

Luke Salamone

Simon Benigeri

Renpin Luo

Checkpoint 3: Interactive Visualization

Our group produced an interactive histogram visualization. This visualization shows salaries and allegations for Police Officers during the period 2007-2015, inclusive. The histogram can be filtered by confounding factors like race, gender, and number of allegations obtained during that period, and number of sustained allegations obtained during that period.

In the README.md and in this report, we link to the D3 Visualization notebook, where you can see the visualization and the code. We also identify the sql file containing the SQL queries used to get the data and the csv file containing the data.

Histogram view of salaries and allegations for Police Officers

Visualization: [histogram-officer-salaries](#)

Script: histogram.sql

Data: histogram.csv

Context

For the CPD to function as intended, the incentive system needs to be aligned with the public interest. Given the CPD record of misconduct, the existence of phenomena such as the “blue wall of silence”, and the appearance of impunity for misconduct within the force, we suspected that salaries increased with levels of misconduct. Therefore, we created an interactive histogram visualization of salaries and allegations, and included filters for some confounding factors like race and gender.

We understand that many factors go into career advancement: successes, failures, misconduct, race, gender, unit, visibility of one's work, network, etc. These factors are likely to impact salary. Also, we understand that police officers get yearly cost of living raises and we will account for that in our analysis.

The data

We queried the CPD database for officer ids and their respective salaries for each year in the period 2007-2015. Again, we chose this period because it is the one for which the dataset is the most complete.

So for each officer id, we have a row for each year and the corresponding salary.

Given these officer ids, we fetched the corresponding gender and race.

Given these officer ids and the year, we fetched the number of allegations and sustained allegations to this date.

How does salary vary with the number of allegations?

The distribution of salaries for officers with no allegations is shifted to the left compared to the distribution of salaries for officers with any number of allegations.

We note that the tails of the distribution of salaries for officers with no allegations are fatter and longer than the tails of the distribution of salaries for officers with any number of allegations. In other words. Most of the highest paid officers in the force have no allegations. We see this at salaries greater than \$95 000. We also note that for no allegations, we have some of the least paid officers. This may be because they are just starting out in the force and salary increases over time.

For officers with 1 or more allegations, the distribution of salaries is similar to the distribution of salaries for any number of allegations. The same is true as we increase the minimum number of allegations.

We conclude from this visualization that there is no significant relationship between allegations and salary. These results do not seem to vary significantly with gender or race.

How does salary vary with the number of sustained allegations?

As the number of sustained allegations increases, it appears that the distribution of salaries shifts right as well. This indicates that officers with more sustained allegations are being paid more and may suggest that misconduct is being indirectly rewarded within CPD.

In the future we would like to extend our analysis to filtering by additional minimum numbers of sustained allegations (as of now we support one or more, two or more, three or more, and four or more sustained allegations) to see whether the positive correlation between pay and number of sustained allegations continues to hold for increasing numbers of allegations. It may be the case, for example, that pay continues to trend upward for three and four sustained allegations, but after 5 sustained allegations the department begins to enforce financial consequences.

Trend between salary and race or gender

The mean salary for all officers is \$76,495. The mean salary among white officers is \$76,519. The mean salary among black officers is \$77,206, slightly higher than for white officers.

The mean salary for male officers is \$76,515. For women is \$76,432, slightly lower. So there are slight trends in salaries in favor of black male officers, but not very significant.

Future Research:

We believe that the link between allegations and salaries should be further investigated because of its potential to provide insight in the causes of police misconduct. If possible, one interesting path forward would be to include the number of hours worked in this data visualization. There may be a significant relationship between hours worked and the number of allegations, as well as a significant relationship between hours worked and officer salary.

Our visualization yielded some interesting results. For example, there is a significant relationship between sustained allegations and salary. We can reduce the uncertainty in our results caused by confounding factors by including these factors in our visualization. In this case, the number of hours worked would be another slider, like number of allegations and number of sustained allegations.

Of course, we can use the same approach for other confounding factors, such as unit, visibility, or the nature of one's work.

When we looked at career timelines for doppelgangers we reduced the number of confounding factors, but also the sample size. Perhaps for this visualization of officer salaries and allegations, we can make the same histogram by unit, in particular, for units 1-25