Safe Road 2024:
Insights for Enhancing Road Safety in Toronto

1. Patterns of Automobile Accidents

Objective	To understand the patterns of automobile accidents across different hours of the day, months of the year, and locations
Observation	Collisions are more likely to happen during 1. Lunch break when people rush out and back for lunch 2. Holiday seasons in the months of the year 3. Locations with high Road Volume Vehicles
Recommendation	1. Increase police presence and traffic enforcing during peak accident hours identified 2. Implement seasonal safety campaigns targeting months with higher accident rates 3. Prioritize traffic calming measures in locations with a higher concentration of accidents

Hourly and Weekly Patterns

The FREQ Procedure

Frequency

Table of OCC_HOUR by OCC_DOW

	OCC_DOW							
OCC_HOUR	Friday	Monday	Saturday	Sunday	Thursday	Tuesday	Wednesda	Total
0	1	1	0	0	0	0	1	3
1	0	1	0	2	2	0	1	6
2	0	1	1	1	1	1	1	6
3	0	0	0	1	0	0	0	1
4	0	0	0	0	0	0	1	1
5	0	0	0	0	1	0	0	1
6	0	0	0	0	0	0	1	1
7	0	0	0	0	1	0	1	2
8	0	1	0	0	0	1	0	2
9	0	0	0	0	0	0	1	1
10	0	0	1	0	0	2	2	5
11	0	0	0	0	1	0	1	2
12	2	1	1	0	0	1	3	8
13	0	0	0	2	2	0	1	5
14	0	2	2	1	1	2	0	8
15	2	0	0	0	1	0	2	5
16	1	1	1	0	1	0	0	4
17	0	1	2	1	0	1	0	5
18	1	0	0	1	1	0	2	5
19	0	0	1	0	1	2	1	5
20	1	0	1	1	1	0	1	5
21	0	0	2	1	1	0	0	4
22	1	0	0	0	0	0	0	1
23	3	0	1	0	0	1	1	6
Total	12	9	13	11	15	11	21	92

The table shows the frequency of collisions by hour of the day and day of the week.

Lunch break is high risk when frequency spiked to 8 (8.7%) at 12 and 14 hour. During this time, drivers might be rushing to grab a quick meal or returning to work, leading to distractions and potential safety hazards on the road.

Wednesday shows an unexpected pattern of higher collisions happening during midnight and early morning. This may be due to midweek fatigue which could impair drivers' reaction times and decision-making abilities when they are driving home after night shift.

- Increased police patrols during peak lunch break hours (12-2 pm) focusing on areas with high pedestrian activity
- Conduct more sobriety checkpoints targeting midnight drivers
- Collaborate with employers to educate night shift workers on the danger of fatigue driving

Seasonal Pattern

The OCC_MONTH table displays the distribution of occurrences by month

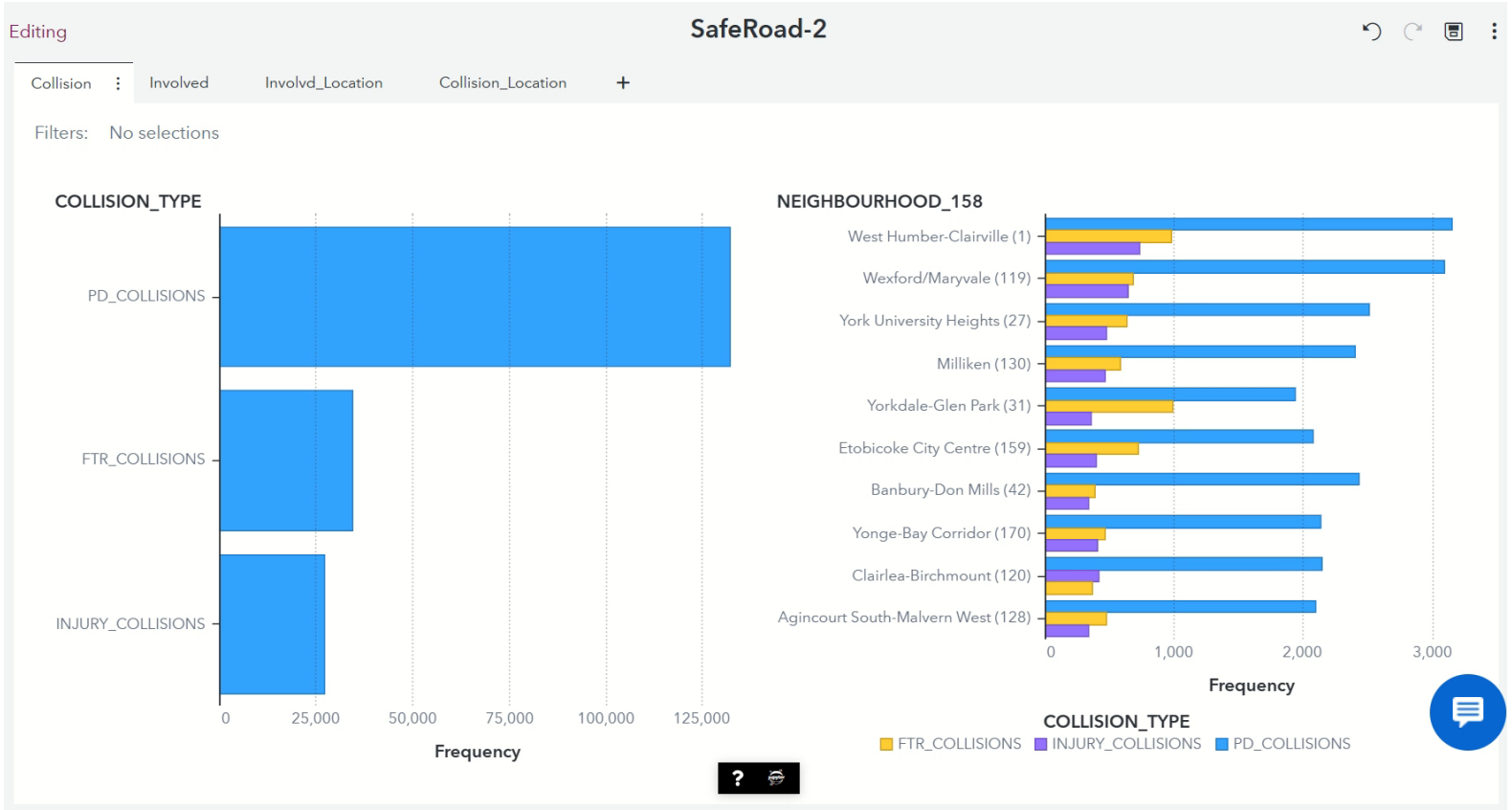
Seasonal patterns with higher accident rates are highlighted. There is a spike in December and January, probably due to holiday traffic (Christmas and New Year), or increased alcohol consumption during festive seasons

Implement appropriate road safety measures such as increased police patrols or awareness campaigns during specific months to mitigate risks

The FREQ Procedure

OCC_MONTH	Frequency	Percent	Cumulative Frequency	Cumulative Percent
April	3	3.26	3	3.26
August	2	2.17	5	5.43
December	25	27.17	30	32.61
February	2	2.17	32	34.78
January	34	36.96	66	71.74
July	4	4.35	70	76.09
June	1	1.09	71	77.17
March	2	2.17	73	79.35
May	4	4.35	77	83.70
November	5	5.43	82	89.13
October	6	6.52	88	95.65
Septembe	4	4.35	92	100.00

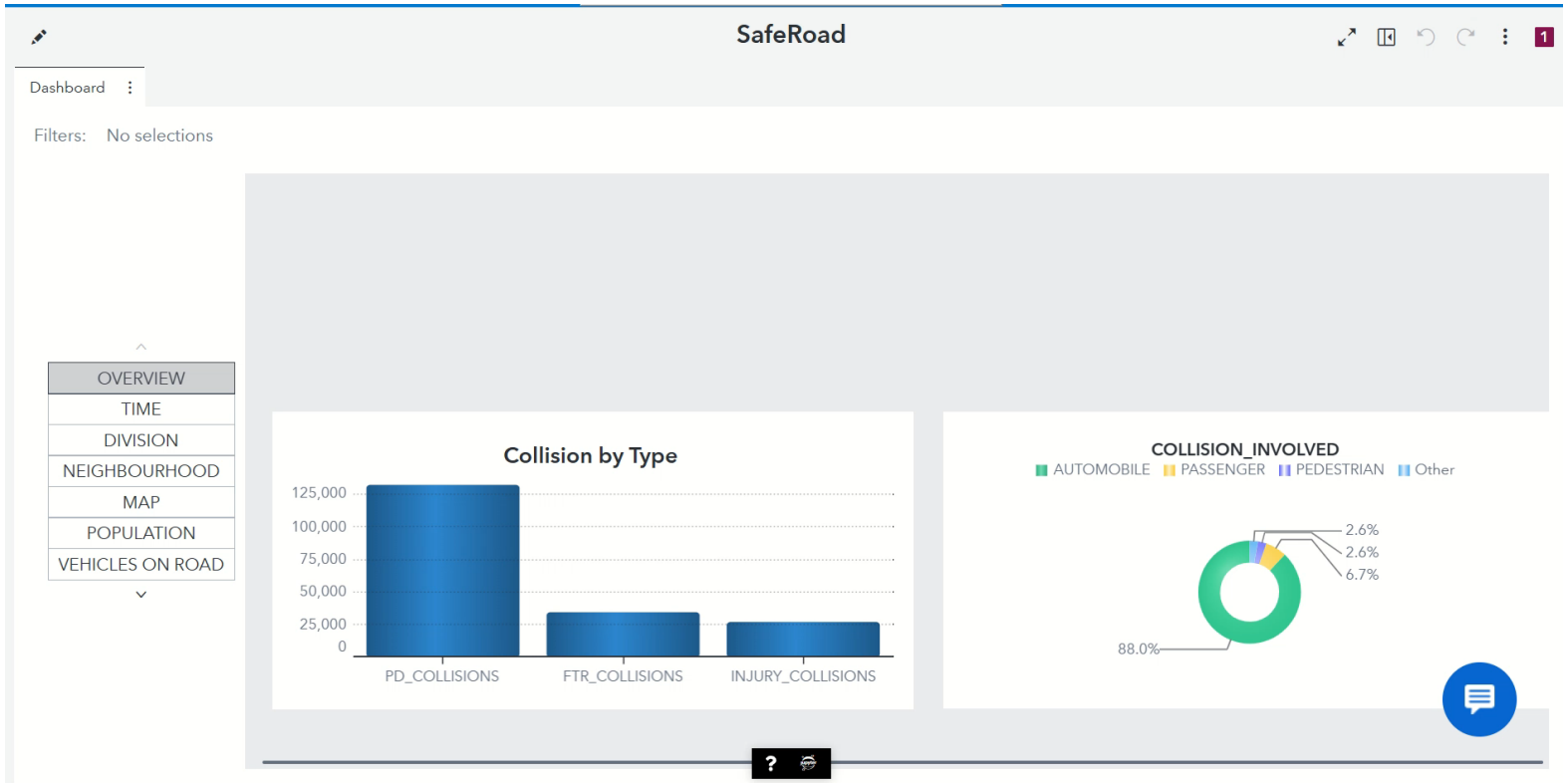
Collision Patterns Across Neighborhoods



131,975 collisions involved Property Damaged

West Humber-Clairville was the neighborhood with the highest collisions

Comprehensive Dashboard: Collision Overview



Increase population leading to increase in number of vehicles on road.

Majority of local Roads have vehicle count above the benchmark of 20,000

2. Road Safety for Pedestrian

Objective	To understand the relationship between the pedestrian and fatalities in road accidents
Observation (What)	The effect of Pedestrians is significant in fatal accidents, meaning accidents involving pedestrians are more likely to result in fatalities compared to accidents where pedestrians are not involved. Speeding and poor visibility are contributing factors to major injuries and fatal accidents.
Recommendation (So What)	1. Safety measures should be focused on improving safety for pedestrians. 2. Improving lighting and signage are preventative measures in case of poor weather conditions. 3. Better sidewalks, lower speed limits in busy pedestrian areas, and campaigns to raise awareness among drivers on speeding consequences are possible measures.

Presence of Pedestrians & Fatalities

- The correlation analysis suggests that the presence of pedestrians has a significant effect on fatalities.
- Accidents involving pedestrians are more likely to result in fatalities compared to accidents where pedestrians are not involved.
- Prioritizing pedestrian safety measures, such as improved pedestrian crossings, sidewalks, and traffic signals, may help reduce fatalities.

The GLM Procedure

Dependent Variable: FATALITIES

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	0.52795031	0.13198758	3.35	0.0134
Error	87	3.42857143	0.03940887		
Corrected Total	91	3.95652174			

R-Square	Coeff Var	Root MSE	FATALITIES Mean
0.133438	913.1767	0.198517	0.021739

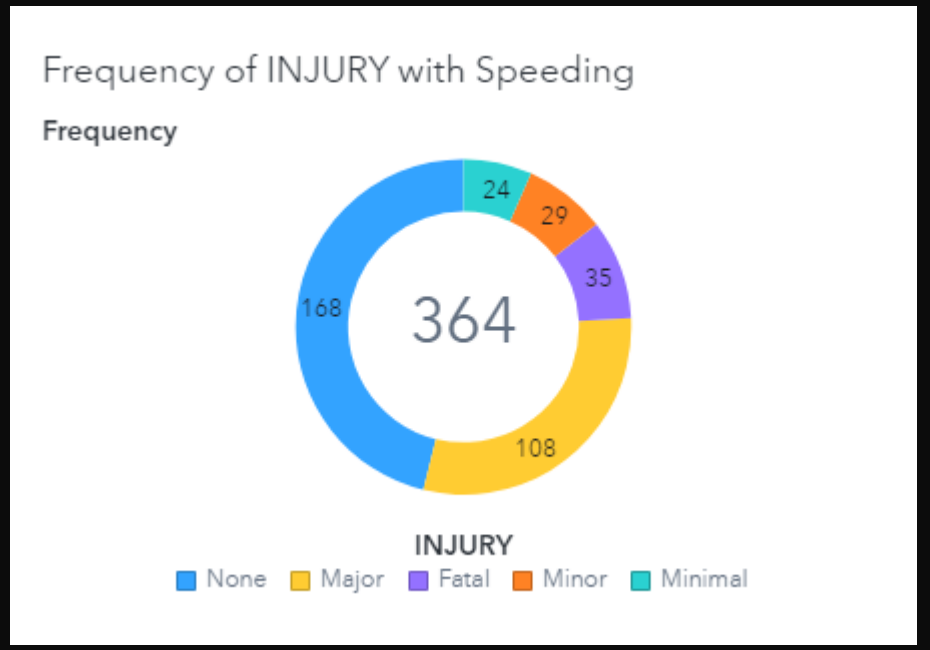
Source	DF	Type I SS	Mean Square	F Value	Pr > F
AUTOMOBILE	1	0.00249875	0.00249875	0.06	0.8018
MOTORCYCLE	0	0.00000000	.	.	.
PASSENGER	1	0.00735632	0.00735632	0.19	0.6668
BICYCLE	1	0.00222222	0.00222222	0.06	0.8129
PEDESTRIAN	1	0.51587302	0.51587302	13.09	0.0005

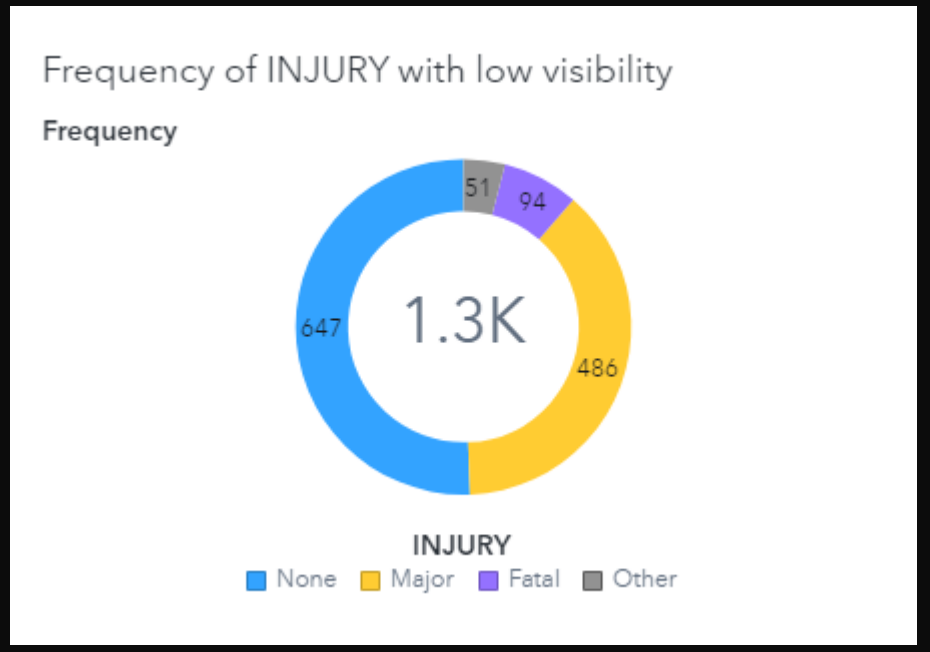
Source	DF	Type III SS	Mean Square	F Value	Pr > F
AUTOMOBILE	0	0.00000000	.	.	.
MOTORCYCLE	0	0.00000000	.	.	.
PASSENGER	1	0.00000000	0.00000000	0.00	1.0000
BICYCLE	1	0.00000000	0.00000000	0.00	1.0000
PEDESTRIAN	1	0.51587302	0.51587302	13.09	0.0005

Pedestrians Related Collisions

- **Speeding** contributes significantly to severe accidents, with a considerable number resulting in fatalities and major injuries.
- **Poor visibility** due to weather conditions like rain, drifting snow, fog, mist, smoke and dust significantly increases the likelihood of major injury and fatalities

- Expand the **speed limit reduction** (30km/hr) on public lanes, and rigorously implement **speed cameras** to deter speeding
- **Improve lighting and signage** in hazardous roads
- Promote **Neighborhood Watch** and **Community Patrols** to educate safe driving practices and caution when driving under poor whether condition





Conclusion

High-risk periods

- **Lunch Break** is high-risk time from 1200 to 1400 and Midweek Fatigue
- **Potential distractions** from rushing to grab a quick meal or returning to work may lead to safety hazards

Seasonal Patterns

- **Dec and Jan** show higher accident rates due to holiday traffic or increased alcohol consumption

High-Risk Area & Fatalities

- **West Humber-Clairville** experiences the highest collisions
- **Presence of pedestrians** significantly affects fatalities

Other Contributing factors

- **Speeding** and **Poor visibility** contributes to most major injuries and fatalities
- **Population Growth** increases likelihood of collisions

Recommendations

- **Targeted Measures:**
  Implement increased police patrols or awareness campaigns during high-risk hours and months
- **Pedestrian Safety Focus:**
  Prioritize pedestrian safety measures, e.g. improved crossings, sidewalks, and traffic signals
- **Resource Allocation & Improve Infrastructure:**
  Allocate resource such as improving road/lighting/signage, increasing police presence, or educational programs for drivers & pedestrians to prioritized neighborhoods
- **Policy Implementation:**
  Consider policy interventions targeting pedestrian safety, such as pedestrian Islands and speed limit regulations in high pedestrian traffic areas

References

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