



**Technical Report:
Canadian National Survey on Child Restraint use 2010**

**Completed for Transport Canada, in partnership with
AUTO21**

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Table of Contents

1. Introduction	3
2. Methods	3
2.1 Design	3
2.2 Sampling Design	4
2.3 Data Collection Procedure	7
2.4 Definition of Appropriate Child Restraint System	8
2.5 Instrument	9
2.6 Analysis	9
3. Results	10
3.1 Sample	10
3.2 Descriptive Statistics for Child Occupants in Vehicles	16
3.3 Weighted Estimates of Correct Child Seat Use	26
3.4 Discussion	28
Reference	29

1. Introduction

The current study reports on the findings of the national child seat survey conducted in May to October, 2010. This study was a follow up to the 2006 national child seat survey submitted to Transport Canada in 2007. In our previous (2006) technical report on Canadian National Survey on Child Restraint Use (2007), we found that although most drivers used some type of safety restraint system, the rate of correct use of safety seats varied among different age groups. The highest rate of correct use was found to be 67% in children 1 to 3 years of age and the lowest rate was in 1 to 4 year olds who used booster seats approximately 20% of the time travelling in vehicles. Our previous report also showed that, Alberta, British Columbia, New Brunswick, Nova Scotia, Ontario, and Saskatchewan had higher rates of correct use of child safety seats compared with Manitoba, Newfoundland, Northwest Territories, Prince Edward Island, and Quebec. [1]

In the 2006 study we relied on both observational and interview data collection (i.e., a detailed Parking Lot Survey) method to assess children's use of child safety seats in vehicles and to document parent's knowledge and awareness of correct use of safety seats for their children. The parking lot study resulted in a high rate of refusal to participate in the parking lot survey. Nonparticipants were predominantly drivers with high rates of non-use or incorrect use of child safety seats. Statistical techniques were used to examine the rates of correct use while accommodating the potential bias due to non-response. [2] Limitations of the 2006 survey also included the failed data collection in the Northwest and Yukon Territories due to weather conditions and lack of accessibility. [2]

For the 2010 report, we have achieved a more representative sample for data collection outcomes. All provinces and territories were included in the 2010 study with the exception of Nunavut, whereby no intersections were included from this territory in the sampling frame. The parking lot survey and interview was not included in this study due to the high rates of non-participation in 2006. The objective of this study was to achieve a representative observational study, using naturalistic observation of vehicles at 196 randomly selected intersections across Canada of child occupant status in every province and territory. Our objective was fully and completely accomplished and the following report documents the outcomes of this study.

2. Methods

2.1 Design

Our survey design utilized an observational data collection method, which was conducted in randomly selected intersections across Canada. Our data

collectors observed the child and driver restraint status in passing vehicles while the vehicles were stopped at the selected intersection. Each data collector was trained to correctly identify the age range of child passenger(s) and the type of child seat in use in each of the vehicles. This was strictly an observational study. No drivers or their passengers were approached during this data collection. The research questions were as follows:

- What is the rate of correct use of child safety seats in vehicles in Canada?
- How do rates of correct use vary in each of the provinces and territories?
- What are the patterns of correct use of child safety seats relative to driver ethnicity?
- How do the rates of correct use in this study compare to rates in the 2006 study?

2.2 Sampling Design

The sampling strategy was conducted by Transport Canada and provided to the research team. The sampling design for this study was based on the sampling design from our previous 2006 study, in order to support the validity of the comparison of the results in 2006 with the results in this 2010 study. [1] Transport Canada's statistical team drew the sample of intersections to be observed for this study and provided it to the research team. Additional intersections were also drawn to be used in the event that the intersections sampled were deemed not feasible for the data collection. The survey frame included drivers with child occupants in private, light duty vehicles including automobiles, minivans, pick-up trucks and sport utility vehicles (SUV) with Canadian license plates traveling on Canadian roads during the months of May through October of 2010. [1] Selection process of survey location, data collectors, as well as date, time, and duration of individual survey session is described below.

Geographic Location

Six urban population strata defined by Transport Canada were used for this survey. [3,4] Only urban census subdivisions (CSD) were used for the intersection sampling due to the relatively low volume of traffic on rural roads and the difficulty in reaching some of the more remote settings. Based on the Statistics Canada demographic definition of urban and rural, Transport Canada's urban strata are defined as follows: [4,5]

U1: Census subdivisions (CSD) within a Census Metropolitan Area (CMA; i.e., large cities) and having a population over 500,000

U2: Census subdivisions (CSD) within a (CMA) and having a population between 100,000 and 499,000

U3: Census subdivisions (CSD) within a (CMA) and having a population between

50,000 and 99,999

U4: Census subdivisions (CSD) within a (CMA) and having a population between 10,000 and 49,999

U5: Census subdivisions (CSD) within a Census Agglomerations (CA; i.e., small cities) and having a population over 50,000

U6: Census subdivisions (CSD) within a CA and having a population between 10,000 and 50,000

Nunavut was not included in this survey since none of the intersections in that particular territory met the U1 – U6 criteria for population density.

According to Transport Canada's sampling design, the first level of stratification was by provinces and territories, while the second stratification was by the U1-U6 defined above. [4] In order to work within the budget, approximately two hundred randomly selected intersections across Canada were to be surveyed. In the first stage of sampling, an intersection was randomly selected in two replicates from each of the second level strata. This selection was done with equal probabilities of selection from the set of all intersection in a stratum. Following this, for every extra 75,000 children in a stratum, an extra intersection was drawn using a systematic sampling process from the list of intersections in the strata, ordered by longitude and latitude, obtained from Transport Canada's Canadian Highway Information System, a geographic information system (GIS) database that contains all road segments in the country. This sampling strategy was used to make the distribution of the 200 planned intersections proportional to the child population density across Canada and also to reduce the possibility of selecting intersections clustered in the same area of the stratum. Once an intersection is selected into the sample, day and time period in which the survey team would collect the data were randomly selected from the 7 days of the week and available hours of the day divided into windows of 3 hour data collection periods. The day and time period selection probabilities were proportional to the distribution of kilometers driven per day and distribution of kilometer by trip starting times obtained from the Canadian Vehicle survey. [4]

After the selection process, these locations were screened for accessibility using Google Earth. Criteria for accessibility included safety of the selected intersection for the observers, and the presence of a controlled stop to facilitate observation of vehicles for use of child safety seat use. Intersections that were not deemed safe for observers (lack of sidewalk or safe location for observers to stand), or did not have a controlled stop (traffic light or stop sign) were replaced with another intersection location randomly selected as an alternative intersection, within the same U1-U6 category and within the same province.

Once the intersections were identified in the sampling procedure as accessible and suitable for data collection, data collectors visited each site to evaluate each

intersection for its suitability. Roadside data collection proceeded only when the intersection was: 1) controlled by traffic lights or a stop sign; 2) had a minimum traffic volume of 10 cars per hour; 3) had a safe place for the data collectors to stand and observe vehicles (e.g., sidewalk or a median). If an intersection was deemed unsuitable, the principal investigator was notified and the site was replaced with another intersection within the same U1-U6 category within the same province. In many situations, the site was suitable for observation; however traffic volume did not meet the minimum criteria for conducting the full, 3 hour observation. In these cases, sites were deemed a “failed site” when traffic volume was too low. In the event of a failed site, observers went to the nearest intersection (in a randomly selected direction) and attempted to collect data. In the case of 22 sites, there were no nearby intersections that yielded adequate traffic volume and were recorded as failed sites. Total number of intersections for the child restraint survey and their location is illustrated in Table 1.

Table 1: Number of Intersections per Province or Territory

Province	Sites Sampled	Failed Sites (no vehicles)	Failed site (unsafe conditions)	Total # sites in sample
PEI	4	0		4
New Brunswick	6	0		6
Nova Scotia	6	0		6
Newfoundland	4	0		4
Quebec	31	7		38
Ontario	43	1	2	46
Manitoba	12	4		16
Saskatchewan	16	2		18
Alberta	18	6		24
British Columbia	26	0		26
Yukon	4	0		4
Northwest Territories	4	0		4
TOTAL	174	22*	2	196

***4 sites were surveyed twice as directed by the sampling frame.**

Total sites reported on = 170

Failed Sites with no vehicles: site was sampled, however <10 vehicles observed in first hour, determined failed due to low traffic volume

Failed Sites (unsafe conditions): deemed a failed site when there was no safe location for observers to complete data collection at the selected roadside, or that there was no controlled stop.

Data Collectors

Data collectors were recruited from academic institutions and injury prevention organizations in each province. Wherever possible, data collectors were experienced in child seat safety inspection or had conducted previous child seat

surveys. In Alberta, the Alberta Centre for Injury Control and Research administered the survey. Each data collector in all provinces had to be 18 years or older in order to participate in the survey, and had to successfully complete training and testing for accuracy of estimating child age (range) and type of child safety seat placed in vehicles. Total number of data collectors from each province and territory is illustrated in Table 2.

Prior to the survey, all data collectors were required to undergo a 30-minute online training course. The online training program was designed to familiarize the participants with the data collecting procedure, including correct identification of child's age range (less than 1 years old, between 1-3 years old, between 4-8 years old, and between 9-14 years old) and type of seat used, appropriate seat for each age group, and requirements for each seat type. Upon completion of the training course, each data collector completed a test to identify and document the accuracy of their ability to correctly identify child age and correctly identify the type of child safety seat children were seated in vehicles. Scores were automatically calculated and sent to the principal investigator. If the score was below the accepted level (75% or higher), data collectors had to repeat the training program and re-write the quiz until they could successfully demonstrate 75% accuracy of estimating child age and type of child safety seat. Data collectors for this survey scored an average of 85% for the online quiz.

Table 2: Number of Data Collectors per Province or Territory

Province or Territory	Number of Data collectors
British Columbia	7
Alberta	9
Saskatchewan	9
Manitoba	2
Ontario	7
Quebec	5
Eastern Provinces	2
Yukon	2
Northwest Territories	2
Total:	45

2.3 Data Collection Procedure

Two data collectors were stationed in each of the 174 intersections. One observer counted the total number of vehicles with child occupants passing through the intersection in order to determine the total traffic volume of vehicles with child occupants for each selected intersection while the second observer completed all observations of child occupants in vehicles while the vehicle was stopped at the intersection (either at a red light or a stop sign) and recorded their findings (such as date, location code, driver information, age of child, location of child in the vehicle, type of restraint used, driver use of seat belts, and driver

ethnicity) in the vehicle on the “Roadside Site Observation – Vehicles with Child Passengers” data collection form. Each data collection sheet represents one vehicle with up to 4 occupants (driver and 3 children).

The data collectors observed as many vehicles as possible during the time period that the vehicle was stopped at the intersection, before traffic resumed travel when the traffic light changed to green. The main data collector resumed his/her data collecting during the next red light cycle which continued throughout the 3-hour observation period. In the event of a STOP sign, every vehicle that arrived at the STOP sign was observed before it proceeded through the intersection.

In the event of extreme weather conditions such as rain, cold, or high winds that impeded the observations, the data collection was rescheduled for the next possible day.

The data collection was completed over a 3-hour period at each intersection. At the end of the observation period, data collectors placed all completed data forms in a pre-labeled envelope which was mailed to the Principal Investigator. Data collectors recorded the date and time of the observation, the location identification number (from the sampling survey sites), and the total vehicles with child occupants observed at each intersection.

2.4 Definition of Appropriate Child Restraint System

Correct use of child safety seat for this survey was based on the child passenger’s estimated age alone. We have not found any unified and simple criteria for guiding parents to the correct use of safety seats for children. Most of the guidelines available to parents seem to have non-exclusive/non-exhaustive classes when defining the age, weight, and height groups for the various child seat types. This creates either redundancy or gaps so that some children do not actually fall in any of the categories and parents are left confused. Table 3 is an effort towards such a unified definition based on the child’s age alone, which was the same definition used in the roadside observation data in 2006 study. The methodology for this study was replicated from the 2006 to allow for valid and accurate comparisons of correct use rates of safety seats and restraints in vehicles.

Table 3: Definition of Correct Safety System Based on the Child's Age Group.

Types of Seat	Variables: Age Groups
Rear-facing Infant Seat	< 1 year
Forward-facing Infant Seat	1 – 4 years
Booster Seat	4 – 9 years
Seatbelt Only	9 – 14 years

2.5 Instrument

The instruments used for this National Child Seat Survey were updated versions of the survey instruments used in the 2006 survey. The only change in the 2010 survey was to include an observation for driver ethnicity in an effort to minimally recognize possible patterns of use in various sectors of Canada's population.

2.6 Analysis

In this survey the main objective was the estimation of the rates of use of child safety seats and vehicle restraints for child occupants in vehicles. Children in each type of child restraint type within each of the four age groups: infant (<1 year), toddler (1-3 years), school age (4-8 years) and older (> 9 years) were observed in each vehicle at a stop, for each selected intersection. The sample has been stratified by province/territory with strata defined in the methodology section 2.2. The sample was weighted based on the population of children in each sampling frame offers the ability of the researcher to account for the probability of each intersection being drawn for the sample. This strategy ensures that the sample is distributed evenly across the entire population. The procedure for including the weights is described as follows:

Let $y_{psidtkj}$ be the observation from the j^{th} child in the k^{th} vehicle collected at the t^{th} time of the d^{th} day at the i^{th} intersection of the s^{th} strata in the p^{th} province. Corresponding to this measurement, we have a sampling weight denoted by $w_{psidtkj} = w_p w_s w_{v(i,s,t,d,k)} w_{i(s)} w_t w_d$. Here, w_p, w_s are, respectively, child population densities of the p^{th} province/territory and of the s^{th} strata with respect to child population of Canada and that of the province/territory, respectively. The quantities w_t, w_d are, respectively the inverses of probabilities of time and day selection from Tables A-1 and A-2 of [4], $w_{i(s)}$ is the inverse probability of selection for the i^{th} intersection in the s^{th} strata and $w_{v(i,s,t,d,k)}$ is inverse of the probability of observing the k^{th} child carrying vehicle at the i^{th} intersection in the s^{th} strata at time t and day d . The latter quantity was estimated as the ratio of the total number of vehicles with child occupants observed at the intersection during

the survey period to the total number of vehicles that passed through the intersection during the survey period. This would in fact introduce some sort of post stratification adjustments to the strata weights.

There have been several intersection changes from the originally drawn samples and several deviations from the randomly scheduled times and days due to the limitations of weather and travel limitations for observers to reach each intersection site at the selected time. In the analysis, we have used the actual day in which the survey was completed, although it might be different from the originally planned one. The weight of the new day would be again equal to the theoretical weight from Table A-1 in reference [4]. The time weights were also calculated wherever necessary by assuming that the percentages in Table A-2 of reference [4] are uniformly distributed within each time period. Therefore, if an actual time of survey does not match the original time periods in Table A-2 in reference [4], but rather intersects with two adjacent time periods, we calculated the sampling weight for the actual period as weighted average of the weights of the two periods it intersects.

In this analysis missing data were ignored under the assumption that the missingness is completely at random and therefore, only complete-case analyses were performed. However, in future designs of similar surveys, we could compute adjusted weights in order to account for possible missingness in the data collection process.

All the weighted analyses were performed by using the PROC SURVEYFREQ and PROC SURVEYMEANS of the SAS software and all descriptive statistics were generated by using the SPSS software.

3. Results

3.1 Sample

In total, 170 intersection sites were completed in this study. All intersections that were deemed inappropriate for the survey (based on safety of the observers or inadequate volume of vehicles) were replaced with alternate intersections randomly selected using the same sampling procedure as illustrated in section 2.2. The majority of failed sites were related to low traffic volumes (<10 vehicles/hour). Even when these sites were replaced with sites in the same U1 – U6 category, the sites remained failed due to low traffic volume. Thus, the sites included in the analysis are described in Table 1.

A total of 7,307 vehicles with 9,772 child passengers were observed for the 2010 Child Restraint Study. One survey form had insufficient information to be included in the study and was subsequently excluded from the study. Number of vehicles observed in each province and territory is illustrated in Table 4.

Distribution of children observed in each province and territory is illustrated in Table 5.

Table 5: Total Number and Distribution of Vehicles per Province and Territory

Province	Vehicles	
	Observed	Percent
NF	288	3.9
PEI	198	2.7
NS	347	4.7
NB	275	3.8
QC	1518	20.8
ON	1406	19.2
MB	653	8.9
SK	470	6.4
AB	280	3.8
BC	944	12.9
YT	580	7.9
NT	348	4.8
Total	7307	100.0

NF = Newfoundland and Labrador
 PEI = Prince Edward Island
 NS = Nova Scotia
 NB = New Brunswick
 QC = Quebec
 ON = Ontario

MB = Manitoba
 SK = Saskatchewan
 AB = Alberta
 BC = British Columbia
 YT = Yukon Territory
 NT = Northwest Territory

Table 5: Total Number and Distribution of Children per Province and Territory

Province	Frequency	Percent
NF	393	4.0
PEI	263	2.7
NS	460	4.7
NB	383	3.9
QC	1981	20.3
ON	1919	19.6
MB	908	9.3
SK	609	6.2
AB	384	3.9
BC	1271	13.0
YK	749	7.7
NT	452	4.6
Total	9772	100.0

Based on the above results we calculated that the average number of children per vehicle was between 1.3 – 1.4.

Of the 7,308 vehicles observed for this study, 3,452 (47.2%) vehicles had male drivers and 3,818 (52.2%) had female drivers. The gender information was missing in 37 survey forms which mean that the data collectors either did not have sufficient time to note the driver's gender or was not sure if the driver was male or female. Total number of male and female drivers is described in Table 6. Number of male and female drivers observed in each province and territory is illustrated in Table 7.

Table 6: Gender of Drivers

Gender	Frequency	Percent (%)
Male	3452	47.2
Female	3818	52.2
Total	7270	99.5
Missing	37	.5
Total	7307	100.0

Table 7: Gender of Drivers per Province and Territory

Province		Sex		Total
		Male	Female	
NF	Count	116	172	288
	% within Province	40.3%	59.7%	100.0%
PEI	Count	65	133	198
	% within Province	32.8%	67.2%	100.0%
NS	Count	114	233	347
	% within Province	32.9%	67.1%	100.0%
NB	Count	116	159	275
	% within Province	42.2%	57.8%	100.0%
QC	Count	702	810	1512
	% within Province	46.4%	53.6%	100.0%
ON	Count	716	685	1401
	% within Province	51.1%	48.9%	100.0%
MB	Count	382	268	650
	% within Province	58.8%	41.2%	100.0%
SK	Count	212	255	467
	% within Province	45.4%	54.6%	100.0%
AB	Count	112	162	274
	% within Province	40.9%	59.1%	100.0%
BC	Count	460	472	932
	% within Province	49.4%	50.6%	100.0%
YT	Count	254	324	578
	% within Province	43.9%	56.1%	100.0%
NT	Count	203	145	348
	% within Province	58.3%	41.7%	100.0%
Total	Count	3452	3818	7270
	% within Province	47.5%	52.5%	100.0%

The largest population of drivers observed for this study was Caucasian (N = 5,960; 81.6%) followed by Aboriginal (N = 323; 4.4%), Asian (N = 220; 3.0%), Southeast Asian (N = 206; 2.8%), African Canadian (N = 152; 2.1%), and Middle Eastern (N = 123; 1.7%).

In this survey, the term “Southeast Asian” was used to identify people from India, Bangladesh, Pakistan, etc. The purpose was to distinguish Eastern Asians (e.g., China, Japan, and Korea) from regions south of China. While we realize that this is not a very accurate or politically correct method of classification, it was a cursory attempt to account for ethnicity of drivers at a very minimally detailed level.

The ethnicity information was missing from 323 survey forms (4.4%). Data collectors either did not have sufficient time to note the driver’s ethnicity or were not sure which ethnicity the driver belonged to. The observation of ethnicity of drivers was intended as a broad estimate of ethnicity and not a detailed or exhaustive examination due to the limitations of naturalistic observational methods. The number of drivers based on ethnicity is described in Table 8. Number of drivers observed in each province and territory based on ethnicity is illustrated in Table 9.

Table 8: Driver Ethnicity

	Frequency	Percent (%)	Valid Percent
Asian	220	3.0	3.1
SE Asian*	206	2.8	2.9
Aboriginal	323	4.4	4.6
Middle Eastern	123	1.7	1.8
African Canadian	152	2.1	2.2
Caucasian	5960	81.6	85.3
Total	6984	95.6	100.0
Missing	323	4.4	0
Total	7307	100.0	100.0

*SE Asian = Southeast Asian

Table 9: Ethnicity of Drivers per Province and Territory

Province		Ethnicity					Total	
		Asian	SE Asian	Aboriginal	Middle Eastern	African Canadian		Caucasian
NF	Count	1	0	3	1	1	278	284
	% within Province	.4%	.0%	1.1%	.4%	.4%	97.9%	100.0%
PE	Count	0	1	0	0	0	193	194
	% within Province	.0%	.5%	.0%	.0%	.0%	99.5%	100.0%
NS	Count	1	0	3	0	5	336	345
	% within Province	.3%	.0%	.9%	.0%	1.4%	97.4%	100.0%
NB	Count	2	0	1	0	1	270	274
	% within Province	.7%	.0%	.4%	.0%	.4%	98.5%	100.0%
QC	Count	37	1	3	31	36	1361	1469
	% within Province	2.5%	.1%	.2%	2.1%	2.5%	92.6%	100.0%
ON	Count	81	91	5	48	65	1099	1389
	% within Province	5.8%	6.6%	.4%	3.5%	4.7%	79.1%	100.0%
MB	Count	30	15	62	15	23	501	646
	% within Province	4.6%	2.3%	9.6%	2.3%	3.6%	77.6%	100.0%
SK	Count	6	4	45	6	4	366	431
	% within Province	1.4%	.9%	10.4%	1.4%	.9%	84.9%	100.0%
AB	Count	8	1	27	1	1	233	271
	% within Province	3.0%	.4%	10.0%	.4%	.4%	86.0%	100.0%
BC	Count	33	68	55	14	8	729	907
	% within Province	3.6%	7.5%	6.1%	1.5%	.9%	80.4%	100.0%
YT	Count	6	20	68	1	1	474	570
	% within Province	1.1%	3.5%	11.9%	.2%	.2%	83.2%	100.0%
NT	Count	15	5	51	6	7	120	204
	% within Province	7.4%	2.5%	25.0%	2.9%	3.4%	58.8%	100.0%
Total	Count	220	206	323	123	152	5960	6984
	% within Province	3.2%	2.9%	4.6%	1.8%	2.2%	85.3%	100.0%

3.2 Descriptive Statistics for Child Occupants in Vehicles

A total of 9,615 child passengers were observed for both age and type of child seat in the 2010 Child Restraint Report. Of these, 402 (4.2%) were not restrained, not using any type of child seat or vehicle restraint such as a seat belt. Approximately 5.1% of children between ages 4-8 years were not restrained in vehicles. The 9-14 year age group rated second highest in unrestrained seating at 4.4%.

National data of child restraint status for different age groups is illustrated in Table 10a. The total number of children in Table 10a is smaller than the number in Table 5 because 157 child passengers had missing data and were excluded from the analysis.

Table 10b summarizes the different types of restraining seat for children observed in this survey.

Restraint status of children less than 1 year, between 1-3 years, between 4-8 years, and between 9-14 years is illustrated in Tables 11, 12, 13, 14, respectively.

Manitoba (8.7%) and Saskatchewan (8.7%) had the highest rate of children unrestrained in a moving vehicle. Yukon Territory (0.4%) had the lowest rate of unrestrained children in vehicles. Table 15 shows the restraint status of children per province and territory.

Table 10a: Child Restraint Status

AGE	RESTRAINT USE							Total
	Not restrained	Can't see	Rear-facing infant seat	Rear-facing convertible	Forward-facing convertible	Booster seat	Seat belt	
< 1 year	9 1.6%	3 .5%	437 75.5%	83 14.3%	46 7.9%	0 .0%	1 .2%	579 100.0%
1-3 years	60 2.9%	40 1.9%	23 1.1%	65 3.1%	1693 81.5%	91 4.4%	105 5.1%	2077 100.0%
4-8 years	205 5.1%	293 7.2%	0 .0%	0 .0%	322 8.0%	1289 31.8%	1939 47.9%	4048 100.0%
9-14 years	128 4.4%	92 3.2%	0 .0%	0 .0%	2 .1%	25 .9%	2664 91.5%	2911 100.0%
Total	402 4.2%	428 4.5%	460 4.8%	148 1.5%	2063 21.5%	1405 14.6%	4709 49.0%	9615 100.0%

Table 10b: Type of Restraints Observed for Child Occupants

<i>Restrained?</i>	<i>Frequency</i>	<i>Percent</i>
Yes	8785	91.4%
No	402	4.2%
Can't see	428	4.5%
<i>Types of Restraint</i>		
Rear-facing infant seat	460	4.8%
Rear-facing convertible	148	1.5%
Forward-facing convertible	2063	21.5%
Booster seat	1405	14.6%
Seat belt	4709	49.0%

Table 11: Restraint Status of Infants Less Than 1 Year per Province and Territory

PROVINCE	RESTRAINED							Total
	Not restrained	Can't see	Rear-facing infant seat	Rear-facing convertible	Forward-facing convertible	Booster seat	Seat belt	
NF	0 .0%	0 .0%	20 60.6%	10 30.3%	3 9.1%	0 .0%	0 .0%	33 100.0%
PEI	0 .0%	0 .0%	11 50.0%	9 40.9%	2 9.1%	0 .0%	0 .0%	22 100.0%
NS	0 .0%	0 .0%	21 72.4%	6 20.7%	2 6.9%	0 .0%	0 .0%	29 100.0%
NB	0 .0%	0 .0%	16 76.2%	5 23.8%	0 .0%	0 .0%	0 .0%	21 100.0%
QC	0 .0%	0 .0%	63 75.9%	11 13.3%	9 10.8%	0 .0%	0 .0%	83 100.0%
ON	2 1.5%	0 .0%	97 74.6%	20 15.4%	11 8.5%	0 .0%	0 .0%	130 100.0%
MB	2 3.8%	0 .0%	40 75.5%	11 20.8%	0 .0%	0 .0%	0 .0%	53 100.0%
SK	2 3.8%	1 1.9%	41 77.4%	4 7.5%	5 9.4%	0 .0%	0 .0%	53 100.0%
AB	0 .0%	1 4.5%	15 68.2%	0 .0%	6 27.3%	0 .0%	0 .0%	22 100.0%
BC	3 3.4%	0 .0%	73 82.0%	6 6.7%	7 7.9%	0 .0%	0 .0%	89 100.0%
YT	0 .0%	0 .0%	31 93.9%	1 3.0%	1 3.0%	0 .0%	0 .0%	33 100.0%
NT	0 .0%	1 9.1%	9 81.8%	0 .0%	0 .0%	0 .0%	1 9.1%	11 100.0%
Total	9 1.6%	3 .5%	437 75.5%	83 14.3%	46 7.9%	0 .0%	1 .2%	579 100.0%

NF = Newfoundland and Labrador
 PEI = Prince Edward Island
 NS = Nova Scotia
 NB = New Brunswick
 QC = Quebec
 ON = Ontario

MB = Manitoba
 SK = Saskatchewan
 AB = Alberta
 BC = British Columbia
 YT = Yukon Territory
 NT = Northwest Territories

Table 12: Restraint Status of Child Between 1-3 years of Age per Province and Territory

PROVINCE	RESTRAINED							Total
	Not restrained	Can't see	Rear-facing infant seat	Rear-facing convertible	Forward-facing convertible	Booster seat	Seat belt	
NF	1 1.1%	0 .0%	0 .0%	0 .0%	89 95.7%	3 3.2%	0 .0%	93 100.0%
PEI	0 .0%	1 1.6%	0 .0%	0 .0%	53 85.5%	7 11.3%	1 1.6%	62 100.0%
NS	0 .0%	1 1.0%	1 1.0%	4 4.1%	84 85.7%	6 6.1%	2 2.0%	98 100.0%
NB	0 .0%	0 .0%	0 .0%	2 2.3%	83 94.3%	1 1.1%	2 2.3%	88 100.0%
QC	3 .7%	3 .7%	4 1.0%	20 5.0%	347 86.1%	8 2.0%	18 4.5%	403 100.0%
ON	3 .6%	0 .0%	2 .4%	12 2.6%	376 80.9%	34 7.3%	38 8.2%	465 100.0%
MB	15 8.1%	1 .5%	2 1.1%	4 2.2%	141 75.8%	11 5.9%	12 6.5%	186 100.0%
SK	12 8.6%	5 3.6%	1 .7%	3 2.1%	100 71.4%	4 2.9%	15 10.7%	140 100.0%
AB	11 9.4%	10 8.5%	0 .0%	1 .9%	87 74.4%	1 .9%	7 6.0%	117 100.0%
BC	12 5.4%	9 4.0%	2 .9%	5 2.2%	174 77.7%	14 6.3%	8 3.6%	224 100.0%
YT	2 1.7%	4 3.3%	2 1.7%	3 2.5%	109 90.1%	1 .8%	0 .0%	121 100.0%
NT	1 1.3%	6 7.5%	9 11.3%	11 13.8%	50 62.5%	1 1.3%	2 2.5%	80 100.0%
Total	60 2.9%	40 1.9%	23 1.1%	65 3.1%	1693 81.5%	91 4.4%	105 5.1%	2077 100.0%

Table 13: Restraint Status of Child Between 4-8 Years per Province and Territory

PROVINCE	RESTRAINED							Total
	Not restrained	Can't see	Rear-facing infant seat	Rear-facing convertible	Forward-facing convertible	Booster seat	Seat belt	
NF	6 3.6%	1 .6%	0 .0%	0 .0%	8 4.8%	106 63.1%	47 28.0%	168 100.0%
PEI	4 3.5%	2 1.8%	0 .0%	0 .0%	5 4.4%	51 44.7%	52 45.6%	114 100.0%
NS	6 3.0%	0 .0%	0 .0%	0 .0%	8 4.0%	87 43.3%	100 49.8%	201 100.0%
NB	2 1.2%	9 5.2%	0 .0%	0 .0%	4 2.3%	101 58.7%	56 32.6%	172 100.0%
QC	23 3.0%	6 .8%	0 .0%	0 .0%	35 4.6%	189 25.0%	504 66.6%	757 100.0%
ON	33 4.3%	4 .5%	0 .0%	0 .0%	49 6.3%	191 24.7%	495 64.1%	772 100.0%
MB	43 11.7%	9 2.5%	0 .0%	0 .0%	77 21.0%	70 19.1%	168 45.8%	367 100.0%
SK	26 10.7%	22 9.1%	0 .0%	0 .0%	31 12.8%	32 13.2%	131 54.1%	242 100.0%
AB	14 9.9%	20 14.2%	0 .0%	0 .0%	20 14.2%	45 31.9%	42 29.8%	141 100.0%
BC	45 7.9%	63 11.1%	0 .0%	0 .0%	18 3.2%	211 37.2%	230 40.6%	567 100.0%
YT	0 .0%	144 41.6%	0 .0%	0 .0%	7 2.0%	167 48.3%	28 8.1%	346 100.0%
NT	3 1.5%	13 6.5%	0 .0%	0 .0%	60 29.9%	39 19.4%	86 42.8%	201 100.0%
Total	205 5.1%	293 7.2%	0 .0%	0 .0%	322 8.0%	1289 31.8%	1939 47.9%	4048 100.0%

Table 14: Restraint Status of Child Between 9 to14 Years per Province and Territory

PROVINCE	RESTRAINED							Total
	Not restrained	Can't see	Rear-facing infant seat	Rear-facing convertible	Forward-facing convertible	Booster seat	Seat belt	
NF	3 3.2%	0 .0%	0 .0%	0 .0%	0 .0%	2 2.1%	90 94.7%	95 100.0%
PEI	1 1.6%	0 .0%	0 .0%	0 .0%	0 .0%	1 1.6%	62 96.9%	64 100.0%
NS	2 1.5%	1 .8%	0 .0%	0 .0%	0 .0%	0 .0%	129 97.7%	132 100.0%
NB	0 .0%	2 2.0%	0 .0%	0 .0%	0 .0%	0 .0%	100 98.0%	102 100.0%
QC	40 5.7%	8 1.1%	0 .0%	0 .0%	0 .0%	3 .4%	651 92.7%	702 100.0%
ON	26 4.8%	1 .2%	0 .0%	0 .0%	1 .2%	9 1.7%	504 93.2%	541 100.0%
MB	18 6.1%	2 .7%	0 .0%	0 .0%	0 .0%	4 1.4%	271 91.9%	295 100.0%
SK	11 7.2%	14 9.2%	0 .0%	0 .0%	0 .0%	1 .7%	127 83.0%	153 100.0%
AB	1 1.1%	3 3.4%	0 .0%	0 .0%	0 .0%	1 1.1%	84 94.4%	89 100.0%
BC	21 5.7%	25 6.8%	0 .0%	0 .0%	1 .3%	2 .5%	318 86.6%	367 100.0%
YT	1 .5%	33 15.3%	0 .0%	0 .0%	0 .0%	1 .5%	181 83.8%	216 100.0%
NT	4 2.6%	3 1.9%	0 .0%	0 .0%	0 .0%	1 .6%	147 94.8%	155 100.0%
Total	128 4.4%	92 3.2%	0 .0%	0 .0%	2 .1%	25 .9%	2664 91.5%	2911 100.0%

Table 15: Restraint Status for All Children (all ages) per Province and Territory

PROVINCE	RESTRAINED							Total
	Not restrained	Can't see	Rear-facing infant seat	Rear-facing convertible	Forward-facing convertible	Booster seat	Seat belt	
NF	10 2.6%	1 .3%	20 5.1%	10 2.6%	100 25.7%	111 28.5%	137 35.2%	389 100.0%
PEI	5 1.9%	3 1.1%	11 4.2%	9 3.4%	60 22.9%	59 22.5%	115 43.9%	262 100.0%
NS	8 1.7%	2 .4%	22 4.8%	10 2.2%	94 20.4%	93 20.2%	231 50.2%	460 100.0%
NB	2 .5%	11 2.9%	16 4.2%	7 1.8%	87 22.7%	102 26.6%	158 41.3%	383 100.0%
QC	66 3.4%	17 .9%	67 3.4%	31 1.6%	391 20.1%	200 10.3%	1173 60.3%	1945 100.0%
ON	64 3.4%	5 .3%	99 5.2%	32 1.7%	437 22.9%	234 12.3%	1037 54.4%	1908 100.0%
MB	78 8.7%	12 1.3%	42 4.7%	15 1.7%	218 24.2%	85 9.4%	451 50.1%	901 100.0%
SK	51 8.7%	42 7.1%	42 7.1%	7 1.2%	136 23.1%	37 6.3%	273 46.4%	588 100.0%
AB	26 7.0%	34 9.2%	15 4.1%	1 .3%	113 30.6%	47 12.7%	133 36.0%	369 100.0%
BC	81 6.5%	97 7.8%	75 6.0%	11 .9%	200 16.0%	227 18.2%	556 44.6%	1247 100.0%
YT	3 .4%	181 25.3%	33 4.6%	4 .6%	117 16.3%	169 23.6%	209 29.2%	716 100.0%
NT	8 1.8%	23 5.1%	18 4.0%	11 2.5%	110 24.6%	41 9.2%	236 52.8%	447 100.0%
Total	402 4.2%	428 4.5%	460 4.8%	148 1.5%	2063 21.5%	1405 14.6%	4709 49.0%	9615 100.0%

Table 16a shows the child passenger's age and location of seating in the vehicle. Table 16b illustrates the location child passengers in the vehicle by province/territory. Location of children less than 1 year, between 1-3 years, between 4-8 years, and between 9-14 years is illustrated in Tables 17, 18, 19, 20, respectively.

Table 16a: Location of all Child Occupants in the Vehicle by Age

AGE	LOCATION		Total
	Front seat	Back seat	
< 1 year	18	519	537
	3.4%	96.6%	100.0%
	.8%	7.4%	5.8%
	.2%	5.6%	5.8%
1-3 years	72	1886	1958
	3.7%	96.3%	100.0%
	3.2%	27.1%	21.3%
	.8%	20.5%	21.3%
4-8 years	678	3197	3875
	17.5%	82.5%	100.0%
	30.3%	45.9%	42.1%
	7.4%	34.7%	42.1%
9-14 years	1471	1368	2839
	51.8%	48.2%	100.0%
	65.7%	19.6%	30.8%
	16.0%	14.9%	30.8%
Total	2239	6970	9209
	24.3%	75.7%	100.0%

Table 16b: Location of all Child Occupants in the Vehicle by Province

PROVINCE	LOCATION		Total
	Front seat	Back seat	
NF	46	332	378
	12.2%	87.8%	100.0%
PEI	50	206	256
	19.5%	80.5%	100.0%
NS	104	348	452
	23.0%	77.0%	100.0%
NB	78	301	379
	20.6%	79.4%	100.0%
QC	567	1269	1836
	30.9%	69.1%	100.0%
ON	341	1514	1855
	18.4%	81.6%	100.0%
MB	183	699	882
	20.7%	79.3%	100.0%
SK	158	406	564
	28.0%	72.0%	100.0%
AB	69	282	351
	19.7%	80.3%	100.0%
BC	312	862	1174
	26.6%	73.4%	100.0%
YT	201	463	664
	30.3%	69.7%	100.0%
NT	130	288	418
	31.1%	68.9%	100.0%
Total	2239	6970	9209
	24.3%	75.7%	100.0%

Table 17: Location of Infant Occupants in vehicle (Age < 1 year)

PROVINCE	LOCATION		Total
	Front seat	Back seat	
NF	0 .0%	32 100.0%	32 100.0%
PEI	1 4.5%	21 95.5%	22 100.0%
NS	1 3.4%	28 96.6%	29 100.0%
NB	0 .0%	19 100.0%	19 100.0%
QC	0 .0%	75 100.0%	75 100.0%
ON	1 .8%	118 99.2%	119 100.0%
MB	1 1.9%	52 98.1%	53 100.0%
SK	5 10.2%	44 89.8%	49 100.0%
AB	0 .0%	19 100.0%	19 100.0%
BC	6 7.3%	76 92.7%	82 100.0%
YT	2 7.1%	26 92.9%	28 100.0%
NT	1 10.0%	9 90.0%	10 100.0%
Total	18 3.4%	519 96.6%	537 100.0%

Table 18: Location of Young Children (Age 1-3 years) in Vehicle

PROVINCE	LOCATION		Total
	Front seat	Back seat	
NF	0 .0%	92 100.0%	92 100.0%
PEI	2 3.3%	58 96.7%	60 100.0%
NS	5 5.2%	92 94.8%	97 100.0%
NB	2 2.3%	85 97.7%	87 100.0%
QC	6 1.6%	359 98.4%	365 100.0%
ON	13 2.9%	437 97.1%	450 100.0%
MB	5 2.8%	176 97.2%	181 100.0%
SK	14 10.5%	119 89.5%	133 100.0%
AB	2 1.8%	109 98.2%	111 100.0%
BC	11 5.3%	197 94.7%	208 100.0%
YT	10 10.3%	87 89.7%	97 100.0%
NT	2 2.6%	75 97.4%	77 100.0%
Total	72 3.7%	1886 96.3%	1958 100.0%

Table 19: Location of School Age Child Occupants (4-8 years) in Vehicles

PROVINCE	LOCATION		Total
	Front seat	Back seat	
NF	10 6.0%	156 94.0%	166 100.0%
PEI	15 13.4%	97 86.6%	112 100.0%
NS	32 16.2%	165 83.8%	197 100.0%
NB	14 8.2%	157 91.8%	171 100.0%
QC	172 23.9%	548 76.1%	720 100.0%
ON	94 12.6%	655 87.4%	749 100.0%
MB	60 16.6%	301 83.4%	361 100.0%
SK	60 26.2%	169 73.8%	229 100.0%
AB	26 19.1%	110 80.9%	136 100.0%
BC	110 20.6%	423 79.4%	533 100.0%
YT	59 18.6%	259 81.4%	318 100.0%
NT	26 14.2%	157 85.8%	183 100.0%
Total	678 17.5%	3197 82.5%	3875 100.0%

Table 20: Location of Older Child Occupants (9-14 years) in Vehicles

PROVINCE	LOCATION		Total
	Front seat	Back seat	
NF	36 40.9%	52 59.1%	88 100.0%
PEI	32 51.6%	30 48.4%	62 100.0%
NS	66 51.2%	63 48.8%	129 100.0%
NB	62 60.8%	40 39.2%	102 100.0%
QC	389 57.5%	287 42.5%	676 100.0%
ON	233 43.4%	304 56.6%	537 100.0%
MB	117 40.8%	170 59.2%	287 100.0%
SK	79 51.6%	74 48.4%	153 100.0%
AB	41 48.2%	44 51.8%	85 100.0%
BC	185 52.7%	166 47.3%	351 100.0%
YT	130 58.8%	91 41.2%	221 100.0%
NT	101 68.2%	47 31.8%	148 100.0%
Total	1471 51.8%	1368 48.2%	2839 100.0%

3.3 Weighted Estimates of Correct Child Seat Use

The rates of correct use of child safety seats are estimated at 64.17% at the national level. This figure is illustrated in Table 21.

Table 22 shows the weighed estimates of correct use of child safety seats by province/territory. Yukon Territory had the highest level of correct child safety seat usage at 91.48%. Saskatchewan had the lowest level of correct child safety seat use at 53.47%.

The highest percentage of unrestrained children occurred in the 4-8 year age group (approximately 5.2%) as illustrated in Table 23. The lowest number of unrestrained children was ages <1 year at 1.3%.

Table 21: National Weighted Estimates of Correct Child Restraint Seat Use

	Proportion	Weighted Estimate	Standard Error	95% Confidence Interval	
				Lower	Upper
Percentage	67.07%	64.17%	1.12%	61.97%	66.36%

Table 22: Weighted Estimates of Correct Child Restraint Seat Use by Province

Province	Proportion	Weighted Estimate	Standard Error	95% Confidence Interval	
				Lower	Upper
NF	81.19%	81.40%	2.17%	77.12%	85.68%
PEI	70.67%	70.37%	3.53%	63.41%	77.34%
NS	71.40%	72.79%	2.42%	68.03%	77.55%
NB	81.99%	82.84%	2.33%	78.25%	87.43%
QC	65.40%	63.98%	1.52%	61.00%	66.96%
ON	62.46%	61.43%	1.83%	57.84%	65.01%
MB	59.96%	57.16%	4.56%	48.20%	66.11%
SK	55.68%	53.47%	2.86%	47.85%	59.09%
AB	68.96%	71.25%	4.35%	62.68%	79.83%
BC	68.00%	68.21%	3.36%	61.62%	74.80%
YT	91.40%	91.48%	1.32%	88.88%	94.08%
NT	57.78%	56.24%	2.64%	51.04%	61.44%

Table 23: National Frequency and Weighted Percent of Restraints for Each Age Group

AGE	RESTRAINED	Frequency	Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent	
< 1 year	Not restrained	9	1.3450	0.5895	0.1894	2.5007
	Cannot see	3	0.3825	0.3251	0.0000	1.0198
	Rear-facing	433	75.0875	2.9051	69.3926	80.7824
	Rear-facing convertible	82	13.7475	2.1644	9.5046	17.9903
	Forward-facing convertible	46	9.4189	2.0928	5.3163	13.5215
	Seat belt	1	0.0186	0.0186	0.0000	0.0550
1-3 years	Not restrained	60	3.1874	1.2694	0.6990	5.6758
	Cannot see	39	2.1669	0.6911	0.8122	3.5216
	Rear-facing	23	0.7762	0.2412	0.3033	1.2490
	Rear-facing convertible	65	2.1726	0.3728	1.4418	2.9034
	Forward-facing convertible	1683	76.7985	2.1801	72.5249	81.0721
	Booster seat	89	6.0310	1.3209	3.4416	8.6204
	Seat belt	105	8.8673	1.5503	5.8284	11.9063
4-8 years	Not restrained	205	5.1763	0.7923	3.6231	6.7294
	Cannot see	293	7.1630	0.9931	5.2162	9.1098
	Forward-facing convertible	319	10.9370	1.7069	7.5910	14.2830
	Booster seat	1279	26.4624	1.4048	23.7086	29.2162
	Seat belt	1931	50.2613	1.8354	46.6634	53.8593
> 9 years	Not restrained	128	4.0002	0.5147	2.9911	5.0093
	Cannot see	92	3.0159	0.4363	2.1607	3.8711
	Forward-facing convertible	2	0.0083	0.0063	0.0000	0.0207
	Booster seat	25	0.9400	0.2699	0.4109	1.4690
	Seat belt	2650	92.0356	0.7310	90.6025	93.4686

3.4 Discussion

Overall, at the national level, the rates of premature transitions seem to have decreased in the four year period between 2006 and 2010. For instance, infants in forward facing car seats has reduced from 37% in 2006 to 9% in 2010, while premature transition from forward facing seats to booster seats has decreased among toddlers from 13% to 6% and similarly premature transition of school aged children to seat belt has decreased from 63% to 50%.

There are substantial differences between regions in levels of correct child seat use and unrestrained children in vehicles in Canada. The region with the highest level of correct use of child seat was the Yukon Territory at 91.48%. The region with the lowest level of correct use of child seat was Saskatchewan at 53.47%. The region with the highest level of unrestrained children in a moving vehicle was Manitoba and Saskatchewan with 8.7% each. The region with the lowest level of unrestrained children in a moving vehicle was the Yukon Territory at 0.4%.

The rate of correct use of child safety seats in Canada has not achieved the Road Safety 2010 target of 95%. In the 2010 survey 91.4% of the population was using some type of child restraint in a moving vehicle.

The age group with the lowest rates of correct use of child safety seats was the school aged children (ages 4 to 8) at 39.8%.

The rate of non-use remains unchanged from the previous 1997 survey.

Direct comparison between this year's survey results and the results of the 2006 reports are difficult due to change in the data collection procedure. For example, correct use of child restraint seat for 2006 report was based on the child's height and weight while for the 2010 survey; appropriate child seat was strictly based on the child's age.

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