

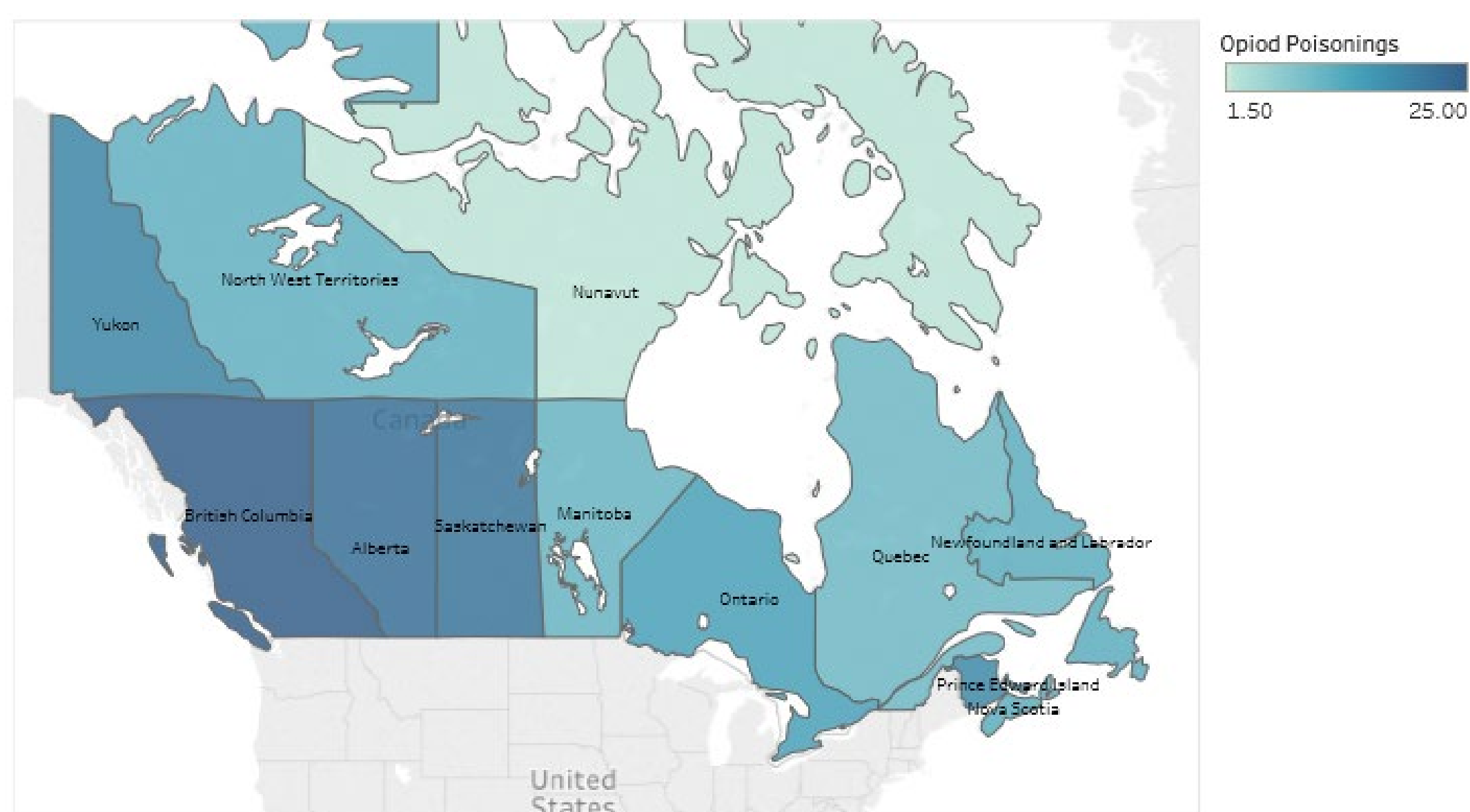
Canada's Opioid Crisis

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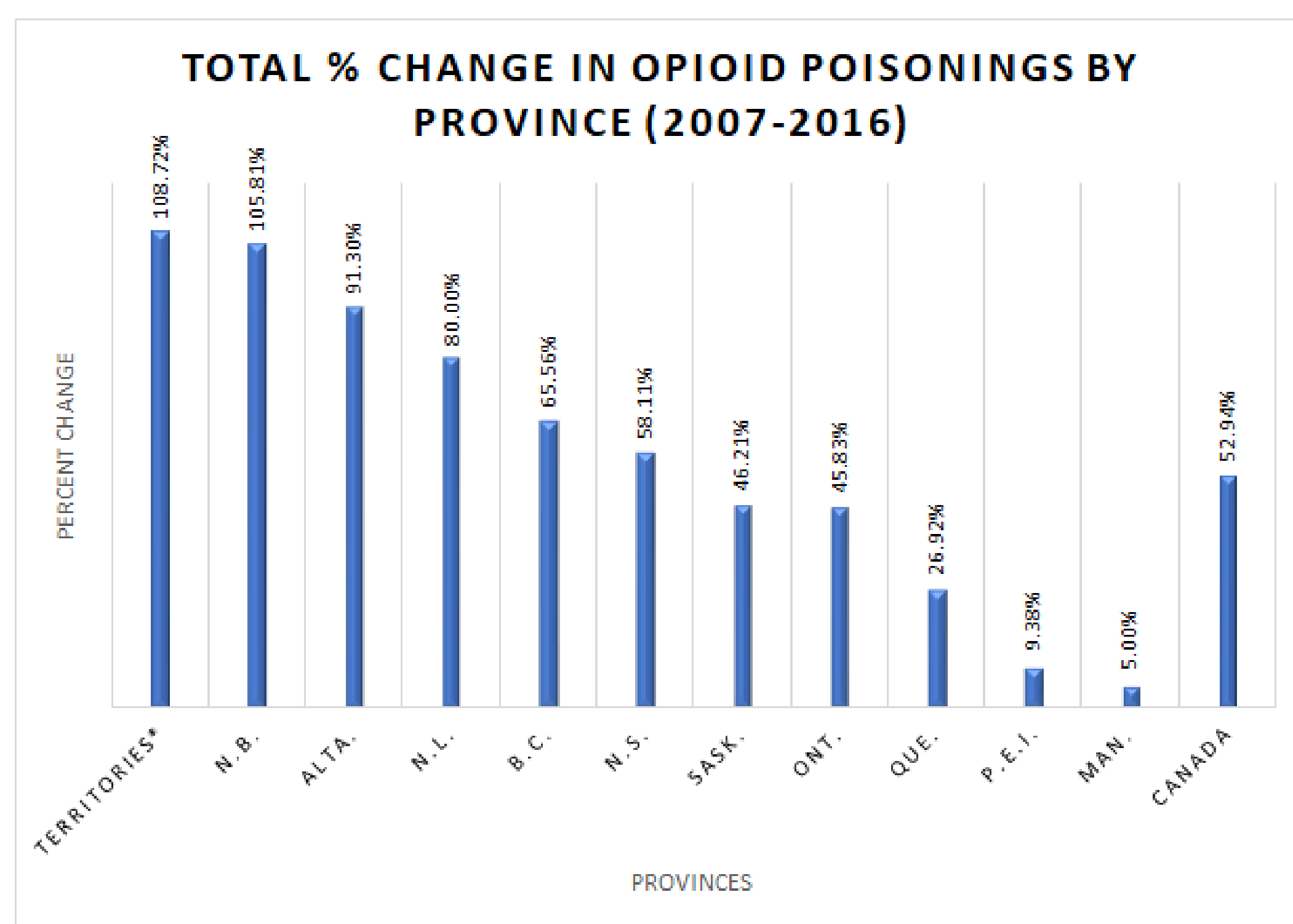
Problem

Opioid hospitalization rates have been quickly increasing across all of Canada. We have identified multiple geographical areas, and demographics that are at an increased risk. We also looked at potential causes for these areas of increased risk and what actions the government should take to reduce future opioid hospitalizations.

Provincial Opioid Poisoning per 100,000 (2016)



This heat map shows the total Opioid Poisonings per 100,000 by Province. The number of Opioid poisonings per 100,000 ranges from the lowest of 1.5 in Nunavut to the highest of 25 in British Columbia. This heat map also shows that Western Provinces tend to have a higher Opioid Poisonings per 100,000 compared to Provinces in the East.

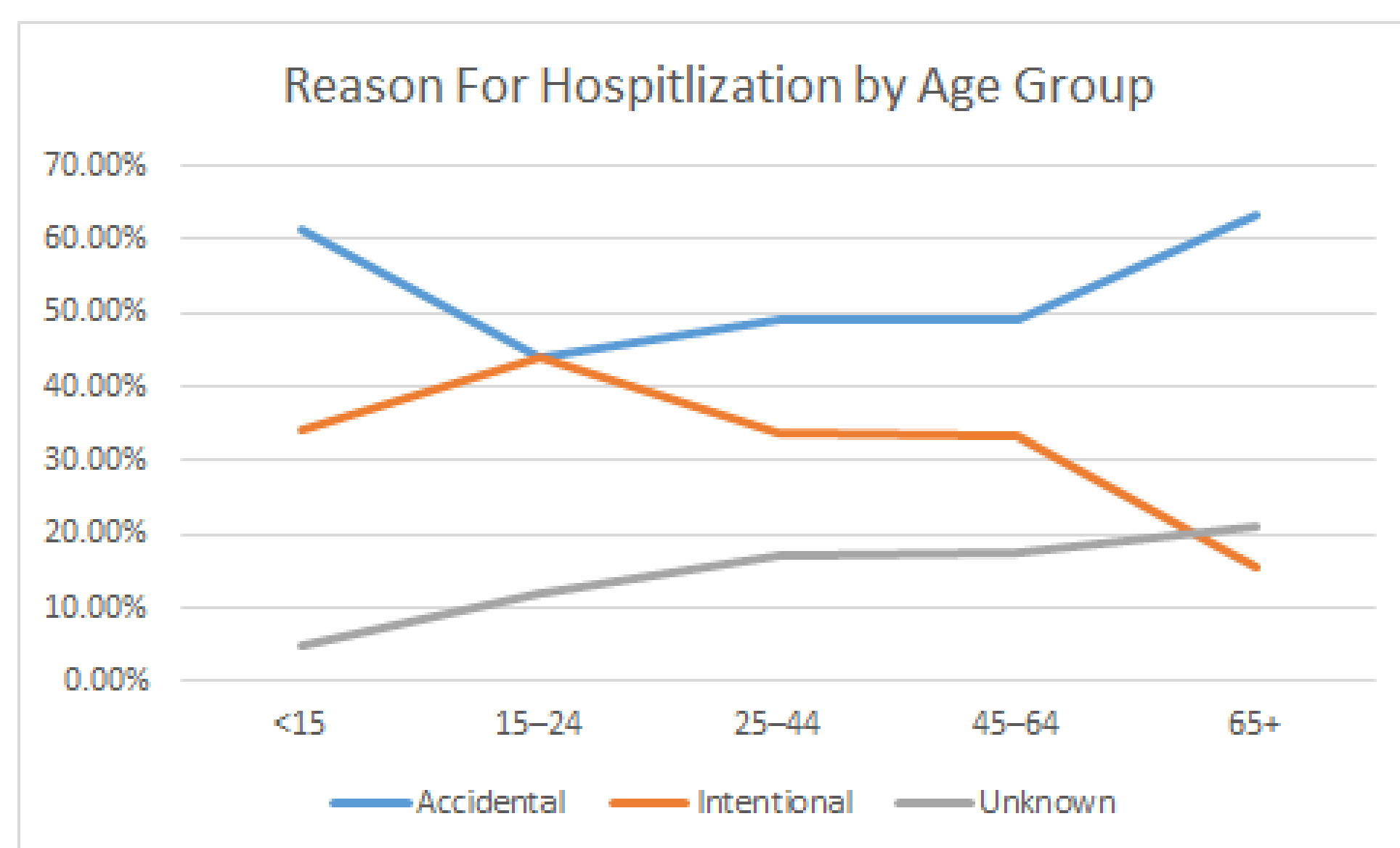


This chart displays the total percent increase in Opioid Poisoning by Province from 2007 to 2016.

The Territories (Yukon, Northwest Territories, and Nunavut) have the highest with a 108.72% increase since 2006, followed by New Brunswick and Alberta with 105.81% and 91.30% respectively. We can also see the growth rate for all of Canada, and how each province compares to it. With the left portion of the graph being above the national growth rate, and the right half being under the national growth rate.

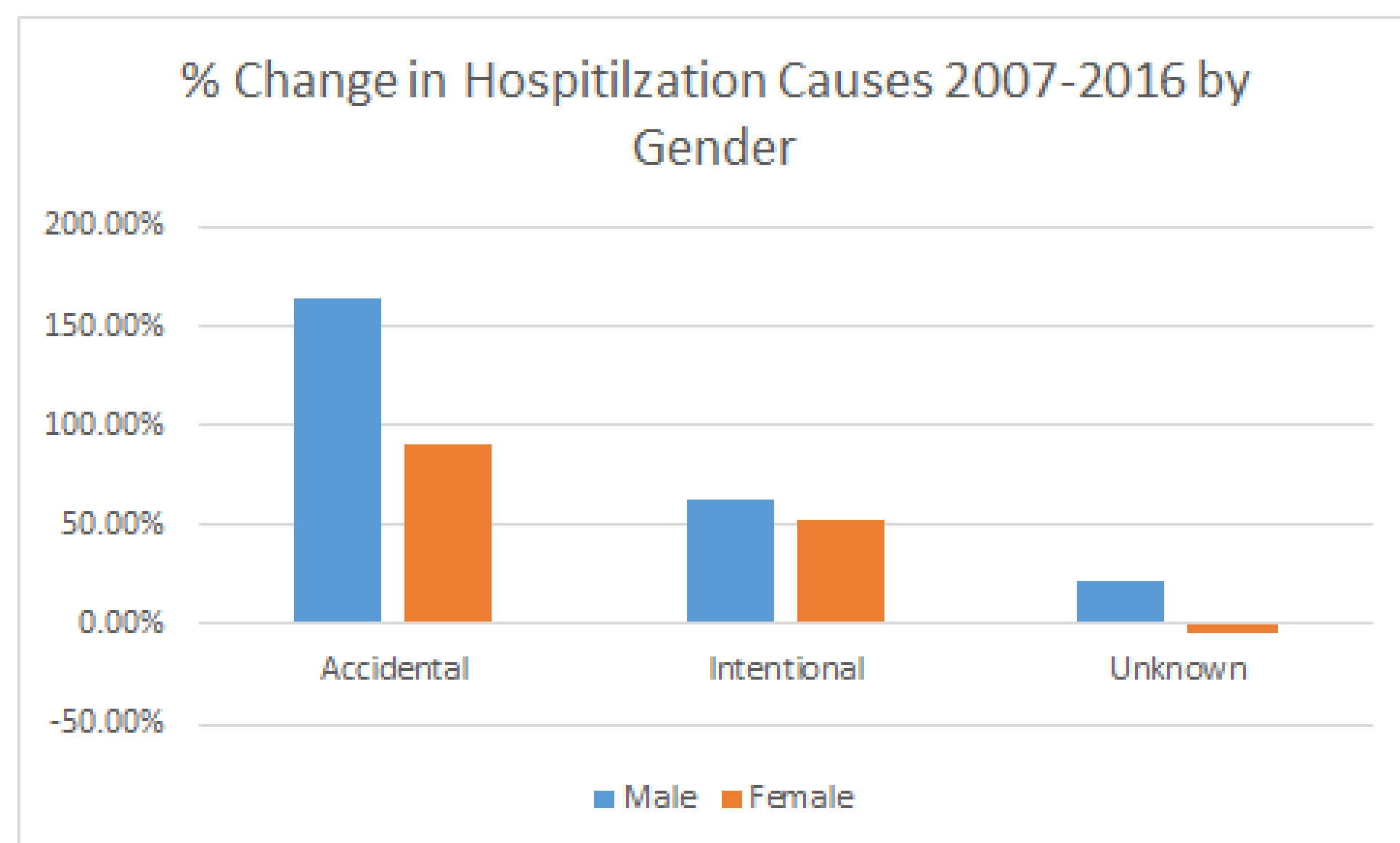
Analysis

Causes of Hospitalization by Age Groups



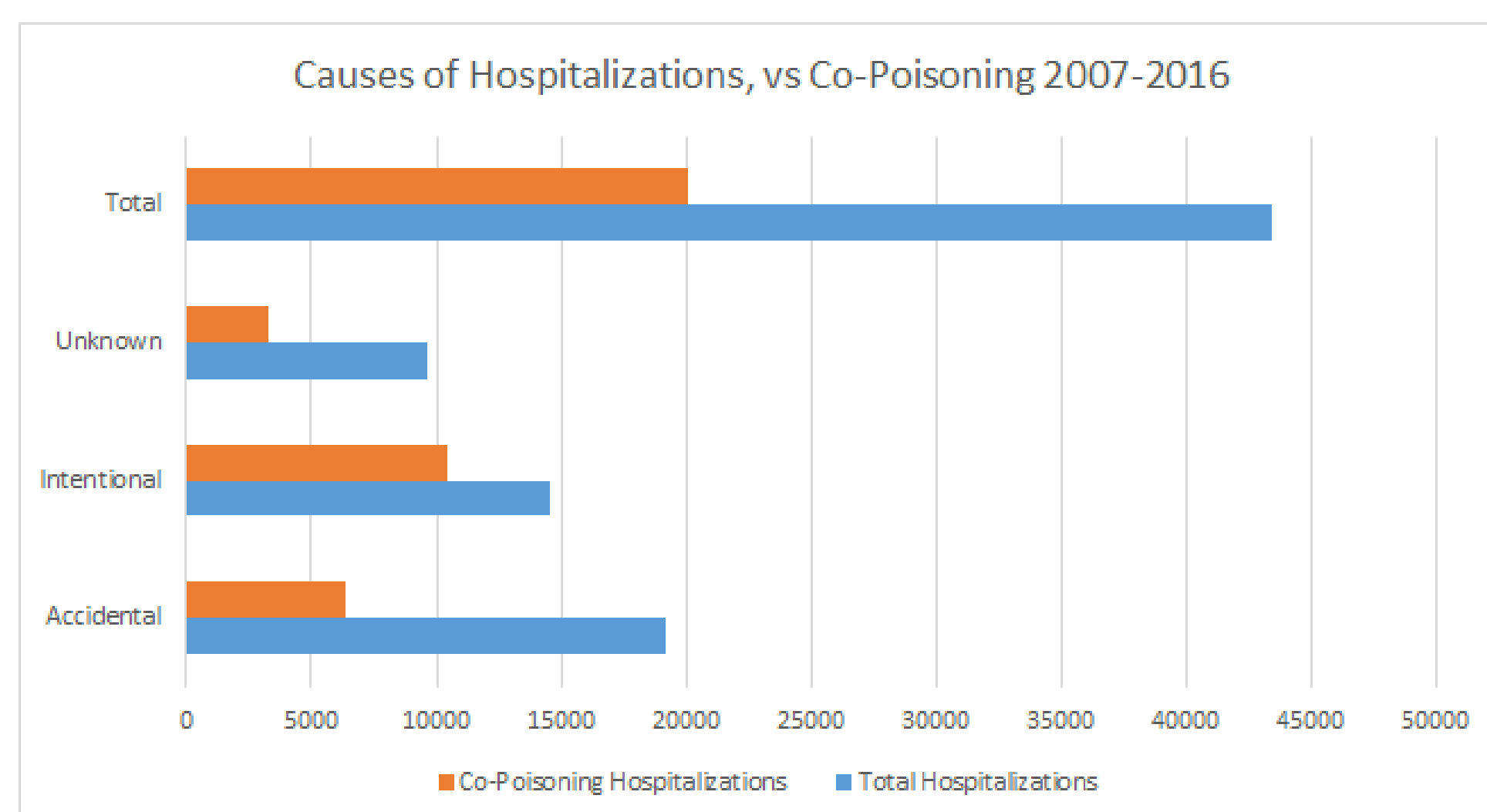
We can clearly see a decrease in intentional opioid hospitalizations across the board, as well as an increase in accidental opioid hospitalizations as age increases. Two main clusters to focus on in this graph are the <15, and 65+ cluster. Both of which have very similar accidental hospitalization rates of 61.3% and 63.4% respectively. As well as the cluster of 25-44 and 45-64, who have almost identical rates when it comes to both have accidental hospitalization of 49% and intentional hospitalization rates of 33%. We can also see that between 15-24 accidental and intentional are roughly a 50/50 split.

Percent Change in Causes by Gender



Since 2007 there has been a drastic 163.9% increase in the number of males being hospitalized from accidents involving opioids. This is compared to another large increase of 90.7% in females. These changes show that accidental hospitalizations from opioids is the fastest growing segment.

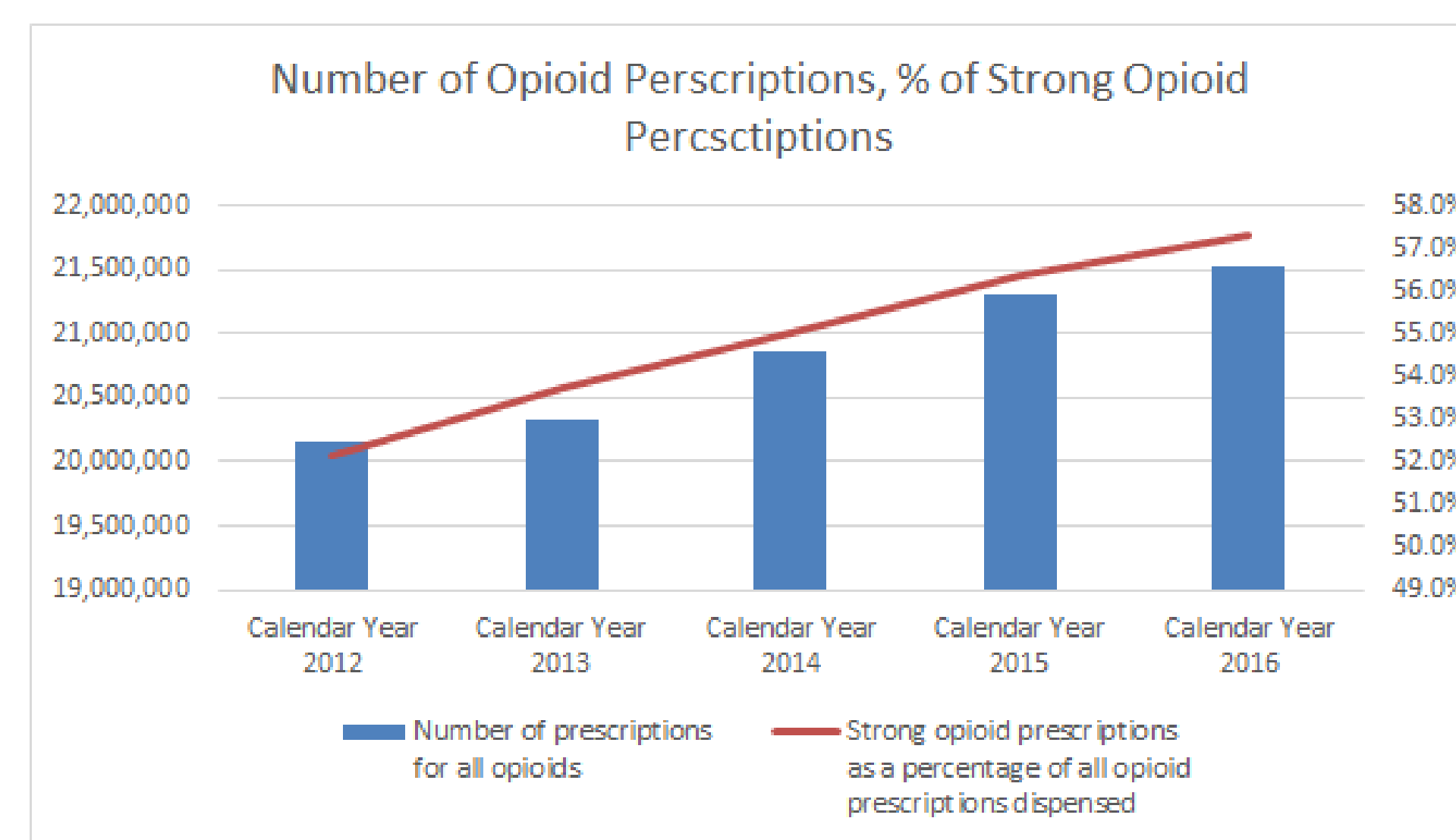
The Effects of Co-Poisoning



When we look at the cause of hospitalizations from 2007-2016 we can see that 44.2% more hospitalizations are caused by accident, and 33.5% are caused intentionally. When we compare these to the amount of co-poisoning hospitalizations we can see that co-poisoning are responsible for almost half of all hospitalizations. And when it comes to accidental they are responsible for almost 3 out of every 4 hospitalizations (72.7%).

Solution

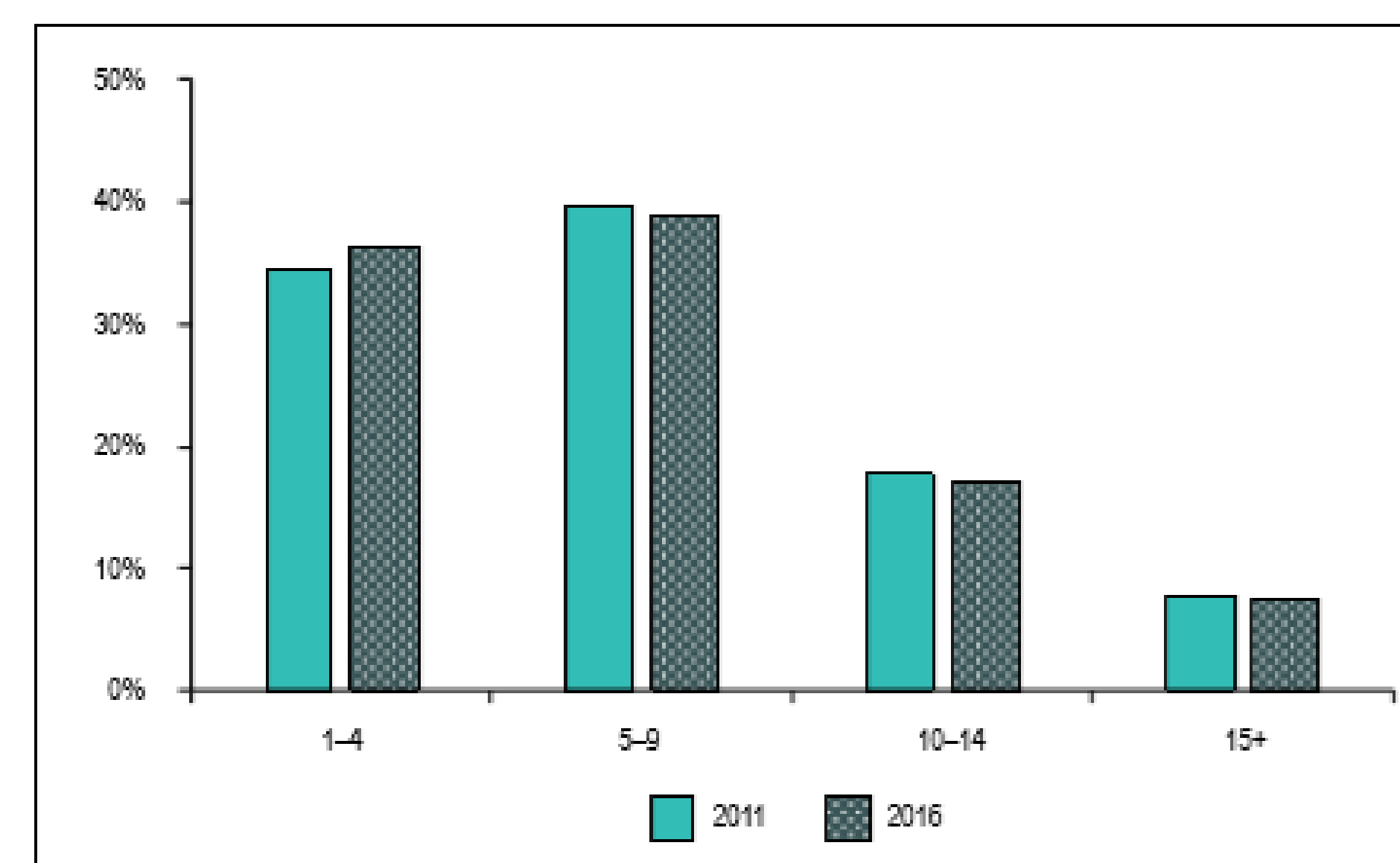
Opioid Prescriptions rates



Since 2012 the number of opioid prescriptions have steadily increased at a rate of 6.8%. The number of strong prescriptions has been increasing faster at a rate of 17.3%. This has caused an increase of 5% in the percentage of strong opioids prescribed.

Seniors at Risk

Figure 1 Percentage of seniors, by number of drug classes, Canada, * 2011 and 2016



In 2016, nearly two-thirds (65.7%) of seniors were prescribed 5 or more different drug classes, with more than one-quarter (26.5%) being prescribed 10 or more different drug classes and 8.4% prescribed 15 or more drug classes.

Correlation between Opioid Type Usage and Number of Provincial Overdoses (2012-2016)

	Codeine	Fentanyl	Hydromorphone	Morphine	Oxycodone	Tramadol	ALTA Overdoses
Codeine	1						
Fentanyl	-0.034355803	1					
Hydromorphone	-0.987341225	0.487213412	1				
Morphine	0.991892968	0.00246537	-0.857562491	1			
Oxycodone	0.774235694	0.263981112	-0.587173255	0.736233865	1		
Tramadol	-0.965474	0.11382223	0.919656488	-0.990103105	-0.72185043	1	
ALTA Overdoses	-0.983472506	0.064900238	0.870329483	-0.930034478	-0.695345481	0.990754084	1

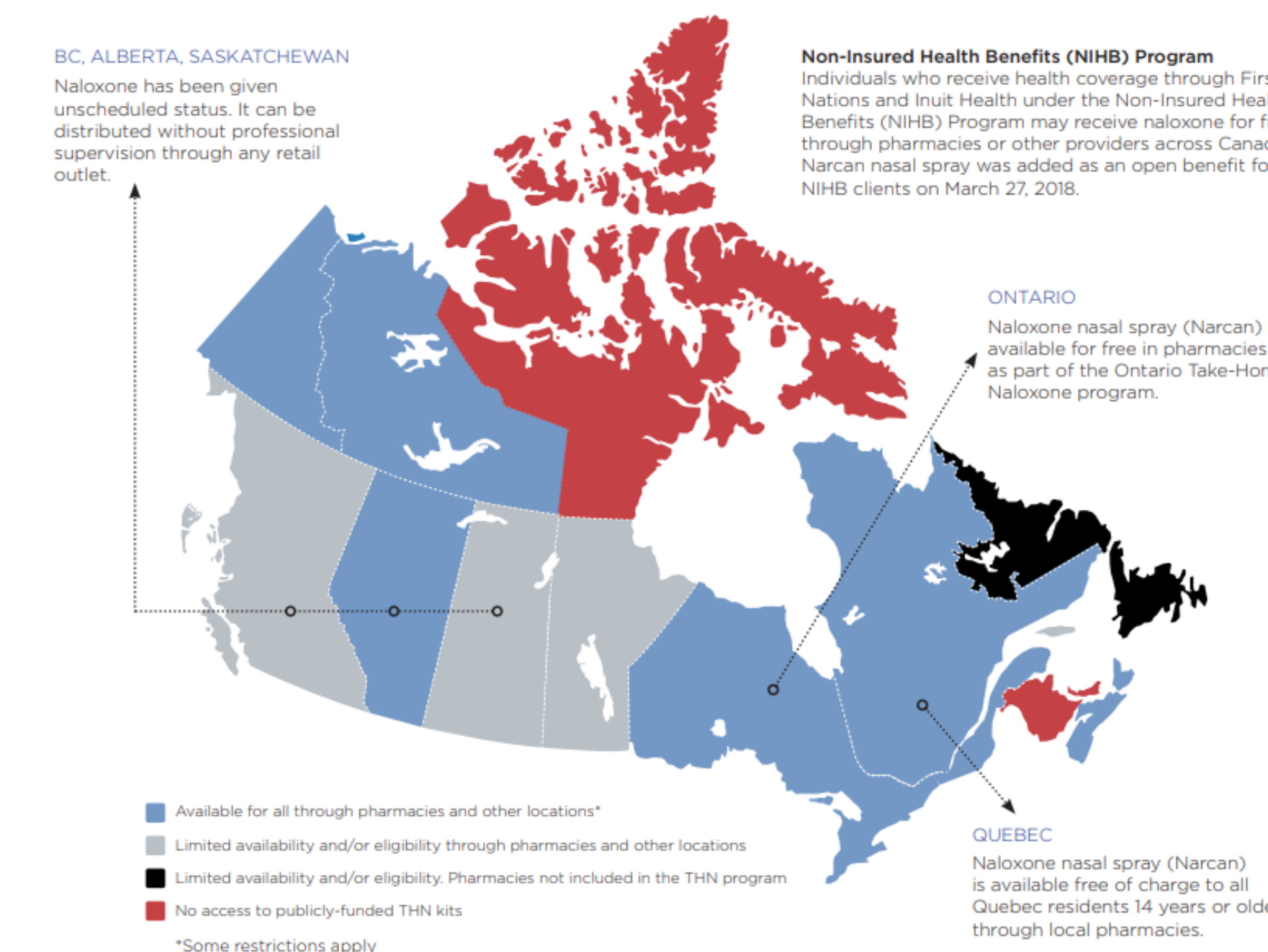
	Codeine	Fentanyl	Hydromorphone	Morphine	Oxycodone	Tramadol	BC Overdoses
Codeine	1						
Fentanyl	0.96287197	1					
Hydromorphone	0.923164296	0.931111546	1				
Morphine	0.962463701	0.999892917	0.926810447	1			
Oxycodone	0.966641737	0.969957403	0.93029437	0.963702055	1		
Tramadol	-0.891041079	-0.91336589	-0.748879172	-0.923603478	0.943606461	1	
BC Overdoses	-0.958466892	-0.947748149	-0.832799255	-0.866000254	0.871419824	0.912639328	1

	Codeine	Fentanyl	Hydromorphone	Morphine	Oxycodone	Tramadol	SASK Overdoses
Codeine	1						
Fentanyl	0.987196518	1					
Hydromorphone	-0.537341048	-0.699751538	1				
Morphine	0.548369438	0.744553847	-0.982248457	1			
Oxycodone	0.376953068	0.647930882	-0.920879188	0.964198595	1		
Tramadol	-0.614176864	-0.797368089	0.919835698	-0.941643004	-0.853495028	1	
SASK Overdoses	-0.342530181	-0.547334333	0.729999007	-0.822714885	-0.691228887	0.91510482	1

Correlation between the Top 6 opioids by province and the number of significant opioid poisonings by province from 2012 to 2016. These include only the top 3 provinces with the highest Opioid hospitalizations per capita which are Alberta, British Columbia and Saskatchewan.

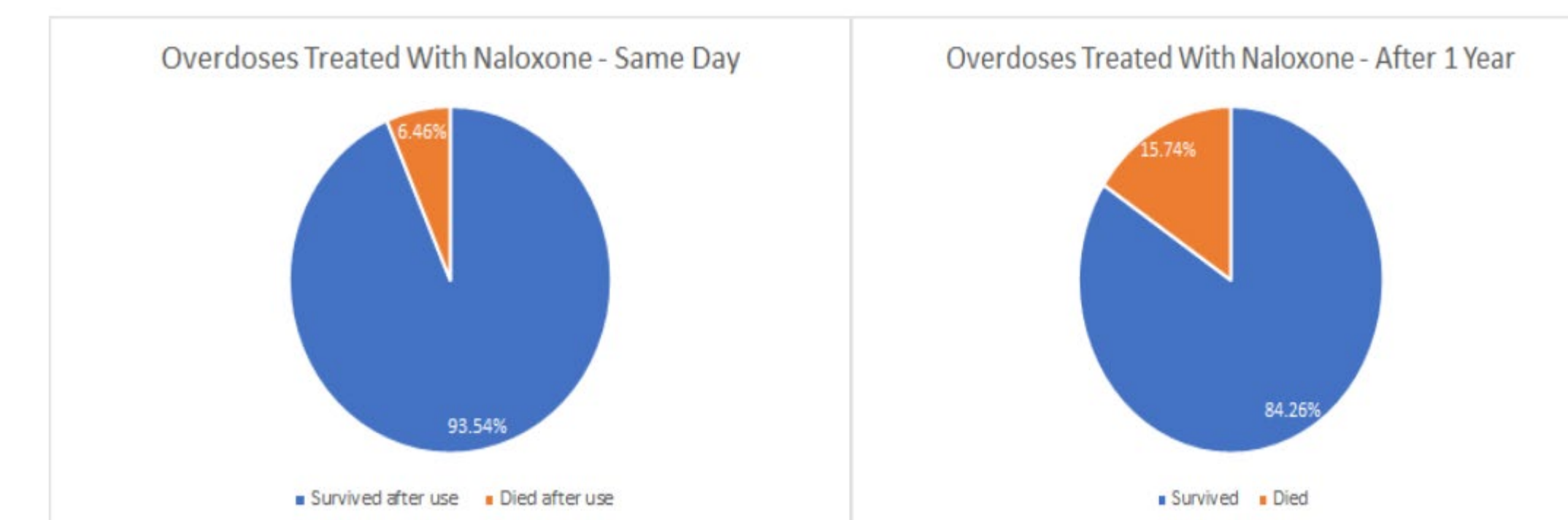
Results show a consistently strong positive correlations between Tramadol prescriptions and number of Opioid Poisonings for these Provinces. Strong negative correlations are indicated by red and strong positive correlations by green.

Naloxone: The Lifesaver



Naloxone has the ability to reverse the effects of an overdose. This can drastically reduce fatalities from opioid overdose. To reduce public risk, provinces need to increase its availability to the public. Provinces should continue to expand their programs and provide education opportunities about its use and application.

Naloxone Effectiveness



A study from Massachusetts department of health showed that Naloxone was successful in 93.5% of cases in reversing the effects of an overdose. However, additional treatment is necessary to watch these high risk patients.

Multi-Pronged Approach

The cause of this crisis cannot be solved with a single solution, but requires a plan with multiple different solutions addressing different issues. We can use the insights we found, to target the more high risk areas first using a multi-pronged plan. First is increased awareness. With the high probability of co-poisoning, and accidental hospitalization, the public must be made more aware of opioid risks. Second, is the Take Home Naloxone programs which gives all Canadians access to it. Provinces have rolled this out already but should continue to expand it. Thirdly, the provinces should develop clear formulation of enforceable guidelines with the aim to have opioids prescribed only in cases supported by good scientific evidence. Opioids should only be dispensed in the lowest possible dose and for the shortest possible duration. A few provinces have started addressing this by removing stronger opioids from approved lists. Finally, an implementation of a real-time monitoring system that pharmacists would have to consult first before prescribing would allow them to be more informed on who they are prescribing it to. To go along with this, a watch list of high risk patients should be included in this system, especially those who have experienced a hospitalization recently.