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Research Note

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THE EFFECT OF DECREASES IN VEHICLE WEIGHT ON INJURY CRASH RATES

Ellen Hertz, Ph. D.

NHTSA's National Center for Statistics and Analysis recently completed an analysis to estimate the effect of a one hundred (100) pound reduction in the average weight of passenger vehicles on the per crash rates of incapacitating injury to drivers. The analysis was conducted as a part of the effort by NHTSA to study the effect of hypothetical decreases in vehicle weight on the crashes, injuries, and fatalities of passenger car and light truck occupants. NHTSA's earlier work in this area (A Collection of Recent Analyses of Vehicle Weight and Safety, DOT HS-807 677, May 1991) examined the effect of a 1,000 pound reduction in the average weight of passenger cars on occupant fatalities and injuries. The 1991 study estimated that the reduction of the average weight of new passenger cars from 3,700 pounds (in 1970) to 2,700 pounds (in 1982) resulted in increases of approximately 2,000 fatalities and 20,000 serious injuries each year.

Crash data from Illinois (1990 - 1992) and Florida (1991 - 1993) were used in the current analysis. Using the KABCO injury scale, data from these states on fatal injuries (K) plus incapacitating injuries (A) for crash involved drivers were analyzed. K+A injuries range from the most severe of all injuries, i.e., fatal, to include many injuries that could be considered minor. The analysis focused on the crash experience of model year 1985 - 1993 passenger vehicles. Three "scenarios" were considered: (1) the effect

of a hypothetical 100 pound reduction on light trucks and vans (LTVs), with the weight of passenger cars (PCs) unchanged; (2) the effect of a hypothetical 100 pound reduction on PCs, with the weight of LTVs unchanged; and (3) the effect of a hypothetical 100 pound reduction on all passenger vehicles. For each of the analytical scenarios, changes in the rate of driver incapacitating injury were analyzed for four crash types. The crash types studied consisted of crashes between:

- the scenario vehicle and a fixed object;
- the scenario vehicle and a heavy truck;
- the scenario vehicle and a PC; and
- the scenario vehicle and an LTV.

Logistic regression was used to determine the effect of the hypothetical vehicle weight decreases on the odds of driver incapacitating injury. If one assumes that the effect of the hypothetical decreases in vehicle weight on drivers is similar to that for all occupants, estimates based on drivers may be extended to estimate the effect of the hypothetical vehicle weight decreases for all occupants. This assumption was used with data from NHTSA's General Estimates System (GES) for 1993 to estimate the impact in the three analytical scenarios described above. **Confidence bounds were estimated using standard errors of logistic regression coefficients, standard errors of target populations from the GES and linear approximation.** The following findings were noted:

- A hypothetical 100 pound decrease in the average weight of LTVs (with PCs unchanged) would result in an estimated increase of 1,795 incapacitating injuries. **The 95% confidence interval is from 1,131 to 2,459.**

- A hypothetical 100 pound decrease in the average weight of PCs (with LTVs unchanged) would result in an estimated increase of 8,804 incapacitating injuries. **The 95% confidence interval is from 7,438 to 10,170.**
- A hypothetical 100 pound decrease in the average of all passenger vehicles (both PCs and LTVs) would result in an estimated increase of 10,543 incapacitating injuries. **The 95% confidence interval is from 9,071 to 12,015.**

These findings are considered to be consistent with the results of NHTSA's 1991 study. The current study, *The Effect of Decreases in Vehicle Weight on Injury Crash Rates*, by Ellen Hertz, Ph. D. (in print, January 1997) presents detailed information on the above results. For a copy, contact the National Center for Statistics and Analysis, NHTSA, NRD-31, 400 Seventh Street, S. W., Washington DC 20590, (202) 366-4198 or 1-800-934-8517; or the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, (703) 487-4650 or fax (703) 321-8547.