Crashes in the Arrowhead …

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I have nothing to disclose

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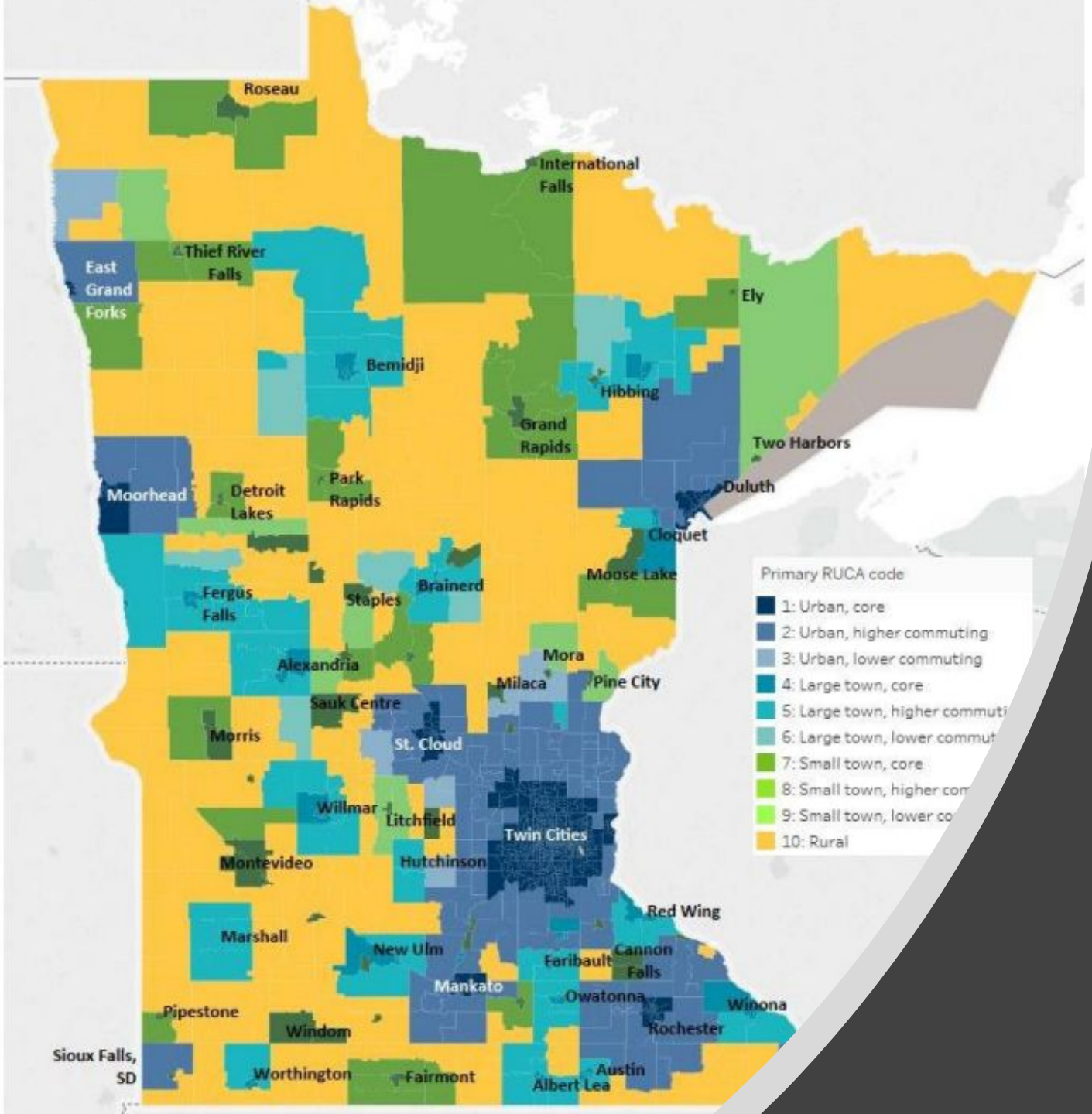
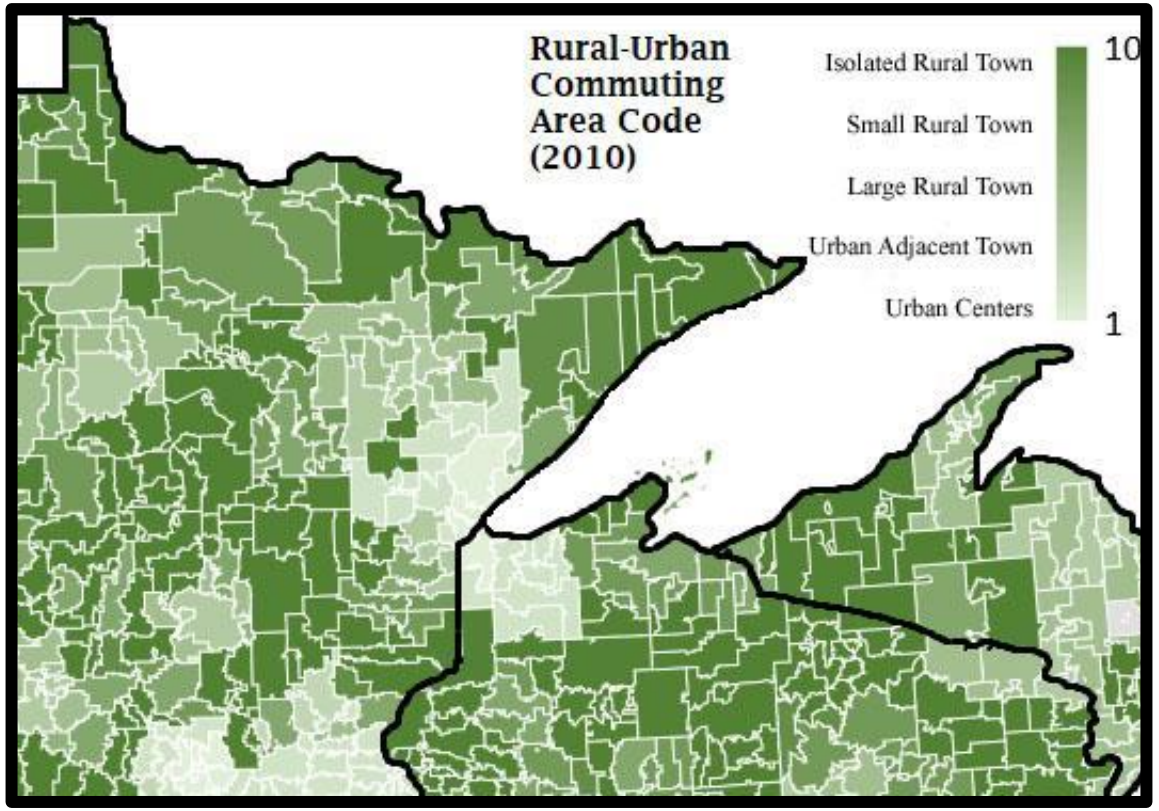
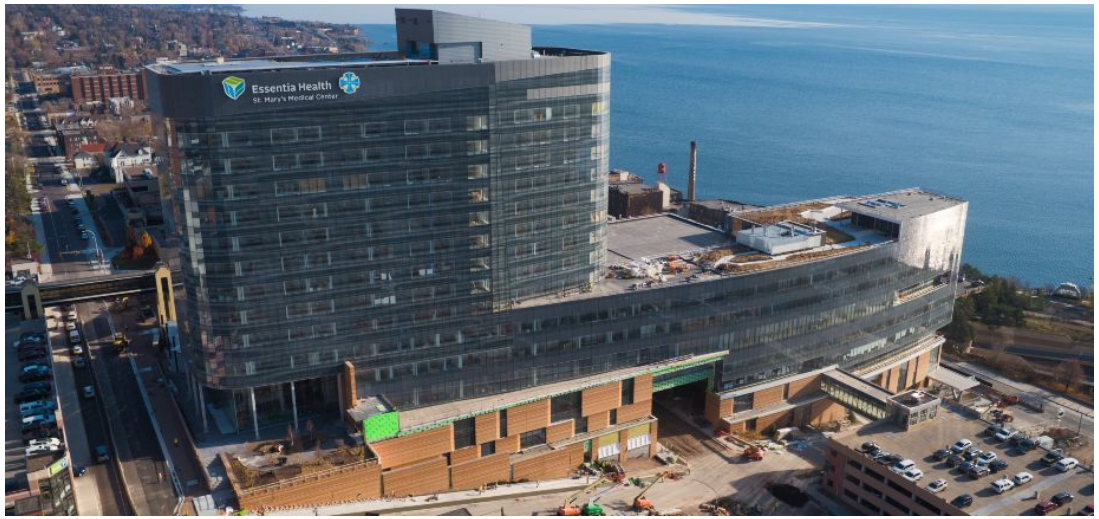


2021 estimated MN population: 5.7 million, with 1.25 million living in rural MN

Essentia Health – Saint Mary's Medical Center

- Duluth, MN
- Level 1 Adult Trauma Center, Level 2 Pediatric





Translational Center for Resuscitative Trauma Care

UNIVERSITY OF MINNESOTA

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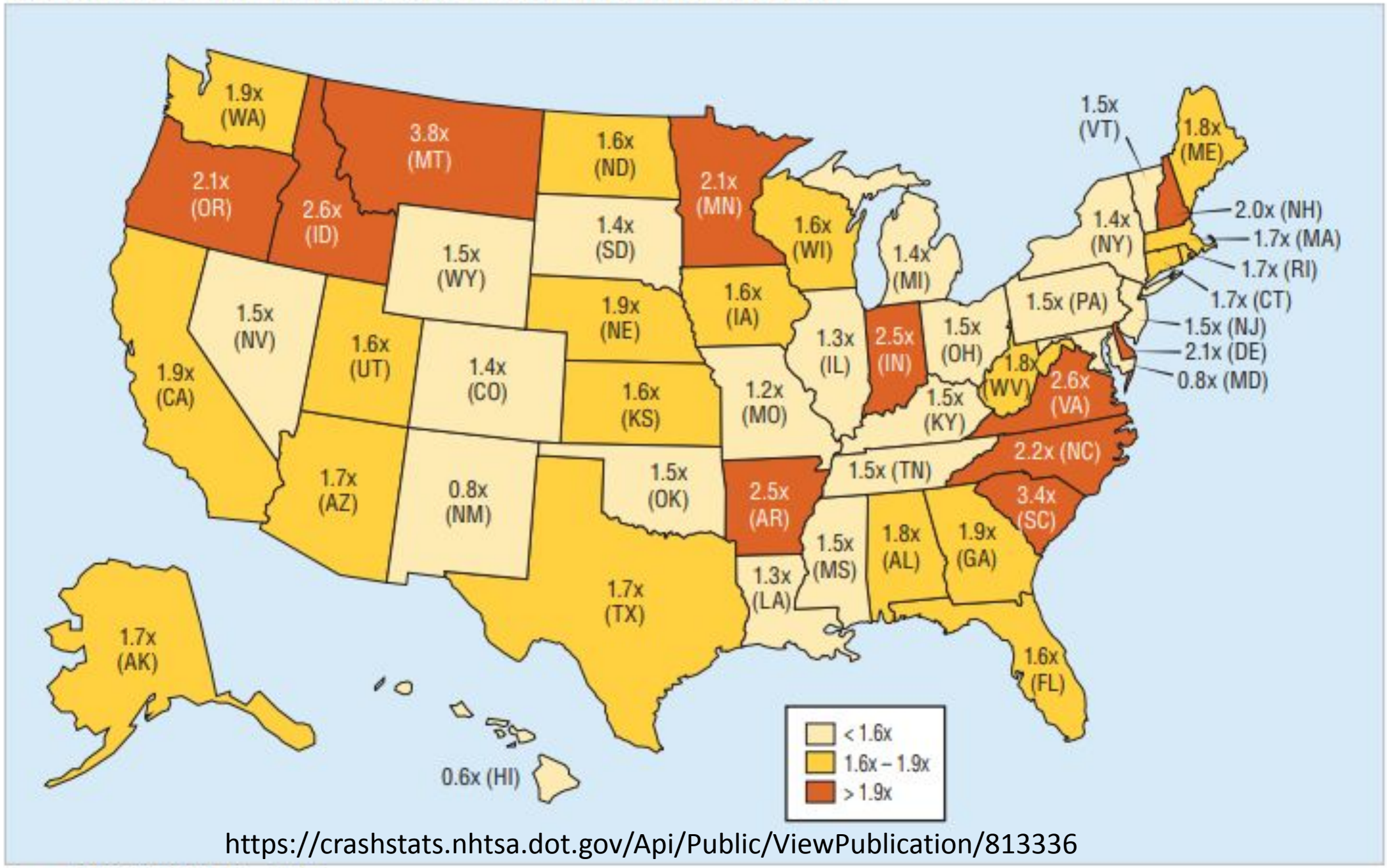
Ratio of Rural to Urban Fatality Rate per 100 Million VMT, by State, 2020



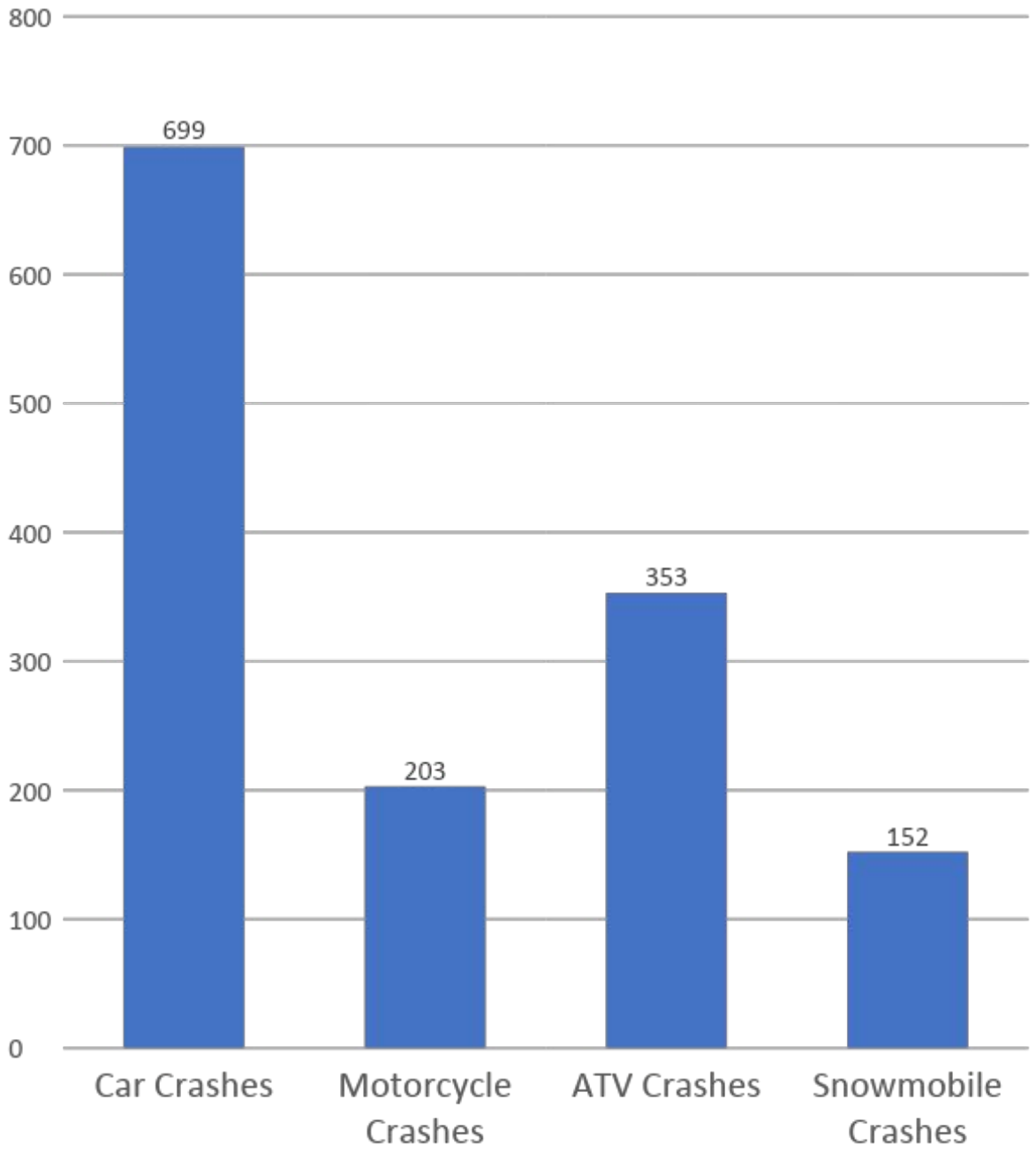
https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813336

Today I will present a retrospective review of all trauma admissions to our Level 1 Trauma Center between January 2016 to December 2020 at Essentia Health – St. Mary's Medical Center due to

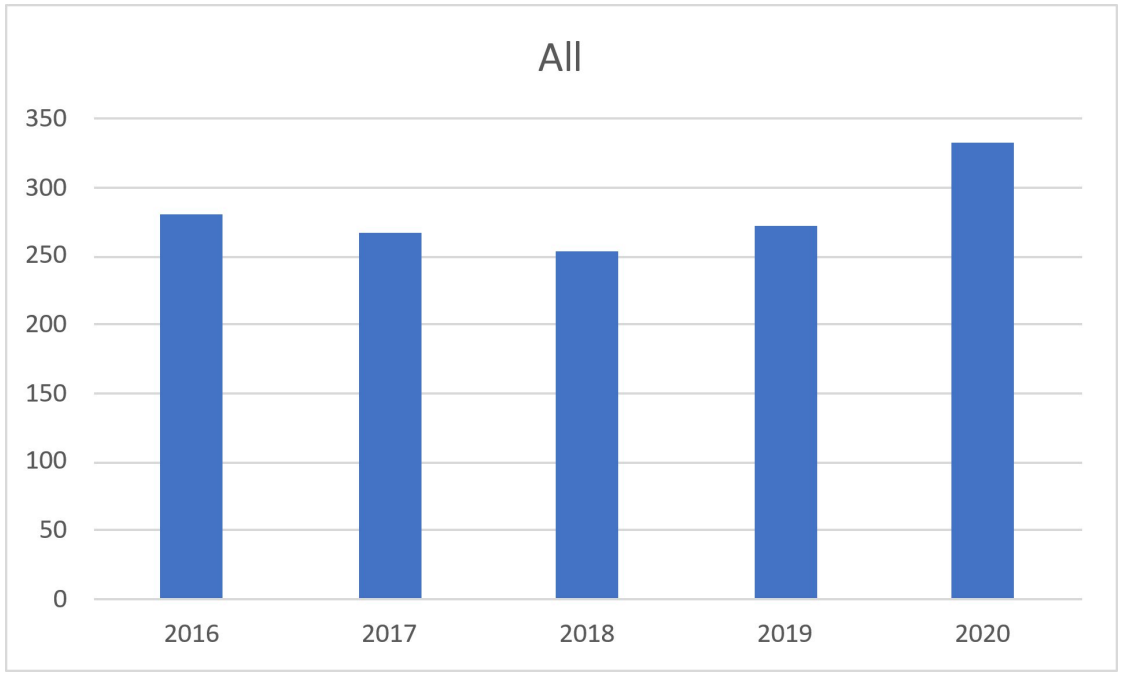
1) Motor vehicle crashes or "car crashes"
2) Motorcycle Crashes
3) ATV Crashes
4) Snowmobile Crashes

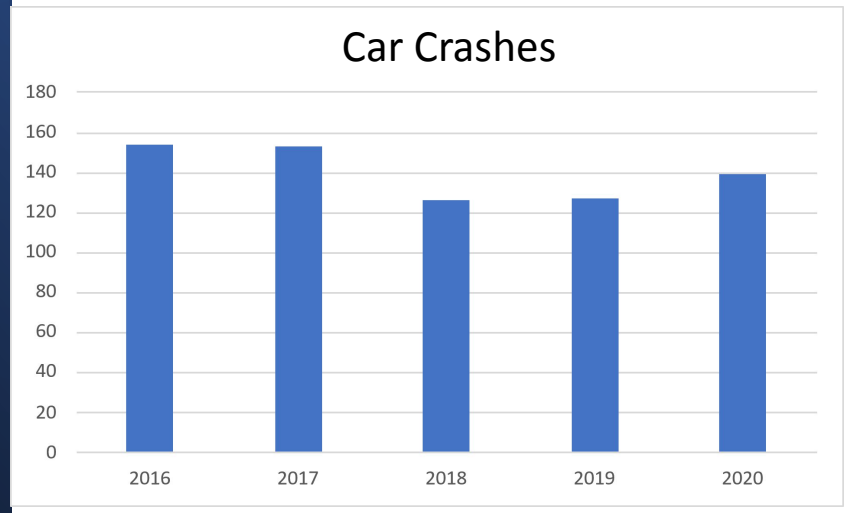
Overview of the Problem

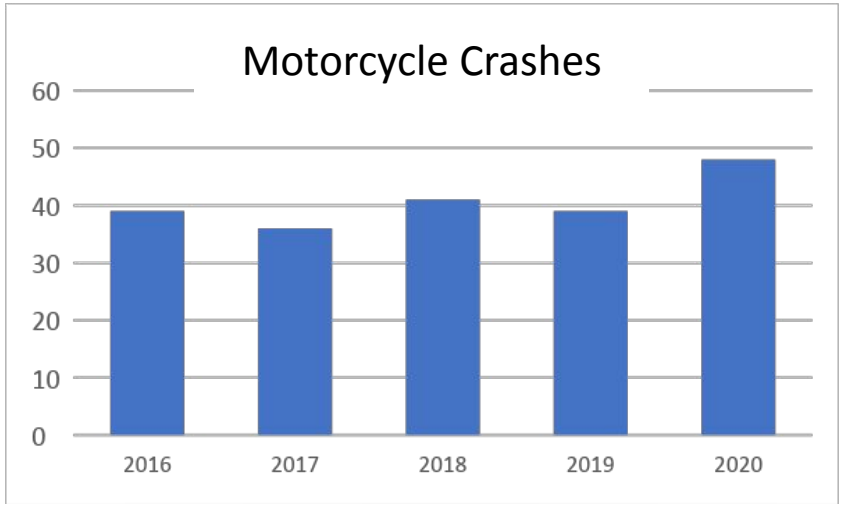
- 1407 crashes
- Motor vehicle crashes were the most common, followed by ATV crashes.



Changes in Crash Related Injury Over the Time Period







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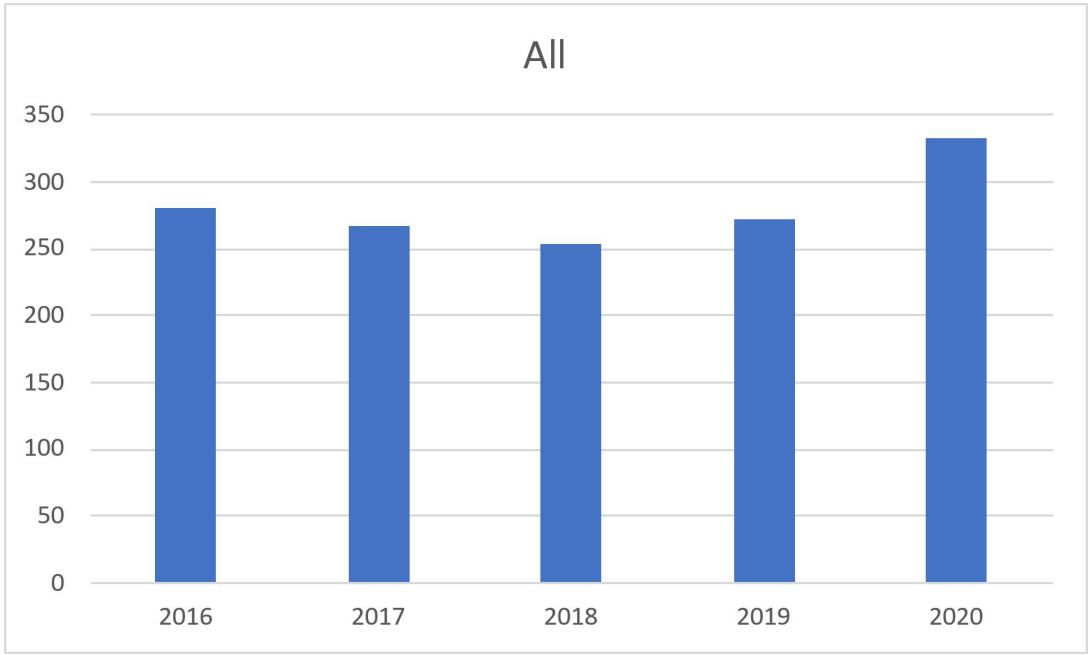
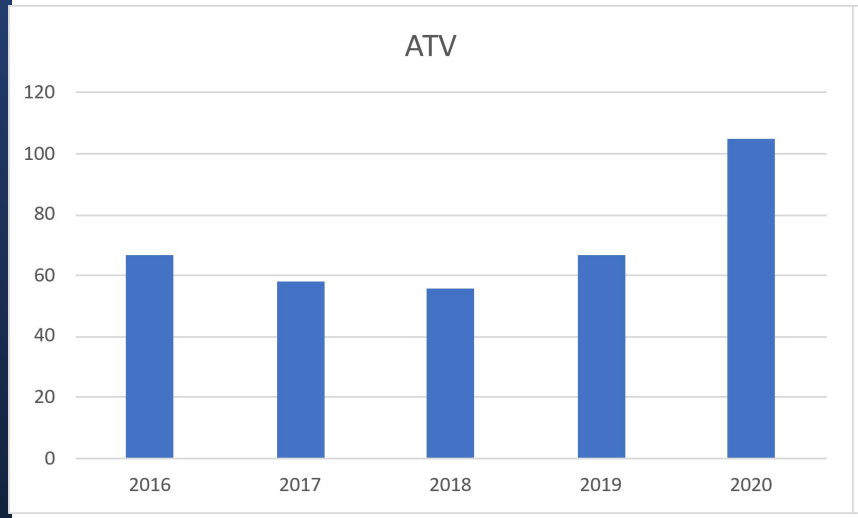
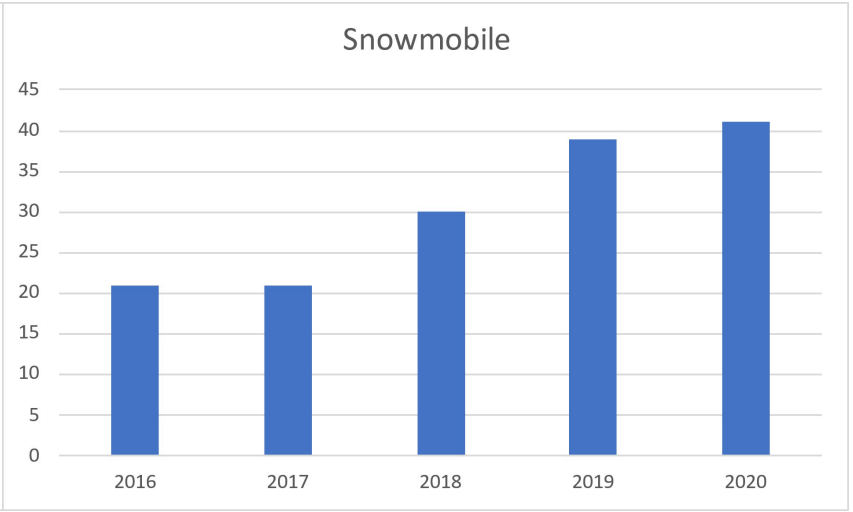
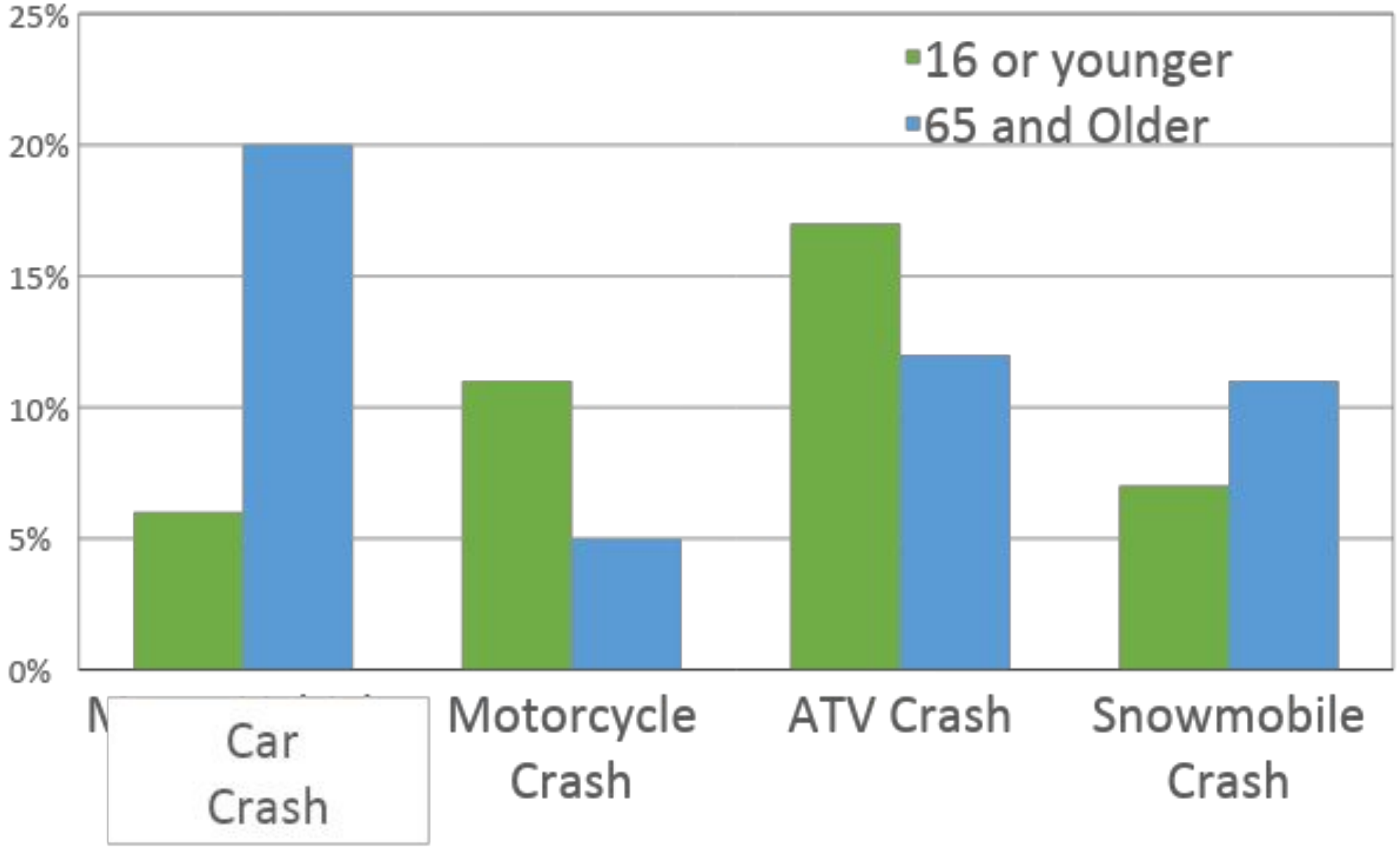








Vehicle Crashes affect all Ages!

Ranged between 1 year old and 92 years old Median age 41 years

Social Factors

	All Vehicle Crashes N = 1407	Motor Vehicle Crash N = 699	Motorcycle Crash N = 203	ATV Crash N = 353	Snowmobile Crash N = 152	P value
Male Sex n (%)	960 (68)	404 (58)	179 (88)	257 (73)	120 (79)	<0.001
Self Reported Race n (%)						< 0.001
Caucasian	1270 (90)	611 (87)	194 (95)	321 (91)	144 (95)	
Black	9 (0.6)	7 (1)	1 (0.5)	0 (0)	1 (1)	
Asian/Native Hawaii/PI	15 (1)	10 (1)	1 (0.5)	3 (1)	1 (1)	
Native American/AI	76 (5)	59 (8)	3 (2)	12 (3)	2 (1)	
Other	1 (0.1)	1 (0.1)	0 (0)	0 (0)	0 (0)	
Not Given	36 (3)	11 (2)	4 (2)	17 (5)	4 (2)	
Rural n (%)	529 (45)	264 (47)	69 (40)	131 (46)	65 (44)	0.47

Mortality rates were not different based on crash type ($p = 0.95$)

3.4%

3.0%

3.4%

2.6%

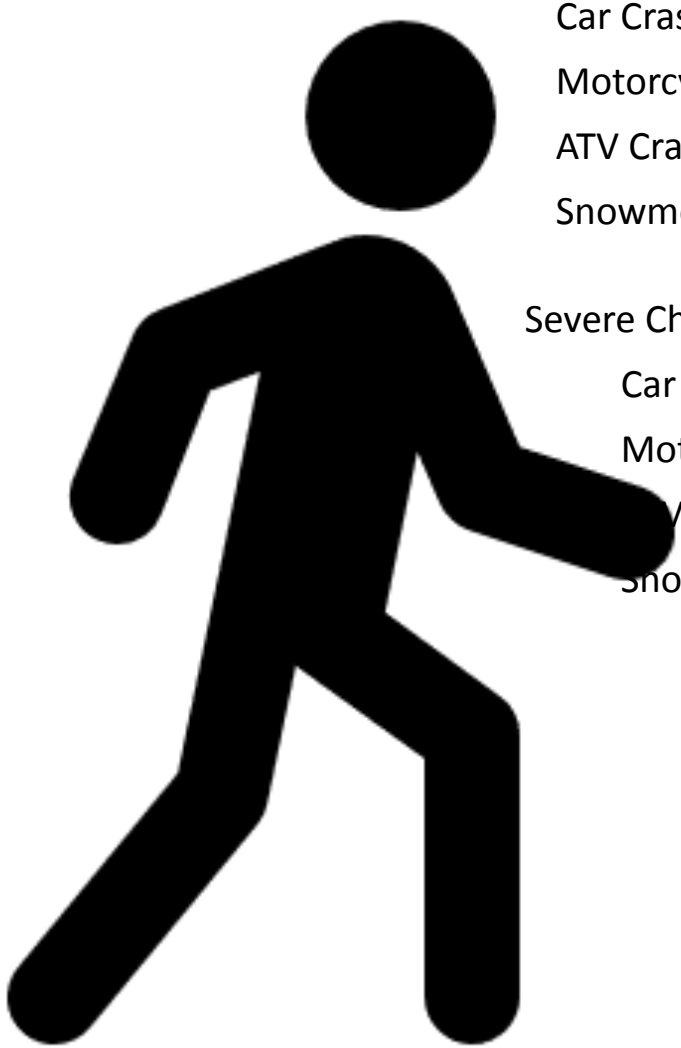
However, injury patterns were different

Severe Spine Injury

- Car Crash 7%
- Motorcycle Crash 4%
- ATV Crash 4%
- Snowmobile Crash 7%

Severe Extremity Injury

- Car Crash 13%
- Motorcycle Crash 12%
- ATV Crash 18%
- Snowmobile Crash 18%



Severe Head Injury*

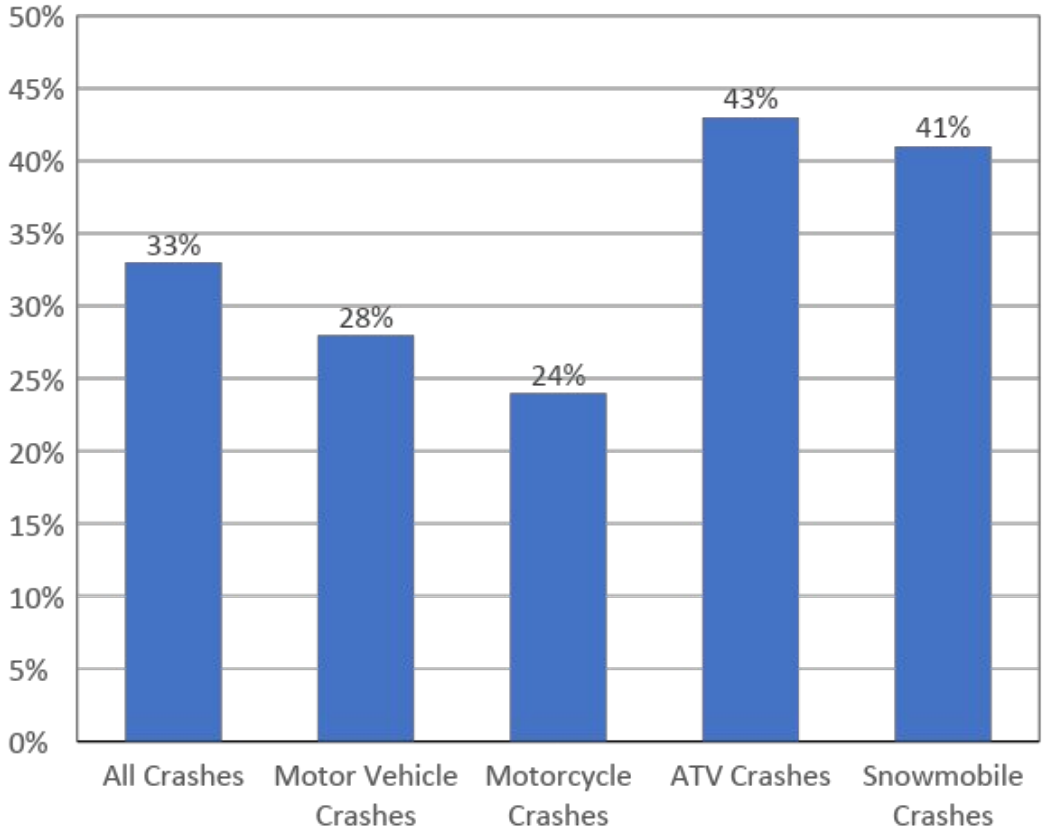
- Car Crash 13%
- Motorcycle Crash 22%
- ATV Crash 23%
- Snowmobile Crash 16%

Severe Chest Wall Injury

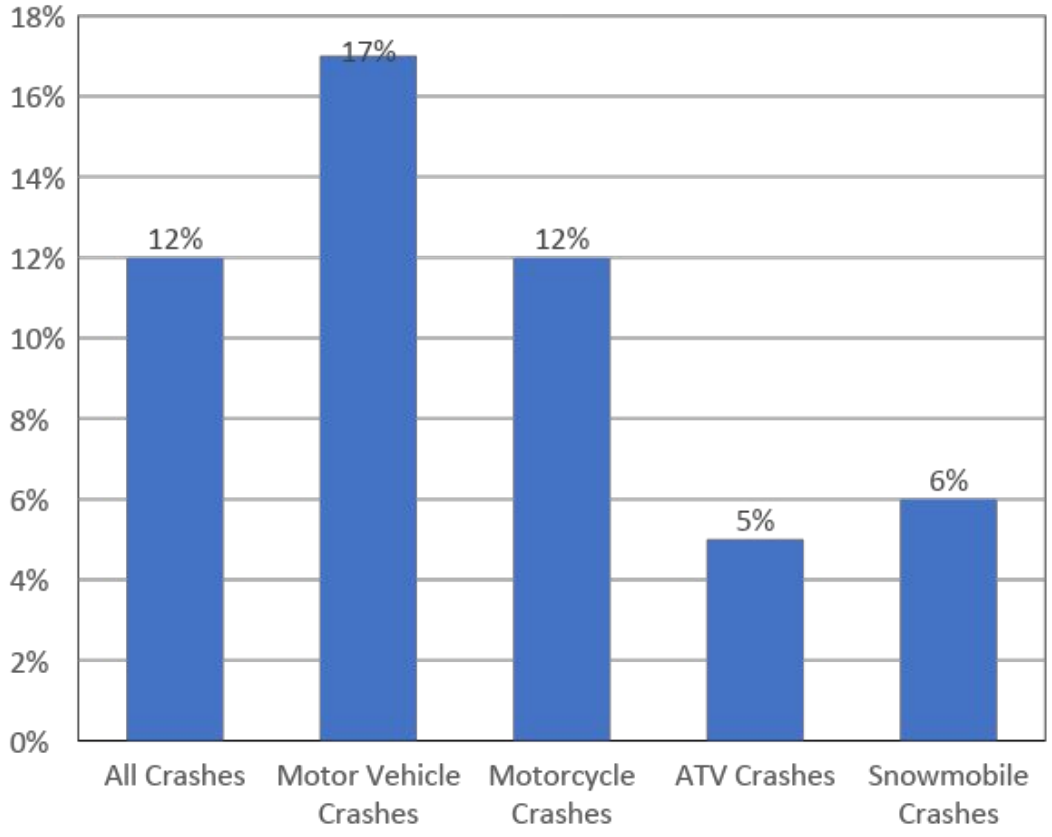
- Car Crash 24%
- Motorcycle Crash 25%
- V Crash 26%
- Snowmobile Crash 32%

Substance Use Associated with Crashes

Alcohol Use Associated with Crash



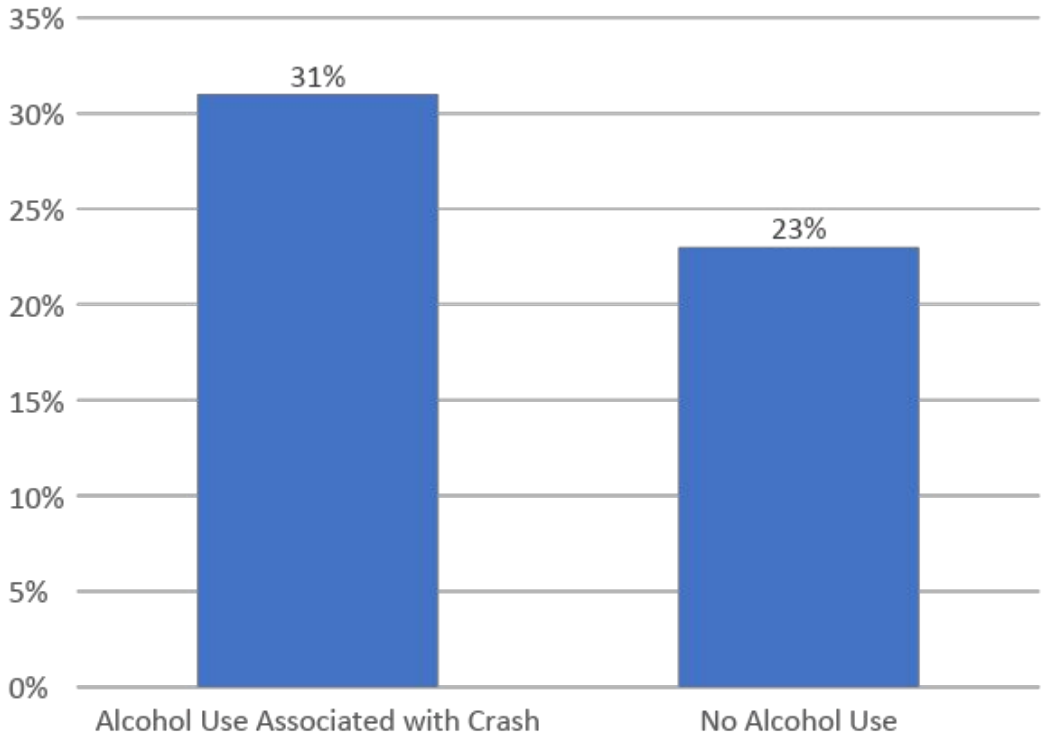
Drug Screen Positive



Substance Abuse and Life-threatening Injury

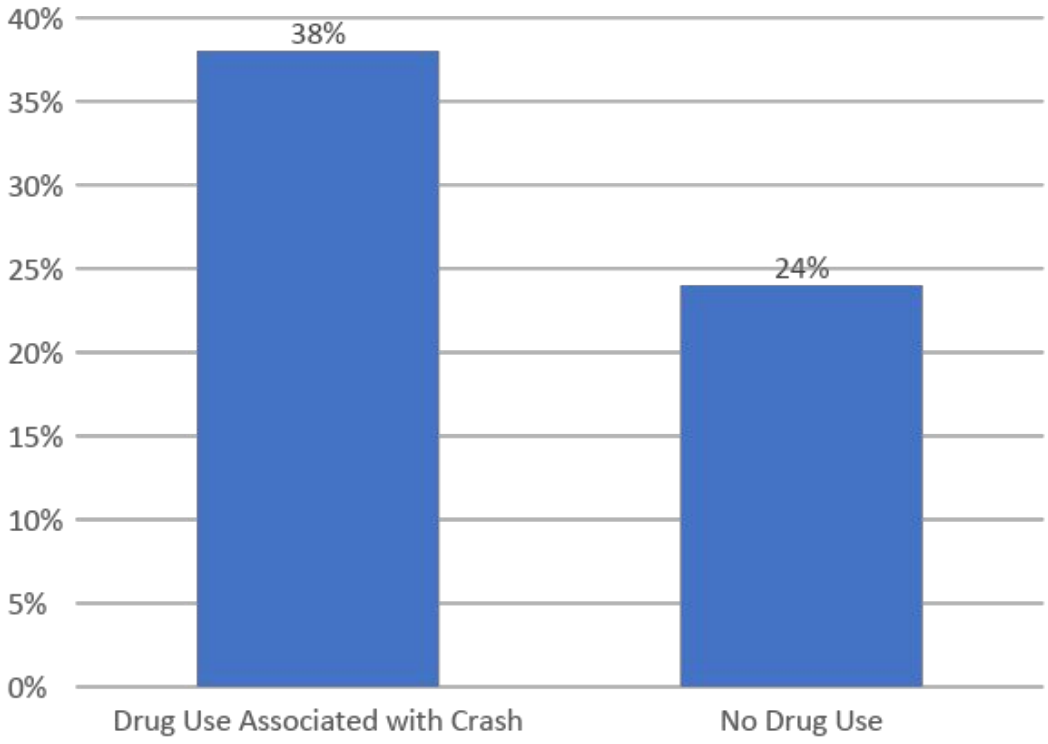
Alcohol Use and Life-threatening Injury (ISS > 15)

Odds Ratio: 1.53, (95% Confidence interval: 1.2-2.0)



Drug Abuse and Life-threatening Injury (ISS> 15)

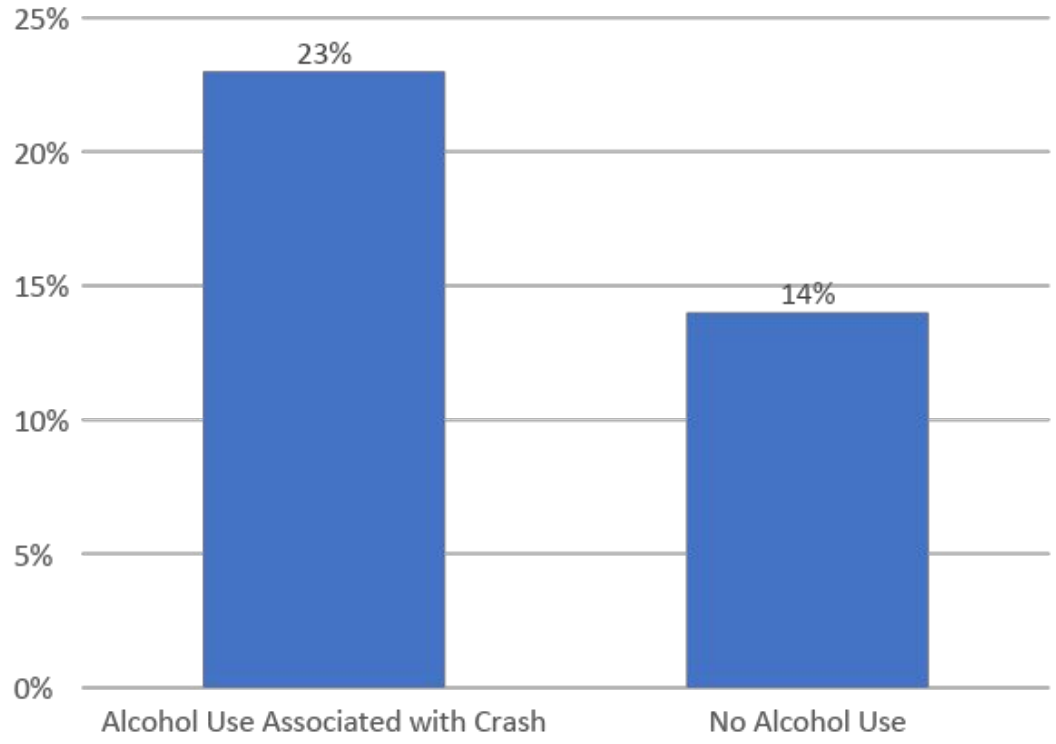
Odd Ratio: 2.01 (95% Confidence interval: 1.4-3.0)



Substance Use and Risk of Severe Head Injury

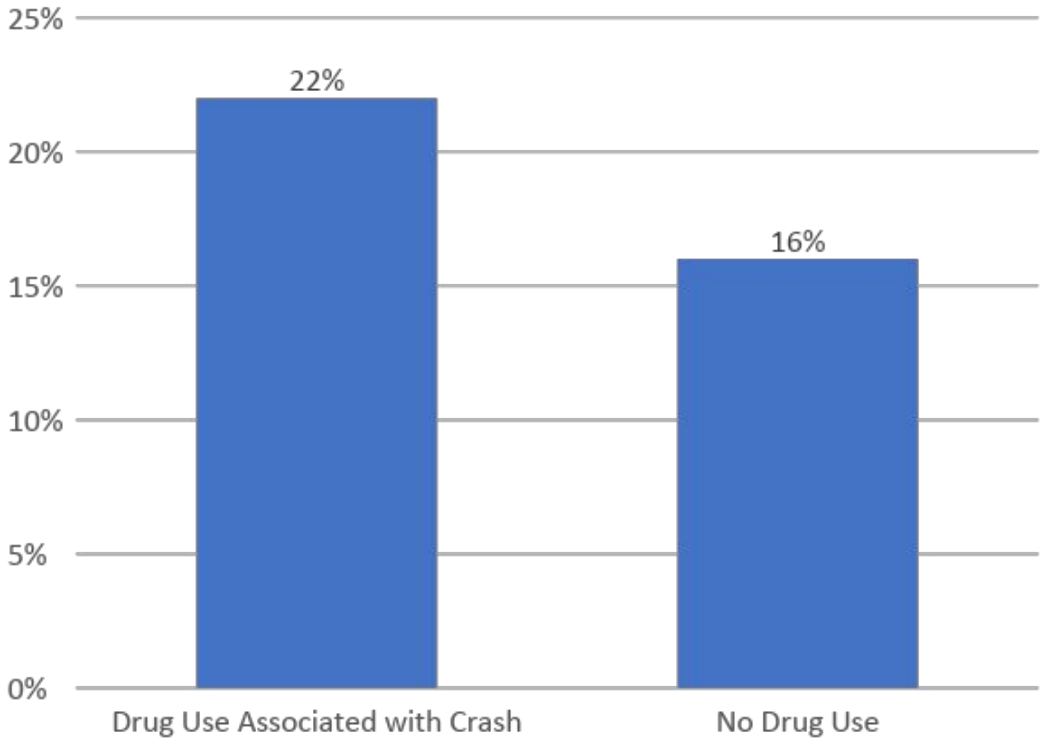
Alcohol Use and Severe Head Injury (AIS > 2)

Odd Ratio: 1.75 (95% Confidence interval: 1.3-2.3)

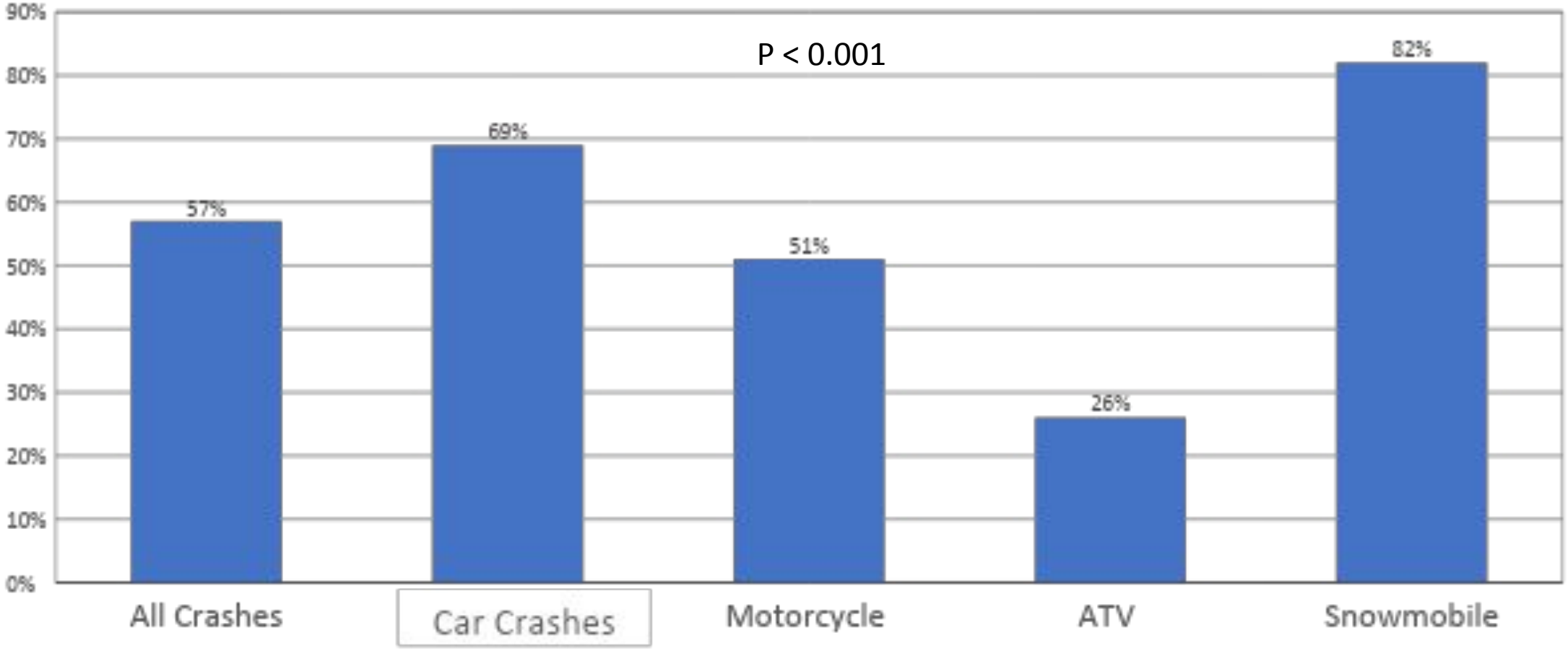


Drug Abuse and Severe Head Injury (AIS > 2)

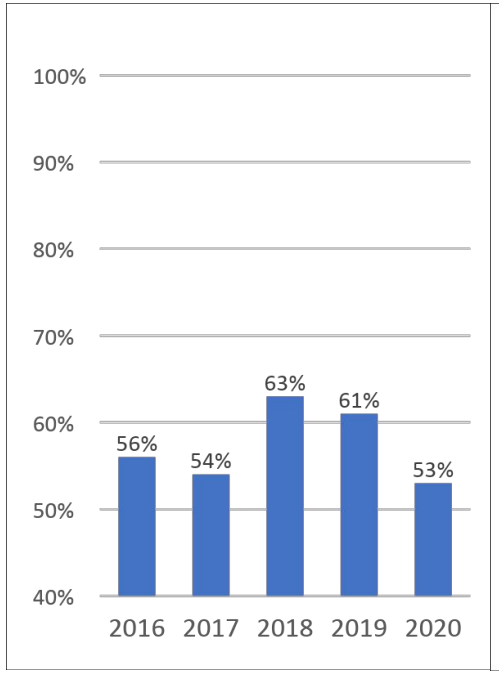
Did not reach significance



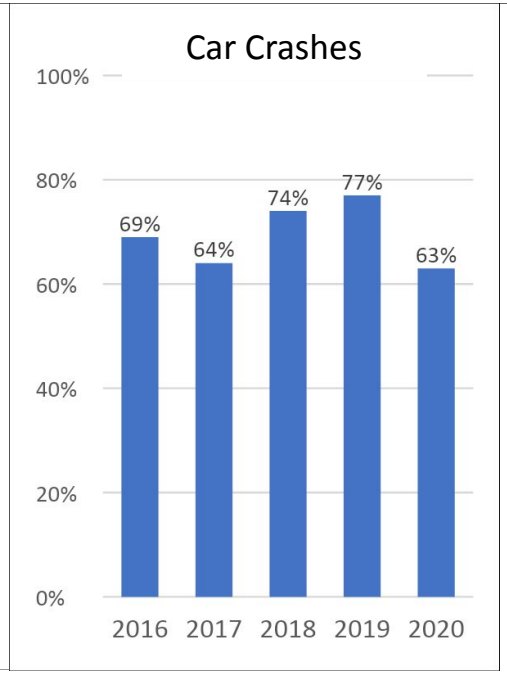
Safety Equipment Use… lots of room for improvement



Safety Equipment Use Over Time… Not making great strides



P = 0.051



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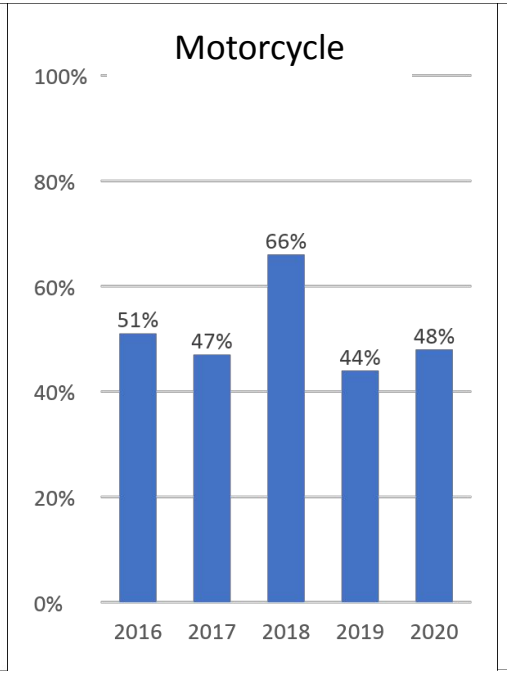
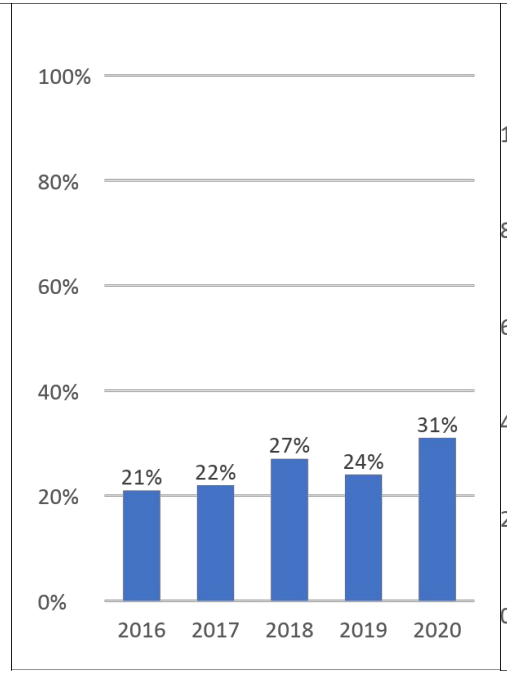
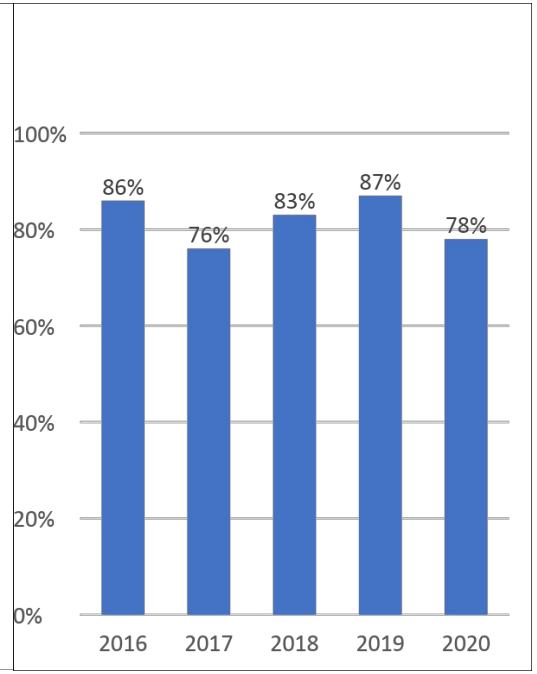


P = 0.30



P = 0.54

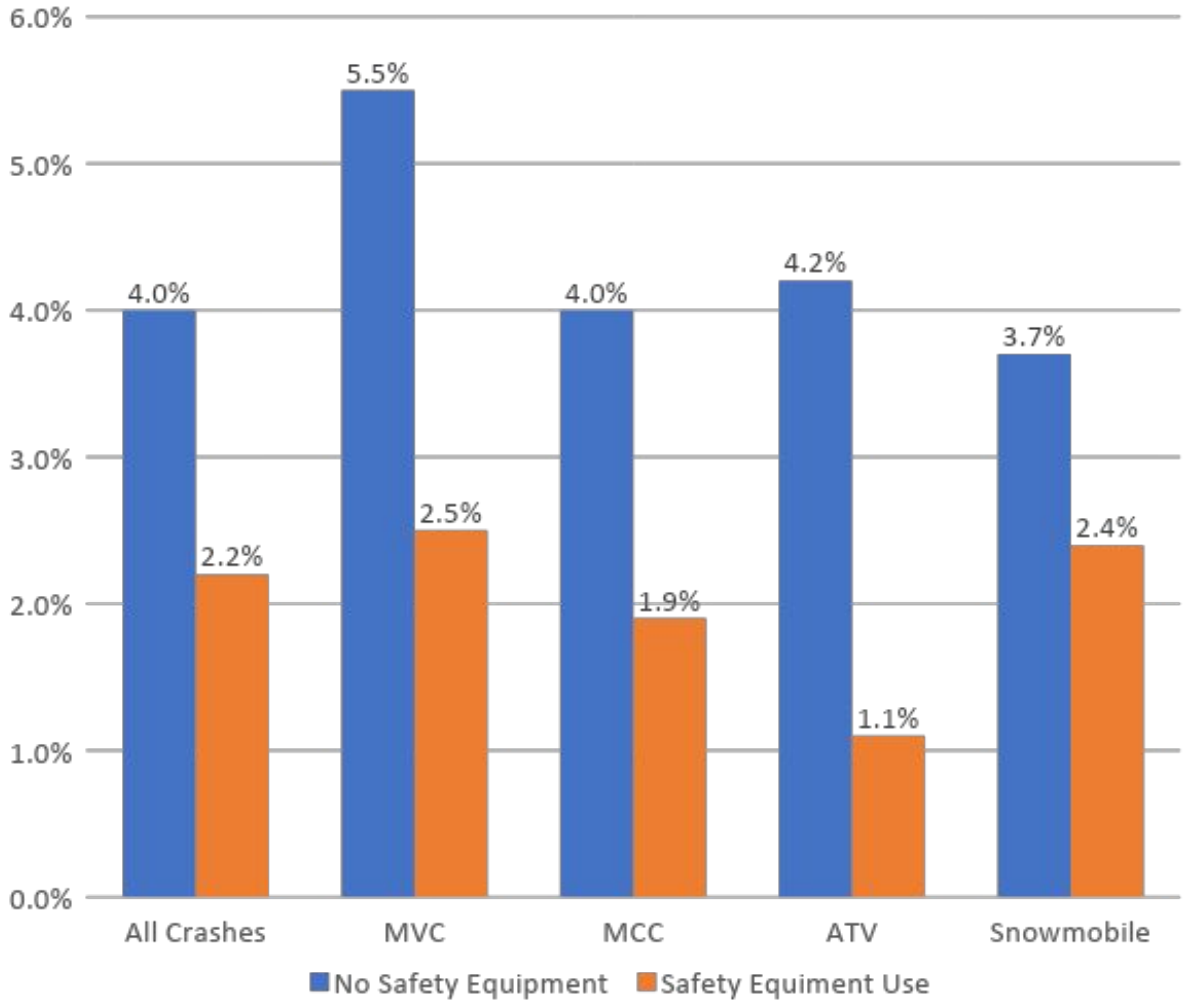


P = 0.76

Seatbelts and Helmets Save Lives

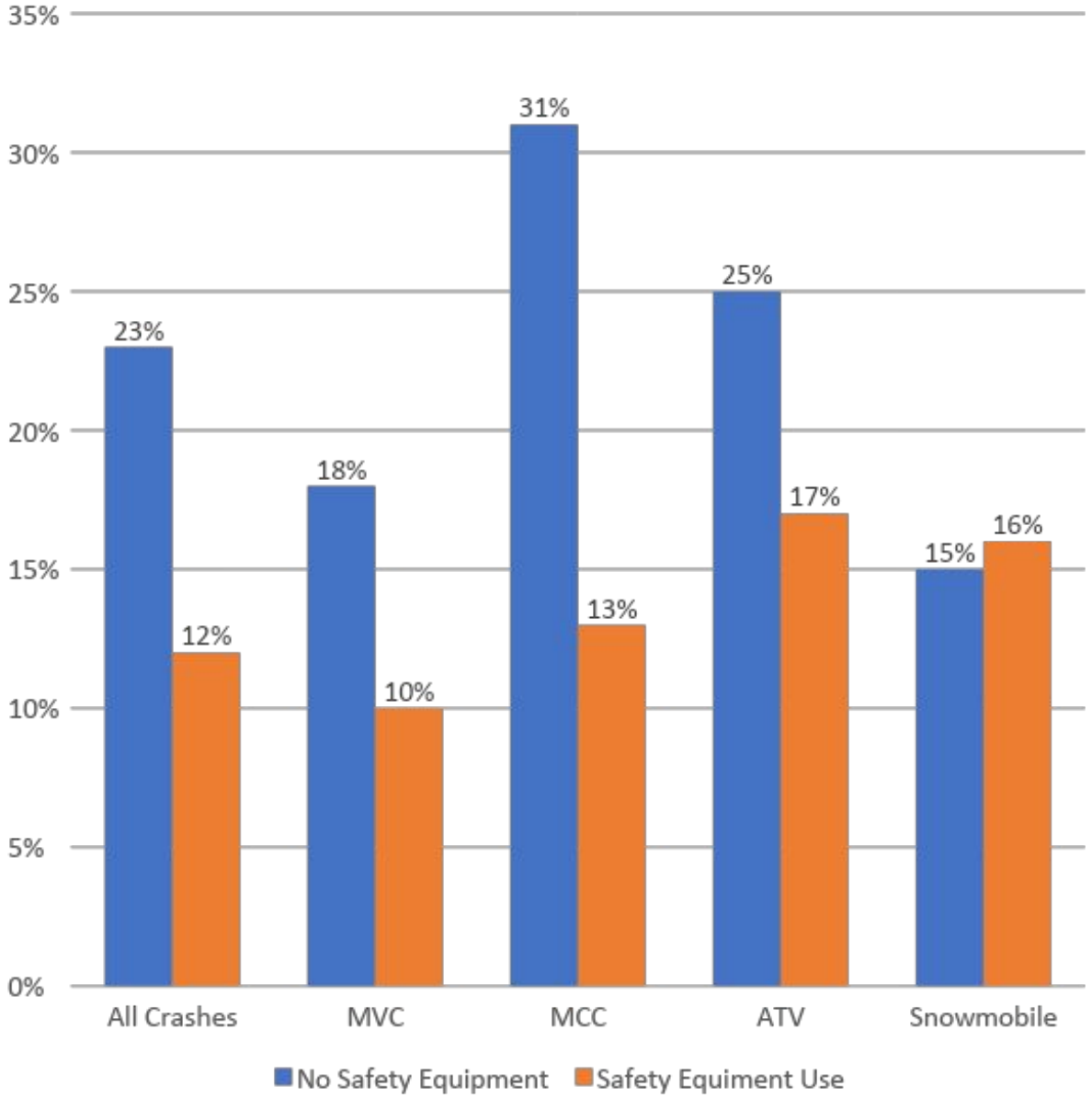
Use of Safety Equipment Decreased Mortality

OR 0.47 (95% CI 0.26-0.87)



Seatbelts and Helmets Decrease Severe Head Injury too!

Odds Ratio 0.45 (95% CI 0.34-0.60)



Safety Equipment use was more common in:

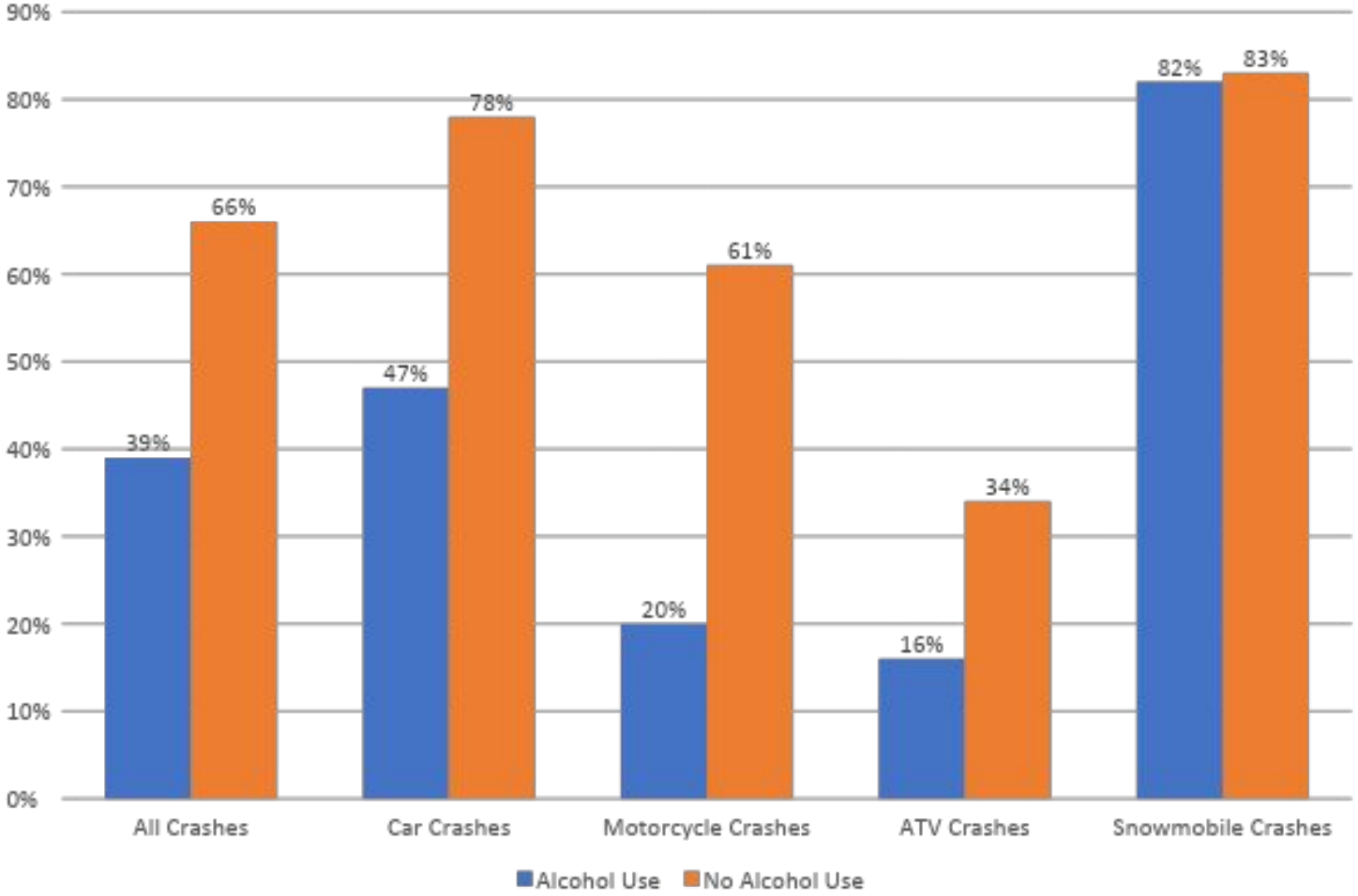
- Women (65% compared to 53% Men)

- Age > 65 (69% compared to 55% younger) $p < 0.001$

- When Alcohol was not involved (38% used compared to 66% without alcohol involved $p < 0.001$)

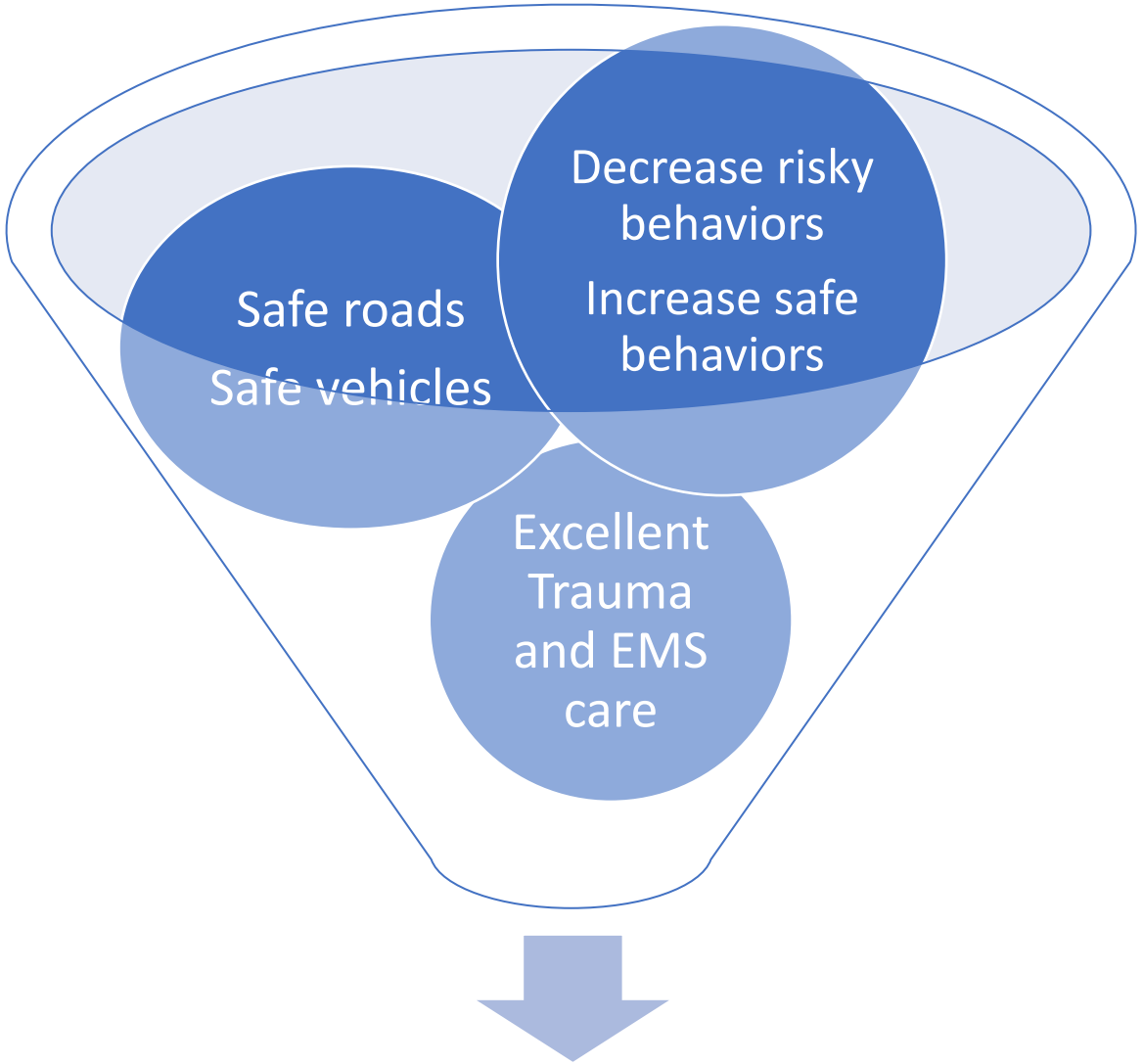
- Urban Patients were more likely to use Safety Equipment (60% vs 54% Rural $p = 0.03$)

Alcohol Use and Safety Equipment Use



Rurality's Effects

- 647 crashes occurred in rural areas (46%)
- More likely to be transferred by helicopter
  - 34% compared to 24%; $p < 0.001$
- More likely to be evaluated at a local hospital first
  - 64% vs 35%; $p < 0.001$
- Less likely to use safety equipment
  - 54% vs 60% $p = 0.03$)
- More likely to have life-threatening injuries
  - 30% vs 20%; $p < 0.001$
- More likely to have severe head injury
  - 20% vs 14%; $p = 0.01$
- In-hospital Mortality not different
  - 3.1% vs 3.4%; $p = 0.72$



Interventions to decrease injuries and improve outcomes following crashes

Conclusions

- Crashes in the Northland are common causes of injury that lead to trauma center admission
- Difference in patient demographics between vehicle injury types, especially age, race and rurality
- Risk of mortality after all vehicle crash types was similar once they made it to the hospital
- Crashes were often associated with risky behavior (alcohol, drugs, no safety equipment use) and these were often co-existing
- Education and risk reduction can SAVE LIVES