



Socio-demographic Variation of Adult Seatbelt Non-use in Rhode Island – Different Data Sources

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Motor vehicle crashes cause serious injuries and premature deaths throughout the world.¹⁻³ Although motor vehicle deaths have declined tremendously since 1925, motor vehicle crashes continue to be a leading cause of death in the United States.^{2,4} Unintentional injury is the fourth leading of death in the US with motor vehicle injuries being the second leading contributor.^{5,6} As the second largest cause of unintentional injury deaths in the United States, it is a major public health challenge.

Motor vehicle injury prevention is a top priority for the National Center for Injury Prevention and Control (NCIPC) and Centers for Disease Control and Prevention (CDC)-wide. Seatbelt use remains a highly effective preventive method of reducing motor vehicle occupant injuries/deaths in motor vehicle crashes.¹⁻³ Increasing seatbelt use to 92% is an objective of IVP-15 under the Unintentional Injury Prevention chapter in the U.S. Healthy People 2020.⁷ Therefore, it is crucial to public health to examine seatbelt non-use. With several data sources available, we sought to estimate the prevalence of motor vehicle occupants who self-report as “not always wearing seatbelt” by socio-demographic characteristics and to compare adult seatbelt non-use across the three different data sources in Rhode Island.

METHODS

Data sources

Data from the 2013 Behavioral Risk Factor Surveillance System (BRFSS) were used to calculate prevalence of seatbelt non-use by socio-demographic characteristics. The CDC developed the BRFSS to monitor the major health conditions, injuries, health risk behaviors, and emerging problems among individuals who were at least 18 years old in the US. The BRFSS is a state-based, anonymous, voluntary, cross-sectional, and random-digit-dialing telephone survey of adults in 50 states, the District of Columbia, and three territories. It uses a complex survey sampling strategy, so the weighted data are representative of Rhode Island adults.

Police crash reports document the details of all crashes occurring throughout the state including information on the crash location, circumstances, vehicles involved, characteristics of the crash, etc., but usually include limited information about the cost and outcome of the crash. The 2012 crash data were available from the Highway Safety Program at the Rhode Island Department of Transportation.

Hospital discharge data (HDD), observation, and Emergency Department (ED) records were linked to the crash records to provide data with detailed crash and health outcome information (e.g. duration of hospital stay and medical charges). Since there is no uniform identifier that can serve to link all the records across crash, HDD, observation, and ED data sets, the data linkage was a sophisticated process. Linkage elements included date of crash/ED visit/admission, date of birth, sex, and town of residence. To ensure the most accurate linkage of records across the four data sources, deterministic methods and careful human review of results were required. A step-wise linkage process was performed to avoid duplication. The linked rate for the 2012 crash and hospital data was 60.9%.

Measures for Seatbelt Use

The 2013 BRFSS included a question on driver or passenger seatbelt use. The seatbelt-use question was: “How often do you use seat belts when you drive or ride in a car?” Possible responses were 1) always wear a seatbelt; 2) nearly always wear a seatbelt; 3) sometimes wear a seatbelt; 4) seldom wear a seatbelt; 5) never wear a seatbelt; and 6) never drive or ride in a car. For analyses, responses were dichotomized as “always used” versus “not always used.” Adults who indicated that they never drive or ride in a car or with missing responses were excluded.

The 2012 crash data had a protection system field, which included 1) not applicable; 2) none used; 3) shoulder and lap; 4) shoulder only; 5) lap only; 6) type unknown; 7) child – forward facing; 8) child – rear facing; 9) booster seat; 10) child unknown; 11) helmet used; 12) other; and 13) unknown. The authors restricted the crash and linked data to adults aged 18 years old and older, drivers and passengers, and the categories (2–5) of the protection system to be consistent with the BRFSS data in this study. Responses were dichotomized as “seatbelt non-use” vs. “seatbelt use.”

Measures for Socio-demographics

Socio-demographic characteristics included age (18–34, 35–44, or 65 years and over), sex, race/ethnicity (non-Hispanic white or minorities), city of residence (core-city including four designated RI cities in which 25% and more of children live in poverty – Central Falls, Pawtucket, Providence, and Woonsocket; non-core city; or out of state), insurance (yes/no), income (less than \$50,000 or \$50,000 and

higher), education level (high school or less, some college, or college graduate), marital status (married/widowed, divorced/separated, or never married/unmarried couple), and rent or own home (own or rent/other arrangement).

Table 1. Adult not always wearing seatbelt by demographic characteristics using the 2013 BRFSS data, Rhode Island

Socio-demographic characteristics	Total	Not always wearing seatbelt		
		n	Weighted	
			Estimated prevalence	Projected population
Total	5,813	607	12.8	94,452
Age group (years)***				
18-34	744	139	20.9	31,935
35-44	723	79	11.2	24,274
45-64	2,413	212	9.7	25,387
65 and over	1,873	171	8.3	12,269
Sex***				
Male	2,289	359	18.0	63,825
Female	3,524	248	8.0	30,628
Race/Ethnicity*				
White, Non-Hispanic	4,919	493	12.1	70,020
Minorities	894	114	15.7	24,433
City of residence				
Core city ^a	1,489	168	14.5	57,754
Non-core city	4,121	419	12.1	32,647
Health insurance**				
Yes	5,202	512	11.9	74,881
No	597	92	18.0	19,173
Annual household income*				
Less than \$50,000	2,580	309	14.6	46,539
\$50,000 and higher	2,378	217	11.2	34,650
Education level***				
High school or less	2,004	238	15.3	46,754
Some college	1,476	164	13.0	28,793
College graduate	2,317	204	9.1	18,838
Marital status***				
Married/Widowed	3,563	292	8.4	34,686
Divorced/Separated	1,010	106	12.1	12,014
Never married/Unmarried couple	1,204	204	21.4	47,071
Own or rent home***				
Own	3,928	378	11.2	54,099
Rent/Other arrangement	1,833	222	16.2	39,670

BRFSS: Behavioral Risk Factor Surveillance System

^a Core-city: Central Falls, Pawtucket, Providence and Woonsocket.

***, <0.001; **, <0.01; *, <0.05

Data Analysis

For the BRFSS data, we calculated unweighted frequency, and weighted percentages and frequencies. For the crash data and crash/hospital-linked data, we calculated seatbelt non-use percentages. Significance was assessed using a chi-square test statistic. All analyses were conducted by using SAS version 9.4 (SAS Institute, Inc, Cary, North Carolina), to account for the complex survey sampling of the BRFSS.

RESULTS

An estimated 12.8% (94,452) of adults in Rhode Island reported they did not always wear a seatbelt when driving or riding in a car (Table 1). The 18–34 years age group had the highest prevalence of persons who reported that they did not always wear a seatbelt (20.9%) and the 65 years and over age group had the lowest (8.3%). Males were twice more likely than females to not always wear a seatbelt. Persons without health insurance were more likely to report not always wearing a seatbelt than those having health insurance. As education level decreased, so did seat belt use. Those who were never married or a member of an unmarried couple had the highest prevalence of reported not always wearing a seatbelt, compared to married or widowed persons.

Only 2.0% of adult drivers and passengers involved in motor vehicle crashes did not use a seatbelt (Table 2); however 5.5% of adults admitted to a hospital did not use

Table 2. Adult seatbelt non-use among motor vehicle crashes by demographic characteristics using the 2012 crash data, Rhode Island

Demographic characteristics	Total	Seatbelt non-use	
		n	%
Total	47,615	958	2.0
Age groups (years)***			
18-34	20,400	522	2.6
35-44	7,576	163	2.2
45-64	14,037	231	1.7
65 and over	5,602	42	0.8
Sex***			
Male	24,519	664	2.7
Female	23,084	294	1.3
City of residence***			
Core city ^a	9,833	281	2.9
Non-core city	30,858	529	1.7
Out of state	6,370	121	1.9
Car insurance***			
Yes	20,371	288	1.4
No	764	66	8.6

^a Core-city: Central Falls, Pawtucket, Providence and Woonsocket.

***, <0.001; **, <0.01; *, <0.05

a seatbelt (**Table 3**). Our analyses indicated that seatbelt non-use was higher for young adults, males, adult drivers and passengers who resided in the four core-cities (Central Falls, Pawtucket, Providence and Woonsocket), and adults with no car insurance. In each category of demographics, adults with motor vehicle-related injuries who were admitted to the hospital had higher percentages of seatbelt non-use (**Table 3**) than overall drivers or passengers who were involved in motor vehicle crashes (**Table 2**).

Table 3. Adult seatbelt non-use among motor vehicle crashes by demographic characteristics using the 2012 crash/hospital-linked data, Rhode Island

Demographic characteristics	Total	Seatbelt non-use	
		n	%
Total	5,112	279	5.5
Age groups (years)^a			
18-34	2,513	147	5.9
35-44	827	48	5.7
45-64	1,295	74	5.7
65 and over	477	11	2.3
Sex^{***}			
Male	2,246	205	9.1
Female	2,867	75	2.6
Race/Ethnicity			
White, non-Hispanic	3,523	200	5.7
Minorities	1,546	77	5.0
City of residence			
Core city ^a	1,672	95	5.7
Non-core city	3,209	170	5.3
Out of state	231	15	6.3
Car insurance^{***}			
Yes	2,024	112	5.5
No	146	25	16.8

^a Core-city: Central Falls, Pawtucket, Providence and Woonsocket.

***, <0.001; **, <0.01; *, <0.05

DISCUSSION

Our findings indicate that young adults, males, persons who resided in the core cities, and adults without insurance or low socio-economic status, were at risk for not always wearing seatbelts or for seatbelt non-use. Our study also showed the persistence of these disparities for driver or passenger seatbelt non-use across the three data sources.

The burden of motor vehicle-related crash deaths/injuries to society is tremendous from an economic perspective. The cost of deaths/injuries from motor vehicle crashes is more than \$150 billion annually in the U.S.² Seatbelt non-use is strongly associated with increase in motor vehicle occupant injury. Decreasing seatbelt non-use could dramatically

reduce these injuries.^{2,8} Our study found that 279 seatbelt non-users in **Table 3** were charged almost five million dollars and the average of their medical charges was about \$17,000 per seatbelt non-user (data not shown). Previous data show that lap and shoulder seatbelt use can reduce 45%-60% of deaths and 50%-83% of fatal injuries to the head, chest, or extremities among driver/passenger.² More lives and medical expenses could be saved if the percentage of seatbelt non-use decreases in Rhode Island.

It is well documented that passage of a primary enforcement seatbelt law, combined with enhanced enforcement of seatbelt use, and public education campaigns can reduce motor vehicle injuries.⁹ Secondary enforcement laws are not as effective at increasing seatbelt use and reducing serious injuries compared to primary enforcement laws that allow police officers to stop a vehicle solely for an observed seatbelt violation.^{1,2} A primary seat belt law in Rhode Island went into effect on June 30, 2011 (R.I.G.L. § 31-22-22).¹⁰ Raboin and Chaudhary's report showed seatbelt use in Rhode Island increased from 80.4% in 2011 to 87.4% in 2014.¹¹

Disparities of seatbelt non-use across the three data sources suggest that targeted interventions are needed to promote seatbelt use for high-risk adult population. Even as rates of seatbelt non-use were lower than 10%, a small sub-population of drivers or passengers having habitual seatbelt non-use were at high risk and can still benefit from targeted interventions.⁸ Steptoe et al. study showed that seatbelt non-use was related to other high-risk driving behaviors.³ Adults who self-reported not always wearing a seatbelt were more likely to drink and drive and less likely to obey speed limits compared to those without high-risk driving behaviors.³

Information alone is not enough to change behavior. Enhanced enforcement campaigns, such as incentive programs and community campaigns, may target high-risk populations in a variety of settings.² Enforcement strategies can utilize mass media, checkpoints, police officers, or alternative penalties to promote adult seatbelt use. In order to be effective, the Rhode Island Violence and Injury Prevention Program works closely with other partners, such as the RI Department of Transportation Office of Highway Safety, state and local police, the Office of the Attorney General, Mothers Against Drunk Driving (MADD), and local SAFE KIDS organization (www.safekids.org).²

The limitations of the three data sources should be noted. First, not always wearing a seatbelt was based on self-reported data in the BRFSS. Previous studies have found that adult drivers or passengers over-report seatbelt use by 5% to 20%.^{3,12} Therefore, the actual prevalence of not always wearing a seatbelt among adults may be even higher than the estimates based on self-reported BRFSS data. Second, the number of adults not wearing seatbelts identified in the crash data is likely higher (maybe much higher) due to under-reporting by police officers. An officer, unless he is actually on the scene when the crash occurs, cannot always determine if occupants were wearing seatbelts or not. Sometimes an

officer can determine from the damage to the car and the types of injuries if an occupant was wearing the seat belt or not. However, normally, by the time the officer arrives on scene the occupants of the vehicles are no longer sitting in the vehicles. Since Rhode Island has a primary seatbelt law, drivers and passengers are not likely to volunteer to the officer that they were not wearing seatbelts and risk being fined. In our 2012 crash data, overall, there were 27.3% of missing values and 10.7% of unknown category for protection system. There were variations among cities/towns by 1.5% (Little Compton) to 77.3% (Middletown) of missing values and 1.3% (Smithfield) to 23.3% (Providence) of unknown category. In general, small towns or rural areas reporting quality is much better than big towns/cities or urban areas. Third, there were only four variables for the data linkage, and there was no unique identifier for the crash/hospital data linkage. Because the linked rate for the 2012 was 60.9% and the hospital data did not capture office visits (outpatient data), we might underestimate medical charges and seatbelt non-use.

Although the findings present some limitations, there are consistencies in the identification of high-risk groups. The analyses provide opportunities to target high-risk populations and focus interventions to promote seatbelt use, and reduce motor vehicle crash injuries and deaths.

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Disclosure

The authors have no financial interests to disclose.

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