

# Washington State Fatal Crash Analysis



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# Data Source



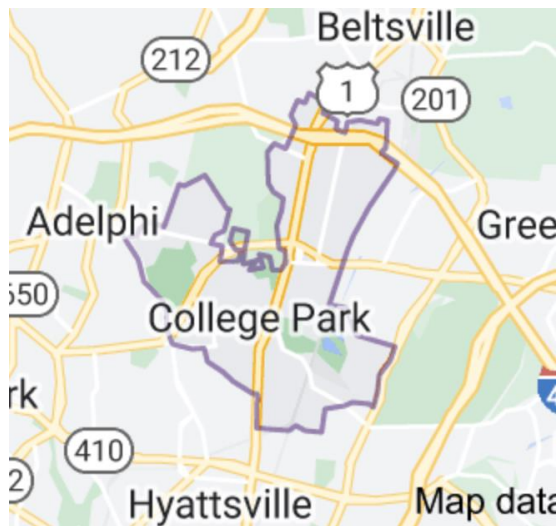
The Washington Coded Fatal Crash (CFC) Data from WTSC and their traffic safety partners .

Data includes:

- Location
- Traffic Condition
- Driver Information
- Damage and Rescue



# ≡ Data Process



20781

# ≡ Data Process



- Drive Off Road
- Control/Traction Loss
- Avoid Collision with Vehicle, Pedestrian, Animal
- Parked Vehicle
- Other (Single Driver)



Crash Type Category:  
Single Driver

# ≡ Data Process

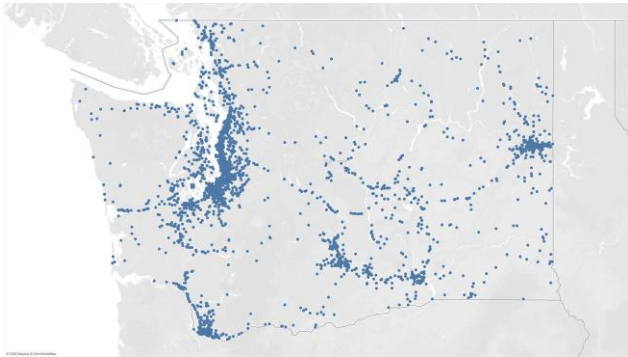


- “Impaired by Alcohol, Drugs, Meds” labeled 5 from 2003–2009
- “Under the Influence of Alcohol, Drugs or Medication” labeled 15 after 2009

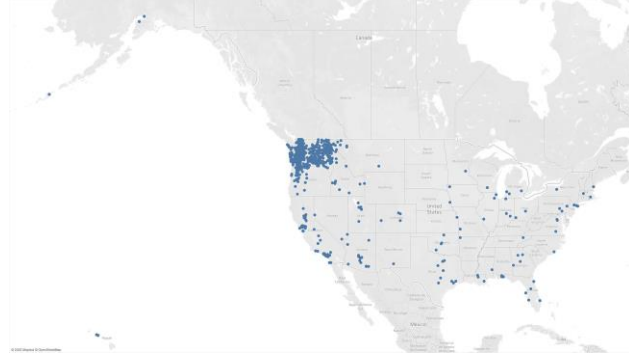


Driver Behavior Factor:  
Physical/Mental  
Condition

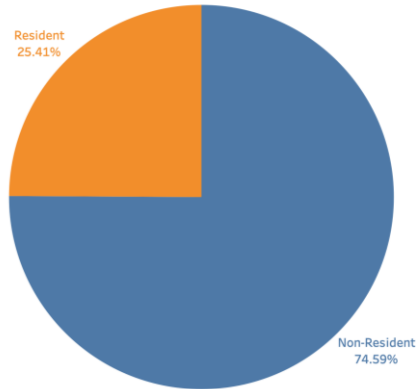
## ≡ Accidents 🔍



## ≡ Drivers' Addresses



# Question



Non-resident drivers shows a much higher percentage in fatal accidents.

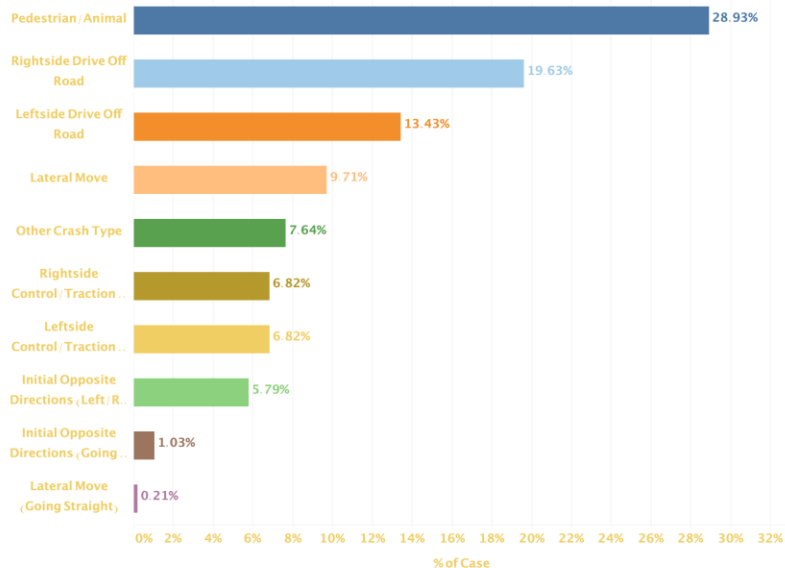
WHY?



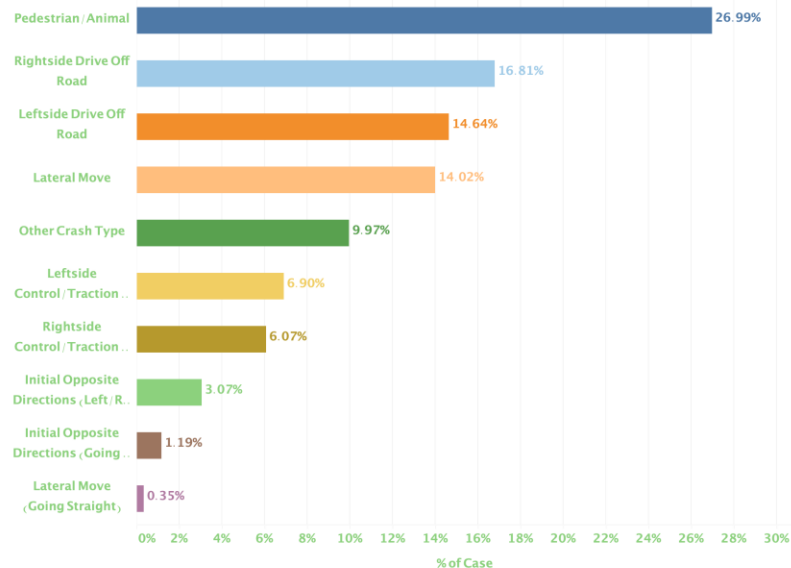
# Resident VS. Non-resident



Top 10 Crashtype among Residents



Top 10 Crashtype among Non-Residents





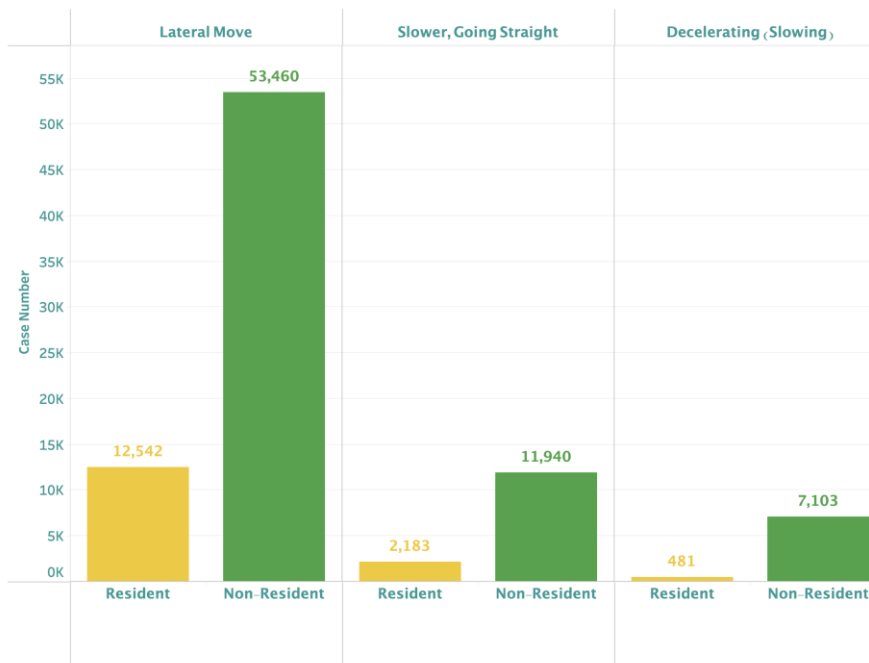


# Resident VS. Non-resident



- The chart shows the proportion of fatal accidents by crash categories, in resident and non-resident drivers separately.
- The largest difference of case proportion appears in the crash types Lateral Move (Left/Right), Decelerating (Slowing), and Slower, Going Straight.

Top 3 Crashtype Difference between Residents and Non-Residents

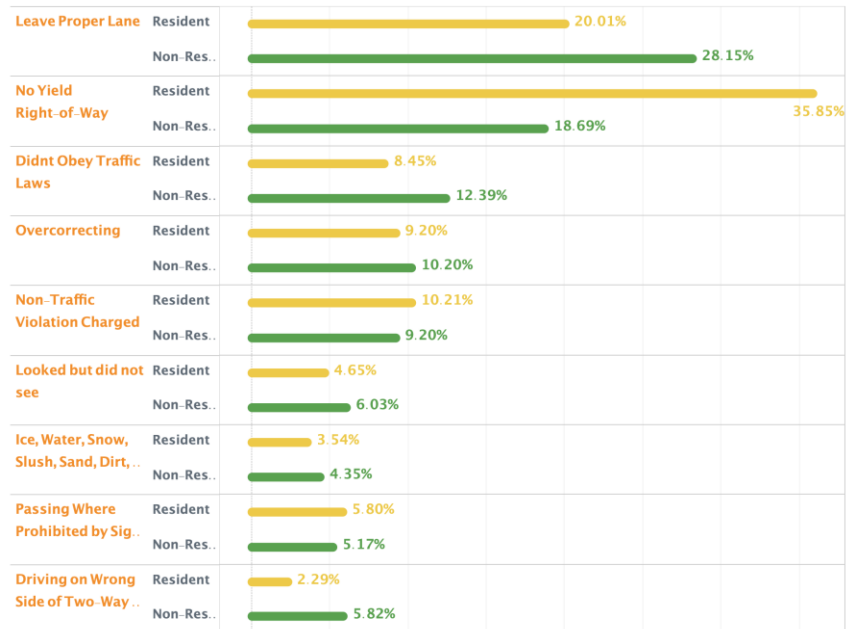


# ≡ Resident VS. Non-resident



- The chart shows the proportion of fatal accidents by behavior factors, in resident and non-resident drivers separately.
- Compared to resident drivers, non-resident drivers are much more likely to encounter fatal accidents with leave proper lane.

Driver Factor Performance on Residents and Non-Residents

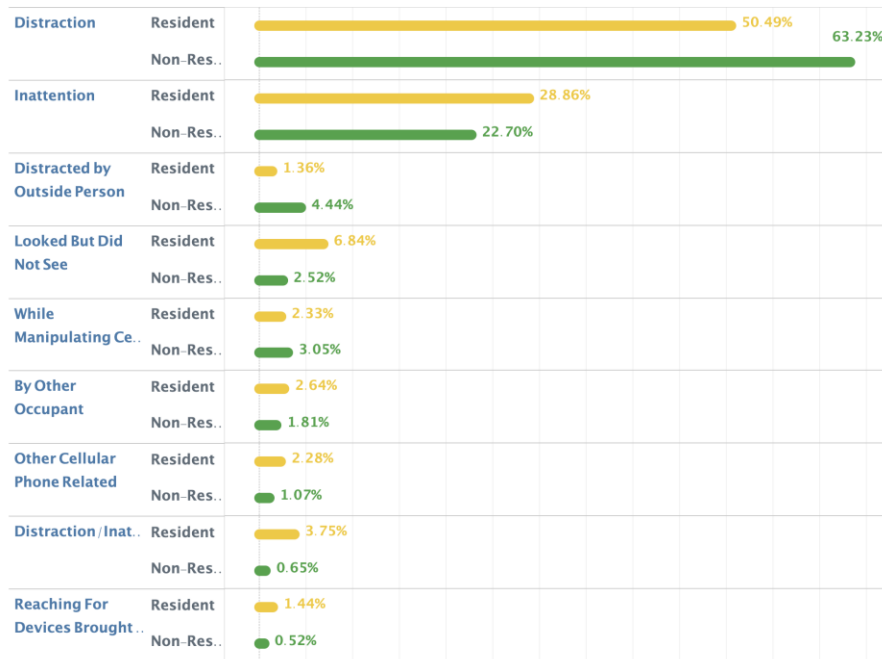


# Resident VS. Non-resident

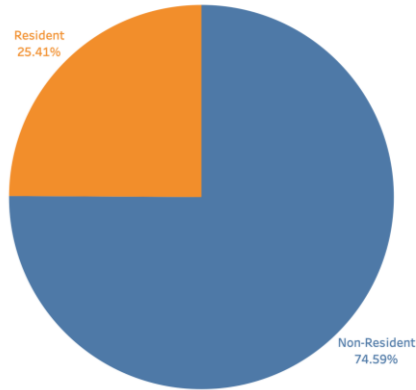


- The chart shows the proportion of fatal accidents by distraction factors, in resident and non-resident drivers separately.
- Compared to resident drivers, non-resident drivers in accidents are more likely to be involved with inattention, looked but did not see, distracted by outside person, talking or listening to phone, and eating or drinking.

Residents and Non-Residents's Difference in Distractor Reason



# Conclusion



Why non-resident drivers shows a much higher percentage in all fatal accidents?

- Unfamiliar with local traffic can lead to frequent lateral move, deceleration and leaving improper lane. This could be the main reason of such high fatal accident percentage.
- Distraction might be another reason for accidents with non-resident drivers.

# ≡ Question



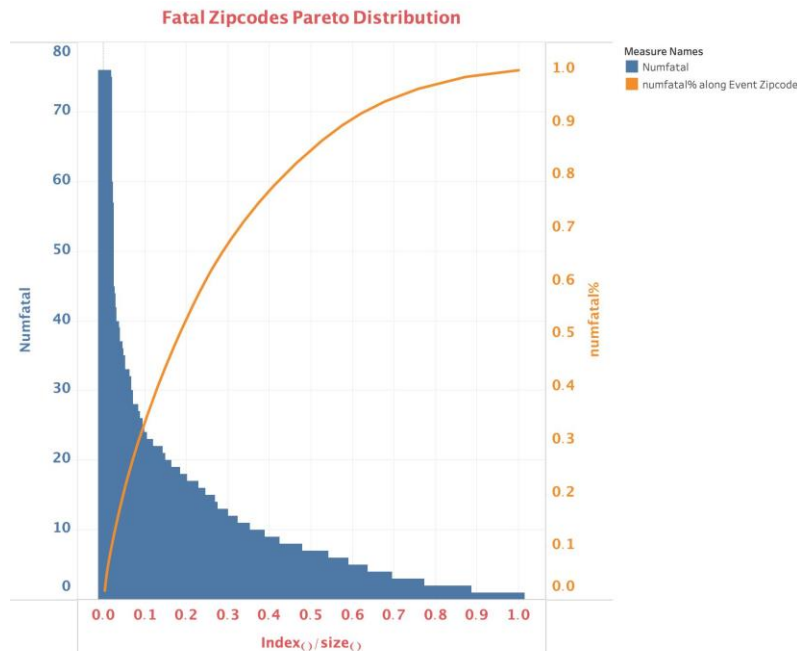
Is there any region that tend to produce higher-risk drivers that are involved in fatal crashes at a higher rate?



# ≡ Region with high-risk Drivers?



- The distribution of case proportion across zip codes is similar to Pareto distribution.
- Few areas account for most of the risky drivers.



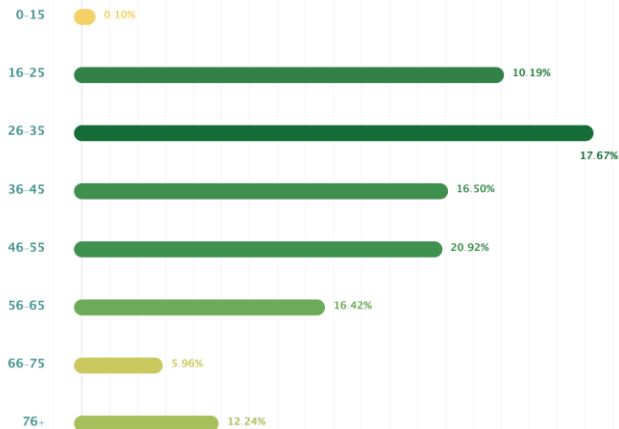
$\text{Index}_{(j)} / \text{size}_{(j)}$  vs. Numfatal and numfatal% along Event Zipcode. Color shows details about Numfatal and numfatal% along Event Zipcode. Details are shown for Event Zipcode.



## Drivers In High-risk Area



Driver Age Distribution among Risky Area



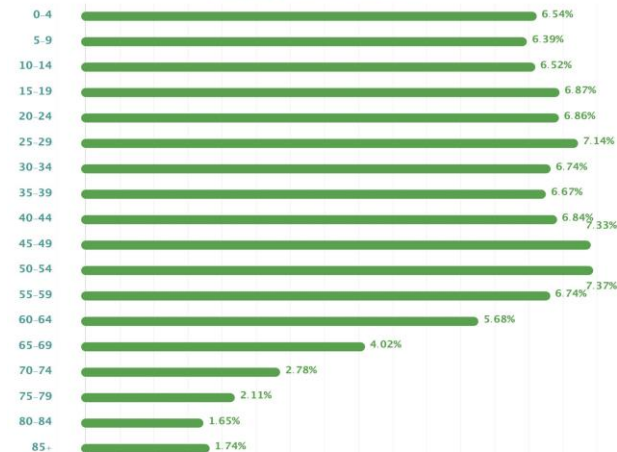
vs.



## Washington Population<sup>[1]</sup>



Age Distribution in Washington

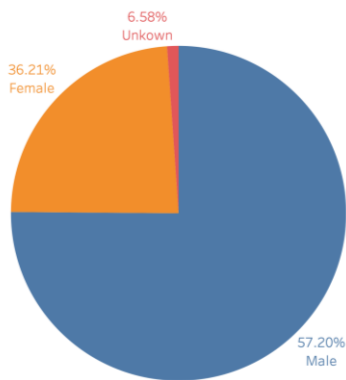


The trends of % of Total F2 along F11 and 0 for F11.





## Drivers In High-risk Area



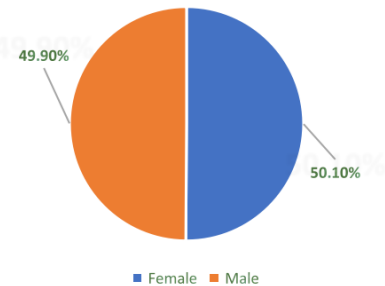
VS.



## Washington Population<sup>[1]</sup>

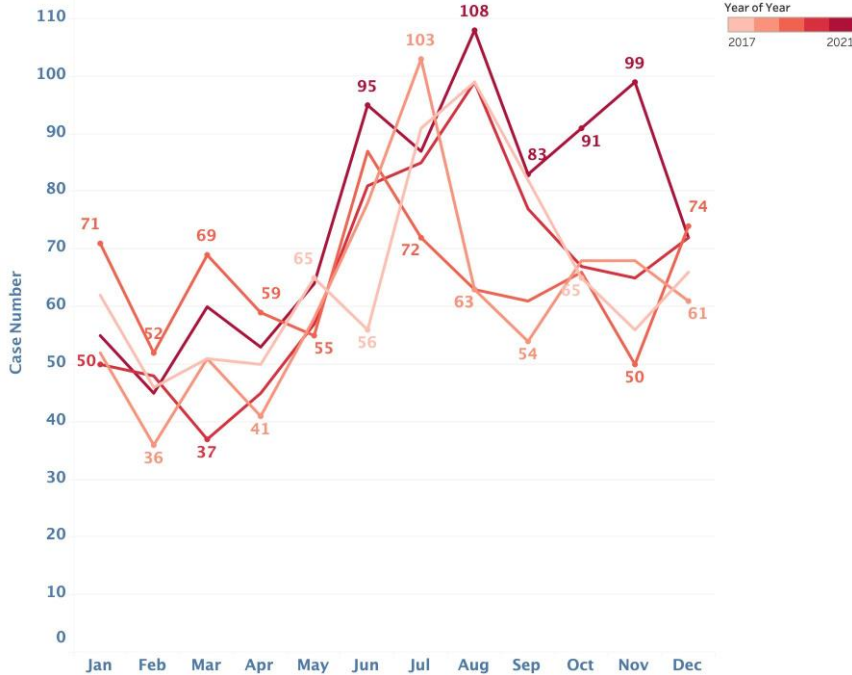


### Sex Distribution on WA





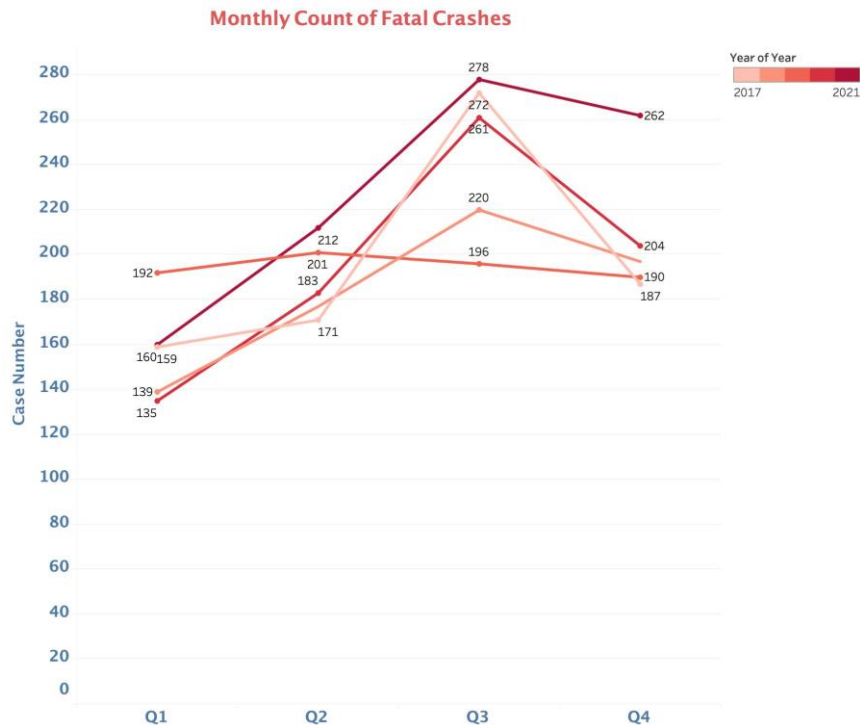
Monthly Count of Fatal Crashes



The trend of count of Par for Accmon Month. Color shows details about Year Year.

## Seasonality

- Seasonality in the number of fatal crashes throughout a year.
- February appears to be the month with fewest number of crashes.
- From 2017 through 2021, the monthly total of fatal crashes peak during July or August.



The trend of count of Par for Accmon Quarter. Color shows details about Year Year.

## Conclusion

- The number of monthly fatal accidents is related to temperature. The higher the temperature, the more fatal accidents.
- Increased outdoor activities due to fine weather from June to August may lead to more fatal accidents.

A background map showing a city street grid with green parks and yellow buildings. Four red location pins are placed on the map: one in the top-left, one in the top-right, and one in the bottom-center.

# How to improve?

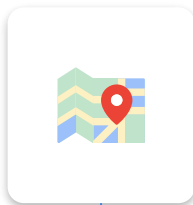


Predict potential accidents and warn drivers!



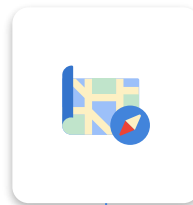


# Prediction



## Models

Random Forest,  
Decision Tree  
and Baseline



## Results

Accuracy: 61.2%  
F1 score: 0.522



## Variables

Target: Crash Category

Independent: Location,  
Weather Condition, Light  
Condition, etc.



## Training and validation

Scikit Learn Library



# References



[1] Population Estimates | Office of Financial Management  
<https://ofm.wa.gov/washington-data-research/population-demographics/population-estimates>

[2] [https://www.washington-demographics.com/zip\\_codes\\_by\\_population](https://www.washington-demographics.com/zip_codes_by_population)



# Thanks!



Q&A

