Data Analysis from U.S.A. Mass Shootings Data

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July 31, 2023

Abstract

This study was developed to learn more about mass shootings in the U.S.A. and to determine through a ranking system which states are more dangerous and which states are less dangerous. The rankings of the more dangerous states include the top 5 more dangerous cities. And also a correlation analysis between the rankings of dangerous states against gun statistics of each state.

The Data

The data used in this project comes from Kaggle, the U.S. Census Bureau, and World Population Review. Most of it came in the form of comma-separated values (.csv), and in other cases, was presented on the webpages and copied to Google Spreadsheets to generate the CSV file.

The Process

The process was divided into different steps to gather all the information and make use of it. The process is described as follows:

1. Data Collection and Importing: The process of finding the correct data from various internet sources and importing it to a Jupyter Notebook.
2. Data Exploration and Data-frames Creation: The process of exploring data to get familiar with it and spot possible mistakes. Then create new data frames by processing and combining data from the original datasets.
3. Dashboard in Tableau: The process of generating and exporting the dashboard.
4. Export data to Excel file and ranking creation: Rankings get created using the filter tool provided by Excel.
5. Linear Regression Analysis: The application of linear regression analysis to understand how dangerous states behave in terms of gun ownership of the people living in those states.

Data Collection and Importing

In this first step of the process, searching to find suitable datasets for the project is essential, as they have to come from trusted resources. That is why the datasets come from Kaggle, World Population Review, and The U.S. Census Bureau.

Data Exploration and Data-frames Creation

After importing datasets, one new data frame gets created to sum all events, deaths, injuries, and total (from both deaths and injuries) by each city, considering some city names get repeated in different states to avoid misrepresentation of data. The name of this data frame is cities_df. Then a new data frame gets created, which condenses all state data, but this time without classifying it by city. This data frame is called states_df.

Since we already have a data frame for cities, we now limit our list of cities to only five cities per state in a new data frame called top_cities__freq_df. These five cities are the ones that have the highest frequency of mass shootings. However, these cities may not be the deadlier, as this list does not always include the ones with the highest number of dead people in its history of mass shooting events.

And finally, the creation of the master data frame. This data frame combines the states_df with the demographics by state. And it also creates more columns by calculating Frequency, Deaths, Injured, and Total per 100,000 habitants in each state. This data frame is called statistics_by_state_df

Dashboard in Tableau

The dashboard must show data on the frequency of mass shootings per 100k people per state and the death rate per 100k people per state. The dashboard shows a geographic map of the U.S., reflecting in shades of red how many deaths are there for each one hundred thousand people, and on the bottom side, there is a two-column bar chart comparing mass shootings and killings for each one hundred people in the state, and these two parts of the dashboard are linked together so the person reviewing it can click on one particular state in one of the graphics. The other one will focus on that particular one, showing data more clearly.

Link to the dashboard:

https://public.tableau.com/app/profile/ra.l.eduardo.toache.thomas/viz/MassShootingsUSAbyState/Dashboard1?publish=yes

Export Data to Excel file and Ranking Creation

Data was exported to Excel since Tableau Public does not accept SQL databases. And also because Excel would allow us to insert the rankings in a better format for this document.

Linear Regression Analysis

For the linear regression model, it was possible to use libraries like sklearn, but it was preferred to do it from scratch to improve the understanding of how the model works as a learning experience. The model was implemented to try to predict how the different gun statistics of each state affect the probability of having more mass shootings for each one hundred thousand people.

The three statistics where the model was applied were:

- Gun Ownership Rate (percentage).
- Registered Gun Rate (per 1,000 or 1k).
- Gun Death Rate (per 100,000 or 100k).

Conclusions and Findings

Ranking for Most Dangerous States Based on Frequency

Ranking includes territories and the District of Columbia when the necessary data was available.

Rank	state	Freq100k
1	United States Virgin Islands	7.0886
2	District of Columbia	6.1739
3	Louisiana	2.6574
4	Illinois	2.1959
5	Northern Mariana Islands	2.0082
6	Mississippi	1.7744
7	Alabama	1.3925
8	South Carolina	1.3589
9	Missouri	1.2932
10	Delaware	1.2597
11	Maryland	1.2511
12	Arkansas	1.1426
13	Tennessee	1.0232
14	Pennsylvania	0.9975
15	Alaska	0.9550
16	Michigan	0.9172
17	New Mexico	0.9005
18	Colorado	0.8861
19	Ohio	0.8427
20	Georgia	0.8335
21	North Carolina	0.8124
22	Indiana	0.8026
23	Nevada	0.7167
24	Wisconsin	0.7113
25	Kentucky	0.7083
26	Virginia	0.6774
27	Texas	0.6721
28	New York	0.6463
29	Florida	0.6045
30	Iowa	0.5931
31	New Jersey	0.5834

32	California	0.5730
33	Connecticut	0.5511
34	Minnesota	0.5242
35	Oregon	0.5208
36	Oklahoma	0.5187
37	Nebraska	0.5070
38	Washington	0.4980
39	Kansas	0.4768
40	Arizona	0.4159
41	Massachusetts	0.3154
42	West Virginia	0.2833
43	Hawaii	0.2791
44	Rhode Island	0.2751
45	Montana	0.2633
46	Utah	0.2337
47	South Dakota	0.2166
48	Wyoming	0.1714
49	Puerto Rico	0.1227
50	Idaho	0.1013
51	Maine	0.0718
52	New Hampshire	0.0713
53	North Dakota	0.0000
54	Vermont	0.0000

Ranking for Most Dangerous States Based on Death Rate

Ranking includes territories and the District of Columbia when the necessary data was available.

Rank	state	Dead100k
1	United States Virgin Islands	15.1899
2	Northern Mariana Islands	10.0410
3	District of Columbia	3.6410
4	Mississippi	2.7299
5	Nevada	2.5864
6	Louisiana	2.2401
7	Alaska	2.1829
8	Hawaii	2.1629
9	Colorado	1.8914
10	South Carolina	1.7870
11	Alabama	1.7455
12	Illinois	1.7151
13	New Mexico	1.5640
14	Missouri	1.5195
15	Texas	1.4459
16	Wisconsin	1.4056
17	Connecticut	1.2951
18	Arkansas	1.2732
19	Delaware	1.2597
20	California	1.2180
21	Michigan	1.1764
22	North Carolina	1.1724
23	Maryland	1.1698
24	Washington	1.1365
25	Ohio	1.1321
26	Virginia	1.1252
27	Indiana	1.1237
28	Tennessee	1.1213
29	Pennsylvania	1.1213
30	Oklahoma	1.0128
31	Florida	1.0105
32	Iowa	0.9990
33	Kentucky	0.9960
34	Oregon	0.8286

35	Georgia	0.8063
36	Utah	0.7889
37	Arizona	0.7379
38	Nebraska	0.7098
39	Minnesota	0.6291
40	Puerto Rico	0.6134
41	New York	0.6052
42	Kansas	0.5789
43	New Jersey	0.5618
44	Montana	0.5265
45	West Virginia	0.5100
46	South Dakota	0.4331
47	Massachusetts	0.3871
48	Wyoming	0.3429
49	Idaho	0.2533
50	Maine	0.2153
51	Rhode Island	0.1834
52	New Hampshire	0.0000
53	North Dakota	0.0000
54	Vermont	0.0000

Ranking for Most Dangerous States Based on Injured Rate

Ranking includes territories and the District of Columbia when the necessary data was available.

Rank	state	Injured100k
1	District of Columbia	28.8115
2	United States Virgin Islands	28.3544
3	Northern Mariana Islands	18.0737
4	Nevada	15.8921
5	Louisiana	11.2224
6	Illinois	9.9298
7	Mississippi	7.2001
8	South Carolina	6.6456
9	Arkansas	5.7131
10	Alabama	5.2366
11	Missouri	4.9143
12	Colorado	4.8053
13	Maryland	4.7281
14	Delaware	4.3605
15	Tennessee	4.1910
16	Pennsylvania	4.0674
17	Ohio	3.6347
18	Georgia	3.3068
19	Michigan	3.2500
20	Kentucky	3.1651
21	Texas	3.1344
22	Indiana	3.0354
23	Oregon	2.9593
24	New York	2.9082
25	North Carolina	2.9080
26	Virginia	2.8014
27	New Mexico	2.7488
28	New Jersey	2.7335
29	Florida	2.6830
30	Wisconsin	2.6249
31	California	2.5388
32	Minnesota	2.5162
33	Nebraska	2.4337
34	Kansas	2.2136

35	Iowa	2.0603
36	Arizona	1.9722
37	Washington	1.9155
38	Alaska	1.9100
39	Connecticut	1.8738
40	Oklahoma	1.7291
41	Rhode Island	1.4672
42	Montana	1.2286
43	Utah	1.1395
44	Massachusetts	1.1327
45	West Virginia	0.9066
46	South Dakota	0.5414
47	Idaho	0.3547
48	Wyoming	0.3429
49	New Hampshire	0.2851
50	Hawaii	0.2791
51	Puerto Rico	0.0920
52	Maine	0.0718
53	North Dakota	0.0000
54	Vermont	0.0000

Ranking for Most Dangerous States Based on Total Victims Rate (Both Death and Injured)

Ranking includes territories and the District of Columbia when the necessary data was available.

Rank	state	Total100k
1	United States Virgin Islands	43.5443
2	District of Columbia	32.4525
3	Northern Mariana Islands	28.1147
4	Nevada	18.4785
5	Louisiana	13.4625
6	Illinois	11.6449
7	Mississippi	9.9641
8	South Carolina	8.4140
9	Arkansas	6.9863
10	Alabama	6.9821
11	Colorado	6.6967
12	Missouri	6.4338
13	Maryland	5.8979
14	Delaware	5.6202
15	Tennessee	5.3123
16	Pennsylvania	5.1887
17	Ohio	4.7669
18	Texas	4.5803
19	Michigan	4.4264
20	New Mexico	4.3128
21	Kentucky	4.1611
22	Indiana	4.1590
23	Georgia	4.1132
24	Alaska	4.0929
25	North Carolina	4.0805
26	Wisconsin	4.0305
27	Virginia	3.9036
28	Oregon	3.7879
29	California	3.7568
30	Florida	3.6935
31	New York	3.5185
32	New Jersey	3.2954

33	Connecticut	3.1689
34	Minnesota	3.1453
35	Nebraska	3.1436
36	Iowa	3.0593
37	Washington	3.0520
38	Kansas	2.7926
39	Oklahoma	2.7418
40	Arizona	2.6967
41	Hawaii	2.4420
42	Utah	1.9284
43	Montana	1.7551
44	Rhode Island	1.6506
45	Massachusetts	1.5199
46	West Virginia	1.4166
47	South Dakota	0.9746
48	Puerto Rico	0.7055
49	Wyoming	0.6858
50	Idaho	0.6080
51	Maine	0.2871
52	New Hampshire	0.2851
53	North Dakota	0.0000
54	Vermont	0.0000

Most Dangerous Cities to Live in each State

Please consider the fact that the following data only includes gross numbers meaning that this data is not represented by a one hundred thousand people rate, but the actual number of mass shootings, deaths, injured, and total victims of these cities and towns.

Alabama

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Birmingham	Alabama	11	11	41	52
2	Montgomery	Alabama	11	9	43	52
3	Mobile	Alabama	7	4	33	37
4	Troy	Alabama	3	3	12	15
5	Tuscaloosa	Alabama	3	0	14	14

Alaska

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Anchorage	Alaska	4	6	12	18
2	Bethel	Alaska	1	2	2	4
3	Farmers Loop	Alaska	1	4	0	4
4	Palmer	Alaska	1	4	0	4

Arizona

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Phoenix	Arizona	15	17	76	93
2	Tucson	Arizona	4	14	22	36
3	Glendale	Arizona	3	2	20	22
4	Mesa	Arizona	3	8	10	18
5	Flagstaff	Arizona	1	1	3	4

Arkansas

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Little Rock	Arkansas	9	6	55	61
2	Pine Bluff	Arkansas	6	3	29	32
3	Magnolia	Arkansas	2	0	8	8
4	Atkins	Arkansas	1	5	0	5
5	Blytheville	Arkansas	1	3	1	4

California

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Los Angeles	California	32	31	139	170
2	Oakland	California	24	20	97	117
3	San Francisco	California	13	25	66	91
4	Sacramento	California	11	17	49	66
5	Fresno	California	9	19	28	47

Colorado

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Denver	Colorado	14	13	60	73
2	Aurora	Colorado	11	20	109	129
3	Colorado Springs	Colorado	11	25	34	59
4	Commerce City	Colorado	2	1	7	8
5	Highlands Ranch	Colorado	2	3	14	17

Connecticut

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Hartford	Connecticut	8	3	32	35
2	Bridgeport	Connecticut	4	3	13	16
3	Waterbury	Connecticut	2	0	8	8
4	Hamden	Connecticut	1	0	5	5
5	New Britain	Connecticut	1	6	0	6

Delaware

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Wilmington	Delaware	7	3	28	31
2	Dover	Delaware	4	3	15	18
3	Claymont	Delaware	1	2	2	4
4	Prices Corner	Delaware	1	5	0	5

District of Columbia

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Washington	District of Columbia	39	23	182	205

Florida

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Miami	Florida	22	19	88	107
2	Orlando	Florida	14	73	97	170
3	Jacksonville	Florida	13	14	55	69
4	Tampa	Florida	10	7	42	49
5	Pensacola	Florida	4	5	22	27

Georgia

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Atlanta	Georgia	30	14	141	155
2	Macon	Georgia	7	10	20	30
3	Augusta	Georgia	5	6	14	20
4	Columbus	Georgia	5	2	21	23
5	Savannah	Georgia	4	4	16	20

Hawaii

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Hanapepe	Hawaii	1	20	0	20
2	Honolulu	Hawaii	1	7	0	7
3	Pearl Harbor	Hawaii	1	3	1	4
4	Wai'anae	Hawaii	1	1	3	4

Idaho

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Boise	Idaho	1	3	4	7
2	Caldwell	Idaho	1	2	3	5

Illinois

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Chicago	Illinois	198	118	881	999
2	Rockford	Illinois	9	9	31	40
3	Decatur	Illinois	4	1	16	17
4	Joliet	Illinois	4	8	18	26
5	Peoria	Illinois	4	2	24	26

Indiana

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Indianapolis	Indiana	28	48	99	147
2	Gary	Indiana	5	9	19	28
3	South Bend	Indiana	5	2	27	29
4	Evansville	Indiana	4	0	18	18
5	Fort Wayne	Indiana	3	4	10	14

Iowa

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Cedar Rapids	Iowa	3	4	18	22
2	Davenport	Iowa	3	1	12	13
3	Des Moines	Iowa	3	2	12	14
4	Sioux City	Iowa	2	1	8	9
5	Coralville	Iowa	1	1	3	4

Kansas

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Wichita	Kansas	7	3	28	31
2	Kansas City	Kansas	2	5	12	17
3	Clafin	Kansas	1	0	4	4
4	Hesston and Newton	Kansas	1	4	14	18
5	Holcomb	Kansas	1	4	0	4

Kentucky

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Louisville	Kentucky	14	18	66	84
2	Lexington	Kentucky	4	3	18	21
3	Covington	Kentucky	3	0	14	14
4	Allen City	Kentucky	1	3	4	7
5	Benton	Kentucky	1	2	16	18

Louisiana

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	New Orleans	Louisiana	41	32	170	202
2	Baton Rouge	Louisiana	15	15	60	75
3	Shreveport	Louisiana	13	5	53	58
4	Monroe	Louisiana	7	9	25	34
5	Lafayette	Louisiana	6	5	38	43

Maine

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Washington County	Maine	1	3	1	4

Maryland

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Baltimore	Maryland	51	30	208	238
2	Annapolis	Maryland	2	6	5	11
3	Cambridge	Maryland	2	1	7	8
4	Germantown	Maryland	2	2	6	8
5	Aberdeen	Maryland	1	4	3	7

Massachusetts

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Boston	Massachusetts	12	9	45	54
2	Lynn	Massachusetts	3	3	12	15
3	Abington	Massachusetts	1	5	0	5
4	Brockton	Massachusetts	1	0	5	5
5	Great Barrington	Massachusetts	1	2	4	6

Michigan

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Detroit	Michigan	36	29	141	170
2	Saginaw	Michigan	9	10	32	42
3	Flint	Michigan	6	6	25	31
4	Grand Rapids	Michigan	6	10	23	33
5	Lansing	Michigan	6	4	22	26

Minnesota

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Minneapolis	Minnesota	20	14	101	115
2	Saint Paul	Minnesota	6	6	30	36
3	Buffalo	Minnesota	1	1	4	5
4	Duluth	Minnesota	1	5	0	5
5	Red Lake	Minnesota	1	10	5	15

Mississippi

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Jackson	Mississippi	11	11	49	60
2	Greenwood	Mississippi	3	3	19	22
3	Meridian	Mississippi	3	15	9	24
4	Grenada	Mississippi	2	0	15	15
5	Gulfport	Mississippi	2	5	8	13

Missouri

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	St. Louis	Missouri	34	30	117	147
2	Kansas City	Missouri	14	11	70	81
3	Springfield	Missouri	4	7	15	22
4	Columbia	Missouri	3	3	12	15
5	Independence	Missouri	2	0	9	9

Montana

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Great Falls	Montana	1	4	1	5
2	Madison County	Montana	1	1	10	11
3	Missoula	Montana	1	1	3	4

Nebraska

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Omaha	Nebraska	8	12	42	54
2	Bellevue	Nebraska	1	2	2	4
3	Lincoln	Nebraska	1	0	4	4

Nevada

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Las Vegas	Nevada	10	6	38	44
2	North Las Vegas	Nevada	4	3	16	19
3	Henderson	Nevada	3	5	12	17
4	Paradise	Nevada	2	62	417	479
5	Carson City	Nevada	1	5	7	12

New Hampshire

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Manchester	New Hampshire	1	0	4	4

New Jersey

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Paterson	New Jersey	11	6	46	52
2	Newark	New Jersey	10	6	44	50
3	Jersey City	New Jersey	8	10	33	43
4	Trenton	New Jersey	6	2	50	52
5	Camden	New Jersey	3	14	10	24

New Mexico

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Albuquerque	New Mexico	9	10	32	42
2	Las Cruces	New Mexico	2	4	7	11
3	Aztec	New Mexico	1	3	0	3
4	Chamita	New Mexico	1	1	3	4
5	Clovis	New Mexico	1	2	4	6

New York

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	New York City	New York	69	46	307	353
2	Buffalo	New York	14	16	53	69
3	Rochester	New York	11	11	48	59
4	Albany	New York	7	4	34	38
5	Syracuse	New York	3	1	17	18

North Carolina

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Charlotte	North Carolina	9	7	40	47
2	Greensboro	North Carolina	8	8	37	45
3	Winston-Salem	North Carolina	8	9	36	45
4	Durham	North Carolina	6	7	24	31
5	Fayetteville	North Carolina	3	6	8	14

Northern Mariana Islands

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Saipan	Northern Mariana Islands	1	5	9	14

Ohio

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Cleveland	Ohio	24	18	114	132
2	Columbus	Ohio	16	11	64	75
3	Cincinnati	Ohio	14	17	65	82
4	Toledo	Ohio	9	6	42	48
5	Youngstown	Ohio	5	10	20	30

Oklahoma

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Oklahoma City	Oklahoma	8	5	28	33
2	Tulsa	Oklahoma	3	7	6	13
3	Edmond	Oklahoma	1	15	6	21
4	Haskell	Oklahoma	1	0	4	4
5	Hugo	Oklahoma	1	0	4	4

Oregon

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Portland	Oregon	12	11	46	57
2	Gresham	Oregon	3	0	15	15
3	Chiloquin	Oregon	1	2	2	4
4	Clackamas	Oregon	1	3	1	4
5	Eugene	Oregon	1	0	6	6

Pennsylvania

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Philadelphia	Pennsylvania	85	45	365	410
2	Pittsburgh	Pennsylvania	6	19	28	47
3	Lebanon	Pennsylvania	2	2	6	8
4	Reading	Pennsylvania	2	5	3	8
5	Allentown	Pennsylvania	1	0	10	10

Puerto Rico

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	San Juan	Puerto Rico	3	16	2	18
2	Trujillo Alto	Puerto Rico	1	4	1	5

Rhode Island

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Providence	Rhode Island	2	0	14	14
2	Westerly	Rhode Island	1	2	2	4

South Carolina

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Columbia	South Carolina	6	4	33	37
2	North Charleston	South Carolina	5	2	33	35
3	Charleston	South Carolina	4	10	19	29
4	Greenwood	South Carolina	4	6	18	24
5	Rock Hill	South Carolina	4	11	9	20

South Dakota

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Scotland	South Dakota	1	3	2	5
2	Sioux Falls	South Dakota	1	1	3	4

Tennessee

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Memphis	Tennessee	29	25	116	141
2	Nashville	Tennessee	15	16	60	76
3	Chattanooga	Tennessee	5	10	30	40
4	Jackson	Tennessee	4	3	14	17
5	Knoxville	Tennessee	3	2	10	12

Texas

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Houston	Texas	53	68	186	254
2	San Antonio	Texas	26	23	94	117
3	Dallas	Texas	22	24	117	141
4	Fort Worth	Texas	11	16	48	64
5	Austin	Texas	8	24	64	88

U.S. Virgin Islands

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Saint Croix	U.S. Virgin Islands	4	11	19	30
2	Contant	U.S. Virgin Islands	1	1	4	5
3	Frederiksted	U.S. Virgin Islands	1	2	2	4
4	Smith Bay	U.S. Virgin Islands	1	1	3	4

Utah

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Salt Lake City	Utah	3	8	11	19
2	Grantsville	Utah	1	4	1	5
3	Ogden	Utah	1	3	2	5
4	Salina	Utah	1	9	19	28
5	Sandy	Utah	1	3	2	5

Virginia

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Richmond	Virginia	13	11	51	62
2	Norfolk	Virginia	7	5	26	31
3	Virginia Beach	Virginia	6	16	29	45
4	Petersburg	Virginia	4	0	16	16
5	Portsmouth	Virginia	4	5	12	17

Washington

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Tacoma	Washington	9	13	37	50
2	Seattle	Washington	8	30	29	59
3	Renton	Washington	2	1	10	11
4	Sunnyside	Washington	2	1	9	10
5	Bryn Mawr-Skyway	Washington	1	2	2	4

West Virginia

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Huntington	West Virginia	2	2	9	11
2	Birch River	West Virginia	1	2	2	4
3	Elkview	West Virginia	1	4	0	4
4	New Manchester	West Virginia	1	1	5	6

Wisconsin

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Milwaukee	Wisconsin	19	25	76	101
2	Kenosha	Wisconsin	5	9	14	23
3	Racine	Wisconsin	3	1	16	17
4	Brookfield	Wisconsin	2	12	8	20
5	Madison	Wisconsin	2	0	8	8

Wyoming

	City	State	Frequency	Total_Dead	Total_Injured	Total
1	Cheyenne	Wyoming	1	2	2	4

Top 10 Safest States in the U.S.A.

10th Place: Montana

Montana is one of the safest states as it only has three mass shootings in the past 100 years, and only six deaths in those three mass shootings which accounts for a frequency of 0.26 mass shootings for each one hundred thousand people, and 0.52 deaths for each one hundred thousand people.

9th Place: Utah

Utah has had more mass shootings than Montana and a far more significant population. Utah has had eight mass shootings and twenty-seven deaths, which translates to a frequency of 0.23 mass shootings and 0.78 deaths for each one hundred thousand people.

8th Place: South Dakota

South Dakota has a slightly smaller population than Montana. It has had two mass shootings and four deaths, which translates to a frequency of 0.21 mass shootings and 0.43 deaths each one hundred thousand people.

7th Place: Wyoming

Wyoming is the state with the smallest population on this list and has had only one mass shooting with two deaths. This is the equivalent of a frequency of 0.17 mass shootings and 0.34 deaths for each one hundred thousand people.

6th Place: Puerto Rico

Puerto Rico is the only territory that made it to this list. It has the second-largest population on the list after Utah. And has had four mass shootings and twenty deaths. This translates to a frequency of 0.12 mass shootings and 0.61 deaths for each one hundred thousand people.

5th Place: Idaho

Idaho has only experienced two mass shootings and had a total of five deaths in those two mass shootings. These events account for 0.1 mass shootings and 0.25 deaths for each one hundred thousand people. It is important to mention that considering the population size of this state at nearly two million habitants, these numbers are great.

4th Place: Maine

Maine has only had one mass shooting which took three lives accounting for a frequency of 0.07 mass shootings, and 0.21 deaths for each one hundred thousand people.

3rd Place: New Hampshire

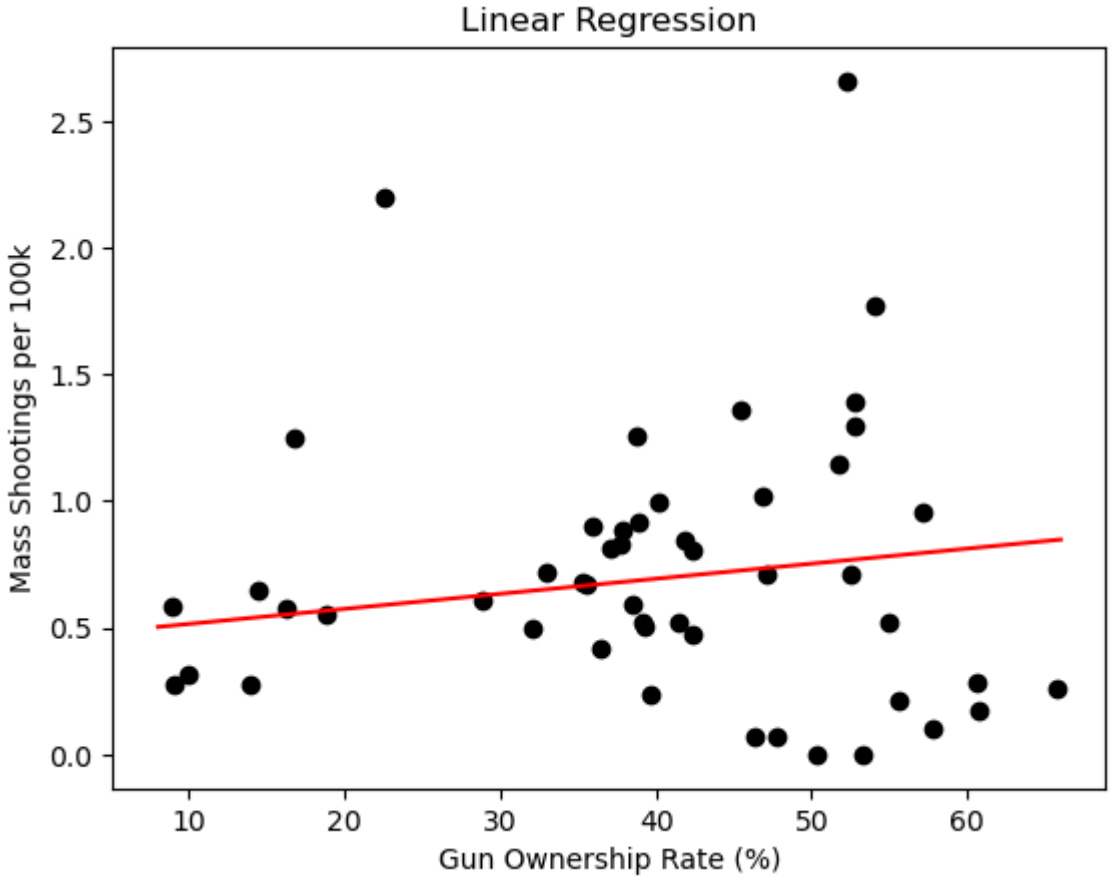
New Hampshire does extremely well, just as good as Maine but better. It has had one mass shooting but no deaths, instead, this state had four injured people. This translates to a frequency of 0.07 mass shootings and 0 deaths for each one hundred thousand people.

Second And First Place: Vermont and North Dakota

For the second and first place, there is a draw between the states of Vermont and North Dakota as they both have never had mass shootings, meaning that they are the safest places to live in the U.S.A. in terms of mass shootings.

Findings of the Linear-Regression Model

The **first** application of the linear regression model was applied to measure how much are mass shootings (Freq100k) increasing according to the Gun Ownership Rate. The following graph was the result of applying this model.



We can conclude that there is a slight increase according to the Gun Ownership Rate. For further analysis, it could be helpful to also consider finding data about how many residents of each state are hunters to filter states with higher rates of hunters and find out if the rest of the states with high gun ownership rates have higher chances of mass shootings than the excluded states.

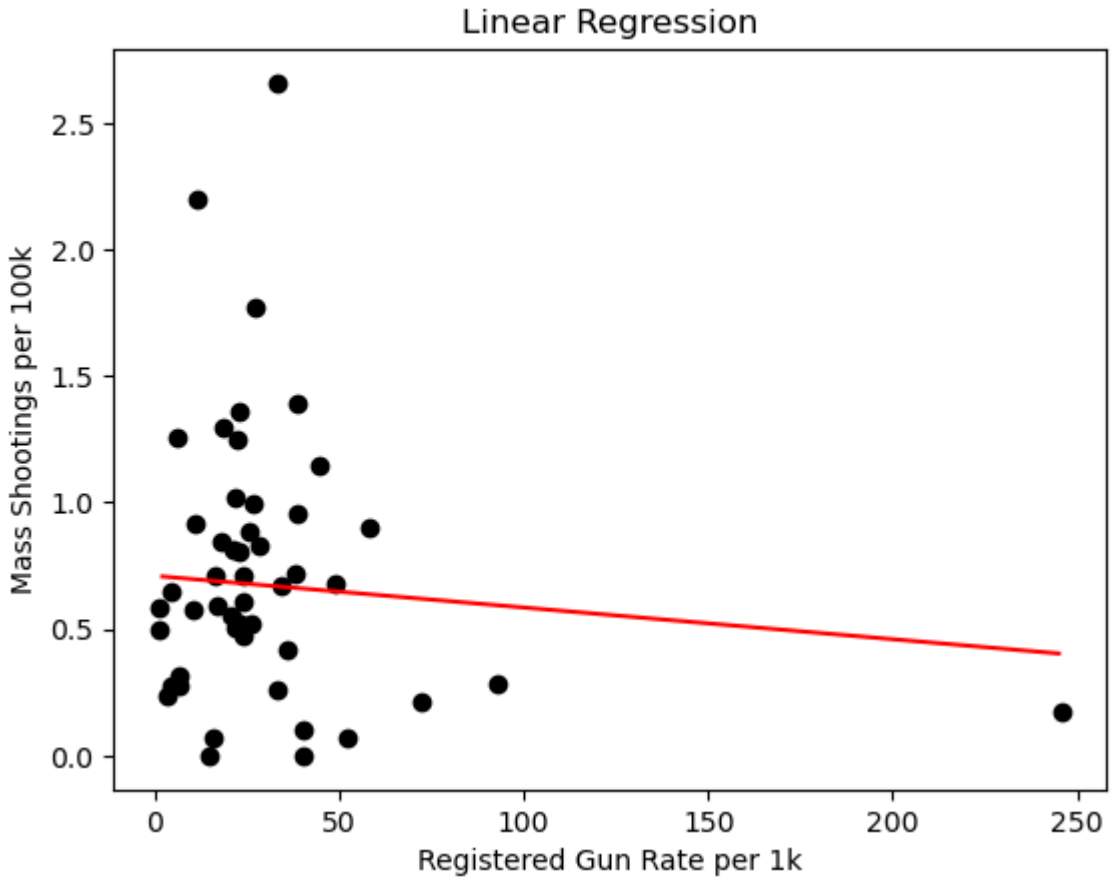
The formula for Linear Regression is:

$$\mathbf{LR = mx + b \quad || \quad LR = m * x + b}$$

The model gave the following values for the formula:

$$\mathbf{LR = 0.005942 * x + 0.456039}$$

The **second** application of the linear regression model was applied to measure how much are mass shootings (Freq100k) decreasing with a higher Registered Gun Rate. The following graph was the result of applying this model.

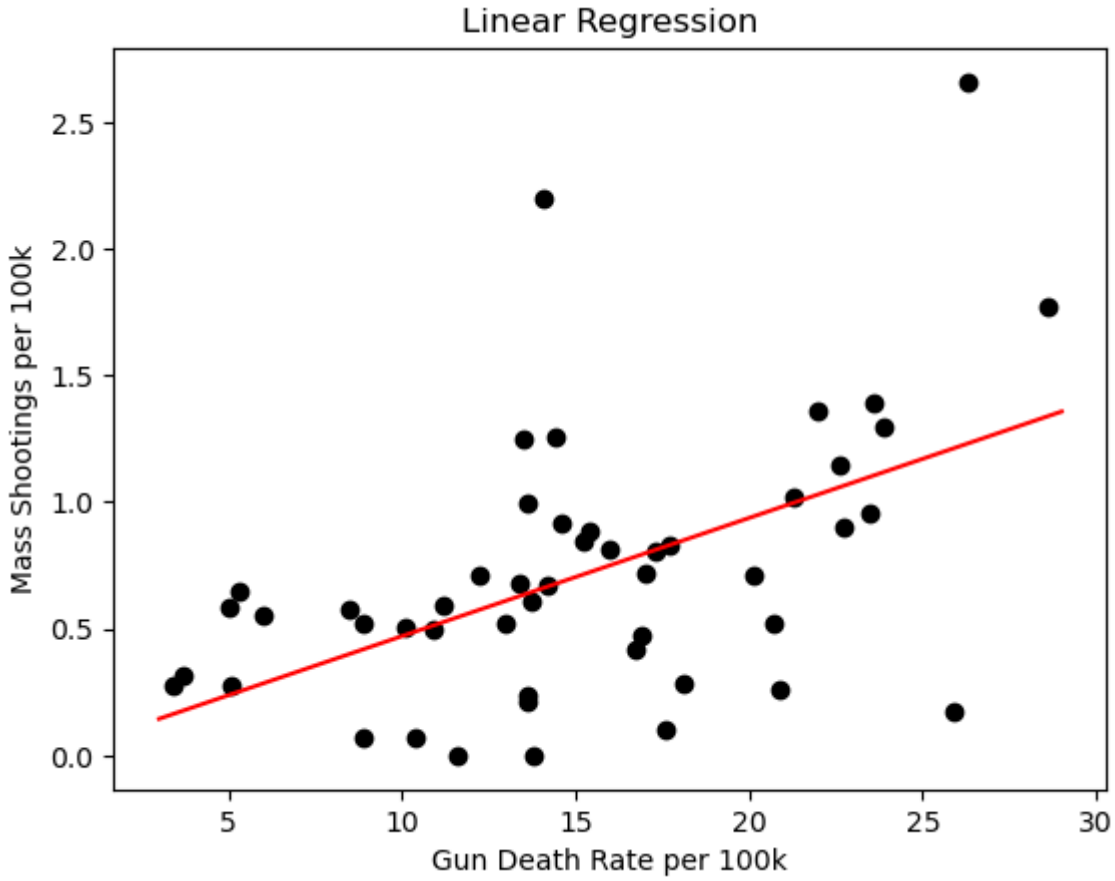


In this graph, we can appreciate too much dispersion when the rate of gun registration is low. However, even though it would be great to have more data before claiming this, it seems that as the gun registration rate approaches and passes fifty registered guns for every thousand guns, then the states become a lot safer, meaning that having more control over who owns a gun is key to a safer state.

The linear regression model gave the following values for the formula:

LR = -0.001251 * x + 0.710399

For the **third**, the linear regression model applied to gun statistics. It might seem to be pointless to investigate if there is a relationship between the gun death rate and the mass shootings rate. But let's look at the graph from these two variables.



As we can see, there are some values that move away from the proposed graph. However, there is a possible explanation for this. It turns out that for a crime to be considered a mass shooting it needs to have a minimum total of both deaths and injured of three, and it does not matter if there are zero deaths or zero injured, meaning that it is likely that the dots situated under the red line and to the right (the ones with higher gun death rate, and lower numbers of mass shootings) relate to states with lots of homicides using guns but with a total of victims (deaths + injured) of two or less.

The linear regression model gave the following values for the formula:

LR = 0.046635 * x + 0.004869