable
West Valley Community Park	N	1323 80th Ave • (3) Picnic Shelters • (2) Playgrounds • (1) Restroom • Horseshoe Pits (unspecified number)	1323 80th Ave • (3) Picnic Shelters • (2) Playgrounds • (1) Restroom • (4) Horseshoe Pits • (2) Basketball Courts	Well maintained structures. Horseshoe pits unmowed, have tall weeds.

Park Name	Data Errors (Y/N)	Reported Location and Amenities	Observed Location and Amenities	Notes
		• Basketball Courts (unspecified number)	• (2) Parking lots (estimated* 54, and 60+ stalls)	
Yakima Arboretum	N	1401 Arboretum Dr • Open space • Parking lot • Jewitt center (owned by Arboretum, not YPR)	1401 Arboretum Dr • Open space • Parking lot (estimated* 135 stalls) • Jewitt center (owned by Arboretum, not YPR)	
Fisher Golf Course	N	823 S 40th Ave • 9-hole 3 par course • Starter house • Maintenance building	823 S 40th Ave • 9-hole 3 par course • Starter house • Maintenance building • Small parking lot (estimated* 23 stalls)	
Franklin Park	N	2101 Tieton Dr • Outdoor pool • (2) Small picnic tables • (1) Pavilion • (1) Playground • Tennis courts (unspecified number)	2101 Tieton Dr • Outdoor pool • (2) Small picnic tables • (1) Pavilion • (1) Playground • (6) Tennis courts	Previous capital improvements received private funding
Kiwanis Park	N	1501 E Maple St • Restrooms, concessions • Playground • Picnic Shelters (unspecified) • (8) Baseball/softball fields • Basketball court • Concrete skate park	1501 E Maple St • Restrooms/concessions • (1) Playground • (2) Picnic Shelters • (8) Baseball/softball fields • (1) Basketball court • Concrete skate park • Large Parking lot (estimated* 441 stalls)	Previous capital improvements received private funding