



Fatal Injury Collisions in Niagara: A 15-Year Analysis, 1999-2013

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TABLE OF CONTENTS

Table of Contents		i
1.0	PREAMBLE	1
2.0	METHODOLOGY	1
3.0	FATAL INJURY COLLISIONS	2
4.0	SUMMARY AND CONCLUDING REMARKS	19
Appendix A:	Traffic Reconstructionist Unit’s Database Illustrated	21
Appendix B:	Glossary of Terms	22
Tables		
Table 1:	15 Year Monthly Average of Fatal Injuries in Niagara	4
Table 2:	Fatalities across Districts	6
Table 3:	Fatal Injuries by Roadway Type across Municipalities	7
Table 4:	Casualty of Other/Casualty of Self across Categorical Age Groups	9
Table 5:	Fatalities across Categorical Age and Time Period	10
Table 6:	Primary Causal Factor by Categorical Age	13
Table 7:	Top 3 Causal Factors and Roadway	14
Table 8:	Top Three Causal Factors of Fatalities across 5-Year Increments	15
Table 9:	Top Three Causal Factors and Type of Victim	16
Table 10:	Primary Causal Factor and Number of Vehicles Involved	16
Figures		
Figure 1:	Fatalities in Niagara, 1999-2013	3
Figure 2:	Fatalities by Month, 1999-2013	3
Figure 3:	Fatal Injuries by the Day of Week	4
Figure 4:	Fatalities by Time of Day	5
Figure 5:	Fatal Injuries by Roadway Type in Niagara	5
Figure 6:	Number of Vehicles Involved in Fatalities	8

Figure 7:	Sex of the Fatally Injured, 1999-2013	8
Figure 8	Fatal Injuries Affecting Older Adults	11
Figure 9:	Primary Causal Factors of Fatal Collisions in Niagara	9
Figure 10:	Three Top Primary Causal Factors of Fatal Injuries and Day of Week	14
Figure 11:	Alcohol as a Causal Factor and Time of Day	15
Figure 12:	Secondary Causal Factor	17
Figure 13:	Total Fatal Life Threatening Injuries, 1999-2013	18



FATAL INJURY COLLISIONS IN NIAGARA: A 15-YEAR ANALYSIS – 1999-2013

PREAMBLE

At the request of Chief of Police Jeff McGuire a report was to be prepared for the Regional Municipality of Niagara Police Services Board to examine traffic fatalities in the Region. Over the past few years the Service and the community have become increasingly alarmed over the number of fatal injury collisions occurring in Niagara. For this reason it became abundantly evident that an analysis was timely to better understand this concern. The study period consists of the years 1999-2013, inclusive.

Collisions occurring on the Queen Elizabeth Way and the 400 series were not included in this analysis since the Ontario Provincial Police patrol these highways. In total, **419** individuals lost their lives as a result of a fatal collision in Niagara between 1999 and 2013. Over this 15 year period, on average 27.9 people died each year on our roadways.¹

METHODOLOGY

Records maintained by the Niagara Regional Police Service's Traffic Reconstruction Unit constituted the data source for this study. Data provided yielded 100 percent of all fatal collisions in Niagara between 1999 and 2013, inclusive. Since we have all fatal collisions for the time-period of analysis, no inferential statistics were employed since we had the entire population rather than a sampling of that population. Therefore, methodologically speaking, the findings found are the true differences/patterns that exist for this time-period.

¹ Raw data provided by the Traffic Reconstruction Unit also included other collision types but that data was removed from the dataset created for this analysis. For instance, suicide by vehicle (2), attempt suicide by vehicle (1) and homicide by vehicle (1) were removed since these collisions were due to the vehicle being used as a weapon. Moreover, fatal collisions that occurred as a result of a medical episode (28) were removed from our analysis. These deaths are not reported to the Ministry of Transportation (MTO) on an annual basis.

Appendix A illustrates how the Service’s Traffic Reconstruction Unit recorded the data. As can be seen it is unusable for immediate statistical analysis so the data had to be restructured and additional variables were created for further analysis. Utilizing a statistical program known as **SPSS 14.0** (*Statistical Package for the Social Sciences*), variables were created using individual level (case-by-case) data provided by the Collision Reconstruction Unit. Each row is a case entry, with twenty variables created for analysis.

Variables were created from the data available (*refer to Appendix B for a Glossary of Terms defining the variables in our analysis*). Some variables were measured at different levels of measurement. For instance, age of victim were recorded at both the nominal (categorical) and at the interval level (actual age). In addition, some variables were created to be able to identify if the victim was a casualty of another driver’s erred behaviour/action, or whether they were a victim of their own driving behaviour/action. For instance, referring back to Appendix A we can see that **Case #2** in 2005 the victim was operating his vehicle and lost control. Both speed and driver error were the causal factors and the victim was fatally injured by his own behaviour/actions. Similarly, **Case #6** in 2005 we see that a vehicle and a pedestrian were involved in a collision. In this case, the pedestrian was fatally injured by the alcohol impairment of another individual. The driver was arrested and charged under the Criminal Code of Canada.

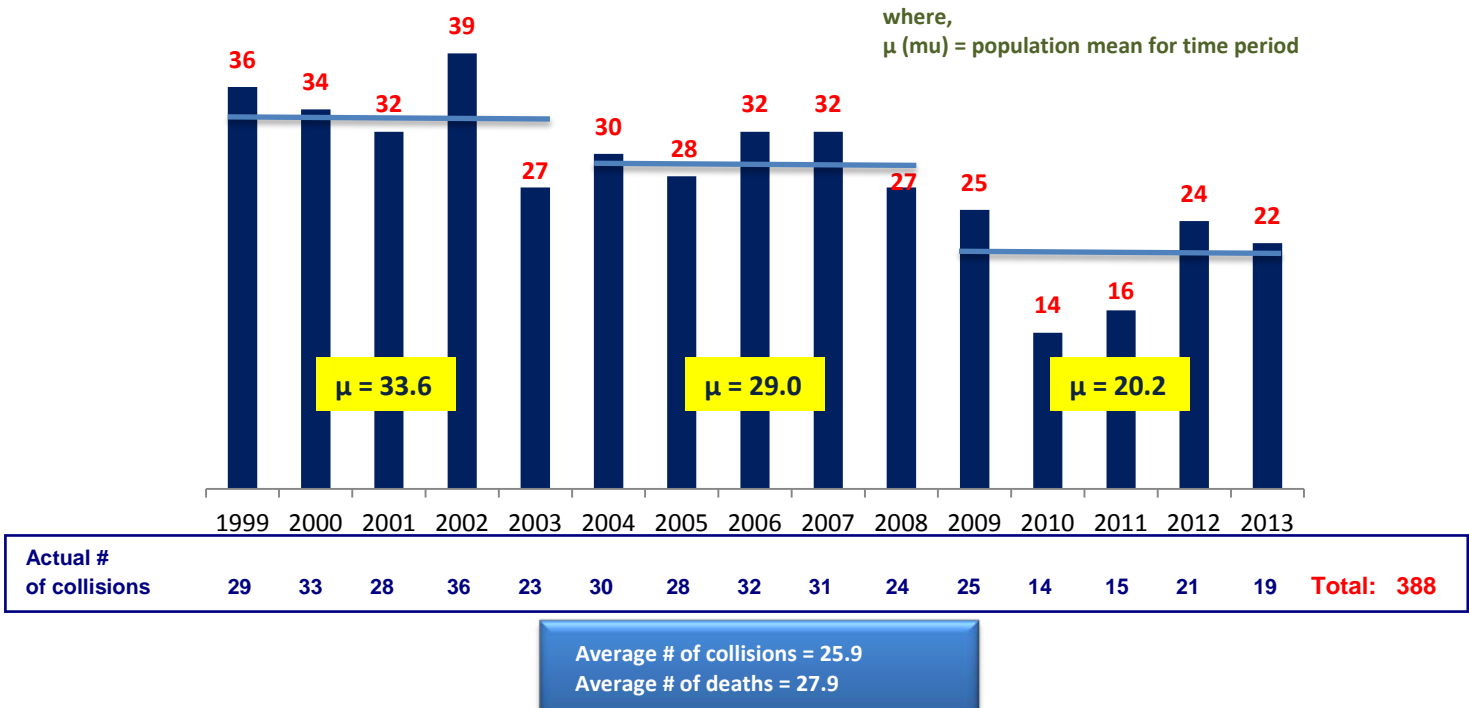
FATAL INJURY COLLISIONS ²

As can be seen in figure 1, from 1999 through 2013 there were **388** collisions resulting in **419** fatal injuries in Niagara (or, on average 27.9 deceased persons each year). These fatalities ranged from a high of 39 in 2002 to a low of 16 in 2011. However when we partition the data into three five-year periods, we find that during the time-period 1999-2003 there were 149 fatal collisions or on average 33.6 fatal collisions per year; 2004-2008 there were 145 fatal collisions or on average 29.0 fatal collisions per year; and between 2009-2013 there were 94 fatal collisions or on average 18.8 fatal collisions. This suggests that, while still high, during the last five years Niagara’s fatalities have actually declined significantly.

	Single Fatality	Multiple Fatality
Number of Fatalities in Collision	362 deaths	25 – 2 or more deaths

² **Fatal Injury Collision** – According to the Ministry of Transportation (MTO) a fatal motor vehicle collision is one in which at least one person sustains bodily injuries resulting in death. Prior to January 1, 1982, fatal collision statistics included deaths attributed to injuries sustained in the collision, for up to one year after the collision. Since that date, only deaths occurring within 30 days of the collision have been included.

Figure 1
Fatalities in Niagara, 1999-2013



As we can see in figure 2, warmer months tend to be the peak time-period associated with vehicular related fatalities. During this time-period better weather, longer daylight hours, lead to motorists driving faster and in 388 instances fatal driver error. In addition, motorcyclists, cyclists and pedestrians and joggers are more prevalent. June, July, August and September have averaged 45 fatalities each month (179/419) over the last fifteen years, or 43% of all fatalities in Niagara. Conversely, the colder months of December, January, February and March average 27 each month (113/419) fatalities over the last fifteen years, or 28% of all fatalities in Niagara. These months also coincide with inclement weather and poor road conditions, reduced speed and overall conservative driving behaviour. Over our five-year increments we can see on the whole, the last five years have seen a considerable decrease in the average number of fatalities by month (see table 1).

Figure 2
Fatalities by Month

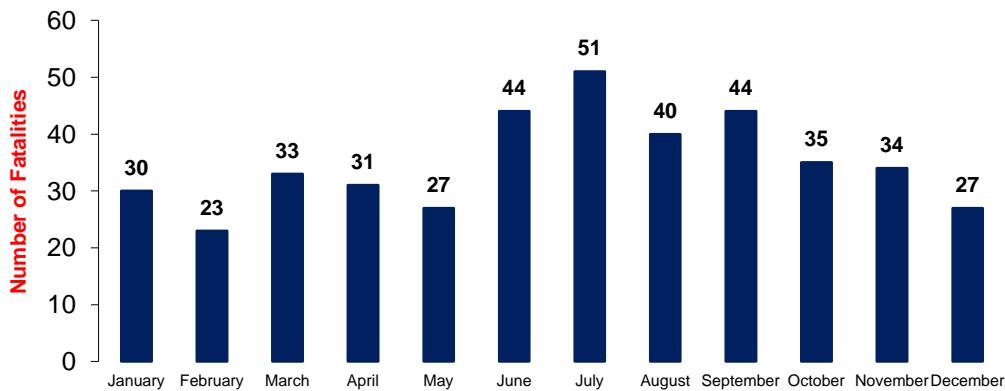
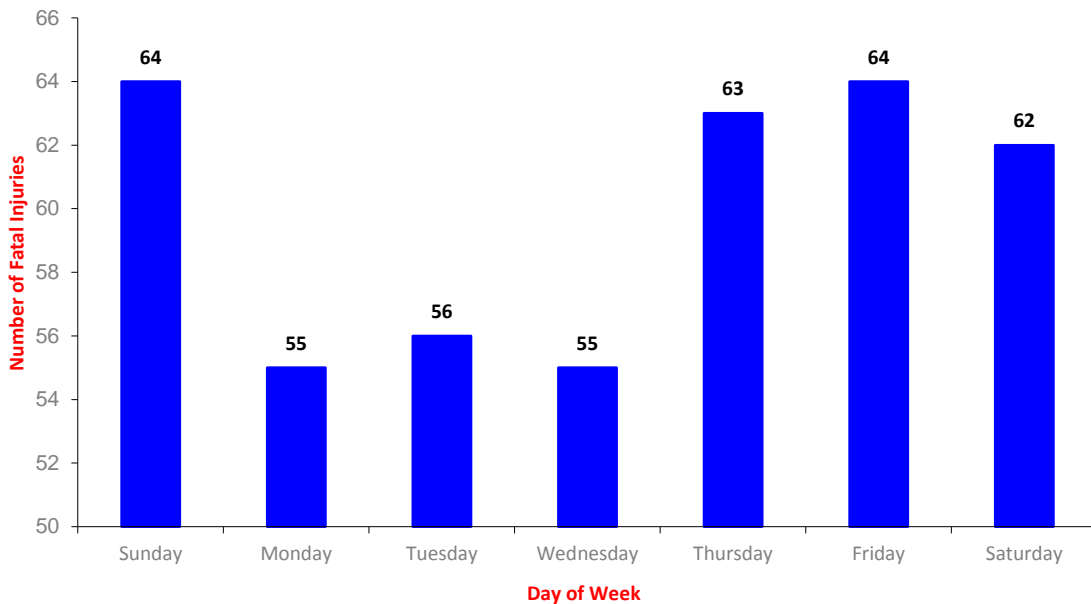


Table 1
15 Year Monthly Average of Fatal Injuries in Niagara, 1999-2013

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
1999-2013	2.5	1.9	2.8	2.6	2.2	3.7	4.3	3.3	3.7	2.9	2.8	2.3
1999-2003	2.6	2.0	3.2	2.0	1.4	4.0	4.2	4.6	4.0	3.0	2.0	3.2
2004-2008	2.2	1.4	2.4	2.2	2.2	2.8	4.8	1.6	3.2	2.2	3.6	1.8
2009-2013	1.6	0.5	1.8	2.3	2.0	3.5	2.8	2.3	1.5	2.3	2.5	2.0

As can be seen in figure 3, Thursday through Sunday tends to be the highest fatality days of the week. By way of speculating, the lower fatality weekdays (Monday, Tuesday and Wednesday) is most likely associated with people settling into a work routine and more people staying at home during the evening hours.

Figure 3
Fatal Injuries by the Day of Week



Fifty-three percent of all fatalities occurred between 3:00pm and 9:00pm (see figure 4). The mid to late afternoon was especially high. This is likely due to the roads being busier with people returning home from work or outings. Inattentiveness and driver error were common causal factors during this time period.

Figure 4
Fatalities by Time of Day

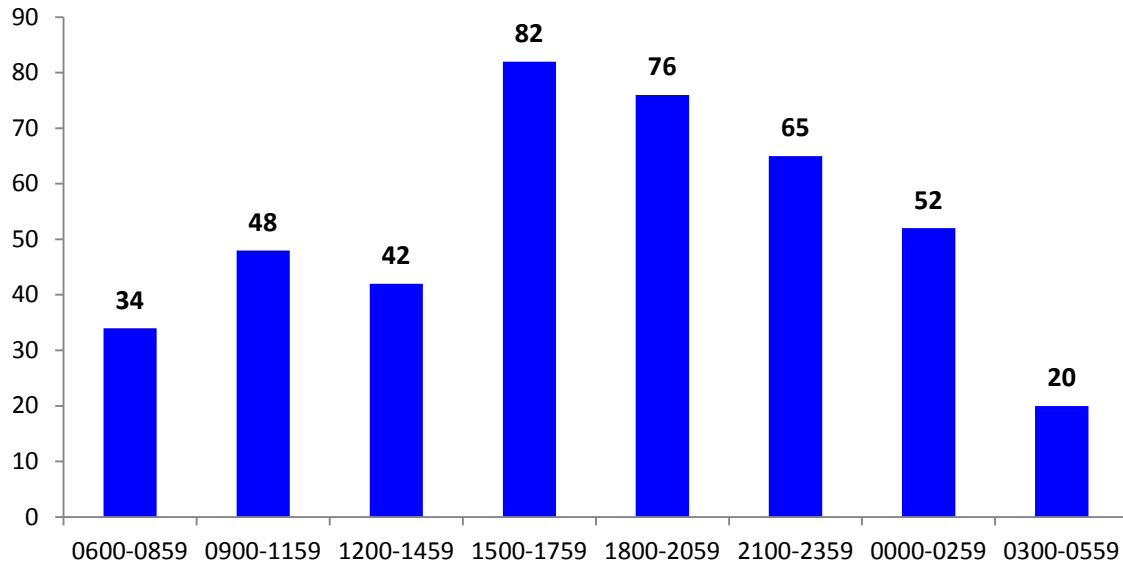
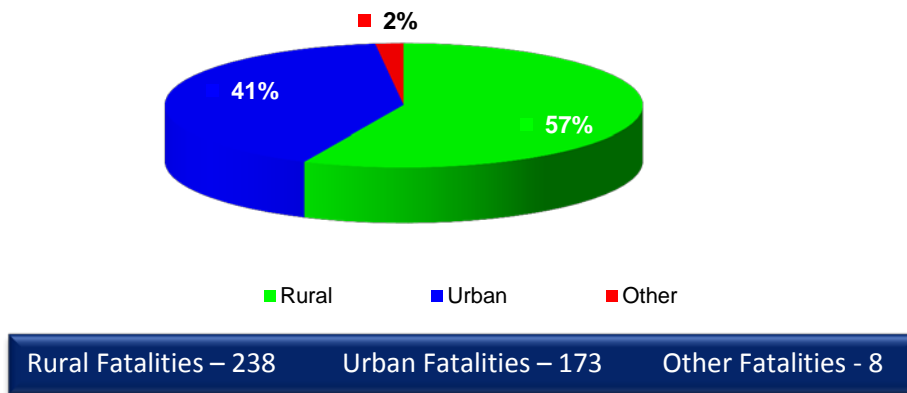


Figure 5 shows that 57 percent of all fatalities occur on Niagara’s rural roadways, compared with 41 percent on urban roadways. This is largely because Niagara has a significant proportion of its land space deemed rural. Excluding regional roads, Niagara rural roadways have 1,082 lane kilometers of paved surface, while urban roadways have 376 lane kilometers of paved surface. Additionally, there are 184 lane kilometers of semi-urban (*closer to urban than rural*) paved surface.³

Figure 5
Fatal Injuries by Roadway Type, 1999-2013



³ **Source:** Janet Moate, A.Sc.T., C.S.T., Transportation Operations Technologist, Regional Municipality of Niagara, Public Works Department – Transportation Services Division.

Comparing fatalities across districts we see variation in where fatalities occur. One District fatalities primarily occur in the City of St. Catharines and Thorold, accounting for forty percent (n=70) of all urban fatalities in the Region. Rural fatalities occur primarily in Thorold and surrounding area. Two District, consisting of a large rural area in Niagara-on-the-Lake, had more fatalities occurring on rural roadways (58.0%, n=70). We also find in 3 District that two-thirds of all fatalities occur on rural roadways. These fatalities tend to be driven by a large rural area in Pelham. Districts 5, 6 and 8 also experienced most of their fatalities on rural roadways. Combined 2 District and 8 District accounted for sixty percent (n=251) of all fatalities occurring on rural roadways in the Region.

Table 2
Fatalities Across the Districts

District	Roadway			Total
	Rural	Urban	Other	
1 District – St. Catharines, Thorold	27	70	4	101
% within district	(26.7)	(69.3)	(3.9)	(100.0)
% across districts	(9.2)	(40.4)	(57.1)	(22.2)
2 District – Niagara Falls, N-O-T-L	70	50	--	120
% within district	(58.0)	(42.0)	(--)	(100.0)
% across districts	(29.0)	(28.9)	(--)	(28.5)
3 District – Welland, Pelham	32	17	1	53
% within district	(64.2)	(34.0)	(1.9)	(100.0)
% across districts	(14.3)	(10.4)	(14.3)	(12.7)
5 District – Fort Erie	17	14	1	39
% within district	(53.1)	(43.9)	(3.1)	(100.0)
% across districts	(7.1)	(8.1)	(14.3)	(7.7)
6 District – Port Colborne, Wainfleet	23	11	1	39
% within district	(66.7)	(30.8)	(3.1)	(100.0)
% across districts	(10.9)	(6.9)	(14.3)	(9.3)
8 District – Grimsby, Lincoln, West Lincoln	69	12	--	82
% within district	(85.4)	(14.6)	(--)	(100.0)
% across districts	(29.4)	(6.9)	(--)	(19.6)
Niagara Region	238	174	7	419
	(56.8)	(41.5)	(1.7)	(100.0)

Table 3 shows that seven out of 12 municipalities had 60 percent or more of its fatalities occurring on rural roadways. Sixty percent (n=143) of all rural roadway fatalities occurred in West Lincoln (n=49), Niagara-on-the-Lake (n=36), Niagara Falls (n=34) and Pelham (n=24). The City of St. Catharines had few fatalities in rural areas since its land space is predominantly urban. Sixty-four percent (n=111) of urban roadway fatalities occurred in the City of St. Catharines (n=65) and the City of Niagara Falls (n=46). The percent of rural-urban fatalities reported here do not vary from year to year.

Table 3
Fatal Injuries by Roadway Type across Municipalities

Municipality	Roadway			Total
	Rural	Urban	Other	
St. Catharines	8	65	2	75
% within municipality	(10.7%)	(86.7%)	(2.7%)	(100.0%)
Thorold	19	5	2	26
% within municipality	(73.1%)	(19.2%)	(7.7%)	(100.0%)
Grimsby	8	5	--	13
% within municipality	(61.5%)	(38.5%)	(0.0%)	(100.0%)
Lincoln	12	7	--	19
% within municipality	(63.2%)	(36.8%)	(0.0%)	(100.0%)
West Lincoln	49	--	--	49
% within municipality	(100.0%)	(0.0%)	(0.0%)	(100.0%)
Niagara Falls	34	46	-	80
% within municipality	(42.5%)	(57.5%)	(0.0%)	(100.0%)
Niagara-on-the-Lake	36	4	--	40
% within municipality	(90.0%)	(10.0%)	(0.0%)	(100.0%)
Fort Erie	16	13	1	30
% within municipality	(53.3%)	(43.3%)	(3.3%)	(100.0%)
Welland	8	15	1	24
% within municipality	(33.3%)	(62.5%)	(4.2%)	(100.0%)
Pelham	24	2	--	26
% within municipality	(92.3%)	(7.7%)	(0.0%)	(100.0%)
Port Colborne	7	10	1	18
% within municipality	(38.9%)	(55.6%)	(5.6%)	(100.0%)
Wainfleet	17	1	--	18
% within municipality	(94.4%)	(5.6%)	(0.0%)	100.0%)

Fatalities	STC	THO	GRI	LIN	WLI	NFO	NOTL	FTE	WEL	PEL	PTC	WAI	
	75	26	13	19	49	80	41	30	24	26	18	18	419

As can be seen in figure 6, seventy-two percent of all fatal injuries involve one vehicle (n=303 fatalities).

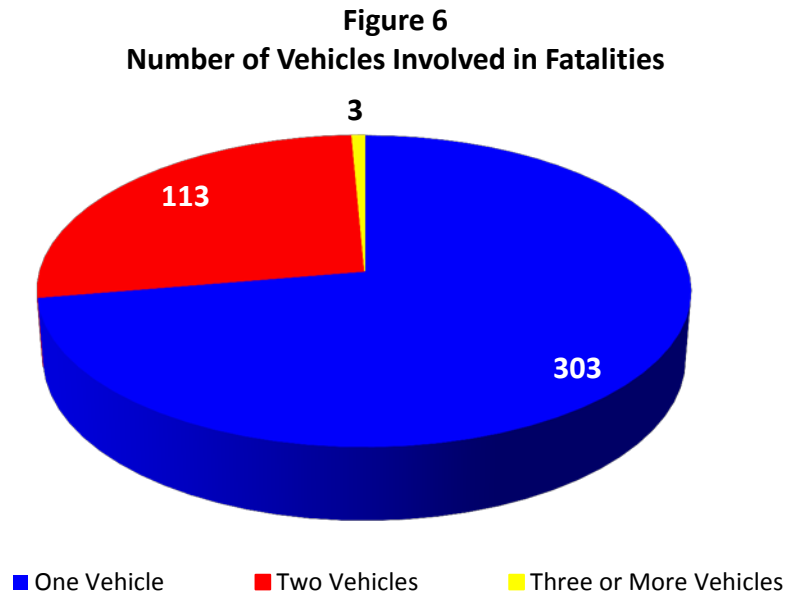
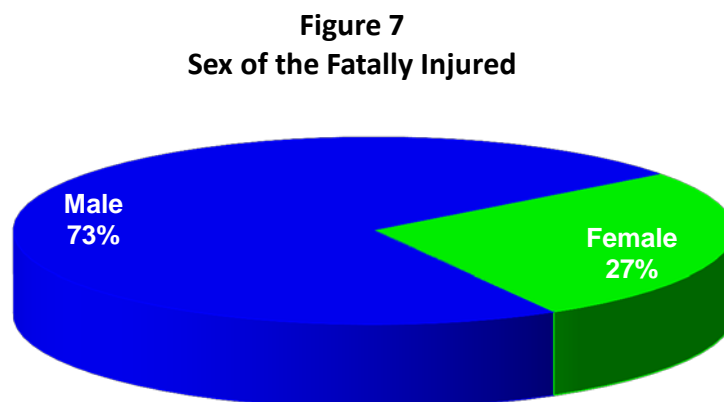


Figure 7 illustrates that 73 percent of all fatalities were males. In total, there were 246 male fatalities compared to 91 female fatalities. In an attempt to determine if there were any discerning patterns that differentiated male from female fatalities, numerous data runs were conducted (*findings not shown here*). No persuasive patterns could be found that distinguished male and female fatalities across roadway type, municipality, age, primary causal factor, and so on. The only significantly different finding was that 52 percent (n=47) of all female fatalities, compared to 32 percent (n=79) of all male fatalities were due to the erred driving behaviour/action of another party. In other words, 68 percent of males were involved in a fatal collision due to their own behaviour/action, while 48 percent of females were involved in a fatal collision due to their own behaviour/ action.



As can be seen in table 4 sixty-two percent (n=261) of all fatal injuries were due to the actions/behaviour of the individual who died, while one third (n=158) were the victims of the action or behaviour of another. Thirty-five percent of all casualties of self were adults between the ages of 30 and 49. As we will see later, this is primarily due to alcohol impairment. This age range accounted for forty-five percent of all alcohol impairment related fatalities in Niagara.

Table 4
Casualty of Other/Casualty of Self across Categorical Age Groups

	Victim of Other	Victim of Self	Total
< 15 years of age	9 (62.2)	4 (30.8)	13 (100.0)
15-19 years of age	18 (33.3)	36 (66.7)	54 (100.0)
20-24 years of age	19 (33.9)	37 (66.1)	56 (100.0)
25-29 years of age	9 (32.1)	19 (67.1)	28 (100.0)
30-39 years of age	27 (36.5)	47 (63.5)	74 (100.0)
40-49 years of age	18 (28.1)	46 (71.9)	64 (100.0)
50-59 years of age	15 (46.9)	17 (53.1)	32 (100.0)
60-69 years of age	10 30.3	23 (69.7)	33 (100.0)
70-79 years of age	19 (46.3)	2 (53.7)	41 (100.0)
80 years of age or older	14 (58.3)	10 (41.7)	24 (100.0)
Total	158 (37.7)	261 (62.3)	419 (100.0)

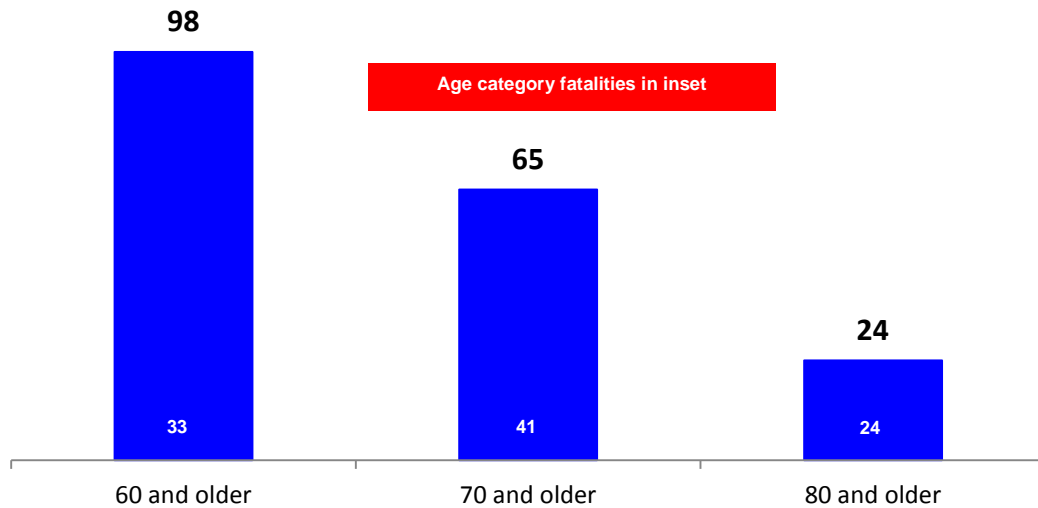
Mean age of deceased: 42.5 (Youngest 6 years; Eldest 94 years)
Median age of deceased 39.0

As seen in table 5 fatalities occur throughout a day, but are more prevalent during the late afternoon and evening hours. More fatalities among young adults occur well into the evening hours, while middle age fatalities occur at the end of a work day. Among seniors, fatalities occur during the daytime hours.

Table 5
Fatalities across Categorical Age and Time Period

Categorical Age	Time Periods								Total
	0600-0859	0900-1159	1200-1459	1500-1759	1800-2059	2100-2359	0000-0259	0300-0559	
< 20 years of age	7 (20.5)	7 (14.6)	4 (9.5)	12 (14.6)	12 (28.6)	14 (21.5)	7 (13.4)	4 20.0	64 (15.2)
20-29 years of age	8 (23.5)	3 (6.2)	9 (21.4)	7 (8.5)	7 (8.5)	14 (21.5)	24 (46.1)	10 (50.0)	84 (20.0)
30-39 years of age	7 (20.5)	6 (12.4)	4 (9.5)	11 (13.4)	11 (13.4)	14 (21.5)	13 (25.0)	3 (15.0)	74 (17.7)
40-49 years of age	2 (0.06)	5 (10.4)	5 (11.9)	18 (21.9)	18 (22.0)	13 (20.0)	7 (13.4)	2 (10.0)	64 (15.2)
50-59 years of age	5 (14.7)	4 (0.8)	1 (2.3)	12 (14.6)	12 (28.6)	4 (6.2)	1 (0.2)	1 (5.0)	32 (7.6)
60-69 years of age	1 (0.03)	7 (14.6)	5 (11.9)	14 (17.0)	4 (4.9)	2 (3.1)	-- (--)	-- (--)	33 (7.9)
70-79 years of age	3 (0.09)	11 (22.9)	6 (14.2)	5 (6.1)	13 (15.9)	3 (4.6)	-- (--)	-- (--)	41 (9.8)
80 years of age or older	1 (0.03)	5 (10.4)	8 (19.0)	3 (3.0)	6 (7.3)	1 (1.5)	-- (--)	-- (--)	24 (5.7)
Total	34 (100.0)	48 (100.0)	42 (100.0)	82 (100.0)	76 (100.0)	65 (100.0)	52 (100.0)	20 (100.0)	419 (100.0)

Figure 8
Fatal Injuries Affecting Older Adults



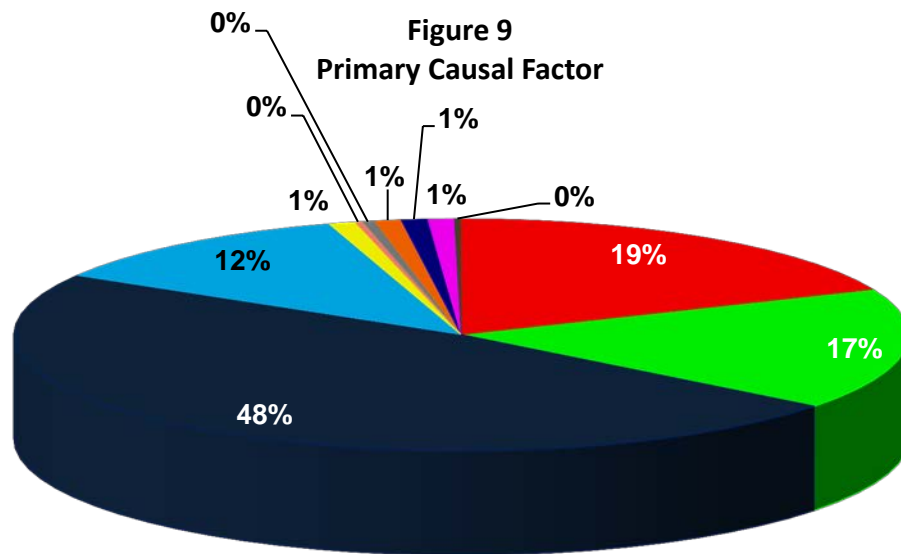
57 - Casualty of another person's erred driving behaviour/action

42 - Casualty of own erred driving behaviour/action

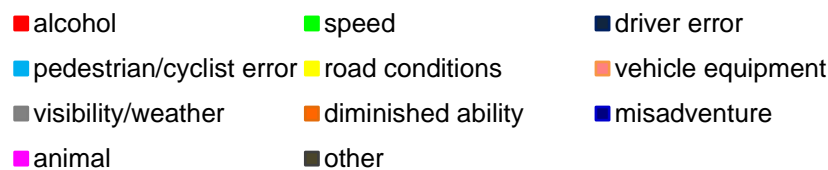
Returning to those fatally injured in the 61 and older age group where driver error was the primary contributory factor, we see that 58 percent (n=57) of them were actually fatally injured due to the behaviour/action of others (*see figure 8*). In addition, this group represents 50 percent of all individuals fatally injured by the driving error of another individual.

Primary Causal Factors

As can be seen in figure 9, driver error accounts for almost half of all fatalities in Niagara (48%, n=201), followed by alcohol impairment related deaths (19%, n=78) and excessive speed (17%, n=71).



Note: 0% is not actual. It denotes less than 1% of all fatalities.



Primary Causal Factor Leading to Fatality										
Alcohol	Speed	Driver Error	Pedestrian/Cyclist Error	Road Conditions	Vehicle Equipment	Visibility/Weather	Diminished Ability	Misadventure	Animal	Other
78	71	201	49	4	1	2	4	4	4	1

Figure 9 examines the top three primary causal factors accounting for 83.5 percent of all fatal injuries (350/419). Speed as a causal factor tends to be relatively stable across the days of the week, while driver error and alcohol impairment is not equitably distributed. In fact, among

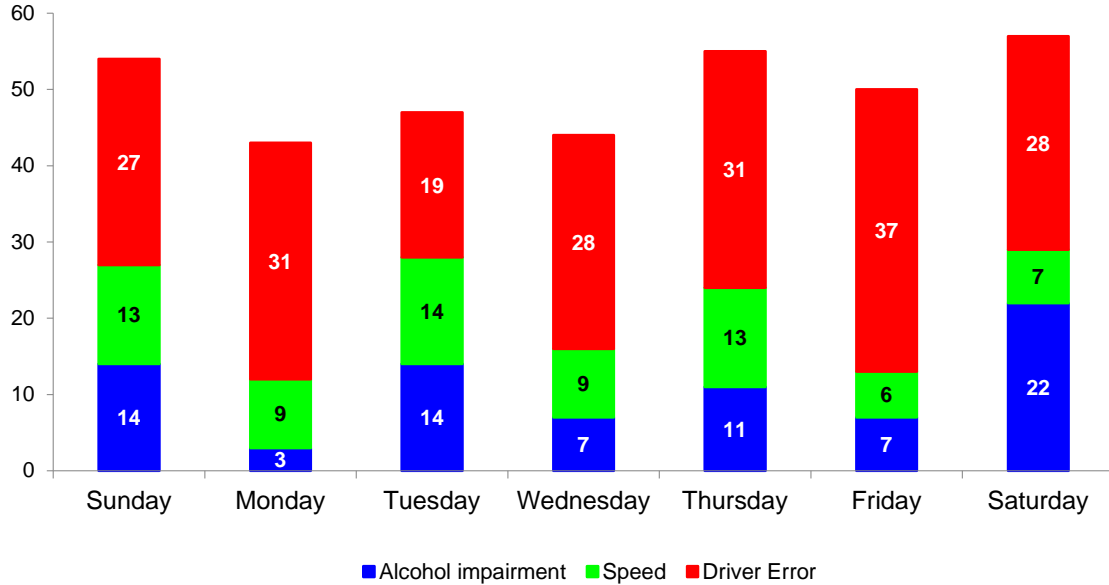
fatal injury collisions, 46 percent of alcohol impairment related injuries occur on Saturdays and Sundays (36/78).

As stated earlier notice that adults between the ages of 30 and 49 years of age are over-represented in alcohol impairment collisions (45%), followed by young people between the ages of 15 and 29 years of age (41%) (see table 6). Young adult fatalities are primarily due to excessive speed (59%) as the primary causal factor. Pedestrian and cyclist error is evenly distributed across all age groups.

Table 6
Primary Causal Factor by Categorical Age

Primary Causal Factor	< 15 years	15-19 years	20-24 years	25-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	80 years & older
Alcohol % within causal factor	-- (--)	12 (15.4)	12 (15.4)	8 (10.3)	21 (26.9)	14 (17.9)	1 (1.3)	3 (3.8)	7 (9.0)	-- (--)
Speed % within causal factor	-- (--)	16 (22.5)	19 (26.8)	8 (10.3)	21 (26.9)	9 (12.7)	5 (7.0)	2 (2.8)	1 (1.4)	-- (--)
Driver Error % within causal factor	6 (3.0)	15 (7.5)	20 (10.0)	12 (6.0)	31 (15.4)	32 (15.9)	20 (10.0)	21 (10.4)	24 (11.9)	20 (10)
Pedestrian/Cyclist Error - % within causal factor	6 (12.2)	6 (12.2)	3 (6.1)	-- (--)	7 (14.3)	8 (16.3)	4 (8.2)	3 (6.1)	8 (16.3)	4 (8.2)
Road Conditions % within causal factor	-- (--)	2 (50.0)	-- (--)	-- (--)	1 (25.0)	1 (25.0)	-- (--)	-- (--)	-- (--)	-- (--)
Vehicle/Equipment % within causal factor	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	1 (100.0)	-- (--)	-- (--)	-- (--)
Visibility/Weather % within causal factor	-- (--)	-- (--)	1 (50.0)	-- (--)	-- (--)	-- (--)	1 (50.0)	-- (--)	-- (--)	-- (--)
Diminished Ability % within causal factor	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	4 (100.0)	-- (--)	-- (--)
Misadventure % within causal factor	1 (25.0)	3 (75.0)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)
Animal % within causal factor	-- (--)	-- (--)	1 (25.0)	1 (25.0)	2 (50.0)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)
Other % within causal factor	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)	-- (--)

**Figure 10
Top Three Primary Causal Factors of Fatal Injuries
and Day of Week**



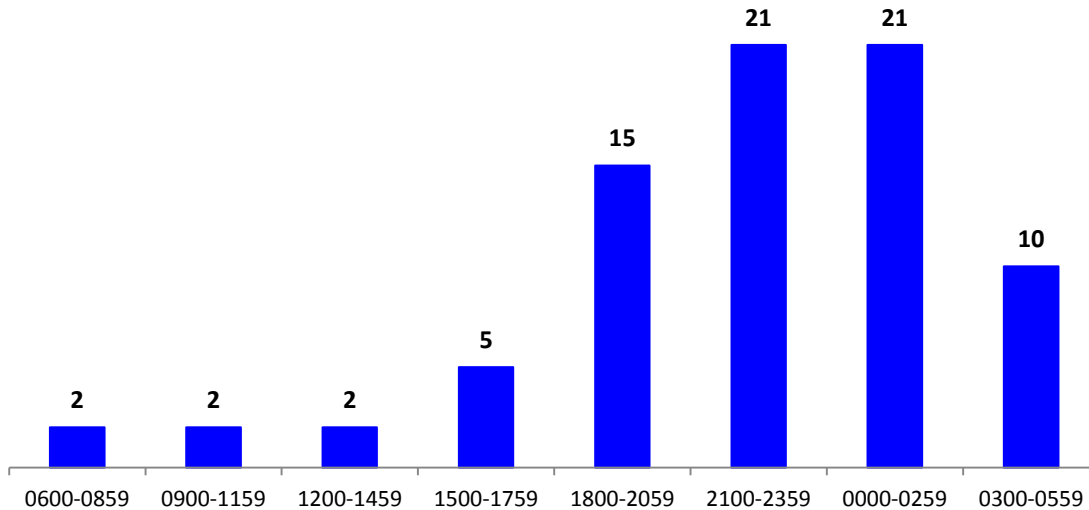
As we have seen previously, most fatalities occur on our rural roadways in Niagara. Note that almost seventy-one percent of all alcohol impairment related charges occur on rural roadways.

**Table 7
Top 3 Causal Factors and Roadway**

	<u>Rural</u>	<u>Urban</u>
Alcohol	55 (70.5)	23 (29.5)
Speed	49 (69.0)	22 (31.0)
Driver Error	110 (55.0)	86 (43.0)

There were 78 alcohol-related fatalities over the last 15 years. Sixteen of the 42 (38 percent) occurred on Saturday and Sunday between (9:00pm and 3:00am).

Figure 11
Alcohol as Causal Factor and Time of Day



Observing 5-year increments we see that alcohol related and driver error fatalities have reduced over time. Speed as a causal factor seems to be unaffected. As we saw earlier, speed as a causal factor was much more prevalent among young adults.

Table 8
Top Three Causal Factors of Fatalities Across 5-Year Increments

Causal Factor	1999-2003	2004-2008	2009-2013
Alcohol Related ⁴	30 (21.0)	25 (19.8)	23 (37.1)
Speed	20 (14.0)	32 (25.4)	19 (30.6)
Driver Error	93 (65.0)	69 (54.8)	20 (32.3)
Total	143 (100.0)	126 (100.0)	62 (100.0)

⁴ Alcohol as a secondary causal factor accounted for 28 fatalities. In these incidents alcohol as a contributory factor are those in which alcohol was involved, but that the individual(s) were not legally impaired as defined by the *Criminal Code of Canada*.

Table 9
Top 3 Primary Causal Factors and Type of Victim

	Casualty of Other	Casualty of Self
Alcohol	29 (37.2%)	49 (62.8%)
Speed	23 (32.4%)	48 (67.6%)
Driver Error	91 (45.3%)	119 (54.7%)

Casualty of other – the victim was either a vehicle operator/passenger/pedestrian/cyclist who as a result of the **behaviour/action of another** was fatally injured.

Casualty of self – the victim was either the vehicle operator/pedestrian/cyclist who as a result of **his or her own behaviour/action** was fatally injured.

As can be seen in Table 10, 72 percent of all fatal injuries in Niagara involve single vehicle collisions, while two or more vehicle collisions account for 27 percent of all fatalities. The three most common primary causal factors – driver error, alcohol impairment and speed – involve a single vehicle collision, accounting for 58 percent of all fatalities.

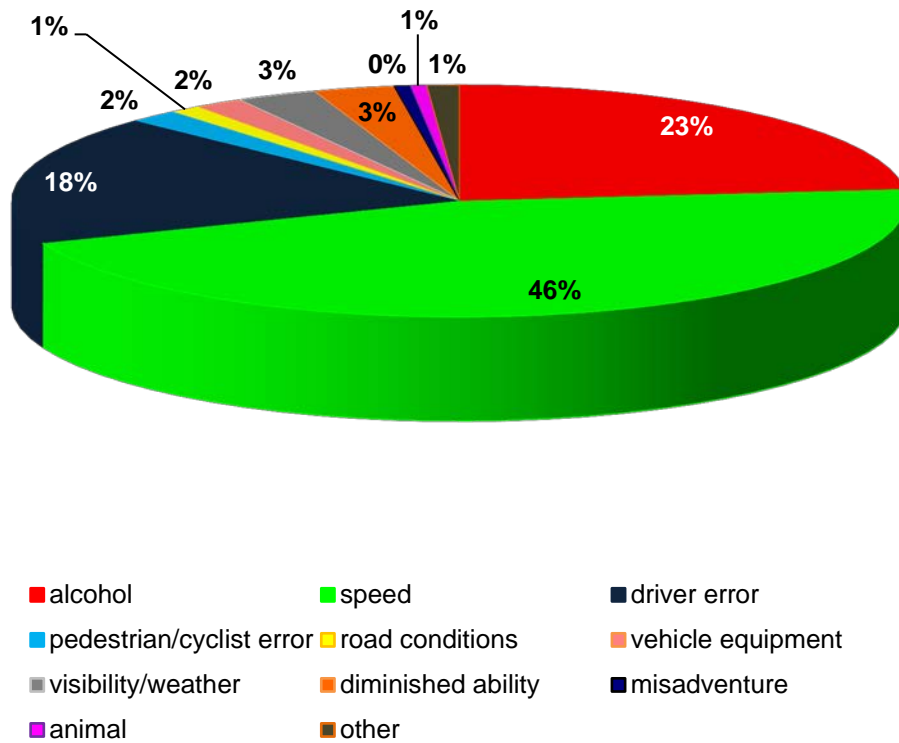
Table 10
Primary Causal Factor and Number of Vehicles Involved in Fatalities

Primary Causal Factor	Number of Vehicles		
	One	Two	Three or more
Alcohol Impairment	63 (20.8)	14 (12.4)	1 (1.3)
Speed	60 (19.8)	11 (9.7)	-- (--)
Driver error	121 (39.9)	78 (69.0)	2 (2.6)
Pedestrian/cyclist error	47 (15.5)	2 (1.8)	-- (--)
Road conditions	1 (0.3)	3 (2.7)	-- (--)
Vehicle Equipment	-- (--)	1 (0.9)	-- (--)
Visibility/weather	-- (--)	2 (1.8)	-- (--)
Diminished ability	3 (1.0)	1 (0.9)	-- (--)
Misadventure	3 (1.0)	1 (0.9)	-- (--)
Animal	4 (1.3)	-- (--)	-- (--)
Total	303	113	3

Secondary Causal Factors of Fatal Injury Collisions

The Service's Traffic Reconstructionists have determined that 41 percent of all fatalities had a secondary causal factor associated with the collision (n=171). Seventy-eight fatalities were attributable to speed as a secondary causal factor. In total, alcohol as a secondary factor accounted for 28 fatalities. In these incidents alcohol as a contributory factor are those in which alcohol was involved, but that the individual(s) were not legally impaired as defined by the *Criminal Code of Canada*.

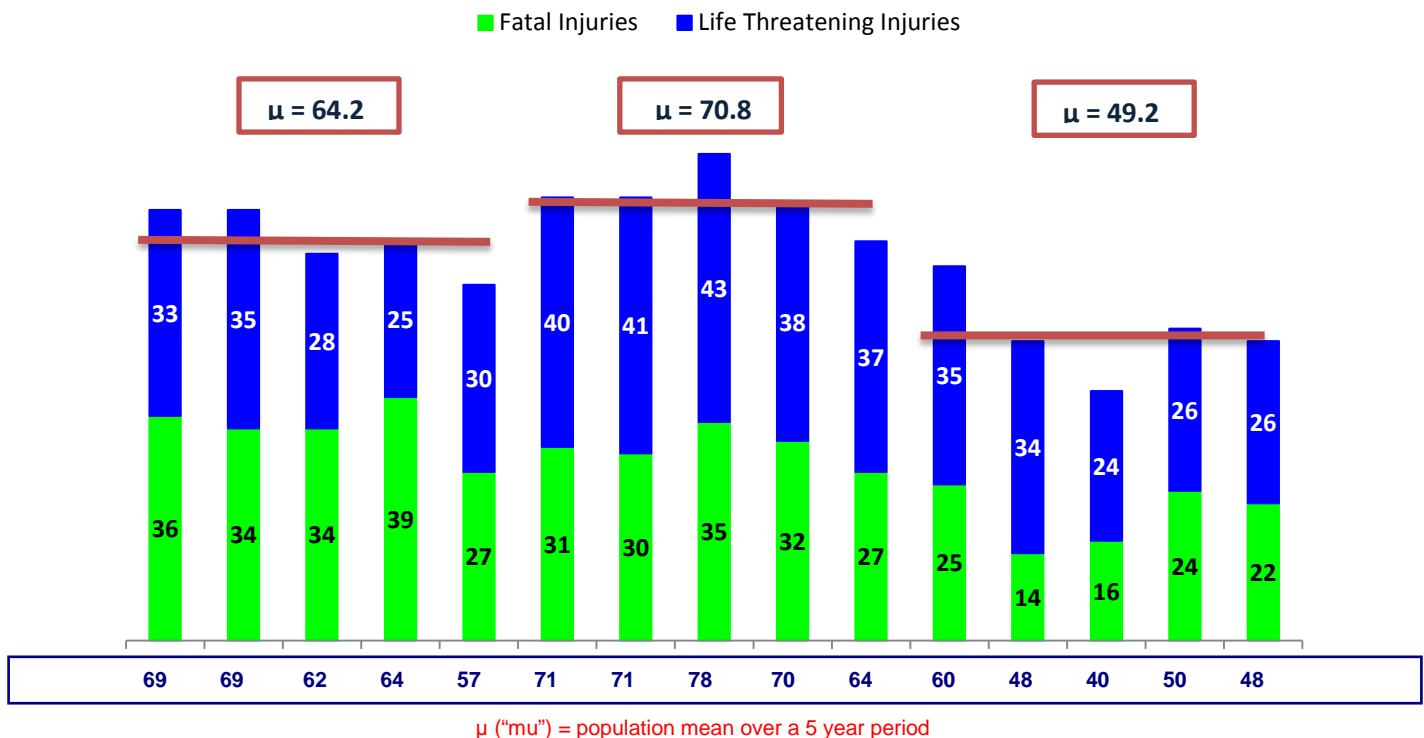
Figure 12
Secondary Causal Factor



Total Fatal and Life Threatening Injuries, 1999-2013

Figure 13 highlights both fatal and life threatening injuries. However, this is mostly due to the fact that fatal and life-threatening injury patterns have changed over time. During the first five-year period, fatalities were greater than life-threatening injuries. The second five years however we see that fatalities were declining slightly, while life-threatening injuries have increased significantly. Notwithstanding that fatalities had reduced, the rise in life-threatening injuries was not a positive sign since we have no knowledge of the quality of life that these victims had post collision. In addition, we need to keep in mind that a death beyond 30 days of the incident is not considered a collision-related fatality according to the Ministry of Transportation - Ontario definition. In some cases, a number of these victims may have succumbed to injuries beyond the 30-day period. However, the last five years we see a significant decrease in both fatal and life threatening injuries.

Figure 13
Total Fatal and Life Threatening Injuries



Fatalities and life-threatening injuries in Niagara have decreased over the last 15 years. There are probably many contributing factors to this decrease. It is believed that greater traffic enforcement by all members and the development of a dedicated Special Enforcement Unit (SEU) dedicated to traffic enforcement and education has affected driver behaviour on our roadways over the last five years. Fatalities have also decreased due to improvements in vehicle safety features, protecting motorists from fatal and life-threatening injuries. In

addition, improvements in paramedic training and the greater deployment of air ambulances have helped to stabilize injured persons until they reach a trauma centre for further life-saving intervention.

SUMMARY AND CONCLUDING COMMENTS

This study was authorized by Chief Jeff McGuire in order to examine patterns associated with fatal collision injuries in Niagara. In total, there were 419 fatal collision injuries in Niagara from 1999-2013. Over the years we have seen a reduction in fatal collisions and a significant reduction in life-threatening injuries. While we attempt to examine fatal injury collisions in Niagara we are unable to establish causal patterns since we do not have available all of the relevant causal variables for every collision. Many variables lead to a fatality and collectively result in driver behaviour/action that leads to a fatal collision.

Three-quarters of all fatal injuries involved a male with more middle aged persons involved in a fatal collision than young and elderly adults (mean age: 42.5 years). Almost sixty percent of all fatalities occurred on Niagara's rural roadways, while sixty-four percent of all urban fatalities occurred in the City of St. Catharines and Niagara Falls. Three-quarters of all fatal injuries involved one vehicle.

Driver error⁵ was the leading causal factor of all fatal collisions (48%), followed by speed (19%) and alcohol impairment (17%). Speed, followed by driver error, was the leading cause of a fatality involving a young person, while driver error was the leading cause of a fatal collision involving a middle-aged and elderly person. Fatal collisions spike between 3:00pm and 9:00pm. Deaths due to alcohol impairment tend to occur between 9:00pm and 3:00am on Saturdays and Sundays. However, it should be noted that we have seen a reduction in alcohol related fatalities over the last five years, compared to the previous time periods observed.

This study demonstrates that the Service's dedication to reducing fatal injury collisions over the last five years through enforcement and education does have an impact on saving the lives of individuals. Continued dedication to enforcement and education should mitigate a return to previous time periods where fatal and life threatening injuries in Niagara led the province on a per capita basis.

While this study did not concentrate on collision locations, with the exception of examining urban and rural patterns, the Service needs to closely examine collision location patterns of all collisions, not just fatal injury collisions. Once we can identify collision sites,

⁵ Driver error is a catch all causal factor. It includes inattentiveness, distractions in the car such as cell phones, small animals running out in front of cars, etc. In discussions with former Traffic Reconstructionists they indicate that it is difficult to break driver error down unless witnesses can attest to what behaviour/action took place before the driver lost control of the vehicle.

along with understanding time periods and day of the week spikes, we can then address intelligence-led enforcement initiatives that will further reduce these collisions.

Appendix A 2005 Fatal Motor Collisions⁶

#	Incident # Officer(s)	Location, Date & Time	Victim Name & Date of Birth	Driver	Factor	Conclusion	Accused Information & Charges
1	05-2488 WATERS/PRIEST	Friendship Trail/Wyldewood Road, PTC Saturday, 2005-01-08 1900hrs	Victim Name 1969-02-28 (35)	Same	Speed Alcohol	Snowmobile Error	
2	05-21264 CODE/DIEGIDIO	Regional Road 20 South Grimsby Road 14, WLI Thursday, 2005-03-10 1745hrs	Victim Name 1984-11-23 (20)	Same	Speed	Driver Error	
3	05-21419 DIEGIDIO/CODE	Regional Road 65/Regional Road 14, LIN Friday, 2005-03-11 0845hrs	Victim Name 1987-06-17 (17)	Other Driver	Speed Inattention	Driver Error	Careless Driving Pending
4	05-22388 WATERS/PRIEST/SAWICKI	Fourth Avenue/Thirteenth Street LIN Sunday, 2005-03-13 1945hrs	Victim Name 1954-07-25 (50)	Same		Driver Error	
5	05-42774 PRIEST/SAWICKI	Thirty Road/Portage Road WLI Thursday, 2005-05-12 1542hrs	Victim Name 1921-08-05 (83)	Same	Diminished Ability Driver Error	Diminished Ability Driver Error	
6	05-43626 PRIEST/SAWICKI	Drummond Road/Portage Road NFO Saturday, 2005-05-14 2255hrs	Victim Name 1983-07-30 (21)	Other Driver	Pedestrian (Victim) Alcohol Impairment (Driver)	Pedestrian (Victim) Alcohol Impairment (Driver)	Driver Charged CC 220 (b) CC 249 (4) CC 252 (1)

⁶ Victims and Accused names eliminated from this exhibit to protect the anonymity of the party(ies) involved.

Appendix B

Glossary of Terms⁷

Causes/Contributing Factors of Motor Vehicle Collisions

Alcohol Impairment – (a) ability impaired, alcohol (over .08) – driver/pedestrian/cyclist had consumed alcohol and upon testing was found to have a blood alcohol level in excess of 80 milligrams. (b) ability impaired, alcohol – driver/pedestrian/cyclist had consumed sufficient alcohol to warrant being charged with a drinking and driving offence.

Diminished Ability – road user with reduced driving or road use proficiency due to inexperience, decreased physical/cognitive capacity.

Driver Error – the actions a driver makes is a misjudgment resulting in the motor vehicle collision (this does not apply to evasive action taken by a driver to avoid the collision).

Medical – driver/pedestrian/cyclist has a permanent (i.e., diabetes, epilepsy) or acute (i.e., heart attack, stroke) condition.

Misadventure – unexpected result of overtly irresponsible actions.

Pedestrian/Cyclist Error – pedestrian/cyclists not following the rules of the road.

Road Conditions – pertaining to the physical state of the roadway (i.e., snow covered, ice patches, excessive water or oil, potholes, etc.)

Speed – vehicle traveling at speed in excess of the posted road signs.

Safety Equipment – equipment used to maintain the safety of the occupants (i.e., seat belts, air bags, child car restraints).

Vehicle Equipment – equipment on the vehicle for vehicle efficiency malfunctions or is in a deteriorated state (i.e., brakes, transmission, etc.).

Visibility – a designated factor pertaining to an environmental factor and whether the road can be seen (i.e., rain, snow, freezing rain, drifting snow, fog, mist, etc.).

⁷ The **Glossary of Terms** here are commonly agreed upon definitions between the Niagara Regional Police Service Traffic Unit and the Regional Niagara Road Safety Committee (RNRSC).

Collision Site

Intersection – the collision involves a vehicle waiting or approaching a four way crossing involving a traffic light, stop sign or yield sign.

Non-Intersection – there are no intersections.

Off-Road – the collision occurred off regional or municipal roadways (i.e., dirt paths, parking lots, etc.).

Fatal Injury Collision – is one in which the collision caused the loss of life within 30 days of the collision. This is definition is provided by the Ministry of Transport Ontario.

Grievous Injury Collision – fatal and life-threatening injuries combined.

Life-Threatening Injury Collision – is one in which paramedics and/or other health care providers determine that the life of the individual is in jeopardy due to a collision.

Primary Cause – most significant contributing leading factor leading to a collision.

Roadway Type

Rural - roadway in sparsely occupied areas, generally surrounding more dense or urban locations.

Urban – roadway in highly built up area within the city/town core.

Secondary Cause – a less significant contributing factor than the primary cause leading to a collision.

Victim Type⁸

Victim of Self - means that the victim was either the vehicle operator/pedestrian/cyclist who as a result of his or her own behaviour/actions caused death or life-threatening injuries.

Victim of Other - means that the victim was either a vehicle operator/passenger/pedestrian/cyclist who because of the behaviour/actions of another caused death or life-threatening injuries.

⁸ These definitions are used for the purposes of this research project and are not associated with the agreed upon terminology used between the Niagara Regional Police Service Traffic Unit and the Regional Niagara Road Safety Committee (RNRSC).