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The 2013 North Carolina Seat Belt Survey and Other Analyses

Final Report

Prepared for

Don Nail, Director
NC Governor's Highway Safety Program
215 East Lane Street
Raleigh, NC 27601

Prepared by

RTI International
3040 Cornwallis Road
Research Triangle Park, NC 27709

RTI Project Number: 0213580

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1. THE NORTH CAROLINA SEAT BELT SURVEY

Annual seat belt surveys are conducted by the State of North Carolina to fulfill the requirements of the National Highway Traffic Safety Administration (NHTSA). The survey is conducted in June after the Governor's Highway Safety Program's (GHSP's) Click It or Ticket program is completed. The Click It or Ticket program in North Carolina has served as a successful pilot project for similar programs nationally, and has been conducted annually since October 1993 as an enforcement and education campaign dedicated to reducing injuries and deaths in motor vehicle accidents by increasing seat belt use.

1.1 NHTSA Seat Belt Survey Certification for 2012

RTI International submitted the required documents detailing that the 2012 NC Seat Belt Survey was compliant with Federal Register's final rule, published on April 1, 2013 (2127-AK41).¹ The report described RTI's revised survey design, data collection dates, quality check information, weights and data used to create estimates of state seat belt use.

1.2 Overall Results

Table 1-1 presents the overall results from the June 2013 North Carolina Seat Belt Survey. The June 2013 weighted statewide seat belt usage rate for drivers (D) is 89.6%, compared with 88.0% of drivers who were observed using seat belts in the June 2012 survey. This year's weighted statewide usage rate for right front-seat passengers (RF) is 84.9%, which is down from 85.7% in June 2012. The 2013 weighted usage rate for drivers and front-seat passengers combined (D+RF) is 88.6%, which is up slightly from the 2012 rate of 87.5%.

¹ <http://www.gpo.gov/fdsys/pkg/CFR-2013-title23-vol1/pdf/CFR-2013-title23-vol1-sec1340-10.pdf>

Table 1-1. North Carolina Seat Belt Usage Rates, Unweighted and Weighted: 120-Site June 2013 Survey

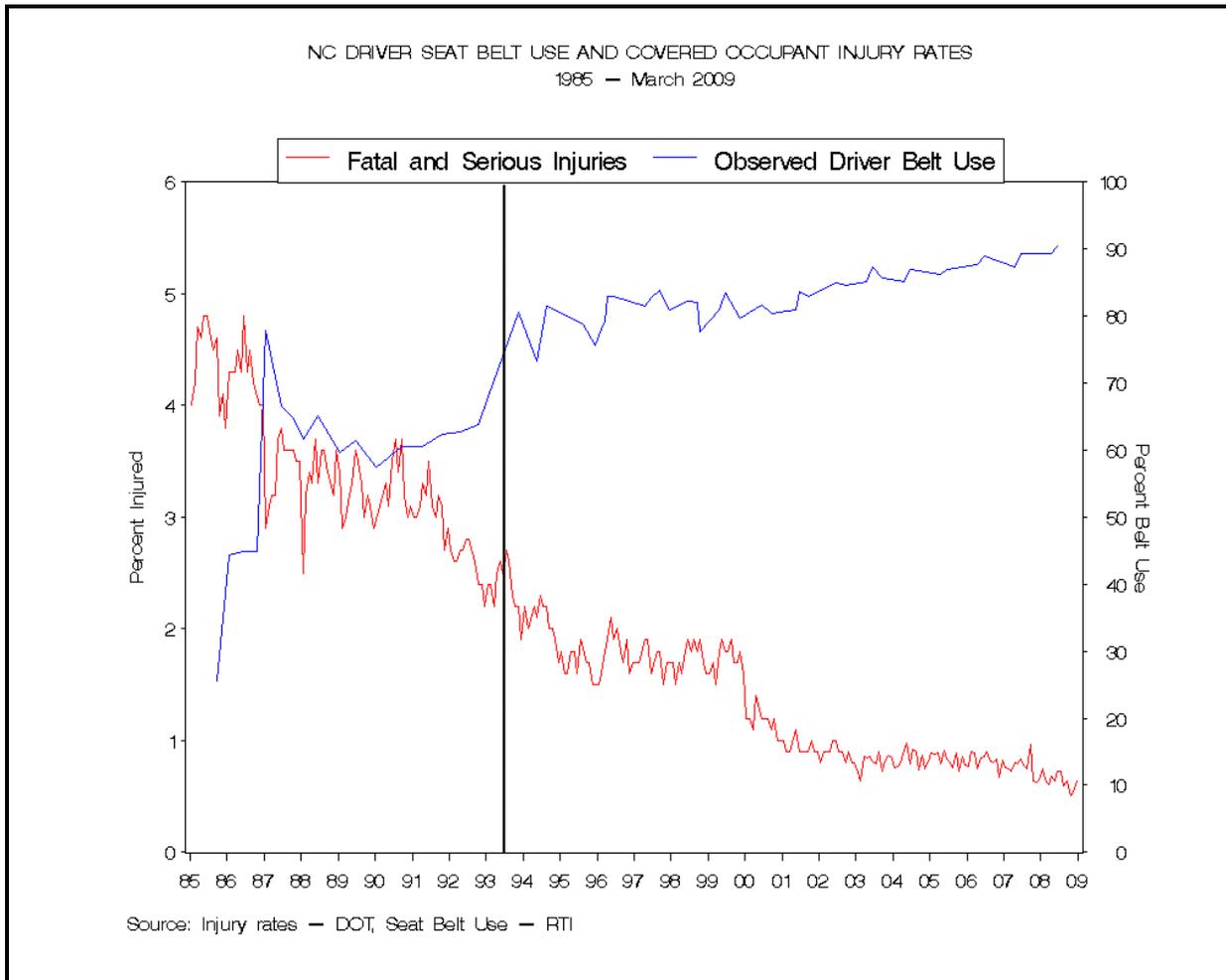
Category	Unweighted		Weighted	
	Use %	Use %	SE %	Sample Size
Overall				
Driver	90.4	89.6	0.9	21,315
Passenger	85.6	84.9	1.0	5,613
Combined	89.4	88.6	0.9	26,928
Urban/Rural				
Urban	91.1	90.8	0.7	16,716
Rural	87.9	86.1	2.2	4,599
Region				
Mountain	92.6	93.0	0.5	7,383
Piedmont	89.3	88.2	0.9	7,598
Coast	89.3	87.5	1.7	6,334
Vehicle Type				
Car	91.4	90.3	0.7	9,937
Van	87.6	83.8	1.6	603
Minivan	94.4	93.9	1.1	1,295
Pickup Truck	86.5	84.5	1.2	4,063
Sport-Utility Vehicle	92.8	92.8	1.5	4,673
Sex of Driver				
Male	89.9	87.9	1.2	5,696
Female	93.0	92.4	0.9	3,568
Race/Ethnicity of Driver				
White	91.8	91.0	0.7	6,906
Black	88.4	85.7	1.9	1,675
Hispanic	90.1	86.5	2.8	425
Native American	82.9	79.3	2.7	140
Asian	97.1	98.4	1.5	104
Age of Driver				
16-24	85.5	85.5	2.5	636
25-64	91.6	90.2	0.9	7,898
65+	90.0	87.5	2.0	733
Cell Usage				
Cell	6.9	7.8	0.4	1,481
Text	1.7	1.7	0.3	365

1.2.1 June 2013 Comparisons and Trends

Figure 1-1 presents noteworthy historical data for driver belt-usage trends versus serious or fatal injury rates for drivers. Note the continuing strong relationship between increasing driver belt-usage rates and decreasing serious and fatal injury rates, especially after the

implementation of Click It or Ticket in October 1993. Since driver belt use has risen from 25% to 90%, driver injury rates have fallen from a high of nearly 5% in 1985–1986 to a rate of less than 0.75% in 2009.

Figure 1-1. North Carolina Driver Seat Belt Use versus Serious and Fatal Injury Rates, 1985–2009



Source: Prepared by RTI International—Revised June 21, 2009.

Note: Vertical black line indicates the kickoff for the North Carolina “Click it or Ticket” campaign.

Some general trends (see Table 1-1) have not continued into recent survey years. For example, since the passage of the North Carolina seat belt law in October 1985, usage rates generally have been lowest in the mountain region. More recently, the lower seat belt use was observed in the coastal region. A new note for the 2013 results is that there is nearly no difference between the seat belt wearing rate by age group.

However, most of the other trends from past surveys are present in the June 2013 survey results. In brief, these include

- higher usage rates among car (90.3%), minivan (94.4), and sport-utility vehicle drivers (92.8%) but much lower usage rates for pickup truck (84.5%) and van (83.8%) drivers
- higher belt usage rates for women (92.4%) than for men (87.9%), although the difference has been decreasing over the years (e.g., in June 2001, the rates were 89.9% and 81.1%, respectively)
- higher usage rates for Asians than for whites or blacks; note the relatively small sample sizes for Hispanic, Asian, and Native American occupants.

This report also includes a series of tables that further describe belt usage trends across North Carolina. Table 1-2 shows D, RF, and D+RF belt-usage rates by county for this survey year. The observed combined (D+RF) belt usage rates in June exceed 90% in four of the 15 counties surveyed. Specifically, those are Cabarrus (90.5%), Caldwell (93.4%), Catawba (93.6%), and Rowan (91.1%) counties. However, seat belt usage lags somewhat in Franklin (86.5%), Guilford (86.9%), and Robeson (81.2%) counties. Columbus County (75.5%) had the highest increase from the previous year in seat belt usage rate (77.9% to 90.7%).

Table 1-2. North Carolina Seat Belt Usage Rates by County, Weighted: 120-Site June 2013 Survey

County	Driver (D)	Passenger (RF)	Combined (D+RF)	Sample Size
Overall	89.6	84.9	88.6	26,928
Alamance	88.5	82.1	87.1	1,634
Cabarrus	91.2	87.6	90.6	1,581
Caldwell	93.8	91.9	93.4	1,715
Catawba	93.8	92.7	93.6	1,460
Columbus	91.4	87.8	90.7	1,275
Franklin	88.1	79.4	86.5	1,968
Guilford	87.6	83.8	86.9	1,780
Harnett	89.3	89.8	89.4	1,831

Table 1-2. North Carolina Seat Belt Usage Rates by County, Weighted: 120-Site June 2013 Survey (continued)

County Name	Driver (D)	Passenger (RF)	Combined (D+RF)	Sample Size
Johnston	90.9	85.2	89.7	1,459
Mecklenburg	93.4	85.8	92.2	2,168
Nash	89.8	86.8	89.0	1,382
Onslow	91.1	86.9	89.9	1,297
Robeson	82.2	77.8	81.2	2,864
Rowan	91.8	91.1	91.7	2,004
Wake	88.3	83.4	87.4	2,510

Table 1-3 provides weighted D, RF, and D+RF seat belt use estimates for a series of surveys dating back over to April 1999. There are consistent trends in the following:

- There are increased belt-usage rates over the 13 years for all groups. Drivers increased from 80% in 1999 to 90% in 2013. RF passengers increased from 76% in 1999 to nearly 85% in 2013, and the combined rate increased from 79% in 1999 to nearly 89% in 2013.
- There is higher belt use for drivers than for passengers, generally a difference of about 5 percentage points, but with a slightly smaller difference (4.7%) in 2013.
- There are most often higher usage rates (D, RF, and D+RF) for the June postcampaign surveys than for the April precampaign surveys, with differences ranging from 1.0 to 3.4 percentage points, consistent with successful media and enforcement campaigns during the Memorial Day period. Note that the April survey has not been conducted since 2010.

Table 1-3. Observed Seat Belt Use in North Carolina (%), Weighted

Survey Periods	Driver (D)	Passenger (RF)	Combined (D+RF)
1999			
Apr ¹	81.0	77.7	79.9
Jun ¹	83.5	80.8	82.3
Nov ²	79.7	71.0	78.6
2000			
Jun ³	81.6	76.1	80.5
Sep ³	80.3	74.7	79.2
2001			
May ³	80.9	74.8	79.6
Jun ³	83.6	79.1	82.7
Sep ³	83.0	77.3	81.9
2002			
Jun ³	84.9	80.6	84.1
Sep ³	84.5	76.5	82.7

Table 1-3. Observed Seat Belt Use in North Carolina (%), Weighted (continued)

Survey Periods	Driver (D)	Passenger (RF)	Combined (D+RF)
2003			
Apr ³	85.1	79.2	84.1
Jun ³	87.3	81.0	86.1
Sep ³	85.7	80.4	84.7
2004			
Apr ³	85.2	79.1	83.8
Jun ⁴	87.4	74.7	85.4
2005			
Apr ⁵	86.2	82.2	85.4
Jun ⁴	86.9	85.6	86.7
2006			
Apr ⁵	87.6	84.4	86.9
Jun ⁴	88.9	86.3	88.5
2007			
Apr ⁵	87.4	74.7	85.4
Jun ⁴	89.4	84.7	88.8
2008			
Apr ⁵	89.4	82.8	88.4
Jun ⁴	90.4	85.5	89.8
2009			
Apr ⁵	90.4	83.3	89.2
Jun ⁴	89.8	88.8	89.5
2010			
Jun ⁴	90.4	86.7	89.7
2011			
Jun ⁶	90.8	84.8	89.5
2012			
Jun ⁶	88.0	85.7	87.5
2013			
Jun ⁶	89.6	84.9	88.6

¹ This survey was conducted at 72 sites.

² This survey was conducted at 306 sites.

³ This survey was conducted at 152 sites.

⁴ This survey was conducted at 121 sites.

⁵ This survey was conducted at 50 sites.

⁶ This survey was conducted at 120 sites.

Table 1-4 presents longitudinal data on observed belt use overall (D+RF) by region; vehicle type; and sex, age, and race/ethnicity of drivers. Again, note the general consistency of the trends across the surveys from April 2006 through June 2013, with the exception of driver age in the June 2009 survey. Also note that the overall seat belt use has plateaued in recent years and the small variation is likely due to the natural variance that occurs when selecting a sample.

Table 1-4. Seat Belt Use Trends in North Carolina (%), Weighted

	2006		2007		2008		2009		2010	2011	2012	2013
	Apr ¹	Jun ²	Jun ²	Jun ²	Jun ⁴	Jun ⁴						
Overall (D+RF) Rate	86.9	88.5	85.4	88.8	88.4	89.8	89.2	89.5	89.7	89.5	87.5	88.6
Region												
Mountain	86.7	88.2	88.7	90.6	90.4	91.3	90.7	89.3	89.5	91.6	93.0	93.0
Piedmont	89.1	90.2	87.5	88.7	89.4	91.0	91.5	91.2	91.1	91.5	87.4	88.2
Coast	84.5	85.8	85.8	90.9	88.5	88.0	87.3	86.2	88.8	87.1	84.6	87.5
Vehicle Type												
Car	90.0	91.2	88.6	90.4	90.3	91.4	92.1	91.2	91.4	92.2	90.6	90.3
Van	63.6	85.5	80.4	87.1	81.6	84.4	77.2	75.7	79.9	80.9	77.3	83.8
Minivan	88.2	90.7	93.1	96.0	97.7	93.6	98.1	91.1	94.5	94.4	92.7	93.9
Pickup Truck	79.7	78.9	83.3	84.0	80.7	86.1	85.9	85.5	84.1	86.1	82.0	84.5
Sport-Utility Vehicle	89.5	91.5	87.8	90.2	92.5	91.0	90.6	90.8	91.6	91.8	91.0	92.8
Sex of Driver												
Male	84.7	89.2	85.7	87.4	89.8	88.9	89.7	88.1	87.8	89.5	85.5	87.9
Female	92.6	93.7	93.9	94.7	92.0	91.9	93.7	92.9	93.5	93.2	92.3	92.4
Age of Driver												
16-24	86.1	92.0	94.1	88.8	95.6	86.9	85.8	92.2	86.6	88.0	89.4	85.5
25-44	88.1	90.4	88.7	89.6	89.8	90.5	91.4	89.6	90.1 ³	90.9 ³	88.3 ³	90.2 ³
45-64	91.1	92.6	86.0	91.7	91.2	89.5	93.1	92.5	90.1 ³	90.9 ³	88.3 ³	90.2 ³
65+	91.5	90.7	68.4	87.7	77.5	98.0	93.2	81.0	96.8	93.6	88.2	87.5
Race/Ethnicity												
White	88.3	90.6	89.2	90.9	90.1	91.2	92.6	91.1	90.3	91.3	89.2	91.0
Black	83.2	89.3	89.9	87.4	94.6	85.8	84.9	83.6	89.6	89.1	85.8	85.7
Hispanic	97.0	93.5	92.2	99.3	96.2	96.0	93.2	96.2	95.4	93.5	89.6	86.5

¹ This survey was conducted at 72 sites.

² This survey was conducted at 306 sites.

³ This survey was conducted at 152 sites.

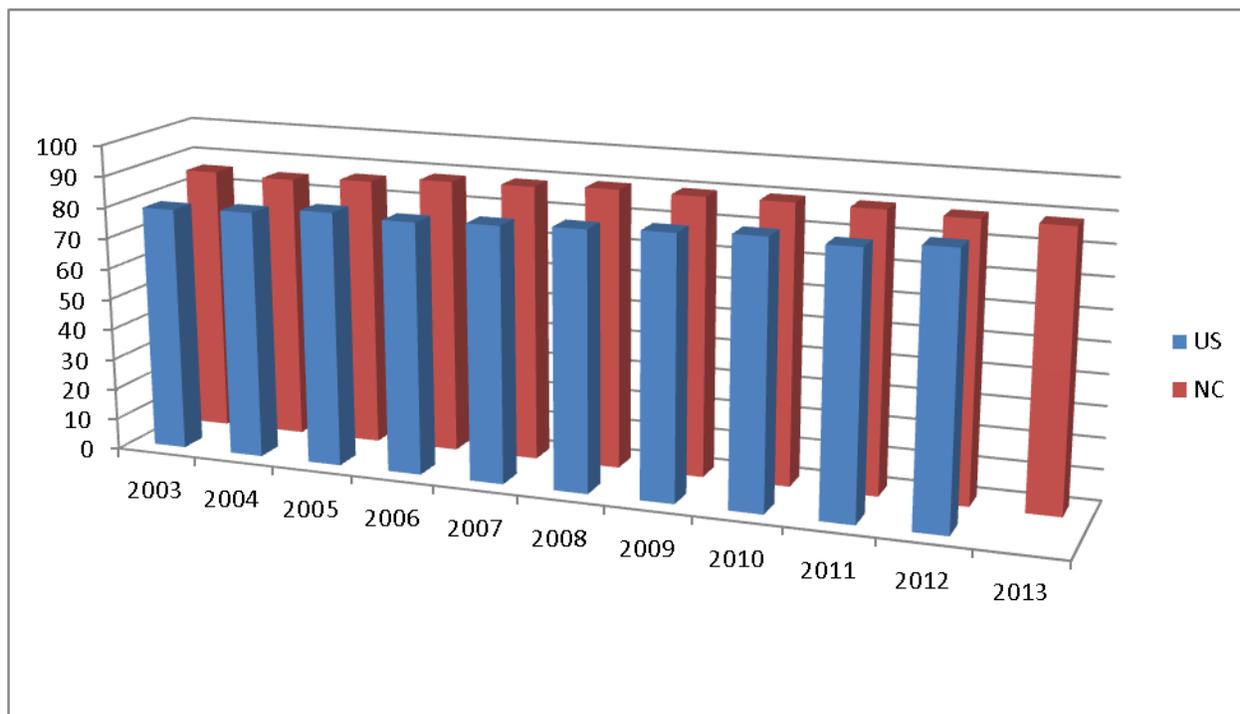
⁴ This survey was conducted at 121 sites.

⁵ This survey was conducted at 50 sites.

⁶ This survey was conducted at 120 sites.

The results discussed previously are shown graphically in Figure 1-2. In particular, Figure 1-2 and Table 1-3 show the upward trend of the combined (D+RF) belt-usage rate from about 79% in 1999 to 90% in 2013. The rate of belt use in North Carolina has been consistently between 5 and 15 percentage points higher than the national rate.

Figure 1-2. Longitudinal View of North Carolina’s Combined Seat Belt Usage Compared with National Combined Seat Belt Usage, 2003–2013



It should be noted that, for years, the mountain region has had lower seat belt usage rates than the other two regions, especially the coast. However, this has not been the case since 2006; in these surveys, the mountain region consistently surpassed the coastal region’s belt usage by a small margin (Table 1-4). It will be important to monitor these and other findings in future surveys to note any new trends.

1.3 Discussion

Trends, figures, and tables in this report are based on the weighted rates of seat belt use. The weighted rates are the best estimators of seat belt use for the entire State and for reported subgroups (e.g., male vs. female drivers).. Estimates for the Hispanic subgroup with only 425 drivers, Asians with only 104 drivers, and the Native American subgroup with only 140 drivers should be used with caution when extrapolating these results to the entire Hispanic, Asian or Native American population of North Carolina.

The 2013 seat belt survey was the second statewide survey in North Carolina to assess the use of cell phones and texting while driving. The nation’s first statewide distracted driving (use of cell phones for talking or texting) occurred in 2010 in California.² The results for North Carolina surveys were very similar to the initial California rate. Although approximately one third of drivers respond that they typically use their cell phone while

² Murphy, C. (2011, September). Distracted driving: What do the research and current experience tell us. Paper presented at GHSA Annual Meeting, Cincinnati, OH.

driving, only about 8 are observed using a cell phone in the statewide survey. The texting rate (1.7%) observed in North Carolina is, again, comparable to California (1.2%). The use of cell phones for talking or texting can occur on and off multiple times throughout a trip, making observation and self-report usage rates vary. The use of texting in 2012 was the same as the previous year.

1.4 Recommendations

The various usage rates (D, RF, and D+RF) over the past several years and particularly since 2006 have plateaued in the 85%–90% range. Many States struggle with how to reach the last resistant groups in the population. However, five States (California, Hawaii, Michigan, Oregon, and Washington)—all with primary laws like North Carolina—have reported usage rates of 96%–97%.³ These states employ survey methodologies different from North Carolina and they may have lower rates in future years because of the required changes in the survey procedures. What might North Carolina do to increase its seat belt wearing rates? Recommendations continue to be the following:

- **Assign driver license points for seat belt infractions.** If North Carolina is indeed similar to other areas, then this measure should be effective among drivers with lower usage rates (e.g., young, male, pickup truck, and van drivers) who generally have poorer driving records and cannot afford to gain additional points.^{4,5}
- **Raise the fine** (currently \$161 when combined with court costs).
- **Impose community service hours for infractions.**
- **Publicize local seat belt tickets by jurisdiction** (to motivate local drivers and police agencies).

1.5 Conclusion

The June 2013 survey was successful in providing updated estimates of seat belt usage following the Click It or Ticket campaign for drivers and passengers statewide and within geographic areas, by vehicle type and by important driver and passenger characteristics. Many of the previous seat belt usage trends have continued through the 2013 survey. For example, female drivers have consistently worn their seat belts more often than male drivers. However, trends of belt use within region and age group are changing and require monitoring in future years. Appendix A contains more detailed tables, which may be useful to North Carolina in planning future campaigns. Information on the Seat Belt Survey methodology can be found in Appendix B.

³ Insurance Institute for Highway Safety. (2009). It's simple: Click It or Ticket. *Status Report*, 44(7), 1-3.

⁴ Williams, A. F., Reinfurt, D. & Wells, J. A. (1996). Increasing seat belt use in North Carolina. *Journal of Safety Research*, 27(1), 33-41.

⁵ Manduca, P. L. (1983). *Raising the seat belt wearing rate in the Province of British Columbia*. Insurance Corporation of British Columbia.

Over the years in which the Click It or Ticket program has been in place (since October 1993), there have been diminishing returns for the increasing seat belt usage rates; that is, there have been only very small increases from year to year. For the past few years, we have seen precampaign April survey results for a given year that reflected usage rates very similar to those observed in the preceding postcampaign June survey. Accordingly, these years have also seen very small increases in usage rates between pre- and postcampaign April/June survey results. Although there is great statistical power to detect small changes in usage rates, recent years' changes usually have been statistically significant, but not of any practical use in shaping traffic safety policy. For this reason, North Carolina terminated the April precampaign survey and currently only conducts a June postcampaign survey.

We continue to recommend enhancements to the sanctions for failure to wear a seat belt while driving, including increasing fines and issuance of driver license points, as well as looking to other particularly successful State programs for ways to improve belt-wearing rates. With no current expectations of meaningful improvements in State seat belt usage rates in North Carolina, there is also the possibility of moving some Click It or Ticket occupant restraint funding to other programs, based on an investigation of how much funding is needed to maintain current seat belt usage levels. North Carolina seat belt rates have plateaued at about 90%, and the Click It or Ticket program, per se, does not appear to be the solution to influencing the remaining 10% of drivers to use their seat belts. We believe it is time to give serious consideration to other options.

2. THE NIGHTTIME SEAT BELT SURVEY

In 2013, RTI staff conducted a second nighttime data collection pilot study. Following recommendations and lessons learned from the 2011 pilot study, RTI continued to use tablet devices, as well as more sophisticated night-vision technology. This study tested several aspects of nighttime data collection, including lighting conditions conducive to data collection, the feasibility of more sophisticated night-vision technology, the use of electronic data collection forms on tablet devices, and data quality. For this study, RTI used the same as the regular 120-site daytime sample in all the counties in North Carolina. Data were collected at each site by RTI project staff member for 60 minutes. Teams of two observers were utilized to optimize the data observation and recording procedures. The observers were either positioned at a corner of the intersection or the end of an interstate highway exit ramp.

For well-lit sites, RTI determined the highest quality data is collection by observation without night-vision goggles. Prior to data collection, RTI researchers determined the optimal position at intersections for observing seat belt use. Sites deemed to have insufficient lighting conditions were used to test the ATN PVS7-3 Night Vision Weapon Goggles. Although headlights and taillights can disrupt the observer's ability to clearly see seat belt use, methods were established to minimize this effect. These methods included the identification of the vantage point for viewing seatbelt use with minimal disturbance from headlights and taillights. For instance, it is not ideal to observe seatbelt use head-on, or from the rear of a car, but rather directly from the side of the vehicle. It is also important not to temporarily impair visibility through the night vision goggles by viewing high-intensity light sources immediately before or during an observation (e.g., as a vehicle is approaching or leaving, but rather as it is passing).

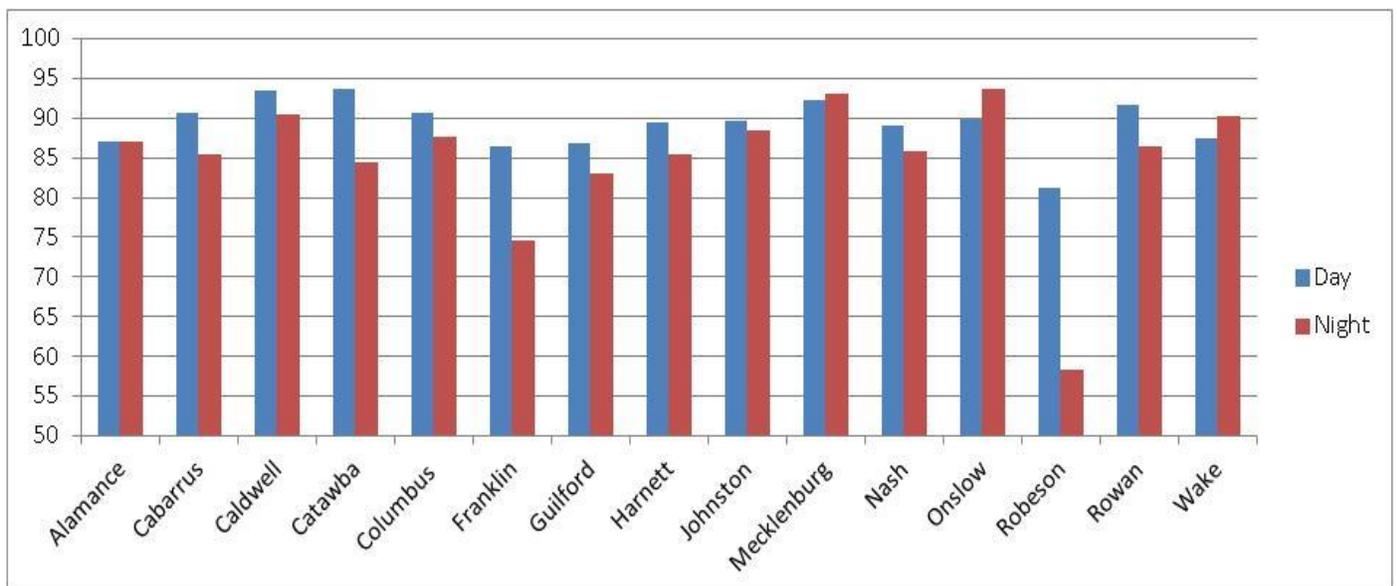
Data recording for all nighttime data collection used electronic forms on tablet devices, specifically the Samsung Galaxy Tab 7.0 Plus. Using a data collection app developed for the high school data collection and June seat belt survey, RTI staff were able to evaluate firsthand the feasibility of electronic data collection in the field and at night. RTI concluded that the use of tablet devices is the most cost efficient and effective method for in-field data collection and data delivery. For future night-time data collection using tablets, RTI recommends the use of two observers, one for observations and one for recording data. Handling both night-vision goggles and a tablet is not only difficult for one observer logistically, but the lighting effects from sudden switches between bright to dim can hinder the observer's ability to efficiently collect data.

Although data collection is conducted in accordance with all laws, RTI staff experienced multiple instances of inquiries by local law enforcement and the North Carolina State Highway patrol. Some of these inquiries were in response to anonymous calls by the public

reporting suspicious behavior. Although officers were very supportive and understanding of our work, we suggest a more thorough coordination with local law enforcement and the State Highway Patrol to minimize concern for future nighttime data collection activities.

As demonstrated in Tables 2-1, 2-2, and Figure 2.1, there is variation in the seat belt wearing rates between the day and night observations. The sample size was relatively small (n=4,722) in this study, giving the preliminary statistical tests between night and day belt use low power to detect differences. Although it appears that Alamance County has higher belt use during the nighttime hours, it is likely a sampling error and would be slightly different on a different day. Also, the low traffic volume at night may contribute to the sampling error.

Figure 2-1. Night and Day Combined Seat Belt Use in NC Counties, 2013



Another factor that drives this unusually high seat belt wearing rate at night is the time of night that the data was collected. In the daytime sample the sites are randomly assigned a time period during which they should be observed (Rush, NonRush and Weekend). That was not done in this survey, which has potentially skewed the results. Field Observers were allowed to self-select the time period for the data collection as long as it fell between 8pm and 4am. Less than 10 percent of the observations occurred after midnight, therefore increasing the belt wearing rate substantially. The wearing rate for observations after midnight is 10 percentage points less than the before midnight rate. These are unweighted numbers that are for illustrative purposes.

Below are the figures based on the data as it was collected.

Table 2-1. North Carolina Seat Belt Usage Rates, Unweighted and Weighted: 120-Site Nighttime 2013 Survey

Category	Unweighted		Weighted		Sample Size
	Use %	Use %	SE %		
Overall					
Driver	86.4	85.8	2.1		4,722
Passenger	83.1	80.9	2.9		1,224
Combined	85.7	84.8	2.2		5,946
Urban/Rural					
Urban	88.5	89.0	1.7		3,671
Rural	78.9	75.5	5.2		1,051
Region					
Mountain	88.8	89.2	2.3		2,162
Piedmont	86.6	85.3	3.3		1,453
Coast	81.4	81.2	4.3		1,107
Vehicle Type					
Car	86.0	85.1	1.6		2,624
Van	89.2	83.2	7.6		120
Minivan	89.6	91.7	3.0		241
Pickup Truck	83.1	80.0	3.6		644
Sport-Utility Vehicle	89.4	91.0	2.5		1,001
Cell Usage					
Cell	10.1	9.2	1.6		4,722
Text	4.5	4.8	1.2		4,722

Table 2-2. North Carolina Seat Belt Usage Rates by County, Weighted: Nighttime 2013 Survey

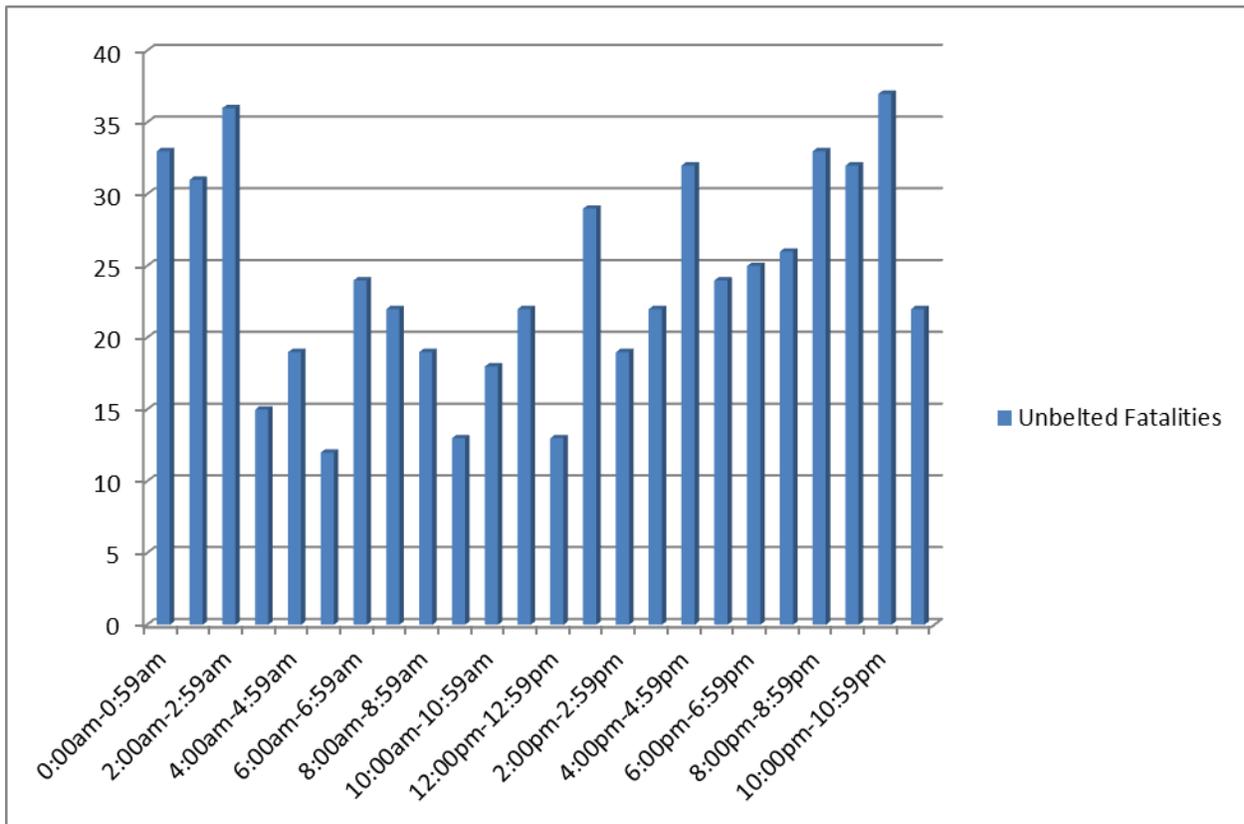
County	Driver (D)	Passenger (RF)	Combined (D+RF)	Sample Size
Overall	85.8	80.9	84.8	5,946
Alamance	88.5	83.6	87.1	424
Cabarrus	85.2	86.8	85.5	378
Caldwell	91.7	81.8	90.4	443
Catawba	83.0	91.7	84.5	403
Columbus	86.9	90.3	87.7	173
Franklin	76.8	69.2	74.5	211
Guilford	84.6	78.0	83.1	266
Harnett	85.5	84.7	85.4	806
Johnston	92.1	80.2	88.4	466
Mecklenburg	92.5	97.7	93.0	719
Nash	91.3	72.5	85.9	368
Onslow	95.0	88.8	93.6	107
Robeson	59.2	55.4	58.3	392
Rowan	86.7	85.0	86.5	603
Wake	89.8	92.3	90.2	187

3. FOR THE FUTURE

In 2014 RTI will continue to conduct a statewide survey of nighttime seat belt use. Since these nighttime sites will be the same as the regular 120-site daytime sample, RTI will research how the weights can be adjusted for our nighttime sample to make direct comparisons to our daytime sample. We will continue the use of the electronic data collection on tablet devices and will use night-vision goggles. In addition, we will coordinate with local law enforcement and highway patrol to limit concerns to the public.

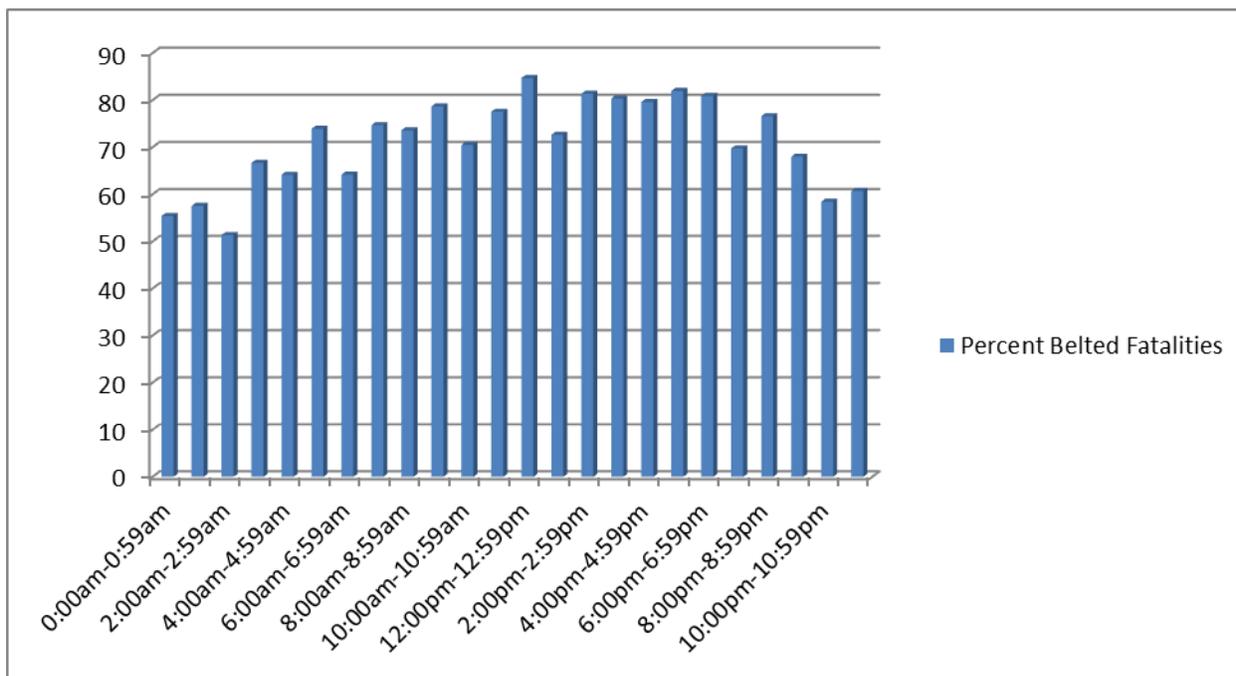
The main change planned for the 2014 Nighttime Survey is to stratify the nighttime data collection periods by time of day and risk. Using FARS 2011 data, Figure 3.1 show the percent of unbuckled fatalities in North Carolina by the hour of the crash.

Figure 3.1 Count of Unbuckled Fatalities in North Carolina by Hour of Crash



When we look at the time of day and the percent of belted fatalities, we can see that the nighttime hours have a lower rate of seat belt use among the fatalities in Figure 3.2.

Figure 3.2. Percent of Belted Fatalities by Time of Crash in NC



Here, the average belt use among fatalities is about 71%. The times of day with lower than average belt use are typically the nighttime hours. This includes midnight-5am and 9pm to midnight. The 6:00am-6:59am time period as well as the 7:00pm – 7:59pm time period have lower rates of belted fatalities. For the 2014 Nighttime Survey, we will continue to study the FARS data and other literature to determine a suitable allocation of sites across times to ensure full coverage and representative rates of seat belt use in the State.

APPENDIX A: DETAILED TABLES FROM THE 2013 NC SEAT BELT SURVEY

Table A-1. 2013 Seat Belt Use by Time Period, Weighted

Time Period	Percent Seat Belt Use (Standard Error)		
	Driver (D)	Passenger (RF)	Combined (D + RF)
Morning Rush	89.3 (1.09)	81.7 (3.49)	88.2 (1.18)
Evening Rush	90.5 (1.56)	86.9 (2.85)	89.7 (1.73)
Nonrush	87.5 (0.77)	84.7 (1.54)	86.9 (0.85)
Weekend	90.8 (0.98)	90.1 (1.38)	90.6 (1.04)

Table A-2. 2013 Driver Seat Belt Use for Race by Sex, Weighted

Race	Percent Seat Belt Use (Standard Error)	
	Male	Female
White	87.2 (1.22)	93.1 (0.66)
Black	85.0 (1.43)	89.4 (1.24)

Table A-3. 2013 Driver Seat Belt Use for Vehicle Type by Sex, Weighted

Vehicle Type	Percent Seat Belt Use (Standard Error)	
	Male	Female
Car	89.9 (0.78)	91.9 (0.88)
Pickup Truck	84.4 (1.56)	84.7 (3.37)
Sport-Utility Vehicle	90.9 (1.31)	93.6 (0.96)
Other	84.0 (2.98)	93.6 (1.77)

Table A-4. 2013 Driver Seat Belt Use for Vehicle Type by Urbanicity, Weighted

Vehicle Type	Percent Seat Belt Use (Standard Error)	
	Urban	Rural
Car	91.7 (0.49)	88.6 (1.53)
Pickup Truck	84.4 (1.26)	77.3 (2.12)
Sport-Utility Vehicle	92.9 (0.70)	88.5 (1.44)
Other	88.1 (1.45)	83.6 (2.14)

Table A-5 2013 Driver Seat Belt Use for Vehicle Type by Region, Weighted

Vehicle Type	Percent Seat Belt Use (Standard Error)		
	Mountain	Piedmont	Coast
Car	94.7 (0.64)	90.1 (0.44)	88.1 (1.17)
Pickup Truck	91.3 (1.21)	79.4 (1.33)	77.3 (2.19)
Sport-Utility Vehicle	95.9 (0.89)	90.8 (0.76)	89.1 (1.08)
Other	94.8 (0.96)	83.5 (2.38)	83.8 (1.82)

APPENDIX B: SURVEY METHODOLOGY

Sampling and Weighting

Sampling

The 120-site sample used for the 2013 survey was drawn by RTI International in 2010 under the new proposed federal guidelines. See Section 1 for more details about the revised sample design. The counties representing the lowest 15% of the fatalities were ineligible for selection. The survey sites were selected on the basis of road segments clustered within eligible counties. The road segments were selected with probability proportional to the average annual daily traffic (AADT) and the vehicle miles traveled (VMT). Site collection times were then randomized to ensure data collection was randomly distributed across the days of week and times of day.

There are three categories of site data collection times:

- Rush hour sites are those that are observed on weekdays between 7am and 9am or between 3:30pm and 6pm.
- Non-rush sites are those that are observed on weekdays between 9am and 3:30pm.
- Weekend sites are those that are observed between 7am and 6pm on Saturday or Sunday.

Weighting

Design weights were calculated as the inverse of the probability of selection. These design weights were then adjusted by multiplying by an adjustment factor based on traffic and population statistics to represent the population of North Carolina. The weights were trimmed to reduce the unequal weighting effect (UWE).

Data Collection

Data collection for the Seat Belt Study is conducted by certified Field Observers (FOs) who are trained to collect and record information through direct observation. These observers are stationed at the sample sites to monitor seat belt usage among drivers and front-seat passengers. Only traffic on the sampled road segment is observed. Observers attempt to collect data for each passing vehicle; however, data collection is limited to information from stopped (or nearly stopped) vehicles, for which reliable observations of seat belt usage can be made. Observations at each site are made over a period of 60 minutes during a preselected time of the day.

Observers work in pairs to monitor the sample sites; under no circumstances is it acceptable for an observer to work a site alone. Therefore, each observer must be able and willing to coordinate his or her schedule with the other team member assigned to his or her sites.

Training

For the 2013 survey, training was held at RTI in late May, prior to the start of data collection. During the survey training, FOs are given a detailed data collection manual. This

manual contains instructions for data collection, data editing, form return protocols, safety, billing, and other topics. This manual serves as a reference and helps to ensure quality throughout the data collection period.

Training serves as a refresher course for returning observers and as primary instruction for new recruits. It also allows RTI and the Governor's Highway Safety Program staff to go over any changes to the project. Training begins with an overview of the project, discussion of key details, and the background of the study. This portion is followed by a review of data collection procedures, observer requirements, equipment, and site details.

Once the observers have been instructed on how the project will be conducted, they are given a series of photos depicting various drivers, passengers, vehicles, and seat belt usage. The class reviews these together to clarify what the observers might see when in the field. This review session also allows observers to gain practice using tablets for data collection and transmission.

Following this practice session, RTI staff review administrative procedures and answer any questions that may arise. Once this portion is complete, the staff and observers break into teams and conduct a field test at a local intersection. RTI staff monitors the observers for quality of performance and provide constructive feedback during and after the field test.

Advances to the 2013 survey data collection effort were the addition of electronic tablets for data collection, storage, transmission, site information storage, and navigation. In 2010, GPS units and clustered data collection assignments were introduced, which resulted in increased efficiency of data collection efforts and site-to-site travel. In 2013, RTI adapted these advancements to the electronic tablet, which provided observers with an all-in-one data collection device. Prior to training, the GPS coordinates of all 120 sites were captured and stored in a Google Earth document. Sites are stored by county and then converted into the appropriate file version for the navigation application on the tablet devices. Each tablet device was then loaded with the location of each site. This addition enhanced the cost effectiveness and efficiency of the overall data collection effort. It also decreased human error by allowing each observer the ability to locate a site without having to reference printed maps and directions, or handle multiple devices for tracking data collection efforts.

As in previous years, site clusters were used to enhance cost efficiency. Mapping each site in Google Earth allows the data collection team to cluster sites. Prior to entering the field, observers were given a list of sites, which were grouped in clusters of three or four sites. Based on location and the time (rush or non-rush) and day (weekday or weekend), each cluster served as a recommendation as to which sites should be completed in the same day of work. Observers were instructed to notify their supervisor of any anticipated deviations from this cluster schedule.

Field Work and Scheduling

Prior to entering the field, observers work in pairs to create a tentative schedule. This allows RTI staff to better track field work. Throughout the data collection period, the field

supervisor remains in contact with each pair of observers on a weekly basis to ensure all data collection is completed on schedule.

Once observers are in place, data are collected for 60 minutes. The first 30 minutes are spent completing survey data collection Form A (includes demographic information). At the end of that time period, observers switch to survey data collection Form B (does not include demographic information) for the final 30 minutes. Observers record data on all vehicles. It is preferable that observers avoid trying to record vehicles in motion. Thus, observers record information for vehicles that are stopped or moving slowly.

Observers always attempt to record information as completely as possible. "Don't know" is to be used only as a last resort. Following each day of data collection, observers e-mail data to RTI.

Quality Control

Project quality control (QC) is an ongoing effort that includes two key steps.

Field Observations

The most direct QC method employed is supervisory site observations. Each team of observers is monitored in the field twice during the survey period. Our objective is to visit each team twice during the survey within the first six sites completed. Previously confirmed schedules allow RTI staff to perform unannounced QCs. RTI staff monitor the FO team, complete a site QC form, and detail any problems or concerns. Field observations also provide an ideal time for FOs to provide feedback on equipment and data collection protocol to RTI staff. This feedback is considered carefully, and any necessary modifications to data collection protocols are implemented.

Electronic Quality Assurance Efforts

All data received by RTI staff are reviewed prior to analysis. Using electronic tablets allow RTI to passively collect timestamps, which are then used to ensure that data was collected during the approved, randomized timeframe. This review ensures that

- sites were completed during the appropriate time (rush, non-rush) and day (weekday or weekend),
- timestamps for each site match between observer pairs,
- recorded site numbers are correct, and
- no sites are missing and data was collected for the entire hour.

Statistical Tasks and Analysis

SAS Programs

Modifications to the prior year's SAS programs can be run using the previous year's data for validation. Any changes to the program are documented and clearly explained. All SAS programs follow the StatEpi Programming Technical Operating Procedures.

Once the data are in an observation-level SAS data set, the statistical programs are run. The SAS programs are reviewed for programming and technical accuracy. Frequencies and other output are checked for consistency and reasonable output. The SAS program logs must be free of any messages indicating errors before they are considered final.

Table Creation

The SAS program automatically creates two tables (*Table 1* and *Table 2*). These tables are in a text document and are transferred into a report-worthy table format. The table entries are verified to prevent transcription errors. *Table 3* and *Table 4* are created by using data from the previous year's tables and adding the relevant data from *Table 1*. All tables present weighted results, while *Table 1* presents both weighted and unweighted results to allow comparisons.