ASSIGNMENT 3

PEDESTRIANIZATION IN SALT LAKE MSA

AIJING LI
CHARUVI BEGWANI

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CHAPTER 1

ABOUT THE PROJECT

O ur study area is the Salt Lake Metropolitan Statistical Area which includes Salt Lake and Tooele counties. In this project, we will be modelling the pedestrianization of Main Street and closure of the street for cars, to explore how impactful the plan for a permanent pedestrian zone may be. This topic is especially relevant since Open Streets have been implemented all across the country, post-pandemic, and many other cities are also considering similar pedestrianization projects with the success of outdoor dining and retail activities.

Existing Scenario

Main Street is one of the key commercial streets in Salt Lake City with banks, major retailers and a high pedestrian footfall. In a few weeks in September and October 2020, a block on the Main Street was shut down for cars from Thursday to Saturday from 6-10 p.m. Referred to as the Downtown SLC Open Streets program, this was done in an attempt to revitalize the downtown area and encourage patrons. The new spaces created, and outdoor dining and retail services initiated as a result of social distancing requirements due to the pandemic, were leveraged to "expand options for pedestrians" and benefit on-street businesses.

In response to the success of this initiative, it was repeated the next year in April for an expanded stretch from South Temple to 400 South. As before, this aimed to invite pedestrians and support local businesses. This news article reports that Downtown Alliance, the group leading this, is considering asking city to make it a permanent, year-round "pedestrian zone."

Alternative Scenario

In response to the success of a pedestrianization initiative on this street, creation of a permanent pedestrian zone is being considered in the South Temple to 400 South stretch.

We aim to model this alternative scenario where we will close Main Street from South Temple to 400 South (see Fig.1) i.e., we will model the deletion of this roadway segment for cars. Additionally, to complement the street closure, we will increase the frequency of bus route 200 on a parallel road towards its east, from 15 minutes to 5 minutes headway. Through these transportation network changes, we wish to see the impact of street closure on travel demand and behavior and also if the increased frequency of bus route 200 in this scenario can further support the impact of the closure of Main Street.

Keith Kramer, FOX 13 News

Assignment 2 tasks

In this assignment we describe the distribution of population and employment across traffic analysis zones within our study area using R. We use census tracts in Salt Lake and Tooele counties as our traffic analysis zones. We start this exercise by isolating the zone boundaries for this MSA and retrieving existing population and employment data (ACS 2019) for census tracts in these two counties for the following variables:
- Total number of households
- Household size composition
- Total number of zero-vehicle households
- Total number of households in multiple income categories
- Total number of employees
- Number of retail employees
- Number of service employees
- Number of basic employees

Assumptions and Limitations

In our alternative scenario we are not proposing any changes to the population and employment characteristics, and therefore for this assignment we have only looked at data for the existing scenario.

We recognize that the transportation network changes described in the alternative scenario above could impact the population and economy in the area as well. For instance, by closing the street to cars, and promoting on-street activities, there may be an increase in commercial activities/services on the street and therefore more jobs and employees. Similarly, the further increase in the frequency of the existing rapid transit line may further impact land use, households, and jobs in the census tracts. However, for the purposes of this modelling assignment/project, we have only considered changes in the inputs identified above and would be treating all other inputs such as land use, population and economic characteristics as constant in the area, to isolate and truly understand the potential impacts of the proposed transportation changes, irrespective of surrounding conditions.

HOUSEHOLD SIZES

This chapter details out three key population attributes and employment characteristics of tracts for the existing scenario in the Salt Lake Metropolitan Statistical Area based on data from ACS 2019. The first section is about the data on household sizes, which is a key factor in understanding the population characteristics of any area. The tree map in Fig. 2 below represents the household size composition of the community in Salt Lake MSA. The MSA has about 47% households with 3 or more persons, which could mean that there are significant number of families within the community. Both 2 person and over 4-persons households dominate the composition.

Fig. 3: Distribution of total number of households by household size in Salt Lake MSA (ACS 2019)

Household size
(each points represents
100 households)
- 1 person
- 2 people
- 3 people
- 4 or more people

Fig. 2: Household size composition in Salt Lake MSA (ACS 2019)

| Households with 2 person 31% | Households with 3 person 16% |
| Households with 4 person and plus 31% | Households with 1 person 22% |
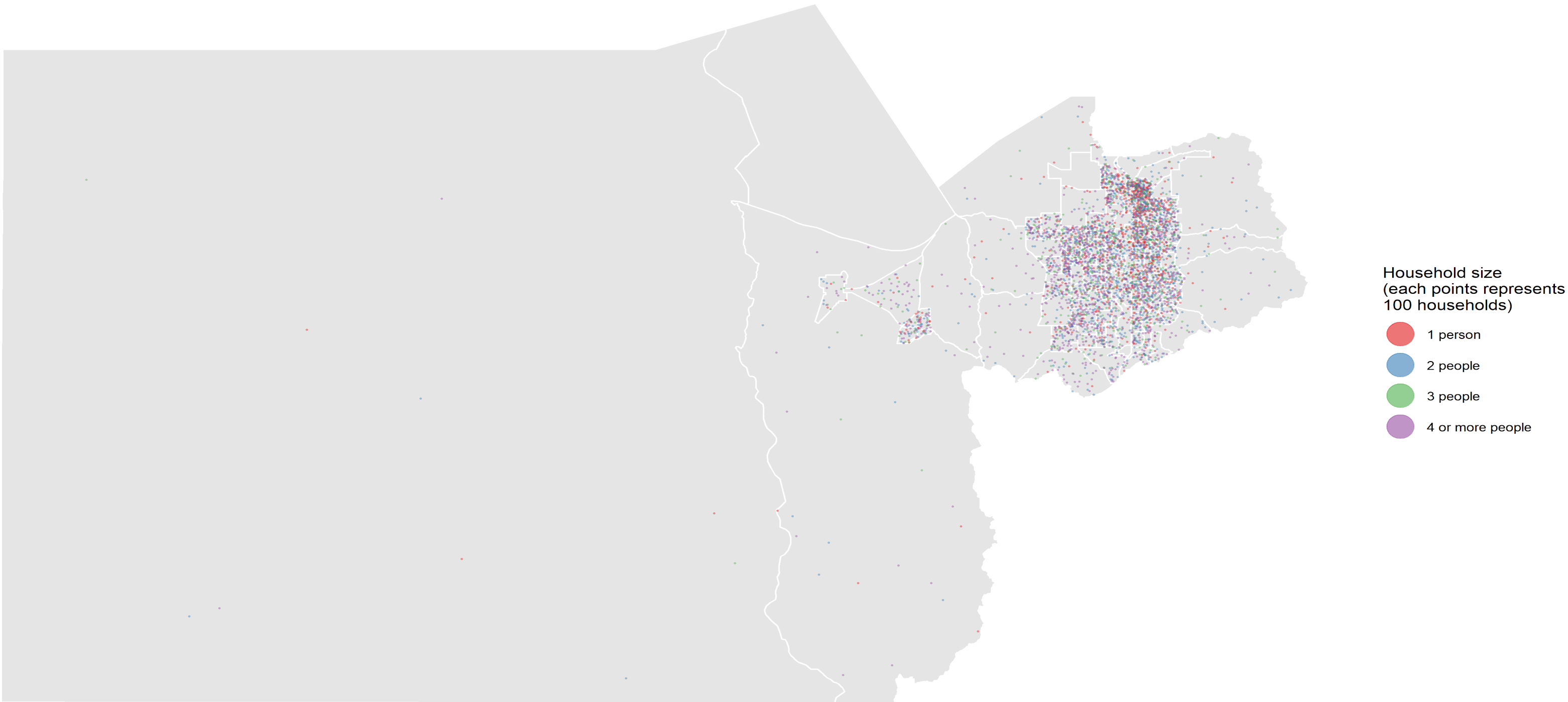
There are 395,298 households in Salt Lake MSA. The dot density map in Fig.3 above shows the distribution of the number of households at the census tract level. A significant disparity can be seen in terms of the household distribution between the Salt Lake and Tooele counties. The majority of the households in this metropolitan statistical area are concentrated in Salt Lake county.

The mean number of total households per census tract is 1773, the median is 1665. However the standard deviation is significant at 878 indicative of the fact that they are probably not a fair representation of the distribution of households across the MSA.

Table 1 shows the tract level statistics for the different household size categories with 2 and 4 peopl households constituting the majority of the Salt Lake MSA community.

Table 1: Household size distribution - tract level statistics

Household Size	Mean	Standard Deviation	Median
1 person	398	282	317
2 people	541	253	507
3 people	282	162	259
4 or more people	552	461	487

INCOME DISTRIBUTION

Another critical population characteristic is household income. The tree map in Fig. 4 below represents the household income composition for the overall community in Salt Lake MSA. We created five income categories based on the quintiles obtained from the regional-level data for the MSA. The majority of households i.e., 61 % of the households in the MSA have a household income of over $60,000 (ACS 2019). There is also a significant section of the population in MSA that earns below $ 60,000 which is below the national median income in USA. The dot density map in Fig. 5 shows the spatial distribution of households under different income categories across the MSA. We find a greater concentration of households with higher incomes in the northern region of Salt Lake County.
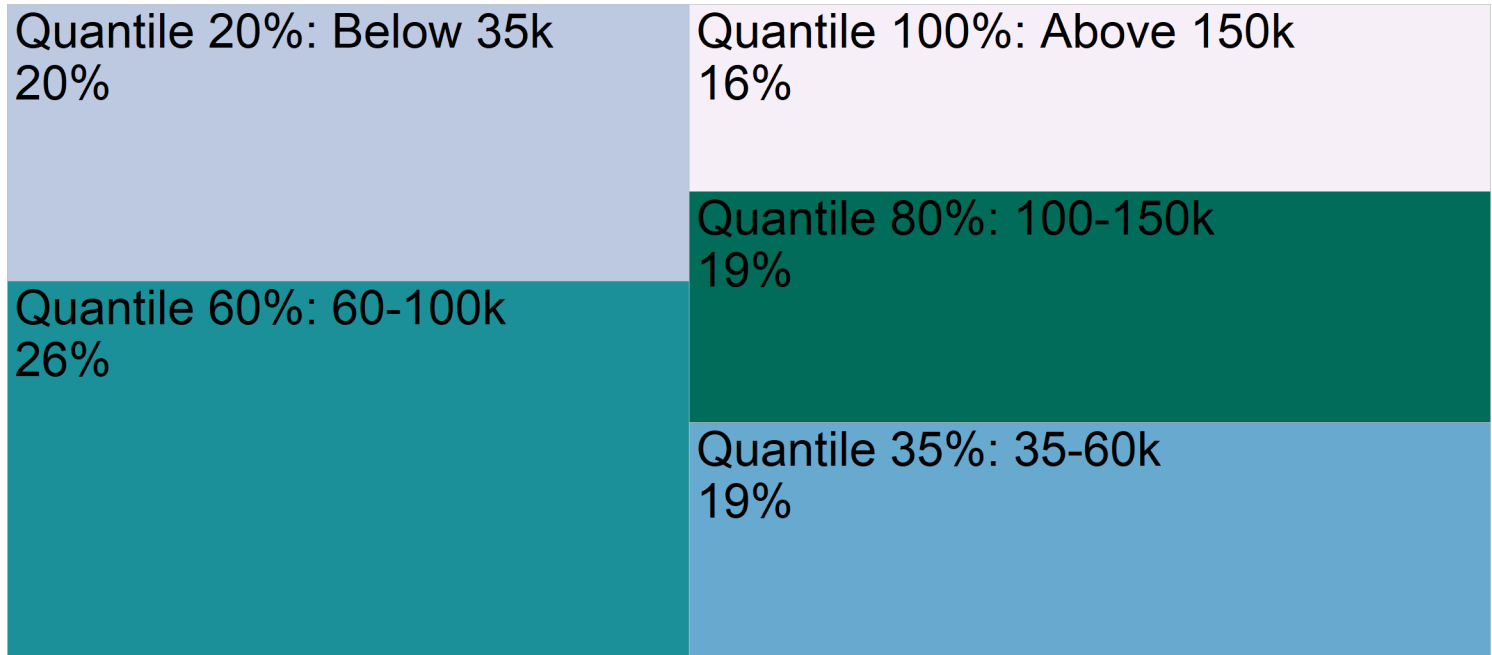
Fig. 4: Household income composition in Salt Lake MSA

Quantile 20%: Below 35k 20%	Quantile 100%: Above 150k 16%
Quantile 60%: 60-100k 26%	Quantile 80%: 100-150k 19%
	Quantile 35%: 35-60k 19%

Fig. 5: Distribution of total number of households by household income in Salt Lake MSA (ACS 2019)

Household income
(each points represents
100 households)

- 100,000 - 150,000
- 150,000 - $200,000
- 35,000 - 60,000
- 60,000 - 100,000
- Under 35,000
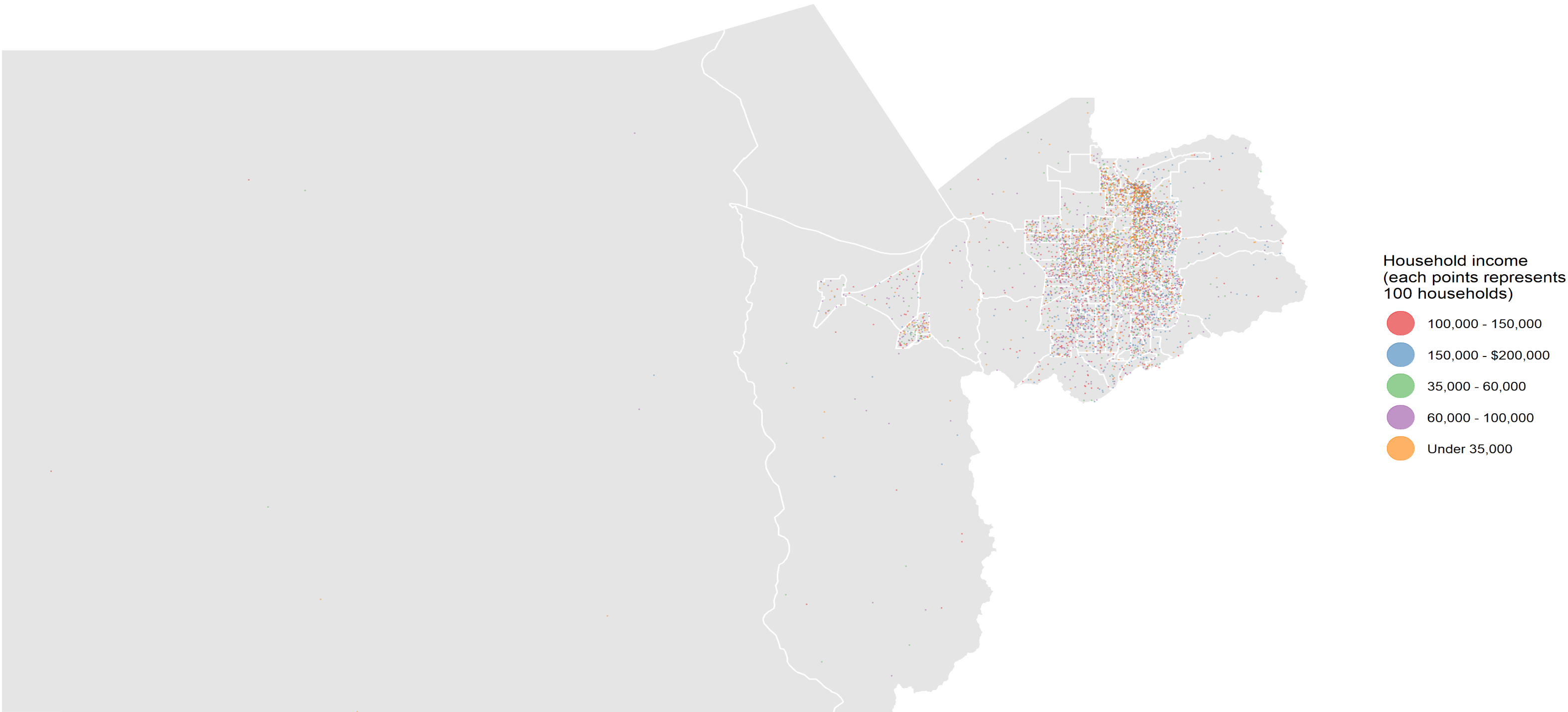
Table 2 represents tract statistics for the household income data and on an average majority of the households were earning $60,000 - $100,000 with an average 469 households per tract and a little under 350 households for the lower two income categories. The standard deviation is significant and so the mean may not be truly representative of the distribution.

Table 2: Household income - tract level statistics

Income Category	Mean	Standard Deviation	Median
< $ 35,000	346	242	292
$ 35,000 - $ 60,000	342	196	307
$60,000 - $ 100,000	469	283	421
$100,000 - $ 150,000	341	273	285
$150,000 - $ 200,000	275	257	181

VEHICLE OWNERSHIP

Zero-vehicle
households/mile^2

1500

1000

500

0

T he chloropleth map in Fig. 6 alongside represents the distribution of the households at the census tract level with zero-vehicle ownership and shows the density of such householdds per square mile. This is an interesting and relevant variable to consider in our model since we would be pedestrianizing a road section, so we can see the impact on this.

The greatest concentration of zero-vehicle households is in Salt Lake County, specifically in and around the Salt Lake city area which speaks to the land use, activities and kind of development in the area - it could be due to the higher walkability in certain streets/neighborhoods such as downtown. Alternatively, it could be reflective of the income levels of the community in those tracts.

Based on the tract level statistics, the mean number of zero-vehicle households per census tract is 90, the median is 52 and it has a high standard deviation of 106 households.

EMPLOYMENT DISTRIBUTION

Density of employees
density/mile^2

30000

20000

10000
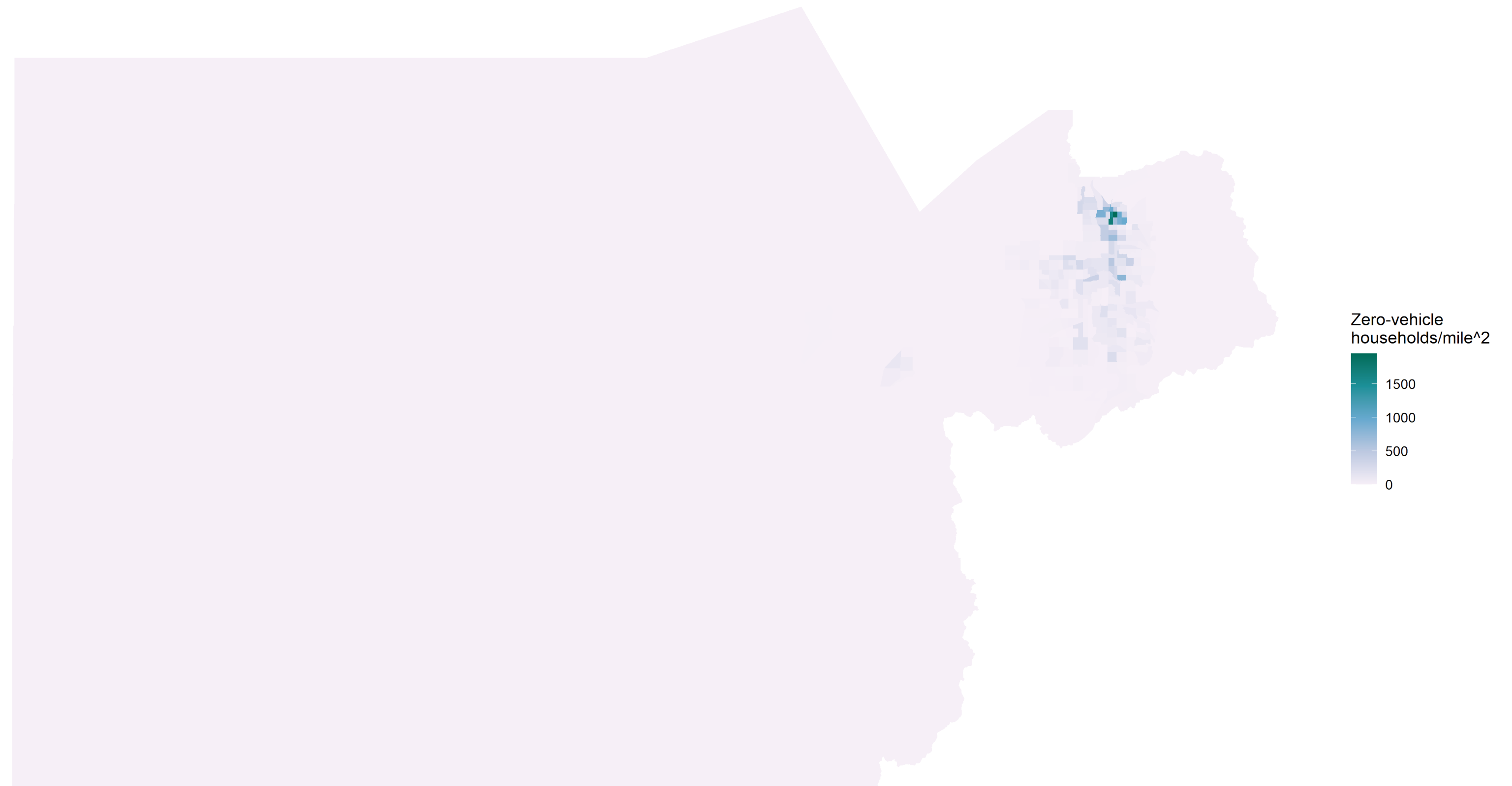
Employment variables are important for any travel demand model since they result in a majority of trips. For our project focused on pedestrianization of a commercial street, total employment as well employment in retail and service categories would be relevant variables to consider when determining variations in other aspects in our model scenario.

The figures ahead represent employment data from the Workplace Characteristics section in the Longitudinal Employer-Household Dynamics (LEHD) dataset for 2019, and includes information about total employment as well as its constituent categories:

- Basic employment (Agriculture, Forestry, Fishing, and Hunting,
  Mining and extraction, Utilities, Construction, Manufacturing,
  Wholesale trade and Transportation and warehousing)
- Retail employment
- Service employment (all the remaining employment is included
  in this)
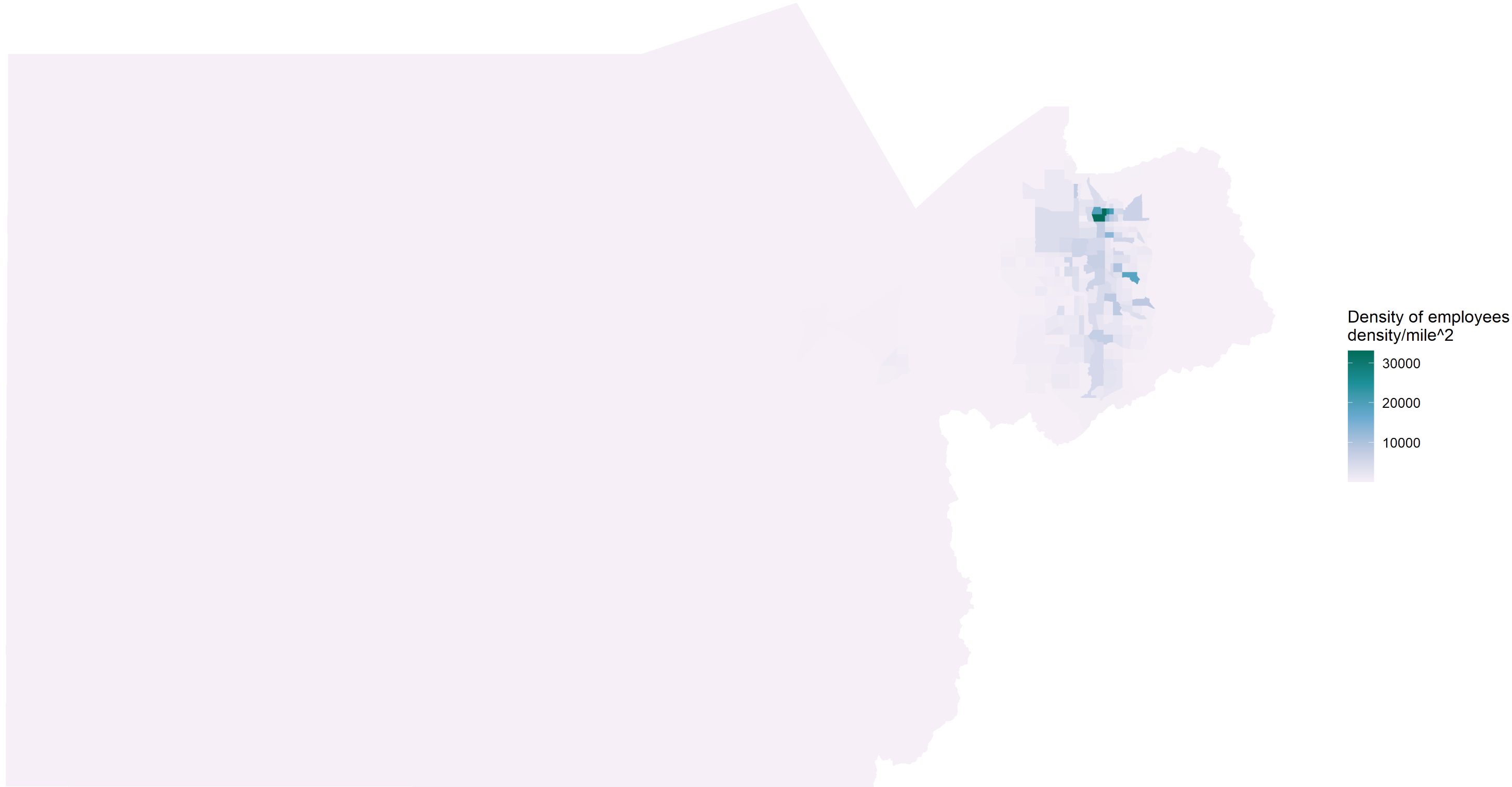
There are 733,400 workers in total in Salt Lake MSA spread across the two counties, largely in Salt Lake County. Service employment is the major employment category with 456,451 workers, i.e., almost 62 percent of total employment. The chloropleth map in Fig. 7 above shows the distribution of the total number of workers at the census tract level in the MSA.

A significant disparity can be seen in terms of the employment distribution between the Salt Lake and Tooele counties, and also within the Salt Lake County, where the employment is concentrated. Maximum employment density is present in the census tracts in the regions in and around West Valley City (approx. 63,500 workers) and Salt Lake City, with densities over 30,000 workers per square mile.

EMPLOYMENT TYPES

There is a higher concentration of service and basic (potentially manufacturing) employment in the northern tracts of Salt Lake County, likely in Salt Lake and West Valley cities, seen in Fig 10 and Fig.8 respectively. On the other hand, a relatively greater density of retail employment is observed in a southern tract in the County in Fig. 9.

We determined tract statistics for the household income data shown in Table 3 below. On an average, there were about 2047 service workers per tract, with this being the major employment type. The standard deviation is significant and so the mean may not be truly representative of the distribution.

The chloropleth maps in Fig. 8, Fig. 9, and Fig. 10 below display the density of basic, retail and service employees per square mile in every census tract in Salt Lake MSA. These maps are helpful to show the spatial distribution of number of employees under different employment categories and some variation can be noticed between these three employment types.

Table 3: Household income - tract level statistics

Employment Category	Mean	Standard Deviation	Median
Basic workers	891	3054	142
Retail workers	350	751	139
Service workers	2047	3927	829

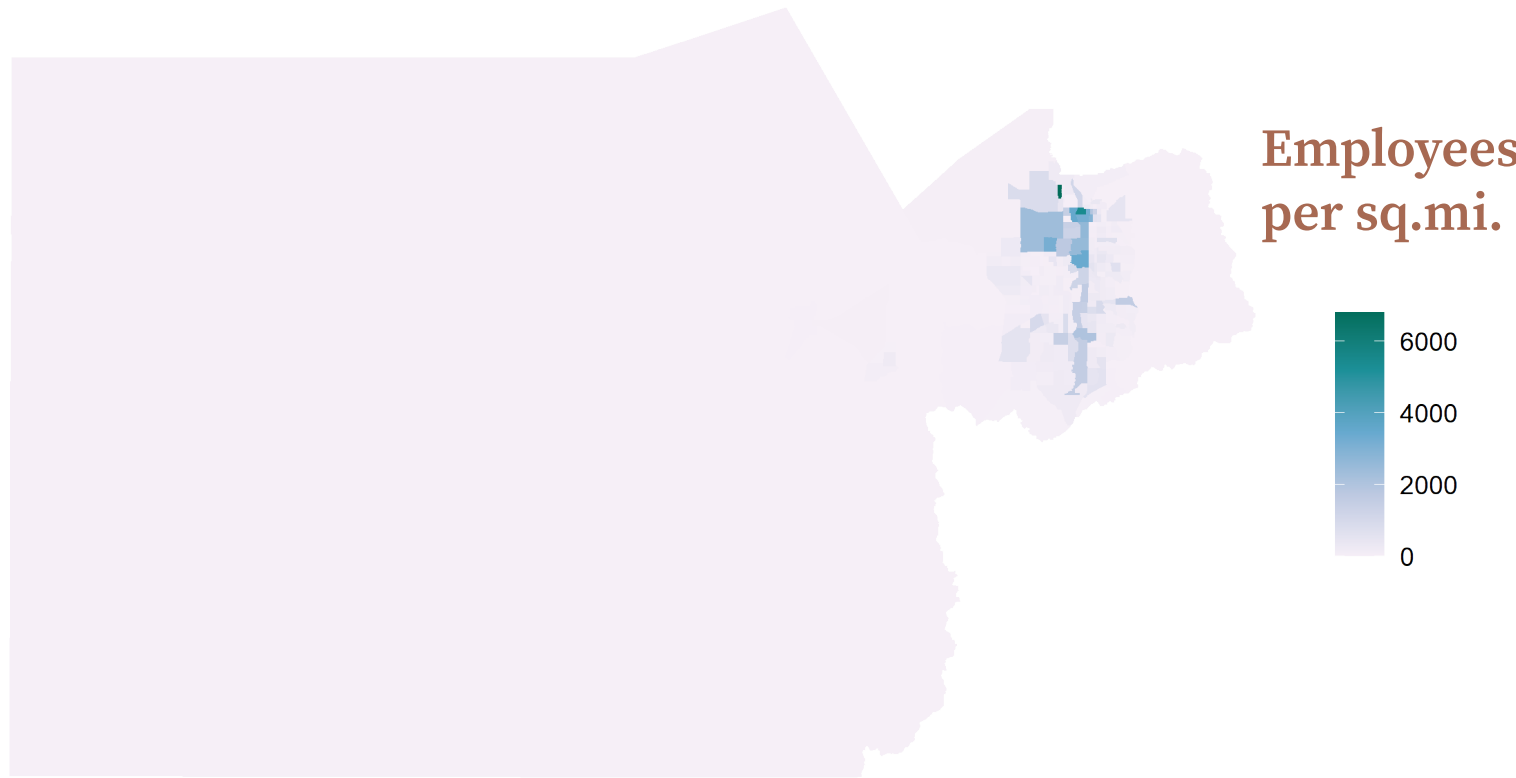**Fig. 8: Density of Basic Employees**
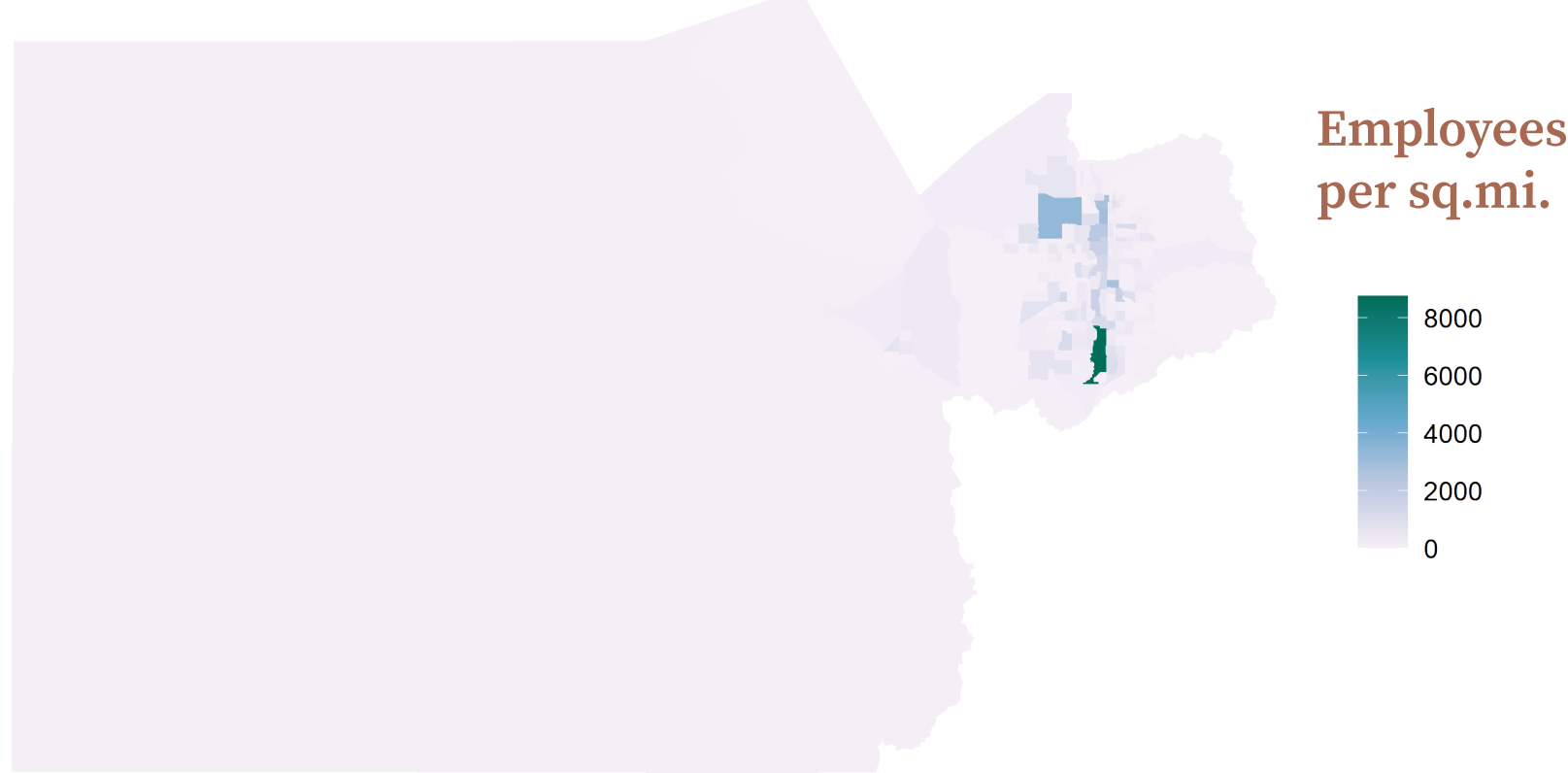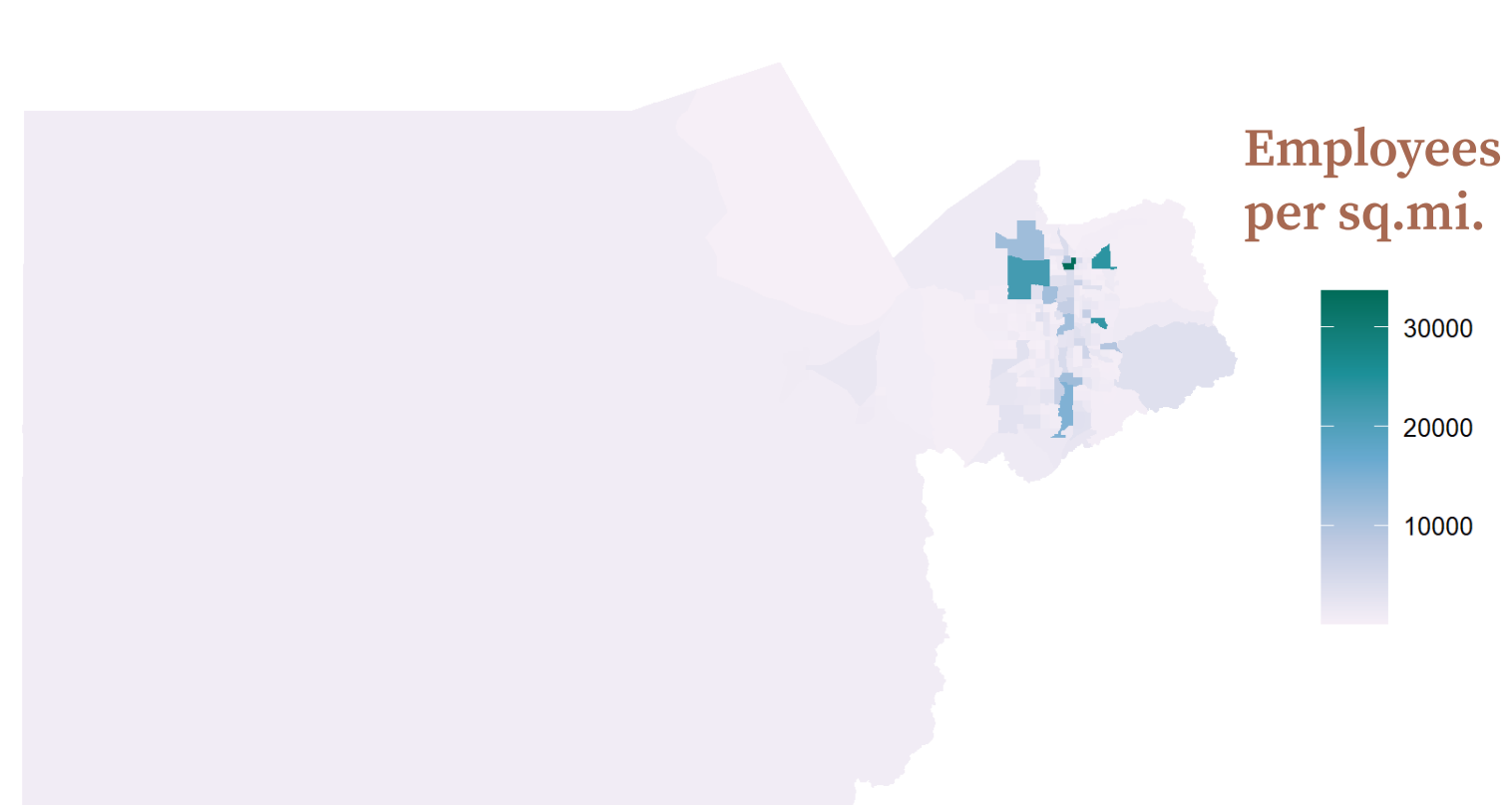

Fig. 9: Density of Retail Employees

Fig. 10: Density of Service Employees

THANK
YOU

CHARUVI BEGWANI
AIJING LI