

The Everytown Research Database: Using SAS® analytic procedures to analyze mass shootings

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ABSTRACT

With mass shootings occurring every week, it can accurately be stated that mass shootings in the U.S. have reached the level of an epidemic. Everytown Research and Policy conducts independent methodically rigorous research and supports evidence-based policies to reduce the incidence of gun violence. In 2009, Everytown Research started assembling a Mass Shooting database which records key data on every mass shooting in the U.S. In this paper, I examine and explore the database using SAS® procedures to produce a series of tables, reports, graphics and visualizations. The goal of this project is to generate insights from the SAS analytics that guide the building of effective programs and policies to reduce the epidemic of mass shootings.

INTRODUCTION

Everytown for Gun Safety is the largest Gun Violence Prevention organization in the United States. Everytown for Research & Policy is the research arm of Everytown for Gun Safety. Everytown for Research and Policy conducts independent research and rigorous analyses and supports evidence-based solutions to the Gun violence epidemic. The definition of a mass shooting can vary widely, with some definitions counting dozens of mass shootings a year, while others count multiple shootings per day. Everytown Research defines a mass shooting as an incident where 4 or more people are shot and killed or wounded. Based on this definition, Everytown alleges that 19,000 people have been shot and wounded or killed since 2015. The Everytown Research database on mass shootings consists of records of mass shootings from 2009 to the present using their definition of a mass shooting. The database gets updated periodically as new mass shooting incidents occur.

THE DATABASE

The mass shooting database can be downloaded directly from the Everytown Research website. It's downloaded in CSV file format, which can be opened in Microsoft Excel. Before we analyze the data, it's necessary to extract the data, import it into SAS, and create SAS data sets. For this project, the SAS Studio interface was used, along with SAS On-demand for academics, a free non-commercial version of SAS.

In SAS Studio, I used PROC IMPORT to extract the data into SAS and create SAS datasets. The PROC IMPORT code is provided below in Figure 1. Running the PROC IMPORT code produces a SAS data set called EVERYTOWN.

```
Filename Reffile 'Massshootingsdata/Everytownresearch_Massshootings_Data.xlsx';
```

```
Proc Import Datafile=Reffile  
    Dbms=Xlsx  
    Out=Work.Everytown;  
    Getnames=Yes;
```

```
Run;
```

Figure 1. PROC IMPORT code used to read CSV file into SAS data set

VARIABLES IN THE DATABASE

Once the data has been read from the CSV file and converted into a SAS data set, the next step is to run a PROC CONTENTS. PROC CONTENTS provides the number of variables and observations in your data set, along with a list of variables and variable attributes. The list of variables from the PROC CONTENTS output is displayed in Figure 2 below.

Data Set Name	WORK.EVERYTOWN	Observations	284
Member Type	DATA	Variables	14
Engine	V9	Indexes	0
Created	08/16/2023 17:08:06	Observation Length	912

Variable	Type	Len	Format	Informat	Label
AssWpn_HC_Mag	Char	12	\$12.	\$12.	AssWpn_HC_Mag
City	Char	24	\$24.	\$24.	City
Date	Num	8	MMDDYY10.		Date
Family_Member_Fatality	Char	12	\$12.	\$12.	Family_Member_Fatality
Last updated	Char	24	\$24.	\$24.	Last updated
Latitude	Num	8	BEST.		Latitude
Longitude	Num	8	BEST.		Longitude
Narrative	Char	764	\$764.	\$764.	Narrative
Number_Fatalities	Num	8	BEST.		Number_Fatalities
Number_Injured	Num	8	BEST.		Number_Injured
Number_PeopleShot	Num	8	BEST.		Number_PeopleShot
Restriction_GunOwnership	Char	12	\$12.	\$12.	Restriction_GunOwnership
State	Char	2	\$2.	\$2.	State
Warning_Signs	Char	12	\$12.	\$12.	Warning_Signs

Figure 2. PROC CONTENTS - listing of variables in the Everytown database

From the PROC CONTENTS output, you'll notice the data set contains 14 variables, including the date the shooting occurred, the city and state where the shooting occurred, and quantitative variables on the number of people shot, the number injured, and the number of fatalities there were. Also included is Narrative, a free-format text variable, which lists details of the shooting incident.

Of the 14 variables in the dataset, 8 variables are character variables, and 6 variables are numeric. Not all the variables in the data set are of interest from an analytic standpoint. Last updated is an administrative variable which defines the date the data set was last updated. Latitude and Longitude are of analytic interest to the extent we can plot and graph the coordinates and produce a GIS map of the shootings. Producing GIS Maps is outside the scope of this paper.

Removing the 3 extraneous variables leaves us with 11 variables in our analysis data set, 7 character variables and 4 numeric variables. The character variables are categorical variables with a discrete set of values. These variables will provide us with groups or subgroups for our analysis, with the exception of the Narrative variable. In providing a text description of the shooting incident, Narrative includes other important details of the shooting, such as the location and place where it occurred.

Location and place where the shooting occurred might be important factors which assist our understanding of the shootings. As an unformatted text variable, Narrative can be manipulated to extract information on the location and the type of facility, and store them in variables.

EXAMINING AND VALIDATING THE DATA SET

Besides examining the descriptor portion of the data set using PROC CONTENTS, it's important to view the data portion of the SAS data set. PROC PRINT and PROC FREQ are both good constructs to examine the data values of the data set. PROC PRINT generates a record-level listing of the data set. Using the OBS= data set option, I selected the first 20 records of the data set and produced a detail report using PROC PRINT. The SAS Code and Output are provided in Figure 3 below.

```
Proc Print Data=EveryTown(Obs=20);
  Var Date State City Number_PeopleShot Number_Injured
      Number_Fatalities Family_Member_Fatality
      Restriction_GunOwnership Warning_Signs AssWpn_HC_Mag;
  Title1 'Mass Shootings - United States';
  Title2 '2009 to Present';
Run;
```

Date	State	City	Shot	Injured	Fatalities	Family_Fatal	Restrictions	Signs	Assault_HC
01/27/2009	CA	Wilmington	6	0	6	Yes	No	No	No
02/14/2009	NY	Brockport	5	1	4	No	No	Yes	No
03/05/2009	OH	Cleveland	6	1	5	Yes	Yes	No	No
03/10/2009	AL	Coffee and Geneva County	14	4	10	Yes	No	No	Yes
03/15/2009	FL	Miami	4	0	4	Yes	No	No	Yes
03/21/2009	CA	East Oakland	5	1	4	No	Yes	Yes	Yes
03/29/2009	CA	Santa Clara	6	1	5	Yes	No	No	No
03/29/2009	NC	Carthage	11	3	8	No	No	Yes	No
04/03/2009	NY	Binghamton	17	4	13	No	No	Yes	Yes
04/04/2009	WA	Graham	5	0	5	Yes	No	Yes	No
04/06/2009	AL	Green Hill	4	0	4	Yes	No	Yes	No
04/19/2009	MD	Middletown	4	0	4	Yes	No	No	No
06/22/2009	KS	Kansas City	4	0	4	Yes	Yes	Yes	No
08/27/2009	GA	Lawrenceville	5	1	4	Yes	No	No	No
11/01/2009	NC	Mount Airy	4	0	4	No	Yes	Yes	Yes
11/05/2009	TX	Fort Hood	45	32	13	No	No	No	Yes
11/09/2009	OK	Oklahoma City	4	0	4	No	Yes	No	No
11/12/2009	AR	Pearcy	5	0	5	No	No	Yes	No
11/26/2009	FL	Jupiter	6	2	4	Yes	Yes	No	No
11/28/2009	KS	Osage	4	0	4	Yes	No	Yes	Yes

Figure 3. PROC PRINT code and output, EveryTown data set

The PROC PRINT output was generated using the ODS EXCEL destination. A copy of the output was copied and pasted from the produced excel workbook. The variable names have been shortened from the SAS data set variable names to fit the output on the page. The output doesn't include the 3 variables dropped from the dataset (Latitude, Longitude, and Last_Updated) and doesn't include Narrative.

The data set includes four categorical variables which contain binary (YES/NO) values. Family_Fatal indicates whether a family member of the shooter was killed in the shooting. Restrictions define if the shooter was legally barred from owning firearms. Signs documents if there were warning signs of the shooting which were present. Assault_HC indicates if there was an Assault Weapon and/or High-Capacity Magazine used in the shooting.

These additional variables provide useful subgroup variables in the analysis data set which might reveal significant insights in the data set.

DATA MANIPULATION

Before we generate frequency tables on the variables, it's prudent to derive a few new variables which may provide us with analytic insights into mass shootings. Earlier, we discussed the variable Narrative, and how the shooting location can be extracted from this variable. In addition, in order to look at trends in mass shootings over time, it's worthwhile to have variables such as Month and Year that the shooting took place. We have the date when the shooting occurred. We just need to extract the month using the MONTH() function, and the year using the YEAR() function.

We found a number of words present in the Narrative variable which describe the location or place of a mass shooting. However, in order to search a long string for a substring or a specific word, we need to use SAS character string functions, such as the FIND function or the INDEX function. Both the FIND() and the INDEX() function return a numeric value indicating the position of the word in the string, if the word is found in the substring. If the word is not found the functions return a 0.

In Figure 4 below, is an excerpt from a SAS program which manipulates the EveryTown data set and uses the FIND function to search Narrative for specific words in an IF-THEN-ELSE series. The function takes a third argument, which is the 'i' modifier. The 'i' modifier is used to ignore case when searching for words.

```
Data ET.EveryTown;
    Length Location $25;
Set EveryTown;

Year_Shooting = Year(Date);
Month_Shooting = Month(Date);

If (FIND(Narrative, 'home', 'i')>0 and FIND(Narrative, 'nursing home', 'i')=0) or
    FIND(Narrative, 'house', 'i')>0 or FIND(Narrative, 'homes', 'i')>0 or
    FIND(Narrative, 'apartment', 'i')>0 or FIND(Narrative, 'residence', 'i')>0 or
    FIND(Narrative, 'residences', 'i')>0 or FIND(Narrative, 'trailer', 'i')>0 or
    FIND(Narrative, 'townhouse', 'i')>0 or FIND(Narrative, 'garage', 'i')>0 or
    FIND(Narrative, 'party', 'i')>0 or FIND(Narrative, 'Social Gathering', 'i')>0 or
    FIND(Narrative, 'backyard', 'i')>0 Then Location='Residence';
```

Figure 4. DATA STEP excerpt using FIND and other functions

We search for records where the FIND() function returns a value greater than 0 (>0), because we know this represents the position of the substring within the string. I could've also used the FINDW() function which searches for the presence of a word (not a substring) in a substring.

In the DATA STEP, I also use the YEAR() and MONTH() functions to create new variables for the year and month the shooting occurred, respectively. The program in Figure 4 is just an excerpt, as the entire program is provided in the appendix of this paper.

FREQUENCY TABLES

Now that we have derived new variables Location and Month and Year of the shooting, we need to generate frequency tables on these and other variables in the data set for validation and to produce analytic insights. Usually, we only produce frequency tables for character variables. To produce frequency tables, we use PROC FREQ.

With the ORDER= option, there is the capability to display the frequencies in specific sorted order. In our code, we use the ORDER=FREQ option to display the results by descending order of frequency. In Figure 5, which is provided below, we include the PROC FREQ code we used to produce the frequency tables, including the ORDER=FREQ option.

```
Proc Freq Data = ET.EveryTown Order=Freq;
  Tables AssWpn_HC_Mag Warning_Signs
         Family_member_fatality Restriction_GunOwnership
         State Year_Shooting Month_Shooting
         Location / List Missing;
  Title1 'One-Way Frequencies';
  Title2 'Everytown Research database';
Run;
```

State	Frequency	Percent
TX	32	11.27
CA	30	10.56
FL	17	5.99
IL	15	5.28
OH	14	4.93
WA	10	3.52
AZ	9	3.17
NC	9	3.17
GA	8	2.82
IN	8	2.82

Location	Frequency	Percent
Residence	151	53.17
Other Place	56	19.72
Professional Office	27	9.51
Unknown	16	5.63
School	7	2.46
Restaurant	5	1.76
Retail Store	4	1.41
Bar/Nightclub	3	1.06
Place of Worship	3	1.06
Beauty Salon	2	0.70
Government Facility	2	0.70

Figure 5. PROC FREQ code and output for State and Location variables

In Figure 5, two Frequency Tables are listed below the PROC FREQ SAS code. Frequency tables for only 2 variables, State and Location, are provided. The frequencies for the remaining variables are provided in the appendix at the end of the paper. Further, only the first ten rows of the SAS output have been included in the tables in Figure 5 for the sake of conserving space.

In reviewing the output in Figure 5, there some interesting findings to point out. In the last 14 years, the states with the highest number of mass shootings were Texas, California, and Florida. Texas had the highest number respectively at 32. This finding makes sense, considering Texas has one of the highest levels of gun ownership amongst its population.

For the other variable, Location, the findings perhaps weren't quite as interesting. Locations with the highest number of mass shootings were Private Residences (151) and Other Places (56). It's worthwhile to note, however, that 9.5% of the mass shootings took place in professional offices, and 2.5% of mass shootings took place in schools. This percentage may be relatively small by itself. However, the numbers may be significant by looking at cross-tabulations with other variables.

TRENDS IN THE DATA

In analyzing trends in mass shootings, it's prudent to use graphical visualizations to represent trends over time. In the data manipulation phase of this project, we created two new variables, Year and Month from the date the mass shooting occurred. Visualizations give us the ability to use different types of graphs and charts to depict trends, such as line graphs, bar charts, pie charts, etc.

In the previous section, we used PROC FREQ to generate frequency counts on the number of mass shootings by a number of variables in the EveryTown database. Many SAS analytic procedures have the capability to store results in an output SAS data set which contains summary data. With PROC FREQ, you can produce an output data set pertaining to each frequency table being produced. To perform this, you need to specify a data set using the OUT= option on each TABLES statement.

Figure 6 below shows the SAS code using the OUT=option on the TABLES statement for PROC FREQ.

```
Proc Freq Data = ET.EveryTown Noprint;  
  Tables Year_Shooting / Out=Shootings_Year List Missing;  
  Tables Month_Shooting / Out=Shootings_Month List Missing;  
Run;
```

Figure 6. PROC FREQ code for creating output data sets

The code in Figure 6 creates 2 separate SAS data sets for year and month, respectively. Now the data is in a summary format where it can be plugged into other SAS procedures to produce visualizations.

In BASE SAS, ODS Graphics give us the capability of producing high-quality visualizations which depict analytic trends in events such as mass shootings. Using PROC SGPLOT, you can produce a variety of types of graphs and charts, such as line graphs and bar charts. Taking the output data sets from Figure 6, we then plugged them into PROC SGPLOT to produce a vertical line plot graphing the number of mass shootings by Year. In Figure 7 below is the SAS code and output.

```
Proc SGPlot Data=Shootings_Year;  
  VLine Year_Shooting / Response=Count;  
  YAxis Min=0 Max=100;  
  Title1 'Number of Mass Shootings by Year';  
Run;
```

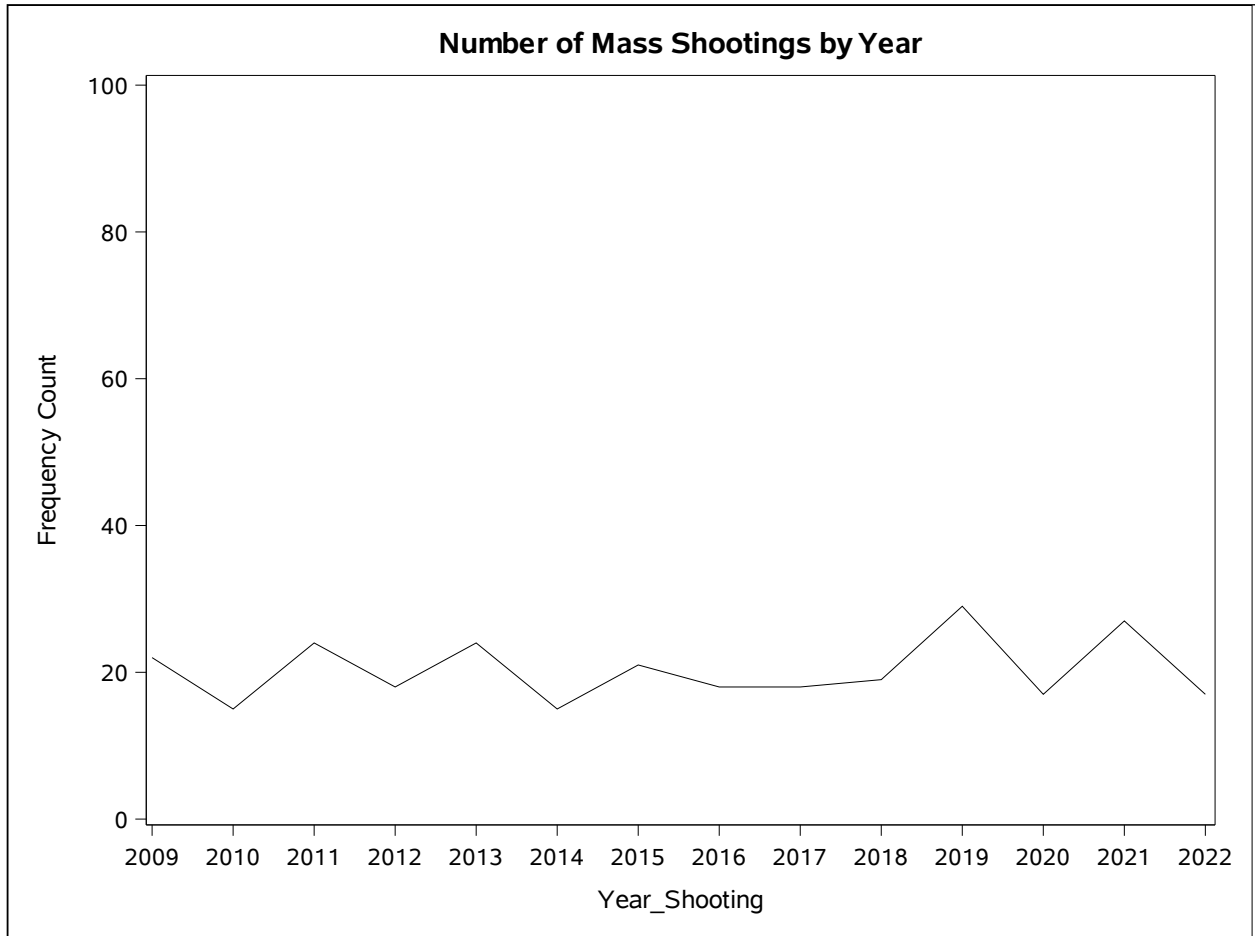


Figure 7. PROC SGPLOT Output - Line graph of Mass Shootings by Year

The vertical line graph in Figure 7 plots the number of mass shootings on the Y axis, and year the shooting occurred on the X axis.

From 2019-2022, the number of mass shootings in the United States stayed relatively constant overall. The graph does show a lot of fluctuation in the number of graphs from one year to the next. In some years, sharp increases in shootings were followed by sharp decreases in shootings or decreases in shootings over the next 1-2 years.

The number of shooting incidents stayed within the range of between 18-30 events per year over this time frame. However, you'll notice that the 2 years with the highest number of shootings were in 2019, and 2021, respectively. The years with the 2 highest levels of shootings both were in the last 5 years.

DESCRIPTIVE STATISTICS – NUMERIC VARIABLES

Besides a frequency count of the number of mass shootings, statistics on the number of fatalities, the number of people injured, and the number of people shot can provide useful metrics in measuring the extent of the mass shooting epidemic. Number of fatalities is specifically the number of people killed in the shooting incident.

BASE SAS includes many procedures to analyze numeric variables. These procedures include PROC MEANS, PROC SUMMARY and PROC UNIVARIATE as well as others. I selected PROC MEANS to run basic descriptive statistics on the number of fatalities, number injured, and number of people shot using the Everytown database. The SAS code and output are presented below in Figure 8.

```
Proc Means Data=ET.EveryTown N Mean Median Std Min Max Maxdec=1;
  Var Number_Fatalities
      Number_Injured
      Number_PeopleShot;
  Title1'Number of Deaths, Injuries, and Total Individuals Shot';
  Title2'Everytown Research database';
Run;
```

Variable	Label	N	Mean	Median	Std Dev	Minimum	Maximum
Number_Fatalities	Number_Fatalities	284	5.6	4.0	5.1	4.0	60.0
Number_Injured	Number_Injured	284	3.6	0	25.2	0	411.0
Number_PeopleShot	Number_PeopleShot	284	9.3	5.0	29.2	4.0	471.0

Figure 8. Proc Means SAS code/output - Statistics on Fatalities, Injured and People Shot

In the PROC MEANS statement, you list the specific statistics to be computed and displayed in the SAS Output. I selected N (Frequency count), Mean (Average), Median, Minimum and Maximum values, as well as the Standard Deviation.

The SAS Output in Figure 8 shows the average number of fatalities in a mass shooting was 5.6, while the range in the number of fatalities went from the minimum of 4.0 to a maximum of 60. The average number of people injured was 3.6, which ranged from a minimum of 0 to a maximum of 411 people. The average number of people shot in a mass shooting was 9.3, with a range going from a minimum of 4 to a maximum of 471 people shot.

Apart from the raw number of mass shooting incidents, the number of fatalities, people injured, and people shot provides a more accurate depiction of the magnitude and impact of a mass shooting. For instance, the number of mass shooting may stay relatively constant from one year to the next. However, if the number of fatalities is increasing, then you can make an argument that mass shootings are actually getting worse.

COMPLEX REPORTS AND VISUALIZATIONS

In Figure 5, earlier in the paper, we looked at a frequency distribution for location of the mass shooting. From the output, we could tell that shootings occurred in various locations in public, as well as in private residences. The public locations consist of Schools, Retail stores such as Walmart, Hospitals, Gas Stations, Grocery Stores, Churches and other places of worship, Bars and Nightclubs, Restaurants, Professional Offices, Beauty Salons, and Government agencies.

Taking a look at each of the specific locations individually doesn't draw out differences in mass shootings. However, if we're to lump the specific categories into a general group of non-residential settings, this may reveal some patterns when compared to residential settings.

I decided to manipulate the data further, and compute a new variable, Location_group. Using The DATA STEP and IF-THEN-ELSE conditional logic, I created a new variable, Location_group, based on the variable Location. I coded all of the specific public locations and settings as 'Non-Residential'. Settings of 'Residence' were coded to 'Residential'.

In Figure 8 in the previous section, we computed descriptive statistics for the number of fatalities, people injured, and people shot. From an analytic standpoint, it might be worthwhile to look at these analytic variables within categories of Location_Group. Further, analyzing these variables within geographic levels, such as State, might yield state-to-state or even regional differences.

PROC REPORT is a powerful BASE SAS reporting construct for producing complex reports. It can construct reports of multiple dimensions, columnar reports, and detail as well as summary reports. I used PROC REPORT to generate a summary report of the analytic variables by State and Location_Group. The PROC REPORT code is listed in Figure 9 below.

```
Proc Report Data=EveryTown2 Headline Headskip;
  Column State Location_Group Number_Fatalities Number_Injured Number_PeopleShot;

  Define State / Group;
  Define Location_Group / Group;
  Define Number_Fatalities / Analysis Sum Order=Freq;
  Define Number_Injured / Analysis Sum Order=Freq;
  Define Number_PeopleShot / Analysis Sum Order=Freq;

  Compute After State;
    Line ' ';
  EndComp;

  Where State in('TX', 'CA', 'FL', 'IL', 'OH');

  Title1'Number of Fatalities, Injured, and People Shot';
  Title2'By State and Location Group';

  Footnote1'From 2009-2023';
Run;
```

Figure 9. PROC REPORT code - Report by State and Location_Group

In PROC REPORT, the variables that will be displayed in the report need to be included in the COLUMN statement. Thus, In the PROC REPORT code in Figure 9, there are 5 variables in the COLUMN statement. State and Location have been defined as Group variables in DEFINE statements.

The remaining variables; Number_Fatalities, Number_Injured, and Number_PeopleShot are defined as analysis variables. The SUM and ORDER=FREQ options have been specified in the DEFINE statements for each of these variables to indicate that the values for the variables should be summed within categories of State and Location. Also, the data in the output will be ordered according to the frequency count for State and Location.

I inserted a line break after each distinct value of State, using a COMPUTE BLOCK. You can also create line breaks using the BREAK AFTER statement, but not in SAS Studio which outputs in HTML. The output in the report is restricted to the 5 states with the highest numbers of shootings, Texas, California, Florida, Illinois, and Ohio. The report produced by the code is presented below in Figure 10.

State	Location_Group	Number of Fatalities	Number of People Injured	Number of Shooting Victims
CA	Non-Residential	81	13	94
	Private Residence	76	63	139
FL	Non-Residential	98	83	181
	Private Residence	30	1	31
IL	Non-Residential	33	60	93
	Private Residence	32	6	38
OH	Non-Residential	33	19	52
	Private Residence	36	2	38
TX	Non-Residential	126	149	275
	Private Residence	82	16	98

Figure 10. Number of fatalities, injured and People Shot by State and Location_Group

By reviewing the output in Figure 10, some interesting patterns are revealed. In CA, IL, and OH, there was a relatively equal split in fatalities between Private Residential, and Non-Residential locations. The numbers injured and shot were substantially higher in non-residential settings in both Ohio and Illinois. However, in CA the opposite was true, with numbers substantially higher in private residential settings.

In Florida and Texas, the level of fatalities, injured, and people shot were dramatically higher in non-residential settings versus private residences. These discrepancies indicate that in these two states increased attention should be given to public safety and security in commercial and public buildings and facilities. There are other variables in the database which should be explored which can reveal insights into the trends of mass shootings in the US. Specifically, the use of an assault weapon or high-capacity magazine involved in the mass shooting.

From a rational perspective, the use of assault weapons carries with it the potential to inflict exponentially more fatalities, injuries, and shooting victims, than a regular handgun, because its an automatic or semi-automatic weapon and can carry many more rounds in one magazine. To document the impact that assault weapons really have, however, its necessary to examine empirical evidence through data.

The database contains the variable AssWpn_HC_Mag, which records if the mass shooting was perpetrated using an assault weapon or high-capacity magazine. Subsetting our data set where records have the value AssWpn_HC_Mag='Yes' and then summarizing the variables for fatalities, injured, and shooting victims would yield some interesting trends. To produce this analysis, I chose PROC SQL. In Figure 11 below is the PROC SQL code.

```
Proc Sql;
  Create Table Shoot_AW_Sum As
  Select Year_Shooting,
         Count(*) as Num_Shootings,
         Sum(Number_Fatalities) as Total_Fatalities,
         Sum(Number_Injured) as Total_Injured,
         Sum(Number_PeopleShot) as Total_Shot
  From ET.Everytown
  Where AssWpn_HC_Mag='Yes'
  Group By Year_Shooting;
Quit;
```

Figure 11. PROC SQL code - analysis of shootings with assault weapons by year.

For the analysis, I grouped the results by year of the shooting. Also, I included a count of the number of shootings as one of the variables, and created a new SAS data set, Shoot_AW_Sum. To depict trends in shootings with assault weapons, I used this summary data set to create line graphs and charts with PROC SGPLOT. The PROC SGPLOT code is presented in Figure 12 below.

```
Proc SGPlot Data=Shoot_AW_Sum;
  Series X=Year_Shooting Y=Num_Shootings / lineattrs=(pattern=solid);
  Series X=Year_Shooting Y=Total_Fatalities / lineattrs=(pattern=solid);
  Series X=Year_Shooting Y=Total_Injured / lineattrs=(pattern=solid);
  Series X=Year_Shooting Y=Total_Shot / lineattrs=(pattern=solid);

  YAxis Min=0 Max=200;
  Where 2020<=Year_Shooting<=2022;
  Title1 'Number of Shootings, Fatalities, Injured, and Shooting Victims';
  Title2 'In Shootings with Assault Weapons or High-Capacity Magazines';
  Title3 'By Year';
  Footnote1 'From 2020-2022';
Run;
```

Figure 12. PROC SGPLOT Code to produce line graphs

One of the capabilities of PROC SGPLOT is to graph multiple series and linear trends on the same axes. Using the SERIES statement, I graphed separate linear trends for number of shootings, number of fatalities, number of people injured and number of shooting victims. The graph produced by the PROC SGPLOT code is displayed in Figure 13 below.

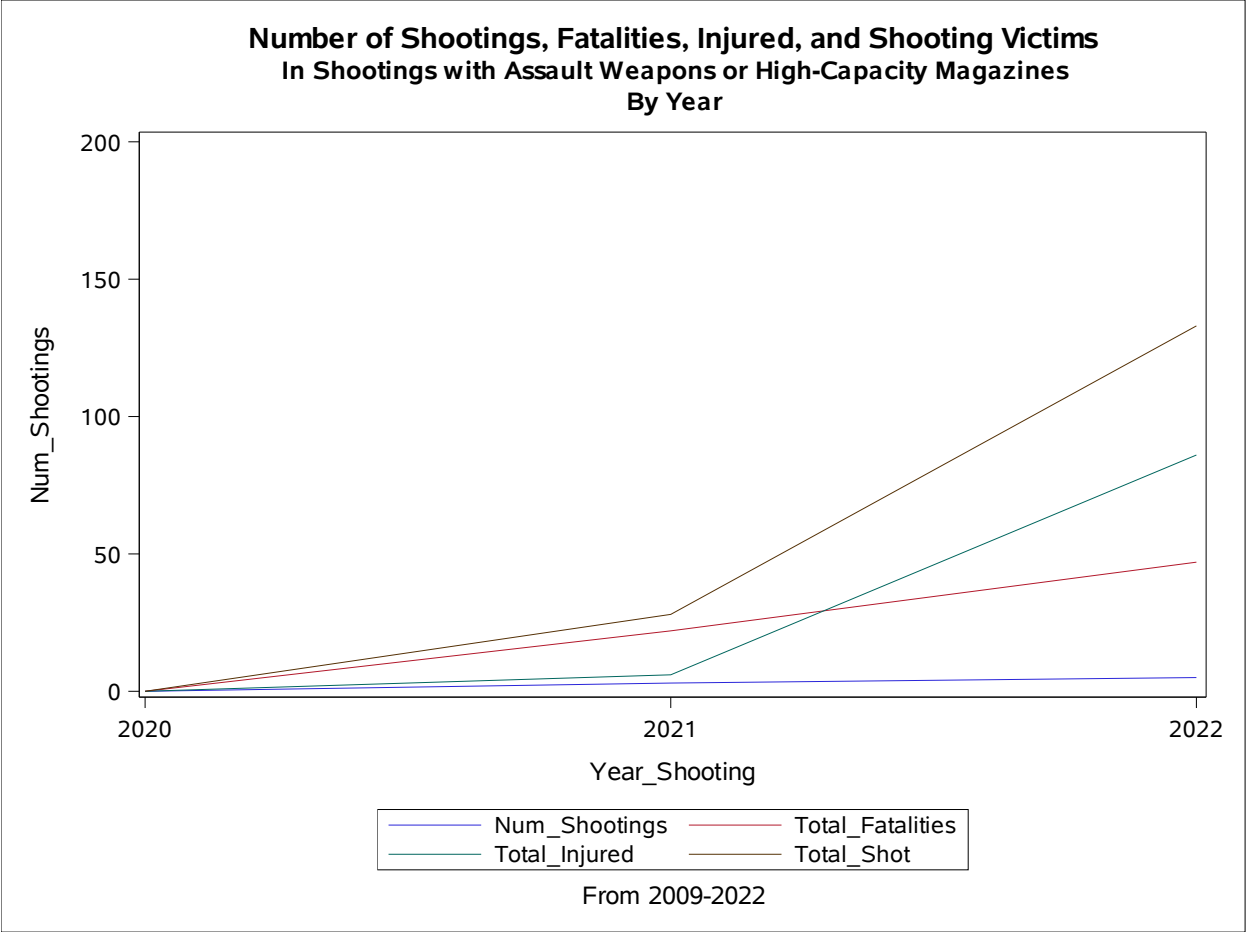


Figure 13. Graph of Shootings/Fatalities/Injured/People Shot by Year for 2020-2022

In order to make the trends in the data more visible, I limited the data in the graph to the last three years, 2020 to 2022. The data points mapped on the graph are limited to shooting incidents involving assault weapons or high-capacity magazines. I also included a trend line for the number of shootings.

The graphed lines clearly show increases in shooting victims (brown), people injured (green), and fatalities (red) over the last three years from 2020 to 2022. Shootings with assault weapons were at a low point in 2020 due to the pandemic, when there were restrictions in place regarding access to public and commercial building and facilities, such as retail stores, grocery stores, airports, churches, etc.

Both the number of injured in shootings, and the number of people shot show dramatic increases from 2021, where they were at a level of less than 25 for shooting victims, and under 10 for injured persons to 2022, where they rose to a level close to 150 for shooting victims, and a least 75 for persons injured in a shooting. In addition, an examination of the raw number of mass shootings (blue line) with an assault weapon shows an increase.

CONCLUSION

EveryTown Research and Policy has compiled and released a database of mass shootings full of valuable information. Through BASE SAS and the DATA STEP, this database can be manipulated to produce an analysis data set. Using BASE SAS analytic and reporting procedures this data can be validated and analyzed to generate insights that address the problem of mass shootings and gun violence. With ODS graphics and PROC REPORT, visualizations and complex reports can be produced which depict the state of mass shootings. These reports highlight subgroups to focus on for policy and program efforts directed at reducing the level of mass shootings.

REFERENCES

EveryTown for Gun Safety Support Fund, EveryTown Research and Policy. "Mass Shootings in the United States, an EveryTown for Gun Safety Support Fund Analysis. Mass Shootings with Four or more people Killed, Download the Data", Updated March 2023. <https://everytownresearch.org/mass-shootings-in-america/>

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Appendix I – SAS Code/Log

```
1      OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
NOTE: ODS statements in the SAS Studio environment may disable some output features.
73
74      FILENAME REFFILE '/home/iyenj/MassShootingsData/Everytown_091623.xlsx';
75      LIBNAME ET '/home/iyenj/MassShootingsData';
NOTE: Libref ET was successfully assigned as follows:
      Engine:          V9
      Physical Name: /home/iyenj/MassShootingsData
76
77      OPTIONS ORIENTATION=LANDSCAPE;
78
79      Proc Import Datafile=REFFILE
80      DBMS=XLSX
81      OUT=EveryTown
82      Replace;
83      GETNAMES=YES;
84      Run;
```

NOTE: One or more variables were converted because the data type is not supported by the V9 engine. For more details, run with options MSGLEVEL=I.

NOTE: The import data set has 299 observations and 14 variables.

NOTE: WORK.EVERYTOWN data set was successfully created.

NOTE: PROCEDURE IMPORT used (Total process time):

real time	0.05 seconds
user cpu time	0.05 seconds
system cpu time	0.00 seconds
memory	3913.78k
OS Memory	28156.00k
Timestamp	09/20/2023 07:04:49 PM
Step Count	24
Switch Count	2
Page Faults	0
Page Reclaims	1181
Page Swaps	0
Voluntary Context Switches	16
Involuntary Context Switches	1
Block Input Operations	120
Block Output Operations	896

```
85
86      /* Contents of Mass Shooting Data set */
87      Proc Contents Data=EveryTown;
88      Run;
```

NOTE: PROCEDURE CONTENTS used (Total process time):

real time	0.06 seconds
user cpu time	0.06 seconds
system cpu time	0.00 seconds
memory	3487.53k
OS Memory	28204.00k
Timestamp	09/20/2023 07:04:50 PM
Step Count	25
Switch Count	0

```

Page Faults                2
Page Reclaims              1216
Page Swaps                  0
Voluntary Context Switches 4
Involuntary Context Switches 0
Block Input Operations      240
Block Output Operations     24

```

```

90      ODS Excel File = "/home/iyenj/MassShootingsData/EveryTown_Sample.xlsx";
91
92      /* Print out a Sample of the Shooting Records */
93      Proc Print Data = EveryTown (Obs=30);
94          Var Date State City Number_PeopleShot Number_Injured Number_Fatalities
              Family_Member_Fatality Restriction_GunOwnership Warning_Signs
              AssWpn_HC_Mag;
95          Title1 'Mass Shootings - United States';
96          Title2 '2009 to Present';
97      Run;
98

```

NOTE: There were 30 observations read from the data set WORK.EVERYTOWN.

NOTE: PROCEDURE PRINT used (Total process time):

```

real time          0.15 seconds
user cpu time      0.16 seconds
system cpu time    0.00 seconds
memory             5247.71k
OS Memory          40012.00k
Timestamp          09/20/2023 07:04:50 PM
Step Count         26  Switch Count  2
Page Faults        0
Page Reclaims      1304
Page Swaps         0
Voluntary Context Switches 21
Involuntary Context Switches 0
Block Input Operations 0
Block Output Operations 40

```

```

99
100     ODS Excel Close;
NOTE: Writing EXCEL file: /home/iyenj/MassShootingsData/EveryTown_Sample.xlsx
101
102     /* Manipulate the Data set */
103     Data ET.EveryTown;
104     Length Location $25;
105     Set EveryTown;
106
107     Year_Shooting = Year(Date);
108     Month_Shooting = Month(Date);
109
110     If (FIND(Narrative, 'home', 'i')>0 and
111         FIND(Narrative, 'nursing home', 'i')=0) or
112         FIND(Narrative, 'house', 'i')>0 or
113         FIND(Narrative, 'homes', 'i')>0 or
114         FIND(Narrative, 'apartment', 'i')>0 or

```

```

115         FIND(Narrative, 'residence', 'i')>0 or
116         FIND(Narrative, 'residences', 'i')>0 or
117         FIND(Narrative, 'trailer', 'i')>0 or
118         FIND(Narrative, 'townhouse', 'i')>0 or
119         FIND(Narrative, 'garage', 'i')>0 or
120         FIND(Narrative, 'party', 'i')>0 or
121         FIND(Narrative, 'Social Gathering', 'i')>0 or
122         FIND(Narrative, 'backyard', 'i')>0 Then Location='Residence';
123
124     Else If FIND(Narrative, 'School', 'i')>0 or
125         FIND(Narrative, 'high school', 'i')>0 or
126         FIND(Narrative, 'College', 'i')>0 Then Location='School';
127
128     Else If FIND(Narrative, 'Association', 'i')>0 Or
129         FIND(Narrative, 'business', 'i')>0 Or
130         FIND(Narrative, 'newspaper', 'i')>0 Or
131         FIND(Narrative, 'office', 'i')>0 Or
132         FIND(Narrative, 'place of employment', 'i')>0 Or
133         FIND(Narrative, 'Co.', 'i')>0 Or
134         FIND(Narrative, 'Company', 'i')>0
135         Then Location = 'Professional Office';
136
137     Else If FIND(Narrative, 'Church', 'i')>0 Or
138         FIND(Narrative, 'synagogue', 'i')>0 Or
139         FIND(Narrative, 'temple', 'i')>0 Then Location='Place of Worship';
140
141     Else If FIND(Narrative, 'Restaurant', 'i')>0 Or
142         FIND(Narrative, 'coffee shop', 'i')>0 Then Location='Restaurant';
143
144     Else If FIND(Narrative, 'Municipal Center', 'i')>0 Or
145         FIND(Narrative, 'army Base', 'i')>0 Or
146         FIND(Narrative, 'Navy Yard', 'i')>0 Or
147         FIND(Narrative, 'Naval Reserve', 'i')>0
148         Then Location='Government Facility';
149
150     Else If FIND(Narrative, 'Hospital', 'i')>0 Or
151         FIND(Narrative, 'Nursing Home', 'i')>0 Then Location='Healthcare Facility';
152
153         Else If FIND(Narrative, 'Walgreens', 'i')>0 Or
154             FIND(Narrative, 'Walmart', 'i')>0 Or
155             FIND(Narrative, 'store', 'i')>0 Or
156             FIND(Narrative, 'Pharmacy', 'i')>0 Then Location='Retail Store';
157
158         Else If FIND(Narrative, 'Health Spa', 'i')>0 Or
159             FIND(Narrative, 'Hair Salon', 'i')>0 Or
160             FIND(Narrative, 'Barbershop', 'i')>0 Then Location='Beauty Salon';
161
162         Else If FIND(Narrative, 'bar', 'i')>0 Or
163             FIND(Narrative, 'nightclub', 'i')>0 Then Location='Bar/Nightclub';
164
165         Else If FIND(Narrative, 'Supermarket', 'i')>0 Or
166             FIND(Narrative, 'Market', 'i')>0 Then Location='Grocery Store';
167
168     Else If FIND(Narrative, 'gas station', 'i')>0 Then Location='Gas station';

```



```

168 Else If FIND(Narrative, 'movie theatre', 'i')>0 Then Location='Cinema';
169
170 Else If FIND(Narrative, 'Music Festival', 'i')>0 Then Location='Concert';
171
172 Else If FIND(Narrative, 'Airport', 'i')>0 Then Location='Airport';
173
174 Else If FIND(Narrative, 'Indian Reservation', 'i')>0 Then Location='Indian
Reservation';
175
176 Else If FIND(Narrative, 'Bank', 'i')>0 Then Location='Bank';
177
178 Else If FIND(Narrative, 'Shopping Mall', 'i')>0 Then Location='Shopping Mall';
179
180 Else If FIND(Narrative, 'X', 'i')>0 Then Location='Unknown';
181
182 Else Location='Other Place';
183
184 Label AssWpn_HC_Mag = 'Assault Weapon or High-Capacity Magazine'
185     City = 'City where shooting occurred'
186     Location='Place where shooting incident occurred'
187     Date = 'Date of Shooting'
188     Family_Member_Fatality = 'Fatalities are Family Member of the Shooter'
189     Last_updated = 'Shooting Record Last Updated'
190     Latitude = 'Geographic Latitude of Shooting'
191     Longitude = 'Geographic Longitude of Shooting'
192     Narrative = 'Descriptive details of Shooting'
193     Number_Fatalities = 'Number of People Killed (Fatalities)'
194     Number_Injured = 'Number of People Injured'
195     Number_PeopleShot = 'Number of Shooting Victims'
196     Restriction_GunOwnership = 'Shooter Restricted from Gun Ownership'
197     State = 'State where Shooting Occurred'
198     Warning_Signs = 'Warning Signs of Shooting\Shooter Present';
199 Run;

```

NOTE: There were 299 observations read from the data set WORK.EVERYTOWN.

NOTE: The data set ET.EVERYTOWN has 299 observations and 17 variables.

NOTE: DATA statement used (Total process time):

```

real time          0.02 seconds
user cpu time      0.00 seconds
system cpu time    0.01 seconds
memory            1677.25k
OS Memory         32812.00k
Timestamp         09/20/2023 07:04:50 PM
Step Count                27  Switch Count  1
Page Faults                0
Page Reclaims             293
Page Swaps                0
Voluntary Context Switches 33
Involuntary Context Switches 0
Block Input Operations     32
Block Output Operations    784

```

```

201      /* One-Way Frequencies - Character Variables */
202      Proc Freq Data = ET.EveryTown Order=Freq;
203          Tables Location / List Missing;
204          Title1'One-Way Frequencies';
205          Title2'Everytown Research database';
206      Run;

```

NOTE: There were 299 observations read from the data set ET.EVERYTOWN.

NOTE: PROCEDURE FREQ used (Total process time):

```

real time          0.03 seconds
user cpu time      0.02 seconds
system cpu time    0.00 seconds
memory            1172.28k
OS Memory          32812.00k
Timestamp          09/20/2023 07:04:50 PM
Step Count         28  Switch Count  4
Page Faults        0
Page Reclaims      302
Page Swaps         0
Voluntary Context Switches  44
Involuntary Context Switches 0
Block Input Operations  800
Block Output Operations  264

```

```

208      /* One-Way Frequencies - Character Variables */
209      Proc Freq Data = ET.EveryTown Order=Freq;
210          Tables AssWpn_HC_Mag
211              Warning_Signs
212              Family_member_fatality
213              Restriction_GunOwnership
214              State
215              Year_Shooting
216              Month_Shooting / List Missing;
217
218          Title1'One-Way Frequencies';
219          Title2'Everytown Research database';
220      Run;

```

NOTE: There were 299 observations read from the data set ET.EVERYTOWN.

NOTE: PROCEDURE FREQ used (Total process time):

```

real time          0.10 seconds
user cpu time      0.10 seconds
system cpu time    0.00 seconds
memory            1308.28k
OS Memory          32812.00k
Timestamp          09/20/2023 07:04:50 PM
Step Count         29  Switch Count  4
Page Faults        0
Page Reclaims      184
Page Swaps         0
Voluntary Context Switches  35
Involuntary Context Switches 3
Block Input Operations  0
Block Output Operations  352

```

```

223      /** Number of Mass Shootings by Year and Month */
224      /** Frequency Tables and Graphs/Trend Lines  */
225      Proc Freq Data = ET.EveryTown Noprint;
226          Tables Year_Shooting / Out=Shootings_Year List Missing;
227          Tables Month_Shooting / Out=Shootings_Month List Missing;
228      Run;

```

NOTE: There were 299 observations read from the data set ET.EVERYTOWN.
NOTE: The data set WORK.SHOOTINGS_YEAR has 15 observations and 3 variables.
NOTE: The data set WORK.SHOOTINGS_MONTH has 12 observations and 3 variables.
NOTE: PROCEDURE FREQ used (Total process time):

```

real time          0.00 seconds
user cpu time      0.00 seconds
system cpu time    0.01 seconds
memory            1733.81k
OS Memory          33332.00k
Timestamp          09/20/2023 07:04:50 PM
Step Count         30  Switch Count  6
Page Faults        0
Page Reclaims      291
Page Swaps         0
Voluntary Context Switches  45
Involuntary Context Switches 0
Block Input Operations  0
Block Output Operations  792

```

```

230      Proc SGPlot Data=Shootings_Year;
231          VLine Year_Shooting / Response=Count;
232          YAxis Min=0 Max=100;
233          Title1 'Number of Mass Shootings by Year';
234      Run;

```

NOTE: Since no format is assigned, the numeric category variable will use the default of BEST6.

NOTE: PROCEDURE SGPLOT used (Total process time):

```

real time          2.43 seconds
user cpu time      0.09 seconds
system cpu time    0.02 seconds
memory            19635.90k
OS Memory          48808.00k
Timestamp          09/20/2023 07:04:52 PM
Step Count         31  Switch Count  3
Page Faults        0
Page Reclaims      6205
Page Swaps         0
Voluntary Context Switches  432
Involuntary Context Switches 0
Block Input Operations  0
Block Output Operations  824

```

NOTE: There were 15 observations read from the data set WORK.SHOOTINGS_YEAR.

```

236 Proc SGPlot Data=Shootings_Month;
237     VLine Month_Shooting / Response=Count;
238     YAxis Min=0 Max=100;
239     Title1 'Number of Mass Shootings by Month';
240 Run;

```

NOTE: Since no format is assigned, the numeric category variable will use the default of BEST6.

NOTE: PROCEDURE SGPLOT used (Total process time):

```

real time          0.24 seconds
user cpu time      0.06 seconds
system cpu time    0.00 seconds
memory            2831.37k
OS Memory          50860.00k
Timestamp          09/20/2023 07:04:53 PM
Step Count         32  Switch Count  3
Page Faults        0
Page Reclaims      933
Page Swaps         0
Voluntary Context Switches  256
Involuntary Context Switches  5
Block Input Operations  0
Block Output Operations  512

```

NOTE: There were 12 observations read from the data set WORK.SHOOTINGS_MONTH.

```

241
242     /* Descriptive Statistics - Numeric Variables */
243 Proc Means Data=ET.EveryTown MAXDEC=2 N Mean Median Std Min Max;
244     Var Number_Fatalities
245         Number_Injured
246         Number_PeopleShot;
247
248     Title1'Number of Deaths, Injuries, and Total Individuals Shot';
249     Title2'Everytown Research database';
250 Run;

```

NOTE: There were 299 observations read from the data set ET.EVERYTOWN.

NOTE: PROCEDURE MEANS used (Total process time):

```

real time          0.02 seconds
user cpu time      0.03 seconds
system cpu time    0.01 seconds
memory            7222.06k
OS Memory          55612.00k
Timestamp          09/20/2023 07:04:53 PM
Step Count         33  Switch Count  3
Page Faults        0
Page Reclaims      1592
Page Swaps         0
Voluntary Context Switches  53
Involuntary Context Switches  0
Block Input Operations  0
Block Output Operations  8

```

```

253     Title2;
254     Title3;
255
256
257     /** Total Number of Fatalities, Injuries and Shootings by Year **/
258     /** Descriptive Stats and Graphs/Trend Lines      **/
259     Proc Sql;
260         Create Table Total_Fatal_Inj_Shot_Yr As
261             Select Year_Shooting,
262                 Sum(Number_Fatalities) as Total_Fatal,
263                 Sum(Number_Injured) as Total_Injured,
264                 Sum(Number_PeopleShot) as Total_Shot
265             From ET.EveryTown
266             Group By Year_Shooting;

```

NOTE: Table WORK.TOTAL_FATAL_INJ_SHOT_YR created, with 15 rows and 4 columns.

```

267     Quit;

```

NOTE: PROCEDURE SQL used (Total process time):

```

real time          0.00 seconds
user cpu time      0.00 seconds
system cpu time    0.00 seconds
memory            5909.53k
OS Memory          55084.00k
Timestamp          09/20/2023 07:04:53 PM
Step Count                34  Switch Count  2
Page Faults                0
Page Reclaims             293
Page Swaps                 0
Voluntary Context Switches 22
Involuntary Context Switches 0
Block Input Operations     0
Block Output Operations    272

```

```

269 Proc SGPlot Data=Total_Fatal_Inj_Shot_Yr;
270     Series X=Year_Shooting Y=Total_Fatal;
271     Series X=Year_Shooting Y=Total_Injured;
272     Series X=Year_Shooting Y=Total_Shot;
273
274     YAxis Min=0 Max=1000;
275
276 Title1 'Total Number of Fatalities, Injured and People Shot in Mass Shootings';
277 Title2 'By Year';
278 Run;

```

NOTE: PROCEDURE SGPLOT used (Total process time):

```

real time          0.29 seconds
user cpu time      0.06 seconds
system cpu time    0.01 seconds
memory            3304.53k
OS Memory          51884.00k
Timestamp          09/20/2023 07:04:53 PM
Step Count                35  Switch Count  3
Page Faults                1
Page Reclaims             753

```

```
Page Swaps                0
Voluntary Context Switches 285
Involuntary Context Switches 1
Block Input Operations     160
Block Output Operations    680
```

NOTE: There were 15 observations read from the data set WORK.TOTAL_FATAL_INJ_SHOT_YR.

```
279
280 Proc SGPLOT Data=Total_Fatal_Inj_Shot_Yr;
281     VLine Year_Shooting / Response=Total_Fatal;
282     YAxis Min=0 Max=200;
283     Title1 'Total Number of Fatalities in Mass Shootings';
284     Title2 'By Year';
285 Run;
```

NOTE: Since no format is assigned, the numeric category variable will use the default of BEST6.

NOTE: PROCEDURE SGPLLOT used (Total process time):

```
real time          0.19 seconds
user cpu time      0.05 seconds
system cpu time    0.01 seconds
memory             3359.56k
OS Memory          52140.00k
Timestamp          09/20/2023 07:04:53 PM
Step Count         36  Switch Count  4
Page Faults        0
Page Reclaims      838
Page Swaps         0
Voluntary Context Switches 258
Involuntary Context Switches 1
Block Input Operations 0
Block Output Operations 552
```

NOTE: There were 15 observations read from the data set WORK.TOTAL_FATAL_INJ_SHOT_YR.

```
286
287 Proc SGPLOT Data=Total_Fatal_Inj_Shot_Yr;
288     VLine Year_Shooting / Response=Total_Injured;
289     YAxis Min=0 Max=500;
290     Title1 'Total Number of Injuries in Mass Shootings';
291     Title2 'By Year';
292 Run;
```

NOTE: Since no format is assigned, the numeric category variable will use the default of BEST6.

NOTE: PROCEDURE SGPLLOT used (Total process time):

```
real time          0.17 seconds
user cpu time      0.06 seconds
system cpu time    0.01 seconds
memory             3197.09k
OS Memory          52140.00k
Timestamp          09/20/2023 07:04:53 PM
Step Count         37  Switch Count  4
Page Faults        0
```

```

Page Reclaims          696
Page Swaps              0
Voluntary Context Switches 260
Involuntary Context Switches 0
Block Input Operations  0
Block Output Operations 568

```

NOTE: There were 15 observations read from the data set WORK.TOTAL_FATAL_INJ_SHOT_YR.

```

293
294 Proc SGPLOT Data=Total_Fatal_Inj_Shot_Yr;
295     VLine Year_Shooting / Response=Total_Shot;
296     YAxis Min=0 Max=650;
297     Title1 'Total Number Shot in Mass Shootings';
298     Title2 'By Year';
299 Run;

```

NOTE: Since no format is assigned, the numeric category variable will use the default of BEST6.

NOTE: PROCEDURE SGPLOT used (Total process time):

```

real time          0.19 seconds
user cpu time      0.06 seconds
system cpu time    0.00 seconds
memory            3193.46k
OS Memory          52140.00k
Timestamp          09/20/2023 07:04:54 PM
Step Count         38  Switch Count  4
Page Faults        0
Page Reclaims      687
Page Swaps         0
Voluntary Context Switches 267
Involuntary Context Switches 1
Block Input Operations 0
Block Output Operations 544

```

NOTE: There were 15 observations read from the data set WORK.TOTAL_FATAL_INJ_SHOT_YR.

```

300
301 /** Average Number of Fatalities, Injuries and Shootings by Year **/
302 /** Descriptive Stats and Graphs/Trend Lines **/
303 Proc Means Data=ET.EveryTown Mean Maxdec=2 Noprint;
304     Var Number_Fatalities Number_Injured Number_PeopleShot;
305     Class Year_Shooting;
306     Output Out=Fatal_Inj_Shot_Year
307         Mean(Number_Fatalities) = Avg_Fatal
308         Mean(Number_Injured) = Avg_Injured
309         Mean(Number_PeopleShot) = Avg_Shot;
310 Run;

```

NOTE: There were 299 observations read from the data set ET.EVERYTOWN.

NOTE: The data set WORK.FATAL_INJ_SHOT_YEAR has 16 observations and 6 variables.

NOTE: PROCEDURE MEANS used (Total process time):

```

real time          0.00 seconds
user cpu time      0.00 seconds
system cpu time    0.01 seconds

```

```

memory                8231.57k
OS Memory              57408.00k
Timestamp              09/20/2023 07:04:54 PM
Step Count             39  Switch Count  3
Page Faults           0
Page Reclaims         1632
Page Swaps             0
Voluntary Context Switches  27
Involuntary Context Switches 0
Block Input Operations 0
Block Output Operations 264

```

```

311
312 Proc SGPLOT Data=Fatal_Inj_Shot_Year;
313     VLine Year_Shooting / Response=Avg_Fatal;
314     YAxis Min=0 Max=30;
315     Title1 'Average Number of Fatalities per Mass Shooting';
316     Title2 'By Year';
317 Run;

```

NOTE: Since no format is assigned, the numeric category variable will use the default of BEST6.

```

NOTE: PROCEDURE SGPLOT used (Total process time):
real time              0.22 seconds
user cpu time          0.08 seconds
system cpu time        0.01 seconds
memory                 3196.75k
OS Memory              51884.00k
Timestamp              09/20/2023 07:04:54 PM
Step Count             40  Switch Count  4
Page Faults           0
Page Reclaims         724
Page Swaps             0
Voluntary Context Switches 267
Involuntary Context Switches 3
Block Input Operations 0
Block Output Operations 544

```

NOTE: There were 16 observations read from the data set WORK.FATAL_INJ_SHOT_YEAR.

```

318
319 Proc SGPLOT Data=Fatal_Inj_Shot_Year;
320     VLine Year_Shooting / Response=Avg_Injured;
321     YAxis Min=0 Max=30;
322     Title1 'Average Number of Injuries per Mass Shooting';
323     Title2 'By Year';
324 Run;

```

NOTE: Since no format is assigned, the numeric category variable will use the default of BEST6.

```

NOTE: PROCEDURE SGPLOT used (Total process time):
real time              0.19 seconds
user cpu time          0.08 seconds
system cpu time        0.01 seconds

```



```

memory                3187.78k
OS Memory              51884.00k
Timestamp              09/20/2023 07:04:54 PM
Step Count             41  Switch Count  4
Page Faults            0
Page Reclaims          686
Page Swaps             0
Voluntary Context Switches 264
Involuntary Context Switches 3
Block Input Operations 0
Block Output Operations 632

```

NOTE: There were 16 observations read from the data set WORK.FATAL_INJ_SHOT_YEAR.

```

325
326 Proc SGPlot Data=Fatal_Inj_Shot_Year;
327     VLine Year_Shooting / Response=Avg_Shot;
328     YAxis Min=0 Max=50;
329     Title1 'Average Number Shot per Mass Shooting';
330     Title2 'By Year';
331 Run;

```

NOTE: Since no format is assigned, the numeric category variable will use the default of BEST6.

NOTE: PROCEDURE SGPLOT used (Total process time):

```

real time              0.21 seconds
user cpu time          0.08 seconds
system cpu time        0.00 seconds
memory                 3215.46k
OS Memory              51884.00k
Timestamp              09/20/2023 07:04:54 PM
Step Count             42  Switch Count  4
Page Faults            0
Page Reclaims          686
Page Swaps             0
Voluntary Context Switches 267
Involuntary Context Switches 17
Block Input Operations 0
Block Output Operations 552

```

NOTE: There were 16 observations read from the data set WORK.FATAL_INJ_SHOT_YEAR.

Appendix II – SAS Output

Assault Weapon or High-Capacity Magazine				
AssWpn_HC_Mag	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No	190	66.90	190	66.90
Under review	44	15.49	234	82.39
Yes	50	17.61	284	100.00

Warning Signs of Shooting\Shooter Present				
Warning_Signs	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No	81	28.52	81	28.52
Under review	100	35.21	181	63.73
Yes	103	36.27	284	100.00

Fatalities are Family Member of the Shooter				
Family_Member_Fatality	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No	114	40.14	114	40.14
Under review	44	15.49	158	55.63
Yes	126	44.37	284	100.00

Shooter Restricted from Gun Ownership				
Restriction_GunOwnership	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No	166	58.45	166	58.45
Under review	44	15.49	210	73.94
Yes	74	26.06	284	100.00

State where Shooting Occurred				
State	Frequency	Percent	Cumulative Frequency	Cumulative Percent
AK	1	0.35	1	0.35
AL	5	1.76	6	2.11
AR	2	0.70	8	2.82
AZ	9	3.17	17	5.99
CA	30	10.56	47	16.55
CO	4	1.41	51	17.96
CT	2	0.70	53	18.66
DC	2	0.70	55	19.37
DE	1	0.35	56	19.72
FL	17	5.99	73	25.70
GA	8	2.82	81	28.52
ID	1	0.35	82	28.87
IL	15	5.28	97	34.15
IN	8	2.82	105	36.97
KS	6	2.11	111	39.08
KY	2	0.70	113	39.79
LA	3	1.06	116	40.85
MA	2	0.70	118	41.55
MD	5	1.76	123	43.31
ME	1	0.35	124	43.66
MI	8	2.82	132	46.48
MN	4	1.41	136	47.89
MO	7	2.46	143	50.35
MS	4	1.41	147	51.76
MT	1	0.35	148	52.11
NC	9	3.17	157	55.28
ND	2	0.70	159	55.99
NJ	3	1.06	162	57.04
NM	4	1.41	166	58.45
NV	4	1.41	170	59.86
NY	6	2.11	176	61.97

State where Shooting Occurred				
State	Frequency	Percent	Cumulative Frequency	Cumulative Percent
OH	14	4.93	190	66.90
OK	6	2.11	196	69.01
OR	1	0.35	197	69.37
PA	8	2.82	205	72.18
SC	8	2.82	213	75.00
SD	1	0.35	214	75.35
TN	5	1.76	219	77.11
TX	32	11.27	251	88.38
UT	2	0.70	253	89.08
VA	7	2.46	260	91.55
VT	1	0.35	261	91.90
WA	10	3.52	271	95.42
WI	7	2.46	278	97.89
WV	5	1.76	283	99.65
WY	1	0.35	284	100.00

Year_Shooting	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2009	22	7.75	22	7.75
2010	15	5.28	37	13.03
2011	24	8.45	61	21.48
2012	18	6.34	79	27.82
2013	24	8.45	103	36.27
2014	15	5.28	118	41.55
2015	21	7.39	139	48.94
2016	18	6.34	157	55.28
2017	18	6.34	175	61.62
2018	19	6.69	194	68.31
2019	29	10.21	223	78.52
2020	17	5.99	240	84.51
2021	27	9.51	267	94.01
2022	17	5.99	284	100.00

Month_Shooting	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	26	9.15	26	9.15
2	24	8.45	50	17.61
3	21	7.39	71	25.00
4	25	8.80	96	33.80
5	20	7.04	116	40.85
6	25	8.80	141	49.65
7	23	8.10	164	57.75
8	22	7.75	186	65.49
9	28	9.86	214	75.35
10	24	8.45	238	83.80
11	25	8.80	263	92.61
12	21	7.39	284	100.00

