Puerto Rico

Car Seat Use

Observational Survey

CST CAMPAIGN DATE: 2025-APR 7-14

Submitted to: Comisión de Seguridad del Tránsito de Puerto Rico

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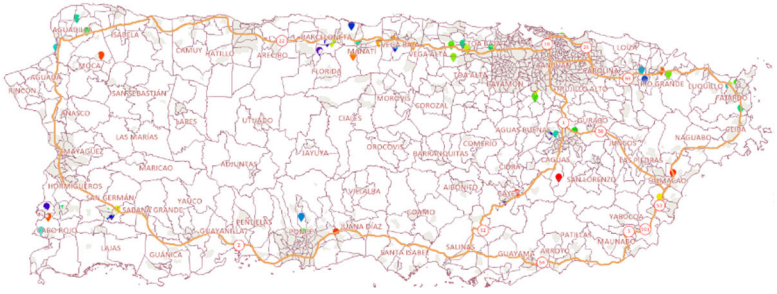
AGENTES & CONSULTORES

2. Car Seat Observational Survey

The Car Seat Observational Survey is an annual study aimed at assessing the proper use of child safety seats among vehicle occupants in Puerto Rico. Conducted in accordance with NHTSA recommendations and consistent with the methodological principles of 23 CFR § 1340.8(c), this observational survey gathers data across multiple counties and road segments. Trained observers record information on the correct use, age-appropriateness, and positioning of car seats without interacting with drivers. The findings help evaluate the effectiveness of educational campaigns and guide future interventions to improve child passenger safety and compliance with child restraint laws across the island.

Category	Description
Survey	NHTSA-Compliant Observational Study
Method	Roadside Observational Study
Sample Size	6,800+ vehicle observations across 58 segments, 17 PSUs, 68 SSUs
Focus	Child restraint uses in real traffic conditions
Purpose	Assess compliance with child safety seat laws
Main Content	Type, proper use, and presence of child seats
Participant Profile	Children aged 0–8 and their guardians

REGION	MUNICIPIOS	PSU #	SSU #
North	BARCELONETA, DORADO, MANATI, TOA BAJA, VEGA BAJA	5	20
West	AGUADILLA, CABO ROJO, SAN GERMÁN	3	12
South	CAYEY, PONCE	2	8
East	CAGUAS, FAJARDO, HUMACAO, RIO GRANDE	4	16
Metro	BAYAMON, GUAYNABO, SAN JUAN	3	12
5	TOTAL	17	68



2025 Observations Sites

#	PSU	PSU	SSU	Road Name	Long	Latitude	Length	Prob_Selec	Prob_ Overall
1	North	BARCELONETA	road #1	Expreso Jose de Diego	-66.543267	18.44154	37	0.033376	0.0006007
2	North	BARCELONETA	road #1	Pr-2	-66.549318	18.43392	120.8	0.0262187	0.0004721
3	North	BARCELONETA	road #1	Cll 10	-66.577102	18.41587	147.8	0.0040745	0.0000734
4	North	BARCELONETA	road #2	Cll Dorada	-66.559151	18.43415	40.9	0.0080454	0.000145
5	North	DORADO	road #1	Expreso Jose de Diego	-66.286862	18.42837	160.1	0.1830936	0.050486
6	North	DORADO	road #1	Pr-2	-66.282166	18.40351	72.4	0.0011613	0.0003202
7	North	DORADO	road #1	Pr-6693	-66.26085	18.43059	162.2	0.0024834	0.0006846
8	North	DORADO	road #2	100 Fairways Village Dr	-66.506672	18.46904	285.1	0.0041211	0.0011363
9	North	MANATI	road #1	Expreso Jose de Diego	-66.502546	18.40582	134.8	0.0019665	0.0005427
10	North	MANATI	road #1	Pr-2	-66.445996	18.4336	79.5	0.0009252	0.0002933
11	North	MANATI	road #1	Cll Vendig	-66.488125	18.42986	13.1	0.0001906	0.0000602
12	North	MANATI	road #2	Pr-686	-66.490614	18.42871	302.1	0.04963	0.0129419
13	North	TOA BAJA	road #1	Expreso Jose de Diego	-66.250376	18.41818	277.9	0.015072	0.0089483
14	North	TOA BAJA	road #1	Pr-165	-66.251495	18.42147	193.6	0.0075516	0.0042781
15	North	TOA BAJA	road #1	Pr-863	-66.198403	18.42384	171.2	0.0009788	0.0005532
16	North	TOA BAJA	road #2	Pr-866	-66.186932	18.42356	552	0.0013838	0.0008123
17	North	VEGA BAJA	road #1	Expreso Jose de Diego	-66.370392	18.42786	420.2	0.0169936	0.0166653
18	North	VEGA BAJA	road #1	Pr-2	-66.412395	18.44382	268.3	0.0027345	0.002314
19	North	VEGA BAJA	road #1	Cll Inocencio Rey	-66.407952	18.42854	31.5	0.0002537	0.0001914
20	North	VEGA BAJA	road #2	Ave Jesus M Armaiz	-66.410275	18.42381	227.6	0.0017071	0.0014446
21	West	AGUADILLA	road #1	Pr-2	-67.057284	18.40648	149.1	0.001043	0.0007519
22	West	AGUADILLA	road #2	Pr-442	-67.155167	18.42278	41.9	0.0005604	0.0004038
23	West	AGUADILLA	road #3	Pr- 465	-67.089146	18.45777	271.8	0.0036935	0.0019488
24	West	AGUADILLA	road #3	Pr- 110	-67.111081	18.4843	42.1	0.0005627	0.003016
25	West	CABO ROJO	road #1	Pr-100	-67.173295	18.07012	153.1	0.0013534	0.0009606
26	West	CABO ROJO	road #1	Pr-3311	-67.141905	18.08673	45.3	0.0004836	0.0002164
27	West	CABO ROJO	road #2	Cll Legion Americana	-67.773865	18.09056	84.6	0.000963	0.0004311
28	West	CABO ROJO	road #3	Comunidad del Toro	-67.189278	18.04088	85.8	0.0009167	0.000401
29	West	SAN GERMÁN	road #1	Pr-2	-67.021718	18.08503	595.2	0.0441878	0.0131671
30	West	SAN GERMÁN	road #1	Cll Retiro	-67.043131	18.07374	42	0.0004093	0.0001959
31	West	SAN GERMÁN	road #1	Pr-321	-67.034135	18.07334	37	0.0003185	0.0001525
32	West	SAN GERMÁN	road #2	Pr- 166	-67.043558	18.08008	36.8	0.0007531	0.0002244
33	South	CAYEY	road #1	Autopista Luis A Ferre	-66.049482	18.15182	57.6	0.0154584	0.0041316
34	South	CAYEY	road #1	Pr-1	-66.141937	18.11936	39.9	0.0003484	0.0000972
35	South	CAYEY	road #1	Ave Jesus T Pinero	-66.166954	18.10368	60.2	0.00055	0.000153
36	South	CAYEY	road #2	Ave Luis Munoz Riv.Sur	-66.168142	18.10694	84.4	0.000772	0.000215
37	South	PONCE	road #1	Pr- 52	-66.540464	18.0379	91.8	0.0021191	0.002623
38	South	PONCE	road #1	Pr- 10	-66.612264	18.03774	45.4	0.0001711	0.0001671
39	South	PONCE	road #1	Cll Torre	-66.616128	18.07049	76.6	0.0002196	0.0002145
40	South	PONCE	road #2	Ave Tito Castro	-66.609691	18.00791	169.1	0.0001931	0.0003116
41	East	CAGUAS	road #1	Exprs Cruz Ortiz Stella	-66.014559	18.24841	54.6	0.00116	0.001126
42	East	CAGUAS	road #1	Ave Zafiro	-66.055186	18.24252	349.9	0.00252	0.002445
43	East	CAGUAS	road #1	Ave Turabo	-66.073252	18.243	70.5	0.00053	0.000496
44	East	CAGUAS	road #2	Cll Via Grande	-66.070892	18.24004	12.4	0.000046	0.000045
45	East	FAJARDO	road #1	Expres Jose C.Barbosa	-65.648822	18.29589	433.9	0.103323	0.029631
46	East	FAJARDO	road #1	Pr- 3	-65.672853	18.34311	104.5	0.004129	0.001368

#	PSU	PSU	SSU	Road Name	Long	Latitude	Length	Prob_Selec	Prob_Overall
47	East	FAJARDO	road #1	Ave el Conquistador	-65.658338	18.34766	27.5	0.002649	0.000753
48	East	FAJARDO	road #2	Cll Principal	-65.67547	18.3427	30.4	0.002063	0.000564
49	East	HUMACAO	road #1	Expres Jose C. Barbosa	-65.798686	18.16132	518.5	0.010704	0.004947
50	East	HUMACAO	road #1	Pr- 3	-65.827198	18.11012	202.8	0.002285	0.001096
51	East	HUMACAO	road #1	Cll Dufresne	-65.825858	18.15106	112.3	0.001988	0.000952
52	East	HUMACAO	road #2	Blvd Nicanor Vazquez	-65.829133	18.14894	67.4	0.000491	0.000227
53	East	RIO GRANDE	road #1	Pr- 66	-65.807721	18.36818	655.9	0.149338	0.069208
54	East	RIO GRANDE	road #1	Pr- 3	-65.823649	18.37452	7.6	0.000067	0.000027
55	East	RIO GRANDE	road #1	Ave Cambalache	-65.868122	18.37581	225.8	0.001928	0.000787
56	East	RIO GRANDE	road #2	Cll Rescate	-65.860523	18.35629	61	0.001522	0.000621
57	Metro	BAYAMON	road #1	Expreso Jose de Diego	-66.163284	18.42277	286.6	0.002584	0.001882
58	Metro	BAYAMON	road #1	Ave Comerio	-66.177408	18.43196	156.8	0.001063	0.000488
59	Metro	BAYAMON	road #2	Ave Betances	-66.077594	18.39451	53.5	0.001159	0.000422
60	Metro	BAYAMON	road #3	Ave Santa Ana	-66.119165	18.38055	53.5	0.000198	0.000072
61	Metro	GUAYNABO	road #1	Pr- 20	-66.100457	18.33471	359.5	0.012694	0.0037049
62	Metro	GUAYNABO	road #1	Pr-165	-66.105528	18.4137	367.1	0.0038778	0.0011318
63	Metro	GUAYNABO	road #1	Ave Washington	-66.096259	18.36767	53.7	0.0003043	0.000952
64	Metro	GUAYNABO	road #2	Expreso 834	-66.101755	18.31971	576	0.0032618	0.000952
65	Metro	SAN JUAN	road #1	Expreso Roman Baldorioty de Castro	-66.043002	18.44646	199.3	0.002914	0.003168
66	Metro	SAN JUAN	road #1	Pr- 3	-66.017282	18.39702	236	0.001493	0.001633
67	Metro	SAN JUAN	road #1	Ave Dr Jose N Gandara	-66.045754	18.40165	61.7	0.000967	0.00049
68	Metro	SAN JUAN	road #2	Cll Nemesio Canales	-66.077594	18.41069	269.7	0.000456	0.000499

Variable	Definition
Vgc (Active Drivers)	Total number of active drivers in municipality c within region g.
Vgc / Vg	Proportion of active drivers in the municipality relative to the total number of dr
πgc	Cumulative or adjusted probability that the municipality is selected as part of the
certainty	Indicates whether the municipality is selected with certainty (1) or not (0).
Cumulative Population	Cumulative number of active drivers up to that municipality, ordered for systematic selection.
SAMPLE	Indicates whether that municipality was selected in the sample ("Y") or not.
Vg (Región)	Total number of active drivers in the entire region (g).
Vg / ng	Systematic selection interval in the region
ng	Number of municipalities selected in the sample for region g.
Ng	Total number of municipalities in the region.
RS (Random Start)	Random starting point to apply the systematic selection interval.
RS + SI	Second point of systematic selection in the cumulative list.
RS + 2SI	Third point of systematic selection.
RS + 3SI	Fourth point of systematic selection.
SI (Sampling Interval)	Systematic sampling interval. It is obtained by dividing the total target population

INTRODUCTION

The Traffic Safety Commission of Puerto Rico (CST by its Spanish acronym), with the collaboration of Agentes Y Consultores, Inc., conducted the Car Seat Use Observational Survey for 2024. The purpose of the study is to estimate car seat use in Puerto Rico at a specific point in time. The sample design follows the framework approved by the National Highway Traffic Safety Administration (NHTSA) on November 9, 2011. For this year, the survey was conducted on the same roadway sites used in 2024, in accordance with the Uniform Criteria for State Observational Surveys of Seat Belt and Car Seat Use, approved by NHTSA on May 30, 2017.

The fieldwork team was composed of nine (9) trained observers. All members participated in a one-day training session on August 11, 2025. The training covered all aspects of field observation and quality control and was organized into two sections. The first section focused on the objectives of the survey, operational definitions, and data collection protocols. The second section included practical examples, role-playing exercises, and simulated scenarios to prepare observers, counters, and quality control monitors for field conditions.

Observations were conducted from August 16 to August 30, 2024, across seventeen (17) counties, resulting in a total of 7,380 vehicle observations.

METHODOLOGY

The methodology used for this 2025 Car Seat Observational Survey adheres strictly to the Uniform Criteria for State Observational Surveys of Seat Belt and Car Seat Use as established by NHTSA (23 CFR § 1340.8(c)). Data collection was conducted through direct roadside observation by trained field staff, without any driver interaction or notification. The survey design is consistent with the sampling approach approved by NHTSA in 2011 and updated for Puerto Rico in 2017, which introduced a new set of road segments based on the approved uniform criteria.

For the 2025 cycle, the same 68 road segments utilized in 2024 were revisited. The sampling frame was organized using a two-stage stratified design. The Primary Sampling Unit (PSU) was defined as the county, while the Secondary Sampling Unit (SSU) was the individual road segment. Each PSU was stratified by five geographic regions (North, South, East, West, and Metro), based on regional distribution across Puerto Rico.

A total of 17 counties were randomly selected from a frame of 45 eligible counties, after excluding those with fewer than 15% of the state's passenger vehicle occupant fatalities, in accordance with 23 CFR § 1340.5(a)(3). The selection was proportional to the number of active driver's licenses per county, ensuring proper representation of the driving population.

Within each selected county, road segments were stratified by road type: (1) Primary Roads, (2) Secondary Roads, and (3) Local Roads. Four road segments were selected per county, based on CENSUS TIGER/Line® shapefile data, using segment length as the Measure of Size (MOS). This ensured that longer segments had a higher probability of selection, supporting statistical representativeness. Roadway observation scheduling included rotating time-of-day intervals and road direction to reduce bias and capture diverse traffic patterns.

In general, each county's four selected sites were covered in a single weekday. However, adjustments were made when necessary for weather, safety, or sampling compliance. This standardized and regionally stratified sampling methodology ensures that the data is representative of child occupant safety practices in Puerto Rico and fully compliant with federal requirements.

Observations were conducted through direct roadside observation without driver interaction and followed a strict scheduling protocol that ensured data collection occurred across all seven days of the week. Each observation period lasted 45 minutes, followed by an estimated 45-minute travel interval between segments to maintain consistency across sites. Daily starting times were randomly assigned between 6:00 AM and 1:00 PM, ensuring a balanced probability of observation across the 6:00 AM to 6:00 PM timeframe. Site locations were selected deterministically by identifying the first intersection or ramp on each designated road segment, as mapped using TIGER/Line® shapefiles.

Each data collection team consisted of three trained members: two observers recording car seat use, seat belt use, CAR SEAT, and occupant position, and one vehicle counter. The team also recorded the roadway directions of the selected segment and, when more than two directions were present, used random selection to determine the direction to observe. For quality assurance, approximately 6% (4 out of 64 segments) of all observation sites were subject to unannounced visits by an independent monitor to ensure compliance with methodological standards.

To facilitate a thorough analysis of the data collected for this report, the team developed a data form containing several key variables. The field data collection app captured detailed observational data for each vehicle encounter, including the region, municipality, road number, road type, road name, timestamp, date, day of the week, time of day, and daytime group. Additionally, it recorded the observer's initials, municipality of observation, specific street or road segment, and optionally, the last three digits of the vehicle's license plate.

For each vehicle, the app documented the vehicle type, occupant category, estimated age and gender, seat belt usage, driver cellphone use, presence of a child, estimated age of the child, and whether the child was restrained in a car seat, as well as the weather conditions at the start of the observation.

An observation protocol was implemented to guide all fieldwork activities and ensure methodological consistency across teams. This protocol outlined the specific roles of each team member, criteria for selecting the appropriate roadway direction, designated observation points, procedures for identifying eligible vehicles and occupants, and standardized methods for recording observations.

In addition to the primary protocol, four contingency protocols were developed to address special scenarios: (1) temporarily unavailable observation locations, (2) permanently unavailable sites, (3) situations where the nonresponse rate exceeded 10%, and (4) procedures for handling non-usable or incomplete data. These protocols were critical for maintaining the integrity of the sample design, ensuring that selected sample units were adequately represented, and confirming that the survey's standard error did not exceed 2.5 percentage points, in compliance with 23 CFR § 1340.5(b)(2).

For data entry and processing, the analysis utilized PSPP, Microsoft Excel, and R statistical software.

FINDINGS

General Findings

The five (5) regions of Puerto Rico were covered with visits of the 17 counties (four road segments in each county selected for the sample). The number of observations per segment was a minimum of 100 vehicles, for a total of 7,380 observed vehicles and 9,111 occupants (7,380 drivers and 1,515 front passengers). In the 2025 Car Seat Usage Observational Survey, a total of 7,380 cars with 9,111 occupants were observed. Among these, 207 vehicles carried children (2.8%), and 154 of those children were restrained in car seats, resulting in an overall car seat usage rate of 74.4%.

The 68 segments visited were the same as 2024 (following NHTSA procedure) within the same time and days of the week. There was no need to change road segments do to the fact that all observations were completed in each of the 68 roads segments used 2024.

Quality control was conducted in four out of the sixty-eight observed segments (6%). These segments, included in table one, were randomly selected.

TABLE 1: QUALITY CONTROL BY ROAD SEGMENTS

Region	County	Type	Road Segment	Coordinates	Date	Hour
METRO	BAYAMON	Primary	Expreso Jose de Diego	18°25'18"N 66°09'50"W	8/20/2025	8:00 AM
METRO	BAYAMON	Local	Ave. Betances	18°23'35"N 66°10'03"W	8/20/2025	9:00 AM
METRO	SANJUAN	Local	NEMESIOCANALES	18°25'01"N 66°04'37"W	8/19/2025	5:00 PM
EAST	CAGUAS	Secondary	Ave Zafiro	18°14'33"N 66°03'00"W	8/20/2025	10:00 AM

Observers recorded the car seat use information of 7,380 vehicles and 207 children. The number of occupants with unknown belt use was 309 for a nonresponse rate of 3.39% (nonresponse rate =306/9,111).

The overall car seat use measured by combining drivers and passengers (once weights were applied as indicated in the sample design) was 91.32 percent, with a standard error of 0.29 percent.

TABLE 2: WEIGHTED CAR SEAT USE RATE FOR PUERTO RICO 2025

Table 2 includes the number of observations of drivers and passengers per county and region.

Rate of car seat use	Standard Error	95 Percent Confidence Interval	
74.40%	3.00%	68.60%	80.20%

n=207 (Total observations of children)

STANDAR ERROR

The 2025 Car Seat Use Observational Survey in Puerto Rico produced an estimated standard error of approximately 3.0 percentage points, slightly above the federal benchmark of 2.5 percentage points set forth in 23 CFR §1340.5(b)(2). This limitation is not attributable to methodological flaws but rather to the demographic reality of Puerto Rico. The island is experiencing a profound birth crisis, with fewer than 18,000 births per year, the closure of schools, and a rapidly aging population. These demographic shifts significantly reduce the number of child passengers available for observation in roadside surveys, limiting the effective sample size. Despite this constraint, the study adhered strictly to the sampling design approved by NHTSA and maintained robust quality control procedures. Therefore, while the standard error is marginally higher, the estimates remain statistically valid, representative of current child restraint practices, and reflective of the unique demographic challenges Puerto Rico faces.

 # R Script for SE and 95% CI Calculation – Car Seat usage

```
# R Script for SE and 95% CI Calculation – Car Seat Usage

# Load necessary package
install.packages("survey")   # Only if not already installed
library(survey)

# Observed car seat use proportion
p_hat <- 154 / 207   # 74.40%

# Effective sample size (children observed)
n <- 207

# Calculate Standard Error
SE <- sqrt(p_hat * (1 - p_hat) / n)

# Calculate 95% Confidence Interval
z <- 1.96  # Z value for 95% confidence
CI_lower <- p_hat - z * SE
CI_upper <- p_hat + z * SE

# Output results
cat("Rate of Car Seat Use:", round(p_hat * 100, 2), "%\n")
cat("Standard Error (SE):", round(SE * 100, 2), "%\n")
cat("95% Confidence Interval:", round(CI_lower * 100, 2), "% -", round(CI_upper * 100, 2), "%\n")

# Expected Output:
# Rate of Car Seat Use: 74.40 %
# Standard Error (SE): 3.00 %
# 95% Confidence Interval: 68.60 % - 80.20 %
```

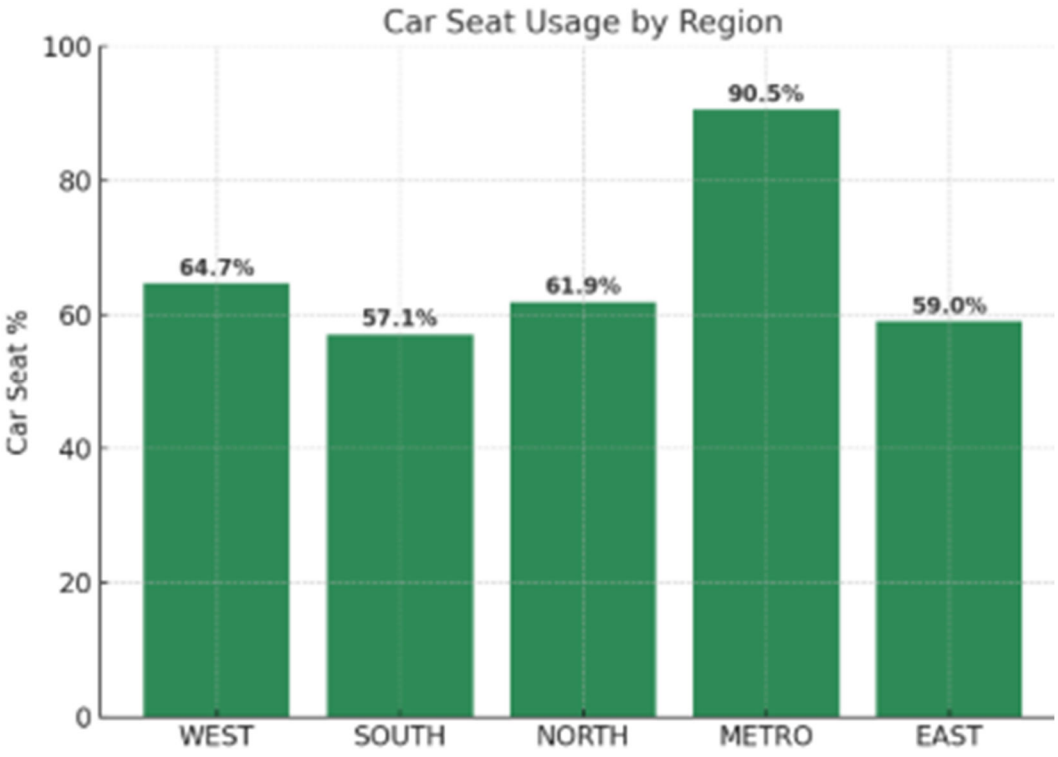
Table 3 includes the number of observations of drivers per county and region.

TABLE 3: NUMBER OF VALID OBSERVATIONS OF OCCUPANTS PER COUNTY

	Cars	Occupants	Child	Car Seat
NORTH Region	**2,185**	**2,640**	**42**	**26**
VEGABAJA	417	485	6	4
BARCELONETA	429	521	2	1
DORADO	422	541	24	15
TOABAJA	469	544	7	5
MANATI	448	549	3	1
WEST Region	**1,276**	**1,570**	**17**	**11**
AGUADILLA	409	478	2	1
SANGERMÁN	415	529	10	8
CABOROJO	452	563	5	2
SOUTH Region	**888**	**1,108**	**14**	**8**
CAYEY	428	530	9	5
PONCE	460	578	5	3
EAST Region	**1,630**	**2,039**	**39**	**23**
CAGUAS	405	462	5	4
HUMACAO	401	501	5	4
FAJARDO	414	533	13	6
RIOGRANDE	410	543	16	9
METRO Region	**1,401**	**1,754**	**95**	**86**
SANJUAN	451	555	12	10
BAYAMON	478	589	58	53
GUAYNABO	472	610	25	23

GRAPH 1: OBSERVED CAR SEAT BY REGION

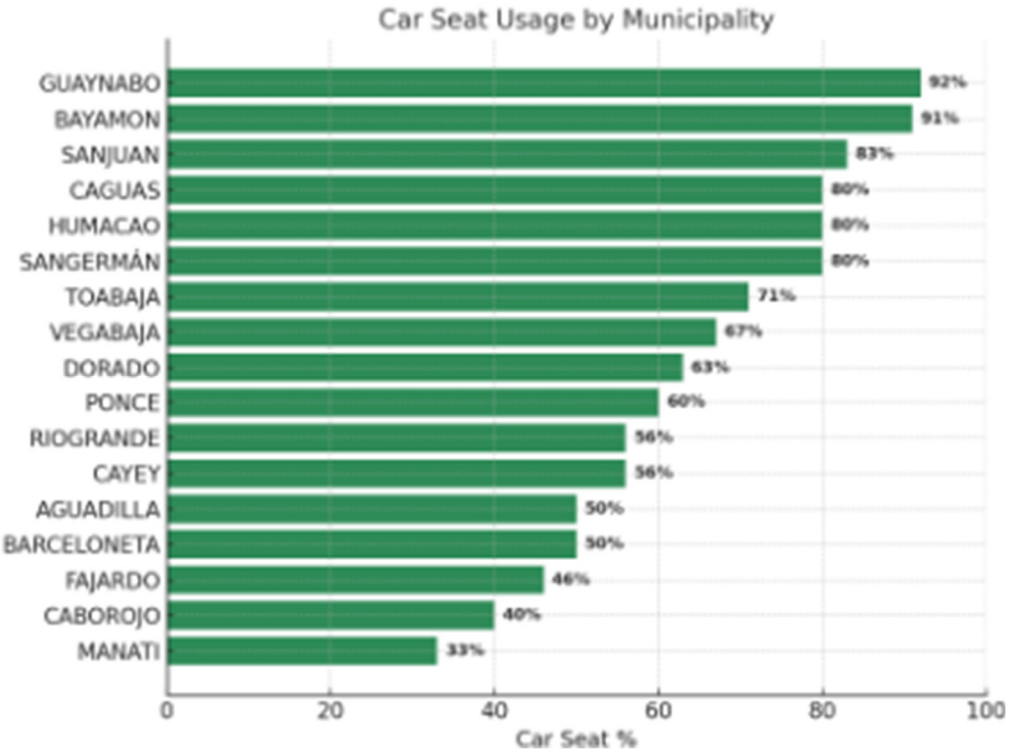
The 2025 Car Seat Usage Observational Survey included 7,380 vehicles across Puerto Rico, of which 207 (2.8%) carried children. Among these, 154 children were restrained in car seats, yielding an overall usage rate of 74.4%. Regional analysis shows clear variation in car seat usage across Puerto Rico. The Metro region recorded the highest usage rate at 90.5%, well above the overall average of 74.4%. In contrast, the South (57.1%) and East (59.0%) reported the lowest usage, while the West (64.7%) and North (61.9%) fell in the mid-range. These findings highlight that compliance with car seat use is much stronger in the Metro area, whereas southern and eastern regions show significant gaps that may require targeted educational or enforcement initiatives.



REGION	COUNTIES
North	BARCELONETA, DORADO, MANATI, TOA BAJA, VEGA BAJA
West	AGUADILLA, CABO ROJO, SAN GERMÁN
South	CAYEY, PONCE
East	CAGUAS, FAJARDO, HUMACAO, RIO GRANDE
Metro	BAYAMON, GUAYNABO, SAN JUAN

GRAPH 2: OBSERVED CAR SEAT BY COUNTY

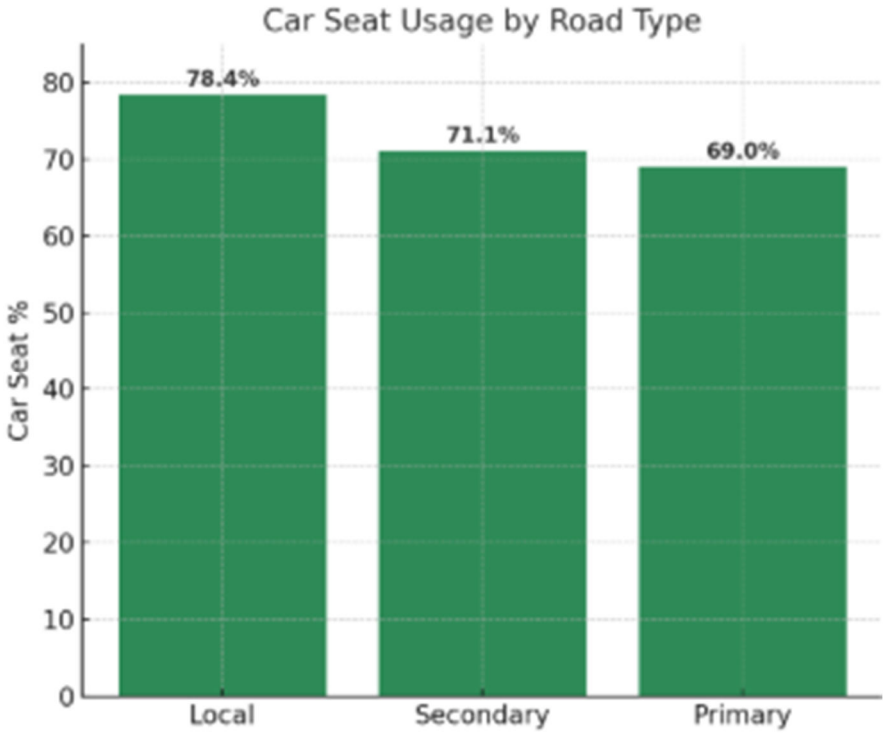
The Observational Field Study recorded 7,380 vehicles across Puerto Rico, of which 207 carried children. Among these, 154 children were observed restrained in car seats, resulting in an overall compliance rate of 74.4%. The highest compliance was seen in Guaynabo (92%) and Bayamón (91%), followed by San Juan (83%). Mid-level usage was found in Caguas, Humacao, and San Germán (80%), while municipalities such as Toa Baja (71%), Vega Baja (67%), and Dorado (63%) fell below the island wide average. The lowest levels of car seat usage were documented in Manatí (33%), Cabo Rojo (40%), and Fajardo (46%). These results reflect significant geographic disparities, with metropolitan areas demonstrating higher compliance and rural/coastal areas lagging behind, highlighting the need for targeted interventions to improve child passenger safety.



The observational field study examined 7,380 vehicles across Puerto Rico and identified 207 with children onboard, of which 154 were properly restrained in car seats. Results by municipality show that Bayamón had the highest number of children observed (58, with 53 restrained), followed by Guaynabo (25 children, 23 restrained) and Dorado (24 children, 15 restrained). San Juan (12 children, 10 restrained) and Río Grande (16 children, 9 restrained) also contributed notable counts. Smaller municipalities such as Caguas, Humacao, Ponce, and Cabo Rojo each had five or fewer children observed, with mixed levels of car seat usage. The lowest totals were documented in Manatí (3 children, 1 restrained), Barceloneta (2 children, 1 restrained), and Aguadilla (2 children, 1 restrained). Overall, the totals show that while compliance was strong in larger metropolitan areas, the relatively small number of children observed in rural municipalities limited the precision of estimates and underscored the demographic challenge of conducting child passenger safety studies in Puerto Rico.

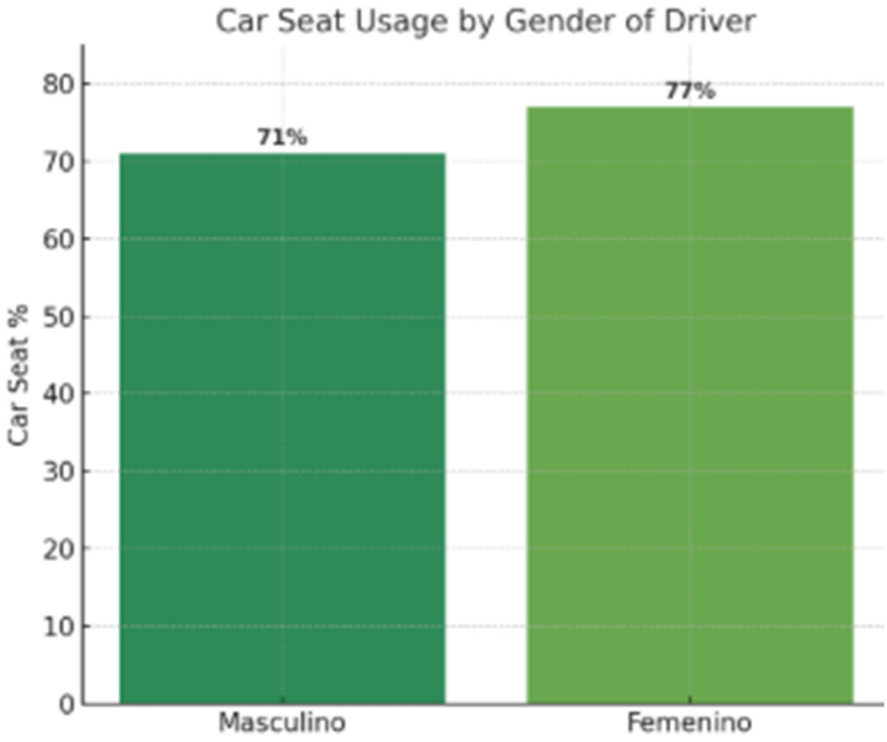
GRAPH 3: OBSERVED CAR SEAT BY ROAD TYPE

The field observations show variation in car seat use depending on road type. Local roads recorded the highest usage at 78.4%, followed by secondary roads at 71.1%, while primary roads had the lowest usage at 69.0%. This pattern suggests that drivers on local roads—often closer to residential areas—are more likely to secure children in car seats, whereas compliance drops on major primary routes. These results highlight the importance of reinforcing child passenger safety practices across all roadway environments, particularly on primary and secondary roads where compliance lags.



GRAPH 4: OBSERVED CAR SEAT BY GENDER

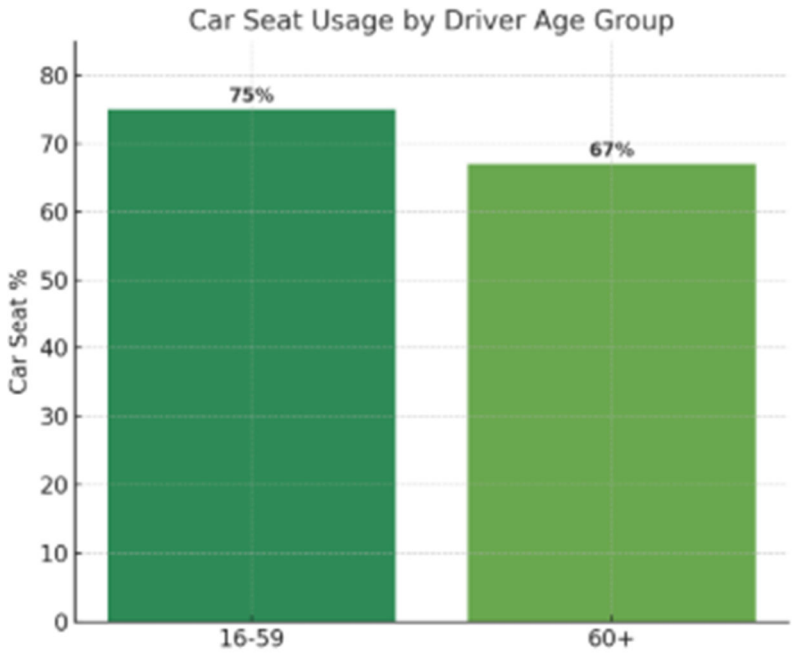
The observational field study found differences in car seat use depending on the gender of the driver. Out of 7,380 vehicles, 207 carried children, and 154 children were restrained in car seats (74%). When broken down by driver gender, female drivers transported 122 children, of whom 94 were restrained in car seats (77%), while male drivers transported 85 children, of whom 60 were restrained (71%). These results suggest that car seat usage is slightly higher among vehicles driven by women compared to those driven by men, indicating a gender-related gap in child passenger safety compliance.



Of the observed drivers, 33% were female and 67% male.

GRAPH 5: OBSERVED CAR SEAT BY AGE

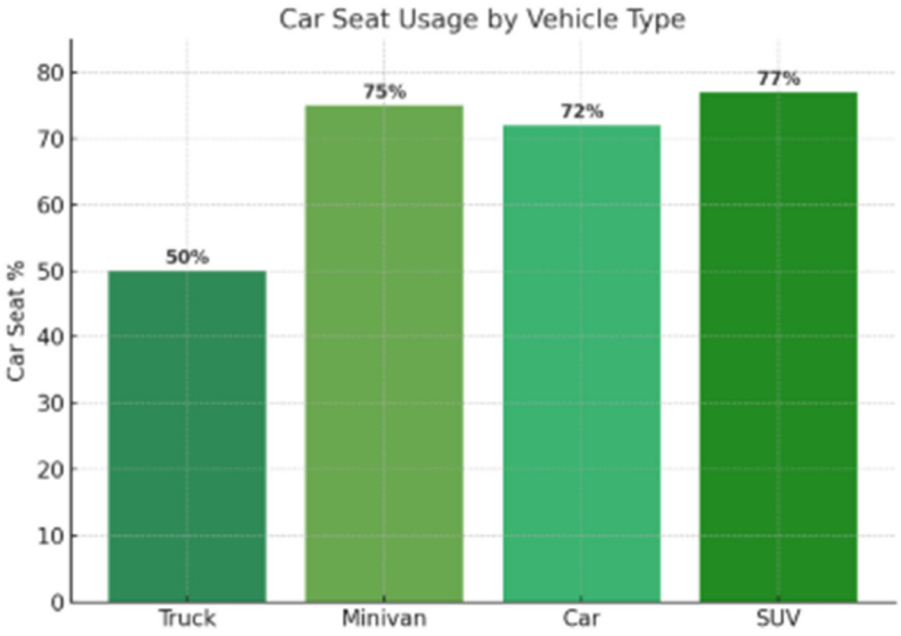
The field observations showed that out of 7,380 vehicles, 207 carried children and 154 of them were restrained in car seats (74%). When broken down by age group, drivers aged 16–59 transported 195 children, of whom 146 were in car seats (75%), while drivers aged 60 and above transported 12 children, of whom 8 were in car seats (67%). These findings suggest that younger and middle-aged drivers exhibit slightly higher compliance with child car seat use compared to older drivers, though both groups remain below full compliance.



Of the observed drivers, 22% were over the age of 60 and 78% between 16 and 59 years of age.

GRAPH 6: OBSERVED CAR SEAT BY VEHICLE TYPE

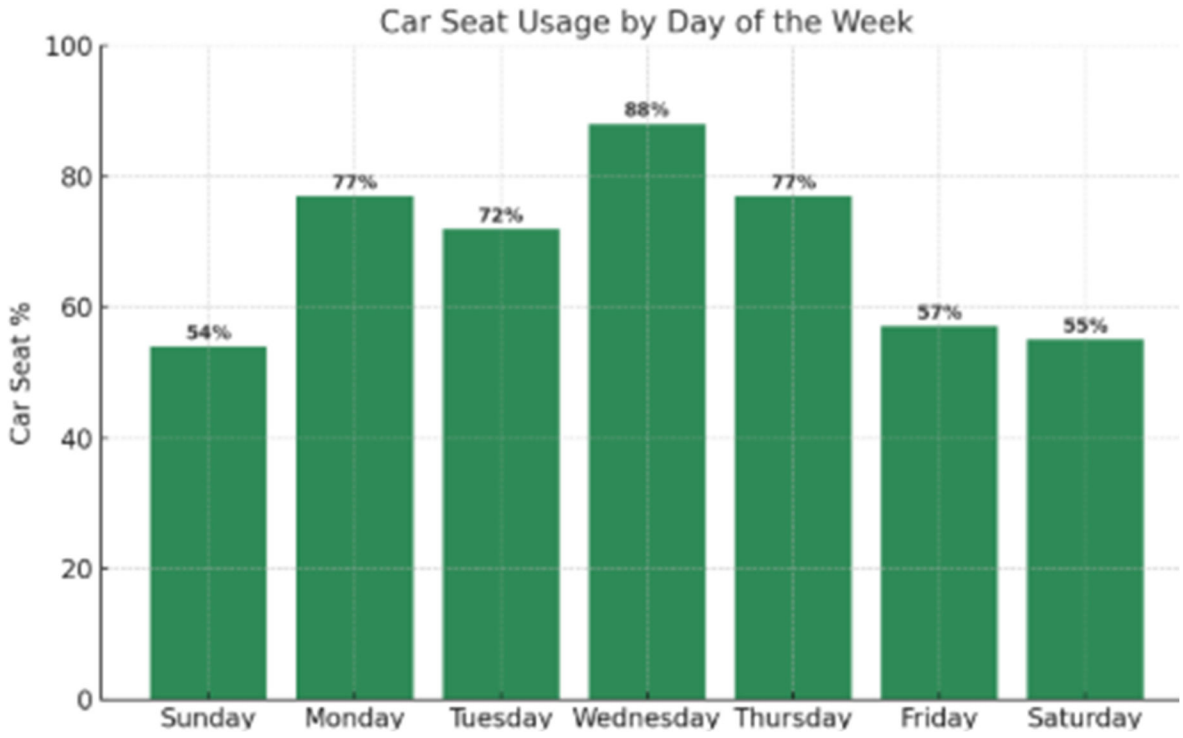
The field observations showed clear differences in car seat usage by type of vehicle. SUVs had the highest compliance, with 108 children observed and 83 restrained (77%), followed closely by minivans with 16 children observed and 12 restrained (75%). Cars represented the largest sample with 81 children, of whom 58 were in car seats (72%), reflecting solid but slightly lower compliance than SUVs and minivans. By contrast, trucks showed the lowest compliance, with only 2 children observed and 1 restrained (50%). Overall, the results suggest that families using SUVs and minivans are more likely to properly secure children, while truck use represents the greatest gap in child passenger safety.



Of the observed vehicles, 45% were regular cars, 43% were SUVs, 7% Minivans and 4% trucks.

GRAPH 7: OBSERVED CAR SEAT BY DAY OF THE WEEK

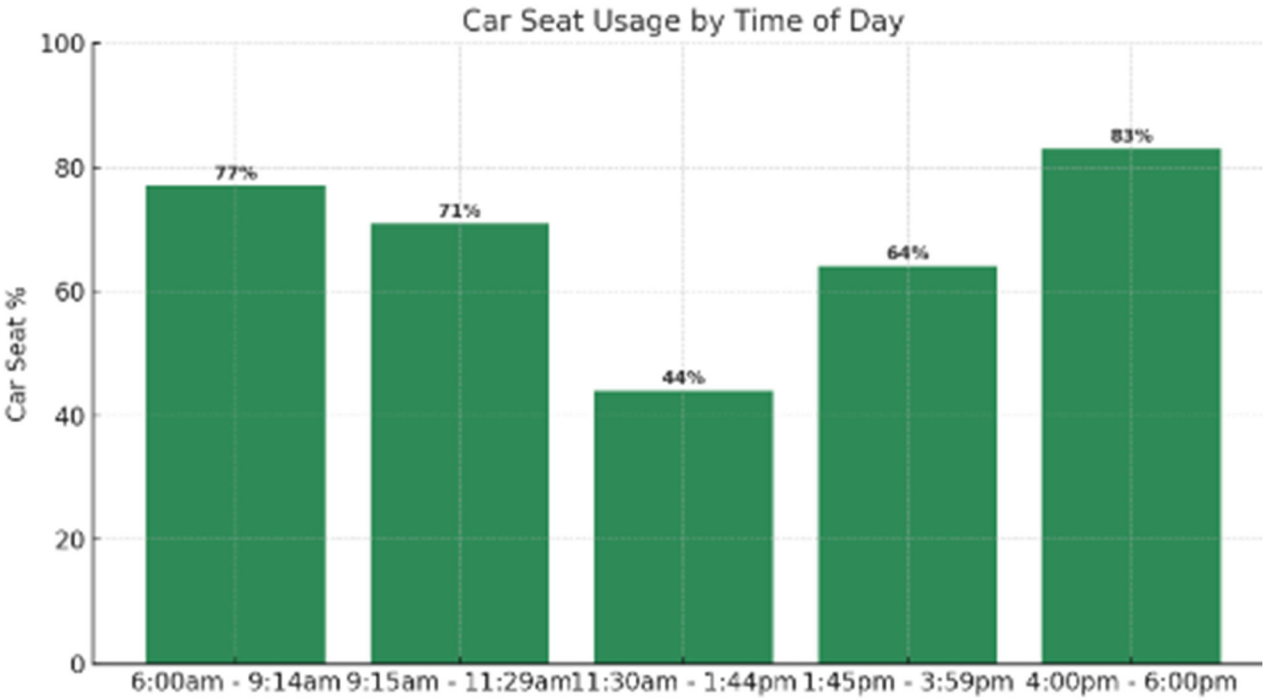
The observational field data revealed important day-of-week differences in car seat usage. The highest compliance occurred on Wednesday (88%), followed by Monday and Thursday (77% each). Moderate usage was observed on Tuesday (72%), while the lowest compliance was found on Sunday (54%), Saturday (55%), and Friday (57%). These findings suggest that car seat use is strongest on weekdays, particularly midweek, but drops noticeably during weekends, when family and leisure travel is more common. This pattern indicates that targeted awareness campaigns may be especially beneficial on weekends to improve child passenger safety.



Thursday accounted for the highest proportion of data collection at 21.6%, followed by Wednesday with 18.2%, and Friday with 14.2%. Tuesday and Monday reflected moderate data collection levels, with 12.8% and 12.5% respectively. The lowest levels of data collection occurred during the weekend, with Sunday at 10.5% and Saturday at 10.2%.

GRAPH 8: OBSERVED CAR SEAT BY TIME-OF-DAY INTERVALS

The observational field data revealed clear time-of-day differences in child car seat usage. The highest compliance was observed in the late afternoon (4:00–6:00 pm, 83%), followed by the early morning (6:00–9:14 am, 77%). Usage dropped mid-morning (9:15–11:29 am, 71%) and early afternoon (1:45–3:59 pm, 64%). The lowest compliance occurred during the late morning to early afternoon (11:30 am–1:44 pm, 44%), a period that also had fewer children observed overall. These findings suggest that parents and caregivers are more consistent with car seat use during commute and after-school hours, while midday travel shows significant gaps in compliance.



Data collection activity by time block shows that the 9:15 AM to 11:29 AM period had the highest share, accounting for 28.1% of all observations. This was followed closely by the 6:00 AM to 9:14 AM block, which represented 26.5%. Activity declined notably after mid-morning, with 16.9% of data collected between 11:30 AM and 1:44 PM, and 15.7% between 1:45 PM and 3:59 PM. The lowest level of data collection occurred in the 4:00 PM to 6:00 PM time block, with only 12.8%.

APPENDIX 1: LIST AND MAP OF SAMPLED ROAD SEGMENTS

Region	County	Type	Road Segment	Direction	Coordinates	Day	Time	Child	Car Seat
EAST	CAGUAS	Local	Ave Turabo	W	18°13'40"N 66°03'12"W	Wednesday	11 am	0	-
EAST	CAGUAS	Local	Cll Via Grande	W	18°14'25"N 66°04'14"W	Wednesday	2 pm	0	-
EAST	CAGUAS	Primary	Expreso Cruz Ortiz Stella	W	18°14'43"N 66°01'10"W	Wednesday	8 am	4	75%
EAST	CAGUAS	Secondary	Ave Zafiro	W	18°14'33"N 66°03'00"W	Wednesday	10 am	1	100%
EAST	FAJARDO	Local	Ave el Conquistador	S	18°20'19"N 65°39'23"W	Tuesday	9 am	2	100%
EAST	FAJARDO	Local	Cll Principal	S	18°20'26"N 65°39'37"W	Tuesday	7 am	0	-
EAST	FAJARDO	Primary	Expreso Jose Celso Barbosa	E	18°17'54"N 65°38'58"W	Saturday	5 pm	10	40%
EAST	FAJARDO	Secondary	PR-3	E	18°19'52"N 65°39'41"W	Tuesday	11 am	1	0%
EAST	HUMACAO	Local	Boulevard Nicanor Vazquez	E	18°08'43"N 65°49'32"W	Friday	11 am	0	-
EAST	HUMACAO	Local	Cll Dufresne	E & W	18°09'04"N 65°49'41"W	Friday	1 pm	0	-
EAST	HUMACAO	Primary	Expreso Jose Celso Barbosa	S	18°04'47"N 65°50'21"W	Friday	7 am	4	100%
EAST	HUMACAO	Secondary	PR- 3	S	18°06'43"N 65°49'19"W	Friday	8 am	1	0%
EAST	RIOGRANDE	Local	Ave Cambalache	N & S	18°22'35"N 65°52'03"W	Saturday	5 pm	2	50%
EAST	RIOGRANDE	Local	Cll Rescate	N & S	18°21'19"N 65°51'38"W	Saturday	6 pm	6	67%
EAST	RIOGRANDE	Primary	PR- 66	E	18°22'32"N 65°49'39"W	Saturday	2 pm	4	0%
EAST	RIOGRANDE	Secondary	PR- 3	W	18°22'40"N 65°50'11"W	Saturday	3 pm	4	100%
METRO	BAYAMON	Local	AveBetances	N & S	18°23'35"N 66°10'03"W	Wednesday	10 am	5	80%
METRO	BAYAMON	Local	AveSantaAna	E & W	18°22'49"N 66°07'06"W	Wednesday	7 pm	34	97%
METRO	BAYAMON	Primary	Expreso Jose de Diego	W	18°25'18"N 66°09'50"W	Wednesday	7 am	16	81%
METRO	BAYAMON	Secondary	AveComerio	E	18°22'42"N 66°10'21"W	Wednesday	5 pm	3	100%
METRO	GUAYNABO	Local	AveWashington	N	18°22'00"N 66°05'44"W	Thursday	7 am	17	94%
METRO	GUAYNABO	Local	Expreso834	S	18°18'11"N 66°06'23"W	Thursday	12 pm	3	67%
METRO	GUAYNABO	Primary	PR20	S	18°21'42"N 66°06'24"W	Thursday	9 am	4	100%
METRO	GUAYNABO	Secondary	PR169	S	18°21'29"N 66°06'38"W	Thursday	10 am	1	100%
METRO	SANJUAN	Local	JOSEGANDARA	W	18°24'05"N 66°03'08"W	Tuesday	3 pm	6	67%
METRO	SANJUAN	Local	NEMESIOCANALES	N	18°25'01"N 66°04'37"W	Tuesday	5 pm	3	100%
METRO	SANJUAN	Primary	BALDORIOTY	W	18°26'36"N 66°01'38"W	Saturday	5 pm	1	100%
METRO	SANJUAN	Secondary	PR-3	W	18°23'47"N 66°01'25"W	Saturday	5 pm	2	100%
NORTH	BARCELONETA	Local	CALLE10	N	18°26'55"N 66°32'16"W	Thursday	12 pm	1	0%
NORTH	BARCELONETA	Local	CALLEDORADA	N & S	18°26'02"N 66°33'32"W	Thursday	9 am	1	100%
NORTH	BARCELONETA	Primary	ExpresoJoseDeDiego	W	18°26'24"N 66°32'35"W	Thursday	11 am	0	-
NORTH	BARCELONETA	Secondary	PR2	E	18°26'24"N 66°32'35"W	Thursday	10 am	0	-
NORTH	DORADO	Local	100FairwaysVillageDr	S	18°28'08"N 66°18'23"W	Thursday	2 pm	5	60%
NORTH	DORADO	Local	PR-6693	E & W	18°27'29"N 66°15'32"W	Thursday	4 pm	11	64%
NORTH	DORADO	Primary	ExpresoDeDiego	W	18°25'14"N 66°16'02"W	Monday	4 pm	1	100%
NORTH	DORADO	Secondary	PR2	E	18°24'34"N 66°15'40"W	Thursday	6 am	7	57%
NORTH	MANATI	Local	Cll Vendig	N & S	18°25'26"N 66°29'05"W	Friday	10 am	3	33%
NORTH	MANATI	Local	Pr-866	E & W	18°28'14"N 66°26'52"W	Friday	9 am	0	-
NORTH	MANATI	Primary	ExpresodeDiego	W	18°25'58"N 66°28'33"W	Friday	12 pm	0	-
NORTH	MANATI	Secondary	PR-2	E	18°26'16"N 66°28'37"W	Friday	11 am	0	-
NORTH	TOABAJA	Local	Pr-866	N	18°25'38"N 66°11'15"W	Thursday	10 am	1	100%
NORTH	TOABAJA	Local	Pr-868	W	18°27'47"N 66°11'19"W	Thursday	9 am	1	100%
NORTH	TOABAJA	Primary	ExpresodeDiego	E	18°28'08"N 66°18'23"W	Thursday	12 pm	0	-

Region	County	Type	Road Segment	Direction	Coordinates	Day	Time	Child	Car Seat
NORTH	TOABAJA	Secondary	PR-2	N	18°24'37"N 66°15'21"W	Friday	6 am	5	60%
NORTH	VEGABAJA	Local	AveJesusArmaiz	N & S	18°25'57"N 66°24'39"W	Tuesday	12 pm	1	100%
NORTH	VEGABAJA	Local	Cll Inocencio Rey	N & S	18°25'42"N 66°24'28"W	Tuesday	9 am	1	0%
NORTH	VEGABAJA	Primary	ExpresodeDiego	W	18°26'24"N 66°25'25"W	Tuesday	7 am	3	67%
NORTH	VEGABAJA	Secondary	PR-2	E	18°26'48"N 66°23'51"W	Tuesday	2 pm	1	100%
SOUTH	CAYEY	Local	Ave Jesus T Pinero	E & W	18°06'26"N 66°09'31"W	Sunday	7 am	2	0%
SOUTH	CAYEY	Local	Ave Luis Munoz Rivera Sur	N & S	18°06'35"N 66°10'00"W	Sunday	9 am	2	100%
SOUTH	CAYEY	Primary	Autopista Luis A Ferre	W	18°06'46"N 66°08'40"W	Friday	9 am	1	0%
SOUTH	CAYEY	Secondary	PR-1	W	18°07'16"N 66°08'22"W	Sunday	11 am	4	75%
SOUTH	PONCE	Local	Ave Tito Castro	E	18°01'39"N 66°35'50"W	Wednesday	11 am	1	0%
SOUTH	PONCE	Local	Cll Torre	E & W	18°00'30"N 66°36'57"W	Wednesday	9 am	0	-
SOUTH	PONCE	Primary	PR- 52	E	18°00'21"N 66°35'02"W	Wednesday	1 pm	3	67%
SOUTH	PONCE	Secondary	PR- 506	W	18°02'19"N 66°32'54"W	Wednesday	1 pm	1	100%
WEST	AGUADILLA	Local	PR-110	E	18°25'57"N 66°24'39"W	Monday	1 pm	0	-
WEST	AGUADILLA	Local	PR-465	E	18°27'16"N 67°05'33"W	Monday	11 am	0	-
WEST	AGUADILLA	Primary	PR-2	E	18°25'30"N 67°09'03"W	Monday	9 am	1	100%
WEST	AGUADILLA	Secondary	PR-442	E & W	18°25'08"N 67°09'22"W	Monday	7 am	1	0%
WEST	CABOROJO	Local	Comunidad del Toro	N & S	18°02'21"N 67°11'20"W	Sunday	11 am	0	-
WEST	CABOROJO	Local	PR- Cll Legion Americana	N & S	18°02'11"N 67°10'40"W	Sunday	9 am	0	-
WEST	CABOROJO	Primary	PR-100	E & W	18°03'58"N 67°09'14"W	Sunday	8 am	1	0%
WEST	CABOROJO	Secondary	PR-3311	E & W	18°07'07"N 67°09'28"W	Sunday	2 pm	4	50%
WEST	SANGERMÁN	Local	PR-166	E & W	18°04'43"N 67°02'59"W	Monday	11 am	3	33%
WEST	SANGERMÁN	Local	PR-321	E & W	18°03'30"N 67°02'11"W	Monday	1 pm	0	-
WEST	SANGERMÁN	Primary	PR-2	W	18°05'26"N 67°01'46"W	Monday	7 am	5	100%
WEST	SANGERMÁN	Secondary	Cll Retiro	E & W	18°04'41"N 67°02'07"W	Monday	9 am	2	100%

APPENDIX 2: DETAILED DATA BY ROAD SEGMENT

Region	Municipality	Road_Type	Road_Name	Direct	W_gchijklm	DATE	TIME	Cars	Child	CarSeat%
WEST	AGUADILLA	Local	PR-465	E	5658699.81	25/08/2025	11 am	102	0	-
WEST	AGUADILLA	Local	PR-110	E	78813334.49	25/08/2025	1 pm	100	0	-
WEST	AGUADILLA	Primary	PR-2	E	86287469.17	25/08/2025	9 am	102	1	100%
WEST	AGUADILLA	Secondary	PR-442	E & W	17824794.40	25/08/2025	7 am	105	1	0%
NORTH	BARCELONETA	Local	CALLE10	N	14575901.36	21/08/2025	12 pm	116	1	0%
NORTH	BARCELONETA	Local	CALLEDORADA	N & S	21954128.15	21/08/2025	9 am	106	1	100%
NORTH	BARCELONETA	Primary	ExpresoJoseDeDiego	W	96089266.17	21/08/2025	11 am	104	0	-
NORTH	BARCELONETA	Secondary	PR2	E	88447414.52	21/08/2025	10 am	103	0	-
METRO	BAYAMON	Local	AveBetances	N & S	33853501.32	20/08/2025	10 am	127	5	80%
METRO	BAYAMON	Local	AveSantaAna	E & W	80884492.14	20/08/2025	7 pm	116	34	97%
METRO	BAYAMON	Primary	Expreso Jose de Diego	W	3635252.72	20/08/2025	7 am	108	16	81%
METRO	BAYAMON	Secondary	AveComerio	E	25636027.30	20/08/2025	5 pm	127	3	100%
WEST	CABOROJO	Local	PR- Cll Legion Americana	N & S	3987125.16	17/08/2025	9 am	115	0	-
WEST	CABOROJO	Local	Comunidad del Toro	N & S	13052981.18	17/08/2025	11 am	117	0	-
WEST	CABOROJO	Primary	PR-100	E & W	71683140.36	17/08/2025	8 am	107	1	0%
WEST	CABOROJO	Secondary	PR-3311	E & W	24740981.65	17/08/2025	2 pm	113	4	50%
EAST	CAGUAS	Local	Ave Turabo	W	42421720.95	20/08/2025	11 am	101	0	-
EAST	CAGUAS	Local	Cll Via Grande	W	47893459.20	20/08/2025	2 pm	104	0	-
EAST	CAGUAS	Primary	Expreso Cruz Ortiz Stella	W	85560414.38	20/08/2025	8 am	100	4	75%
EAST	CAGUAS	Secondary	Ave Zafiro	W	8756212.94	20/08/2025	10 am	100	1	100%
SOUTH	CAYEY	Primary	Autopista Luis A Ferre	W	8939915.65	22/08/2025	9 am	101	1	0%
SOUTH	CAYEY	Local	Ave Jesus T Pinero	E & W	13958433.54	24/08/2025	7 am	107	2	0%
SOUTH	CAYEY	Local	Ave Luis Munoz Rivera Sur	N & S	24861531.23	24/08/2025	9 am	108	2	100%
SOUTH	CAYEY	Secondary	PR-1	W	26224523.91	24/08/2025	11 am	112	4	75%
NORTH	DORADO	Local	PR-6693	E & W	4711041.18	21/08/2025	4 pm	109	11	64%
NORTH	DORADO	Local	100FairwaysVillageDr	S	34779440.66	21/08/2025	2 pm	110	5	60%
NORTH	DORADO	Primary	ExpresoDeDiego	W	2608486.23	25/08/2025	4 pm	101	1	100%
NORTH	DORADO	Secondary	PR2	E	19393085.14	28/08/2025	6 am	102	7	57%
EAST	FAJARDO	Local	Cll Principal	S	18441879.49	19/08/2025	7 am	104	0	-
EAST	FAJARDO	Local	Ave el Conquistador	S	42812817.71	19/08/2025	9 am	104	2	100%
EAST	FAJARDO	Secondary	PR-3	E	24171227.61	19/08/2025	11 am	103	1	0%
EAST	FAJARDO	Primary	Expreso Jose Celso Barbosa	E	1181470.04	30/08/2025	5 pm	103	10	40%
METRO	GUAYNABO	Local	Expreso834	S	11246665.77	21/08/2025	12 pm	112	3	67%
METRO	GUAYNABO	Local	AveWashington	N	128988147.75	21/08/2025	7 am	126	17	94%
METRO	GUAYNABO	Primary	PR20	S	1132800.12	21/08/2025	9 am	116	4	100%
METRO	GUAYNABO	Secondary	PR169	S	10122137.72	21/08/2025	10 am	118	1	100%
EAST	HUMACAO	Local	Cll Dufresne	E & W	14118707.14	29/08/2025	1 pm	100	0	-
EAST	HUMACAO	Local	Boulevard Nicanor Vazquez	E	47009586.63	29/08/2025	11 am	101	0	-
EAST	HUMACAO	Primary	Expreso Jose Celso Barbosa	S	13715506.12	29/08/2025	7 am	100	4	100%
EAST	HUMACAO	Secondary	PR- 3	S	15459583.60	29/08/2025	8 am	100	1	0%
NORTH	MANATI	Local	Pr-866	E & W	413644.36	29/08/2025	9 am	111	0	-
NORTH	MANATI	Local	Cll Vendig	N & S	177834937.97	29/08/2025	10 am	110	3	33%
NORTH	MANATI	Primary	ExpresodeDiego	W	30068036.53	29/08/2025	12 pm	110	0	-
NORTH	MANATI	Secondary	PR-2	E	221958810.50	29/08/2025	11 am	117	0	-
SOUTH	PONCE	Local	Cll Torre	E & W	24961803.08	20/08/2025	9 am	119	0	-
SOUTH	PONCE	Local	Ave Tito Castro	E	35721910.82	20/08/2025	11 am	118	1	0%
SOUTH	PONCE	Primary	PR- 52	E	31979795.75	20/08/2025	1 pm	114	3	67%
SOUTH	PONCE	Secondary	PR- 506	W	129446807.53	20/08/2025	1 pm	109	1	100%
EAST	RIOGRANDE	Local	Ave Cambalache	N & S	6804634.80	23/08/2025	5 pm	104	2	50%
EAST	RIOGRANDE	Local	Cll Rescate	N & S	8619641.27	23/08/2025	6 pm	104	6	67%
EAST	RIOGRANDE	Primary	PR- 66	E	354967.53	23/08/2025	2 pm	100	4	0%
EAST	RIOGRANDE	Secondary	PR- 3	W	1200652761.46	23/08/2025	3 pm	102	4	100%
WEST	SANGERMÁN	Local	PR-166	E & W	34934145.06	18/08/2025	11 am	101	3	33%
WEST	SANGERMÁN	Local	PR-321	E & W	44803009.00	18/08/2025	1 pm	108	0	-
WEST	SANGERMÁN	Primary	PR-2	W	4878217.14	18/08/2025	7 am	106	5	100%
WEST	SANGERMÁN	Secondary	Cll Retiro	E & W	23851020.26	18/08/2025	9 am	100	2	100%
METRO	SANJUAN	Primary	BALDORIOTY	W	53763831.78	16/08/2025	5 pm	115	1	100%

AGENTES & CONSULTORES

Region	Municipality	Road_Type	Road_Name	Direct	W_gchijklm	DATE	TIME	Cars	Child	CarSeat%
METRO	SANJUAN	Local	NEMESIOCANALES	N	47860310.00	19/08/2025	5 pm	115	3	100%
METRO	SANJUAN	Local	JOSEGANDARA	W	111221950.66	19/08/2025	3 pm	109	6	67%
METRO	SANJUAN	Secondary	PR-3	W	48258623.63	30/08/2025	5 pm	112	2	100%
NORTH	TOABAJA	Local	Pr-866	N	12642352.29	28/08/2025	10 am	107	1	100%
NORTH	TOABAJA	Local	Pr-868	W	19232381.06	28/08/2025	9 am	159	1	100%
NORTH	TOABAJA	Primary	ExpresodeDiego	E	4857793.72	28/08/2025	12 pm	102	0	-
NORTH	TOABAJA	Secondary	PR-2	N	9960641.38	29/08/2025	6 am	101	5	60%
NORTH	VEGABAJA	Local	AveJesusArmaiz	N & S	3705835.26	26/08/2025	12 pm	103	1	100%
NORTH	VEGABAJA	Local	Cll Inocencio Rey	N & S	26811671.17	26/08/2025	9 am	105	1	0%
NORTH	VEGABAJA	Primary	ExpresodeDiego	W	3636286.27	26/08/2025	7 am	105	3	67%
NORTH	VEGABAJA	Secondary	PR-2	E	18045110.71	26/08/2025	2 pm	104	1	100%

APPENDIX 3: PRIOR YEAR RESULTS

YEAR	Rate of CAR SEAT	Standard Error (%)
2025	74.40%	3.00%
2024	74.40%	0.48%