Factors Affecting Traffic Accidents in Toronto

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1. Introduction

Every year, drivers, passengers, and passersby die as a result of traffic accidents - many are left injured, disabled, or in vegetative states for the same reason. Traffic accident is the leading cause of death globally, with approximately 1.19 million deaths and about 50 million injured or disabled each year (World Health Organisation: WHO, 2023). Although traffic accident rate is increasing globally, some countries like Sweden are recording low rates of road fatalities e.g., Sweden (William Kremer, 2024).

In Canada, traffic accident is the second-leading cause of injury and the third-leading cause of injury that results in death (Parachute, 2025). The aftermath of a traffic accident imposes significant economic, social, and health costs on the society. Families and communities are left shattered, and countries spend resources on treating victims and restoring damages. According to the International Transport Forum (2023), Canada spent approximately 36 billion dollars in 2021 on road accidents, which represents about 1.8% of Canada's GDP.

Traffic accidents are complex events influenced by a variety of factors. For an urban environment like Toronto, many factors such as population density, overcrowding, speeding, impaired driving, bad environmental conditions, lack of experience (human error), and non-adherence to safety measure(traffic rules) contribute greatly to accident rates (Canadian Association of Chief of Police, 2023).

In this study, we intend to examine the factors that affect traffic accidents in Toronto (e.g., road conditions, etc.), identify the patterns, and determine the variables that impact accident frequency and severity using data from the Toronto Policing Authority. We also want to assess if there is a relationship between timing, vehicle types, traffic controls, human behaviour, and accident frequency. In addition, we want to investigate whether specific roads and districts are particularly prone to accidents and to identify some of the underlying reasons for these occurrences. Understanding the characteristics of these high-risk areas can help us pinpoint critical factors such as traffic volume, road design, and the presence of safety features, which can contribute to a higher incidence of accidents.

1.1 Expected Contributions

The research study focuses on analyzing the key factors that significantly contribute to traffic accidents in Toronto, as well as identifying patterns and suggesting preventive measures. The findings will support policymakers, city planners, and law enforcement in creating city projects, traffic laws, and interventions aimed at reducing traffic accidents. The methodology used will facilitate results for informed decision-making to enhance safety and compliance on the road, which will help save lives. Furthermore, the results can be developed into educational campaigns for insurance companies and non-governmental organizations to educate people on the importance of safe driving. We believe that by understanding the main contributing factors and developing preventive measures, alongside educating the public on road safety, we can significantly minimize road accidents.

2. Dataset Description

For this study, we used the Killed or Seriously Injured (KSI) in Traffic Accident data from the Toronto Police Service Public Safety Data Portal. This dataset captures data on traffic accidents - factors that contribute, the timing of the accidents (in years, months, days, and hours), road conditions, vehicle types, visibility levels, injury type, and fatality and district. The data contains reports of traffic accidents fr0om April 2007 to December 2017. This extensive time frame gives us room for comprehensive analysis and helps us understand traffic accident trends in Toronto over a long period.

2.1 Dataset Justification

The following are the reasons we decided to use this dataset for this study;

1. Source reliability – Since the data was obtained from the Toronto Police, it reports a significant representation of real-world incidents and serves as an accurate report of events.

2. Relevance to research objectives – The dataset directly addresses the research question and contains the necessary variable needed to carry out the research analysis and achieve the study objectives.

3. Data Format and Structure – The dataset is presented in a format that is easy to work with and analyze. It is organized in a structure that enables us to perform data extraction and manipulation.

4. Scalability -

The chosen dataset is ideal for this study as it originates from a reliable source, aligns well with the research question, and its well-structured format supports adequate data analysis. These qualities ensure the data is relevant and reliable which gives us insightful conclusions about the study.

2.2 Types of Data Collected

The dataset was made up of mostly qualitative variables derived from surveys carried out for the Toronto Police. Although the data collected were mostly non-numeric and descriptive, they were valuable to the research study.

The following are the variables in the study and their data type:

- Timing of Accidents (categorical/numeric/timestamp) – The occurrence of accidents by hours, seasons, and years.
- Road Conditions (categorical) – The different road conditions that can affect traffic accidents.
- Road Classification (categorical) – The different types of roads where accidents happen in Toronto.
- Vehicle Types (categorical) – The different vehicle types involved in accidents.
- Toronto Districts (categorical) – The districts in Toronto

2.3 Data Preprocessing

To ensure that the data was accurate and adequate for analysis, we had to perform some data preprocessing steps necessary to complete the study.

Step 1 – After a thorough assessment of the dataset, the necessary information on the different variables was extracted and copied on a new sheet. The missing, invalid, and incomplete data such as speeding, impairment, driving experience, redlight violations were removed. Imputation could not be done as these were information gotten from surveys.

Step 2 – Critical data such as seasons was not captured in the dataset. The season variable was added by dividing the year into the different seasons in Canada. This was used to represent the seasons that affect traffic accidents.

Step 3 – Timestamp (hour) data was transformed into the categories (e.g., day and night).

Step 4 – Some vehicle type variable was grouped into a single unit of identification. For example: Municipal Transit Bus, Coaches, Go buses were grouped as 'Bus'. The same was done on the traffic ctrl variables. All types of traffic control methods were summed up in 'Traffic control".

Step 5 –The trim function was used to deal with extra spaces in the visibility and traffic control columns. These duplicated categories such as 'clear' into two groups. The trim function addressed this issue.

3. Research Questions and Hypotheses

The project aims to address key research questions related to the factors affecting traffic accidents in Toronto. These questions will guide the data collection and analysis process, ensuring that the project stays focused on uncovering relevant and actionable insights. The research questions are:

1. What time of day and year do most accidents occur in Toronto?
2. How do road conditions (e.g., wet, dry, loose snow, etc.) impact accident frequency?
3. What road classification has the most accidents?
4. Which vehicle types are most frequently involved in accidents?
5. Are certain districts more prone to accidents, and what factors contribute to this?

3.1 Hypotheses

To guide this research, we propose testing the following hypotheses:

Hypothesis 1

Ho (Null Hypothesis) – The count of accidents is the same across all road condition types.

Ho: $f$accident = all road types

Hα (Alternative Hypothesis) – The count of accidents differs across road condition types.

Hα: $f$accident $\neq$ all road types

Where:

- $f$accident refers to the observed frequency of accidents.

The following hypothesis is rooted in the assumption that road conditions play an important role in impacting traffic accidents. For example, icy roads or wet roads may lead to higher accident counts and dry roads experience lower accident counts. We want to statistically test if the count of accidents happens by chance, or they reflect any difference depending on the road condition.

Hypothesis 2

Ho (Null Hypothesis) – The count of accidents is the same across different levels of visibility.

Ho: $f$accident =levels of visibility

Hα (Alternative Hypothesis) – The count of accidents varies across different levels of visibility.

Hα: $f$accident $\neq$ levels of visibility

Where:

- $f$accident refers to the observed frequency of accidents.

To enhance safety, it is advised that drivers and other road users should be aware of varying visibility levels. This assumes that visibility levels impact our ability to be safe on the road. For example; reduced or low visibility may limit the driver's ability to see road hazards or reduce reaction time, leading to more accident counts and clear visibility could lead to fewer accident counts. The hypothesis aims to determine if the observed difference in accident counts happened at random or if there is an impact of varying visibility levels on accident frequency.

Hypothesis 3

Ho (Null Hypothesis) – The presence of traffic control measures (e.g., traffic lights, stop signs) in various districts have no impact on accident occurrences.

Ho: $f$with control = $f$without control

Hα (Alternative Hypothesis) –The presence of traffic control measures in some districts have a significant impact on accident occurrences.

Hα: $f$with control $\neq$ $f$without control

The implementation of traffic control measures in various districts is believed to improve traffic flow and reduce accident frequency by giving drivers directions and clear visual cues. This assumes that districts with traffic control measures experience fewer accident counts. Therefore, we want to statistically test to assess if there’s evidence supporting the impact of traffic controls on accident occurrence.

4. Methodology

This methodology outlines the structured approach taken to address the research questions and hypotheses for this study. In this section, the data collection, assumptions, tests, and visualization will be explored in detail to understand the factors affecting traffic accidents in Toronto.

For each hypothesis, the Chi-square was used to determine if there is a statistically significant impact between the categorical variables and accident frequency. The Chi-Square test is a non-parametric test used to examine whether the observed frequency in **one or more categories** matches the expected outcome.

4.1 Summary of Statistical Methods

Hypothesis 1 – Chi-Square for One variable (Goodness-of-fit-test): This test determines if a single categorical variable follows an expected distribution. In this case, we want to test if the count of accidents is the same in all road condition types or if the count is not the same.

Assumption of Chi-Square Goodness-of-fit-test

- Categorical data – It is assumed that the variable used for measure is categorical. This means that the values are either names or labels, for example; in this study the variable – road conditions – are names/labels such as dry, loose sand, ice etc.
- Data values are derived using simple random sampling from the general population.
- Independent observation – It is assumed that the variables are independent and the value of one observation is not dependent on the outcome of another value of observation.
- Mutual exclusive categories – It is assumed that each categorical variable must belong to one group; that is, they must be mutually exclusive.
- It is assumed that the expected frequency in each group of categorical variables must be at least 5.

Hypothesis 2 - Chi-Square for One variable (Goodness-of-fit-test): This test determines if a single categorical variable follows an expected distribution. In this case, we want to test if the count of traffic accident varies across different levels of visibility or if it is the same across different levels of visibility.

Assumption of Chi-Square Goodness of Fit Test

- Categorical data – It is assumed that the variable used for measure is categorical. This means that the values are either names or labels, for example; in this study the variable – road conditions – are names/labels such as dry, loose sand, ice etc.
- Data values are derived using simple random sampling from the general population.
- Independent observation – It is assumed that the variables are independent and the value of one observation is not dependent on the outcome of another value of observation.
- Mutual exclusive categories – It is assumed that each categorical variable must belong to one group; that is, they must be mutually exclusive.
- It is assumed that the expected frequency in each group of categorical variables must be at least 5.

Hypothesis 3 – Chi-Square for Two Variables (Test of Independence): This checks if there is a significant association between two categorical variables. Here we want to test if the presence of traffic control measures in some districts significantly impacts accident frequency, or if they have no impact at all. The variables used here were:

i. We have a list of districts in Toronto; this is the first variable.
ii. The second variable indicates the presence or absence of traffic control measures.

Assumption of Chi-Square Test of Independence

- It is assumed that there are two variables, and they are both measured as categorical.

- Independent observation – It is assumed that the variables are independent and the value of one observation is not dependent on the outcome of another value of observation.
- Mutual exclusive categories – It is assumed that each categorical variable must belong to one group; that is, they must be mutually exclusive.
- The data should be presented as frequencies or counts.
- It is assumed that the expected frequency in each group of categorical variables must be at least 5.

4.2 Tools used for analysis

For this study, the software used was Excel - Pivot Table - to effectively carry out the analysis. The Chi-Square calculations were done manually by using the formula stated below:

To calculate for Chi-Square –

$$\chi^2 = \sum \frac{(\mathbf{O} - \boldsymbol{E})\mathbf{2}}{\boldsymbol{E}}$$

Where;

O = observed frequency

E = expected frequency

Σ = the sum of

X^2 = the statistic test

Degree of Freedom for Goodness of Fit Test –

df = (c– 1)

Where;

c = Number of columns

Degree of Freedom calculation for Test of Independence –

$$\mathbf{df = (r\text{-}1)(c\text{-}1)}$$

Where;

r = number of rows

c = number of columns

To calculate the expected frequency in a Chi-Square Test for Independence –

$$\boldsymbol{E = \frac{(Row\ Total\ x\ Column\ Total)}{Grand\ Total}}$$

5. Results

The core findings from the statistical methods used in this study is presented and interpreted in this section. The data will be illustrated and effectively communicated using tables, graphs and charts for easy understanding and interpretation.

5.1 What time of day and year do most accidents occur in Toronto?

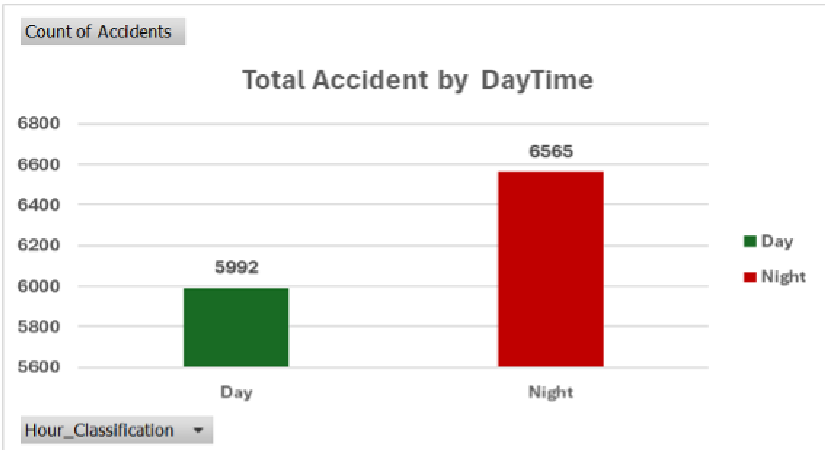

Figure 1 Total Accident by DayTime

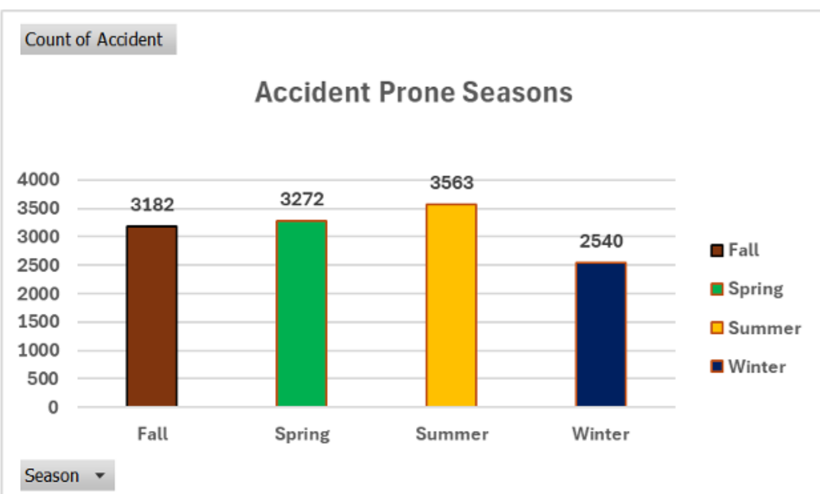

Figure 2 Count of Traffic Accident by Seasons

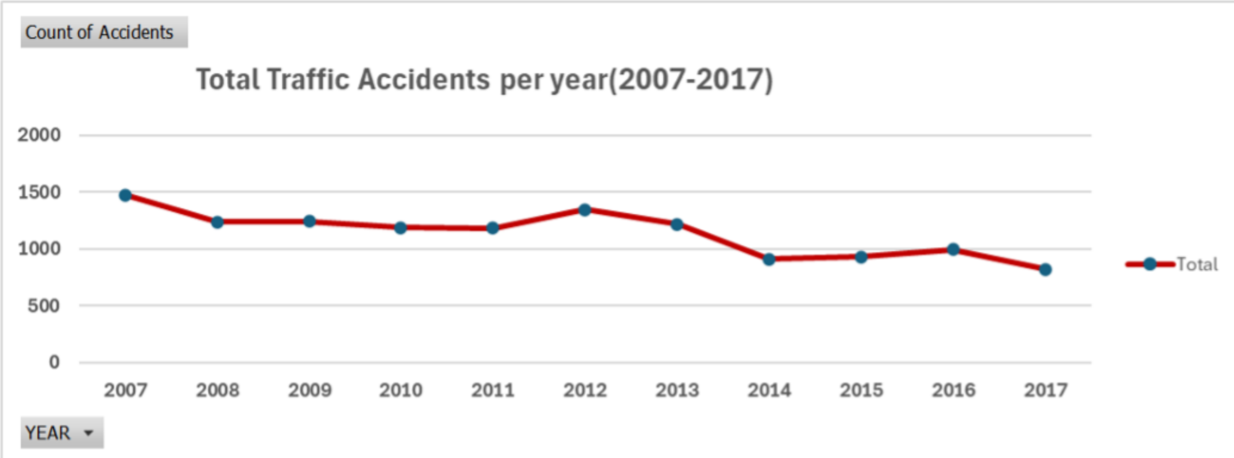

Figure 3 Total Traffic Accidents per Year from 2007 – 2017

The data presented in the figures illustrate the times of day and year when accidents occur, using a bar chart and a line graph. In Figure 1, it is evident that nighttime has the highest number of accidents with 6,565 counts and day having the lowest at 5,992 counts.

Figure 2 illustrates that the summertime has the most accidents in Toronto, which signifies that the months of July to September record more accidents than other months in the year.

The line graph shows the trends of accident in Toronto from 2007 to 2017. There has been a decrease in the count of accidents, years after 2007 saw a decline until 2012 with a slight increase from about 1,200 to about 1,400. Looking at years after 2012, there was a decline in counts until 2017.

5.2 How do road conditions (e.g., wet, dry, loose snow, etc.) impact accident frequency?

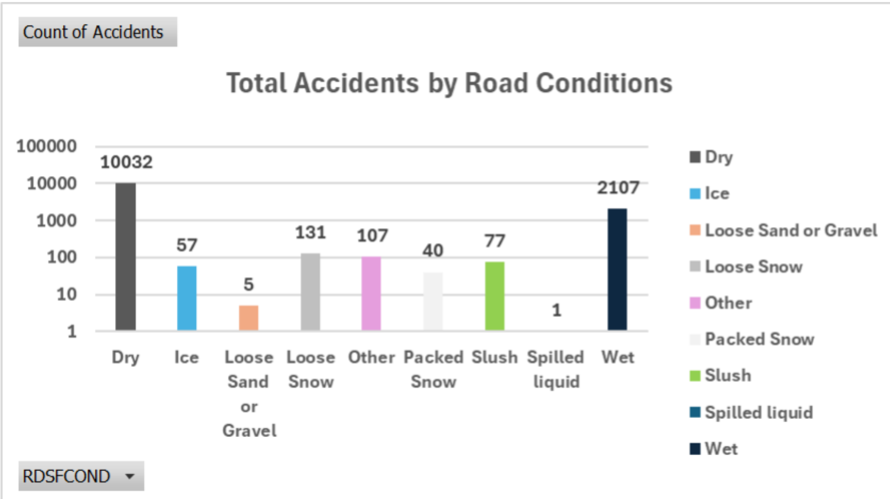

Figure 4 Total Accidents by Road Conditions

The figure identifies the various road conditions and how they impact accident frequency and severity. It shows that dry road records the highest count of accident with an extreme frequency of 10,032 count. This disparity may mean that during dry conditions, drivers develop a false sense of security that could make them complacent to the road hazards.

	Dry	Ice	Loose Sand or Gr	Loose Snow	Other	Packed Snow	Slush	Spilled liquid	Wet	Grand Total
Observed values	**10032**	**57**	**5**	**131**	**107**	**40**	**77**	**1**	**2107**	**12557**
Expected values	1114.666667	6.333333333	0.555555556	14.55555556	11.88888889	4.444444444	8.555555556	0.111111111	234.1111111	
(O-E^2)	79518833.78	2567.111111	19.75308642	13559.30864	9046.123457	1264.197531	4684.641975	0.790123457	3507712.79	
(O-E)^2/E	71338.66667	405.3333333	35.55555556	931.5555556	760.8888889	284.4444444	547.5555556	7.111111111	14983.11111	**89294.22222**

Table 1 Chi-Square Calculation of Count of Accidents by Road Condition Types

Test	Result
Chi-Square Goodness of Fit Test	Chi-square statistics = 89294.2
	Critical Value = 15.507
	Degree of Freedom = 8

Table 2 Statistical Method result

The Chi-Square Goodness of Fit Test indicates that the observed distribution of accidents significantly deviates from the expected distribution. The calculated Chi-Square statistic is 89249.2, which exceeds the critical value of 15.507. In the Chi-Square distribution table, this critical value corresponds to degree of freedom (8) at a 0.05 significance level. Since our calculated Chi-Square statistic surpasses this critical value, we reject the null hypothesis and accept the alternative hypothesis, which posits that the frequency of accidents varies across different road condition types.

5.3 What road classification has the most accidents?

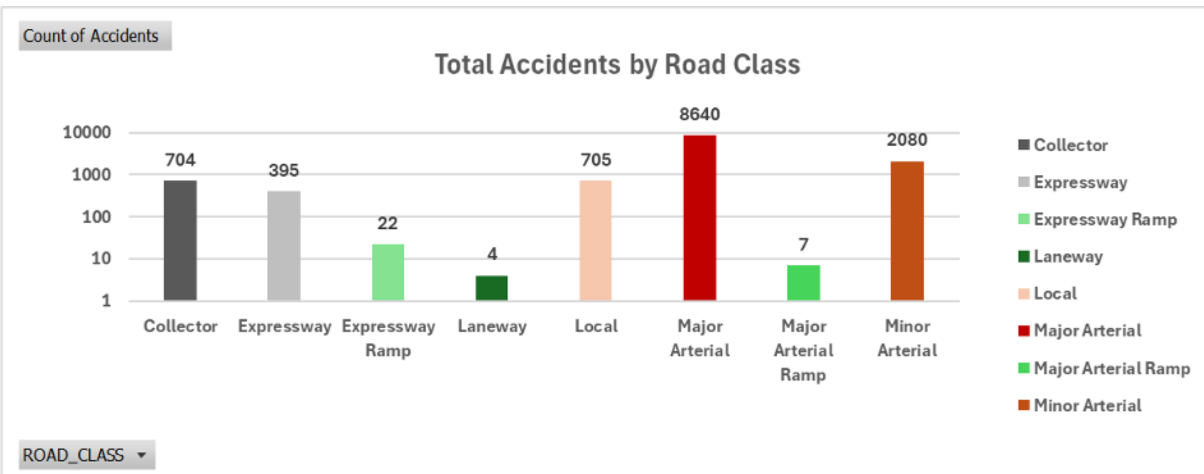

Figure 5 Total Accidents by Road Class

This bar chart represents the Total Accident by Road Class, which shows the count of accidents for different types of roads in Toronto. Major Arterial roads have the highest number of accidents counts at 8,640, significantly higher than other road types. The Collector Road and Local Road have similar accident counts at 704 and 705 respectively. The Expressways recorded a count of 395, which makes it lower than the previous road types. Expressway Ramps and Major Arterial Ramps have fewer accidents with 22 and 7 respectively. The road with the least accidents is Laneway. Laneway reports only 4 accidents.

5.4 Which vehicle types are most frequently involved in accidents?

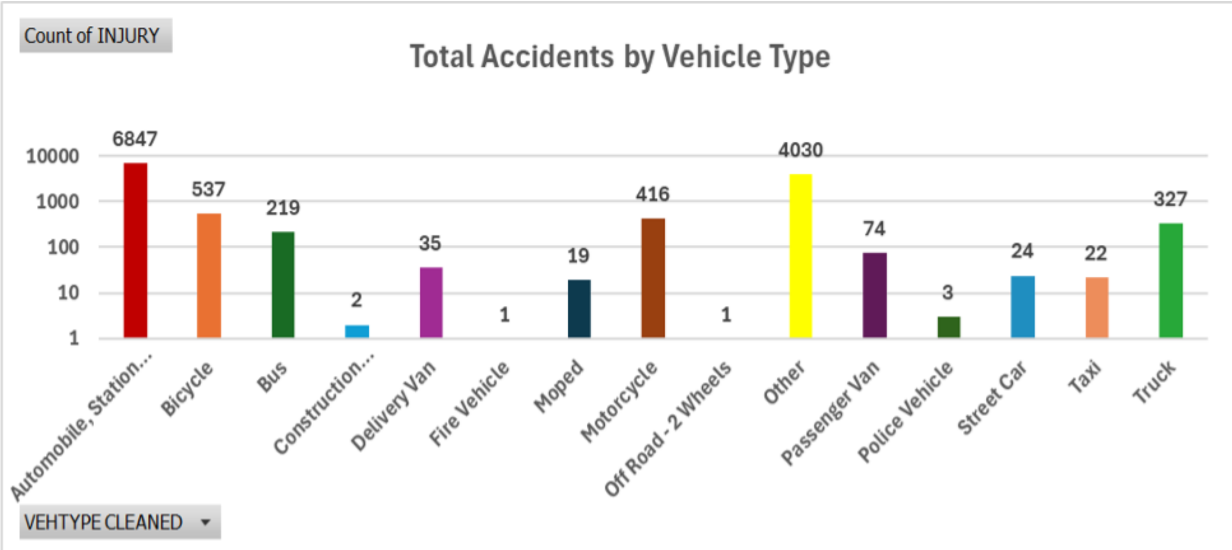

Figure 6 Total Accidents by Vehicle Type

The graph above provides insights into the number of accidents in Toronto categorized by vehicle type with the count of injuries. It is observed that Automobiles – Cars and Station Wagons – account for the highest number of accidents at 6,847, followed by other types. Other here could signify unclassified vehicles or a mixture of different vehicle types at an accident. Bicycles, and Motorcycles show similar rates at 537 and 416 respectively. Trucks and Buses record fewer accidents than Automobiles, Bicycles and Motorcycles with 327 and 219 counts. Other specialized vehicles like Fire Trucks, Police vehicles, Off-road vehicle, and Construction vehicles record most of the lowest counts.

5.5 Are certain districts more prone to accidents, and what factors contribute to this?

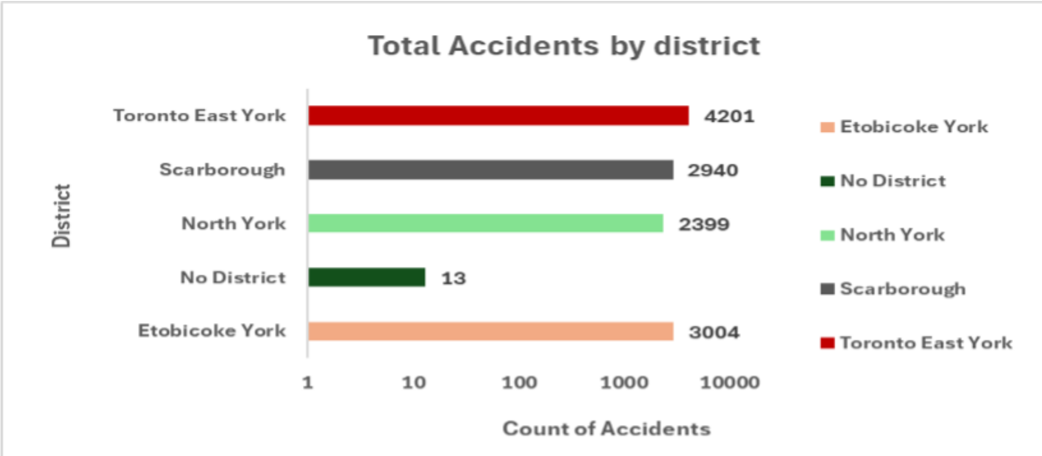

Figure 7 Total Accidents by District

This graph breaks down the total amount of accidents by districts, showing high prone districts and districts with fewer accidents. Toronto East York records the highest number of accidents(4,201). Followed by Etobicoke York with 3,004 accident recorded. Scarborough and North York records almost similar counts, with 2,940 and 2,399 accidents respectively. Unclassified districts had the lowest accidents likely due to insufficient or missing data.

5.6 Traffic Accident frequency and Visibility levels

	Clear	Drifting Snow	Fog, Mist, Smoke	Freezing Rain	Other	Rain	Snow	Strong wind	Grand Total
Observed values	**10814**	**13**	**38**	**31**	**74**	**1301**	**281**	**5**	**12557**
Expected values	1351.75	1.625	4.75	3.875	9.25	162.625	35.125	0.625	
(O-E)^2	89534175.06	129.390625	1105.5625	735.765625	4192.5625	1295897.641	60454.51563	19.140625	
(O-E)^2/E	66235.75	79.625	232.75	189.875	453.25	7968.625	1721.125	30.625	**76911.625**

Table 3 Chi-Square Calculation of Count of Accidents by Visibility Levels

Test	Result
Chi-Square Goodness of Fit Test	Chi-square statistics = 76911.625
	Critical Value = 14.067
	Degree of Freedom = 7

Table 4 Statistical Method Result

The Chi-Square Goodness of Fit Test indicates that the observed distribution of accidents significantly differs from the expected distribution. The calculated Chi-Square statistics of 76911.625 exceeds the critical value of 14.067. According to the Chi-Square distribution table, the critical value at a 0.05 significance level with a degree of freedom of 7 is approximately 14.067. Consequently, since the calculated Chi-Square is greater than this critical value, we reject the null hypothesis and accept the alternative hypothesis, which states that the frequency of accidents varies across different levels of visibility.

5.7 Does the presence of traffic control measures impact accident occurrence?

Districts								
Row Labels	No Control	Traffic Control	Grand Total	Expected Traffic Cont	Expected No Control	(O-E)^2/E No Control	(O-E)^2/E Traffic Control	
Etobicoke York	1465	1539	3004	1555.228478	1448.771522	0.181784011	0.169340712	
No District	2	11	13	6.730349606	6.269650394	2.9076445	2.708613305	
North York	1104	1295	2399	1242.008362	1156.991638	2.427082103	2.260945887	
Scarborough	1360	1580	2940	1522.094449	1417.905551	2.364792799	2.20292035	
Toronto East York	2125	2076	4201	2174.938361	2026.061639	4.83144199	4.500724918	
Grand Total	**6056**	**6501**	**12557**			**12.7127454**	**11.84254517**	**24.5552905**

Table 5 Chi-Square calculations of the Count of Accidents by districts, with Traffic controls and without traffic controls.

Test	Result
Chi-Square Test of Independence	Chi-square statistics = 24.5552
	Critical Value = 9.488
	Degree of Freedom = 4

Table 6 Statistical Method Result

The Chi-Square Test of Independence checks if there is a significant association between the various districts and the presence of traffic control measures on accident frequency. The calculated Chi-Square statistics of 24.5552 is greater than the critical value of 9.488. In the Chi-Square distribution table, a degree of freedom of 4 at a 0.05 significant level corresponds to a critical value of approximately 9.488. Since the calculated Chi-Square is greater than the critical value, the null hypothesis is rejected, and the alternate hypothesis is accepted – the presence of traffic control measures in some districts significantly impacts accident frequency.

6. Discussions

6.1 What time of day and year do most accidents occur in Toronto

From the study results, we found out that the most accidents happen at night. Although there is typically less traffic at night, which means fewer cars on the road, some drivers may take advantage of this by speeding or driving recklessly. Additionally, the darkness can lead to reduced visibility, making it difficult for both drivers and pedestrians to see clearly. Furthermore, nighttime increases the likelihood of drowsiness and fatigue, as it coincides with the hours when people are usually asleep.

In Figure 2, it is evident that summer has the highest count of accidents. The summertime is usually packed with events and outings after several months of snow and rainfall. This could mean a lot of partying, travelling, camping which most times involve substance intake and abuse. Most people in this state are carefree and do not take the necessary precaution on the road.

6.2 Road Conditions and Accident Frequency

The study recorded that dry road accounts for the most accidents in Toronto, which is quite shocking giving the common perception that wet and icy condition are the most hazardous. The high frequency suggests that the reason shifts from the road condition to the behaviour of the driver. Drivers develop a false sense of security, feeling overly confident when driving on dry roads. This could result in speeding, reduced attentiveness and delayed reaction time.

When comparing dry conditions to wet, icy, and snowy ones, it becomes evident that while the frequency of accidents is highest during dry conditions, adverse weather may contribute to greater accident severity. Although wet and icy conditions may not lead to a higher frequency of accidents, they could result in more, severe outcomes when they do occur.

6.3 What Road classification has the most accidents?

The findings indicated that Major Arterial roads experienced the highest number of accidents, likely due to their substantial traffic volume. These high-capacity roads facilitate the flow of traffic to key destinations and connect with major expressways and highways. With multiple lanes and numerous intersections, they present a heightened risk, as even the smallest mistake can lead to accidents. In contrast, Ramps and Laneways recorded the fewest accidents, as they primarily serve as secondary routes intended to bypass congestion on main roads. These routes accommodate a limited number of vehicles and are typically narrower, designed for access to parking areas and buildings.

6.4 Which vehicle types are most frequently involved in accidents?

Given that automobiles are the most prevalent mode of transportation, it is not surprising that they are involved in the majority of accidents. There are significantly more cars and station wagons on the road than any other type of vehicle. Bicycles and motorcycles, which rank next in frequency after cars and station wagons, highlight the need for designated lanes, as these smaller vehicles are particularly vulnerable and at higher risk of being struck by larger vehicles. In contrast, specialized vehicles such as fire and police vehicles tend to have fewer accidents, likely due to the strict regulations that drivers of these vehicles must adhere to operate on the road.

6.5 Are certain districts more prone to accidents?

In densely populated and highly urbanized cities like Toronto, the presence of numerous motorists, pedestrians, cyclists, and intersections contributes significantly to the likelihood of collisions and accidents. Notably, Toronto East York experiences the highest accident frequency, likely due to its closeness to downtown Toronto, where there is a substantial amount of both human and vehicle traffic. In contrast, suburban areas such as Scarborough and Etobicoke, while they also maintain a decent volume of traffic and high-speed roads, tend to have fewer interactions on the road, potentially leading to a reduced frequency of accidents.

6.6 The presence of traffic control measures and accident frequency

The study conducted highlights the crucial role that traffic control measures play in influencing the frequency of accidents on the road (see hypothesis 3). These measures can be categorized into three main types: physical control – such as traffic signals, speed bumps, and road signs; legal controls – laws and regulations governing road use and human controls, which involve the presence of law enforcement officers on the road.

The findings of this study emphasize the urgent need for law enforcement agencies and regional leaders to implement comprehensive and effective traffic control strategies aimed at enhancing public safety. It is essential that these measures must not be enforced but also regularly assessed for their effectiveness in reducing accidents. Furthermore, a strong emphasis on driver education and training is essential. Drivers should receive thorough instruction regarding the various traffic signs, their meanings, and the responsibilities associated with different road safety rules and regulations. This educational framework should aim to foster a deeper understanding of safe driving practices, encouraging responsible behavior on the road.

6.7 Limitations of the study

There are some notable limitations in the study:

- Most of the data used are mostly categorical which made it hard for us to address missing values through imputation.
- The first two hypothesis violated one of the assumptions of Chi-Square Goodness of Fit Test as one of the columns did not have an expected value of 5.

- The lack of numerical and continuous variable made it hard to run important statistical models like regression, ANOVA etc.
- Chi-Square has lesser statistical power than other models.
- The human behaviour variable data was missing from the dataset which made it hard for us to analyze the impact of human behaviour on accident frequency. This gives room for further study to understand how human behaviour impacts accident frequency.

7. Recommendations

For City Planners and Government authorities

- There is a pressing need for driver education and training. This will equip the driver with the necessary knowledge to take actions that reduce the likelihood of accidents.
- Regular maintenance of the roads and road signs will ensure that the roads remain in good and stable conditions necessary for safe driving.
- Clear and visible traffic signals, utility poles, and streetlights will help with better visibility, especially at night.
- Public awareness campaigns centered around driving at night and general safety in accident-prone districts and roads.
- Improved infrastructure for cyclists and pedestrians to ensure safety from bigger vehicles.
- Accident-prone districts need to be monitored to ensure that road laws are adhered to.
- Roads with high traffic volumes require infrastructure to control the traffic.

For Law Enforcement

- An increased presence of traffic measures and patrolling officers to ensure adherence to traffic rules.
- Stringent traffic rules and penalties must be implemented and enforced to uphold road safety standards effectively. Such stringent measures would serve as a warning to reckless driving behaviors, ensuring that all road users adhere to established regulations.

For drivers

- Drivers need to ensure that vehicles are in safe conditions suitable for different environmental conditions.

8. Conclusion

Traffic accidents are influenced by multiple factors, including road and environmental conditions, human behavior, and infrastructure. The analysis of traffic accidents in Toronto provided valuable insights into how accident frequency varies based on road conditions, timing, vehicle types, and road classifications. These findings offer a comprehensive understanding of the key factors contributing to accidents and how they can be managed to improve road safety.

The results of this study can serve as a crucial resource for city planners and government authorities in their efforts to reduce traffic accidents in Toronto and across the country. Additionally, the insights can be used to develop educational campaigns for insurance companies, non-governmental organizations, and the general public. By applying the knowledge gained from this study, more effective safety measures and compliance strategies can be implemented to enhance road safety for all users.

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