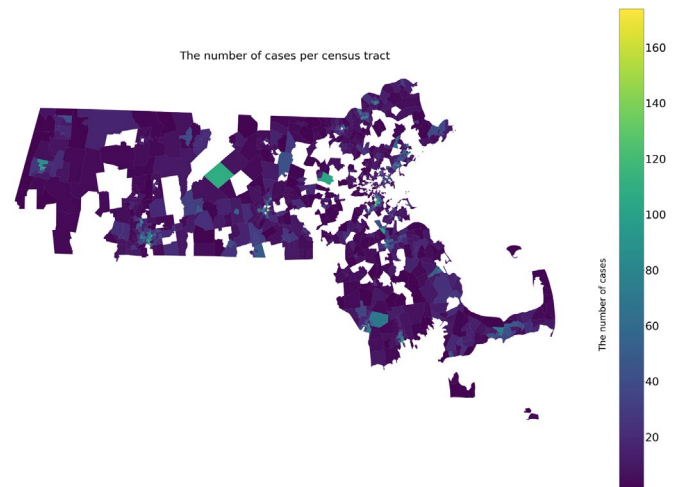# Distribution of clients in Massachusetts

The picture on the right shows how many cases there are in each census tract area in Massachusetts. The darker the color in the picture indicates the fewer cases in the area, and the lighter color indicates the more cases in the area. White indicates that there is no case in this area in the database. According to statistics, the area with the most cases is Census Tract 7327, Worcester County, Massachusetts, with 174 cases. On average, there are about 17 cases in each region of Massachusetts.
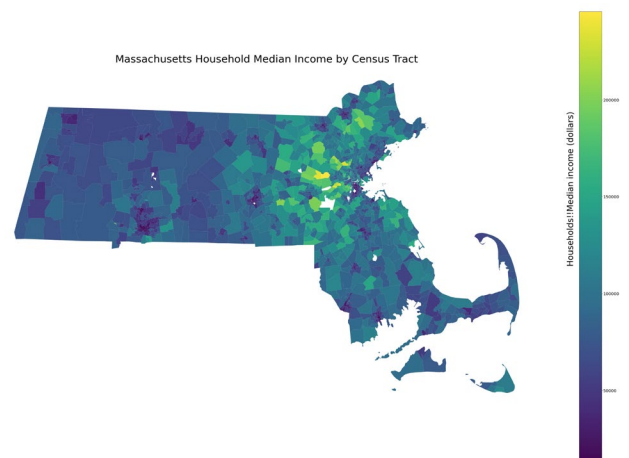
It can be seen from the figure that there are many cases in the central-eastern coastal areas (need to zoom in to see clearly). They are small in area, but the average number of cases in each area is higher than that in most parts of Massachusetts.

Analysis Overall Census Tract:
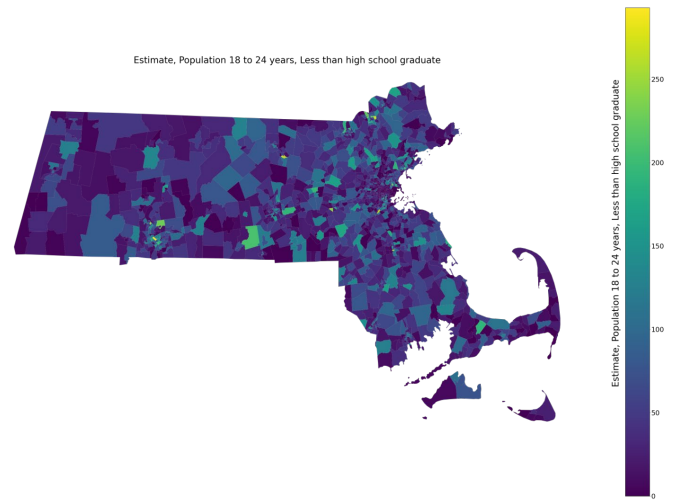
1. Income

The picture on the right is the heatmap of Massachusetts's household's median income in 2019. The darker the color, the lower the median income of the area; on the contrary, the lighter the color, the higher the median income of the area.

It can be seen from the figure that the household median income of eastern Massachusetts is relatively higher than that of the central and western regions.
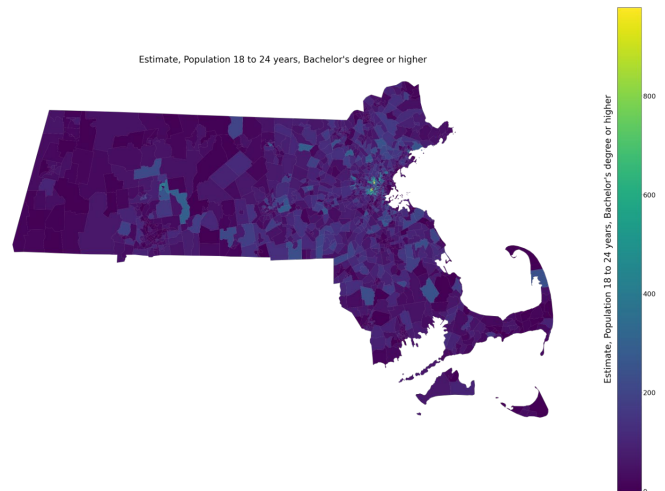
2. Education Attainment

Population 18 to 24 years old that have attained less than high school graduate in Massachusetts.
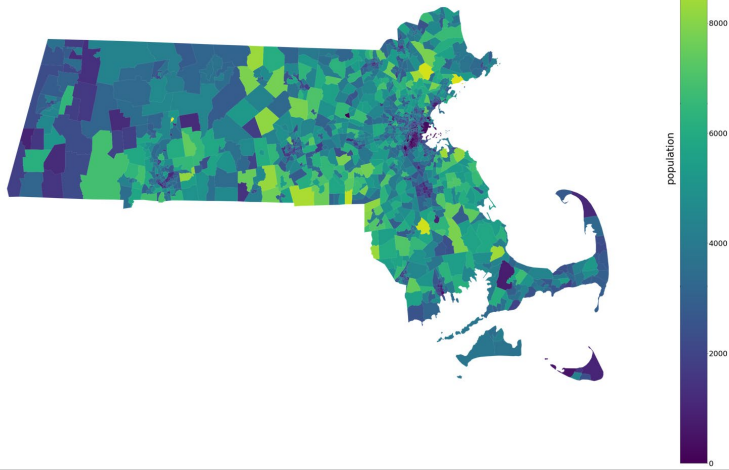

Estimate, Population 18 to 24 years, Less than high school graduate

Population 18 to 24 years old that have attained Bachelor's degree or higher in Massachusetts.

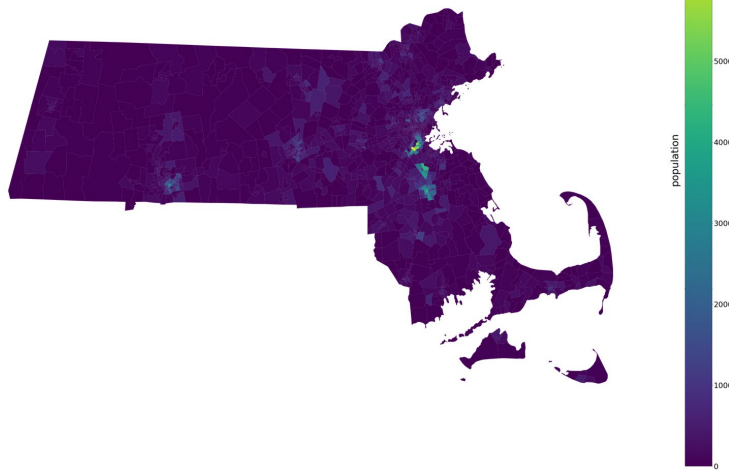Estimate, Population 18 to 24 years, Bachelor's degree or higher

3. Race

The following graphs are distributions of 5 different races in all census tracts. The lighter the color of a census tract, the more the population of that race in that census tract. The deeper the color of a census tract, the less the population of that race in that census tract.
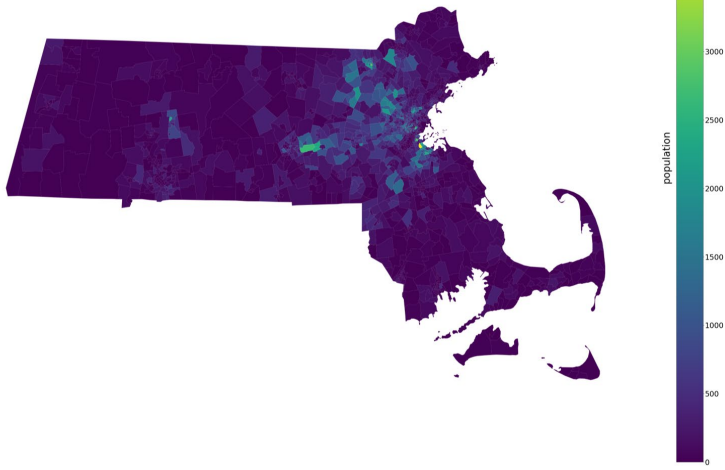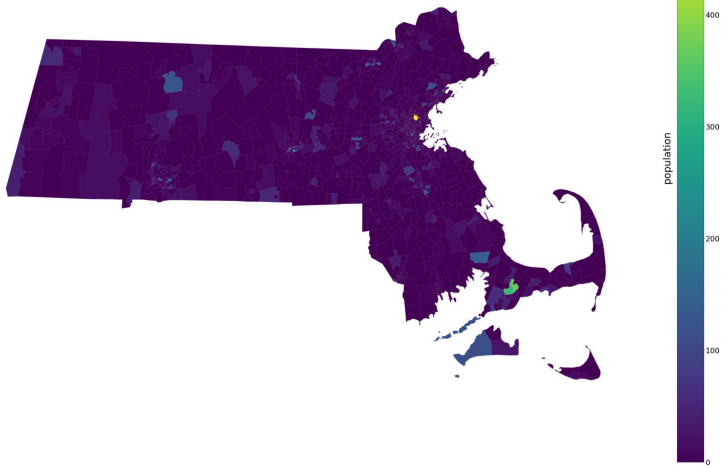
Massachusetts Race of White by Census Tract

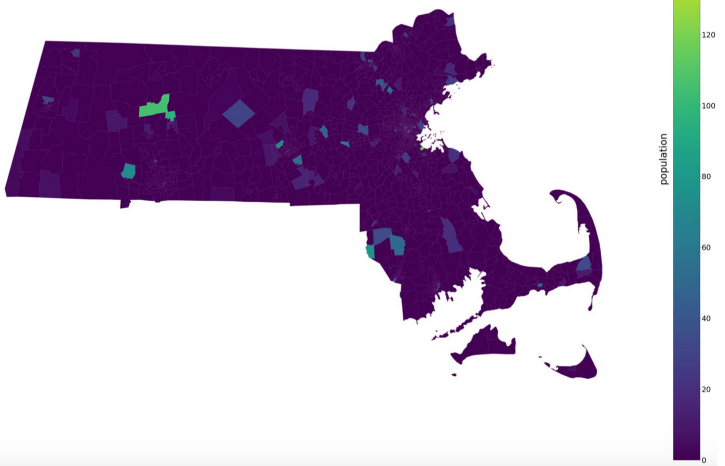Massachusetts Race of Black or African American by Census Tract

Massachusetts Race of Asian by Census Tract

Massachusetts Race of American Indian and Alaska Native by Census Tract

Massachusetts Race of Native Hawaiian and Other Pacific Islander by Census Tract
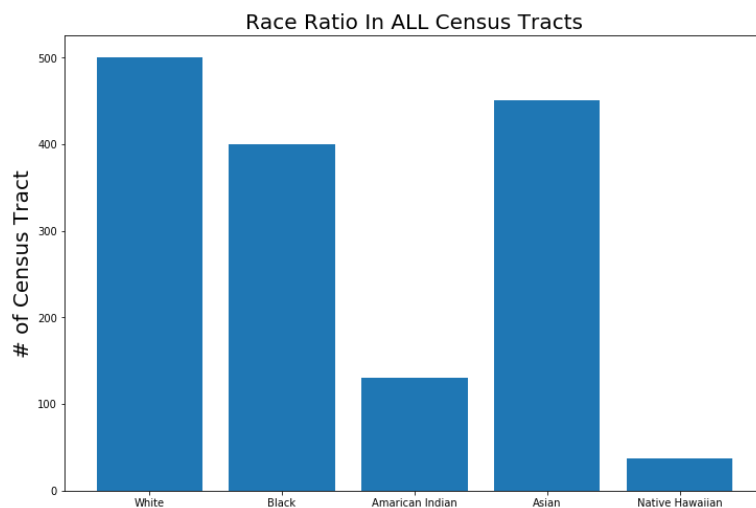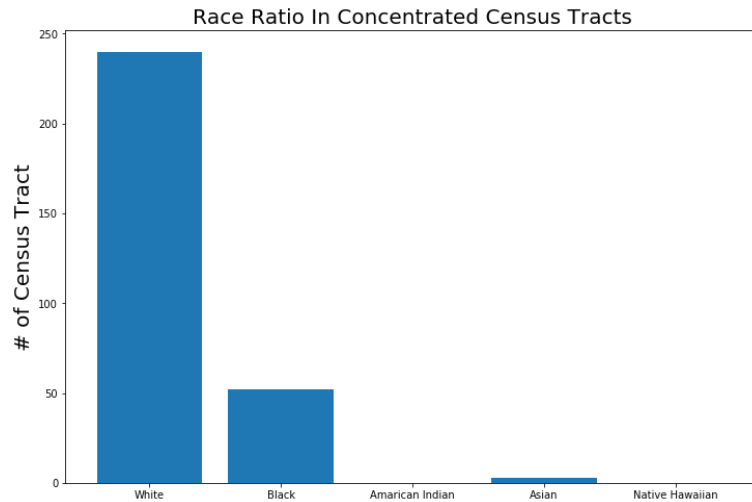
Concentrated Census Tract

We decided to select the top 20% of the most concentrated census tract as our analysis dataset, which covers about 60% of all cases.

1. Race

The following graphs are race ratio in all census tracts and race ratio in concentrated census tracts. We consider 5 races in a census tract. We label a census tract by the dominant race living in that census tract. The following bar graphs represent the number of census tracts of five different races.
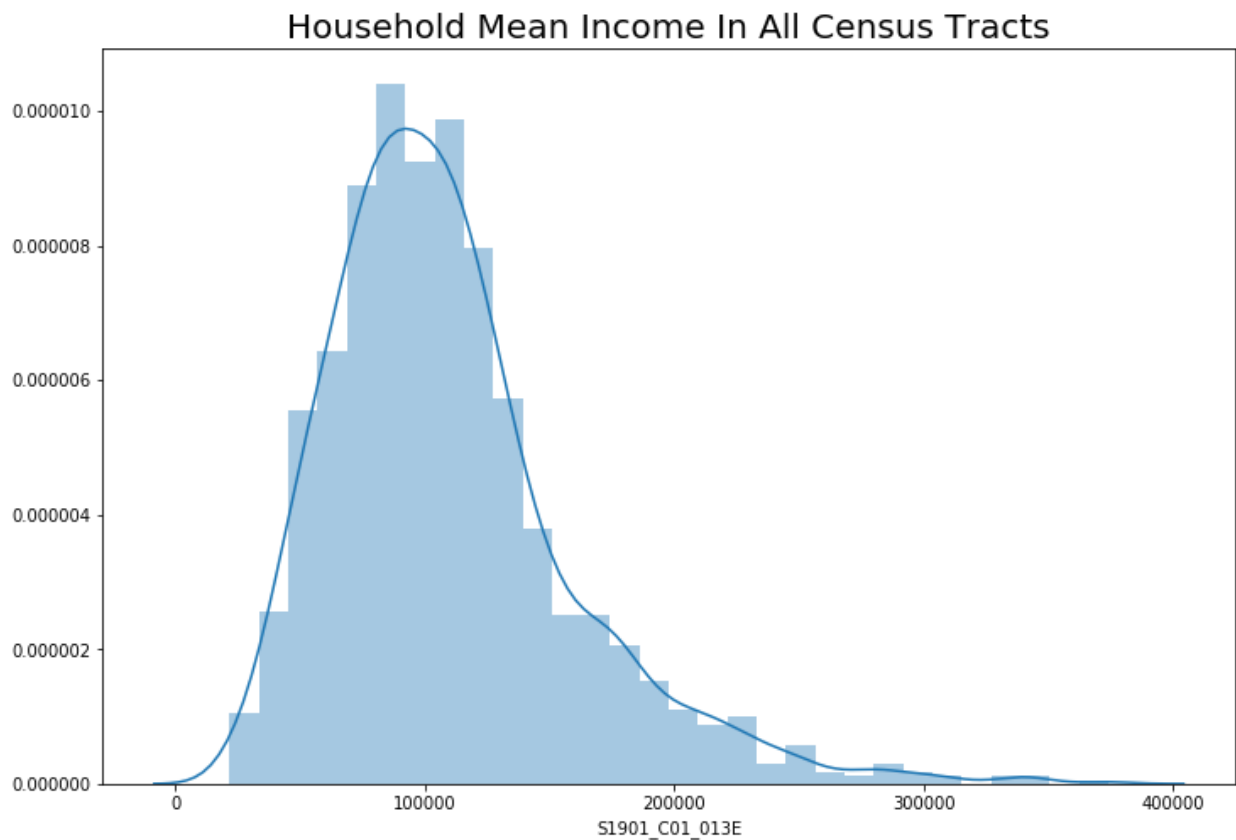

On the above graph, we can see that the white, black, and Asian census tracts are the most ones.
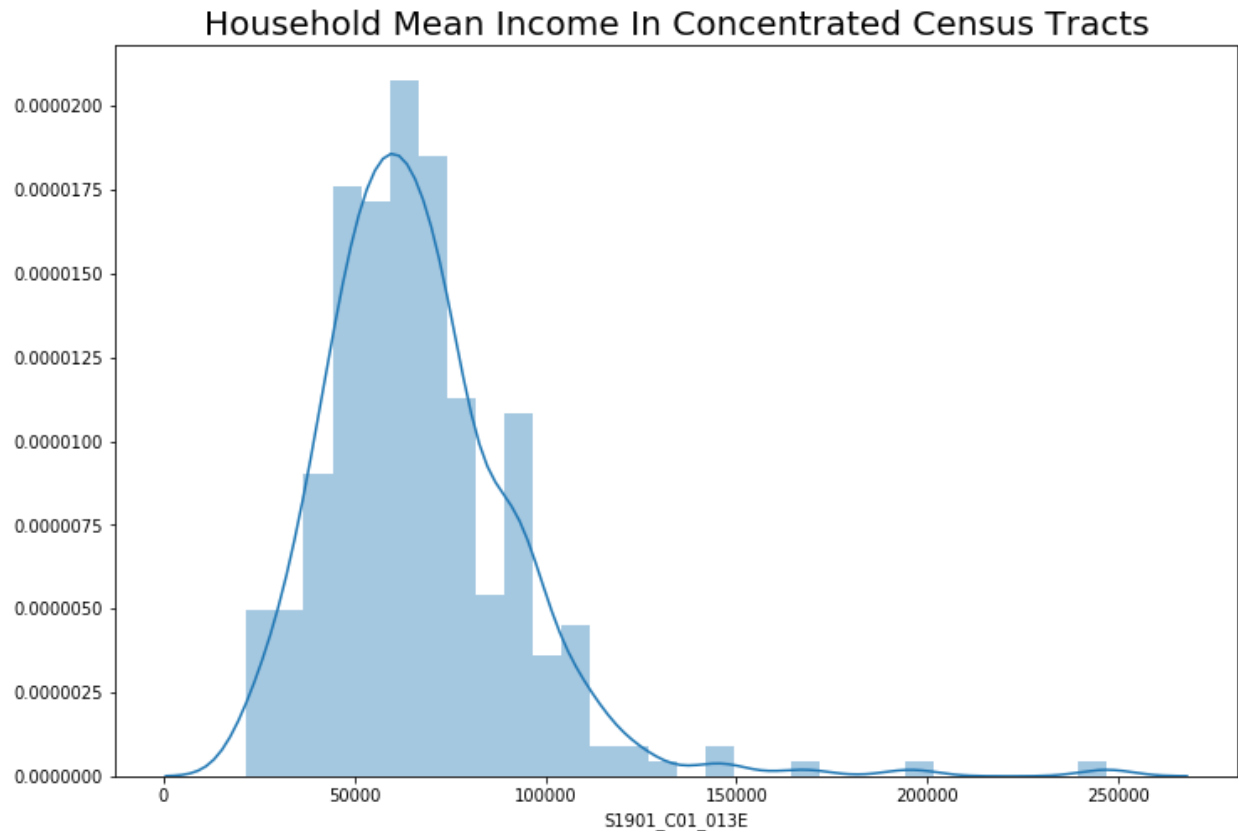
Race Ratio In Concentrated Census Tracts

On the above graph, which is only showing the concentrated census tracts. We can see that the census tracts with the most cases are white and black census tracts, but white census tract has a higher ratio than the previous graph.

2. **Income**

The following graph is the household mean income in all census tracts. We can see the most samples clusters around 100000.

Household Mean Income In All Census Tracts

The following graph is the household mean income in concentrated census tracts.

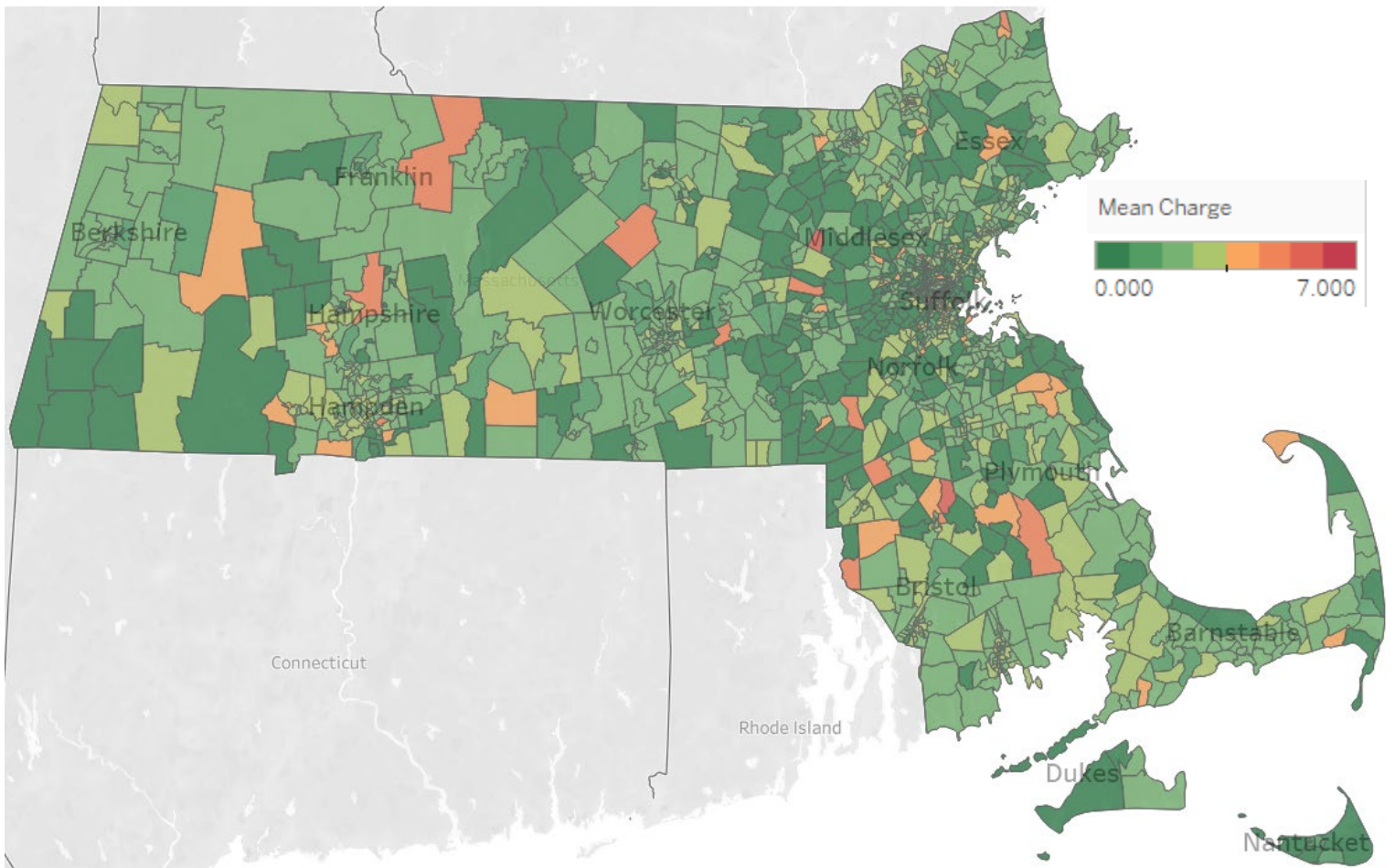

Household Mean Income In Concentrated Census Tracts

We can see that both graphs share that distribution, but there is a shift to the left on the household income in concentrated census tracts, which means that the concentrated census tracts tend to have a lower mean household income than the all census tracts.

Social Services

Here we tried to analyze whether the social services provided to the clients can produce better legal results on clients' cases. Based on our calculations, the average disposition code of cases with clients receiving social services is about 1.999, and the average disposition code of cases with clients NOT receiving social services is about 1.864. Therefore, the social services are working, although not in a significant amount. But such improvement could be magnified to a significant extent over a large population.

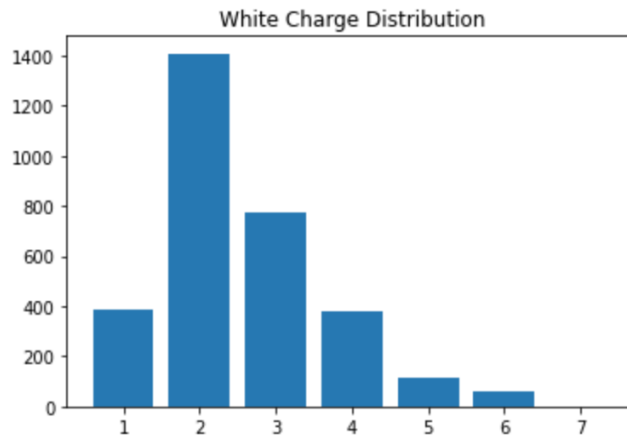# Charge level distribution by census tract area

The mean charge grid level for each census tract area is the mean of maximum charge grid leves of all cases that happened there.
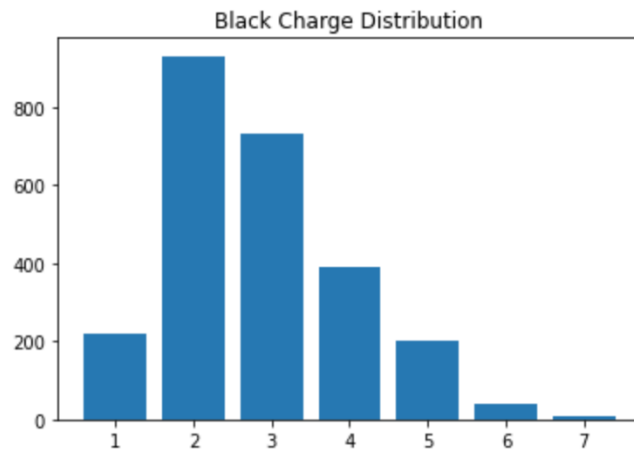
Charge level distribution by race

The vertical axis in each figure is the number of clients at a certain charge level, and the horizontal axis represents the charge grid level. If one client or one case has multiple charge levels, we use the maximum one.
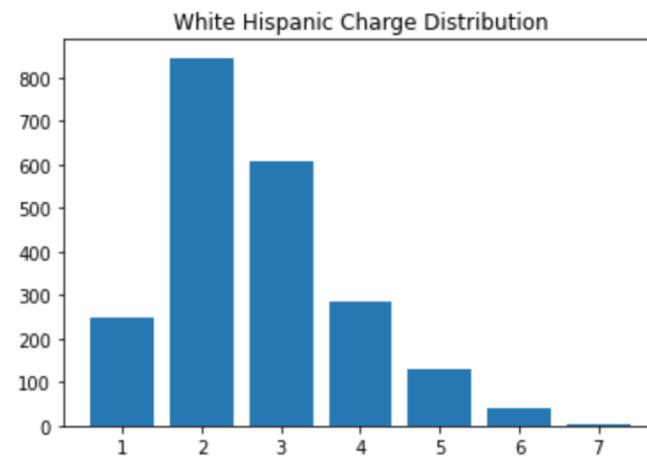
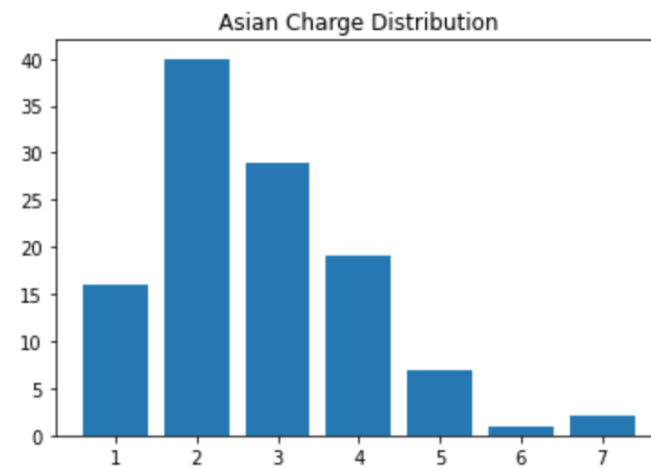**White**: Toral: 3129   Average: 2.557   Distribution: [388, 1408, 774, 382, 116, 59, 2]

Black: Toral:2522   Average: 2.834   Distribution: [220, 931, 731, 389, 200, 41, 10]
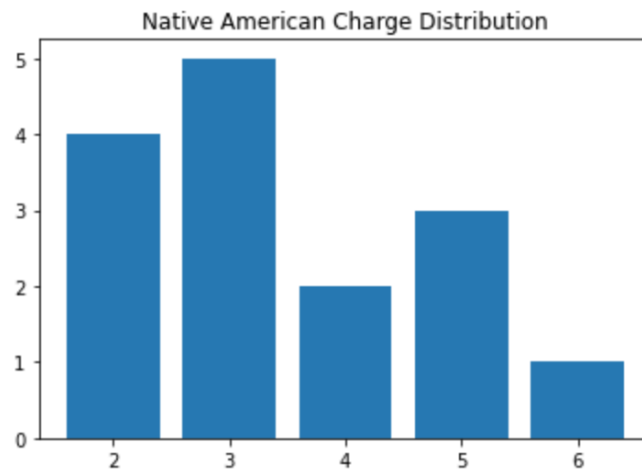
White Hispanic: Toral:2162   Average: 2.696   Distribution: [247, 846, 609, 285, 130, 42, 3]

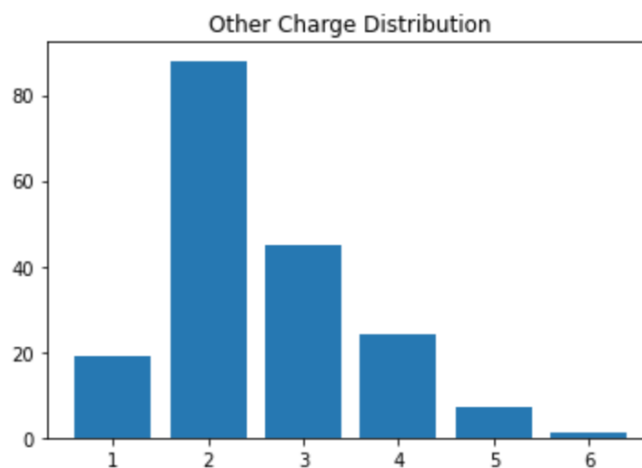**Asian**: Toral:114   Average: 2.754   Distribution: [16, 40, 29, 19, 7, 1, 2]

Native American:Toral:15   Average: 3.467   Distribution: [0, 4, 5, 2, 3, 1, 0]

Native American Charge Distribution

Other: Toral:184   Average: 2.538   Distribution: [19, 88, 45, 24, 7, 1, 0]
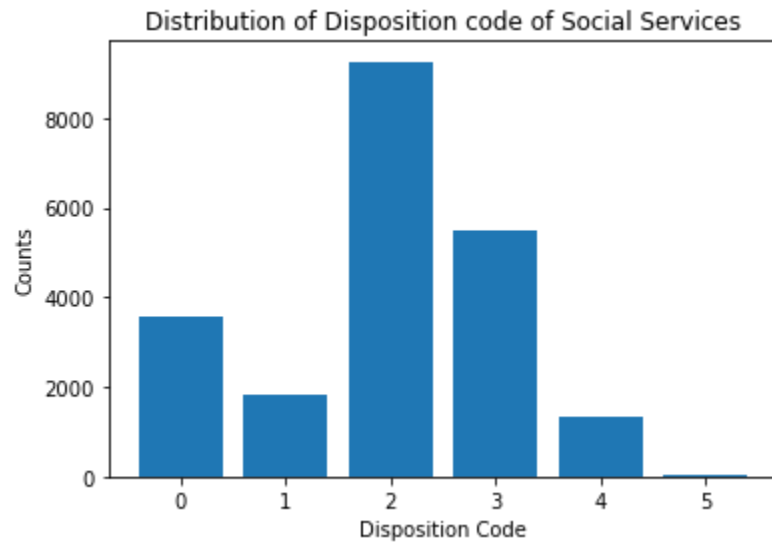

Other Charge Distribution

Summary:

By drawing the charge grid level distribution of each race, through observation, we can conclude that the charge grid level distribution between different races is not obviously related to race.

Among the 5 race clients, the lowest average charge grid level is the White client, with an average of 2.557; the highest average charge grid level is the Native American client, with an average of 3.467, but there are only 15 Native American clients in the database, so we think this average value for the Native American may be not persuasive; secondly, the Black clients have the second highest charge grid level, with an average of 2.834.
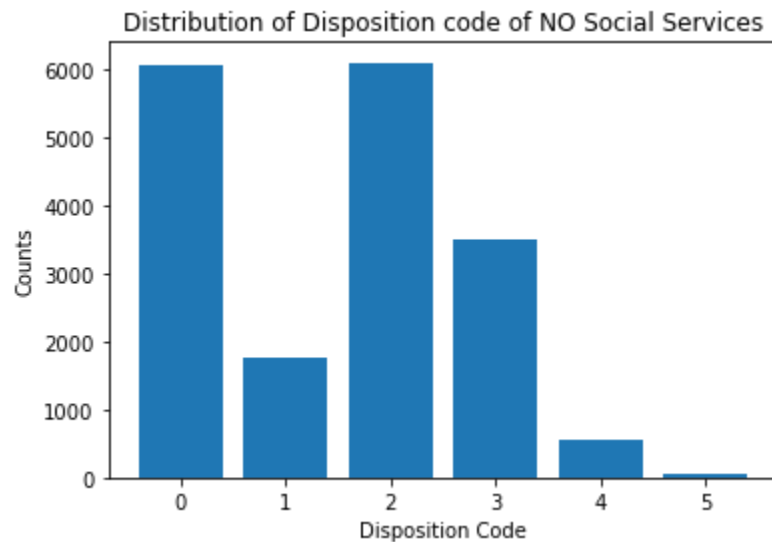
Social Services and Dispositions

First, the following is the distribution of dispositions over all clients. The x-axis represents disposition code 1-5, and 0 means null or n/a. The y-axis represents the number of clients.

Clients receiving social services. **Distribution**: [3569, 1845, 9252, 5474, 1327, 58] **Total**: 21525

Clients NOT receiving social services. **Distribution**: [6053, 1771, 6100, 3487, 556, 44] **Total**: 18011
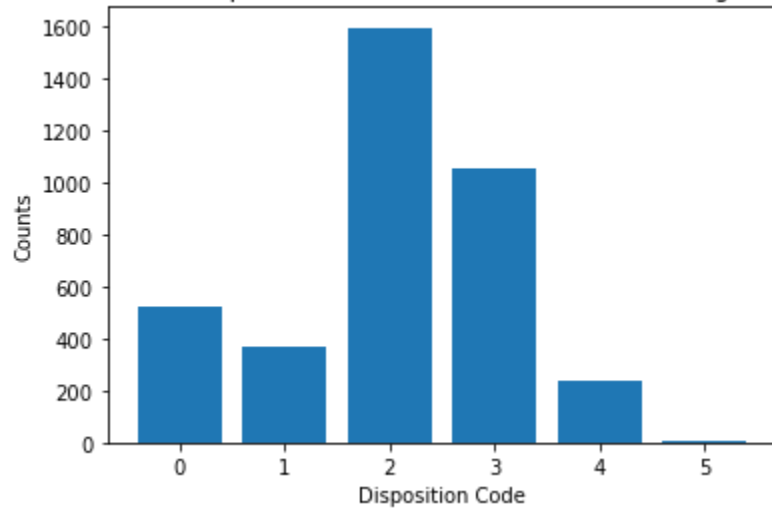

Second, we try to figure out whether there is a difference in distributions between different charge levels that clients received. The following tables are separated by seven charge levels 1-7, and for each charge level, the distributions of receiving social services and not receiving social services are shown.
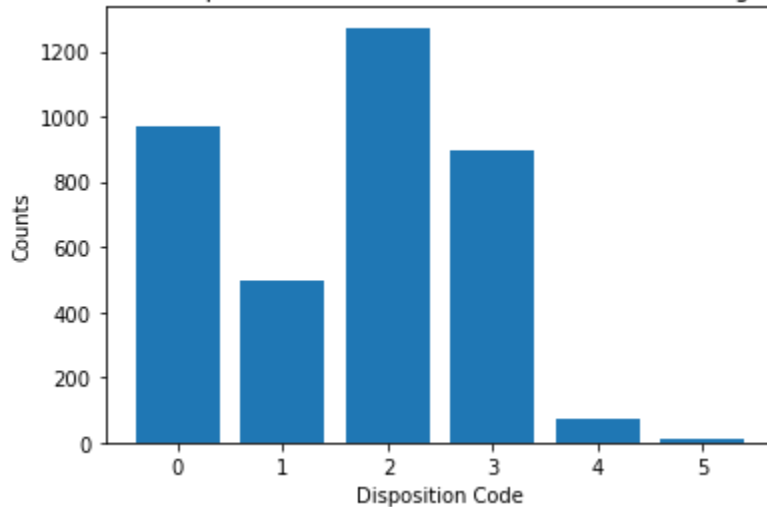
For charge level one:

Clients receiving social services. **Distribution**: [523, 368, 1597, 1055, 234, 6] **Total**: 3783

Distribution of Disposition code of Social Services On Charge Level One

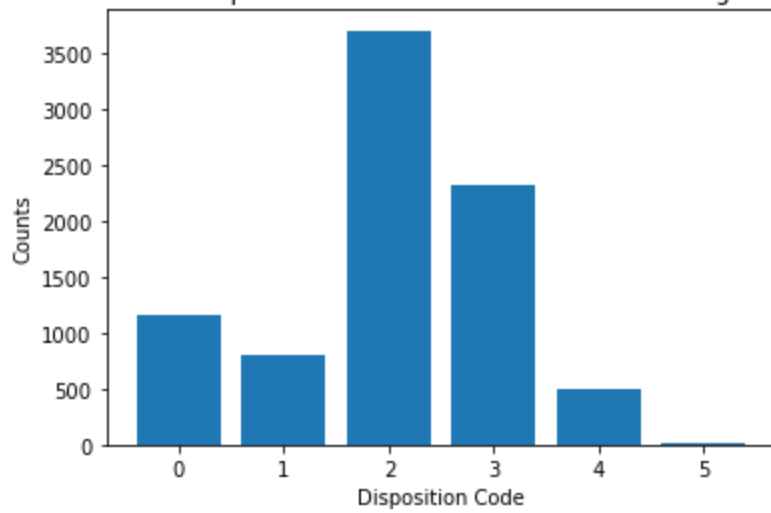Clients NOT receiving social services. **Distribution**: [969, 496, 1273, 894, 73, 8] **Total**: 3713

Distribution of Disposition code of NO Social Services On Charge Level One
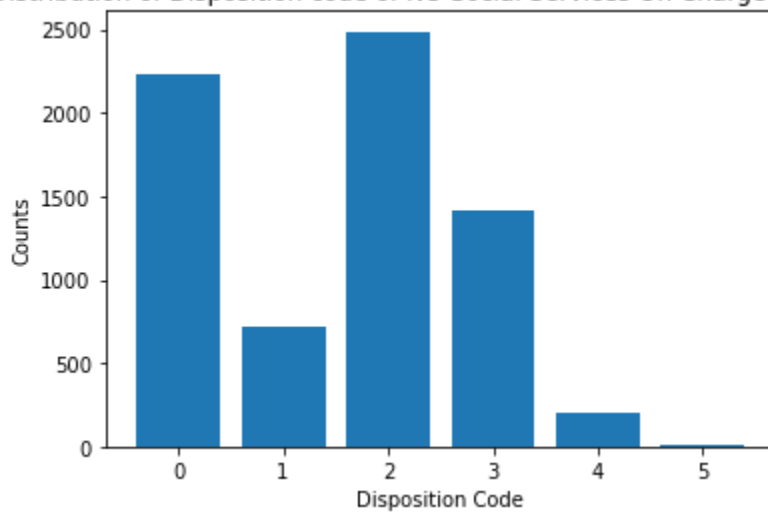
For charge level two:

Clients receiving social services. **Distribution**: [1156, 808, 3707, 2315, 491, 13] **Total**: 8490

Distribution of Disposition code of Social Services On Charge Level Two

Clients NOT receiving social services. **Distribution**: [2229, 717, 2487, 1414, 203, 13] **Total**: 7063
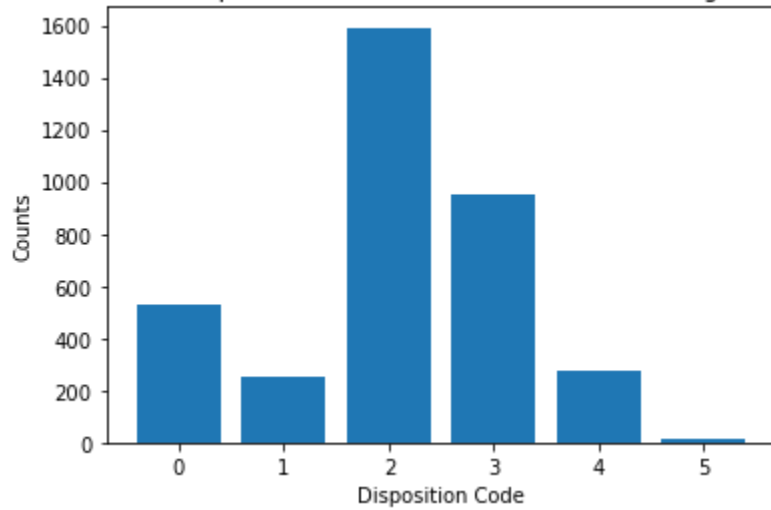
Distribution of Disposition code of NO Social Services On Charge Level Two

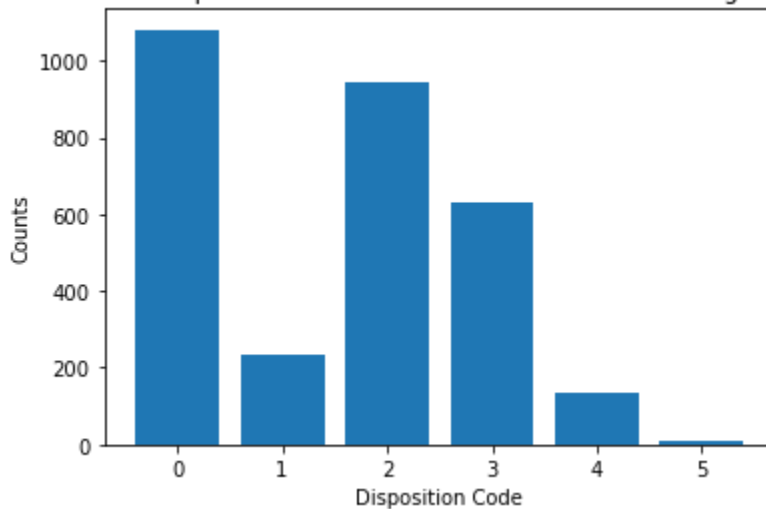**For charge level three:**

Clients receiving social services. **Distribution**: [527, 250, 1591, 954, 272, 15] **Total**: 360

Distribution of Disposition code of Social Services On Charge Level Three

Clients NOT receiving social services. **Distribution**: [1081, 233, 943, 631, 133, 11] **Total**: 3032
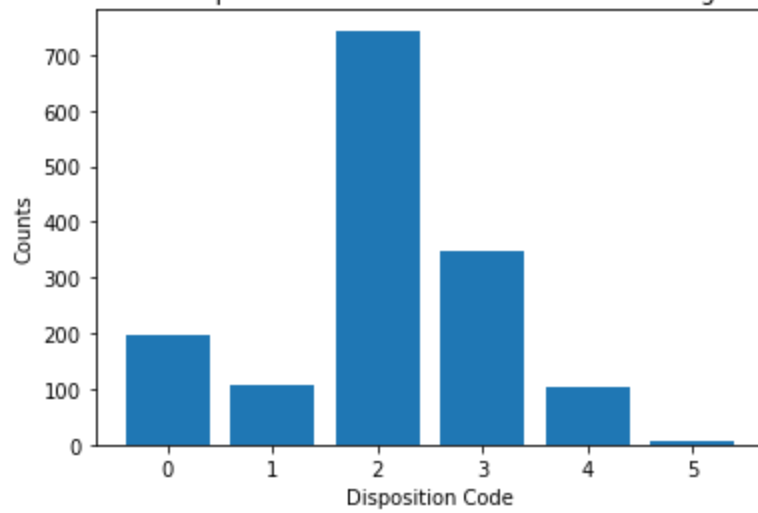
Distribution of Disposition code of NO Social Services On Charge Level Three
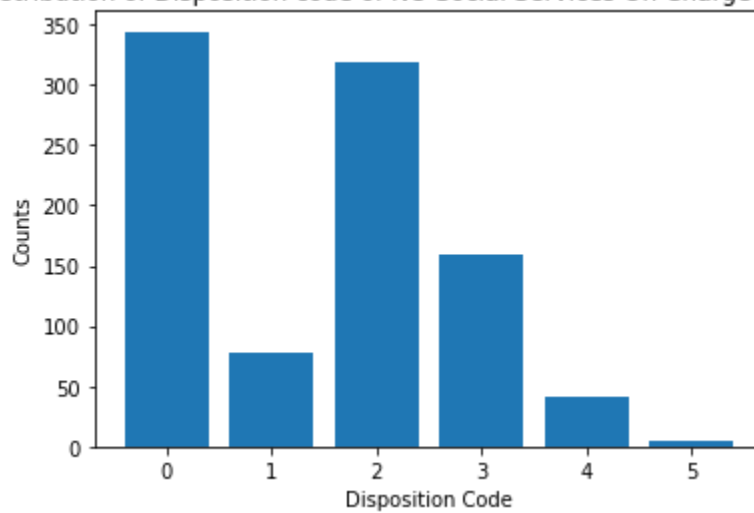

For charge level four:

Clients receiving social services. **Distribution**: [197, 106, 744, 346, 105, 7] **Total**: 1505

Distribution of Disposition code of Social Services On Charge Level Four

Clients NOT receiving social services. **Distribution**: [344, 78, 318, 159, 42, 5] **Total**: 946
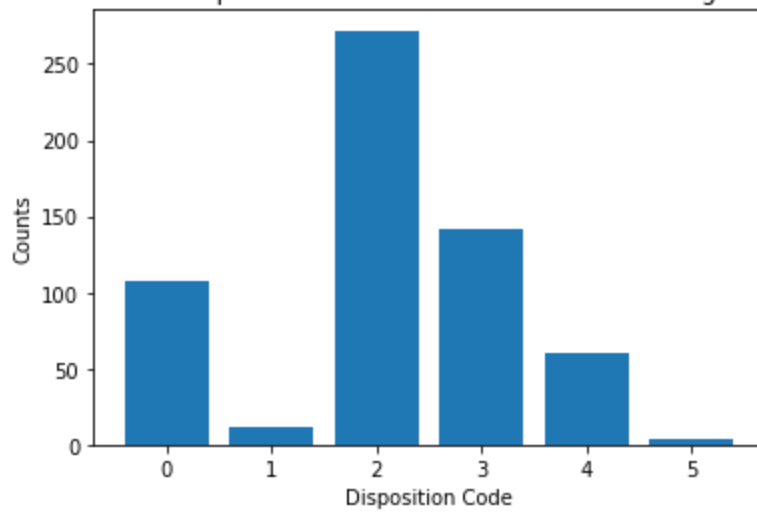
Distribution of Disposition code of NO Social Services On Charge Level Four
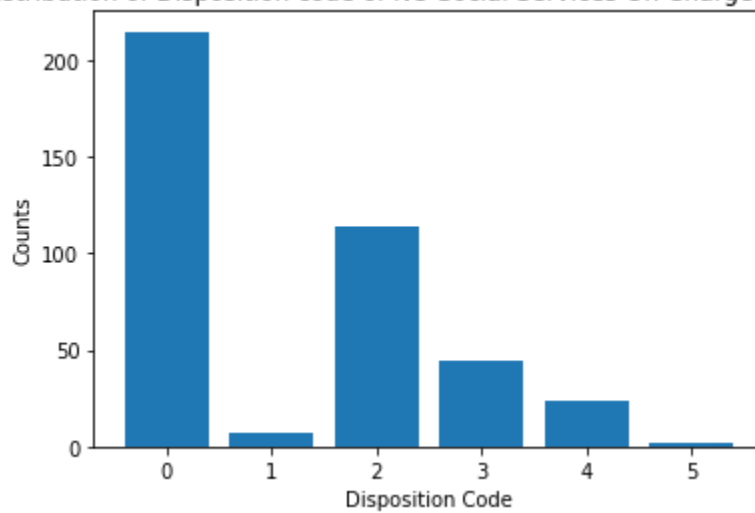

For charge level five:

Clients receiving social services. **Distribution**: [108, 11, 272, 141, 60, 4] **Total**: 596

Distribution of Disposition code of Social Services On Charge Level Five

Clients NOT receiving social services. **Distribution**: [215, 7, 114, 44, 24, 2] **Total**: 406
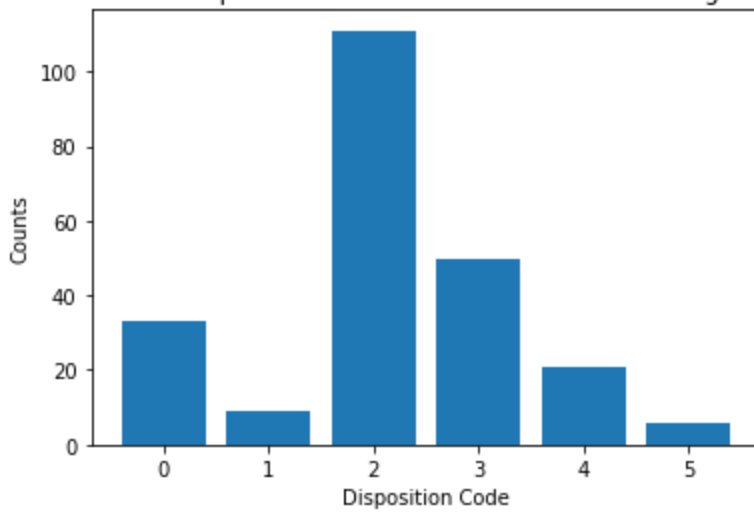

Distribution of Disposition code of NO Social Services On Charge Level Five
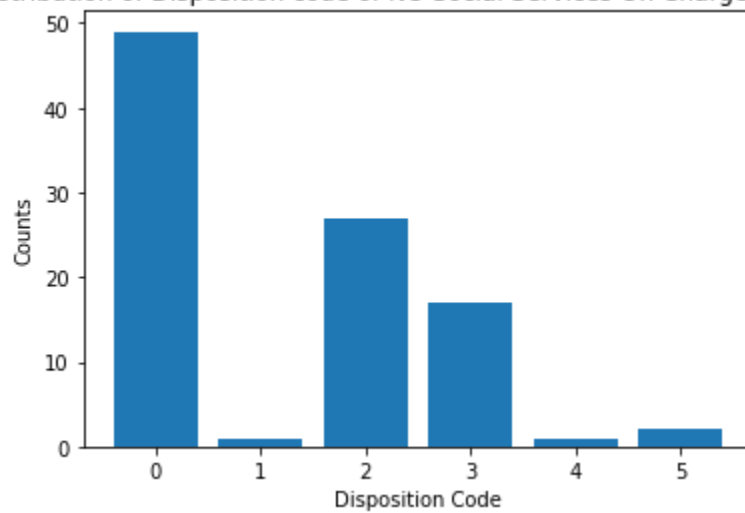
For charge level six:

Clients receiving social services. **Distribution**: [33, 9, 111, 50, 21, 6] **Total**: 230

Distribution of Disposition code of Social Services On Charge Level Six

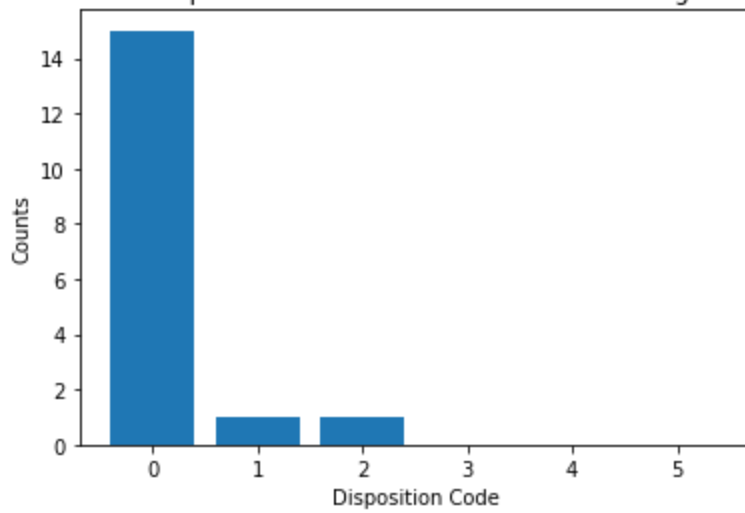Clients NOT receiving social services. **Distribution**: [49, 1, 27, 17, 1, 2] **Total**: 97

Distribution of Disposition code of NO Social Services On Charge Level Six

For charge level seven:

Clients receiving social services. **Distribution**: [15, 1, 1, 0, 0, 0] **Total**: 17

Distribution of Disposition code of Social Services On Charge Level Seven

Clients NOT receiving social services. **Distribution**: [3, 0, 0, 0, 0, 1] **Total**: 4

Distribution of Disposition code of Social Services On Charge Level Seven