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Data 205

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Montgomery County’s Vision Zero Traffic Plan: Success or Failure?

**Introduction:**

In 2017, Montgomery County adopted the Vision Zero concept for roadway safety. (Office of the County Executive, Montgomery County, Maryland, 2017) Montgomery County’s goal is to reach zero severe and fatal collisions on county roadways by 2030. This project analyzes Montgomery County’s success both in comparison to its own goals and to the performance of neighbors who have and who have not adopted Vision Zero.

**Datasets:**

My primary data sources for analyzing Montgomery County’s roadway safety performance were three sets from dataMontgomery: Crash Reporting-Incidents Data, Crash Reporting-Drivers Data, and Crash Reporting-Non-Motorists Data. These datasets, linked by report number, are high-quality repositories of a rich variety of data. They include information on the types of crashes and factors involved in each, including injuries (if any), roadway conditions, and evidence of who was at fault. The data itself was easy to use and required little cleaning. I just needed to standardize names of jurisdictions and merge the three datasets (on the report number). There were very few missing entries, which I was able to delete without an impact on the overall data. For my purposes, I was interested in variables indicating the type of crash (serious injury, fatal, or property damage), and the time, date, and location of the crashes. I needed to convert the time/date entries to datetime format for analysis. There were over 69,000 rows and 44 columns to explore.

To assess the effectiveness of Montgomery County’s program, I used data from Maryland’s Open Data portal. Two datasets: Maryland Statewide Vehicle Crashes and Maryland Statewide Vehicle Crashes-Person Details provided me with the same sort of information I got from the Montgomery County datasets. Most importantly, it included information on the type of crash and injury severity. The Maryland Statewide Vehicle Crashes dataset consisted of over 666,000 rows and 56 columns, which required very little cleaning because of the consistency of the entries and the lack of missing data. It only required name standardization and deletion of the few missing data rows. This allowed me to directly compare incidents in Montgomery County to others statewide. I merged these datasets (on report number) and filtered this data in order to compare Montgomery County with two counties most similar to it: Frederick County and Prince George’s County. Neither of these counties has a Vision Zero program, so they offer a useful check to see how Montgomery County’s results compare with neighbors who do not have the program. To compare the rates of accidents, I had to merge these sets with a set on traffic volume and the census data on population. I then created new variables showing accident numbers per population and per volume.

From Washington, DC, a long-standing participant in Vision Zero and a very close neighbor to Montgomery County, I used the Crashes in DC dataset. This set has details on the type of crash, the type of injuries sustained, the time and location, and conditions when the crash occurred. It too is a high-quality set, requiring only name standardization and missing data deletion, and featuring almost 600,000 entries and 75 columns. I focused on the time, location, and type of crash variables, narrowing my focus to serious injury and fatal collisions.

For more information on the demographics of the counties I was examining, I used the United States Census Bureau’s American Community Survey population estimates for 2015-2019. After finding the data I needed, I selected just relevant county data for downloading. This allowed me to take the population of each county for each year and compare it to the number and type of accidents in each county.

Finally, I realized that population may not be the most accurate indicator of crash rates. Traffic volume was more realistic. I used Maryland’s Open Data portal to access the dataset: Maryland Annual Average Daily Traffic - Annual Average Daily Traffic (SHA Statewide AADT Points). This high-quality dataset (again, very little cleaning required due to the quality and consistency of the entries) includes information on various traffic points throughout the state. It records the type and number of vehicles crossing each point per year. In order to get a representative number per county, I took the point with the largest number of vehicles per year in Montgomery, Frederick, and Prince George’s Counties (using the “max” function) and created a rate variable for each county.

**Montgomery County’s Performance**

Chart, bar chart

Description automatically generatedThe number of crashes in Montgomery County has not decreased noticeably since the implementation of Vision Zero in 2017. As figure 1 below shows, there is a slight decline from 2017 to 2019, and a more precipitous drop off in the number of crashes in 2020. 2020 is an anomalous year, however, due to the pandemic and resultant dramatic changes in traffic patterns. (The data for 2021 is also incomplete for comparison purposes, as we are dealing with a much shorter time period (fewer than the first six months of the year).) Vision Zero aims, however, not to eliminate *all* crashes, but serious injury and fatal crashes. Figures 3 and 4 below show that the number of injury crashes[[1]](#footnote-1) in Montgomery County did, indeed decline, but the number of fatal crashes increased steadily through 2020. Chart, bar chart

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Figure

Figure

Chart, bar chart

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Figure

In comparison with Frederick and Prince George’s Counties, which did not implement Vision Zero, Montgomery County appears to have made no notable improvement in fatality and serious injury numbers. Figures 4 and 5 show that all three counties faced some fluctuations in numbers, but Montgomery County’s fatalities increased from 2017 while others decreased. While Montgomery County’s serious injuries decreased, Prince George’s County’s serious injuries decreased even more. Chart, line chart

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Figure

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Figure

Statistical analysis, however, suggests Vision Zero may be working in Montgomery County. In 2018 (the last date for which Maryland traffic volume data is available), Montgomery County actually had about half the rate of fatalities and serious injuries per 10000 vehicles on the road that Prince George’s County (see Table 1). It also had a lower rate than Frederick County. An ANOVA analysis (comparing the means of the number of accidents per year in the three counties) shows that there is a statistically significant connection between location and likelihood of a serious injury or fatal crash. In short, while raw numbers do not show an improvement in crash incidents in Montgomery County, an analysis of what is happening in neighboring counties indicates Montgomery County is doing better than they are and suggests that had Montgomery County not implement Vision Zero, the number of fatalities and serious injuries may have increased.

Table

Table

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Washington, DC, another Vision Zero community, appears to have had similar results to Montgomery County. Figure 6 shows a steady decline in the number of fatal accidents in the District (with the exception of the anomalous 2020). There is more fluctuation in the number of serious injury accidents (figure 7).

Chart, bar chart

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Chart, line chart

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Figure : FBProphet Model for future Fatal Crashes

Figure : FBProphet Model for future Serious Injuryl Crashes

**Data Operationalization**

The data thus far do not definitively show the effectiveness (or lack thereof) of Vision Zero in Montgomery County. The program is only three years old, and 2020 was an anomalous year. The outstanding quality of data available for analysis, though, is a direct result of the program, and should provide the information necessary for understanding where crashes are most likely and where they are most likely to be serious or deadly. Working with Data Montgomery is easy, and allows for effective visualizations online even before downloading and more thoroughly analyzing the data.

To more specifically target changes that would improve traffic safety, I recommend using the data to establish what conditions most often occur in correlation with serious accidents. Surface, light, and weather conditions are noted, as are whether or not pedestrians and drivers paid attention to traffic controls.

I also recommend more comparative analysis with neighboring communities. What caused the improvement in raw serious injury and fatality numbers in Prince George’s County? Are the conditions that correlate with crashes similar in these counties and in Washington, DC?

Finally, I recommend exploring which crashes can be prevented by changes in engineering, and which are the result of human nature (a far more intractable problem).

**Acknowledgements**

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1. Note, these are all injury crashes, not just serious injury crashes. [↑](#footnote-ref-1)