Chicago Traffic Crash Analysis using SAS

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Introduction

This report aims to conduct a study on traffic accidents in Chicago using a dataset from the Chicago Police Department. This dataset is available to everyone and has information on crashes from September 2016 to August 2023 (click here for the dataset). It has over 750,000 records of crashes in the City of Chicago. Using SAS, our team will look into this data to find trends and analyze accident patterns. The purpose of this analysis is to determine what are the prime factors contributing to the traffic crashes. It is expected that most crashes would occur during the night due to poor lighting conditions. Slippery roads speeding could also be a significant factor. The report provides certain patterns and insights about the accidents and incidents and helps provide a conclusion that can potentially shape the understanding and management of traffic in Chicago.

Assumptions

- The information in the dataset, as provided by the Chicago Police Department, is accurate and has been recorded without significant biases.
- Parameters like street conditions, weather conditions, and posted speed limits, even if they might sometimes differ from other sources, are assumed to be the best available information at the time of recording.
- The timeframe (September 2016 to August 2023) provides a representative sample of traffic accidents in Chicago, with no significant external events (like major construction projects, city-wide events, etc.) disproportionately affecting the accident rate.
- The method of data collection and recording has remained consistent over the years, ensuring that comparisons across time are valid.
- Even though only crashes with a property damage value of $1,500 or more or involving bodily injury are considered reportable as per Illinois statute, the dataset's recording of all reported traffic crash events ensures a holistic understanding of the traffic situation.
- Any categorical variables in the dataset (like type of accident, type of vehicle, etc.) have consistent and well-defined categories throughout the dataset.

Methods

The data was analysed using the SAS software, a robust platform known for its advanced analytics, multivariate analysis, and data management capabilities. Initially, the data was imported into SAS, where it underwent preliminary cleaning and formatting. Irrelevant attributes such as CRASH_DATE_EST_I, LANE_CNT, ALIGNMENT, among others, were dropped to refine the dataset for analysis.

Primary variables from the dataset for this report includes POSTED_SPEED_LIMIT, DAMAGE, CRASH_HOUR, CRASH_DAY_OF_WEEK, CRASH_MONTH etc. A series of visualizations were generated

to explore various aspects of the data. These included bar plots, mosaic plots, and other graphical representations to understand trends, distributions, and relationships among different variables.

Results

Variables in Creation Order					
#	Variable	Type	Len	Format	Informat
1	CRASH_RECORD_ID	Char	100	$100.	$100.
2	RD_NO	Char	10	$10.	$10.
3	CRASH_DATE	Char	10	$10.	$10.
4	POSTED_SPEED_LIMIT	Num	8	10.	10.
5	TRAFFIC_CONTROL_DEVICE	Char	30	$30.	$30.
6	DEVICE_CONDITION	Char	30	$30.	$30.
7	WEATHER_CONDITION	Char	10	$10.	$10.
8	LIGHTING_CONDITION	Char	30	$30.	$30.
9	FIRST_CRASH_TYPE	Char	50	$50.	$50.
10	TRAFFICWAY_TYPE	Char	30	$30.	$30.
11	ROADWAY_SURFACE_COND	Char	50	$50.	$50.
12	ROAD_DEFECT	Char	50	$50.	$50.
13	CRASH_TYPE	Char	50	$50.	$50.
14	DAMAGE	Char	20	$20.	$20.
15	DATE_POLICE_NOTIFIED	Char	50	$50.	$50.
16	PRIM_CONTRIBUTORY_CAUSE	Char	50	$50.	$50.
17	STREET_NAME	Char	50	$50.	$50.
18	BEAT_OF_OCCURRENCE	Num	8	10.	10.
19	NUM_UNITS	Num	8	10.	10.
20	MOST_SEVERE_INJURY	Char	10	$10.	$10.
21	INJURIES_TOTAL	Num	8	10.	10.
22	INJURIES_FATAL	Num	8	10.	10.
23	INJURIES_INCAPACITATING	Num	8	10.	10.
24	INJURIES_NON_INCAPACITATING	Num	8	10.	10.
25	CRASH_HOUR	Num	8	10.	10.
26	CRASH_DAY_OF_WEEK	Num	8	10.	10.
27	CRASH_MONTH	Num	8	10.	10.
28	LOCATION	Char	50	$50.	$50.

Figure 1. Description of the variable types, the variables we have are a mixture of both numeric as well as characters. Appropriate formatting was applied while loading the dataset into SAS Studio.

The CONTENTS Procedure

Data Set Name	WORK.TRAFFIC	Observations	759741
Member Type	DATA	Variables	28
Engine	V9	Indexes	0
Created	10/20/2023 22:31:03	Observation Length	760
Last Modified	10/20/2023 22:31:03	Deleted Observations	0
Protection		Compressed	NO
Data Set Type		Sorted	NO
Label			
Data Representation	SOLARIS_X86_64, LINUX_X86_64, ALPHA_TRU64, LINUX_IA64		
Encoding	utf-8 Unicode (UTF-8)		

Figure 2. Overview of dataset.

Overview of data

Figure 2 give us an overview of the traffic dataset; we have 759741 observations and 28 variables. No observations have been deleted and the dataset is saved in the local folder WORK in SAS Studio. From Figure 1 it can be observed that we have 10 numeric variables and 18 character variables. For appropriate viewing all variables were formatted accordingly for proper results while loading in SAS.

Engine/Host Dependent Information	
Data Set Page Size	131072
Number of Data Set Pages	4418
First Data Page	1
Max Obs per Page	172
Obs in First Data Page	165
Number of Data Set Repairs	0
Filename	/saswork/SAS_workA86F0000302E_odaws02-apse1.oda.sas.com/SAS_workE6720000302E_odaws02-apse1.oda.sas.com/traffic.sas7bdat
Release Created	9.0401M7
Host Created	Linux
Inode Number	1826366
Access Permission	rw-r--r--
Owner Name	u63524461
File Size	552MB
File Size (bytes)	579207168

Figure 3. Overview of dataset

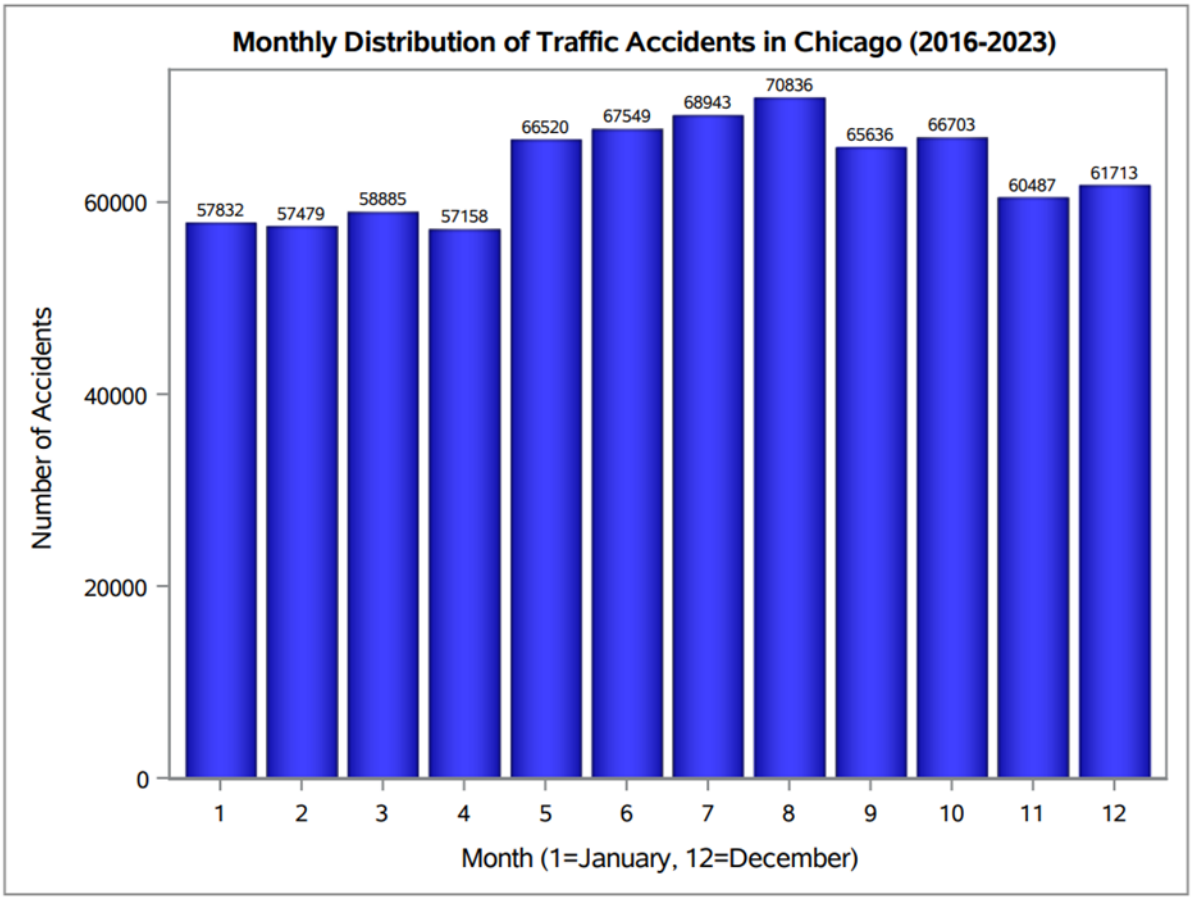

Figure 4. Bar plot of Monthly Distribution of Traffic Accidents in Chicago (2016-2023)

Here from the bar chart of the crash months, we can see that there is a variation in the number of crashes across the various months of the year which means that certain months are more accident prone than others. There is a higher frequency in the months of July and August which suggests that there is an increase in the number of accidents which can be attributed to the potential increase in vehicular movement during the summer months. There is a steady increase in the number of crashes, peaking in July and August, and then a gradual decrease as the year progresses, hitting the lowest in the winter months. The colder months tend to have a lower number of crashes which could be due to winter weather factors like fewer daylight hours, snow, or reduced travel activity. On the other hand, some months like March, April, and October see a moderate number of crashes.

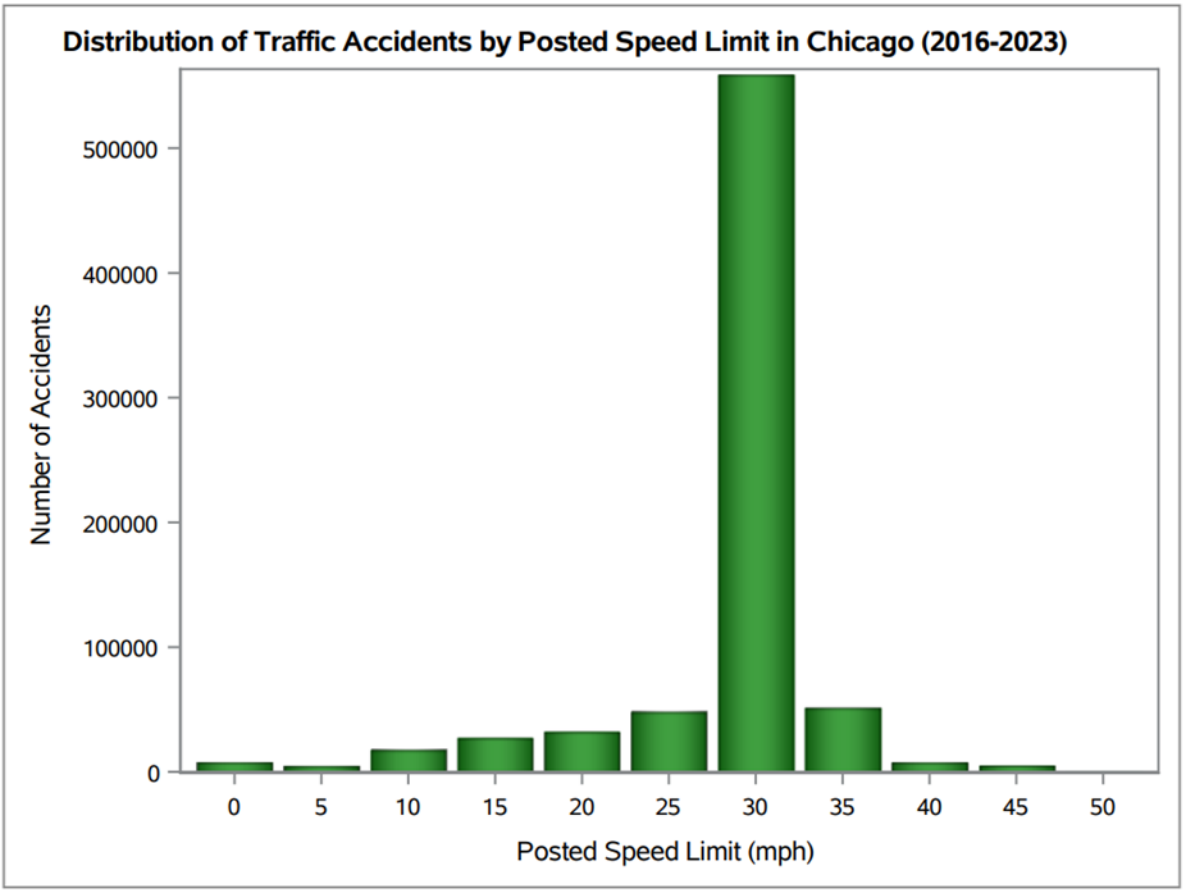

Figure 5. Bar plot of traffic accidents by posted speed limit in Chicago (2016-2023)

The dataset exhibits a distribution of speed limits: a primary peak at 30 mph, indicative of urban/suburban roads. Speeds between 0-20 mph, likely school or residential zones, are less common. Notably, the 40-45 mph range and limits above 60 mph are infrequent. The data spread, from 0 to over 60 mph, underscores diverse road types and safety considerations. This distribution emphasizes the importance of context-specific speed regulations.

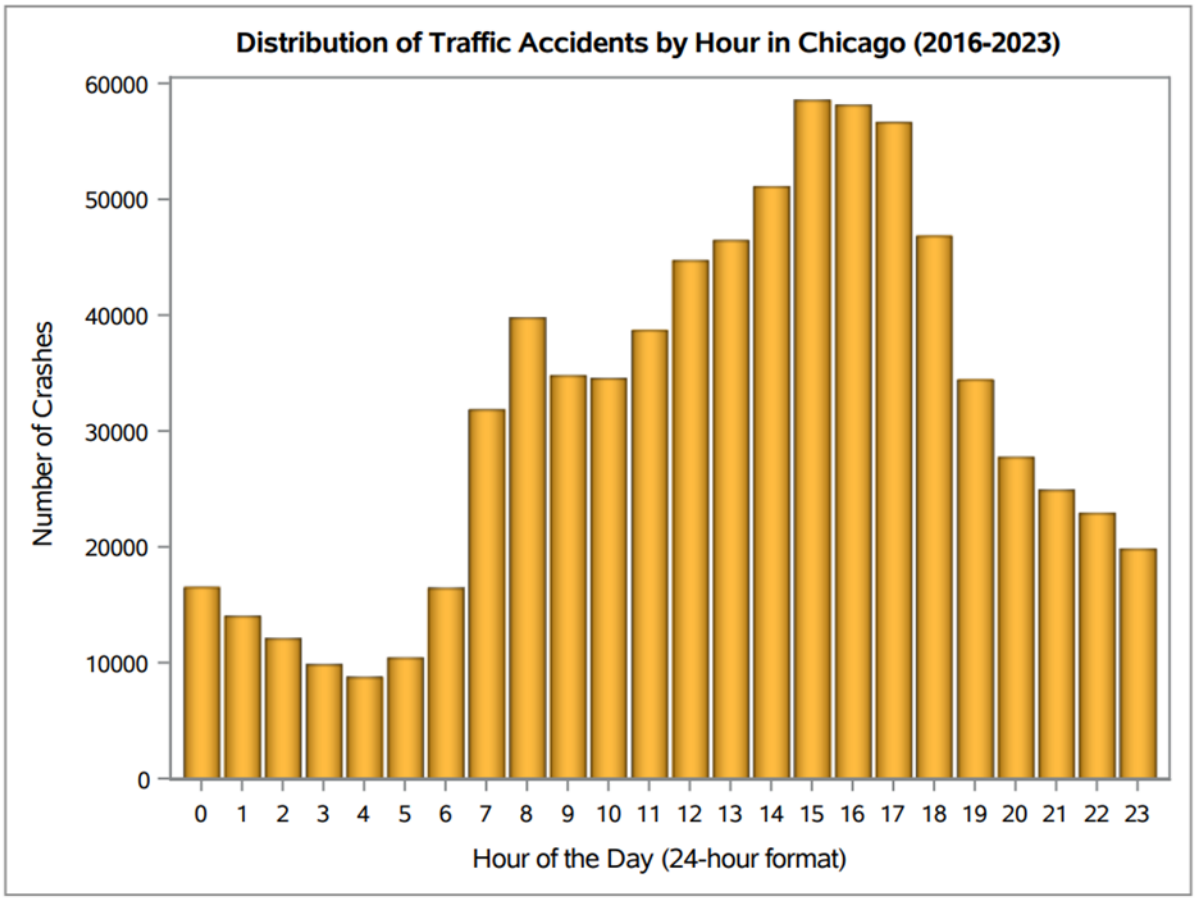

Figure 6. Bar plot of distribution of traffic accidents by hour in Chicago (2016-2023)

Crash data showcases a diurnal pattern: low occurrences from midnight to 5 am, a peak during the 6-9 am rush hour, consistent increasing rates until 5 pm, and a tapering off with a minor midnight spike. This rhythm reflects standard daily activities, suggesting a relationship between typical vehicular movement and the probability of accidents. The midnight uptick might hint at factors like reduced visibility or fatigue

Distribution of Vehicle Crash Damages by Crash Type in Chicago (2016-2023)

The FREQ Procedure

Frequency Percent Row Pct Col Pct	Table of CRASH_TYPE by DAMAGE			
	DAMAGE			
CRASH_TYPE	$500 OR LESS	$501 - $1,500	OVER $1,500	Total
INJURY AND / OR TOW DUE TO CRASH	16814 2.21 8.35 19.12	20994 2.76 10.42 10.23	163577 21.53 81.23 35.06	201385 26.51
NO INJURY / DRIVE AWAY	71107 9.36 12.74 80.88	184225 24.25 32.99 89.77	303024 39.89 54.27 64.94	558356 73.49
Total	87921 11.57	205219 27.01	466601 61.42	759741 100.00

Figure 7. Tabular representation of vehicle crash damage by crash type in Chicago (2016-2023)

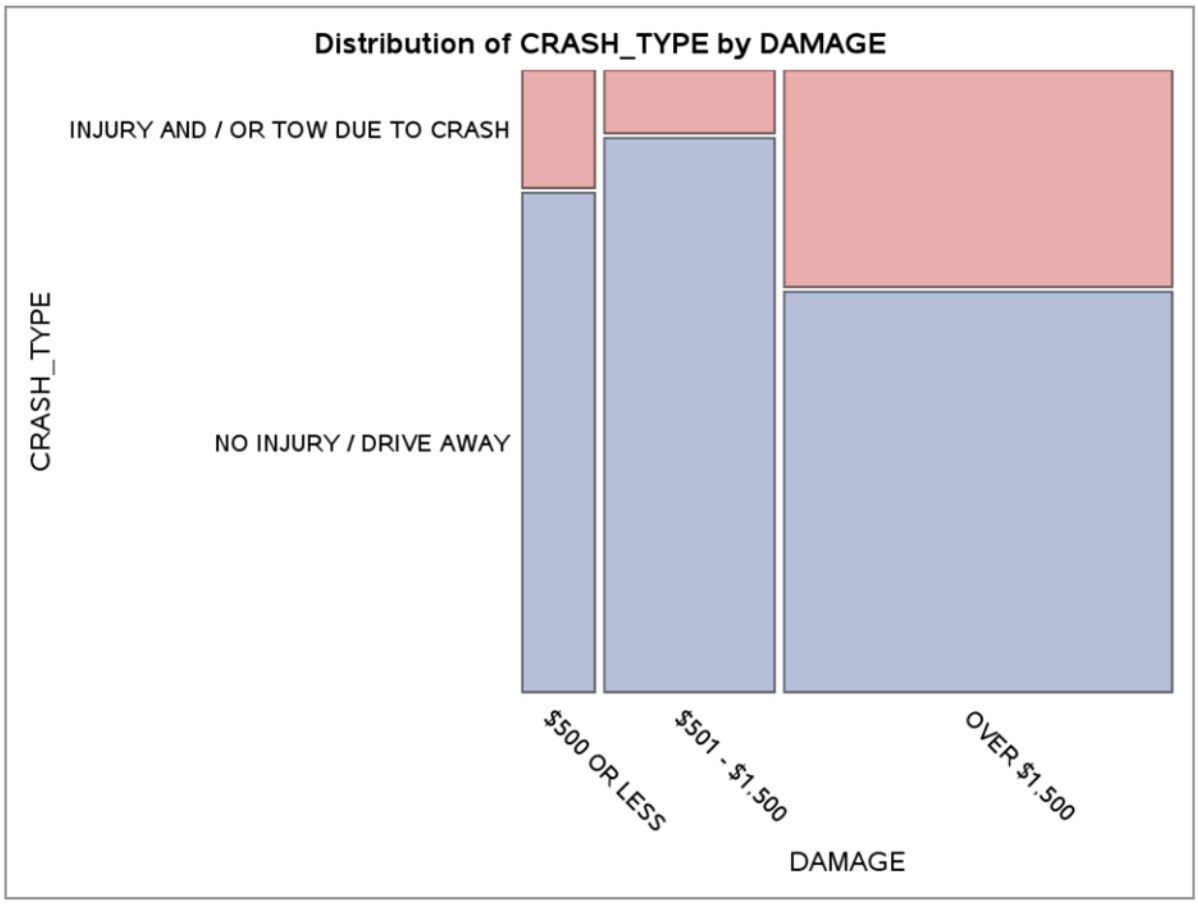

Figure 8. Mosaic plot of vehicle crash damage by crash type in Chicago (2016-2023)

The mosaic plot(Figure 8) reveals that the "No Injury / Drive Away" crash type is predominant, yet many crashes, regardless of injury status, result in significant damages exceeding $1,500. In cases involving injuries or towing, damages usually surpass this amount. Conversely, the "No Injury / Drive Away" type shows a wider spread across damage values, with "$500 OR LESS" being the least frequent. This data underscores the considerable financial implications of crashes, even in the absence of severe injuries

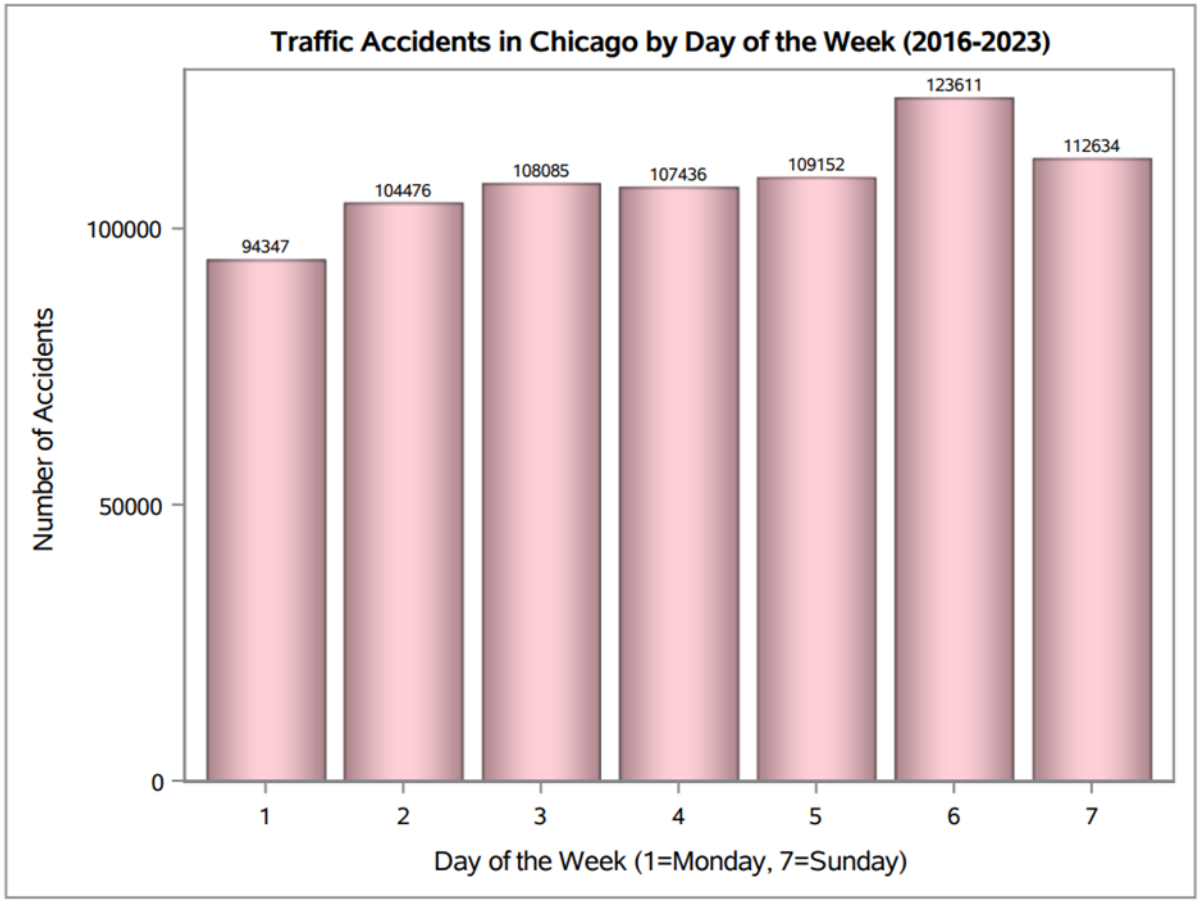

Figure 9. Bar plot of traffic accidents by day of the week in Chicago (2016-2023)

The analysis of the bar graph(Figure 9) of crash day reveals that Saturday has the highest number of crashes. We can see that there is a notable stability from Monday to Friday suggesting that crash risks remain predominantly unchanged during the traditional workweek. Wednesday registers a slight uptick in the crash numbers. As the week progresses, we see a clear change in the numbers with Saturday amassing over 120000 crashes. Sunday on the other hand Sunday has a slightly lower number of crashes as compared to Saturday attributed to factors such as diminished work-related commutes. In conclusion, the prevailing pattern highlights an almost uniform crash frequency on weekdays, contrasted with a marked decline during the weekend, most notably on Sunday. These observations provide a clear understanding of how the risk and occurrence of crashes vary throughout the week, influenced by daily routines and work schedules.

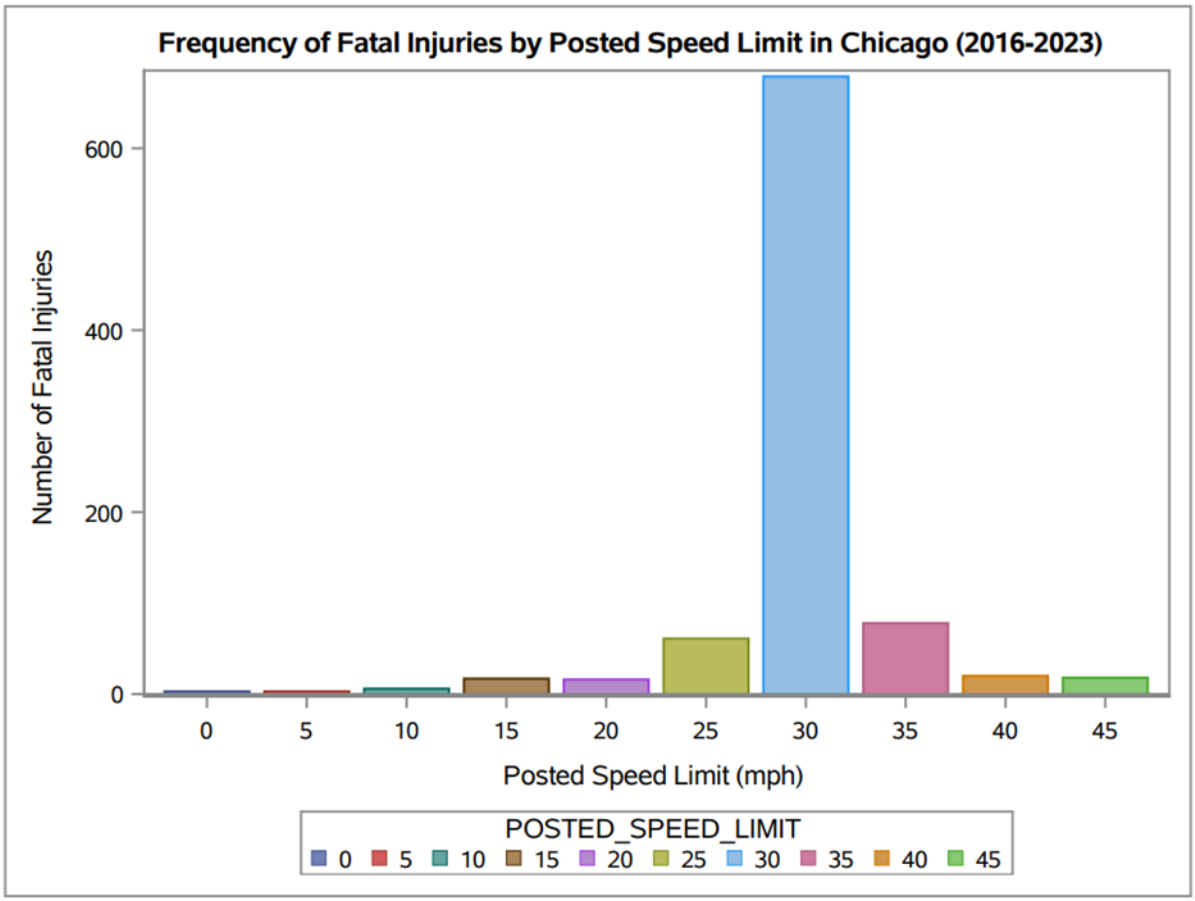

Figure 10. Bar plot of fatal injuries by posted speed limit in Chicago (2016-2023)

Figure 10 indicates that speed limits of 30 and 35 mph have the highest fatal injury counts, pinpointing these as high-risk zones. Low-speed zones (0-15 mph) show fewer fatalities, likely due to reduced crash severity. Zones around 40 and 45 mph present lower fatality counts, suggesting inherent safety or underrepresentation. The data suggests that fatal risks aren't solely tied to higher speeds but are influenced by traffic dynamics in moderate speed zones.

Mosaic plot of Vehicle Damage with respect to Lighting condition

The FREQ Procedure

Frequency Percent Row Pct Col Pct	Table of LIGHTING_CONDITION by DAMAGE			
	DAMAGE			
LIGHTING_CONDITION	$500 OR LESS	$501 - $1,500	OVER $1,500	Total
DARKNESS	3967 0.52 11.10 4.51	9757 1.28 27.30 4.75	22021 2.90 61.61 4.72	35745 4.70
DARKNESS, LIGHTED ROAD	16488 2.17 9.94 18.75	36179 4.76 21.82 17.63	113144 14.89 68.24 24.25	165811 21.82
DAWN	1452 0.19 11.51 1.65	3208 0.42 25.42 1.56	7959 1.05 63.07 1.71	12619 1.66
DAYLIGHT	59967 7.89 12.23 68.21	140782 18.53 28.72 68.60	289479 38.10 59.05 62.04	490228 64.53
DUSK	2802 0.37 12.84 3.19	6178 0.81 28.31 3.01	12845 1.69 58.85 2.75	21825 2.87
UNKNOWN	3245 0.43 9.68 3.69	9115 1.20 27.20 4.44	21153 2.78 63.12 4.53	33513 4.41
Total	87921 11.57	205219 27.01	466601 61.42	759741 100.00

Figure 11. Tabular representation of vehicle damage with respect to lighting condition in Chicago (2016-2023)

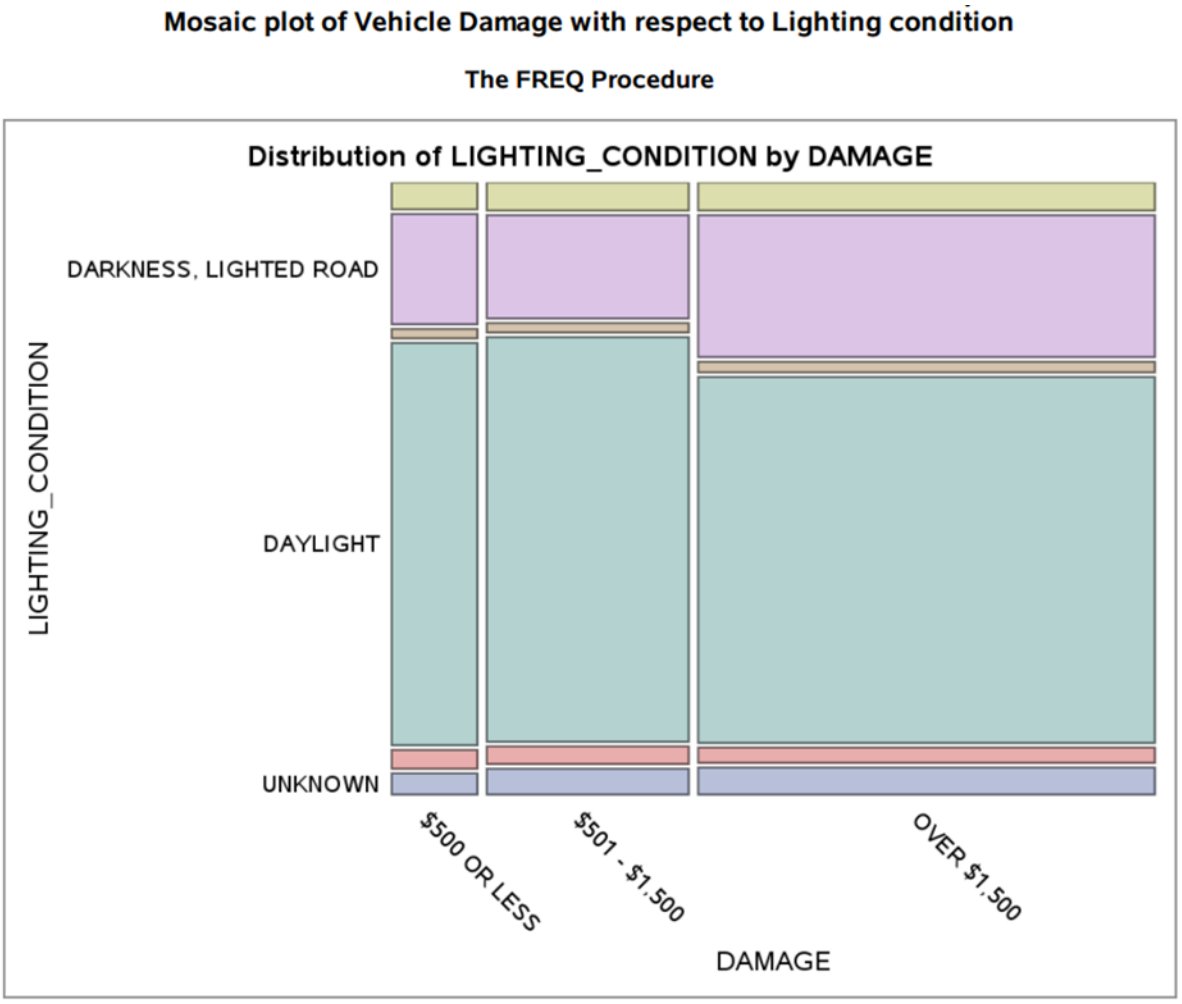

Figure 12. Mosaic plot of vehicle damage with respect to lighting condition in Chicago (2016-2023)

Most crashes occur during "DAYLIGHT", yet high damage exceeding $1,500 dominates across all lighting conditions, indicating severity remains consistent regardless of visibility. "DARKNESS, LIGHTED ROAD" is the second most common condition, with damage patterns similar to daylight, suggesting road lighting doesn't greatly mitigate crash severity. Damage trends are consistent across lighting conditions, with "OVER $1,500" always most prevalent. Transitional light periods like "DUSK" and "DAWN" also see high damages. Overall, factors beyond visibility significantly influence crash severity.

The below given bar chart (Figure 13) tells us death via injuries with respect to the lighting condition. Most deaths occurred during crashes during the day followed by darkness/dim-lighting conditions. Least deaths took place during dawn and unknown.

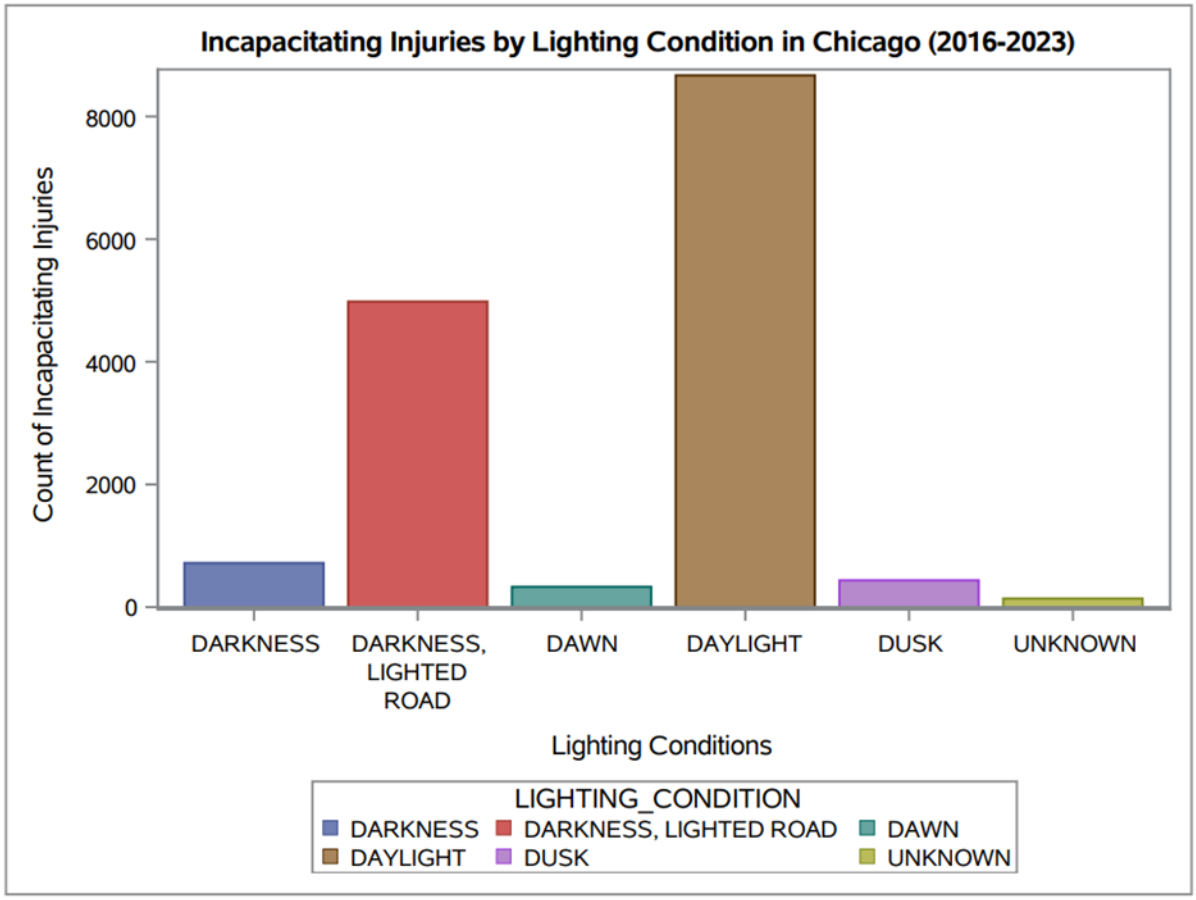

Figure 13. Bar plot of incapacitating injuries by lighting condition in Chicago (2016-2023)

Figure 14 shows roadway conditions significantly influence accident severity. Dry roads, despite having the highest count of incapacitating injuries, likely result from their predominant use. Wet roads, while second in injury counts, pose risks due to reduced tire traction causing potential skids. Snowy or slushy surfaces present their own hazards, as evident from their injury tallies. Icy roads, although fewer in incidents than wet or snowy conditions, still emphasize the dangers they pose. Conditions like sand, mud, or standing water have lesser counts, indicating their infrequency or reduced severity. Not displayed but essential are conditions like oil or debris. These insights stress the importance of vigilance, especially in adverse conditions.

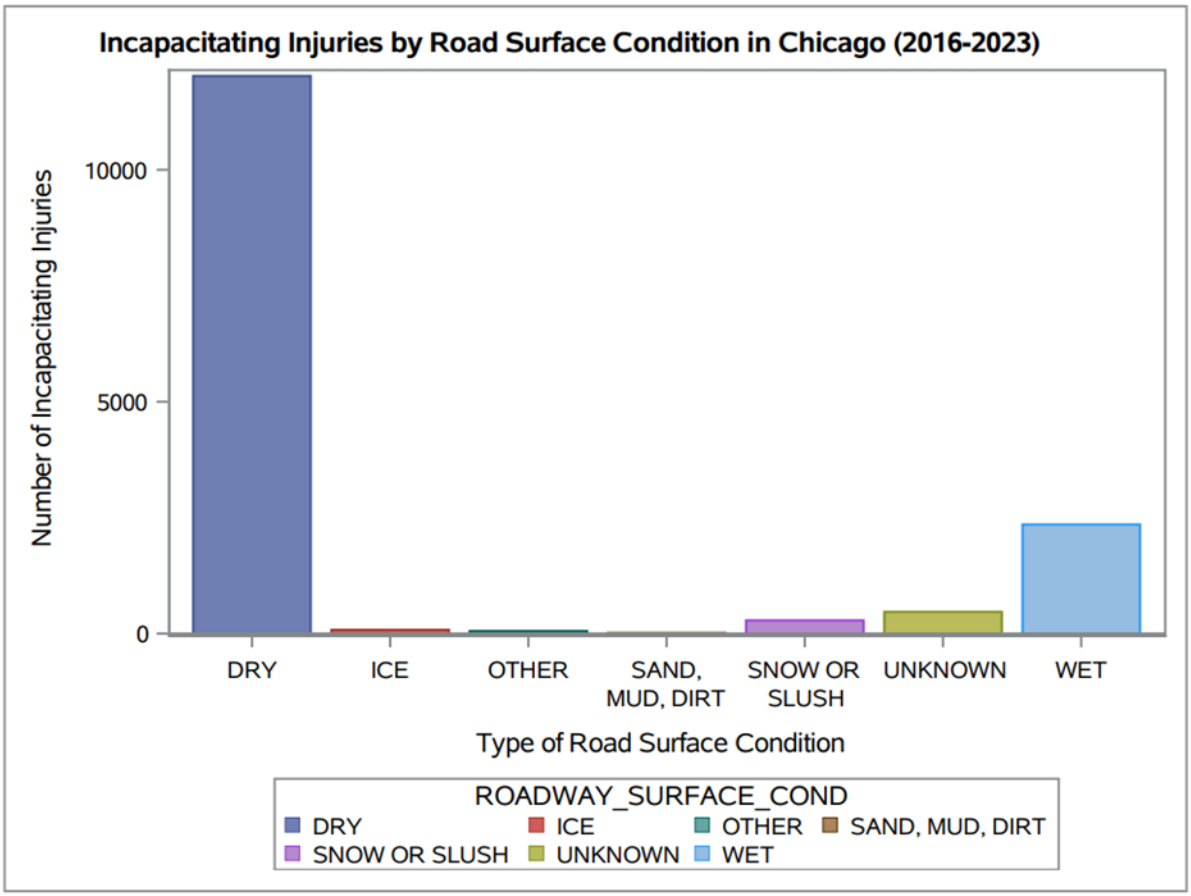

Figure 14. Bar plot of incapacitating injuries by road surface condition in Chicago (2016-2023)

Conclusion

The analysis of various plots and charts offers invaluable insights into the multifaceted nature of vehicular incidents, encompassing the diverse factors that shape road safety. Predominantly, crashes do not lead to severe injuries; however, the financial burden they impose, often exceeding $1,500, is noteworthy. Such implications, while underscored during daylight, remain consistent across varying lighting conditions, suggesting factors beyond visibility influence the severity of crashes. Seasonality plays a distinct role, with heightened crash occurrences during summer months like June and July and a tapering off in winter, pointing to the effects of environmental factors and potential changes in vehicular activity. While speed limits inherently suggest risk, the data interestingly reveals that moderate speeds, particularly around 30 and 55 mph, see the most fatal outcomes. This suggests that it is not just the speed but the overall traffic dynamics and environment that determine risk. Roadway conditions further exacerbate or mitigate risks, with adverse conditions like wet, snowy, or icy roads leading to more severe accidents. Hence our initial assumptions of most crashes taking place at high speed limits, slippery roads and dim lighted conditions were proven wrong.

The distribution of speed limits across areas reflects deliberate designations, balancing mobility and safety, and catering to specific environments. The ebb and flow of daily activities mirror crash occurrences, emphasizing peak hours and the varied risks associated with different times of the day. Crashes across weekdays remain relatively stable, with weekends, especially Sundays, seeing a decrease—indicative of shifts in societal routines and driving behaviours. In sum, vehicular incidents' patterns and their associated outcomes are shaped by a confluence of factors. These range from environmental conditions and daily rhythms to specific roadway characteristics and societal behaviours. Such comprehensive insights advocate for contextually tailored road safety measures and interventions, addressing the nuances that each factor presents.

References

- “TrafficCrashes - Crashes - Catalog” 2023, viewed <https://catalog.data.gov/dataset/traffic-crashes-crashes>.
- “SAS/STAT(R) 12.3 User’s Guide” 2013, viewed <http://support.sas.com/documentation/cdl/en/statug/66103/HTML/default/viewer.htm#statug_freq_syntax08.htm>.

Appendix

SAS Code used for the analysis

```
data traffic;

informat CRASH_RECORD_ID $100.0 RD_NO CRASH_DATE_EST_I CRASH_DATE $10.0
POSTED_SPEED_LIMIT 10.

    TRAFFIC_CONTROL_DEVICE $30.0 DEVICE_CONDITION $30.0 WEATHER_CONDITION
$10.0 LIGHTING_CONDITION $30.0

    FIRST_CRASH_TYPE $50.0 TRAFFICWAY_TYPE $30.0 ALIGNMENT
ROADWAY_SURFACE_COND

    ROAD_DEFECT $50.0 REPORT_TYPE CRASH_TYPE $50.0 INTERSECTION_RELATED_I $10.0
NOT_RIGHT_OF_WAY_I $10.0

    HIT_AND_RUN_I DAMAGE $20.0 DATE_POLICE_NOTIFIED PRIM_CONTRIBUTORY_CAUSE
$50.0

    SEC_CONTRIBUTORY_CAUSE STREET_NO STREET_DIRECTION STREET_NAME $50.0
BEAT_OF_OCCURRENCE 10.0

    PHOTOS_TAKEN_I STATEMENTS_TAKEN_I DOORING_I WORK_ZONE_I WORK_ZONE_TYPE

    WORKERS_PRESENT_I NUM_UNITS 10.0 MOST_SEVERE_INJURY $10.0 INJURIES_TOTAL
10.0 INJURIES_FATAL 10.0 INJURIES_INCAPACITATING 10.0

    INJURIES_NON_INCAPACITATING 10.0 INJURIES_REPORTED_NOT_EVIDENT
INJURIES_NO_INDICATION

    INJURIES_UNKNOWN CRASH_HOUR 10.0 CRASH_DAY_OF_WEEK 10.0 CRASH_MONTH
10.0 LATITUDE LONGITUDE LOCATION $50.0;

format  CRASH_RECORD_ID $100.0 RD_NO CRASH_DATE_EST_I CRASH_DATE $10.0
POSTED_SPEED_LIMIT 10.

    TRAFFIC_CONTROL_DEVICE $30.0 DEVICE_CONDITION $30.0 WEATHER_CONDITION
$10.0 LIGHTING_CONDITION $30.0

    FIRST_CRASH_TYPE $50.0 TRAFFICWAY_TYPE $30.0 ALIGNMENT
ROADWAY_SURFACE_COND

    ROAD_DEFECT $50.0 REPORT_TYPE CRASH_TYPE $50.0 INTERSECTION_RELATED_I $10.0
NOT_RIGHT_OF_WAY_I $10.0

    HIT_AND_RUN_I DAMAGE $20.0 DATE_POLICE_NOTIFIED PRIM_CONTRIBUTORY_CAUSE
$50.0

    SEC_CONTRIBUTORY_CAUSE STREET_NO STREET_DIRECTION STREET_NAME $50.0
BEAT_OF_OCCURRENCE 10.0
```

```
    PHOTOS_TAKEN_I STATEMENTS_TAKEN_I DOORING_I WORK_ZONE_I WORK_ZONE_TYPE

    WORKERS_PRESENT_I NUM_UNITS 10.0 MOST_SEVERE_INJURY $10.0 INJURIES_TOTAL
10.0 INJURIES_FATAL 10.0 INJURIES_INCAPACITATING 10.0

    INJURIES_NON_INCAPACITATING 10.0 INJURIES_REPORTED_NOT_EVIDENT
INJURIES_NO_INDICATION

    INJURIES_UNKNOWN CRASH_HOUR 10.0 CRASH_DAY_OF_WEEK 10.0 CRASH_MONTH
10.0 LATITUDE LONGITUDE LOCATION $50.0;

 infile "/home/u63524461/sasuser.v94/Traffic_Crashes_-_Crashes.csv"

 delimiter="," firstobs=2 dsd missover ;

 input CRASH_RECORD_ID$ RD_NO$ CRASH_DATE_EST_I$ CRASH_DATE$
POSTED_SPEED_LIMIT

    TRAFFIC_CONTROL_DEVICE$ DEVICE_CONDITION$ WEATHER_CONDITION$
LIGHTING_CONDITION$

    FIRST_CRASH_TYPE$ TRAFFICWAY_TYPE$ LANE_CNT$ ALIGNMENT$
ROADWAY_SURFACE_COND$

    ROAD_DEFECT$ REPORT_TYPE CRASH_TYPE$ INTERSECTION_RELATED_I$
NOT_RIGHT_OF_WAY_I$

    HIT_AND_RUN_I$ DAMAGE$ DATE_POLICE_NOTIFIED$ PRIM_CONTRIBUTORY_CAUSE$

    SEC_CONTRIBUTORY_CAUSE$ STREET_NO STREET_DIRECTION$ STREET_NAME$
BEAT_OF_OCCURRENCE

    PHOTOS_TAKEN_I$ STATEMENTS_TAKEN_I$ DOORING_I$ WORK_ZONE_I$
WORK_ZONE_TYPE$

    WORKERS_PRESENT_I$ NUM_UNITS MOST_SEVERE_INJURY$ INJURIES_TOTAL
INJURIES_FATAL INJURIES_INCAPACITATING

    INJURIES_NON_INCAPACITATING INJURIES_REPORTED_NOT_EVIDENT
INJURIES_NO_INDICATION

    INJURIES_UNKNOWN CRASH_HOUR CRASH_DAY_OF_WEEK CRASH_MONTH LATITUDE
LONGITUDE LOCATION$;

DROP CRASH_DATE_EST_I LANE_CNT ALIGNMENT REPORT_TYPE

    INTERSECTION_RELATED_I NOT_RIGHT_OF_WAY_I HIT_AND_RUN_I

    SEC_CONTRIBUTORY_CAUSE STREET_NO STREET_DIRECTION PHOTOS_TAKEN_I
STATEMENTS_TAKEN_I DOORING_I WORK_ZONE_I

    WORK_ZONE_TYPE WORKERS_PRESENT_I INJURIES_REPORTED_NOT_EVIDENT

    INJURIES_NO_INDICATION INJURIES_UNKNOWN LATITUDE LONGITUDE;

run;
```

```
ods graphics on;
/* /DATA OVERVIEW/ */
proc contents data=traffic order=varnum;
run;

ods graphics / width=640px height=480px;




/* ods ALL CLOSE; */
/* ods pdf file="/home/u63524461/sasuser.v94/ODS_pdf_outputs/Damage_crash_hour.pdf"; */




/* 1)  Bar plot of Monthly Distribution of Traffic Accidents in Chicago (2016-2023): */

proc sgplot data=traffic;
   vbar CRASH_MONTH /
   datalabel
   FILL
   FILLATTRS=(color=blue)
   dataskin=pressed;
   xaxis values=(1 to 12) label="Month (1=January, 12=December)";
   yaxis label="Number of Accidents";
   title "Monthly Distribution of Traffic Accidents in Chicago (2016-2023)";
```

```
run;

/* 2.Bar plot of Distribution of Traffic Accidents by Posted Speed Limit in Chicago (2016-2023) :
*/

proc sgplot data=traffic;
   vbar POSTED_SPEED_LIMIT /
   FILL
   FILLATTRS=(color=green)
   dataskin=pressed;
   xaxis values=(0 to 50 by 5) label="Posted Speed Limit (mph)";
   yaxis label="Number of Accidents";
   title "Distribution of Traffic Accidents by Posted Speed Limit in Chicago (2016-2023)";
run;

/* 3.Bar plot of Distribution of Traffic Accidents by Hour in Chicago (2016-2023) : */

proc sgplot data=traffic;
   vbar CRASH_HOUR /
   FILL
   FILLATTRS=(color=orange)
   dataskin=pressed;
   xaxis values=(0 to 23) label="Hour of the Day (24-hour format)";
   yaxis label="Number of Crashes";
   title "Distribution of Traffic Accidents by Hour in Chicago (2016-2023)";
run;
```

```
/* 4. Mosaic plot of Distribution of Vehicle Crash Damages by Crash Type in Chicago (2016-2023): */

proc freq data=traffic;
tables CRASH_TYPE * DAMAGE/plots=mosaicplot;
title 'Distribution of Vehicle Crash Damages by Crash Type in Chicago (2016-2023)';
format DAMAGE $damageLabel.;
axis1 label=(angle=45 'Crash Type');
axis2 label=('Extent of Damage');
run;

/* 5. Bar plot of Traffic Accidents in Chicago by Day of the Week (2016-2023): */


proc sgplot data=traffic;
  vbar CRASH_DAY_OF_WEEK /
  DATALABEL
  FILL
  FILLATTRS=(color=pink)
  dataskin=pressed;
  xaxis values=(1 to 7) label="Day of the Week (1=Monday, 7=Sunday)";
  yaxis label="Number of Accidents";
  title "Traffic Accidents in Chicago by Day of the Week (2016-2023)";
run;



/* 6.Frequency of Fatal Injuries by Posted Speed Limit in Chicago (2016-2023): */

proc sgplot data=traffic;
```

```
vbar POSTED_SPEED_LIMIT /Freq=INJURIES_FATAL
group= POSTED_SPEED_LIMIT;
Title "Frequency of Fatal Injuries by Posted Speed Limit in Chicago (2016-2023)";
xaxis label="Posted Speed Limit (mph)";
yaxis label="Number of Fatal Injuries";
run;


/* 7. Mosaic plot of Vehicle Damage with respect to Lighting condition: */

PROC freq data=traffic;
tables LIGHTING_CONDITION* DAMAGE/ plots=mosaicplot;
title 'Mosaic plot of Vehicle Damage with respect to Lighting condition';
format DAMAGE $damageLabel.; /* If using custom labels */
axis1 label=(angle=45); /* Rotate labels 45 degrees */
run;



/* 8. Bar plot of Incapacitating Injuries to people by Lighting Condition in Chicago (2016-2023): */

proc sgplot data=traffic;
  vbar LIGHTING_CONDITION / Freq=INJURIES_INCAPACITATING
group=LIGHTING_CONDITION;
  Title "Incapacitating Injuries by Lighting Condition in Chicago (2016-2023)";
  xaxis label="Lighting Conditions";
  yaxis label="Count of Incapacitating Injuries";
run;

/* 9. Bar plot of Incapacitating Injuries to people by Road Surface Condition in Chicago (2016-
2023): */
```

```
proc sgplot data=traffic;
vbar ROADWAY_SURFACE_COND / Freq=INJURIES_INCAPACITATING
group=ROADWAY_SURFACE_COND;
Title "Incapacitating Injuries by Road Surface Condition in Chicago (2016-2023)";
xaxis label="Type of Road Surface Condition";
yaxis label="Number of Incapacitating Injuries";
run;


ods pdf close;
```