

Intracranial Injuries and Concussions – Emergency Department visits, Niagara Region, 2008-2012

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Emergency Department Visits for Intracranial Injuries (ICD10-CA code S06)

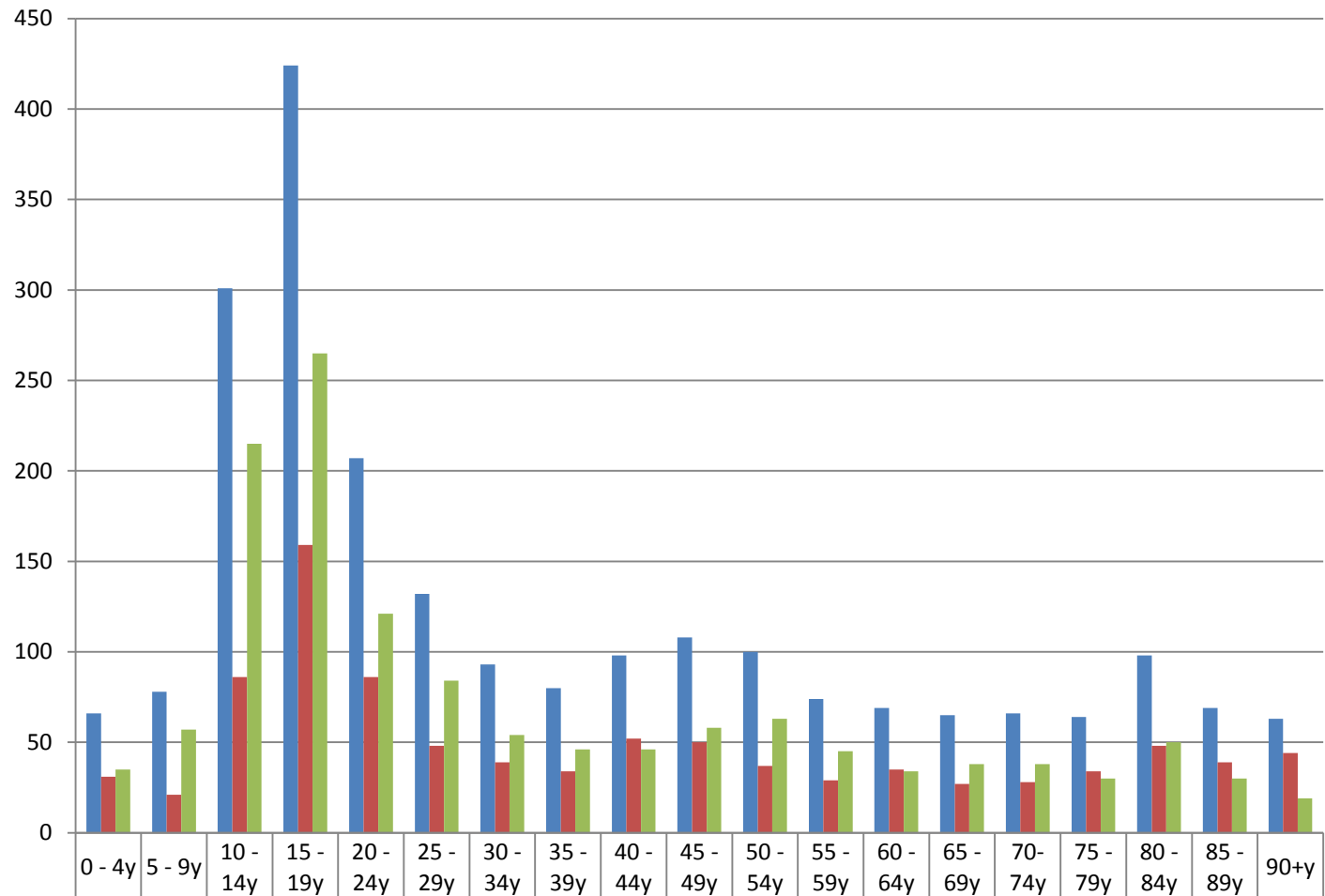
Niagara

Percentage of Intracranial Injuries* that are Concussions, Niagara Region 2008-2012

	2008	2009	2010	2011	2012	Total
Concussions	414	508	474	533	602	2531
ICI	571	676	633	795	827	3502
%	75%	75%	75%	67%	73%	72%

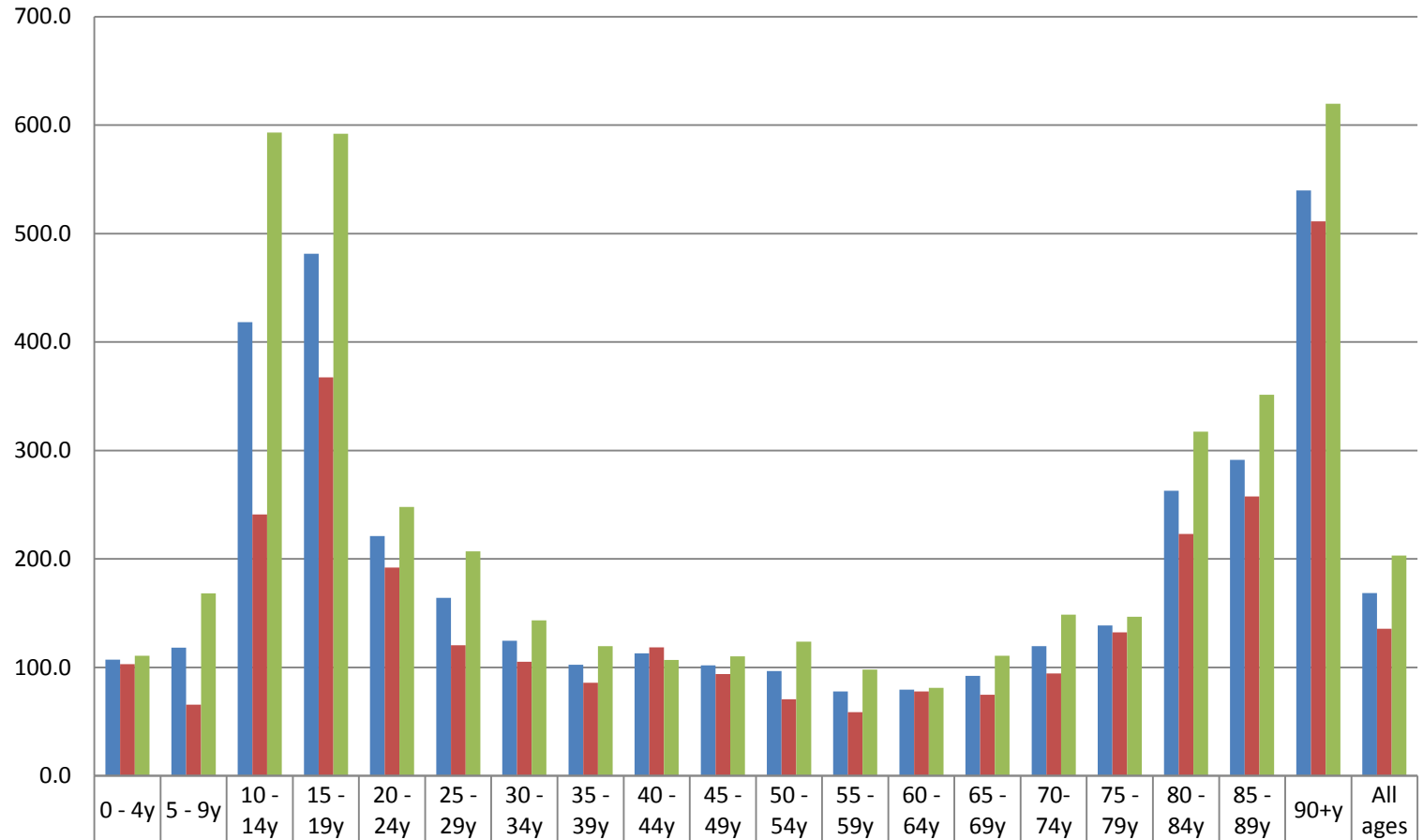
*Emergency visits for intracranial injuries are defined by an ICD-10 code of S06 which includes the ICD-10 codes for concussions (S06.0)

Number of ED visits for Intracranial injury in the Niagara region in 2010 - 2012

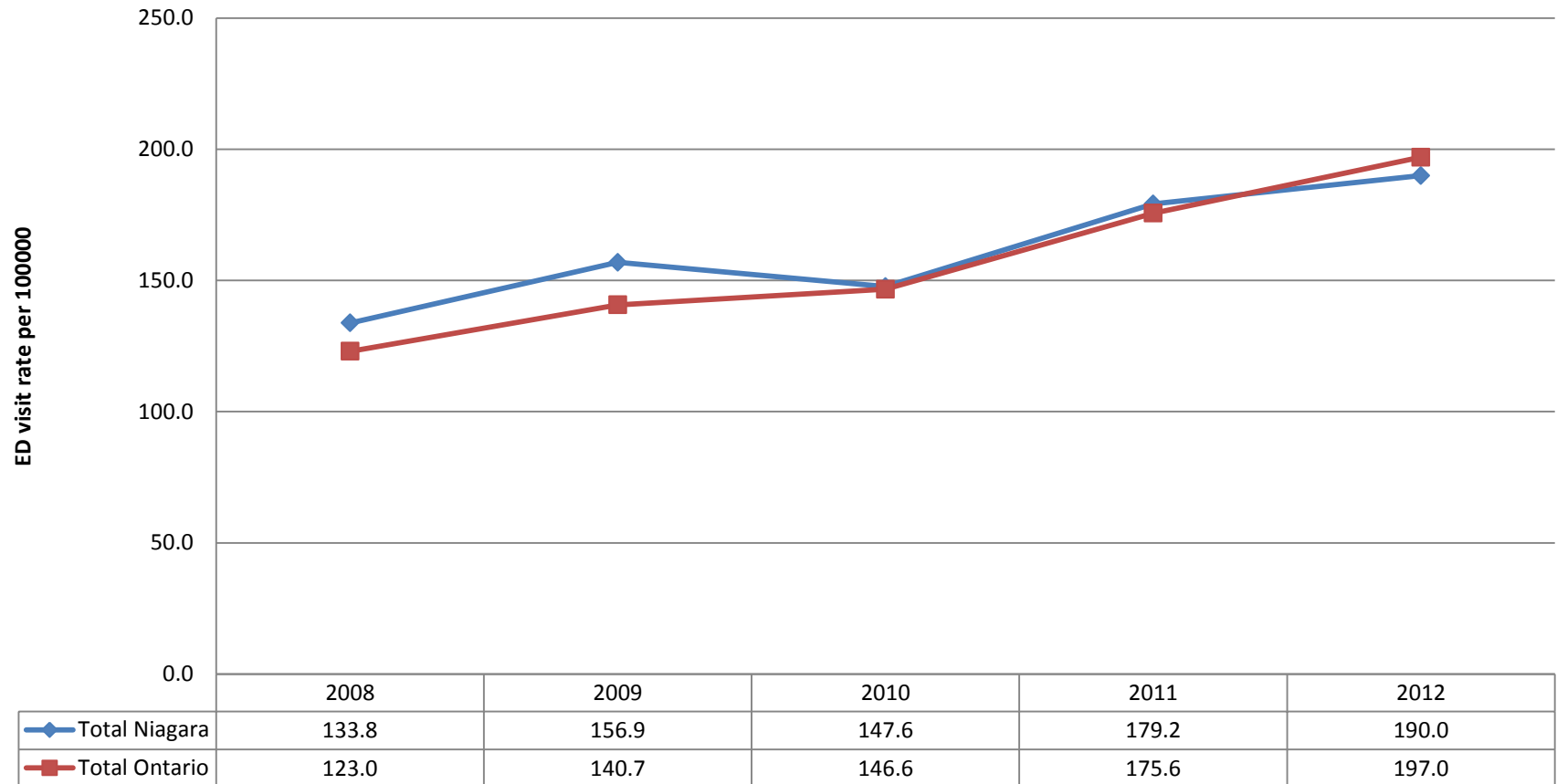


■ Total Intracranial 2010/11/12	66	78	301	424	207	132	93	80	98	108	100	74	69	65	66	64	98	69	63
■ Intracranial Female	31	21	86	159	86	48	39	34	52	50	37	29	35	27	28	34	48	39	44
■ Intracranial Male	35	57	215	265	121	84	54	46	46	58	63	45	34	38	38	30	50	30	19

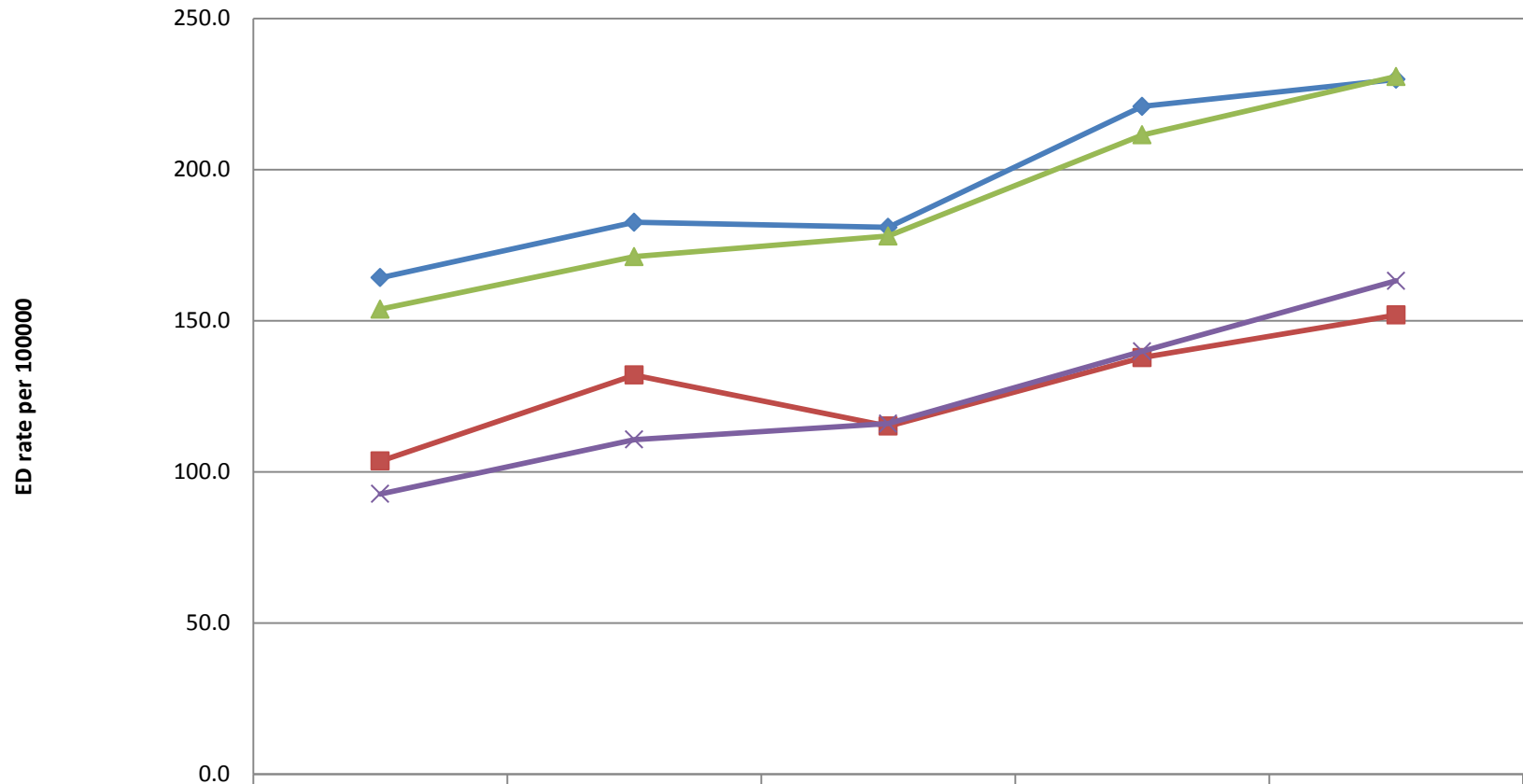
Rate of ED visits for Intracranial injury in the Niagara region in 2010 - 2012



Age-standardized rate of emergency department visits for Intracranial injury, Niagara and Ontario, 2008 - 2012

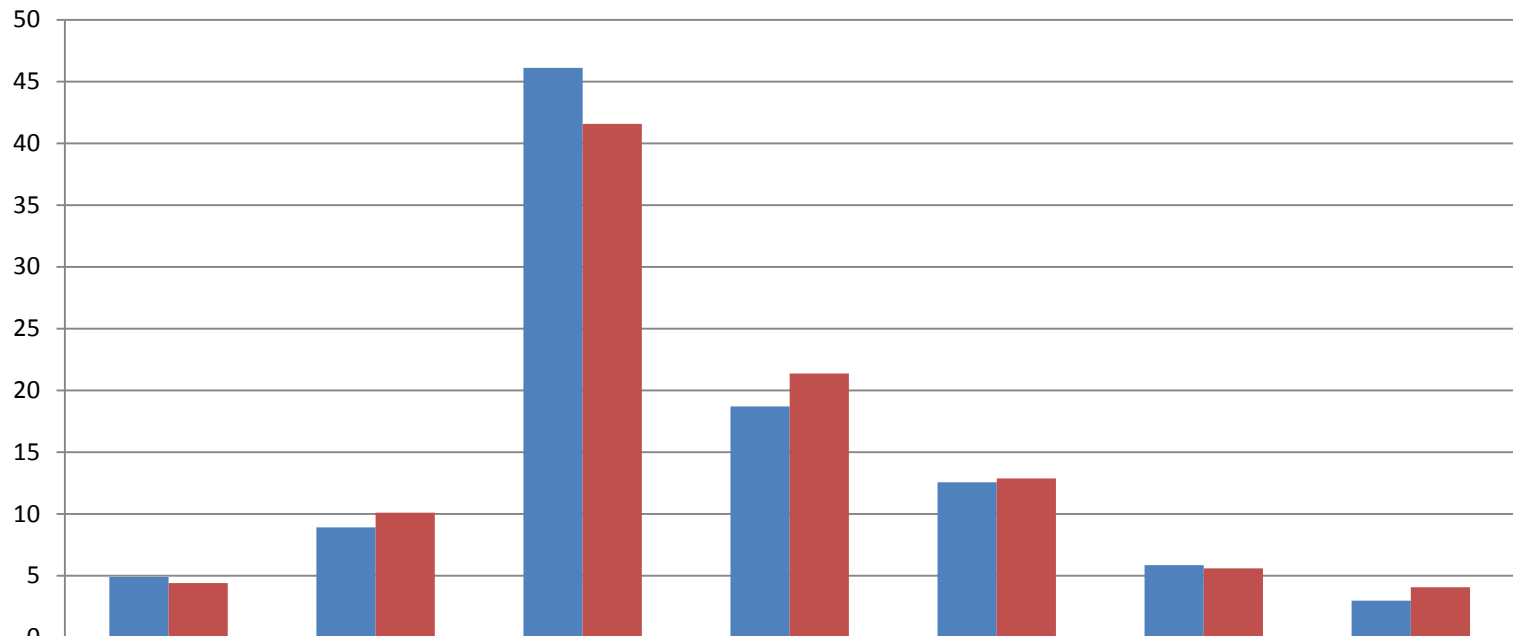


Age standardized rate of ED visits for intracranial injury by sex, Niagara and Ontario, 2008 - 2012



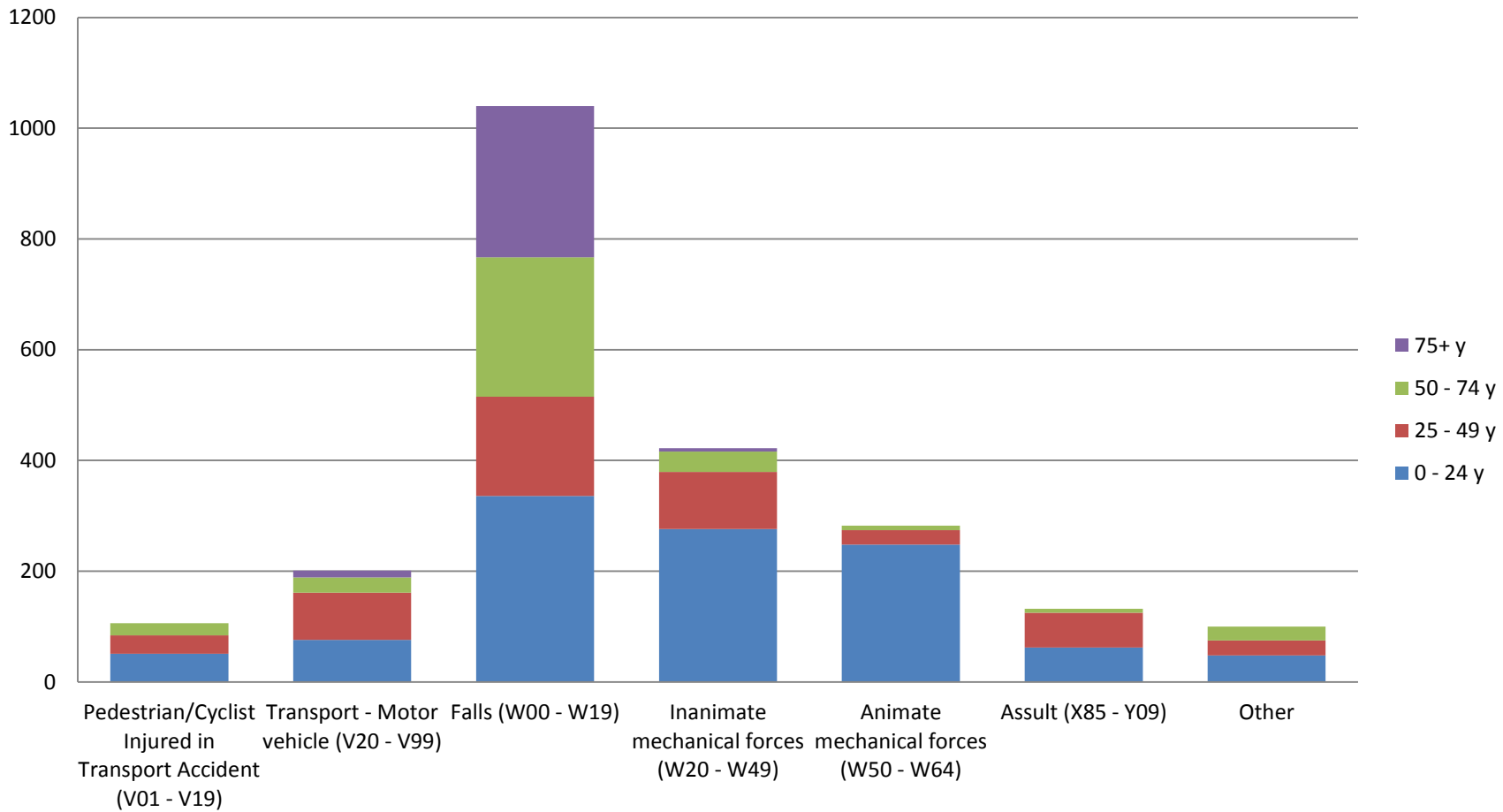
	2008	2009	2010	2011	2012
◆ Males Niagara	164.2	182.6	180.9	220.9	229.9
■ Females Niagara	103.6	132.0	115.1	137.8	151.9
▲ Males Ontario	153.8	171.2	178.0	211.5	230.8
× Females Ontario	92.7	110.7	116.0	139.9	163.2

Reasons for ED intracranial Injury visits in Niagara and Ontario in 2010 - 2012 combined



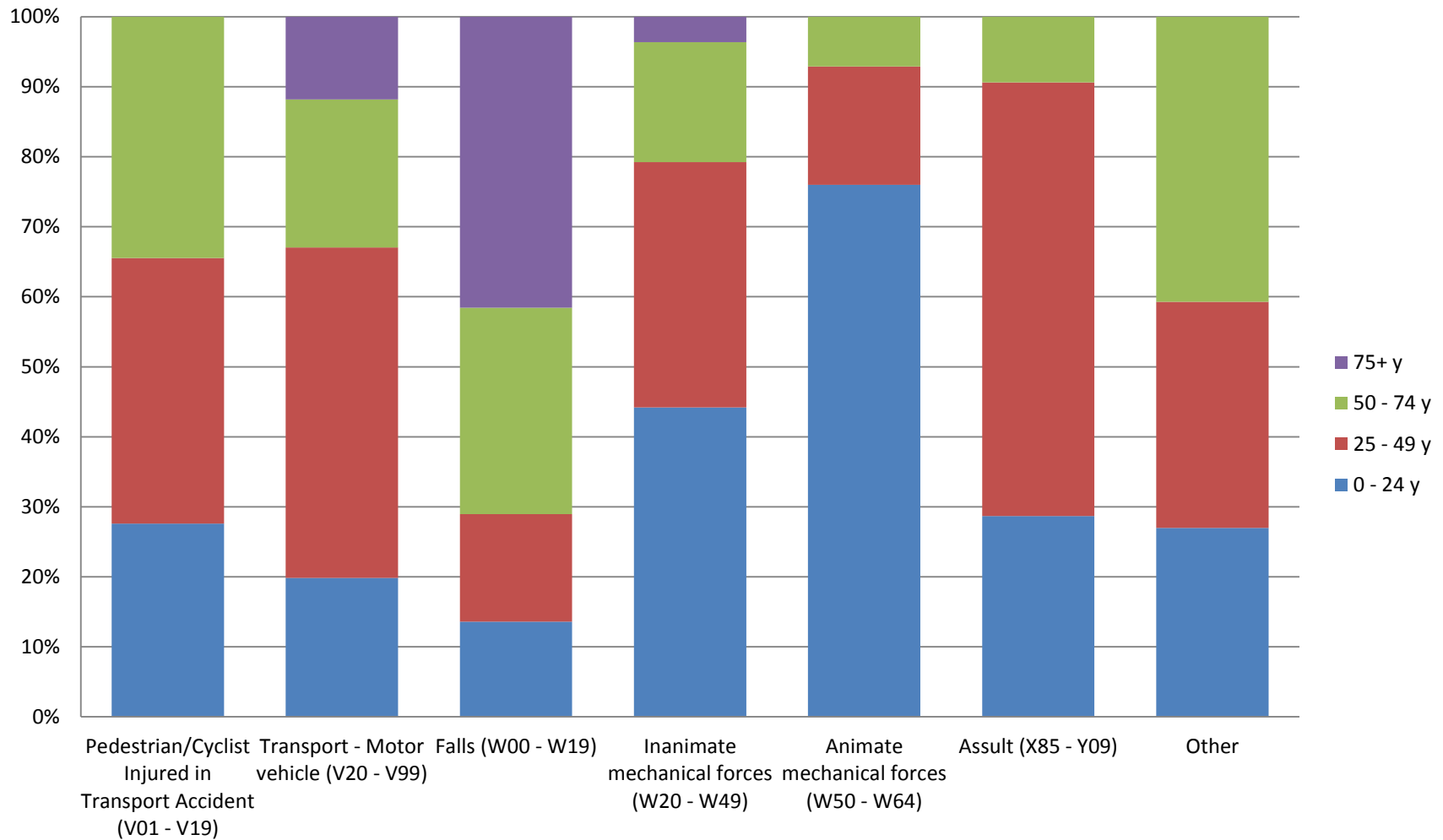
■ Total Niagara	4.88	8.9	46.12	18.71	12.55	5.85	2.97
■ Total Ontario	4.4	10.09	41.57	21.37	12.86	5.6	4.07

Reasons (n) for ED Intracranial Injury visits in Niagara by age ranges from 0 - 24, 25 - 49, 50 - 74 and 75 + years in 2010 - 12

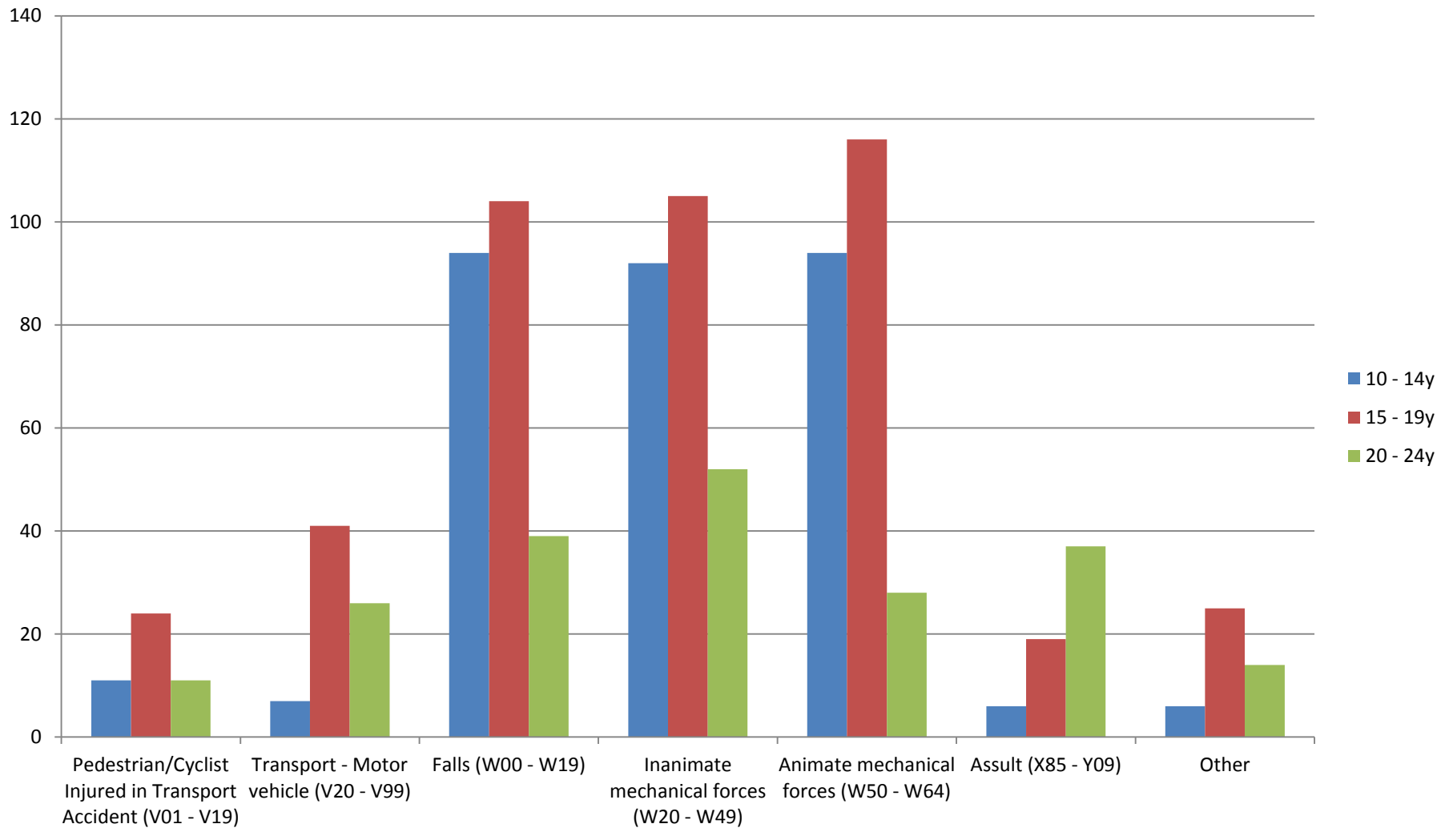


* ED visits for concussion caused by Animate and Inanimate mechanical forces for the 50 – 74y AND ED visits for all categories with the exception of Falls in the 75y+ age group were not reported due to low numbers.

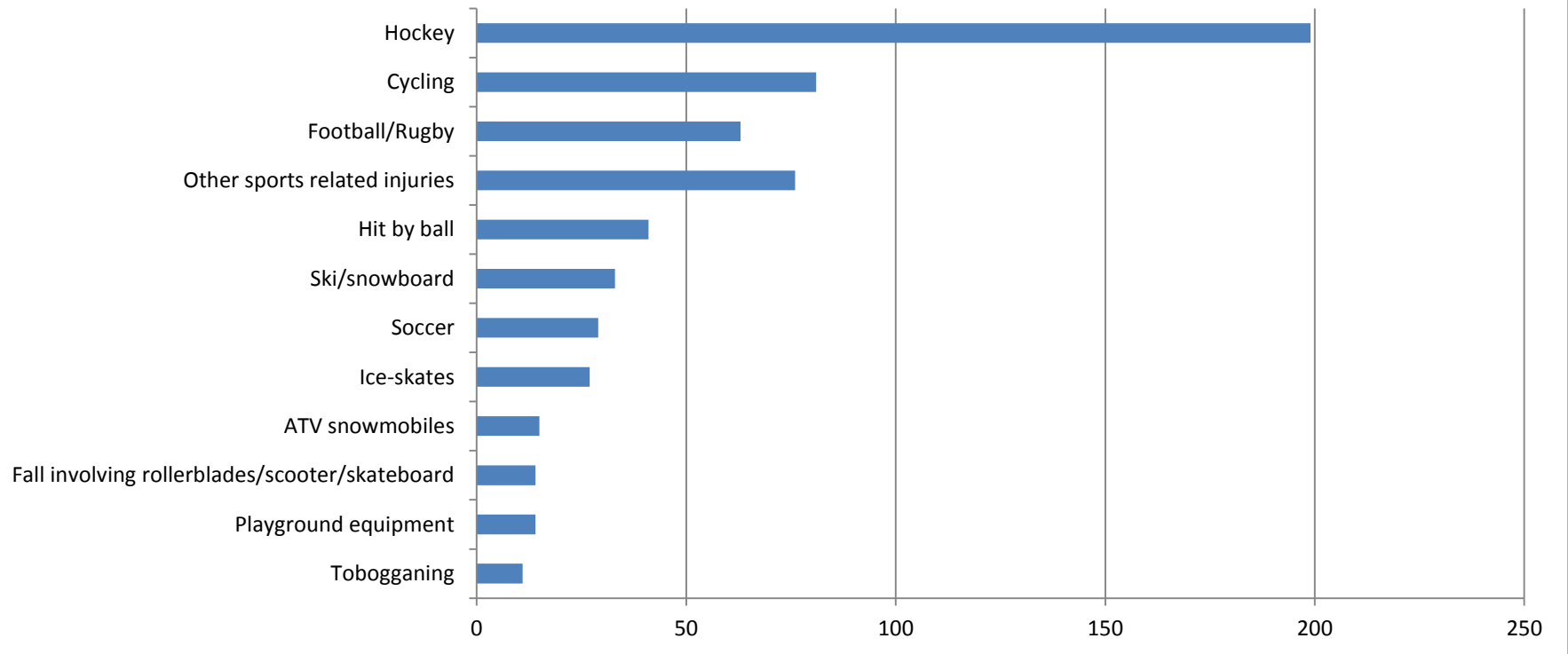
Reasons (%) for ED Intracranial Injury visits in Niagara by ages ranges 0 - 24, 25 - 49, 50 - 74 and 75+ years in 2010 - 2012



Reasons (n) for ED intracranial visits in Niagara by age ranges from 10 - 14, 15 - 19 and 20 - 24 years in 2010 - 12 combined



No. of ED visits for Intracranial Injury by sport/recreation specific external cause (2010,11,12 combined)



In 2010 - 12, there were 603/2255 ED visits for Intracranial injury with an external cause linked to sports/recreation. Hockey was the sport category with the highest number of visits accounting for n = 199 (33%) of all sport/recreation visits followed by cycling (13%) and football (10%).

Number of ED visits for concussions by sport recreation specific external cause (2010 - 2012)		
		%
Tobogganing	11	2
Playground equipment	14	2
Fall involving rollerblades/scooter/skateboard	14	2
ATV snowmobiles	15	2
Ice-skates	27	4
Soccer	29	5
Ski/snowboard	33	5
Hit by ball	41	7
Other sports related injuries (including struck by bat/pool and water/recreational boating/baseball)	61	10
Football/Rugby	63	10
Cycling	81	13
Hockey	199	33
	603	

ED visits for Intracranial Injury linked to falls, inanimate and animate mechanical forces in the Niagara region in 2010/11/12.

- For ED Intracranial Injury visits within the **Falls** category (W00 - W19 n = 1040) in 2010-12, 20% (n = 203) were coded as a 'Fall at the same level from slip, trip or stumble'. 8% (n = 84) of ED intracranial Injury visits within the Falls category were related to sport/activity related incidents. Therefore, the majority of intracranial Injuries categorized as 'Falls' were **not** linked to sport/activity and were mainly from falling on the same level or from steps/ladders/stairs/off furniture (n = 548; 53%).
- For ED intracranial Injury visits within the **Inanimate mechanical forces** category (W20 - W49 n = 1422); 170 (40%) of ED intracranial Injury visits were linked to sport/activity with the majority being linked to Hockey. The majority of ED concussion visits related to this category were coded as exposure to non-specific **non-sports** objects (60%).
- 283 ED intracranial Injury visits were as a result of exposure to **animate mechanical forces (W50 – W64)**. 80% (n = 227) were as a result of playing a sport/activity and the majority of these (39%) were related to playing hockey, while 20% were related to playing football/rugby.

Emergency Department visits for Intracranial Injury in Niagara: Place of occurrence (2010 - 2012)

59% of all visits in 2010 - 2012 did not have a place of occurrence specified making it difficult to draw strong interpretations from the data. Sports/athletics and the home were the most common places of occurrence.

Place of occurrence description (ICD10-CA Code)	Count	% of Total
NOT ASSIGNED	362	16
OTHER SPECIFIED PLACE OF OCCURRENCE	75	3
PLACE OF OCCURRENCE, FARM	*	*
PLACE OF OCCURRENCE, HOME	309	14
PLACE OF OCCURRENCE, INDUSTRIAL AND CONSTRUCTION AREA	24	1
PLACE OF OCCURRENCE, RESIDENTIAL INSTITUTION	68	3
PLACE OF OCCURRENCE, SCHOOL OTHER INSTITUTION AND PUBLIC AREA	95	4
PLACE OF OCCURRENCE, SPORTS AND ATHLETICS AREA	319	14
PLACE OF OCCURRENCE, STREET AND HIGHWAY	42	2
PLACE OF OCCURRENCE, TRADE AND SERVICE AREA	97	4
UNSPECIFIED PLACE OF OCCURRENCE	903	40
Total	2255	

Emergency Department Visits for Concussions (ICD10- CA code S06.0

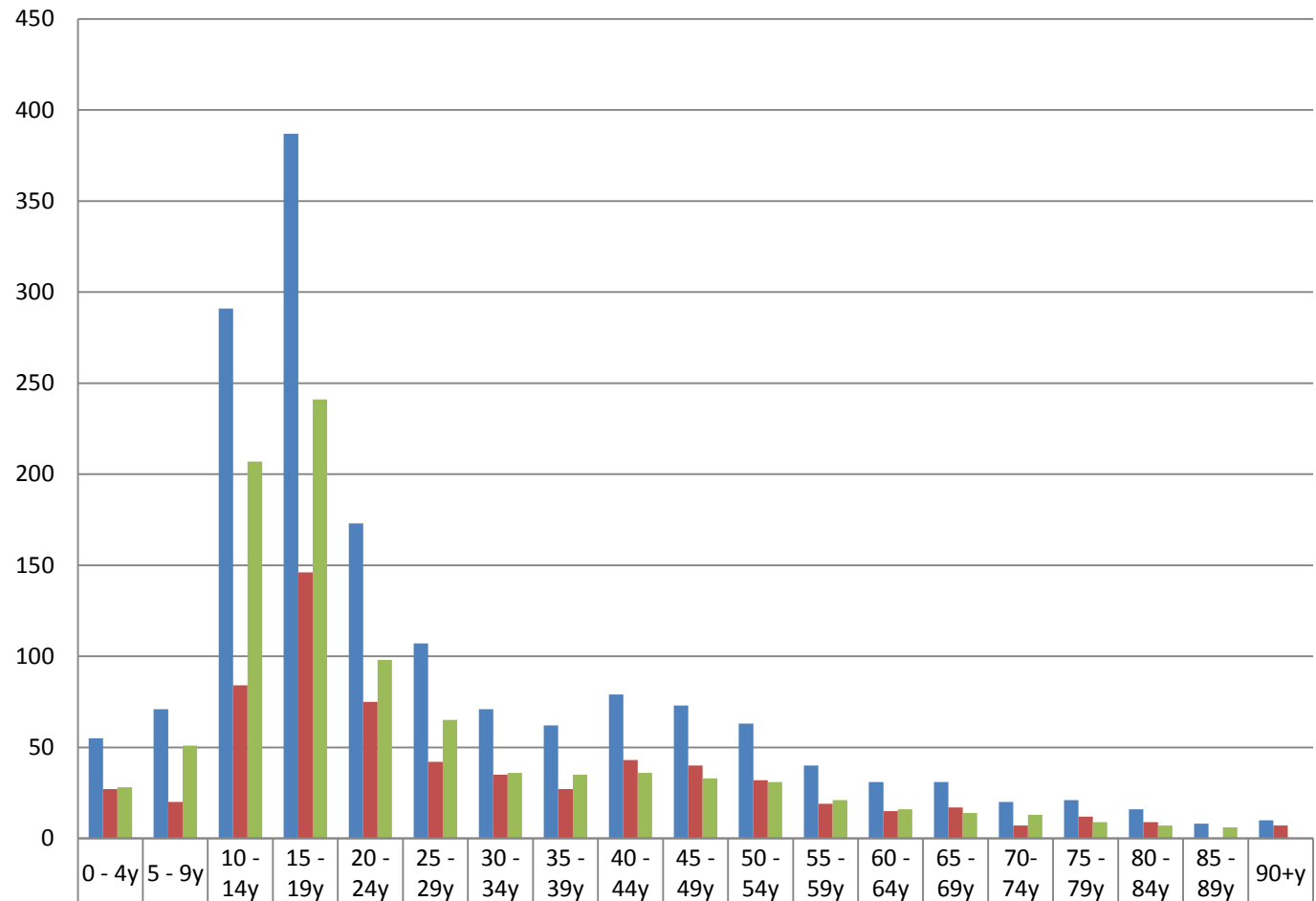
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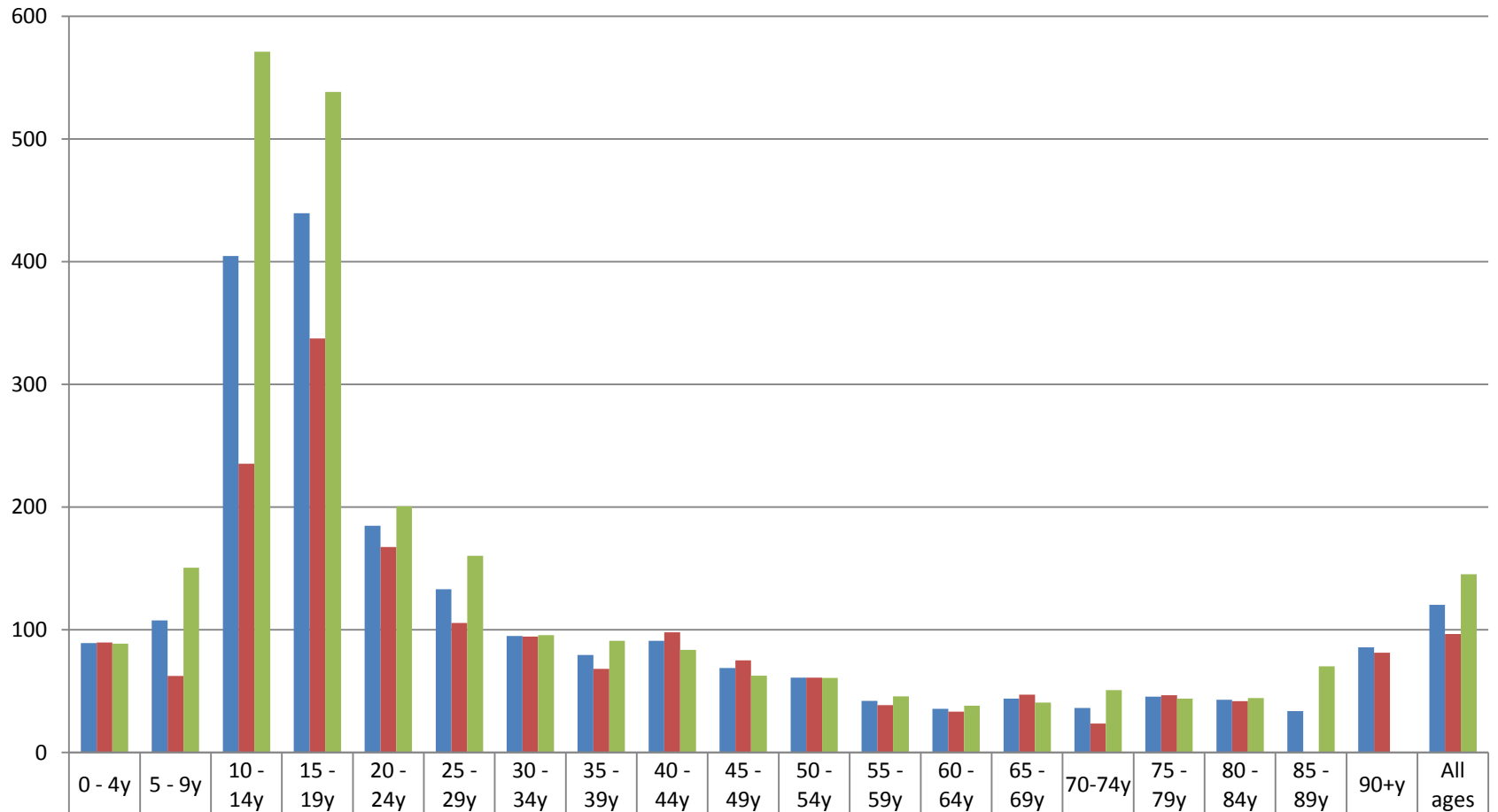
*Emergency visits for intracranial injuries are defined by an ICD-10 code of S06 which includes the ICD-10 codes for concussions (S06.0)

No. of ED visits for concussions by age group and sex for the Niagara Region in 2010 - 2012



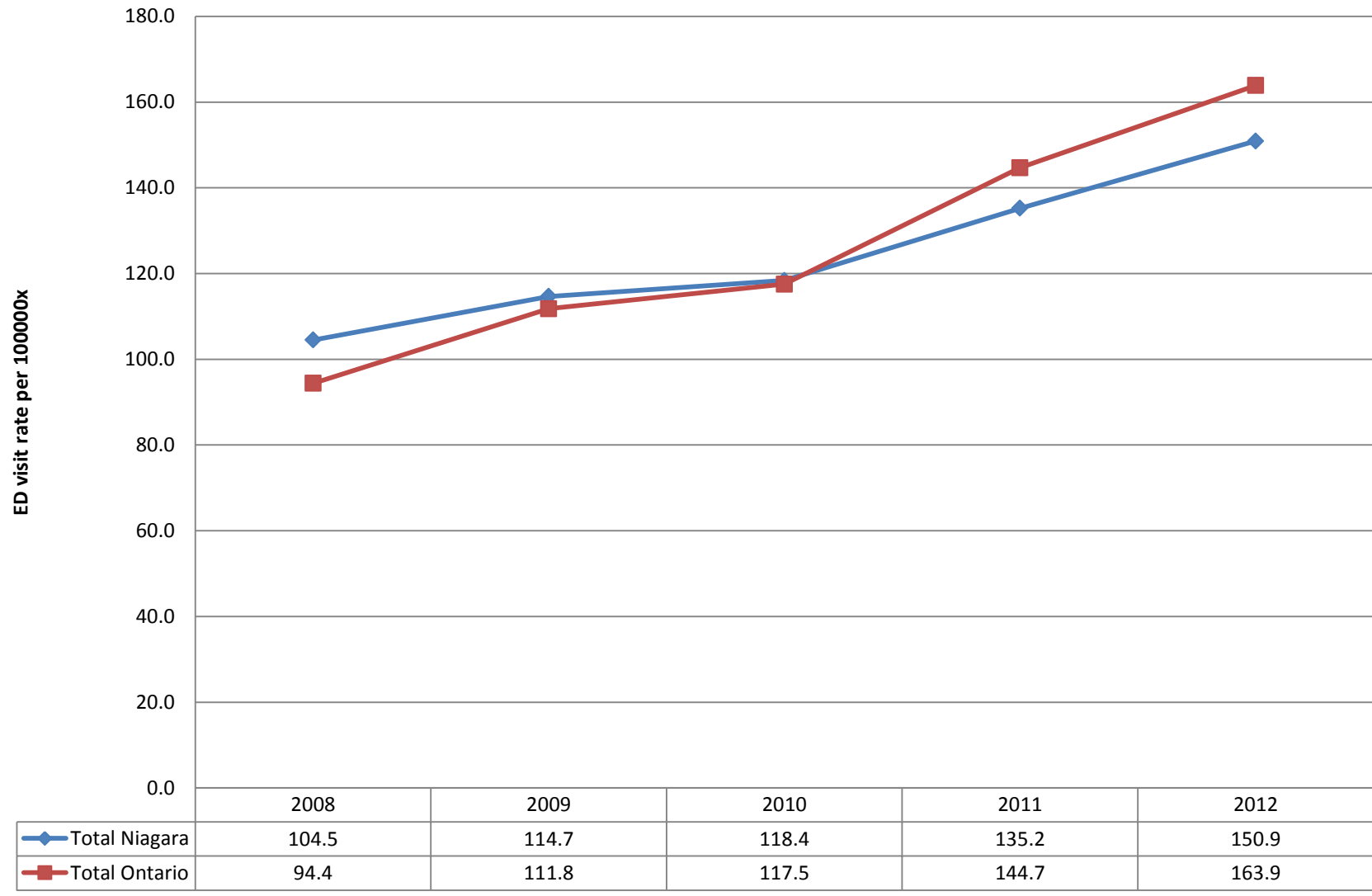
	0 - 4y	5 - 9y	10 - 14y	15 - 19y	20 - 24y	25 - 29y	30 - 34y	35 - 39y	40 - 44y	45 - 49y	50 - 54y	55 - 59y	60 - 64y	65 - 69y	70 - 74y	75 - 79y	80 - 84y	85 - 89y	90+y
■ Total Concussions 2010/11/12	55	71	291	387	173	107	71	62	79	73	63	40	31	31	20	21	16	8	10
■ Concussions Female	27	20	84	146	75	42	35	27	43	40	32	19	15	17	7	12	9	0	7
■ Concussions Male	28	51	207	241	98	65	36	35	36	33	31	21	16	14	13	9	7	6	0

Rate of ED visits for concussion, by age-group and sex, Niagara, 2010 - 2012

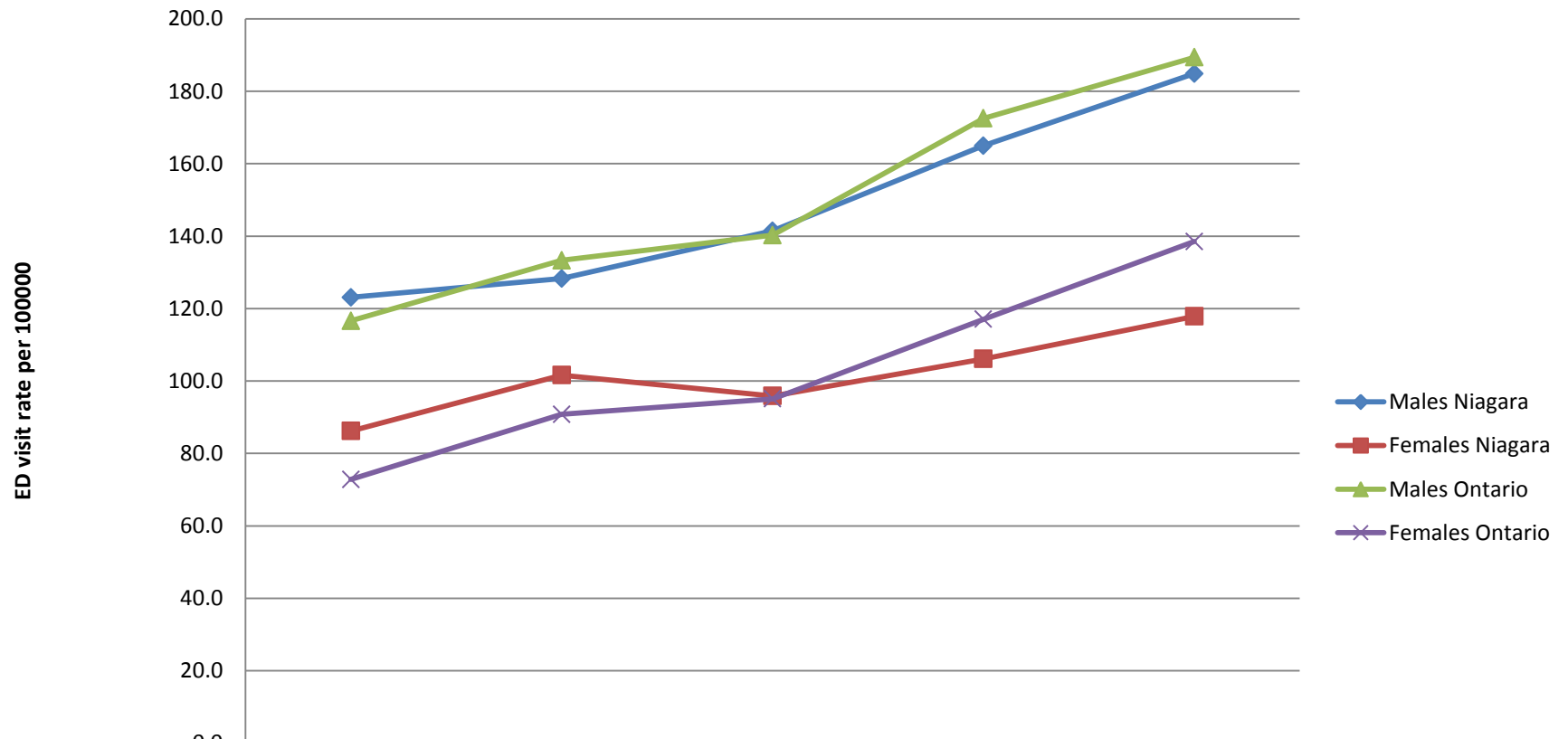


Rate (Total)	89.19	107.74	404.53	439.53	184.79	133.12	95.06	79.40	90.97	68.93	60.95	42.02	35.71	44.01	36.24	45.51	42.91	33.80	85.68	120.36
Rate (Female)	89.71	62.47	235.41	337.31	167.44	105.49	94.47	68.07	98.05	75.05	61.00	38.55	33.38	47.07	23.64	46.71	41.81	0.00	81.34	96.50
Rate (Male)	88.71	150.51	571.00	538.36	200.72	160.25	95.63	91.10	83.74	62.73	60.89	45.75	38.21	40.79	50.82	43.99	44.42	70.27	0.00	145.28

Age standardized rate of ED visits for concussions for Niagara and Ontario 2008 - 2012.

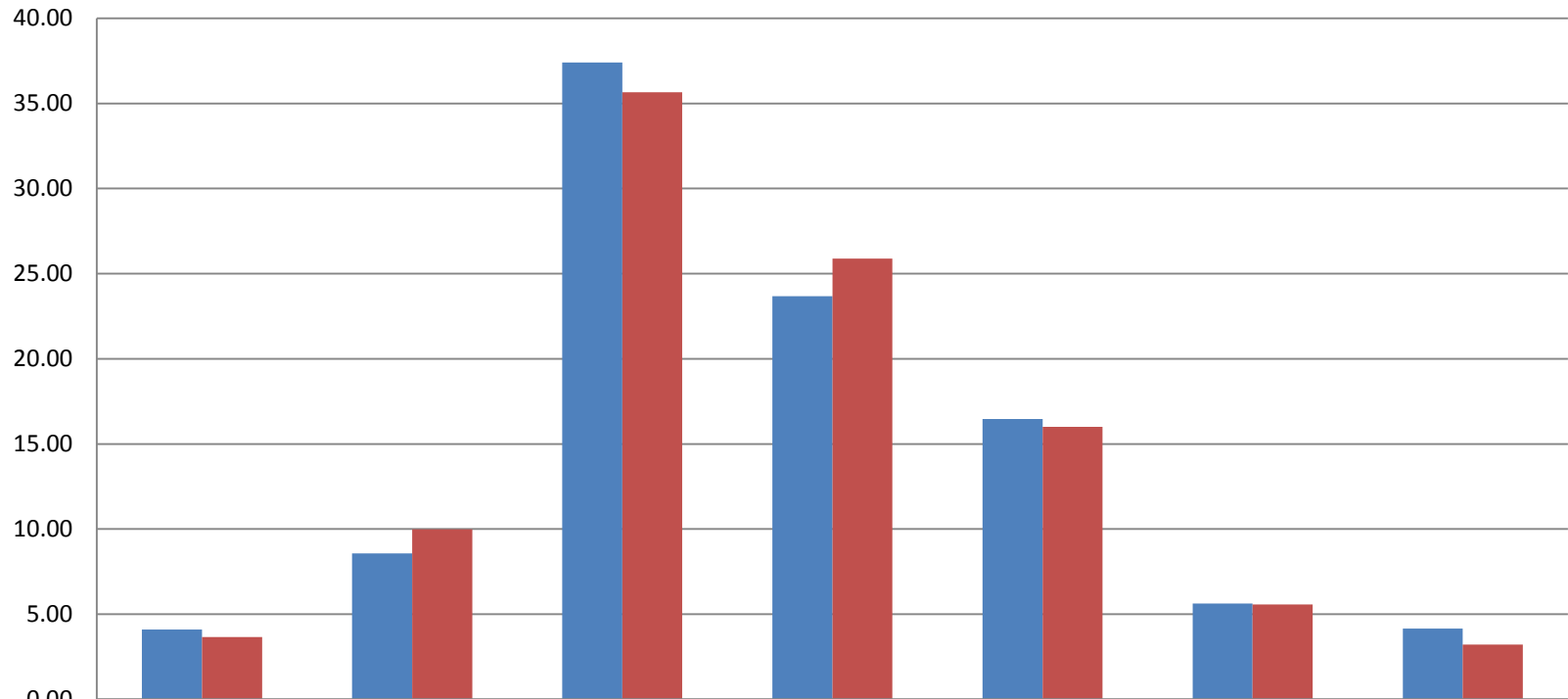


Age standardized rate of ED visits for concussions for Niagara and Ontario males and females 2008 - 2012.



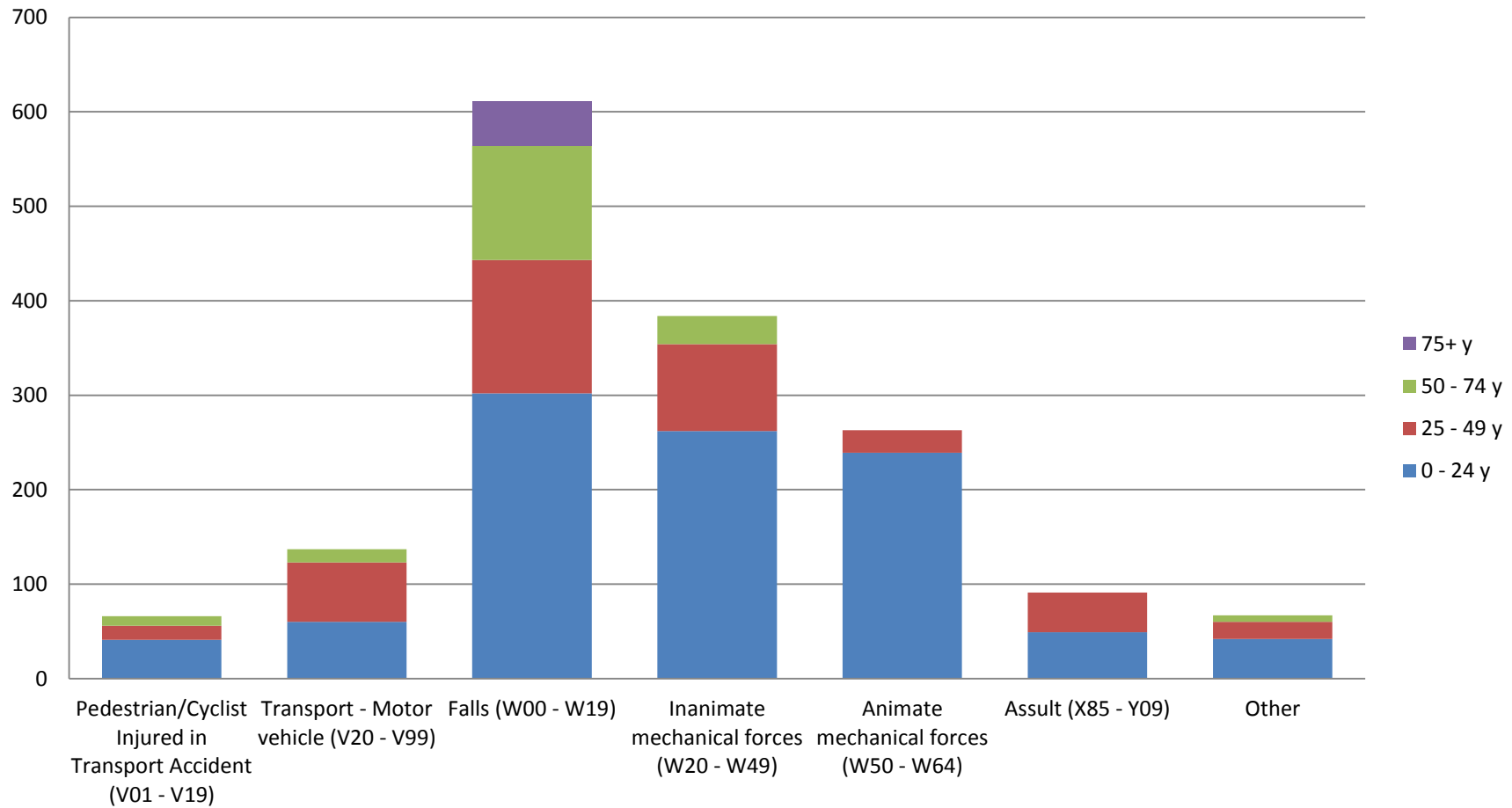
	2008	2009	2010	2011	2012
◆ Males Niagara	123.1	128.3	141.4	164.9	184.9
■ Females Niagara	86.2	101.6	95.9	106.1	117.9
▲ Males Ontario	116.6	133.3	140.3	172.5	189.4
× Females Ontario	72.8	90.8	95.1	117.1	138.5

Reasons (%) for ED Concussion visits in Niagara (n = 1609) and Ontario 2010 - 2012 combined



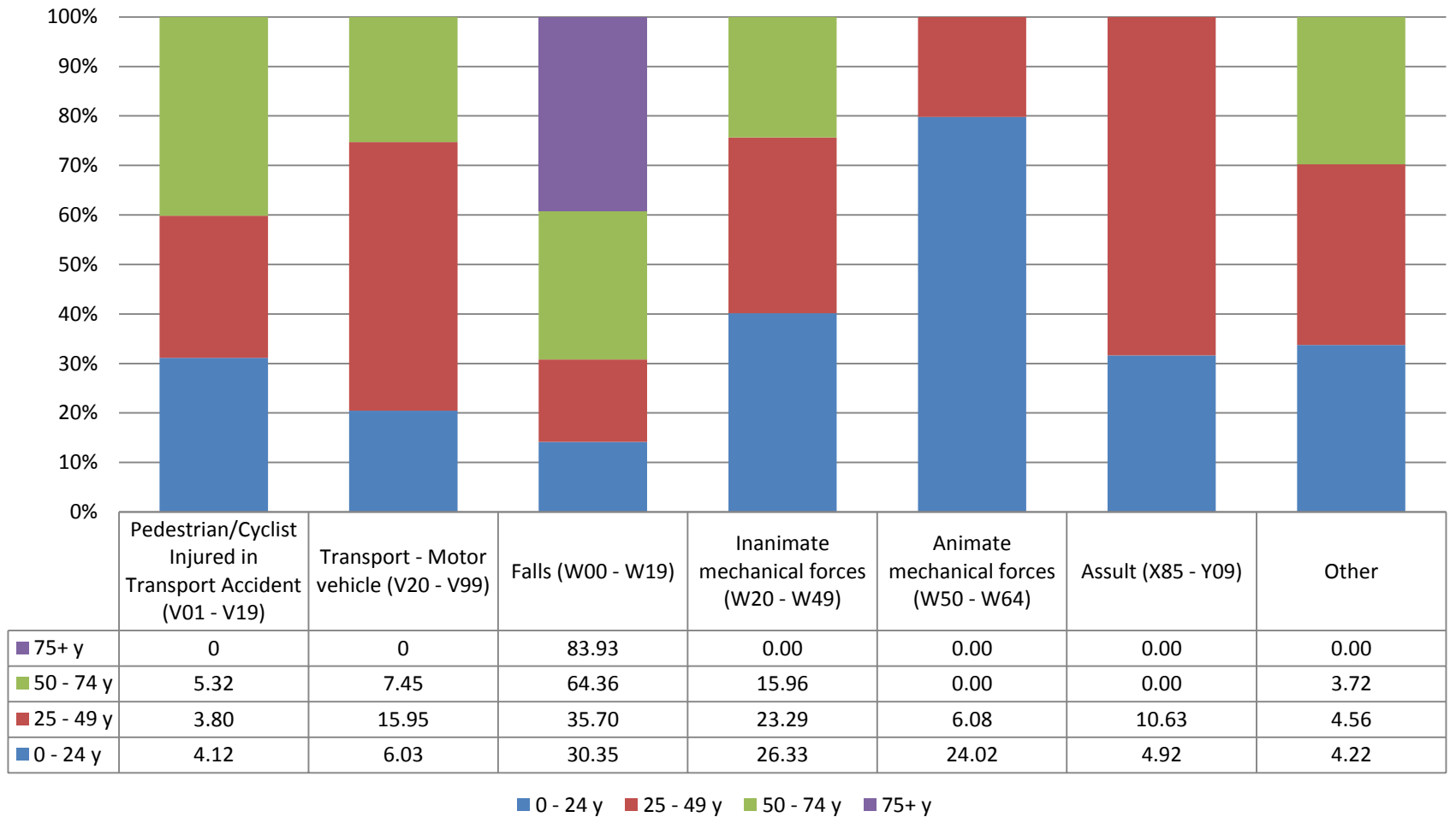
■ Total Niagara	4.10	8.57	37.39	23.68	16.46	5.63	4.16
■ Total Ontario	3.67	9.99	35.65	25.89	16.01	5.57	3.21

Reasons (n) for ED Concussions in Niagara by age ranges in 2010 - 2012 combined



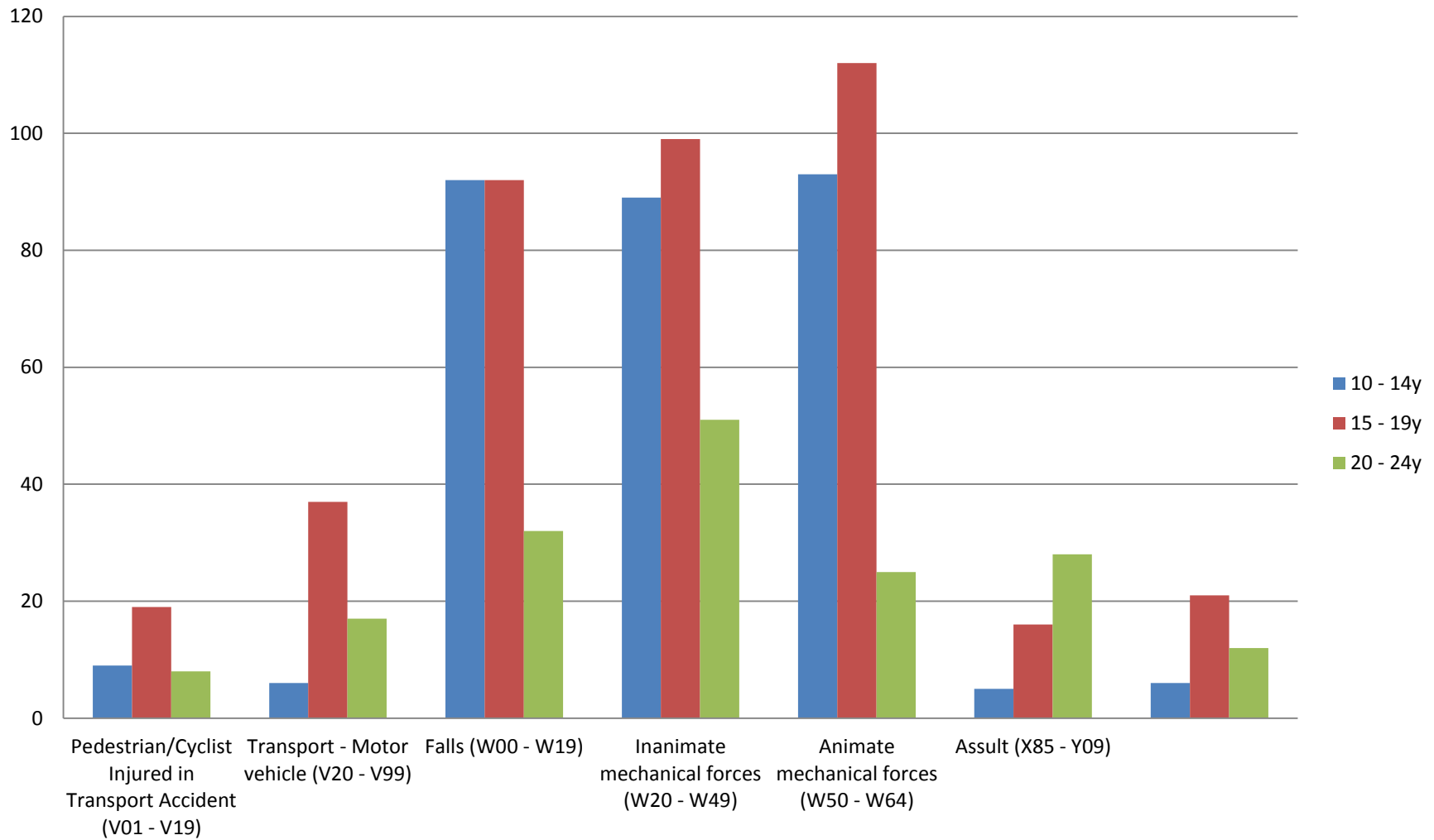
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Reasons (%) for ED Concussions in Niagara by age ranges in 2010 - 2012



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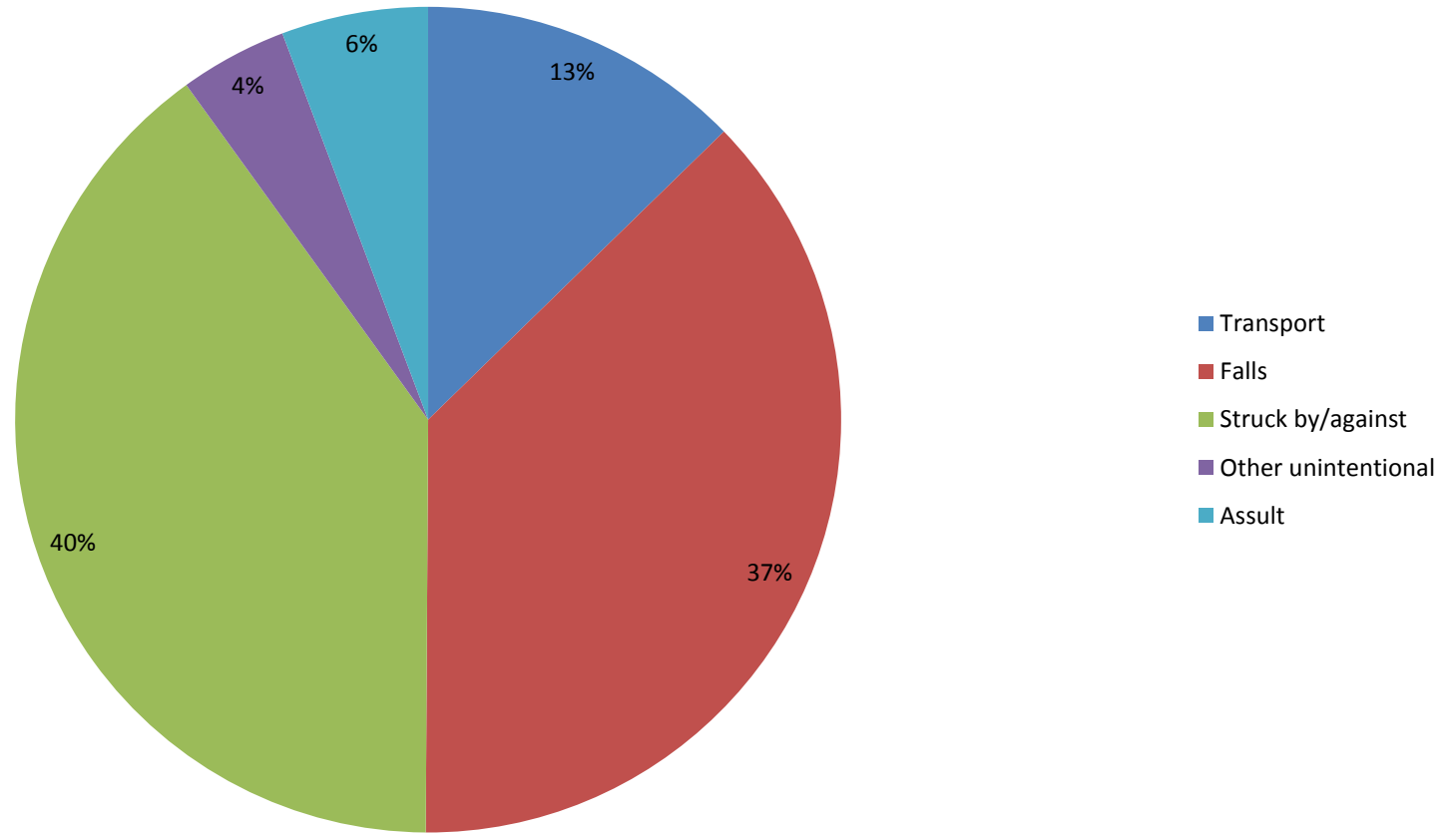
Reasons (n) for ED Concussions in Niagara by for those aged between 10 - 24 years in 2010 - 2012 combined



ED visits for concussion linked to falls, inanimate and animate mechanical forces in the Niagara region in 2010 - 2012.

- For ED Concussion visits within the **Falls** category (W00 - W19 n = 612) in 2010 - 2012, 37% (n = 229) were coded as a 'Fall at the same level from slip, trip or stumble/fall at the same level'. 13% (n = 80) of ED concussion visits within the Falls category were related to sport/activity related incidents. Therefore, the majority of concussions categorized as 'Falls' were **not** linked to sport/activity and were mainly from falling at the same level (37%) or falling from steps/ladders/stairs/furniture (n = 132; 22%).
- For ED concussion visits within the **Inanimate mechanical forces** category (W20 - W49 n = 388); two fifths (n = 181; 47%) of ED concussion visits were linked to sport/activity. All of these were coded as 'struck by/struck against' a sport related inanimate object (– e.g. bat/ball/stick/other) and 84 of these (i.e. 84/181 = 46%) were related to hockey.
- 335 ED concussion visits were as a result of exposure to **animate mechanical forces (W50 – W64)**. 217 (65%) were as a result of playing a sport/activity. All of these were coded as 'struck against/bumped into' when playing sports and of these 109/207 (50%) were related to hockey.
- Therefore, of all concussions in Niagara 2010 – 2012 combined (taking into account, pedestrian/cyclist/transport/falls etc etc), approximately a quarter (n = 398/1609) were as a result of being struck by/struck against/bumped into during a sport (13.5 % animate (217) and 11.2% (181) inanimate). The sport most frequently cited is Hockey.

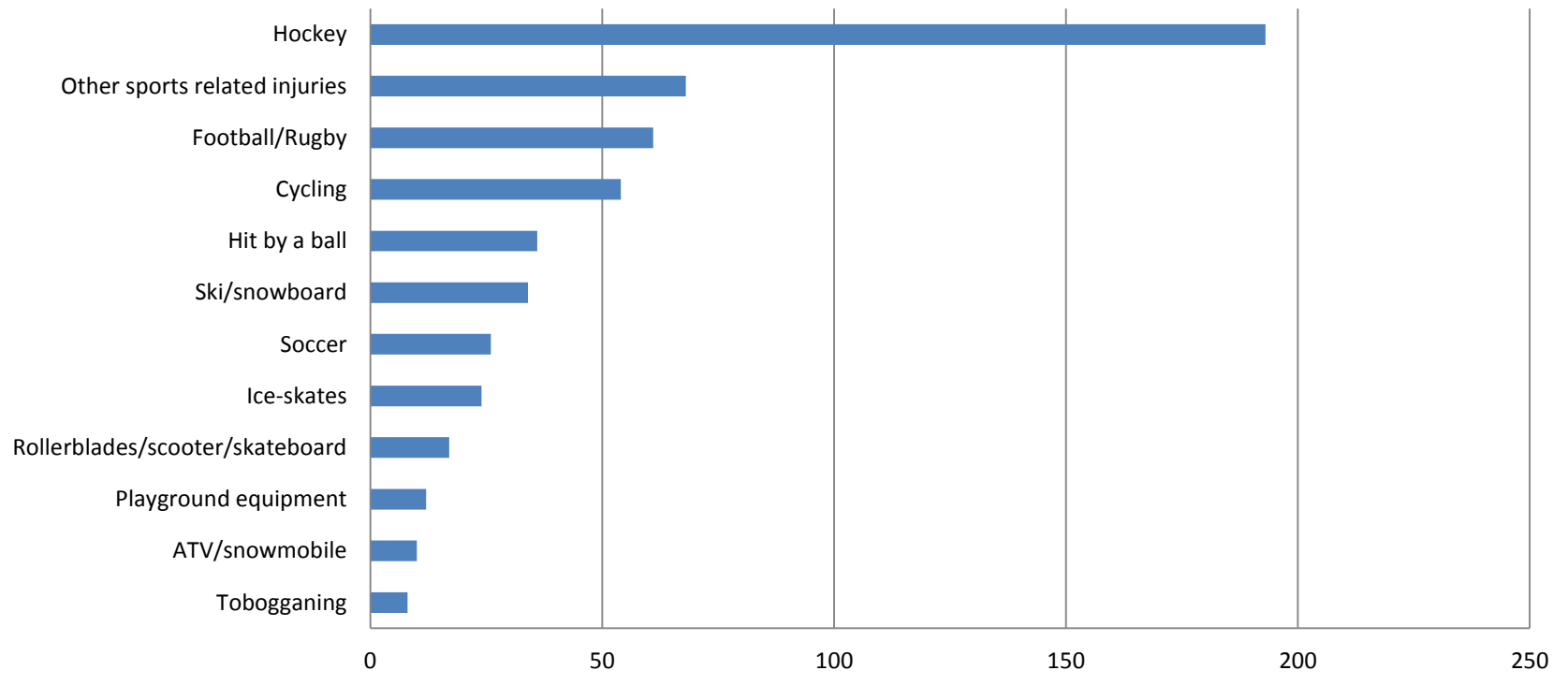
% of Concussions caused by Transport, Falls, Struck by and against, Other unintentional and Assult in Niagara 2010 - 2012



* Niagara numbers too small to break into meaningful age categories. Of the 'struck by/struck against' category 398 (24%) of ED concussions are as a result of sports (and of that 193 (48%) are as a result of Hockey)

Sport/Recreation Specific Cause of ED visit for concussion, Niagara 2010 - 2012	Count	% of Total
Tobogganing	8	1.55
ATV/snowmobile	10	1.93
Playground equipment	12	2.32
Rollerblades/scooter/skateboard	17	3.29
Ice-skates	24	4.64
Soccer	26	5.03
Ski/snowboard	34	6.58
Hit by a ball	36	6.96
Cycling	54	10.44
Football/Rugby	61	11.80
Other sports related injuries	68	13.15
Hockey	193	37.33
	543	

Sport/recreation specific cause of ED visits for concussion, Niagara, 2010 - 2012



In 2010 - 2012, there were 543 ED visits for concussion with an external cause linked to sport/recreation. Hockey was the sport category with the highest number of visits accounting for n =193 (37%) of all sport/recreation visits. Cycling and Football were the next two highest categories. The 'other' sports related injuries category comprised of swim, hit by a bat, other sports equipment, other sport and recreation, baseball and bumped into sports and recreation equipment.

Emergency Department visits for concussions in Niagara: Place of occurrence (2010 – 2012 combined)

61% of all visits in 2010 - 2012 did not have a place of occurrence specified making it difficult to draw strong interpretations from the data. Sports/athletics areas followed by home were the next most common places of occurrence i.e. a fifth of ED visits for concussion occurred in sports or athletics areas.

Place of occurrence description (ICD10-CA Code)	Count	% of Total
Not assigned	246	15
Home (U980)	118	7
Residential Institution (U981)	17	1
School/Institution and public area (U982)	81	5
Sport and Athletics Area (U983)	305	19
Street Highway (U984)	22	1
Trade/Service Area (U985)	74	4
Industrial/Construction area (U985)	15	1
Farm (U987)	*	*
Other (U988)	55	3
Unspecified (U989)	701	43
Total	1637	

Of the concussions caused by falls, 14% were in the home and 10% were in sports/athletics areas.

Of the concussions caused by inanimate mechanical forces a fifth (24%) occurred in a sports/athletic area.

Of the concussions caused by animate mechanical forces, 54% occurred in a sports/athletic area.

Data Source, Definitions, Methods, and Limitations

- Data on emergency department visits for concussions was extracted from IntelliHEALTH ONTARIO using the ICD 10 Main Problem Diagnosis code of S06.0 for residents of the geographical area specified (Niagara Region or Ontario) and only for unscheduled emergency visits.
- Inclusions:
 - Unscheduled emergency visits: AM case type = EMG
 - Ontario (Province of patient residence = ON) or Niagara Region (PHU = Niagara 2246) residents
 - Intracranial Injury: ICD-10-CA MPDx code = S06
 - Concussion: ICD-10-CA MPDx code for the visit begins with S06.0
 - Age standardization is a method of adjusting rates to minimize the effects of different age distributions between two or more populations (in this case, Niagara Region and Ontario). Where indicated, rates were age standardized to the 1991 Canadian Standard population using the direct method. The rates refer to the number of emergency department visits per 100,000 population.
- Limitations:
 - Not all visits for concussion have an external cause of injury reported for the visits and a visit could have more than one external cause of injury reported
 - ICD-10 external cause of injury blocks V01-V89 (transport accidents) are not assigned a place of occurrence as they are assumed to occur in the specified transport-related location
 - Emergency department visit data reflects the number of visits to an emergency room by individuals residing in the designated area based on place of residence and does not represent the number of emergency department visits occurring in institutions in the designated area.
 - Emergency visit data does not capture those who did not seek treatment for an injury in a hospital setting and therefore will underestimate burden of injury.

Sports and Recreation Specific External Cause ICD10-CA Codes

Description	ICD10-CA Code
Baseball	W2205, W5105
Hit by Bat	W2101
Hit by Ball	W2200
Cycling	V10-V19
Rollerblade/Skateboard	W0202, W0203
Football/Rugby	W2203, W5103
Hockey	W2102, W2103, W2202, W5102
Ice Skates	W0200
Playground equipment	W09-W0909
Skiing/Snowboarding	W0201, W0204, W2200, W5100
Soccer	W2204, W5104
Water sports	V90-V94
ATV/Snowmobile	V86
Other sports injury	W2108, W2207, W5107
Tobogganing	W2201, W5101
Swimming/Diving	W16, W67-W74

Data Citations:

Ambulatory ALL Visit Main Table (NACRS, CIHI), 2008-2012, MOHLTC, IntelliHEALTH ONTARIO, Date Extracted: January 2014

Ambulatory Emergency External Cause (Chapter 20) (NACRS, CIHI), MOHLTC, IntelliHEALTH ONTARIO, Date Extracted: January 2014

Population Estimates (Statistics Canada), MOHLTC, IntelliHEALTH ONTARIO, data extracted January 2014

