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Investigation of Factors Associated with Truck Crash Severity in Nebraska

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16. Abstract
The severity of truck crashes is a concern in the state of Nebraska. This study was undertaken to investigate factors associated with the severity of truck crashes. A two-year dataset obtained from the Nebraska Department of Roads (NDOR) was analyzed to determine those factors. Results indicated that the involvement of alcohol was associated with more severe injuries in truck crashes on Nebraska highways. Crashes involving farm equipment were more injurious than other truck crashes. Dawn and dusk were critical periods associated with more severe truck crashes. Further, the absence of medians contributed to truck crash severity. Crashes on adverse pavement conditions such as snow, ice, and slush were less severe in comparison to crashes on pavements of different conditions. Crashes reported on local roads were less severe compared to those reported on other highways. The researchers recommend strengthening the ongoing focus on reducing driving under the influence of alcohol, as well as an in-depth investigation of truck crashes involving farm equipment. The researchers also recommend provision of medians on roadways, where possible.

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Executive Summary

The severity of truck crashes is a concern in the state of Nebraska. This study was undertaken to investigate factors associated with truck crash severity. A two-year dataset obtained from the Nebraska Department of Roads (NDOR) was analyzed to determine those factors. Results indicated that the involvement of alcohol was associated with more severe injuries in truck crashes on Nebraska highways. Crashes involving farm equipment were more injurious than other truck crashes. Dawn and dusk were critical periods associated with more severe truck crashes. Further, the absence of medians contributed to truck crash severity. Crashes on adverse pavement conditions such as snow, ice, and slush were less severe in comparison to crashes on pavements of different conditions. Crashes reported on local roads were less severe compared to those reported on other highways.

The researchers recommend strengthening the ongoing focus on reducing the occurrence of driving under the influence of alcohol, as well as an in-depth investigation of truck crashes involving farm equipment. The researchers also recommend provision of medians on roadways, where possible.

Chapter 1 Introduction

1.1 Organization of the Report

This report is organized into four chapters. The current chapter provides background information and research objectives. Chapter two consists of a review of published literature. Chapter three presents information on the collection and analysis of crash data. Chapter four provides the conclusions and recommendations drawn from this research.

1.2 Background

Truck traffic in Nebraska and across the nation is increasing as a result of a growing population and greater quantities of freight transported on highways. Increasing truck traffic across Nebraska creates highway safety issues. Despite safety investments, fatality and injury-related crashes involving trucks have not decreased significantly (US DOT 2009).

Crashes involving trucks are not uncommon in Nebraska, and are becoming more critical as truck traffic increases due to rising ethanol production and greater volumes of freight transported through Nebraska. There is a need to understand causes of truck crashes and the different factors that may have a bearing on their severity. Any findings would likely be of interest to NDOR and the Carrier Enforcement Section of the Nebraska State Patrol.

1.3 Research Objective

The objective of this research was to obtain a better understanding of different factors associated with the severity of crashes involving trucks in Nebraska. Two years of data on crashes involving trucks was analyzed using statistical models. The modeling effort aimed to isolate factors that are prominent in severe truck crashes, while controlling for elements such as weather, topography, and highway geometry.

Chapter 2 Literature Review

A review of published literature on trucks was conducted to provide a structure for this research. The main topics discussed below are the frequency of crashes involving trucks, factors associated with truck crashes, and safety countermeasures.

Researchers have focused on analysis of the frequency of truck crashes. Randolph and Mokherjee (2008) reported that tractor trailers were associated with 10% of all fatal vehicle crashes, while tractor trailers constitute 3% of registered vehicles in the US. According to the FMCSA, in the past 20 years the number of fatal crashes involving trucks decreased by 7%, while during the past 10 years, injury crashes involving trucks decreased by 14 % (FMCSA 2008).

With respect to the factors associated with truck crashes, Modnesinghe et al. (2003) stated that the majority of large truck crashes could be attributed to roadway factors such as non-divided-lanes, relative positions of driving vehicles, and speed limits. Daniel and Chien (2004) indicated that geometric conditions, environmental conditions, and driver performance were the main factors associated with truck crashes on urban arterials. Using US accident history data, the US DOT and the FMCSA reported that 55% of highway crashes had some relationship to trucks. Moreover, driver-related causes accounted for 87% of all crashes, while 13% were attributed to vehicle characteristics, weather, and roadway conditions (US DOT and FMCSA 2006). FMCSA also named three categories for large truck crashes, including crash factors, vehicle factors, and human factors. The first category involved factors such as speed limit, roadway function class, time of day, day of week, traffic flow, relation to junction and roadway, weather, road surface conditions, and work zones. The second category included factors such as vehicle configuration, cargo body, vehicle weight, hazardous materials cargo, and jackknife occurrence with passenger vehicles. The third category included factors such as driver's age and sex and commercial driver's license status (FMCSA 2008).

Some publications have focused on discussing factors relating to large truck crashes in specific regions of the US. For instance, Spainhour et al. (2006) provided common crash types such as run-off-the-road, intersection crashes, pedestrian crashes, and rear end or side swipe as main categories for large truck crashes in Florida. According to Spainhour et al., 94% of fatal crashes in Florida involved human factors such as alcohol and drug use. Some studies have conducted in-depth analysis of specific factors associated with truck crashes. American Transportation Research Institute (ATRI) indicated that driver behaviors such as improper or erratic lane changes, failure to yield right of way, improper turn, and failure to maintain proper lane influenced more than 91% truck crashes in the US (ATRI 2005). Young et al. (2007) demonstrated that wind-related attributes (e.g., wind speed) were critical in truck crash models.

Other researchers have compared factors relating to car-truck crashes and car-car crashes. Council et al. (2003) concluded that 81% of fatal car-truck collisions involved a passenger car's fault. Kostyniuk et al. (2005) reported that driver factors such as following improperly, fatigue, obscured vision resulting from various weather conditions, and improper or erratic lane changes, may contribute to more car-truck crashes than car-car crashes.

Exploring the relationship between specific geometric characteristics and truck crashes or possible hazards, Wang and Council (1999) found that a significant percentage of truck crashes occurred on highway ramps. Khattak et al. (2004) indicated that work zone crashes involving large trucks were more injurious than non-work zone crashes. Zimmerman (2007) reported that the use of a truck dilemma zone that is 1.5 longer than the passenger car dilemma zone at intersections produced a 47% reduction in the number of trucks in the dilemma zone, without producing a noticeable effect on intersection delay.

Finally, several studies focused on the effectiveness of countermeasures and policies on the occurrence of large truck crashes. In management field, Rodriguez (2003) reported that higher pay rates and pay increases for truck drivers were related to lower expected crash counts and a higher probability of zero crashes. Chen (2008) addressed the finding that truck companies that received compliance reviews experienced a 15%-39% reduction in the number of crashes. The reduction in crashes was sustained for at least seven years after the reviews. Hall et al. (2008) indicated that 8-9 hours of service driving time was safer than, for example, 10 to 11 hours.

Regarding engineering practices, Moses et al. (2007) stated that truck lane restrictions had a positive safety influence relative to large truck crashes on some highways, but a negative safety influence on others. Kobelo et al. (2008) explained that highway sections with truck lane restrictions tended to have fewer crashes than sections without restrictions, with a yearly reduction of approximately 4%.

Chapter 3 Data Collection and Analysis

3.1 Crash Data and Reduction

Relevant data for crashes involving trucks, including coding information from crash reports, was requested from NDOR for 2004-2007. The obtained dataset consisted of data from July 2004 through June 2007. Because six-months of data were missing for both 2004 and 2007, these years were excluded from analysis. Thus, the analyzed dataset consisted of truck-involved crashes reported in 2005 and 2006. The dataset was further limited to five severity categories representing the KABCO scale (Killed, A-type injury, B-type injury, C-type injury, and property damage only). The final dataset consisted of 1,801 reported crashes, out of which 51.9% were reported in 2005 and 48.1% reported in 2006.

3.2 Data Analysis Methodology

This research investigated the relationship between truck crash severity in Nebraska and a host of associated factors. Crash severity was measured on an ordinal scale, for which the Ordered Probit model was selected for this study. The ordinal nature of crash severity arises from the way in which each crash is ranked, i.e., fatal, A-type (incapacitating) injury, B-type (evident) injury, C-Type (complaint of pain) injury, and PDO (property damage only) crashes. This model has been widely used in the reported literature for the analysis of crash severity (Khattak 2002; Storchmann, 2005). Table 3.1 presents the variables suitable for use in the model. Details of variable definitions and explanations are given in appendix A.

Table 3.3 Variables for model estimation

Variable	**Variable Name**	**Definition**
rd_cls_c	road class code	defines what road class marked
lght_con	light condition code	defines what light condition marked
rd_char	road character code	defines different road characters
rd_surf	road surface code	defines typical road surface categories
rsc_cde	road surface condition code	defines typical road surface condition categories
tnl_cde	total number of through lanes code	defines the categories of through lanes with different numbers of lanes
mdn_typ	median type code	defines the median type on the road
rltn_to	relation to roadway code	defines different categories in terms of relation to roadway
acc_sev	accident severity code	defines typical accident severity categories
alc_r	alcohol related switch	defines if respondent is an alcohol related accident or not
farm_eqp	farm equipment switch	defines if respondent is an farm equipment related accident or not
young_dr	young driver switch	defines if respondent is an young driver related accident or not
teen_sw	teenager driver switch	defines if respondent is an teenager related accident or not
schl_bus	school bus switch	defines if respondent is an school bus related accident or not
whr_cnd	weather condition code	defines weather conditions

For the ordered probit model, the research group modeled the observed severity responses by a latent variable y_t^*, and using the following linear equation:

$$y_t^* = x_t \beta + \varepsilon_t, \text{ with } \varepsilon_t \sim N(0, 1) \quad (3.1)$$

Here, x_t represents independent variables. βs are related coefficients. ε_t represents error terms. The observed categories of y_t are based on y_t^* and can take on six values:

$$y_t = \begin{cases} 0 \text{ fatality if } y_t^* \leq \gamma_1 \\ 1 \text{ disabling injury if } \gamma_1 \leq y_t^* < \gamma_2 \\ 2 \text{ visible injury if } \gamma_2 \leq y_t^* < \gamma_3 \\ 3 \text{ possible injury if } \gamma_3 \leq y_t^* < \gamma_4 \\ 4 \text{ property damage onlyif } \gamma_4 \leq y_t^* \end{cases} \quad (3.2)$$

where,

γ are the thresholds, or cut points, between the intervals.

The maximum likelihood (ML) estimation is employed to estimate the regression of y_t^* on x_t. The probability of y_t in a particular rank can be illustrated as follows:

$\Pr(y_t = 0) = \Pr(y_t^* < \gamma_1) = \Pr(x_t \beta + \varepsilon_t < \gamma_1) = \Pr(\varepsilon_t < \gamma_1 - x_t \beta) = \Phi(\gamma_1 - x_t \beta)$

$\Pr(y_t = 1) = \Pr(\gamma_1 \leq y_t^* < \gamma_2) = \Pr(\gamma_1 \leq x_t \beta + \varepsilon_t < \gamma_2) =$

$\Pr(\varepsilon_t < \gamma_2 - x_t \beta) - (\varepsilon_t < \gamma_1 - x_t \beta) = \Phi(\gamma_2 - x_t \beta) - \Phi(\gamma_1 - x_t \beta)$

…etc. and

$\Pr(y_t = 4) = \Pr(y_t^* \geq \gamma_4) = \Pr(x_t \beta + \varepsilon_t \geq \gamma_4) = \Pr(\varepsilon_t \geq \gamma_{45} - x_t \beta) = \Phi(x_t \beta - \gamma_4)$

(3.3)

where,

$= \Phi$ (.) denotes the respective cumulative distribution function.

3.3 Descriptive Statistics and Model Estimation

Appendix B provides descriptive statistics for the dataset. For truck crash severity, the percentage of PDO was the largest proportion (41.9%) among the five categories, while fatal crashes constituted the smallest proportion (3.7%) (fig. 3.1). Monthly distribution of truck crashes showed the most reported crashes in December and October (fig. 3.2). The distribution of crashes on different road classes is presented in figure 3.3, showing that most occurred on highways, followed by local and interstate mainline. Most (71.2%) of the crashes were reported during daylight conditions, while only 4.4% were reported during dawn and dusk conditions. Crashes reported on dry pavement conditions constituted 73.1%, while 11.2% occurred on wet pavements and 14.3% were reported on snow, ice, and slush conditions. In 7.2% of the reported crashes, a barrier was in the median, while in 42.8% of the crashes, there was no median present. Alcohol was involved in 2.8% of crashes.

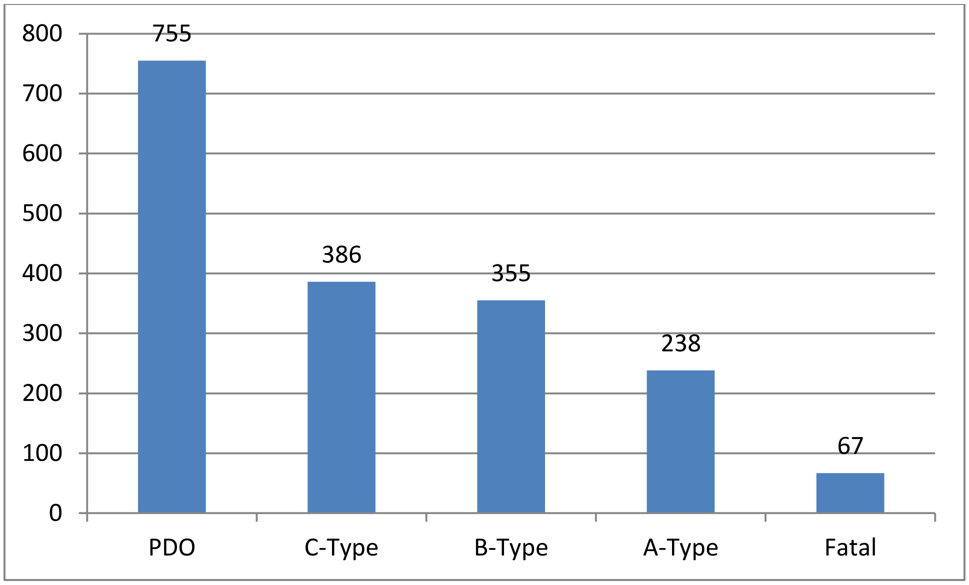

Figure 3.1 Distribution of truck crash severity (2005-2006 data)

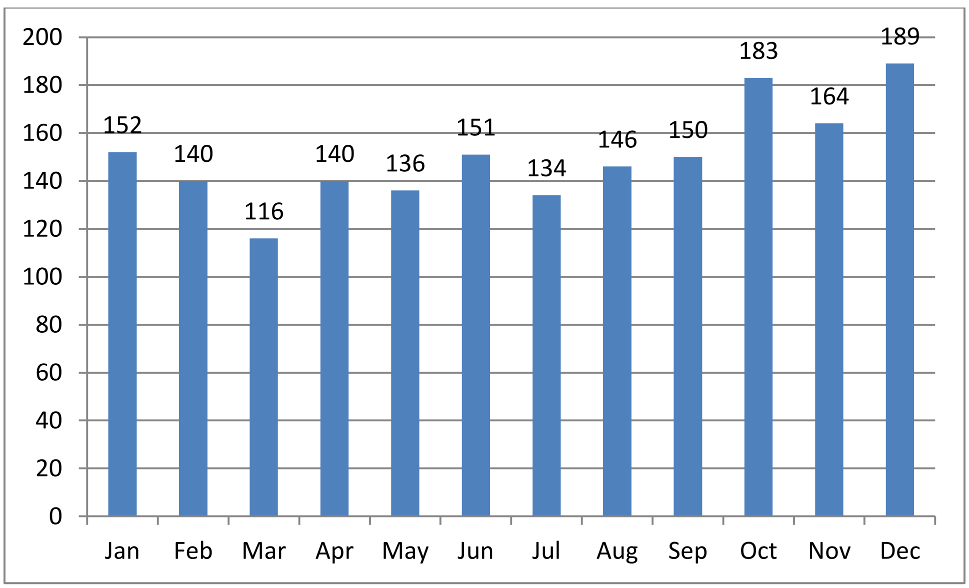

Figure 3.2 Monthly distribution of truck crashes (2005-2006 data)

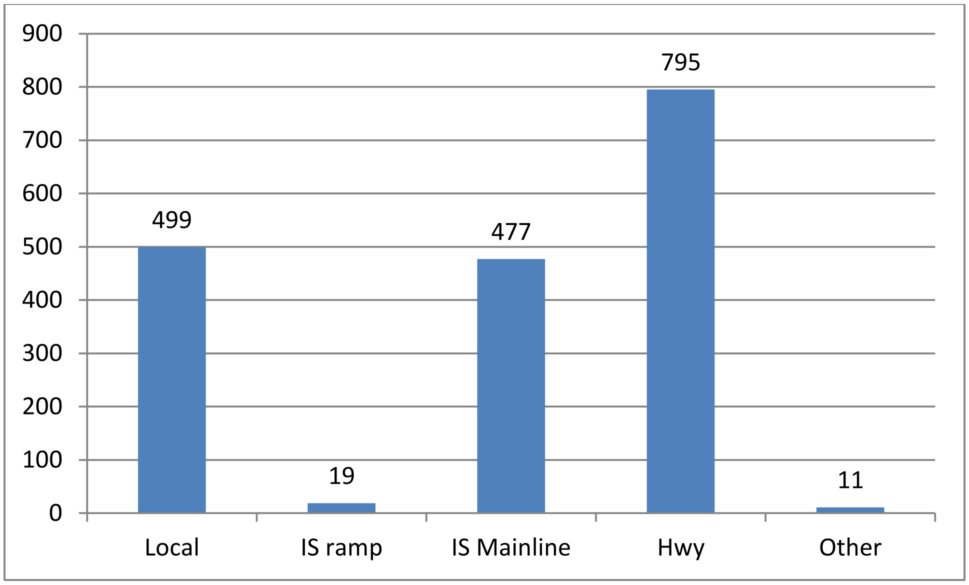

Figure 3.3 Crashes on different road classes (2005-2006 data)

Table 3.2 presents the model estimated for crash severity, while appendix C gives the detailed output from the software Nlogit version 4.0. The table lists several variables that were found to be associated with the severity of truck crashes; it also lists the estimated coefficient for each variable, the standard error of the estimate, the t-statistic for the estimate, and the mean value of each variable. An absolute t-statistic value of 1.96 or greater is indicative of statistical significance at the 95% confidence level. Also, a positive estimated parameter indicates that crash severity increases with increasing values of the variable, while a negative estimated parameter shows decreasing crash severity with increasing values of the variable.

Table 3.4 Estimated ordered probit model for truck crash severity

Variable	**Definition**	**Estimated coefficient**	**Std. Error**	**t-statistic**	**Mean**
Constant	Constant	0.175	0.039	4.427	-
ALCOHL_R	Alcohol involved=1, otherwise=0	0.765	0.149	5.122	0.028
FARM_EQP	Farm equipment involved=1; otherwise=0	0.791	0.328	2.409	0.006
DWN_DSK	Dawn or dusk=1; otherwise=0	0.384	0.123	3.121	0.044
SNW_ICE_SLUSH	Snow, ice, slush=1; otherwise =0	-0.261	0.076	-3.425	0.143
NO_MEDIAN	No median=1; otherwise=0	0.159	0.055	2.904	0.428
LOCAL	Local roads	-0.132	0.061	-2.179	0.277

Note: Crash severity coding: PDO=0, C-Type=1, B-Type=2, A-Type=3, Fatality=4

The estimated model showed that truck crashes involving alcohol were more severe in comparison to those that did not involve alcohol. The estimated coefficient for this variable was statistically significant at the 95% confidence level. This is an important finding, and emphasizes the need for efforts aimed at reducing impaired driving.

Crashes involving farm equipment were more severe compared to other crashes. This may be due to the unique nature of farm equipment, which may not exhibit the same level of safety as other, more common, vehicles. Crashes that occurred during dawn and dusk conditions were found to be associated with higher crash severity. A dummy variable for different types of adverse pavement conditions (snow, ice, and slush) was included in the model specification to evaluate their impact on the severity of truck crashes. The estimated coefficient for this variable was negative and statistically significant, indicating that crashes under such pavement conditions were less severe than those reported under other conditions; this variable may be capturing the effect of increased driver caution and slower speeds when traveling on pavements with snow, ice, and slush. Finally, the model showed that crashes on roadways with no median were more severe than crashes on roadways where medians were present.

Chapter 4 Conclusions and Recommendations

The objective of the research was to obtain a better understanding of several factors associated with the severity of large truck crashes in Nebraska. A two-year dataset was obtained from NDOR and analyzed for factors associated with crash severity. The following conclusions and recommendations are presented:

4.1 Conclusions

Based on the analysis results, it was concluded that:

- Alcohol involvement contributes to more severe injuries in truck crashes on Nebraska highways.
- Crashes involving farm equipment are more injurious than other truck crashes in Nebraska.
- Dawn and dusk are critical periods for truck crashes, and injuries in crashes reported during dawn and dusk are more severe.
- Crashes on adverse pavement conditions such as snow, ice, and slush are less severe than crashes on pavements characterized by other conditions.
- The absence of medians contributes to truck crash severity.
- Crashes reported on local roads are less severe than those reported on interstate highways and other highways.

4.2 Recommendations

Based on the conclusions of this study, the following recommendations are made for improving public safety on highways.

The current focus on reducing driving under the influence of alcohol should be emphasized. Farm equipment that is involved in truck crashes should be analyzed to ascertain causes associated with the heightened severity of injuries exhibited by this crash type. Where possible, medians should be provided to reduce the severity of truck crashes.

4.3 Future Work

The analysis presented in this report was based on a two-year dataset of truck crashes reported in Nebraska. Larger datasets comprised of crashes reported in multiple states and spanning a longer time period should be analyzed to obtain a more in-depth understanding of truck crashes. Research should also focus on countermeasures aimed at reducing the severity of truck crashes.

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Appendix A Variables and Coding

Table A.1 The definitions of variables and corresponding coding

Variable	Variable Name	Definition	Coding Definition
rd_cls_c	Road class code	Defines what road class marked	0 if Not applicable,1 if Recreation road, 2 if Local road or street,3 if Highway system,4 if Interstate system
lght_con	Light condition code	Defines the light condition at the time of crash	(-999) if Not stated , Other,Unknown,0 if Daylight, 1 if Dawn, Dusk ,Dawn/Dusk (History) , 2 if Dark – lighted roadway,3 if Dark-unknown roadway lighting,4 if Dark - roadway not lighted
rd_char	Road character code	Defines different road characters	(-999) if Not stated,0 if Straight and level,1 if Straight and on slope , 2 if Straight and on hilltop,3 if Curved and level,4 if Curved and on slope, 5 if Curved and on hilltop
rd_surf	Road surface code	Defines various road surface categories	(-999) if Not stated ,Other ,0 if concrete,1 if Asphalt, 2 if Brick ,3 if Gravel,4 if Dirt
rsc_cde	Road surface condition code	Defines typical road surface condition categories	(-999) if Not stated ,Other ,Unknown,0 if Dry,1 if Wet, 2 if Water ,3 if Sand, mud ,Slush,4 if Snow,5 if Ice
tnl_cde	Total number of through lanes code	Represents the number of through lanes	(-999) if Not stated ,0 if one lane,1 if two lanes, 2 if three lanes ,3 if four lanes,4 if five lanes,5 if six or more lanes
mdn_typ	Median type code	Defines various types of road medians	(-999) if Not stated ,0 if barrier,1 if raised, 2 if grass ,3 if painted,4 if no median

Table A.1 The definitions of variables and corresponding coding (cont'd)

acc_sev	Accident severity code	Defines typical accident severity categories	0 if fatal,1 if disabling injury, 2 if visible injury,3 if possible injury, 4 if property damage only,5 if non-reportable
alc_r	Alcohol related switch	Defines if respondent is an alcohol related accident or not	0 if no, 1 if yes
farm_eqp	Farm equipment switch	Defines if respondent is an farm equipment related accident or not	0 if no, 1 if yes
whr_cnd	Weather condition code	respondents the diverse weather condition	(-999) if Not stated , Other, Unknown,0 if clear,1 if cloudy , 2 if fog, smog and smoke ,3 if rain,4 if sleet, hail, freezing rain/drizzle

Appendix B Descriptive Statistics

Table B.1 DAYLIGHT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	518	28.8	28.8	28.8
	1.00	1283	71.2	71.2	100.0
	Total	1801	100.0	100.0	

Table B.2 DWN_DSK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1722	95.6	95.6	95.6
	1.00	79	4.4	4.4	100.0
	Total	1801	100.0	100.0	

Table B.3 DARK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1380	76.6	76.6	76.6
	1.00	421	23.4	23.4	100.0
	Total	1801	100.0	100.0	

Table B.4 STRT

		Frequency	Percent	Valid Percent	Cumulative Percent
	.00	214	11.9	11.9	11.9
Valid	1.00	1587	88.1	88.1	100.0
	Total	1801	100.0	100.0	

Table B.5 CURVE

		Frequency	Percent	Valid Percent	Cumulative Percent
	.00	1598	88.7	88.7	88.7
Valid	1.00	203	11.3	11.3	100.0
	Total	1801	100.0	100.0	

Table B.6 CONC

		Frequency	Percent	Valid Percent	Cumulative Percent
	.00	931	51.7	51.7	51.7
Valid	1.00	870	48.3	48.3	100.0
	Total	1801	100.0	100.0	

Table B.7 ASPH

		Frequency	Percent	Valid Percent	Cumulative Percent
	.00	1019	56.6	56.6	56.6
Valid	1.00	782	43.4	43.4	100.0
	Total	1801	100.0	100.0	

Table B.8 DRY

		Frequency	Percent	Valid Percent	Cumulative Percent
	.00	484	26.9	26.9	26.9
Valid	1.00	1317	73.1	73.1	100.0
	Total	1801	100.0	100.0	

Table B.9 WET

		Frequency	Percent	Valid Percent	Cumulative Percent
	.00	1600	88.8	88.8	88.8
Valid	1.00	201	11.2	11.2	100.0
	Total	1801	100.0	100.0	

Table B.10 SNW_ICE_SLUSH

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1544	85.7	85.7	85.7
	1.00	257	14.3	14.3	100.0
	Total	1801	100.0	100.0	

Table B.11 WATER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1800	99.9	99.9	99.9
	1.00	1	.1	.1	100.0
	Total	1801	100.0	100.0	

Table B.12 BARRIER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1671	92.8	92.8	92.8
	1.00	130	7.2	7.2	100.0
	Total	1801	100.0	100.0	

Table B.13 NO_MEDIAN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1031	57.2	57.2	57.2
	1.00	770	42.8	42.8	100.0
	Total	1801	100.0	100.0	

Table B.14 ALCOHL_RLTD_SW

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1750	97.2	97.2	97.2
	1.00	51	2.8	2.8	100.0
	Total	1801	100.0	100.0	

Table B.15 FARM_EQP_SW

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1791	99.4	99.4	99.4
	1.00	10	.6	.6	100.0
	Total	1801	100.0	100.0	

Appendix C Model Results

```
ORDERED;LHS=SEV_NEW;RHS=ONE, ALCOHL_R, FARM_EQP,DWN_DSK,SNW_ICE_,NO_MEDIA,, LOCAL$

Normal exit from iterations. Exit status=0.

+---------------------------------------------+
| Ordered Probability Model                   |
| Maximum Likelihood Estimates                |
| Model estimated: Jun 29, 2012 at 10:37:21AM.|
| Dependent variable              SEV_NEW     |
| Weighting variable                 None     |
| Number of observations             1801     |
| Iterations completed                 14     |
| Log likelihood function       -2495.920     |
| Number of parameters                 10     |
| Info. Criterion: AIC =          2.78281     |
|   Finite Sample: AIC =          2.78288     |
| Info. Criterion: BIC =          2.81333     |
| Info. Criterion:HQIC =          2.79407     |
| Restricted log likelihood     -2529.630     |
| McFadden Pseudo R-squared      .0133258     |
| Chi squared                    67.41875     |
| Degrees of freedom                    6     |
| Prob[ChiSqd > value] =         .0000000     |
| Underlying probabilities based on Normal    |
+---------------------------------------------+


+---------------------------------------------+
| Ordered Probability Model                   |
| Cell frequencies for outcomes               |
|  Y Count Freq  Y Count Freq  Y Count Freq   |
|  0   755 .419  1   386 .214  2   355 .197   |
|  3   238 .132  4    67 .037                 |
```

Variable	Coefficient	Standard Error	b/St.Er.	P[|Z|>z]	Mean of X
Index function for probability					
Constant	.17476865	.03947732	4.427	.0000	
ALCOHL_R	.76454499	.14927220	5.122	.0000	.02831760
FARM_EQP	.79053952	.32815757	2.409	.0160	.00555247
DWN_DSK	.38356140	.12288972	3.121	.0018	.04386452
SNW_ICE_	-.26095803	.07618144	-3.425	.0006	.14269850
NO_MEDIA	.15887510	.05471079	2.904	.0037	.42754026
LOCAL	-.13233785	.06073979	-2.179	.0293	.27706830
Threshold parameters for index					
Mu(1)	.55642531	.02365829	23.519	.0000	
Mu(2)	1.18943737	.03300047	36.043	.0000	
Mu(3)	2.04175534	.05579617	36.593	.0000	

Cross tabulation of predictions. Row is actual, column is predicted.
Model = Probit . Prediction is number of the most probable cell.

Actual	Row Sum	0	1	2	3	4	5	6	7	8	9
0	755	743	0	8	4	0					
1	386	372	0	4	10	0					
2	355	336	0	4	15	0					
3	238	215	0	3	20	0					
4	67	60	0	1	6	0					
Col Sum	1801	1726	0	20	55	0	0	0	0	0	0