Exploratory Analysis of Gun Issues in the U.S.

1. Introduction

The generation of this idea is from a newly published news with the headline: "More Americans killed by guns than car crashes." It clearly shows that, with the death toll and cases increasing dramatically over the past decade, gun violence has become one of the most urgent issues in the US. If government officials want to solve such an issue, they need to understand the data and the hidden factors causing the cases to rise. Further, data visualizations and analysis are two crucial steps to initiate the reports, which this report covers.

2. Visualization

After collecting the data sets needed for the analysis, the graphs are made through an Excel file. The following data sets are included for the gun violence issues: 1) Figures among different countries, 2) Total fatalities/injuries cases for the past years, 3) number/ownerships of firearms by states, 4) figures in different states.

1) Figures in Different Countries

When comparing the death rate due to gun violence, the US is in 10th place worldwide. When comparing the total death number, however, the US is in the 2nd place, shown in the middle graph below, with only 6,000 behind the first and almost three times the number in the 3rd place. And if both firearm homicide rate and suicide rate of the US are compared among all developed nations in 2019, the situation in the US is the worst, a rate four times any other developed countries.
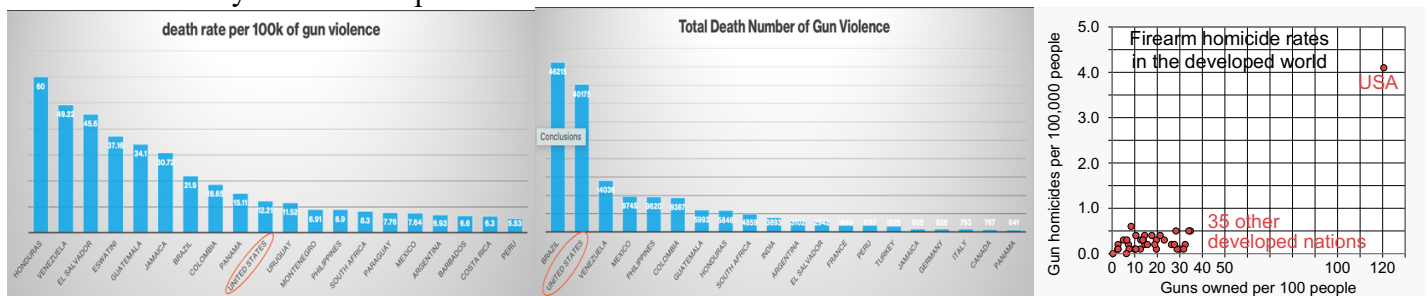
2) Total Fatalities/Injuries Cases

In 2021, the non-governmental organization Gun Violence Archive (GVA) reported a new record high of 37,414 people die from gun violence of all causes. As we can see from the data, both the total number of incidents and the death toll doubled over the last seven years.
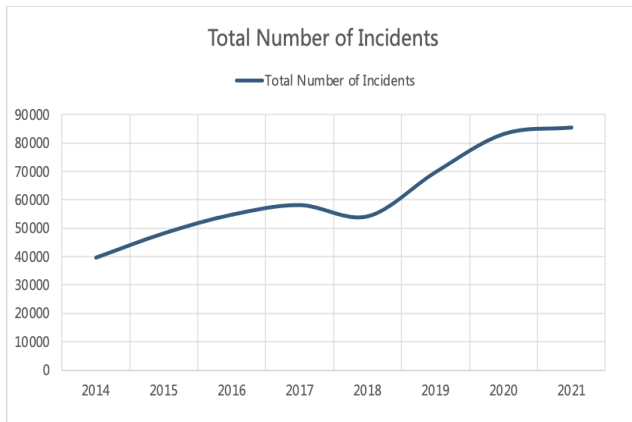
GVA - Seven Year Review	2014	2015	2016	2017	2018	2019	2020
Deaths - Willful, Malicious, Accidental	12,418	13,537	15,112	15,679	14,896	15,448	19,411
Suicides by Gun	21,386	22,018	22,938	23,854	24,432	23,941	Pending
Injuries - Willful, Malicious, Accidental	22,779	27,033	30,666	31,265	28,284	30,186	39,492
Children [aged 0-11] Killed or Injured	603	695	671	733	664	695	999
Teens [aged 12-17] Killed or Injured	2,318	2,695	3,140	3,256	2882	3,122	4,142
Mass Shooting	269	335	382	346	336	417	611
Murder-Suicide	624	530	549	608	623	632	573
Defensive Use [DGU]	1,531	1,393	2,001	2,107	1874	1,597	1,478
Unintentional Shooting	1,605	1,969	2,202	2,039	1691	1,905	2,315

Number of Deaths, Injuries, Children, Teens killed/injured [actual numbers]
Mass Shooting, Murder-suicides, Defensive Use, Unintentional Shooting [number of incidents]
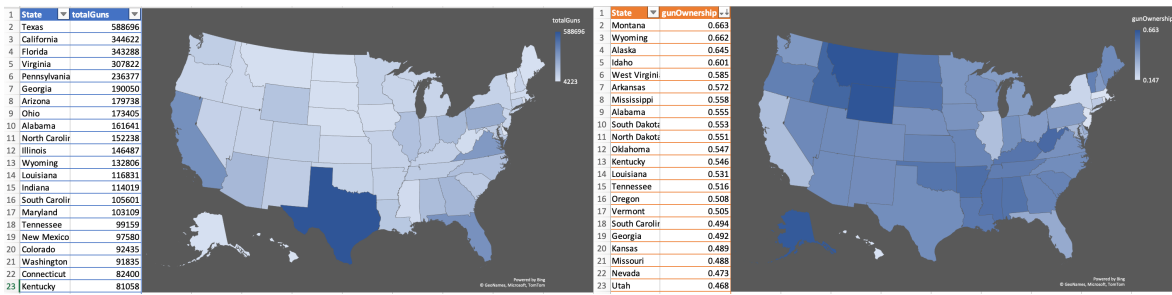Suicide numbers supplied by CDC End of Year Report [actual numbers]

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3) Number/Ownership of Firearms by States

Two sets of numbers are needed when handling the exact gun numbers and ownership; two sets of numbers are required, one is the total guns number in different states, and another is the gun ownership percentage in those states. The two sets of data are being sorted in descending order. Here are the two sets of data and their graphics. As we can see in the graph below on the left, when the data is sorted by the total guns number, Texas, California, and Florida are three states with the highest gun numbers among all states, at the same time, however, the graph on the right, if the data is being sorted by ownership percentage, Montana, Wyoming, and Alaska are three states with the highest ownership among all.

1	State	totalGuns
2	Texas	588696
3	California	344622
4	Florida	343288
5	Virginia	307822
6	Pennsylvania	236377
7	Georgia	190050
8	Arizona	179738
9	Ohio	173405
10	Alabama	161641
11	North Carolir	152238
12	Illinois	146487
13	Wyoming	132806
14	Louisiana	116831
15	Indiana	114019
16	South Carolir	105601
17	Maryland	103109
18	Tennessee	99159
19	New Mexico	97580
20	Colorado	92435
21	Washington	91835
22	Connecticut	82400
23	Kentucky	81058

1	State	gunOwnership
2	Montana	0.663
3	Wyoming	0.662
4	Alaska	0.645
5	Idaho	0.601
6	West Virgini:	0.585
7	Arkansas	0.572
8	Mississippi	0.558
9	Alabama	0.555
10	South Dakot:	0.553
11	North Dakot:	0.551
12	Oklahoma	0.547
13	Kentucky	0.546
14	Louisiana	0.531
15	Tennessee	0.516
16	Oregon	0.508
17	Vermont	0.505
18	South Carolir	0.494
19	Georgia	0.492
20	Kansas	0.489
21	Missouri	0.488
22	Nevada	0.473
23	Utah	0.468

4) Figures in the Different States

When collecting states' data sets, death numbers and deaths rate are two data sets needed to be considered as two criteria on how bad the situation is among states. The graph below on the left shows that when the data is sorted by deaths rate in descending order, Alaska, Alabama, and Louisiana are three states among all having the highest death rate from gun violence, while when the data is sorted by death numbers, Texas, California, and Florida are three states with a highest total number among all states. So, suppose we determine where gun violence is the worst by death. In that case, we should look at the states with the highest death number, Texas, California, and Florida, because these states have significantly higher deaths than any other state.
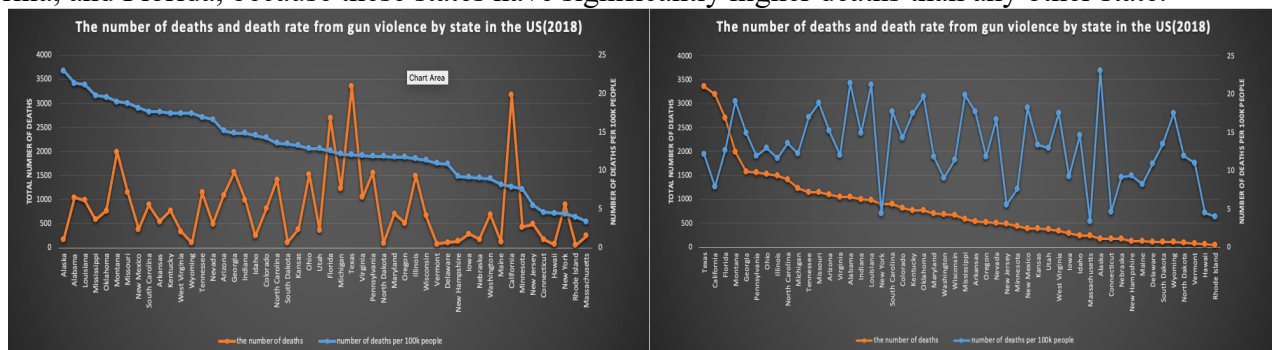
3. Analyzation

As shown in the graph above, there are mismatches between gun numbers and ownership and between death numbers and death rates. It is, therefore, clearly indicating that factors affecting the data sets are not being considered. Henceforth, a question is being raised on how a population/density affects those data and the possible correlations. So the statistical software, SPSS, is being introduced into the analysis process. After data sets were put into the software, the results returned with detailed correlation shown in the following table. The results determined two groups of correlation: the relationships between death and guns, shown in the left table below, and the relationships between guns, death, and population, shown in the right table below. It clearly shows a strong positive correlation between fatalities and registered guns number, and between the death rate and gun ownership percentage. And at the same time, it is clear that the population in different states is positively correlated with gun numbers and deaths.

In contrast, population density is negatively associated with gun ownership and the death rate. Here, correlation analysis shows that the number of guns contributes to the death number, instead of ownership, and population contributes to the gun number and the death number instead of population density. These seemed counterintuitive at first but made perfect sense with analysis. Therefore, if we determine the worst situation by total death numbers in that state, Texas, California, and Florida have the highest number of deaths because these are the three states with the highest gun numbers and highest total population.

Pearson Correlation

	Registered Guns	Gun Ownership
number of deaths	0.840**	-0.034
death rate	0.039	0.821**

*$p < 0.05$ ** $p < 0.01$

Pearson Correlation

	Registered Guns	Gun Ownership	death rate	number of deaths
density	-0.004	-0.802**	-0.595**	-0.026
Pop2021	0.809**	-0.337*	-0.221	0.862**

*$p < 0.05$ ** $p < 0.01$

4. Conclusions and Recommendations

a.Gun violence issue in the US is one of the most serious among all other nations, and attention needs to be drawn onto it by government officials;

b.The situation varied widely across the US, and large gun numbers and populations mainly cause the large death number in a state;

c.If you desire a highly safe environment with fewer gun violence cases, then you should probably avoid states with both high population and gun numbers while staying in states with high population density.

References:

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