

**Report on the
Niagara Regional Police Service
Motor Vehicle Collision Data
1999-2003**

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Purpose:

To identify the causative factors contributing to serious and fatal motor vehicle collisions (MVCs) on regional and municipal roads in the Niagara Region based on Niagara Regional Police Services data from 1999 to 2003.

Background:

A Regional Niagara Road Safety Committee (RNRSC) was struck in 2004 to make the region's roadways safer for Niagara citizens and visitors. Its' mission is to reduce serious and fatal motor vehicle collisions in the Niagara Region by 10% over a five year period (from 2004 to 2008) through community partnerships in road safety.

Motor vehicle collision (MVC) data collected through the Niagara Regional Police Service (NRPS) collision reports from 1999 to 2003 provides baseline data for the analysis of serious and fatal MVCs in Niagara. The objectives for data analysis identified by the RNRSC's working committee are:

- To improve the ability of the RNRSC to accurately and consistently communicate crash data to the executive committee, municipal leaders and community stakeholders.
- To identify the causative factors contributing to serious and fatal motor vehicle collisions in the Niagara Region through data analysis (e.g. crash locations, crash times, high collision areas, driver condition, driver action, etc.).
- To support evidence-based programming to target road safety initiatives in the areas of highest concern.
- To provide data required for the evaluation of the RNRSC goals and objectives, annual report and progress reports.
- To provide local data that is comparable to provincial and federal data (i.e Ministry of Transportation Ontario (MTO), Canadian Motor Vehicle Traffic Collision Statistics).

Data was collected as part of a mandatory reporting process required of the NRPS by the Ministry of Transportation of Ontario. Reports are completed by officers based on their observations at the MVC locations. The classification of causes /contributing factors as primary and secondary is at the discretion of the officers. Since the data was not collected as part of a specific survey, no advanced statistical analysis can be performed.

The data analyzed is not a sum of all collisions that occur in Niagara, but represents the serious and fatal MVCs that comprise a small percentage of the total number of MVCs that occur in the Niagara Region. The data analyzed represents the serious and fatal MVCs that occur on regional and municipal roads only, which account for the majority of fatal collisions and a portion of the serious injury collisions that occur on all roadways within the Niagara region. It does not include the serious and fatal collisions occurring on provincial roads (King's Highways). (Note: NRPS serious injury data cannot be compared to Ontario Road Safety Annual Report [ORSAR] major injury data as they are defined differently).

The data has been analyzed using SPSS statistical analysis software. Descriptive analysis will include frequencies, percentages, and ranges.

The baseline data analysis has been performed in order that the Regional Niagara Road Safety Committee can determine patterns within the data to inform planning and to act as a baseline for future comparative analyses with MVC data collected from 2004 to 2008.

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Overview:

The data analyses indicate that driver error, impairment and speed are the most common primary and secondary contributing factors involved in serious and fatal MVCs.

The primary causes/contributing factors of fatal MVCs are similar to the primary causes/ contributing factors of serious injury MVCs. For that reason, fatal and serious MVC data have been combined for further analyses (see Figure 1)

There were 303 serious and fatal MVC's due to both primary and secondary cause/contributing factor. Although there is a primary cause documented for each incident, secondary cause/contributing factor are not consistently provided. In 59% of the incidents, no secondary cause/contributing factor have been provided.

The most common secondary cause of fatal and serious MVCs is speed. All collisions involving speed as a secondary cause have driver error or impairment as the primary cause of the MVC. (See Table 3)

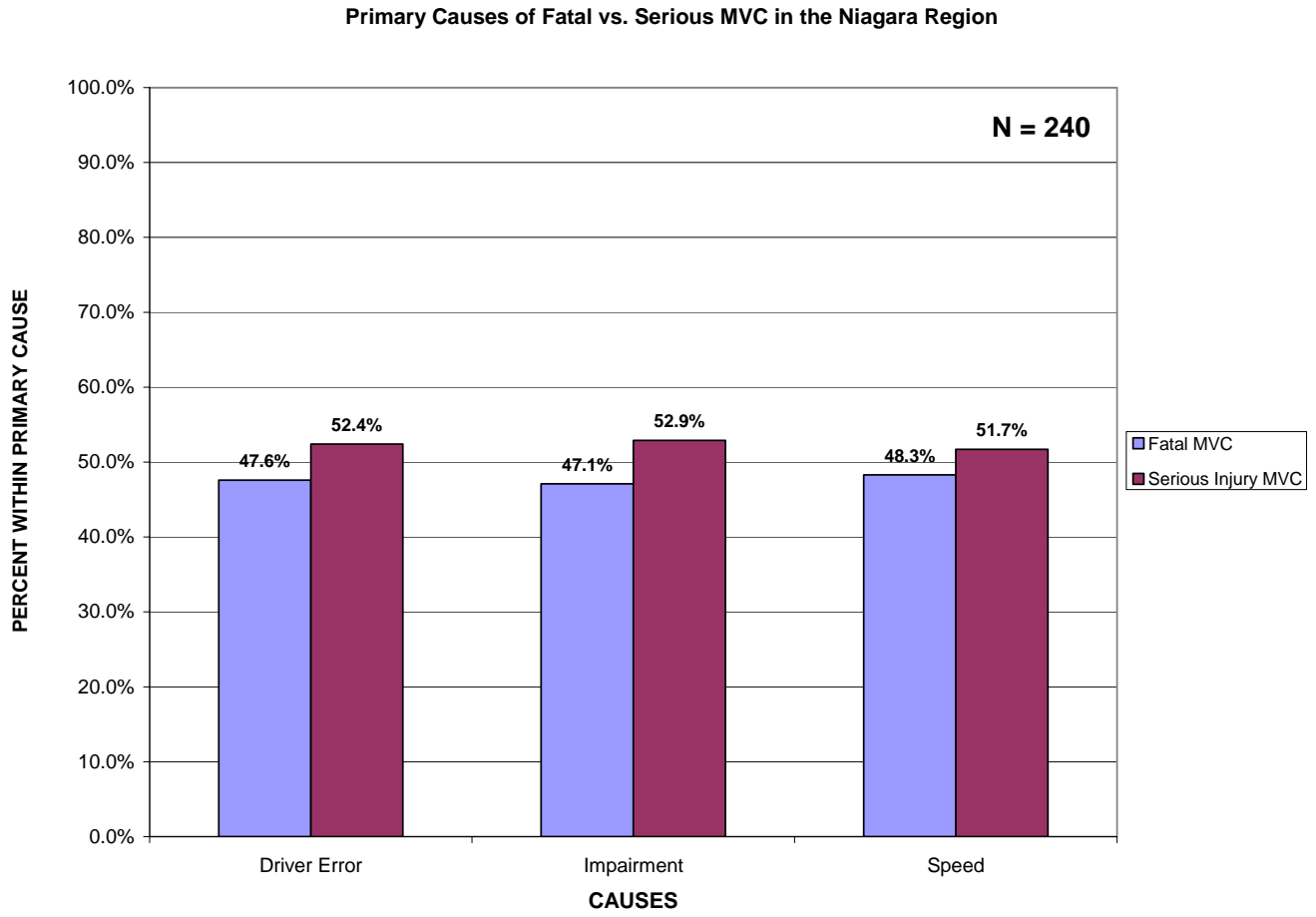
The second most common secondary cause of fatal and serious MVCs is driver error. Fifty percent of the collisions involving driver error as a secondary cause have impairment as a primary cause of the MVC. (See Table 3)

In addition, when data is collected at a collision scene, the cause/contributing factor are documented based on the circumstances of the collision, which can be subjective and based on expert opinion. (i.e. when impairment is involved, it is usually listed as the primary contributing factor, regardless of other causative factors involved.)

For the reasons indicated above, analysis of the most common cause/contributing factor of serious and fatal motor vehicle collisions on Niagara regional and municipal roads has been performed on the data containing only the three main primary causes/contributing factors involved in these crashes.

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Figure 1: Primary Cause/Contributing Factor of Fatal vs. Serious MVC in the Niagara Region

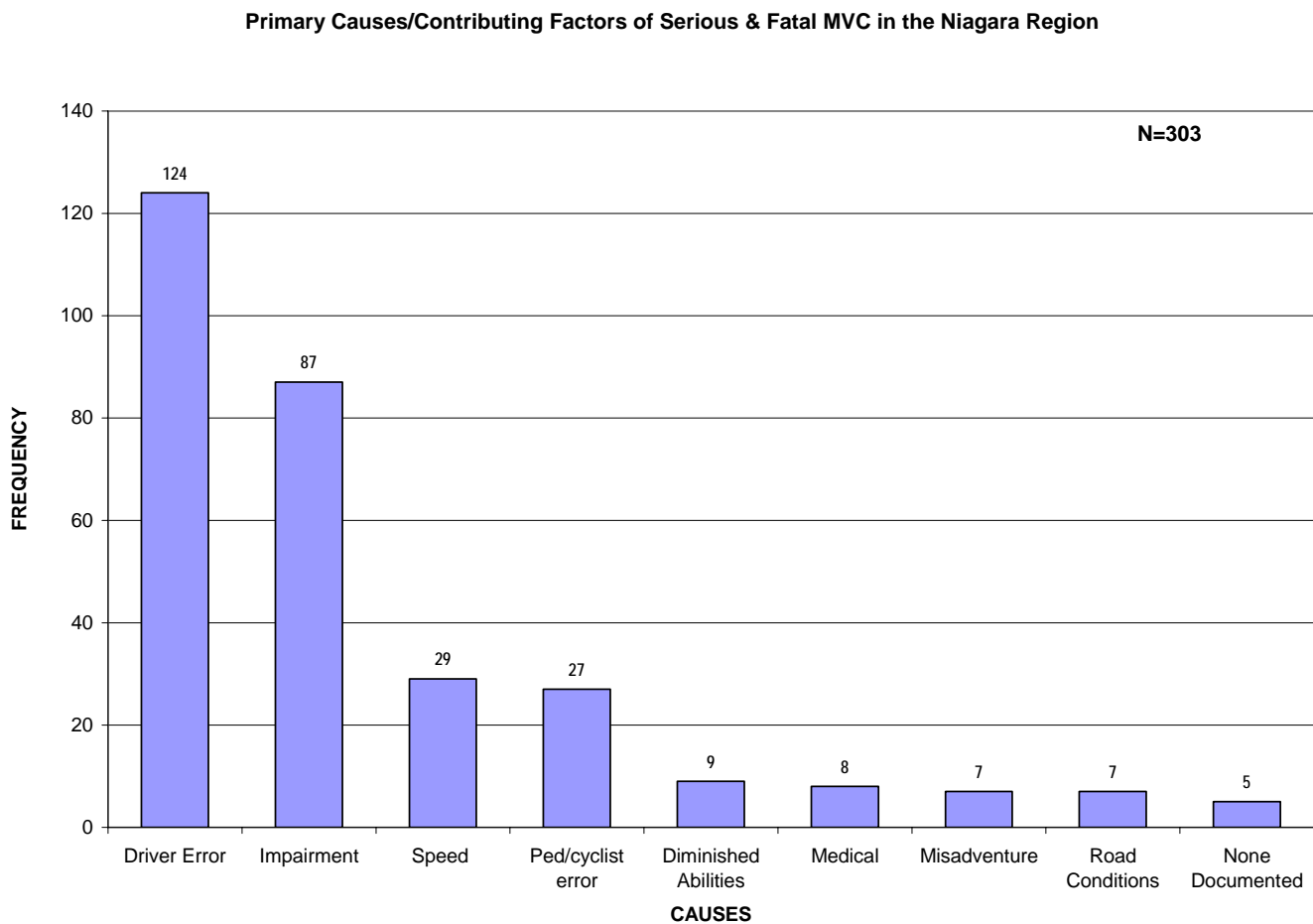


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Table 1: Primary Causes /Contributing Factors of Serious and Fatal Motor Vehicle Collisions

Causes /contributing factors	Frequency	Percent
Driver error	124	40.9
Impairment	87	28.7
Speed	29	9.6
Pedestrian /cyclist error	27	8.9
Diminished abilities	9	3.0
Medical	8	2.6
Road conditions	7	2.3
Road conditions	7	2.3
None documented	5	1.7
Misadventure	7	2.3
Total	303	100.0

Figure 2: All Primary Causes/Contributing Factors of Serious and Fatal MVC in the Niagara Region

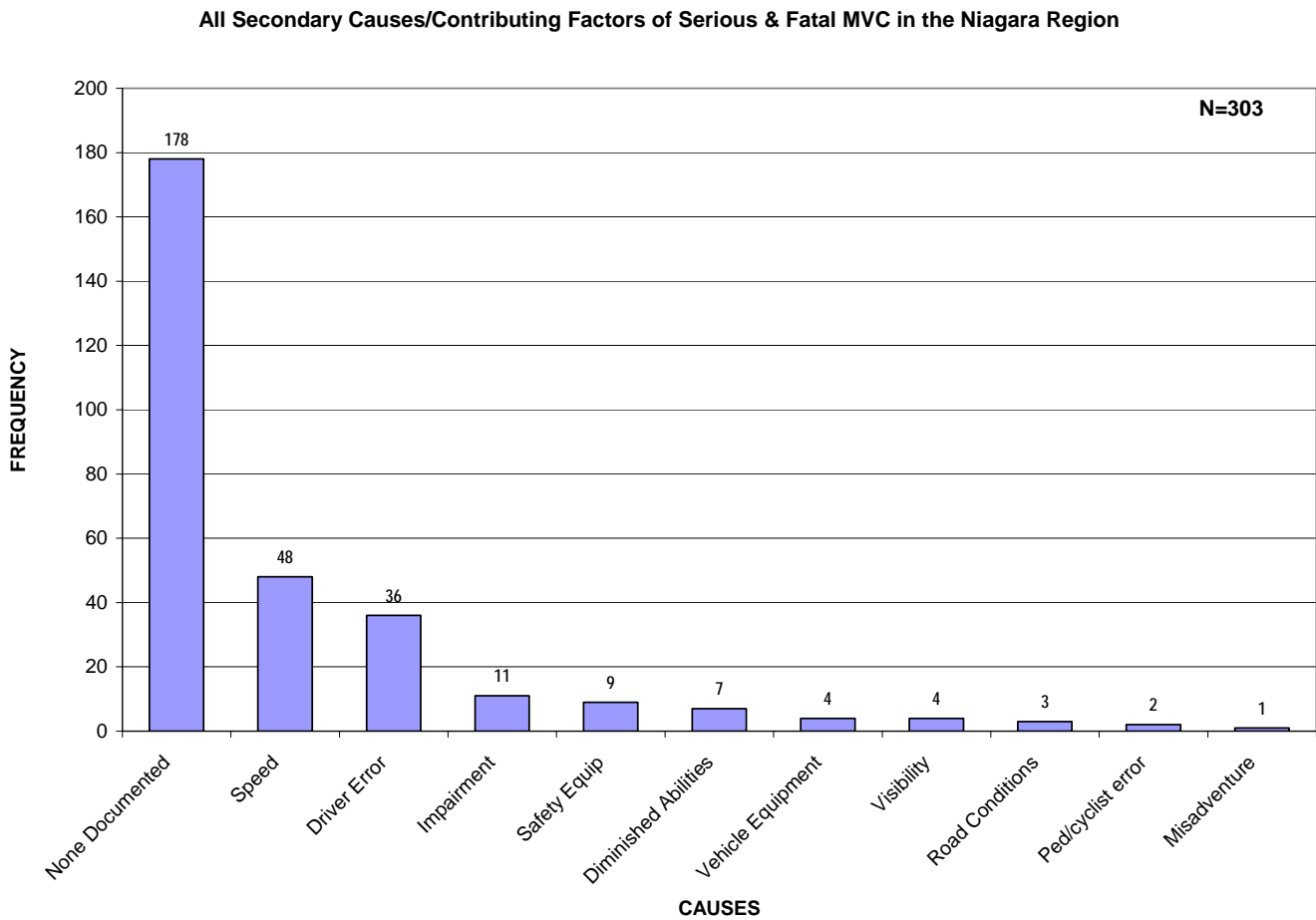


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Table 2: Secondary Causes /Contributing Factors Involved in Serious and Fatal Motor Vehicle Collisions

Causes /contributing factors	Frequency	Percent
None documented	178	58.7
Speed	48	15.8
Driver error	36	11.9
Impairment	11	3.6
Safety equipment	9	3.0
Diminished abilities	7	2.3
Vehicle equipment	4	1.3
Visibility	4	1.3
Road conditions	3	1.0
Pedestrian /cyclist error	2	0.7
Misadventure	1	0.3
Total	303	100.0

Figure 3: All Secondary Causes/Contributing Factors of Serious and Fatal MVC in the Niagara Region



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Table 3: Primary vs. Secondary Causes /Contributing Factors of Serious and Fatal Motor Vehicle Collisions

Secondary Causes/Contributing Factors of Motor Vehicle Collisions (MVC)														
Primary Causes/ Contributing factors of MVCs		None	Diminished abilities	Driver error	Impairment	Misadventure	Ped / cyclist error	Road conditions	Safety equipment	Speed	Vehicle equipment	Visibility	Total	
	None	5	0	0	0	0	0	0	0	0	0	0	0	5
	Diminished abilities	3	0	6	0	0	0	0	0	0	0	0	0	9
	Driver error	100	4	0	3	0	1	3	4	7	0	2	124	
	Impairment	24	0	18	2	0	0	0	2	41	0	0	87	
	Medical	8	0	0	0	0	0	0	0	0	0	0	8	
	Mis-Adventure	5	0	0	0	0	1	0	1	0	0	0	7	
	Ped/cyclist Error	18	1	0	2	1	0	0	1	0	4	0	27	
	Road conditions	5	0	0	0	0	0	0	0	0	0	2	7	
	Speed	10	2	12	4	0	0	0	1	0	0	0	29	
	Total	178	7	36	11	1	2	3	9	48	4	4	303	

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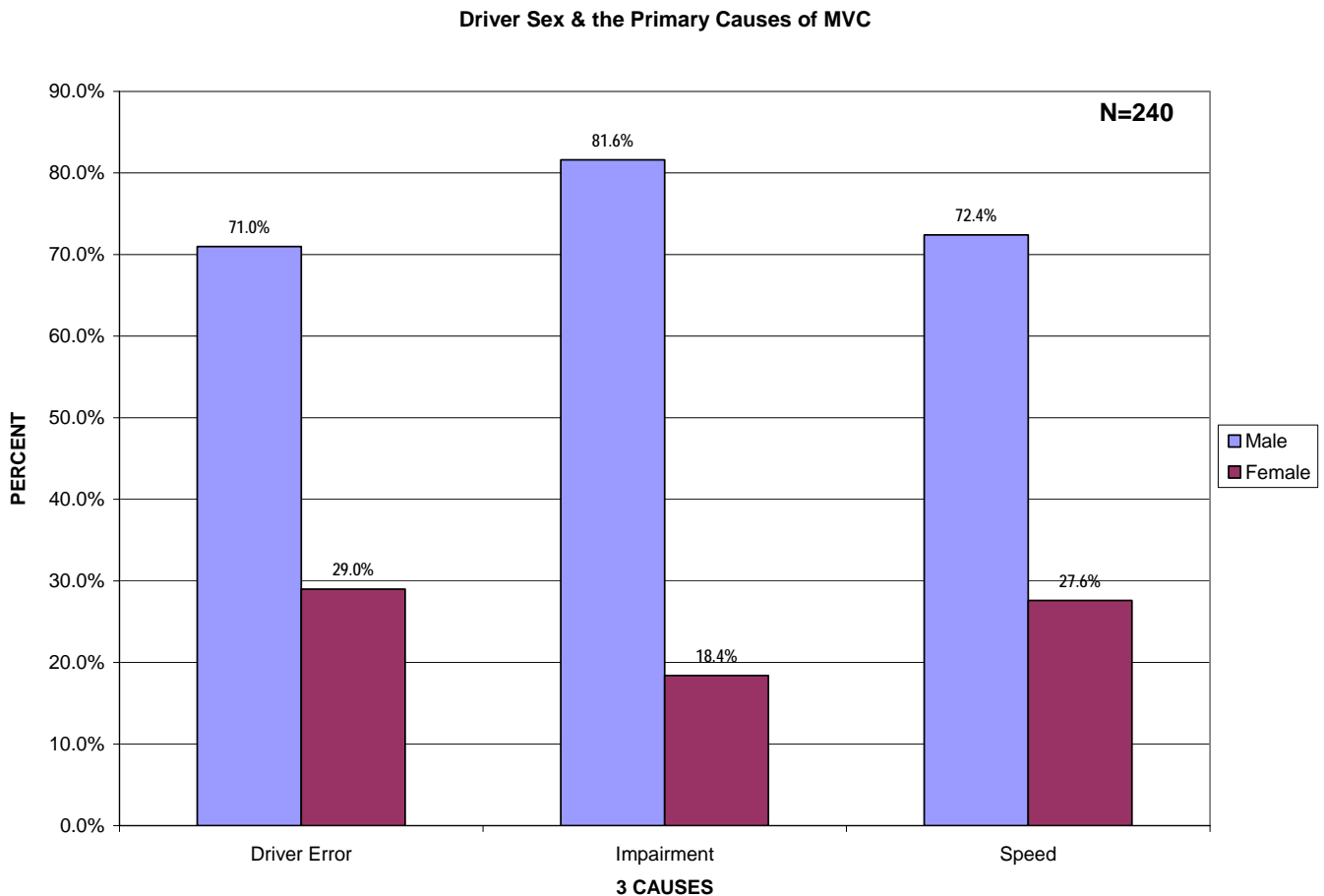
The People

The MVCs were examined based on both sex and age groups.

Sex

While male drivers are involved in 75% of fatal and serious MVCs involving driver error, impairment and speed, female drivers are involved in the other 25% of fatal and serious collisions attributable to those causes /contributing factors. This sex-specific breakdown is seen within each of the main cause/contributing factor of the MVCs (Figure 4).

Figure 4: Driver Sex and the Primary Cause/Contributing Factor of MVC



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Although the Ontario driving population is 53% male and 47% female, the % of serious and fatal collisions in Niagara due to the 3 primary cause/contributing factor involve predominantly male drivers (75%) vs. female drivers (25%). (Table 4)

Table 4: Sex of Driver Population in Ontario 1999-2002

Sex of Driver Population in Ontario 1999-2002 (source ORSAR 1999-2002)					
	1999	2000	2001	2002	Average 1999-2002 and %
Male	4,213,893	4,313,694	4,382,036	4,451,210	4,340,208 = 53%
Female	3,704,421	3,807,680	3,884,580	3,962,294	3,839,743 = 47%

The ratio of male vs. female drivers involved in fatal and serious injury collisions due to the 3 primary cause/contributing factor in Niagara (male 75% vs. female 25%) is similar to the ratio of male vs. female drivers involved in fatal collisions in Ontario (male 77% vs. female 23%) and the ratio of male vs. female drivers involved in all collisions in Ontario. (Table 5)

Table 5: Sex of Driver by Class of Collision 1999-2002

Sex of Driver by Class of Collision 1999-2002 (source ORSAR 1999-2002)										
	1999 class of collision		2000 class of collision		2001 class of collision		2002 class of collision		Average total 1999-2002 and %	
	Fatal	All (total)	Fatal	All (total)	Fatal	All (total)	Fatal	All (total)	Fatal	All (total)
Male	1,051	273,570	963	269,356	960	261,067	976	269,041	988 = 77%	268,259 = 67%
Female	313	125,058	274	136,677	264	133,711	298	141,035	287 = 23%	134,120 = 33%

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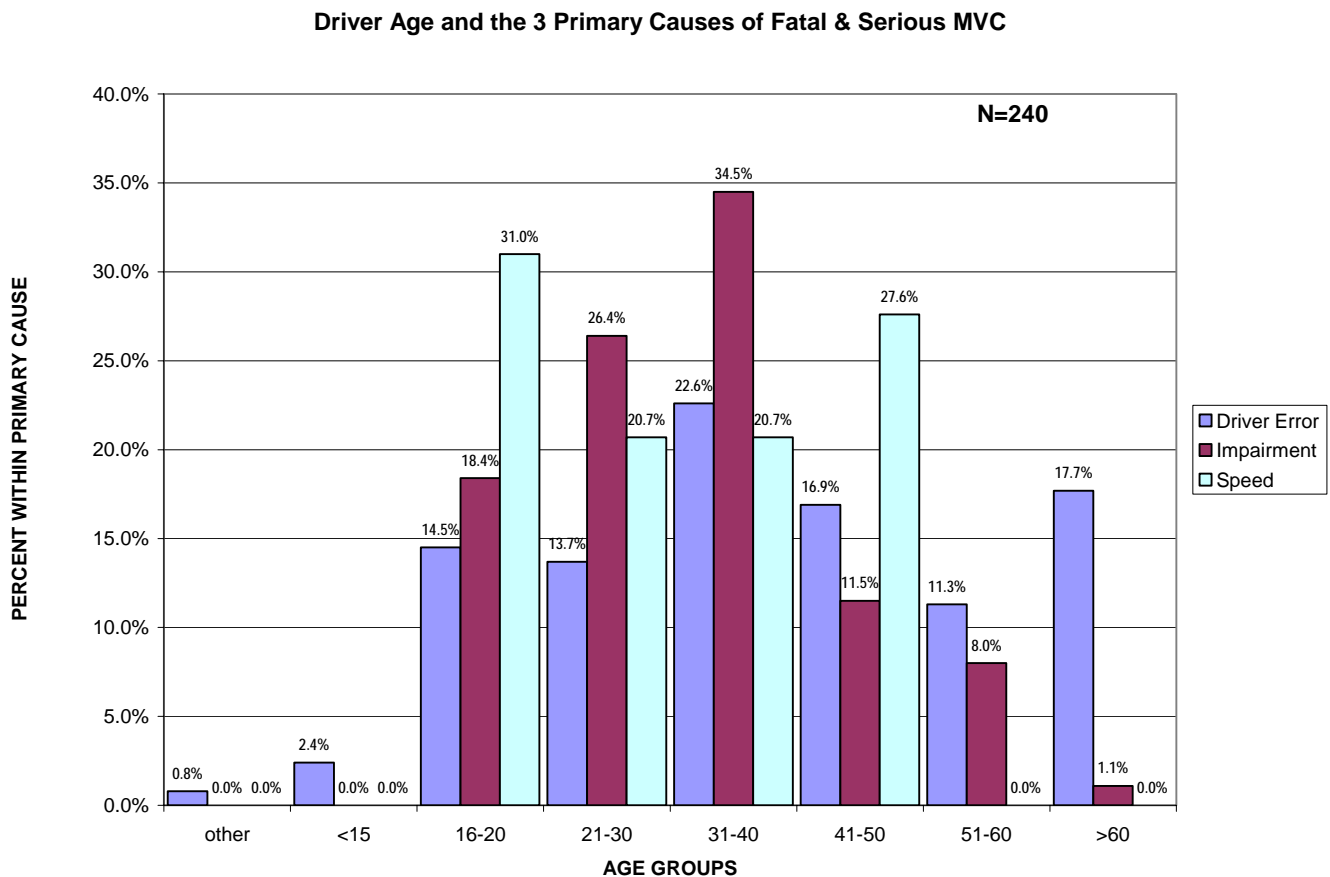
Age Groups

There are no definite patterns based on age groups. However, it appears that impairment is more common in younger age groups, that driver error is a problem across all age groups and that speed is a problem for those under 50 years. Two age groups (21 – 25 and 26 – 30 years) were combined for this analysis although the collision data was collected separately for these 2 groups.

It is worth noting that the youngest age group, which is only a 5 year age range (16 – 20 years), accounts for 18% of the total collisions due to the 3 primary causes / contributing factors, whereas the 31 – 40 year age group (10 year span) accounts for 27% of total collisions due to the 3 primary causes / contributing factors. Within speed as a primary cause, the 16 – 20 year age group is involved in almost one third (31%) of all serious and fatal collisions due to speed.

The 21-30 year age group accounts for 19% of total collisions due to the 3 primary causes /contributing factors, the 41 – 50 year age group for 16%, the 51 – 60 year age group for 9% and the over 60 year age group for 10%.

Figure 5: Driver Age and the 3 Primary Causes/Contributing Factors of Fatal and Serious MVC

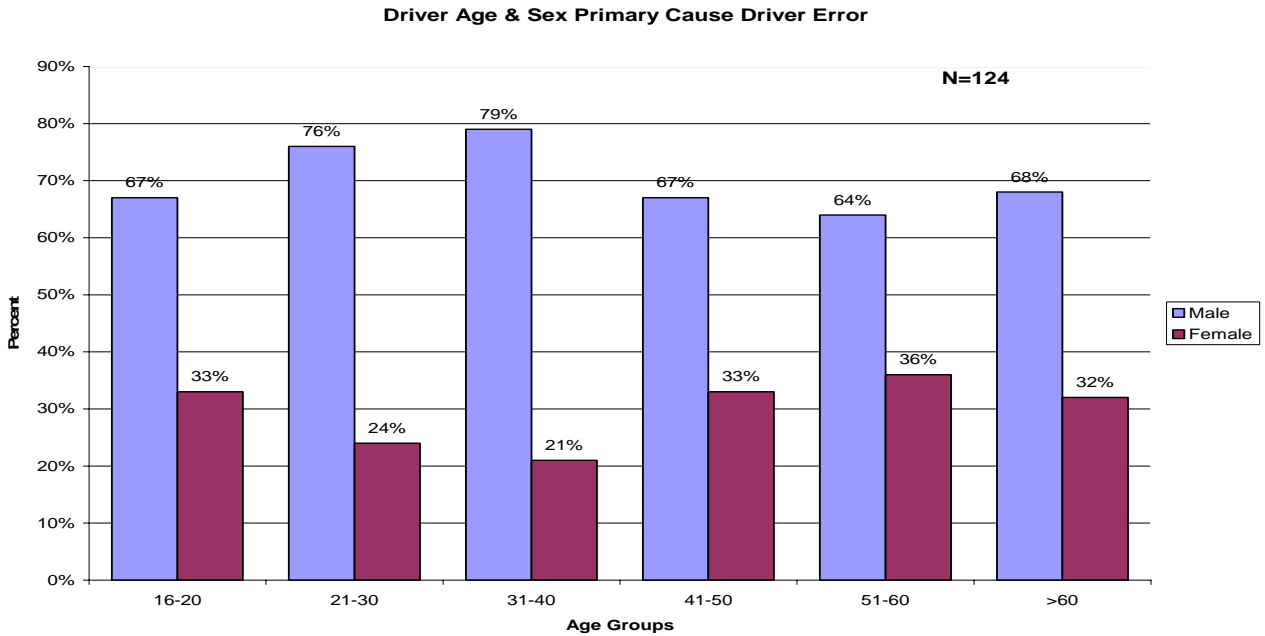


Note: the age group ranges vary in the figure above.

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Driver sex within driver error as a primary cause – males 71% vs. females 29% -this pattern is similar across all age groups

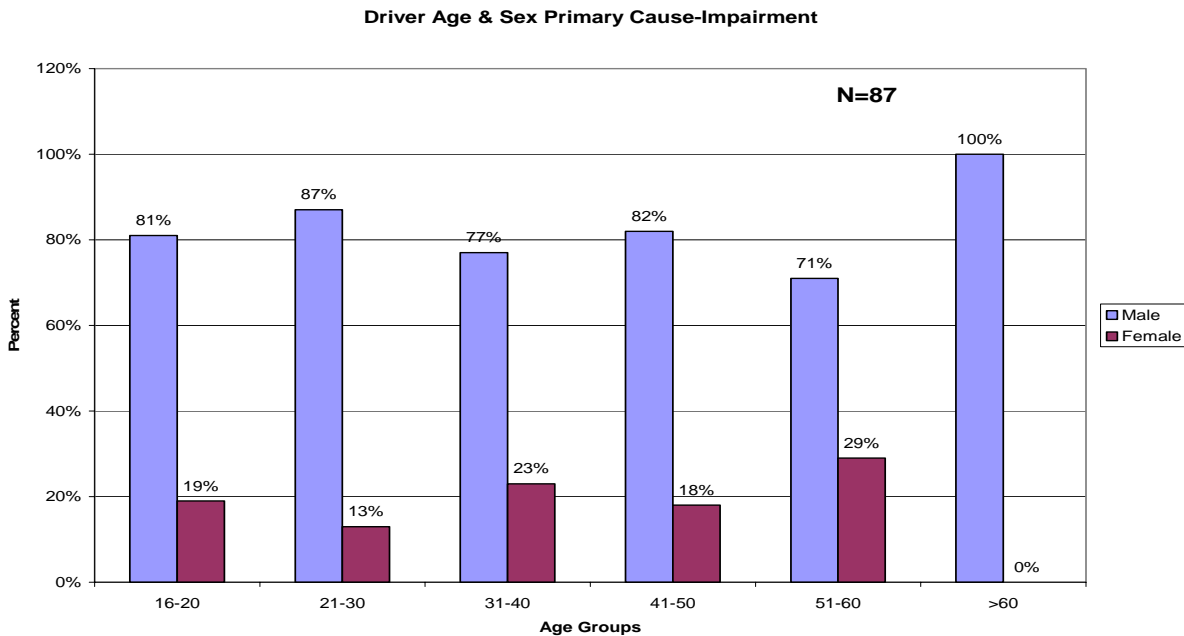
Figure 5A: Driver Age & Sex Primary Cause: Driver Error



Driver sex within impairment as a primary cause –males 82% vs. females 18% - similar pattern across most age groups with slightly more involvement of males vs. females in the 21-30 age group (87% male vs. 13% female) and slightly more involvement of females vs. males in the 51-60 age group (71% male vs. 29% female)

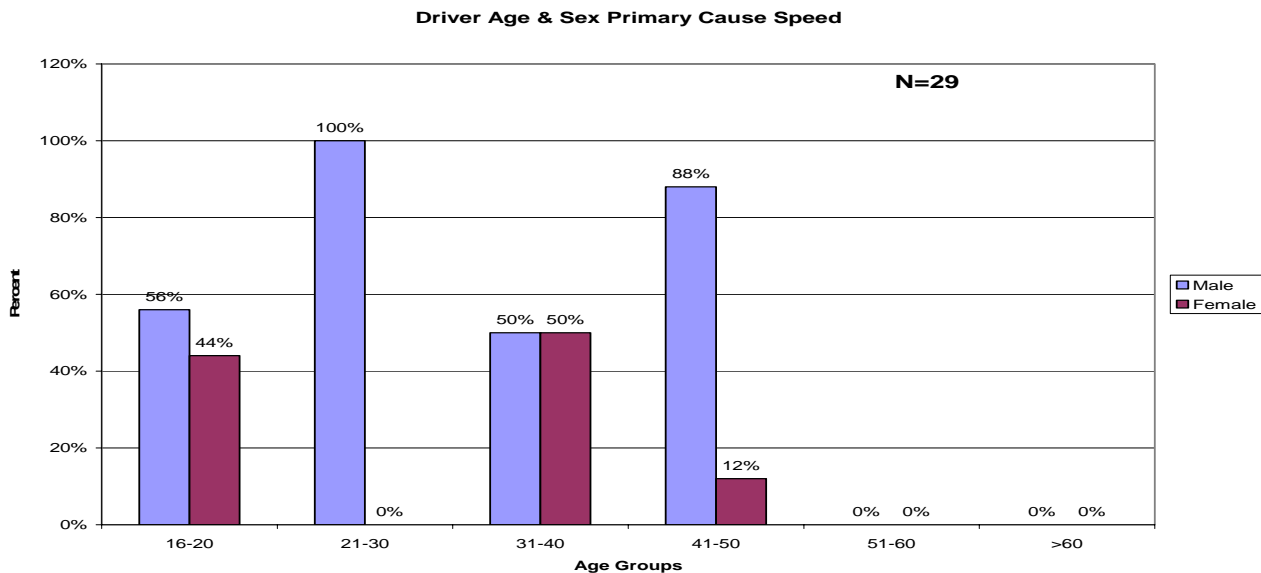
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Figure 5B: Driver Age & Sex Primary Cause: Impairment



Driver sex within speed as a primary cause – males 72% vs. females 28% - this ratio varies among the age groups (Note: be cautious of drawing any conclusions from these results due to the small data set in this category). In the 16-20 age group, there is a higher % of females (males 56% vs. females 44%), in the 21-30 age group, 100% of the speed related MVCs involve males vs. 0% females, in the 31-40 age group, 50% males and 50% females are represented, and in the 41-50 age group, there is a higher # of males (88%) vs. females (12%). Speed was not a primary contributing factor in MVCs for the drivers in the over 50 age groups.

Figure 5C: Driver Age & Sex Primary Cause: Speed



Young drivers (16 to 20 yrs.) are involved in 17% of the serious and fatal MVCs in Niagara, based on the NRPS data. According to ORSAR data (on all Niagara roads), approx.12% of fatalities and 15% of all injuries involve youth between 16 to 20 yrs. old.

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The Collision

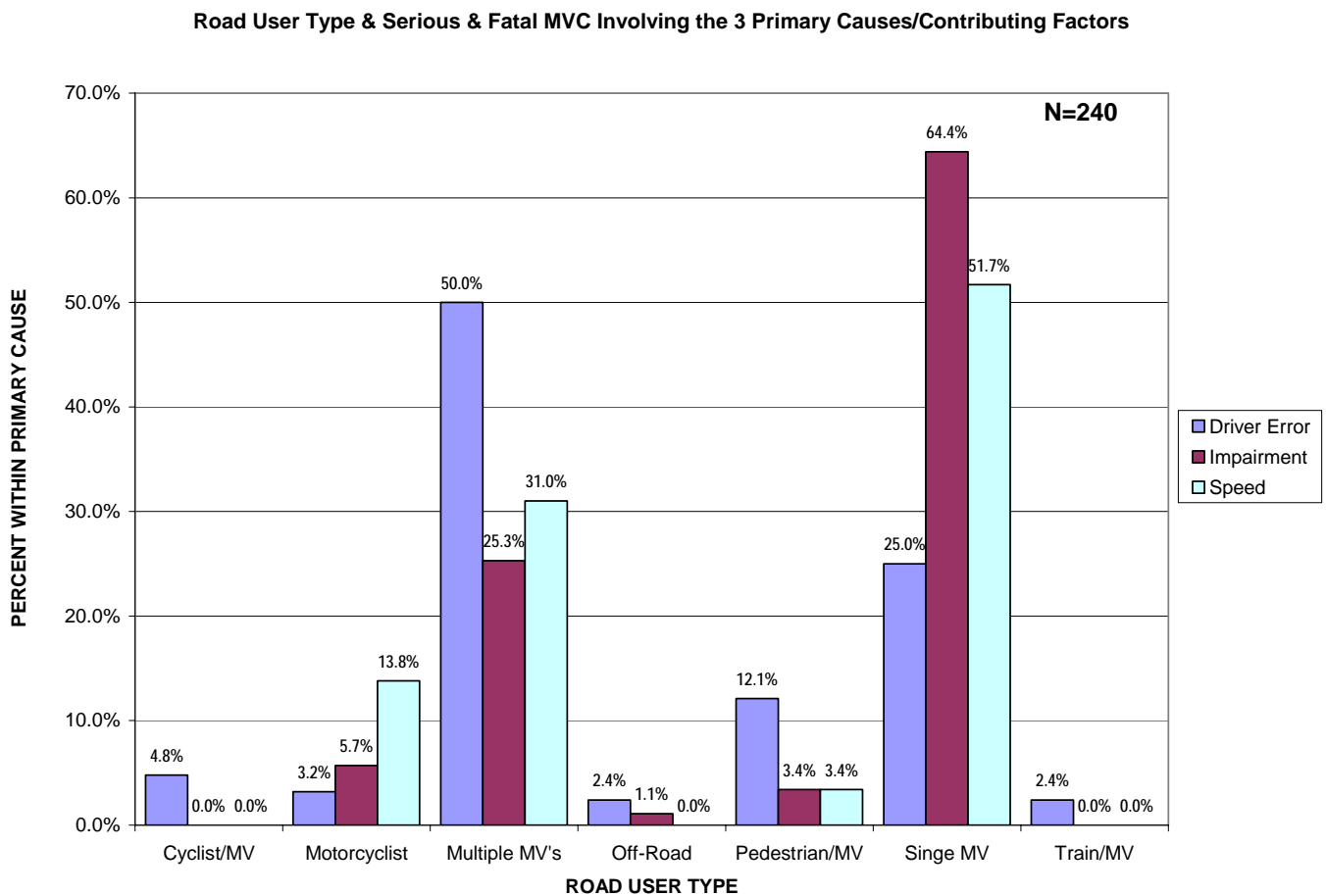
Road User Type

While multiple vehicle collisions were more common in incidents identifying driver error as the primary cause, single vehicle involvement was more likely in those incidents identifying either impairment or speed. Of serious and fatal motor vehicle collisions involving driver error as a primary cause, 50% involve multiple vehicles while 25% are single vehicle crashes, and 12% involve pedestrians.

Collisions identifying impairment as a primary contributing factor occurred most often with single vehicle crashes (64%) and less often with multiple vehicle crashes (25%). For collisions identifying speed as the primary contributing factor, over half (52%) occurred with a single motor vehicle while almost a third (31%) involved multiple vehicles and 14% were with motorcyclists.

Single vehicle crashes account for 43% and multiple vehicle crashes account for 39% of the total collisions due to the 3 primary causes /contributing factors.

Figure 6: Road User Type and Serious and Fatal MVC involving the 3 Primary Causes/Contributing Factors

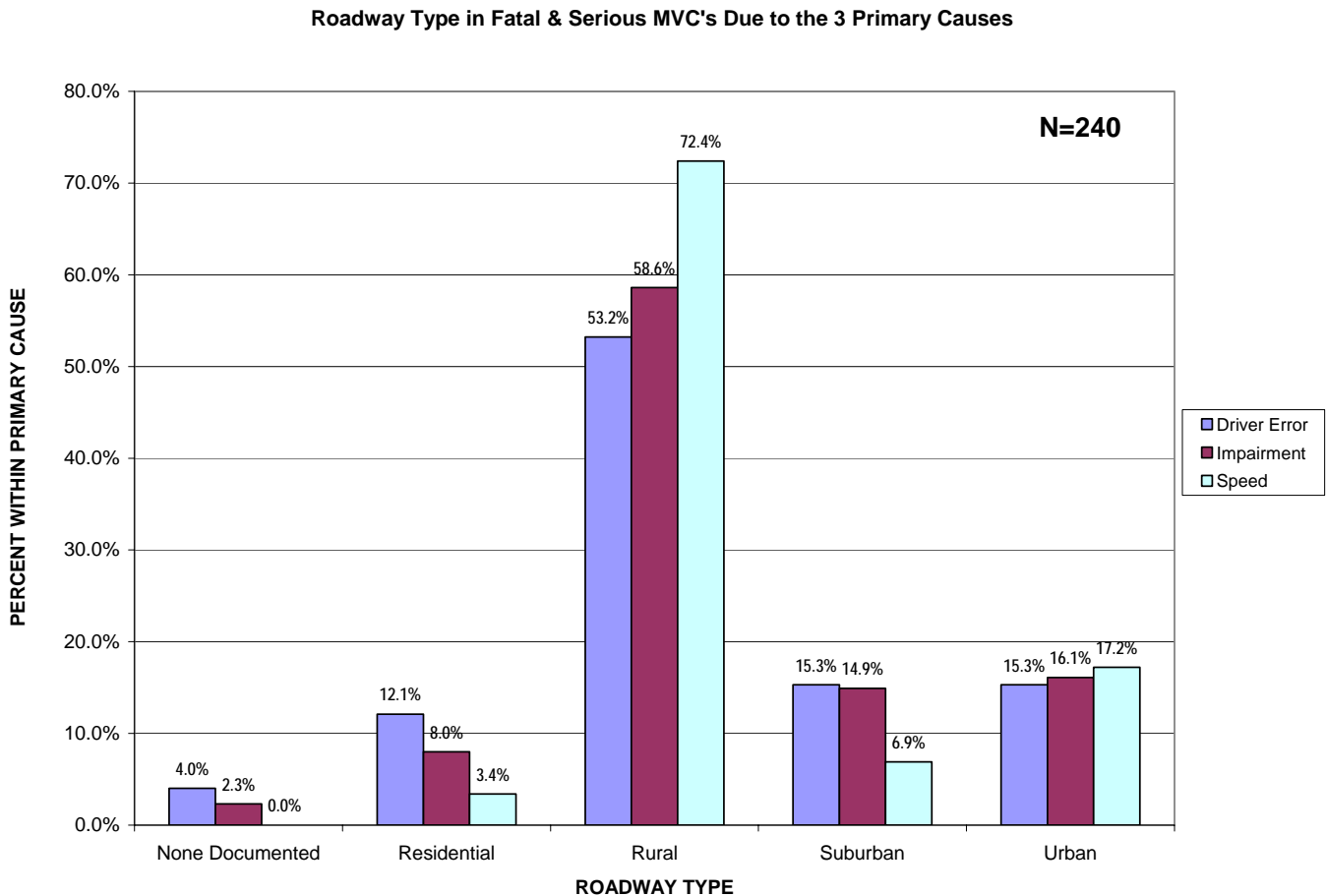


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Roadway type

Most serious and fatal collisions occurred on rural roads (58% of the total). While urban locations accounted for 16% of collisions, suburban roadways were involved in 14% of the serious and fatal collisions. Residential roadways had the lowest percentage of serious and fatal collisions (10%). While speed was a more common cause identified in rural locations, this pattern was not obvious in other settings.

Figure 7: Roadway Type in Fatal and Serious MVC's due to the 3 Primary Causes/Contributing Factors

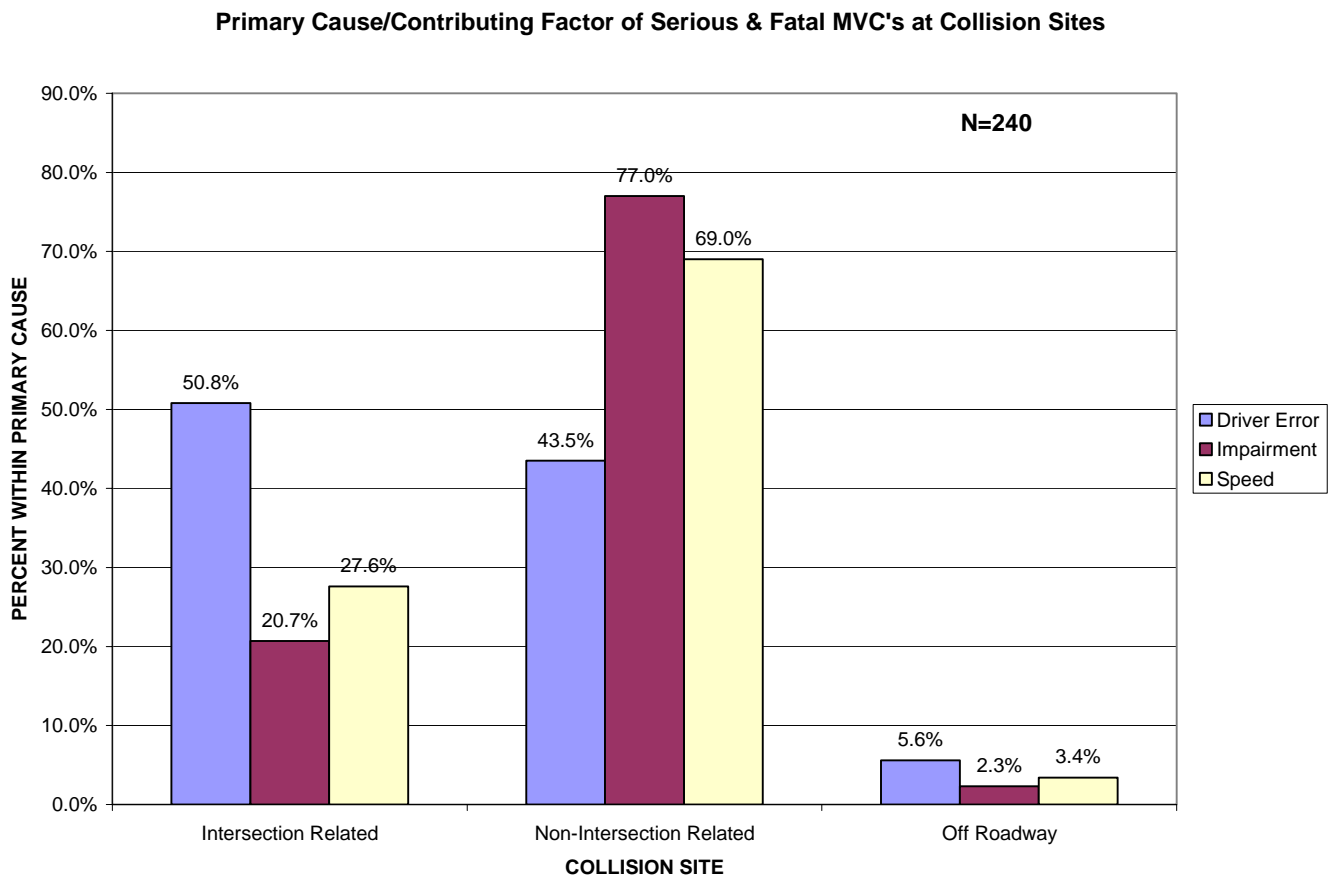


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Collision Site

Most serious and fatal collisions occurred at non-intersection sites (59%). In non-intersection sites, speed or impairment were more commonly identified as the primary cause of the collision. At intersection sites, driver error was more commonly identified as the primary cause of the collision (51%).

Figure 8: Primary Cause/Contributing Factor of Serious and Fatal MVC at Intersection vs. Non-Intersection Collision Sites

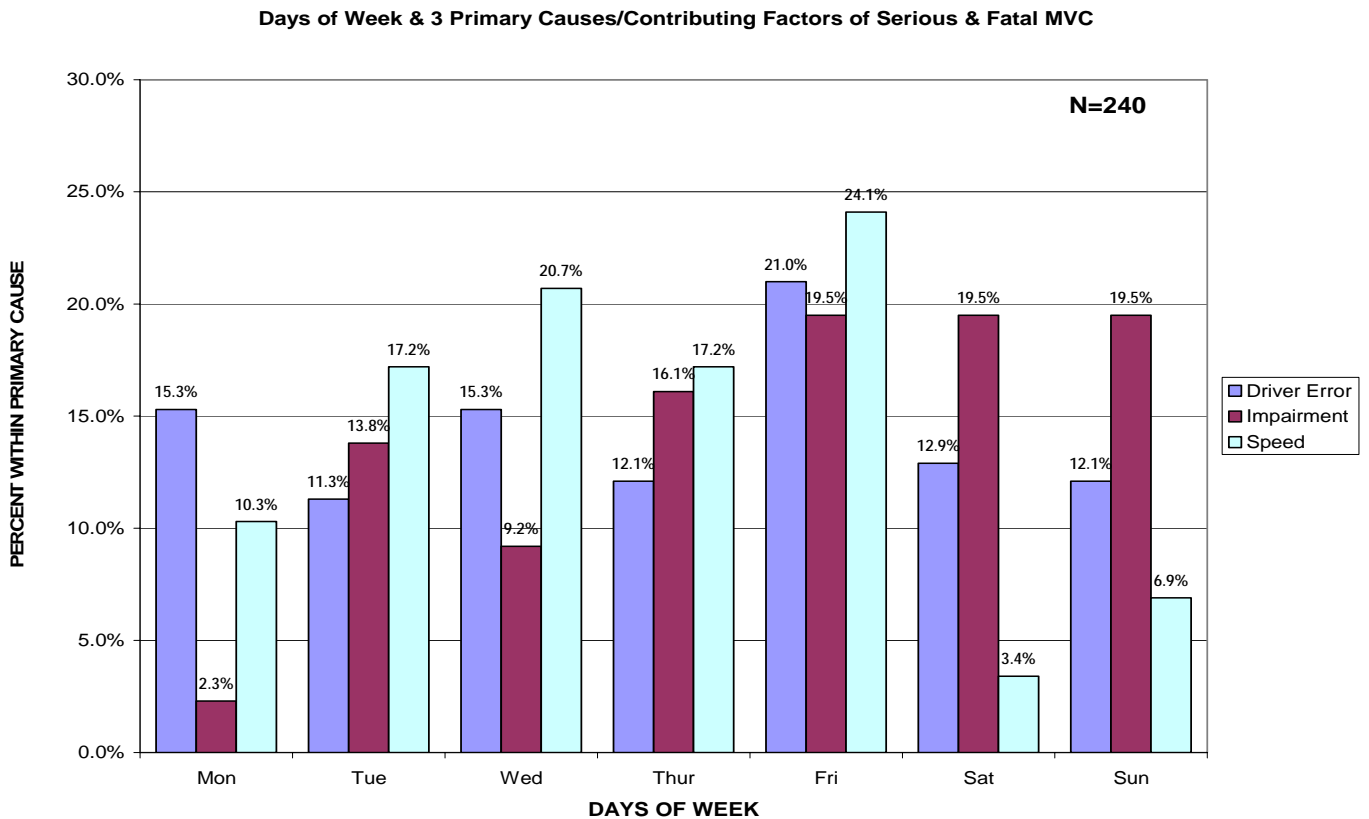


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Days of Week

Different patterns of occurrence were noted based on the days of the week and primary cause of the collision. The day of the week when most of the collisions occurred was Friday (21%). While driver error was identified similarly throughout the week (with Fridays being slightly greater) collisions involving impaired driving occurred more frequently during the “weekend” (Friday, Saturday and Sunday) and those collisions involving speed occurred during “weekdays” (Tuesday through Friday).

Figure 9: Days of the Week and 3 Primary Causes/Contributing Factors of Serious and Fatal MVC



Driver error:

Overall, males are involved in 71% of MVCs and females are involved in 29% of MVCs due to driver error. This ratio is fairly consistent from Tuesday to Friday. However, on Mondays, more males (89%) vs. females (11%) are involved in MVCs due to driver error. On Saturday and Sunday, more females are involved in MVC due to driver error. (Saturday: males 63% vs. females 37% , Sunday: males 53% vs. females 47%).

Impairment:

Overall, males are involved in 82% vs. females 18% of MVCs due to impairment. This ratio is fairly consistent throughout the week with the exception of Saturdays and Mondays, where males were involved in 100% of these MVCs. (note Saturday 17/17 MVCS involved males, Monday 2/2 MVCs involved males)

Speed:

Overall, males are involved in 72% vs. females 28% of MVCs involving speed. This pattern was fairly consistent throughout the week.

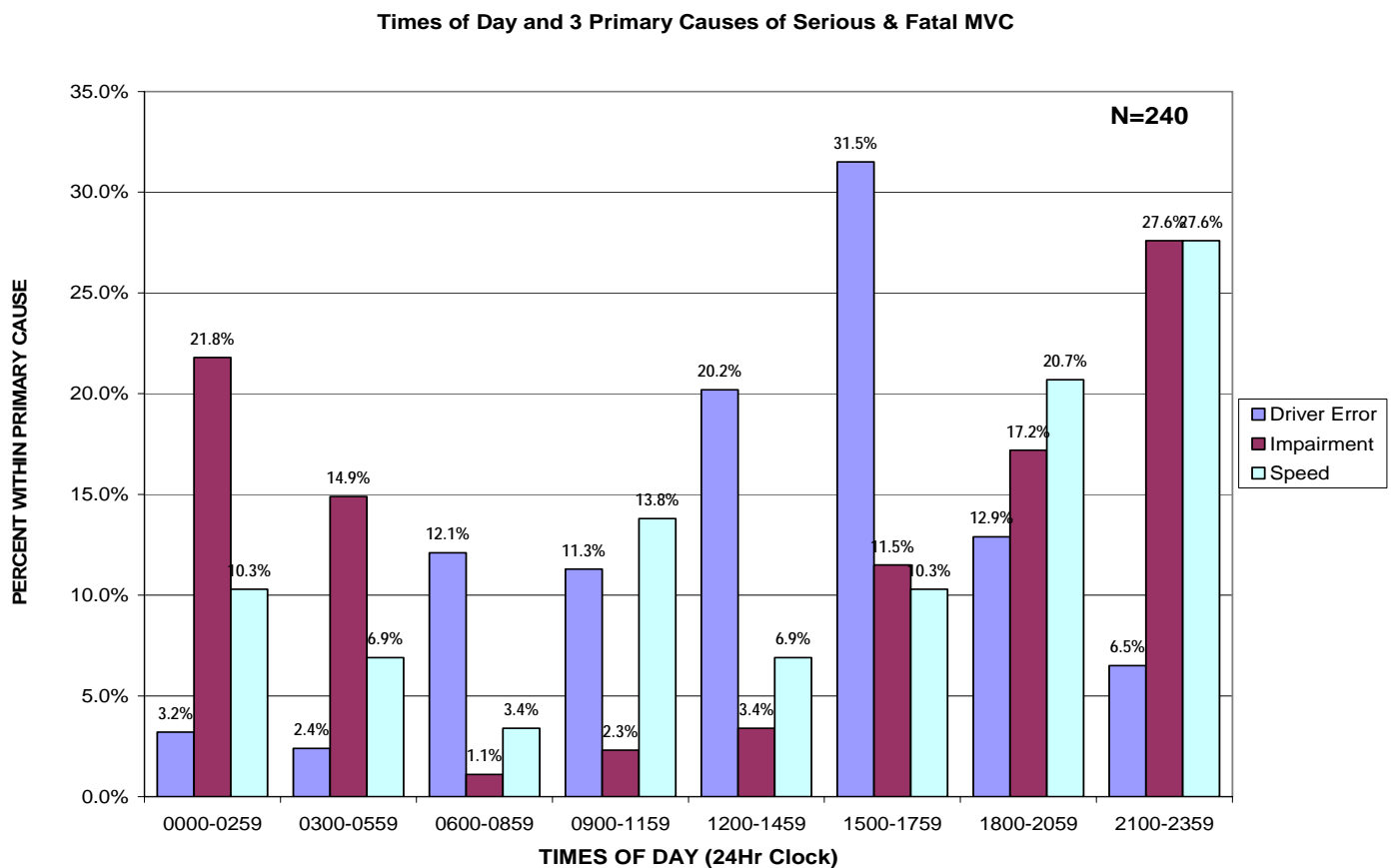
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Times of Day

Different patterns of occurrence was noted based on the times of the day and primary cause of the collision. The greatest number of collisions (22%) occurred between 1500 to 1759 hours, the second greatest number (17%) between 2100 to 2359 hours and the third greatest number (15%) between 1800 and 2059 hours.

Driver error was more commonly identified as the primary cause of the collision between 1200 and 1759 hours and least frequently between midnight and 0559 hours. Impairment was identified as the primary cause most frequently between 1800 and 0559 hours peaking between 2100 and 2359. Speed was identified as the primary cause more frequently between 1800 and 2359 hours.

Figure 10: Times of Day and the 3 Primary Causes/Contributing Factors of Serious and Fatal MVC



Driver error:

Overall, males are involved in 71% of MVCs and females are involved in 29% of MVCs due to driver error. Data indicates that this ratio increases for males between 9:00 p.m. and noon (from 2100 to 1159; male vs. female ratio = 89% to 11%) and decreases between noon and 9:00 p.m. (1200 to 2059; male vs. female ratio = 62% to 38%)

Impairment:

Overall, males are involved in 82% vs. females 18% of MVCs due to impairment. Throughout the day, this ratio is fairly consistent for males.

Speed:

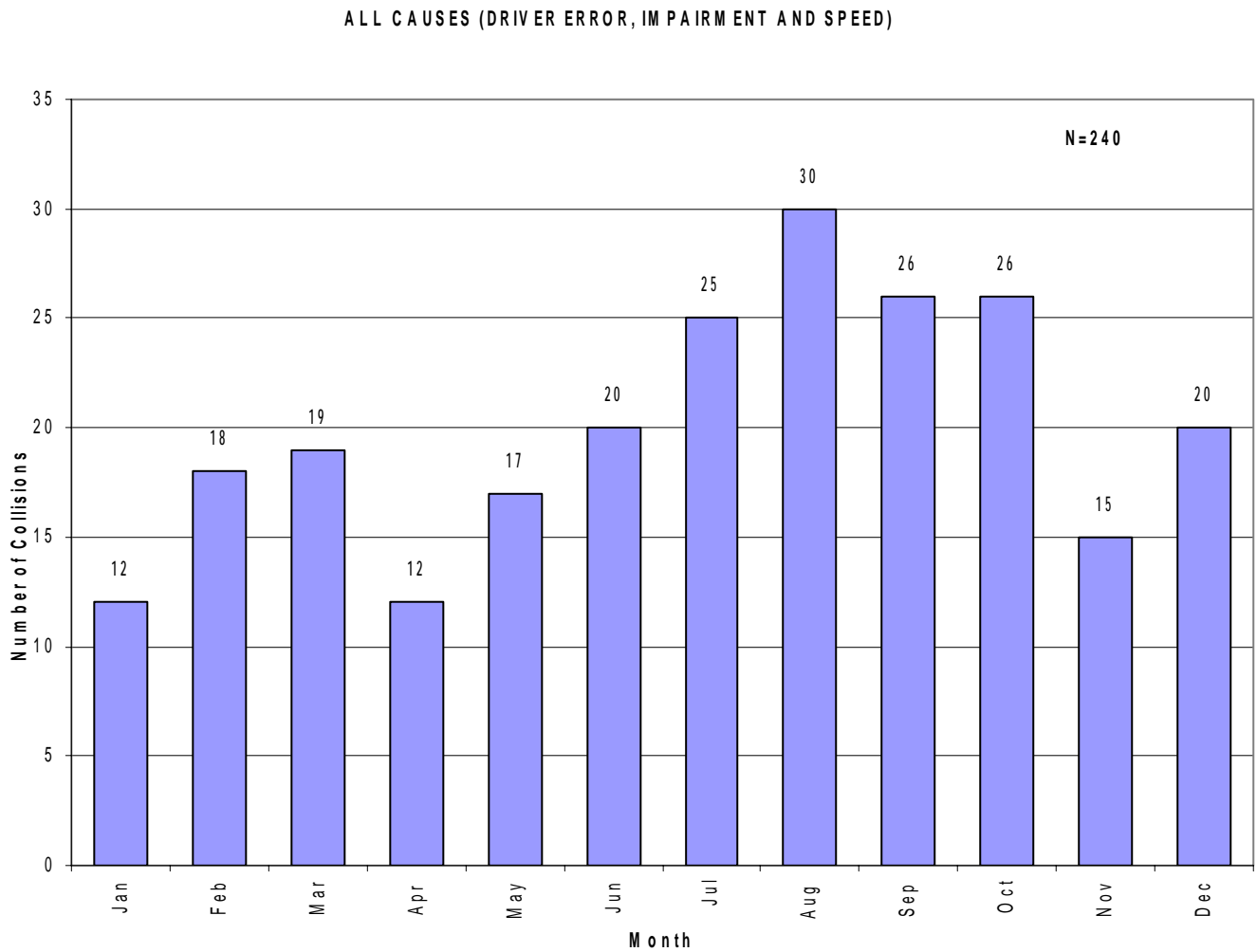
Overall, males are involved in 72% vs. females 28% of MVCs involving speed. Ratio patterns are fairly consistent throughout the times of day.

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Months of the Year - Trends and patterns

Over the course of five years, most serious and fatal collisions occurred between July and October (see Figure 11). Over the time period, there were three months when no collisions occurred. In months when collisions occurred, the frequency ranged from an average of one collision per month to 10 collisions per month over the 5 year period (1999 to 2003).

Figure 11: Total Collisions by Month due to 3 Primary Causes/Contributing Factors (1999-2003)

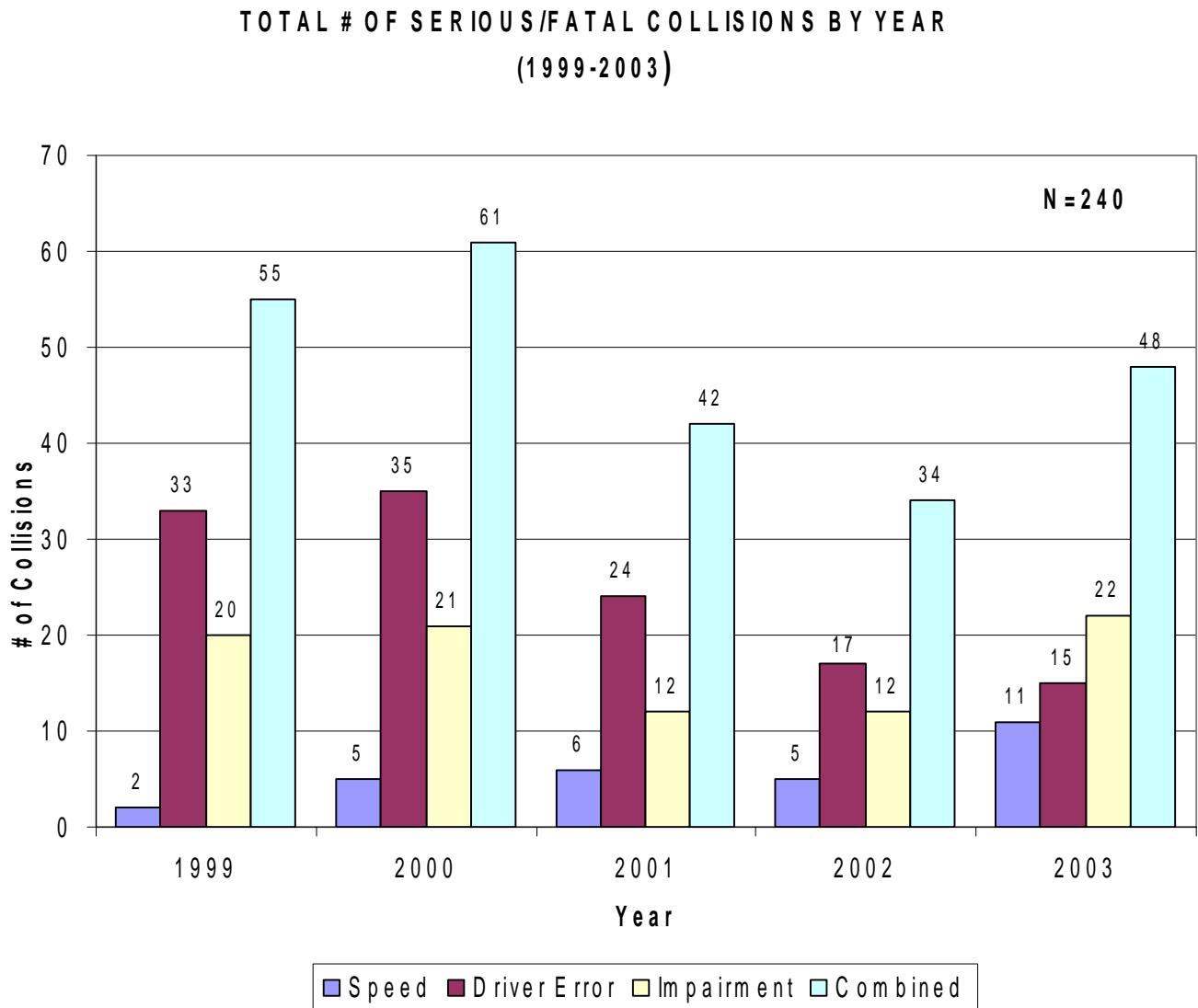


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Years 1999 to 2003 – Trends and Patterns

There appears to be a downward trend in the annual number of serious and fatal collisions, however, in 2003 there was a slight increase in the occurrences (see Figure 12). More years of data are required to determine if the trend is actually changing or if this was an aberrant year.

Figure 12: Total Number of Serious & Fatal Collisions 1999-2003



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Appendix 1: Glossary of Terms

Causes /contributing factors of motor vehicle collisions:

Diminished abilities - road user with reduced driving or road use proficiency due to inexperience, decreased physical capacity (i.e. reduced peripheral vision, reduced flexibility).

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).

Impairment - ability impaired, alcohol (over 0.08)– driver had consumed alcohol and upon testing was found to have a blood alcohol level in excess of 80 mg.

- ability impaired, alcohol – driver had consumed sufficient alcohol to warrant being charged with a drinking and driving offence.

- ability impaired, drugs – driver / pedestrian had used drugs and was legally impaired in the judgment of the investigating officer.

Medical - driver / pedestrian has a permanent medical or physical handicap, e.g. diabetic, epileptic or amputee, or an illness or temporary physical defect which was a factor in the collision, e.g. heart attack or broken arm. The disability need not have been a factor in the collision

Misadventure – unexpected result of overtly irresponsible actions

Pedestrian / cyclist error - pedestrians or cyclists not following the rules of the road.

Road conditions - pertaining to the physical state of the roadway (e.g. snow covered, ice patches, potholes).

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

Safety Equipment - equipment used to maintain the safety of the passengers (e.g. seat belts, air bags, child car restraints)

Vehicle equipment - equipment on the vehicle for vehicle efficiency (e.g. brakes, transmission, etc.)

Visibility - a designated factor pertaining to environmental condition and whether the road can be seen (e.g. clear, rain, snow, freezing rain, drifting snow, strong wind, fog, mist, smoke, dust).

Collision site:

Intersection related - the collision is intersection related, regardless of the distance from the intersection, if it involves vehicles waiting at or proceeding toward the intersection. It is not used when the collision occurs on an approach to an intersection and the collision is not related to intersection activities (e.g. fire, explosion).

Non-intersection related – there are no intersections, underpasses, tunnels, bridges, private drives or railway crossings. The cause of the collision is not related to activity at a nearby intersection.

Off-road - the collision occurred off of regional or municipal roadways

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Fatal injury - person killed immediately or within 30 days of the motor vehicle collision (MVC)

Primary cause – most significant single contributing factor leading to a collision

Road user type:

Cyclist - person riding a bicycle, adult tricycle, unicycle, trailer, side car or other conveyance attached to a bicycle or adult tricycle. (excludes a person walking a bicycle)

Motorcyclist - person driving a self-propelled vehicle with a seat or saddle for the driver and designed to travel with not more than 3 wheels in contact with the ground, including a motor scooter but not a moped or motor assisted bicycle.

Multiple MVs - more than two motor vehicles involved in the collision.

Off-road - 2 wheels – a motorcycle for recreational use which is plated as an off-road vehicle. Vehicle may be unplated if owner occupies the land.

- 3 wheels – designated primarily for recreational use off-highway and only incidentally operated on public highways (i.e. drive directly across a highway). Includes trappers or farmers using the vehicle for agriculture provided it bears a slow moving vehicle sign.

- 4 wheels – same as off-road – 3 wheels, but with 4 wheels

- other – designated primarily for recreational use off-highway. May or may not be required to have an off road vehicle plate.

Pedestrian – any involved person who is not a vehicle occupant or a cyclist. Includes person pushing or repairing a vehicle.

Single MV – one motor vehicle involved in collision.

Train – all railway vehicles except street cars

Roadway type:

Residential – roadway in area primarily occupied by housing units

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

Suburban – roadway in moderately dense occupied areas, generally located on the city's / town's outer rim

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

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

Serious injury (RNRSC) - a non-fatal injury that is considered life threatening