

ISYS 623 Project

Analysis on Accidents in Pennsylvania

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Abstract—My analysis observed that aggressive driving is significant factor contributing to the injured accidents in Pennsylvania. In fact, aggressive driving is causing close to 50% of the injured accidents. The NHTSA includes 15 actions in its definition of aggressive driving. Out of 15, the top 5 most actions that contributes to the injured accidents are speeding, left turn, tail gating and running red and stop signs. However, when you compare results by top 5 counties, there exists significant differences in their rates of aggressive driving related accidents requiring further analysis to identify the reasons for differences. For example, Philadelphia with highest population have lowest aggressive driving related accidents.

1 INTRODUCTION

1.1 According to the PennDOT Crash website, Crash data is derived from the information that comes from a reportable crash. A reportable crash is an incident that occurs on a highway or traffic way that is open to the public by right or custom and involved at least one motor vehicle in transport. An incident is reportable if it involves:

- Injury to or death of any person, or
- Damage to any vehicle to the extent that it cannot be driven under its own power in its customary manner without further damage or hazard to the vehicle, other traffic elements, or the roadway, and therefore requires towing
- Crash data does not include non-reportable crashes or near misses

1.1.1 Focus of Analysis

For my analysis, I focused on understanding what factors contribute to the accidents. Therefore, I used Crash and Flag tables along with population information to perform the analysis. *These table contains information on the following attributes of the data:*

CRASH: Information about the crash such as: Where: County, Municipality, Work zone When: Time, Day of Week, Hour of Day, Month of Year Item Counts: People, Vehicles, Unbelted, Fatal, etc.

FLAG: Series of Yes/No items that help refine lookups for specific factors about the crash such as: Drinking Driver, Use of a Cell Phone, Fatal Crash, Motorcycle involved, and over 60 other crash defining items

County Population: Annual Estimates of the Resident Population for Counties in Pennsylvania: April 1, 2010 to July 1, 2019 (CO-EST2019-ANNRES-42)

Out of many factors contributing to crash, my analysis further focuses on the “Aggressive Driving” as the factor in the accidents as it causes majority of the accidents. According to the PennDOT website, Aggressive Driving is defined as if any driver was listing as having any of the following actions:

Making illegal U-turn, Making improper or careless turn, Turning from wrong lane, Proceeding w/o clearance after stop, Running stop sign, Running red light, Failure to respond to TCD, Tailgating, Sudden slowing or stopping, Careless passing or lane change, Passing in no passing zone, Making improper entrance to highway, Making improper exit from highway, Speeding, Driving too fast for conditions, Driver fleeing police (police chase).

NHTSA Aggressive Driving involves a driver with at least 2 of these actions.

2 ANALYSIS

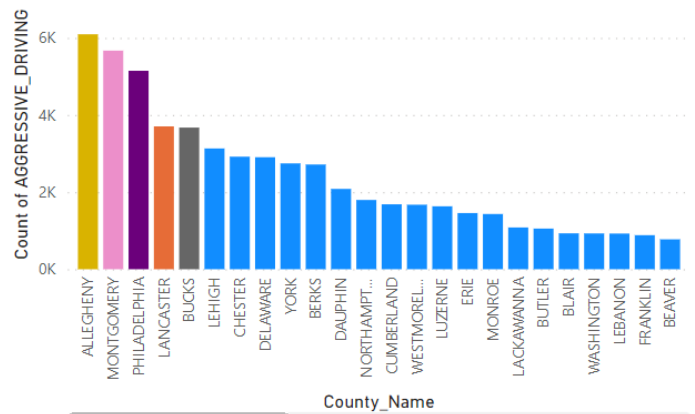
I analyzed the distribution of the injury counts against the collision type using actions as defined in the definition of aggressive driving defined above (chart below).

Aggressive Drinving Definition

Definition of Aggressive Driving:

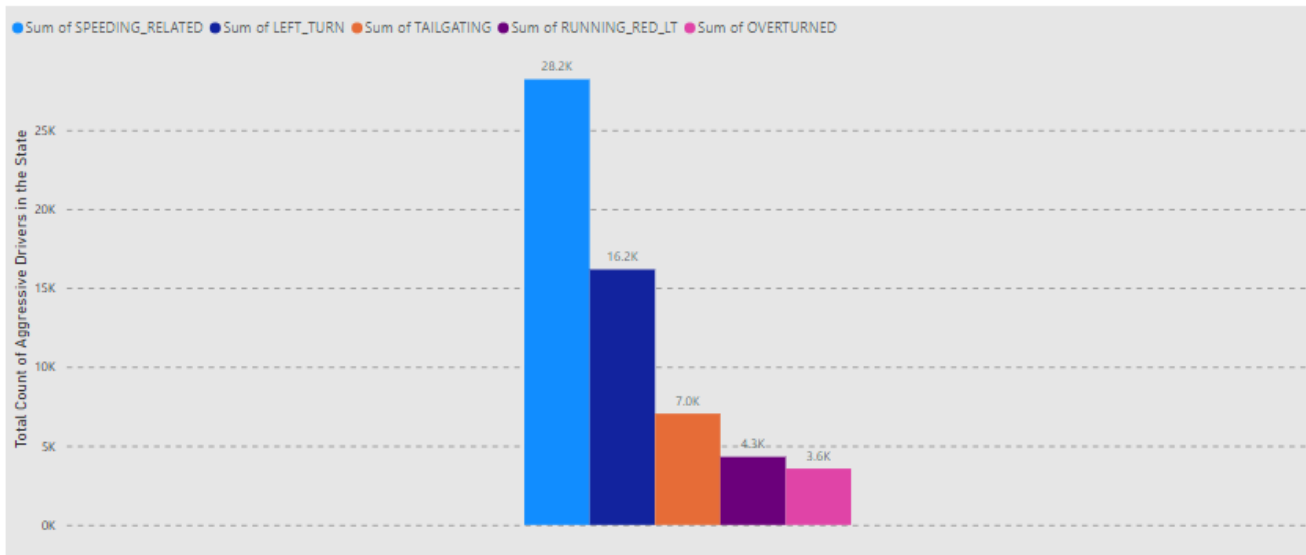
1. Making illegal U-turn
2. Making improper or careless turn
3. Turning from wrong lane
4. Proceeding w/o clearance after stop
5. Running stop sign
6. Running red light
7. Failure to respond to TCD
8. Tailgating, Sudden slowing or stopping
9. Careless passing or lane change
10. Passing in no passing zone
11. Making improper entrance to highway
12. Making improper exit from highway
13. Speeding
14. Driving too fast for conditions
15. Driver fleeing police (police chase)

Total Injuries Count in Each County



I observed that the speeding, left turn, tailgating, overturned, and running red are the top contributing actions out of 15 actions included in the aggressive driving to the injuries during the accidents. These actions looks reasonable to the causes of the accidents.

Top Five Categories of Aggressive Driving in the State

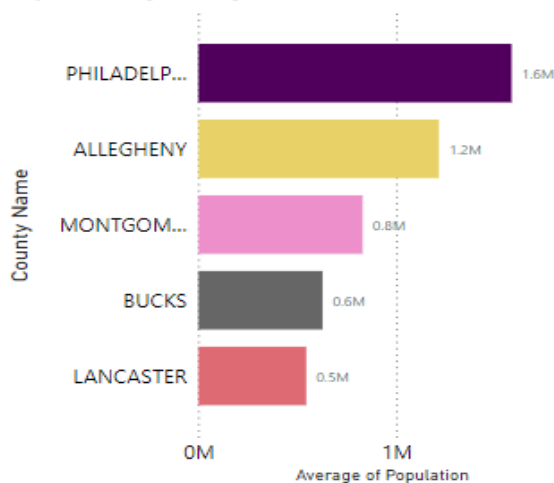


I further analyzed the aggressive driving injuries by counties in Pennsylvania and observed that top five counties with highest aggressive driving injuries are Allegheny (2), Montgomery (46), Philadelphia (67), Lancaster (36) and Bucks (9).

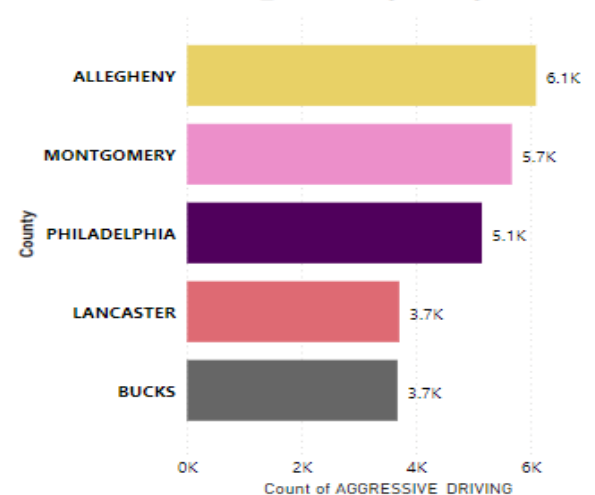
The order of number of aggressive driving-related accidents are highest in Allegheny County than Philadelphia County. The results seem counter intuitive given the population of Philadelphia is higher than Allegheny County (Chart below)

Aggressive Driving by County

Population by County



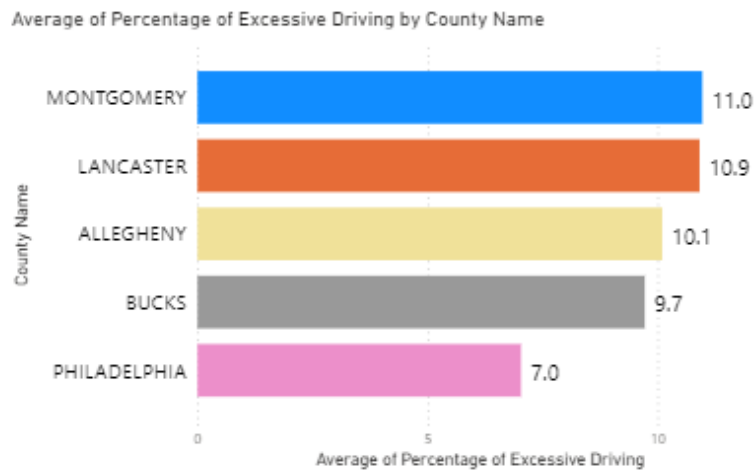
Count of AGGRESSIVE_DRIVING by County Name



Further, I analyzed the aggressive driving accident rate per 1000 people for the counties with highest aggressive driving related accidents. The chart below shows that although population of Philadelphia is highest among all the counties, it's

rate of aggressive driving related injuries are lowest in Pennsylvania. Similarly, Lancaster has lowest population amount 5 counties. However, it has second highest Aggressive Driving -related accident rate after Montgomery.

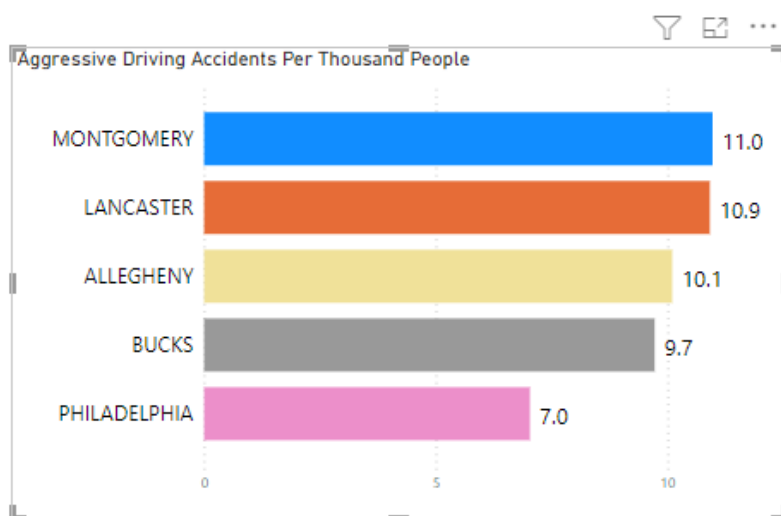
Aggressive Driving Accident by Population



County Name	Percentage of Excessive Driving
ALLEGHENY	10.10
BUCKS	9.72
LANCASTER	10.91
MONTGOMERY	10.97
PHILADELPHIA	7.03

The difference in the rates may be attributed to differences in driving responsibility, traffic lights and road designs, higher traffic budgets, or difference in open areas or crowded streets. This difference further needs to be researched and findings need to be applied to bring aggressive driving related injuries down to the level of Philadelphia for other counties of Pennsylvania providing immense public safety related benefits.

Aggressive Driving Accidents Per Thousand People



County Name	Percentage of Excessive Driving
MONTGOMERY	10.97
LANCASTER	10.91
ALLEGHENY	10.10
BUCKS	9.72
PHILADELPHIA	7.03

Power BI Online workspace: <https://app.powerbi.com/groups/me/reports/a92a6abf-cfdo-40d5-8361-46a45bd1c715/ReportSection54ef8d13ad8f09bce4c7>

References:

1. Population Source: <https://www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html>