
Improving Data on Child Passenger Safety: Survey Methods from the “Native Children Always Ride Safe” (Native CARS) Study

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Introduction

In the early 2000s, the Northwest Tribal Epidemiology Center (The EpiCenter) noticed a growing disparity in motor vehicle fatalities for American Indian and Alaska Native (AI/AN) children. The motor vehicle death disparity increased at least 10 percentage points between 1999 and 2002, with AI/ANs having the highest rate at 27.04 deaths per 100,000, compared to 16.28 per 100,000 for Whites in 2002.¹ We wanted to investigate whether low rates of child safety seat use could help explain the disparity.

In 2003, with funding from the Indian Health Service’s Native American Research Centers for Health (NARCH, grant 1U269400013-01), six Northwest tribes conducted a child safety seat survey. While a number of existing observation methods captured use of seat belts by vehicle occupants,^{2,3,4} these Northwest Portland Area Indian Health Board member tribes were interested in determining proper use of specific child safety seats (infant seats, forward-facing harness seats, and booster seats). To assist the tribes with their goals, the EpiCenter partnered with Harborview Injury Prevention Center in Seattle and developed a survey instrument and method to capture whether a child was riding in an age- and size-appropriate restraint. We administered this survey in summer 2003 and found that age and size-appropriate child safety seat use ranged from 25% to 55% by tribe.⁵ Forty percent of children were completely unrestrained in the vehicle, which was substantially higher than the 12% of unrestrained children in the general population in these same states, as reported by the National Highway Transportation and Safety Administration (NHTSA).^{5,6} We concluded that children in these tribes rode inadequately

restrained, and culturally-appropriate efforts were needed to address child restraint use in the Northwest tribes. At the tribes’ request, the EpiCenter pursued funding for child safety seat interventions.

In 2008, we received funding from National Institute on Minority Health and Health Disparities (grant 5 R24 MD002763) to use a community-based participatory research approach to develop and test community-specific interventions to increase child safety seat use in these same six Northwest Tribes. The tribes named the project Native Children Always Ride Safe (Native CARS). In this study, all six tribes received the intervention in a staggered design. Three tribes designed and implemented interventions from 2009-2011 and three tribes did so from 2011-2013. This gave us an evaluation time point in 2011 to compare child safety seat use in intervention tribes to tribes that had not yet implemented interventions. The child safety seat survey was administered at three time points – at baseline in 2009, in 2011, and again in 2013. Our baseline results have been discussed elsewhere,⁷ and our intervention results will be shared in the near future. This paper discusses the child safety seat survey methods we developed for the Native CARS study.

Background

We know that child safety seats work. Child safety seats reduce the risk of death in passenger cars by 71% for infants, and by 54% for children ages 1 to 4 years.⁸ We also know that American Indian children have the highest motor vehicle fatality rate of any race in the United States, with death rates 2-3 times higher than other races.⁹ What remains unknown for many tribal communities is the proportion of children who are properly restrained when traveling in motor vehicles.¹⁰ Establishing the frequency and patterns of child passenger restraint use can have many important benefits for a community. These include assessing community needs, identifying those at risk for motor vehicle injuries, connecting individuals with appropriate resources, guiding and evaluating tribal programs, and tracking improvements over time. Child safety seat use data can readily be used to apply for grants to fund child safety seat efforts. Perhaps most importantly, conducting a child safety seat survey makes a statement that reducing motor vehicle injuries is a community priority.

The EpiCenter has developed a rigorous methodology to

Table 1. Information collected in the Native CARS vehicle survey.

Recorded/Observed:	Asked:
Date	Driver's consent to participate
Data collector's initials	Driver's race/ethnicity
Site	Whether any children in the vehicle were AI/AN
Time of day	Distance from home in minutes
Driver's sex	Driver's age
Driver seat belt use	Driver's relationship to the child
Number of people in the vehicle	
Whether the number of passengers exceeds the available seats	Child's age
Vehicle type (Car, Truck, Van/SUV)	Child's weight
Child's gender	Whether child is 4'9" tall
Child's seating location (front/back)	
Restraint used by child	

assess proper child passenger restraint that we used for three purposes: 1) to determine the percent of children age 8 and younger riding properly restrained; 2) to identify risk factors associated with improper child restraint (both incorrect type of restraint and unrestrained); and 3) to evaluate the effectiveness of interventions implemented as part of the Native CARS study between 2009 and 2013. This method has been tested, modified, re-tested, and has been used to collect information on over 5400 children traveling in over 3600 vehicles in the Northwest.

Survey instrument

Our method consists of an observational survey and a short driver interview. Table 1 contains a list of elements collected in the survey. Factors that we found to be consistently related to proper restraint of children in vehicles included driver seat belt use, short trip, child age, and driver relationship to the child. We also mapped where all passengers were seated in the vehicle, and whether they were using seat belts or child safety seats. More detailed information (age, height and weight) was recorded for each child passenger younger than age 13. The final section of the survey included open-ended questions customized to the needs and interests of each tribe, such as driver opinions on booster seat guidelines, why they were or were not using a child safety seat, where they accessed child passenger safety information, and whether they were in favor of a tribal child passenger safety law.

The data collection form was printed on a single sheet of

legal-sized paper. Interviewers carried clipboard storage cases to store data collection packets, made up of a pre-numbered survey form, information about the study, information on child safety seats, and contact information for their local child passenger safety seat technician. Each observational interview took three to five minutes to administer.

Observation sites

We conducted observational interviews in parking lots such as the community center, health clinic, gas station, trading post, grocery store, elementary school, preschool or Head Start. Community site coordinators made a list of all potential observation sites and we attempted to collect data at each location, after obtaining permission from the proprietors. Few locations denied permission; those that did cited non-solicitation policies or unsafe parking lot conditions (e.g. ongoing construction). We limited the number of surveys collected at preschools and elementary schools to less than 40% of our total sample to avoid oversampling specific age groups. We found trading posts, grocery stores and gas stations to be ideal sites for the survey as people were less likely to be in a hurry, there was a more continuous flow of vehicles entering and leaving the site, and outside of school hours, children of all ages were equally likely to be found there.

Vehicle selection

We attempted to make contact with every vehicle that

appeared to have a child passenger age 8 or younger. We chose 8 years because children less than age 8 or less than 4'9" in height are recommended and/or required by state law to use a child safety seat when traveling in a vehicle. Because children under age 13 are recommended and/or required to ride in the back seat, if children age 9-12 were passengers in a selected vehicle, we collected information on their height, restraint, and seating as well. Once a vehicle had been approached and the driver had been asked to participate, we collected data even if the child passenger was over age 8. We did not collect personally identifying information such as names or license plate numbers during the interviews. We excluded buses, motorcycles, or other commercial vehicles. When drivers refused to participate, we recorded driver seat belt use, but did not record any information about passengers.

Survey protocol

Observational interviews were conducted when cars were stopped, either as a vehicle first pulled in, or right before the vehicle departed and after occupants had a chance to secure their restraints. The interviewer approached vehicles, introduced himself/herself to the driver and explained the survey. After ensuring confidentiality, the interviewer requested permission to conduct the survey. Upon obtaining the driver's verbal consent, the interviewer proceeded with the interview and observation. Once complete, the interviewer thanked the driver and gave information on child safety seats and a token of appreciation (\$5 gift card).

We hired local community members to collect data at each tribe. In some tribes, we worked with tribal employment offices to find data collectors, while at others, our Native CARS site coordinators contacted individuals they knew who were interested in temporary work. All observers received a systematic, comprehensive training on age-appropriate child restraint methods and the survey protocol. They then practiced approaching vehicles, asking child's age and size, assessing child restraint use, and filling out the remainder of the data collection form. NPAIHB staff supervised the data collection, reviewed completed forms, and provided feedback to the interviewers. For safety considerations, interviewers wore fluorescent safety vests, which also served to identify them as operating in an official capacity. We conducted observational interviews during daylight hours, which was safer for interviewers and was also when children were most likely to be traveling. For consistency, we conducted all surveys in the spring. This allowed us to obtain a reliable comparison of child safety seat use over time, avoid potential seasonal biases, and collect data while school was in session.

Sample size

We observed 200 vehicles at each of three separate time points (2009, 2011, 2013) in each of the six participating tribes. We selected a sample size that would give us enough power to detect a conservative increase of 15-17 percentage points in proper child restraint use in intervention communities versus no

change in other communities. The time needed to complete data collection depended on the number of interviewers, as well as the density of traffic at the sites. We completed 200 surveys in as few as two days or as many as 20. Response rates varied from 85%-97% by tribe. In 2003, when our only goal was to obtain a reliable estimate of proper child safety seat use in each tribe, we completed 100 surveys per tribe. Tribal Epidemiology Centers (TECs) may be able to assist tribes that wish to do a child safety seat survey to determine the sample size needed based on their goals.

Data analysis and Results

We defined proper child passenger restraint according to the guidelines set forth by American Academy of Pediatrics and the National Highway Transportation Safety Administration at the time the study began (2009).^{11,12} Children should ride in a rear-facing infant seat until at least one year of age and after that, remain rear-facing until they reach the top height or weight limit of the car seat. After that, children should ride in a forward-facing harness seat until they reach the top weight or height limit of that seat. Then, children should ride in a booster seat until the seat belt fits properly, usually when the child reaches 4'9" in height. Children age 12 and younger should ride in the back seat whenever possible.

We designated each child we observed as properly, improperly or unrestrained according to these guidelines and based on reported age and size. Figure 1 illustrates the proportion of children properly restrained in the six tribes overall by year and Figure 2 shows proper restraint by child age and year. Results examining correlates of proper and improper use in six tribes have been previously reported.²

Limitations

This methodology has some limitations. Some drivers may incorrectly report a child's age, weight, or height, which may lead to misclassification of some children as properly or improperly restrained. However, relying on reported age is likely more accurate than estimating age. Interviewers did not enter the vehicles to assess whether safety seat choice, installation, belt placement, and fit were correct. Such assessments would require that the interviewers be certified child passenger safety technicians. Drivers who declined to participate were less likely to be wearing a seat belt, and by association, their child passengers would be less likely to be properly restrained. This could result in an overestimation of proper child restraint use. It's possible that drivers and children have different restraint behavior in parking lots than on a road, such as removing seat belts to drive through a parking lot. This could result in an underestimation of proper restraint use. As the survey method was consistent across years, these potential biases do not impact the observed increases in proper restraint use. Finally, the survey can be time- and resource-intensive. To address this, we have developed a modified survey that is faster to administer, and will be available soon at nativecars.org.

Figure 1. Restraint status of children traveling in vehicles on or near six Northwest tribal reservations over time (n=1811, 1785, 1755, respectively for 2009, 2011, and 2013).

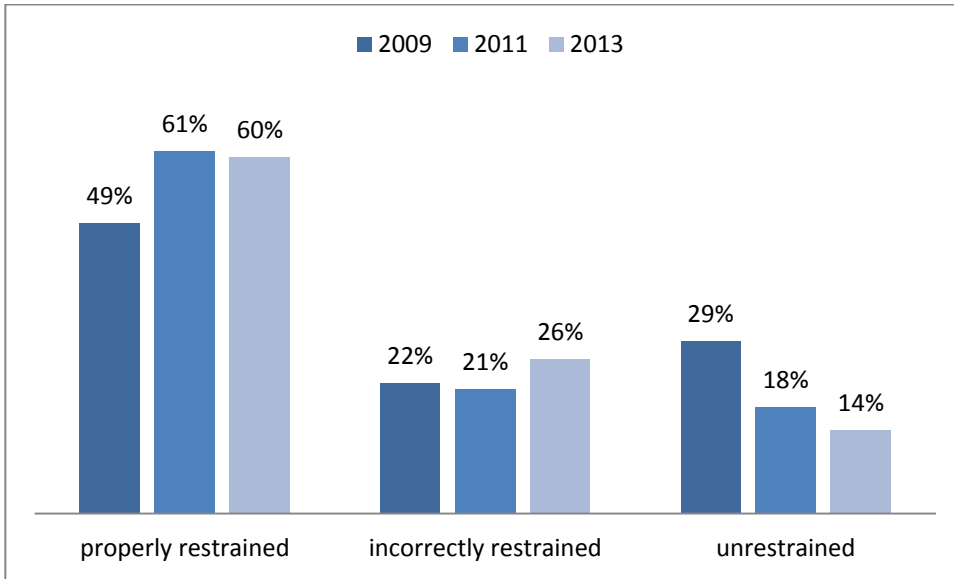
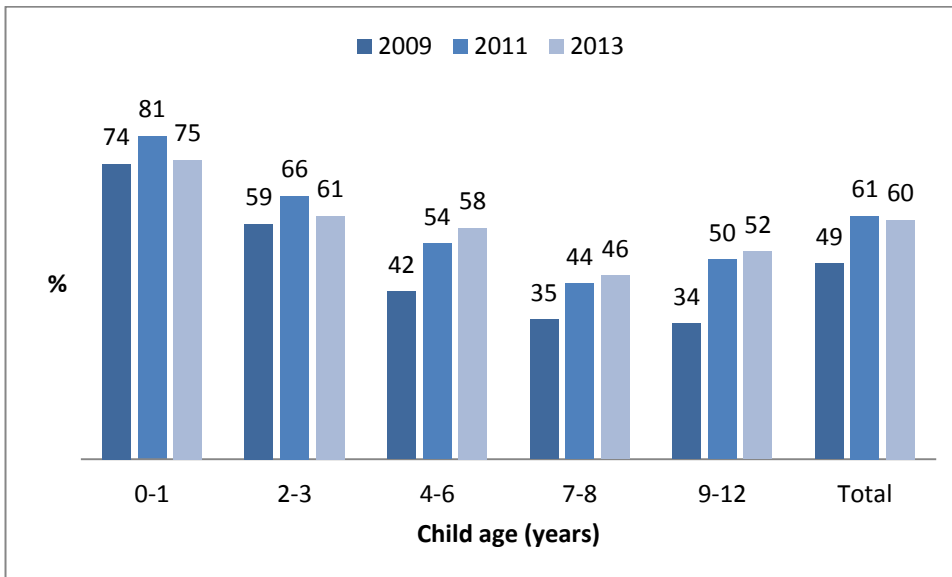


Figure 2. Percent of properly restrained children by child’s age.



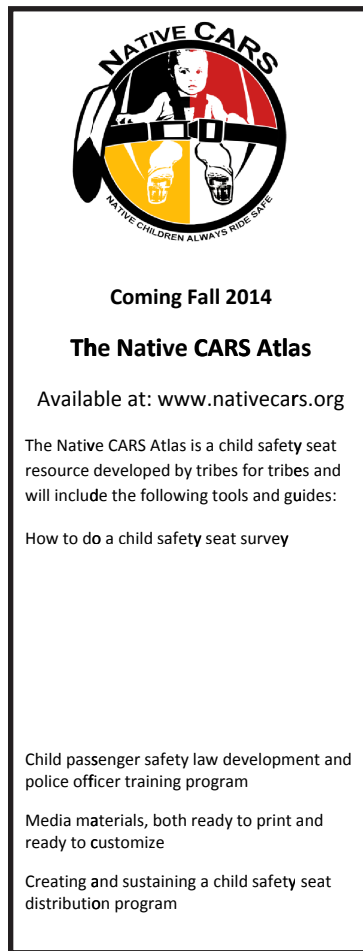
Conclusions

Despite limitations, this methodology provides more detailed insight into child safety seat use in communities than methods that categorize restraint use solely as “yes” or “no”. The Native CARS observational interview methodology is a useful tool to identify risk factors for children riding unrestrained and incorrectly restrained in motor vehicles. The

tribes that have implemented this survey have utilized their data to develop innovative methods for improving child passenger safety that are customized to their local needs. They have also been able to evaluate the effectiveness of their program and policy efforts by repeating the survey and seeing a marked increase in child safety seat use in their communities.

Due to its success, Native CARS has now entered a dissemination phase, where processes and materials will be

Figure 3. The Native CARS Atlas



modified and shared broadly. For a step-by-step guide to conducting a community child safety seat assessment and many other child passenger safety materials, please watch nativecars.org for upcoming information and resources (Figure 3). We anticipate that Tribal Epidemiology Centers will play a vital role in using the Native CARS resource as TECs can assist with data analysis, provide technical assistance, and arrange for child passenger safety technician training and certification. TECs could also assist tribes in securing Tribal Transportation Program (TTP) funding if child passenger safety is part of the tribe's safety plan.

Acknowledgments

We would like to acknowledge the six NW tribes that implemented the Native CARS study, specifically, the site coordinators whose hard work and expertise made the project a success. Beth Ebel, our co-Investigator and director of Harborview Injury Prevention and Research Center, lent the project her experience, ideas, and dedication to child passenger safety and made this project possible in the first place.

References

1. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2002) Accessed May 27 2014. Retrieved from www.cdc.gov/ncipc/wisqars.
2. Leaf WA, Solomon MG. Safety Belt Use Estimate for Native American Tribal Reservations. 2005, Report Number DOT HS 809 921. Washington, D.C.: National Highway Traffic Safety Administration.
3. Tribal Epidemiology Center Consortium (TECC). Injury Prevention Toolkit. Accessed May 27, 2014. Retrieved from <http://www.crihb.org/health-resources/injury-prevention/injury-prevention-toolkit.html>.
4. Price JD, Newsad RS, House D. Development of a web-based occupant protection data collection and warehouse system for use in Indian Country. *IHS Primary Care Provider*. 2008. 33(7):213-216.
5. Lapidus JA, Smith NH, Ebel BE, Romero FC. Restraint use among Northwest American Indian children traveling in motor vehicles. *Am J Public Health*. 2005 November; 95(11): 1982-1988. doi: 10.2105/AJPH.2004.052514 PMID: PMC1449472 Restraint Use Among Northwest American Indian Children Traveling in Motor Vehicles
6. US Department of Transportation. Misuse of child restraints. Washington DC: National Highway Traffic Safety Administration; 2004. DOT HS 809 671. Accessed May 27, 2014. Retrieved from <http://www.nhtsa.dot.gov/people/injury/research/Misuse/images/misusescreen.pdf>.
7. Lapidus JA, Smith NH, Lutz T, Ebel BE. Trends and correlates of child passenger restraint use in 6 Northwest Tribes: The Native Children Always Ride Safe (Native CARS) Project. *Am J Public Health*. 2013;103(2): 355-361. doi: 10.2105/AJPH.2012. 300834
8. Department of Transportation (US), National Highway Traffic Safety Administration (NHTSA). Traffic Safety Facts: Occupant Protection. March 2014. DOT HS 811 892. Accessed May 27,2014. Retrieved from <http://www.nrd.nhtsa.dot.gov/Pubs/811892.pdf>.
9. Centers for Disease Control and Prevention. Injuries among American Indians/Alaska Natives (AI/AN): Fact Sheet. Retrieved from <http://www.cdc.gov/motorvehiclesafety/native/factsheet.html>.
10. Department of Transportation (US), National Highway Traffic Safety Administration (NHTSA). Fatal Motor Vehicle crashes on Indian Reservations 1975-2002. April 2004. DOT HS 809 727.
11. American Academy of Pediatrics, Committee on Injury, Violence, and Poison Prevention. Policy Statement-Child Passenger Safety. *Pediatrics* 2011. (doi:10.1542/peds.2011-0213) Accessed May 27,2014. Retrieved from <http://pediatrics.aappublications.org/content/early/2011/03/21/peds.2011-0213.abstract>.
12. American Academy of Pediatrics. Car Seats: Information for Families 2014. Accessed May 27, 2014. Retrieved from <http://www.healthychildren.org/English/safety-prevention/on-the-go/Pages/Car-Safety-Seats-Information-for-Families.aspx>.