

Automotive Crashes across Texas in 2020

Abstract: Despite increasing vehicles miles traveled – more cars and more drivers – automotive fatality rates have been in decline for decades. However, in 2020, amidst a global pandemic and widespread societal lockdowns, driving behaviors changed dramatically¹. Reports emerged as early as mid-summer^{2,3} and were later reaffirmed by the National Highway Safety Administration⁴: the number of automotive collisions in 2020 had decreased from previous years, but the number of fatal crashes held steady – or even increased. I validate these observations for the State of Texas and provide a closer examination of the spatial and temporal trends underlying the increased fatality rates.

Data: Four years of Texas crash reports, 2,442,811 reports in total across all 254 counties.

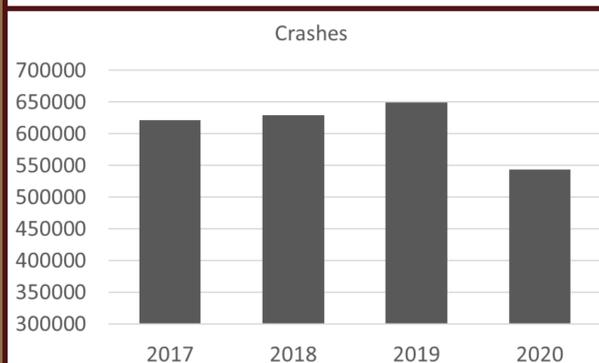
Analysis: Two-sample difference of proportions tests were used across multiple comparisons. First, at the state-level, comparing the fatal crash proportions averaged between 2017-2019 to the observed fatal crash proportion in 2020. The same strategy was used to complete a series of 254 statistical comparisons of fatality rates within each county. Additional analyses included testing rural counties in aggregate and examining how the fatal crash rate varied month to month within counties and across the state.

Two Sample Difference of Proportions Test Statistic:

$$t = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}}$$

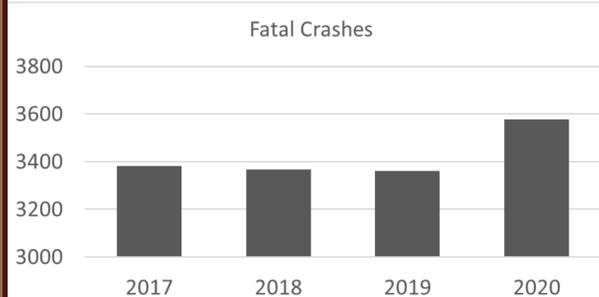
Background Figure: Point map of automotive crashes (2017-2020).

Statewide Analysis



Year	Fatal	Crashes	Fatal Prop.
2017	3383	620859	0.005449
2018	3367	629100	0.005352
2019	3361	648924	0.005179
2020	3578	543928	0.006578

2017-2019 Fatal Crash Proportion: .005325
2020 Fatal Crash Proportion: .006578



True difference with 95% Confidence:
an increase between .001014 and .001490
t = 10.9 p < .0001

Result: More than one additional fatal crash than expected for every 1,000 crashes across the state of Texas in 2020.

County-Level Analysis

Selected County Data and Results:

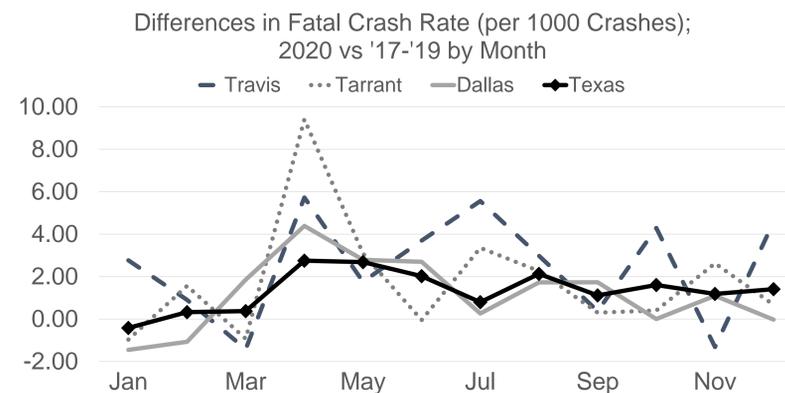
County	2017 - 2019		2020		Diff. of Prop. Test	
	Crashes	Fatal	Crashes	Fatal	Increase	P-Val
Harris	389221	1235	112542	472	0.00102	0.00000
Tarrant	119906	494	32323	183	0.00154	0.00026
Travis	65098	344	17204	131	0.00233	0.00041
Bexar	185333	523	49417	186	0.00094	0.00083
Dallas	175206	814	54403	308	0.00102	0.00337
El Paso	69196	222	18052	72	0.00078	0.12386

Results: Only 137 counties contained enough fatal crashes for appropriate estimation; of these, only 13 individual counties observed a statistically significant increase in fatal crash rates. The worst fatal crash rate increases were centered around Texas' most urbanized areas. 40 counties observed insignificant decreases in the fatal crash rate.

117 counties with too few records for individual analysis were examined in aggregate (representing mostly rural counties). Although rural counties typically hold higher absolute rates of fatal crashes⁵, 2020 brought a relative (though still statistically insignificant) decline in the observed fatal crash rate of rural counties.

117 Rural Counties' Fatal Crash Proportions: 2017-2019 and 2020

Years	Fatal	Crashes	Fatal Prop.
2017-2019	831	57942	0.01434
2020	221	16786	0.01317



There is some evidence that fatal crash rates peaked in urban areas during the month of April – a month strongly associated with lockdowns. However, at the county-level (where these peaks are most evident), crash reports are too few for statistical power. Furthermore, the fatal crash rate was significantly higher across the state of Texas for all months *except* January, February, March and July.

Conclusion: Evidence from 2020 suggests that Texas' roadways today are deadlier than they were in the late 2010's.

Select References

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