DIRECT OBSERVATION
OF SEAT BELT USE IN MICHIGAN:
JULY 1987

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Lisa J. Molnar
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SEPTEMBER 1987

UMTRI
The University of Michigan
Transportation Research Institute
Results of a direct observation study of seat belt use in Michigan conducted in July 1987 were compared with results of previous surveys in December 1984, April 1985, July 1985, December 1985, April 1986, July 1986, December 1986, and April 1987. In the current survey, 18,663 occupants in 12,219 cars and light trucks were observed between July 7 and July 31, 1987. The main finding was that use of seat belts changed little between April 1987 and July 1987. Front-seat restraint use among all motorists observed was 46.6% in July 1987, compared to 45.7% in April 1987. The increase is not statistically significant since the estimates have a margin of error of ±2%. All age groups exhibited only marginal changes from the previous survey wave. Use rates were as follows in July 1987 (all seat positions): 72.9% among occupants age 0-3; 33.0% among occupants age 4-15; 38.3% among occupants age 16-29; 47.0% among occupants age 30-59; and 54.0% among occupants age 60 and older. Females continued to exhibit higher restraint use than males, 48.9% versus 40.7% in the current survey. As in previous surveys, restraint use varied by region of the state. Seat belt use has remained relatively stable since December 1985 when use among front-seat occupants was 44.5%. Finally, front-seat belt use among those age 16 and over remains significantly higher than it was before Michigan’s mandatory use law took effect (46.5% in July 1987, versus 18.3% in December 1984). Additional surveys are scheduled for fall of 1987 and spring of 1988.
This report was prepared in cooperation with the Michigan Office of Highway Safety Planning and the U.S. Department of Transportation, National Highway Safety Administration. Support of these organizations is gratefully acknowledged.

Findings, conclusions, and recommendations in this report are solely the authors', and do not necessarily reflect the views of the Michigan Office of Highway Safety Planning or the National Highway Traffic Safety Administration.
ACKNOWLEDGMENTS

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1 INTRODUCTION

The Michigan mandatory seat belt law, implemented in July of 1985, is one of 27 similar laws in the United States intended to reduce motor vehicle crash-related deaths and injuries (Highway and Vehicle Safety Report, 1987).\(^1\) The success of these laws in preventing injury and death, however, has not been uniform, perhaps due to varying levels of compliance attained in these states. For example, a recently completed multiple time-series evaluation of effects in the first eight states with seat belt laws in the U.S. identified significant fatality reductions of 7.1% to 24.5% (Wagenaar, Maybee, and Sullivan, 1987). Compliance with mandatory belt laws has also varied within states over time. Although the short-term trend following such legislation has generally been a sharp increase in belt use immediately following implementation of such laws, followed by a partial decline over the subsequent six to twelve months, belt use in some states has exhibited a departure from this pattern. In Austin, Texas, for example, a sharp increase in belt use observed immediately after enforcement of the law began was still evident six months later (Bunch and others, 1986). These differing trends over time have implications for expected reductions in motor vehicle crash-related deaths and injuries. Consequently, evaluation of the success of mandatory seat belt laws should include an understanding of trends in belt use.

In order to measure compliance with Michigan’s seat belt law, The University of Michigan Transportation Research Institute is conducting a series of direct-observation surveys of seat belt use among motor vehicle occupants throughout the state. Two survey waves (December 1984 and April 1985) were conducted prior to implementation of the law and provide a base against which effects of the law are assessed. The third wave was conducted in July 1985 immediately following implementation of the law. The fourth, fifth, sixth, seventh, and eighth waves were conducted five, nine, twelve, seventeen, and twenty-one months after the law took effect (December 1985, April, July, and December 1986, and April 1987). The ninth survey wave reported here covered the period from July 7 to July 31, 1987, twenty-four months after the Michigan law was implemented. Each of the surveys examined restraint use by a number of variables including age, sex, seating position, time of day, day of week, type of roadway, weather conditions, vehicle type and size, and region of the state. Readers are referred to earlier reports for complete results of the previous surveys (Wagenaar and Wiviott, 1985a; Wagenaar, Wiviott, and Compton, 1985; Wagenaar and Wiviott, 1985b; Wagenaar, Wiviott, and Businski, 1986; Wagenaar, Businski, and Molnar, 1986). Laws in two additional states, Nebraska and Massachusetts, were repealed by voter referendum in November 1986.

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1. Laws in two additional states, Nebraska and Massachusetts, were repealed by voter referendum in November 1986.
1986a; Wagenaar, Businski, and Molnar, 1986b; Wagenaar, Molnar, and Businski, 1987a; and Wagenaar, Molnar, and Businski, 1987b). In the current report, restraint use in July 1987 is compared with the results of previous survey waves. Additional survey waves are scheduled for the fall of 1987 and spring of 1988.
2 METHODS

To ensure comparability across all survey waves in this series, the same methods were used in each wave. A few minor differences in the current wave are noted in this section. For a detailed discussion of the sample design, data collection procedures, and analytic procedures used throughout the series of survey waves, the reader is referred to the first report of this series (Wagenaar and Wiviott, 1985a).

As in previous survey waves, motor vehicle occupants at a carefully selected probability sample of 240 intersections throughout the State of Michigan were observed by trained field observers. Observers recorded restraint use, seat position, estimated age, and sex for occupants in all seating positions in each sampled vehicle. The size and type of vehicle were also recorded.

Detailed information on the seating positions of all occupants was recorded, including those in nonstandard seating positions. Specifically, observers noted whether passengers were sitting, standing, kneeling, or lying on the seat, floor, or cargo area of the vehicle. Passengers riding in the lap of another occupant were also recorded. The objective was to collect data on the full complement of restraint use and related information for all occupants of vehicles included in the sample.

Beginning in the July 1985 wave, observers were instructed to record incorrect use of seat belts. Examples of incorrect belt use included: positioning the shoulder harness under the outboard arm, behind the back, or over the inside shoulder; and restraining two occupants with one seat belt. The category of incorrect belt use did not include occupants (typically in the 4-15 age group) who were too short to wear a shoulder belt in the correct position across the chest. Often such occupants placed the belt behind the back. These occupants were coded as correctly belted. Occupants incorrectly using seat belts were coded as "belted" and, therefore, appear in the tables and figures below as restrained. However, incorrect use of belts was recorded to assess the extent of incorrect use and to permit further analyses of occupants who use seat belts incorrectly.

Observers limited the number of vehicles recorded during any given signal cycle to three. This procedure was adopted during the July 1985 wave. After the mandatory use law took effect, occupants in long traffic queues buckled up after noticing the observer examine
vehicles ahead of them in the queue. Recording data on only the first three vehicles prevented inclusion of these occupants in the survey.

The sample of 240 sites was identical to previous survey waves except that four alternative sites were selected (from the pool of sites selected in the original sample design) to replace sites at which construction was occurring or at which a yellow flashing rather than cycling traffic signal was in operation. Three field staff with experience in previous survey waves conducted observations. All field personnel were spot checked in the field by the field supervisor. Field personnel attended an extensive training session in which data collection policies and procedures were reviewed and practice field observations were conducted (the training program was described in the first report of this series; Wagenaar and Wiviott, 1985a).

The first observer visited 85 sites, the second 77 sites, and the third 70 sites. The remaining 8 sites were observed by the field supervisor. Beginning in the April 1985 wave, two-person teams were used to observe certain central city sites due to safety considerations. At each of these sites two observers collected data at the same intersection but from different paths of traffic. Each observer recorded half of the required vehicles at each site. Using two observers for central city sites allowed for efficient and rapid collection of data while providing security for the observers. All other sites were observed by a single observer. Within each sampling area, the first site observed for each day and city was selected, using a random number table.

Descriptive statistics for the 240 observation sites are shown in Table 2.1. The distribution of site observations by day of week and time of day was similar to previous survey waves conducted in the month of July except that observations were extended to 8:00 in the evening in the current wave. The distribution of site observations by weather conditions differed only slightly from that of the July wave a year ago in that there were more observations made under sunny and cloudy conditions and fewer under rainy conditions compared to a year ago.
<table>
<thead>
<tr>
<th>Day of Week</th>
<th>Start Time</th>
<th>Site Choice</th>
<th>Weather</th>
<th>Observer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>13.8%</td>
<td>7-9 AM</td>
<td>7.1%</td>
<td>Primary</td>
</tr>
<tr>
<td>Tuesday</td>
<td>13.8%</td>
<td>9-11 AM</td>
<td>17.9%</td>
<td>Alternate</td>
</tr>
<tr>
<td>Wednesday</td>
<td>14.6%</td>
<td>11-1 PM</td>
<td>22.9%</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>17.1%</td>
<td>1-3 PM</td>
<td>23.3%</td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>17.9%</td>
<td>3-5 PM</td>
<td>20.9%</td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td>12.1%</td>
<td>5-7 PM</td>
<td>7.9%</td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td>10.8%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Actual numbers of cases observed across categories of the major variables are shown in Table 2.2. Restraint use estimates based on small numbers of cases, such as those for occupants in extra seats and cargo areas, need to be interpreted with care.

In addition to showing the actual number of cases by subcategory, Table 2.2 indicates the extent of missing data for each variable. The key restraint item was missing for only 0.1% of all occupants observed. These were cases in which the observer could not accurately identify whether the occupant was restrained. There were 2 cases of missing data on restraint use for the 12,219 drivers and 4,249 front-right occupants observed. Front-center occupants had no cases of missing data and rear-seat occupants had low levels of missing data on restraint use (0.2% to 1.1%; see Table 2.2).
### TABLE 2.2
Sample Distributions for Major Variables by Seat Position, Unweighted Ns and Percent Missing Data

<table>
<thead>
<tr>
<th>Seat Position</th>
<th>Driver</th>
<th>Front Center</th>
<th>Front Right</th>
<th>Rear Left</th>
<th>Rear Center</th>
<th>Rear Right</th>
<th>Extra Seats</th>
<th>Cargo</th>
<th>Area</th>
<th>Held in Lap</th>
<th>All¹</th>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>165</td>
<td>2,331</td>
<td>425</td>
<td>314</td>
<td>576</td>
<td>29</td>
<td>47</td>
<td>43</td>
<td>10,340</td>
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<td>Belted</td>
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<td>1,875</td>
<td>140</td>
<td>51</td>
<td>144</td>
<td>6</td>
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<td>2</td>
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<td>46</td>
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<td>CRD Wrong</td>
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<td>5</td>
<td>4</td>
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<td>1,503</td>
<td>334</td>
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<td>25</td>
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<td>622</td>
<td>306</td>
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<td>133</td>
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<td>134</td>
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<td>Monday</td>
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<td>532</td>
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<td>6</td>
<td>9</td>
<td>6</td>
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<td>17</td>
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<td>3</td>
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### Table 2.2 Continued

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<th>Front Right</th>
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<th>Rear Center</th>
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<th>Cargo Area</th>
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<td>9</td>
<td>9</td>
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<td>6,994</td>
</tr>
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</table>

| TOTAL N     | 12,219 | 217          | 4,249      | 635      | 407        | 775       | 43          | 48         | 45          | 18,663|

¹ Includes 25 occupants standing.
3 RESULTS

Seat belts or child restraint devices were used by 44.5% of all motor vehicle occupants observed during July 1987. By comparison, the use rate in the April 1987 survey wave was 43.9% (Figure 3.1); this difference is not statistically significant (Z = 0.35).

The latest survey supports earlier findings that restraint use has stabilized during the past nineteen months. In December 1985, five months after the mandatory seat belt law took effect, overall restraint use had declined to 43.0% from 58.4% in July 1985, immediately after the law took effect. Since that time, however, restraint use has changed little (43.7% in April 1986, 45.3% in July 1986, 43.6% in December 1986, 43.9% in April 1987, and 44.5% in July 1987). While restraint use in July 1987 was lower than the 58.4% peak restraint use rate observed in July 1985, it is still higher than it was before the law took effect. The July 1987 use rate of 44.5% represents a 124.7% increase from the December 1984 rate of 19.8%.

Table 3.1 provides summary information on restraint use by seat location (front and rear) for each major variable of the study, including sex, age, type of vehicle, site type, day of week, time of day, weather, and region. As in previous surveys, restraint use was higher among front-seat occupants than rear-seat occupants (46.6% versus 27.2%).

Young children have particularly high rates of restraint use as a result of mandatory child restraint legislation implemented in 1982 (Wagenaar, 1984; Wagenaar and Webster, 1986) and therefore exert an upward influence on overall use rates. Consequently, effects of the adult mandatory seat belt law on restraint use can be seen most clearly by including only motor vehicle occupants 16 years and older in the analyses. In December 1984, restraint use for adults (16 and over) was 18.3% among front-seat occupants and 7.2% among rear-seat occupants. A noticeable increase in belt use was seen in April 1985, after the law was enacted but before implementation. In July 1985, immediately after implementation, restraint use among front-seat occupants more than doubled, increasing to 60.5%. In December 1985, after five months of compulsory belt use, restraint use was down to 44.0% among front-seat occupants and 6.9% among rear-seat occupants. Adult restraint use remained essentially at those levels through April 1986--44.4% among front-seat occupants

---

2. These numbers include both correct and incorrect use of seat belts and child restraint devices.

3. Calculation of Z-statistics takes into account the design effect resulting from the multi-stage sampling procedure used. The design effect of the July 1987 wave was 9.0.
Figure 3.1: Overall Restraint Use
TABLE 3.1
Percent Restrained by Major Variables and Seat Location

<table>
<thead>
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<th>Front Seat</th>
<th>Rear Seat</th>
<th>All²</th>
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<tr>
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</tr>
<tr>
<td>Female</td>
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<td>48.9</td>
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<table>
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<th>Rear Seat</th>
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<td>4-15</td>
<td>46.2</td>
<td>25.3</td>
<td>33.0</td>
</tr>
<tr>
<td>16-29</td>
<td>40.0</td>
<td>11.6</td>
<td>38.3</td>
</tr>
<tr>
<td>30-59</td>
<td>48.0</td>
<td>4.1</td>
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<tr>
<td>60+</td>
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<table>
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<th>All²</th>
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<td>48.6</td>
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<tr>
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</table>

¹All percents are based on analyses weighted according to the sample design to accurately represent the entire state. Restraint use includes correct and incorrect use of child restraint devices and seat belts.

²Includes occupants riding in third and fourth seats of station wagons and vans and in nonstandard seat positions (i.e., on laps, in cargo area, on floor).
TABLE 3.1 Continued

<table>
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¹All percents are based on analyses weighted according to the sample design to accurately represent the entire state. Restraint use includes correct and incorrect use of child restraint devices and seat belts.
²Includes occupants riding in third and fourth seats of station wagons and vans and in nonstandard seat positions (i.e., on laps, in cargo area, on floor).
and 6.6% among rear-seat occupants. In July 1986, estimated adult restraint use increased slightly to 47.0% among front-seat occupants and 7.3% among rear-seat occupants. In December 1986, restraint use among both front-seat and rear-seat adult occupants declined slightly (to 44.3% and 4.6%, respectively) and then increased again in April 1987 (to 45.6% and 11.1%, respectively). In the current survey wave, restraint use for adults was 46.5% among front-seat occupants and 7.6% among rear-seat occupants (Figure 3.2); changes from the previous survey wave were not statistically significant (Z=0.49 for front-seat adult occupants and Z=0.62 for rear-seat adult occupants).

An examination of restraint use by vehicle seating position indicates that in all age groups restraint use was higher among drivers than occupants of other seating positions (Table 3.2). Furthermore, as in previous post-law survey waves, only drivers and front-right passengers had use rates which were substantially higher than those observed in December 1984, prior to enactment of the seat belt law. Occupants in all other seating positions had use rates comparable to pre-law levels (Figure 3.3). This finding is consistent with expectations, given that the law applies only to front-seat occupants.

Restraint use remained highest among occupants age 0-3, who have been required to be restrained when traveling in motor vehicles in Michigan since 1982. A total of 72.9% of occupants 0-3 years were restrained, compared to 33.0% of occupants 4-15 years, 38.3% of occupants 16-29 years, 47.0% of occupants 30-59 years, and 54.0% of occupants 60 years and older (Table 3.2). All age groups exhibited only marginal increases in restraint use from April 1987 except the age group 60 and older which exhibited a marginal decline (Figure 3.4); none of these differences were statistically significant.

Incorrect use of safety seats among children age 0-3 increased slightly from the previous wave and continues to be a problem. A total of 35.2% of child restraint devices were observed to be incorrectly used in the current wave, compared to 27.5% in April 1987, 24.4% in December 1986, 28.1% in July 1986, 27.3% in April 1986, and approximately 20% in each prior wave. Because incorrect use was limited only to cases obvious to the observer (noting the data collection process used), data presented here should be considered a conservative estimate. A more detailed study of restraint use among Michigan children under the age of four found that 62.9% of child restraint devices were incorrectly used (Wagenaar, Molnar, Businski, and Margolis, 1986). Incorrect use of child restraint devices in that study was measured both by how the child restraint device was installed in the vehicle and how the child was positioned in the restraint device. Specifically, data were collected on

4. The Z-statistics are as follows: 0-3 years, 0.97; 4-15 years, 0.18; 16-29 years, 0.40; 30-59 years, 0.04; and 60 and over, 0.37.
Figure 3.2: Restraint Use by Seat Location

Occupants Age 16 and Over

Front Seat

Rear Seat
# TABLE 3.2
Restraint Use by Age and Seat Position

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Driver</th>
<th>Front Center</th>
<th>Front Right</th>
<th>Rear Left</th>
<th>Rear Center</th>
<th>Rear Right</th>
<th>Extra Seats</th>
<th>Cargo Area</th>
<th>Held in Lap</th>
<th>All²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age 0-3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Belted</td>
<td>—</td>
<td>7.3</td>
<td>18.4</td>
<td>29.9</td>
<td>8.3</td>
<td>27.3</td>
<td>19.2</td>
<td>0.0</td>
<td>5.7</td>
<td>18.8</td>
</tr>
<tr>
<td>% Correct CRD</td>
<td>—</td>
<td>10.4</td>
<td>36.4</td>
<td>46.3</td>
<td>49.3</td>
<td>42.8</td>
<td>80.8</td>
<td>0.0</td>
<td>0.0</td>
<td>35.4</td>
</tr>
<tr>
<td>% Incorrect CRD</td>
<td>—</td>
<td>20.3</td>
<td>28.7</td>
<td>16.7</td>
<td>24.2</td>
<td>19.9</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>18.7</td>
</tr>
<tr>
<td>% Restrained³</td>
<td>—</td>
<td>38.0</td>
<td>83.5</td>
<td>92.9</td>
<td>81.8</td>
<td>90.0</td>
<td>100.0</td>
<td>0.0</td>
<td>5.7</td>
<td>72.9</td>
</tr>
<tr>
<td>Unweighted N</td>
<td>—</td>
<td>44</td>
<td>64</td>
<td>96</td>
<td>54</td>
<td>73</td>
<td>6</td>
<td>1</td>
<td>40</td>
<td>383</td>
</tr>
<tr>
<td><strong>Age 4-15</strong></td>
<td>100.0</td>
<td>26.4</td>
<td>48.7</td>
<td>29.4</td>
<td>16.3</td>
<td>28.3</td>
<td>12.7</td>
<td>0.0</td>
<td>0.0</td>
<td>33.0</td>
</tr>
<tr>
<td>Unweighted N</td>
<td>3</td>
<td>97</td>
<td>622</td>
<td>306</td>
<td>260</td>
<td>364</td>
<td>18</td>
<td>36</td>
<td>5</td>
<td>1,731</td>
</tr>
<tr>
<td><strong>Age 16-29</strong></td>
<td>42.4</td>
<td>7.3</td>
<td>32.8</td>
<td>12.7</td>
<td>7.8</td>
<td>12.1</td>
<td>26.8</td>
<td>0.0</td>
<td>—</td>
<td>38.3</td>
</tr>
<tr>
<td>Unweighted N</td>
<td>3,790</td>
<td>40</td>
<td>1,177</td>
<td>121</td>
<td>54</td>
<td>133</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td>5,326</td>
</tr>
<tr>
<td><strong>Age 30-59</strong></td>
<td>48.9</td>
<td>11.0</td>
<td>45.1</td>
<td>6.8</td>
<td>0.0</td>
<td>3.3</td>
<td>0.0</td>
<td>0.0</td>
<td>—</td>
<td>47.0</td>
</tr>
<tr>
<td>Unweighted N</td>
<td>7,138</td>
<td>30</td>
<td>1,774</td>
<td>75</td>
<td>21</td>
<td>133</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>9,181</td>
</tr>
<tr>
<td><strong>Age 60+</strong></td>
<td>57.5</td>
<td>13.3</td>
<td>57.3</td>
<td>5.4</td>
<td>7.6</td>
<td>1.5</td>
<td>31.6</td>
<td>—</td>
<td>—</td>
<td>54.0</td>
</tr>
<tr>
<td>Unweighted N</td>
<td>1,281</td>
<td>6</td>
<td>606</td>
<td>36</td>
<td>17</td>
<td>71</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>2,026</td>
</tr>
<tr>
<td><strong>All Ages</strong></td>
<td>47.7</td>
<td>23.1</td>
<td>44.5</td>
<td>32.7</td>
<td>23.1</td>
<td>25.0</td>
<td>29.4</td>
<td>0.0</td>
<td>5.2</td>
<td>44.5</td>
</tr>
<tr>
<td>Unweighted N</td>
<td>12,219</td>
<td>217</td>
<td>4,249</td>
<td>635</td>
<td>407</td>
<td>775</td>
<td>43</td>
<td>48</td>
<td>45</td>
<td>18,663</td>
</tr>
</tbody>
</table>

¹All percents are based on analyses weighted according to the sample design to accurately represent the entire state. Unweighted Ns indicate the actual number of occupants observed in a given group.
²Restraint use for all positions includes cargo areas, passengers held in laps, and passengers standing.
³Percent restrained includes correct and incorrect CRD use.
Figure 3.3: Restraint Use by Seat Position

Driver

Front Center

Front Right
Figure 3.3 (Continued): Restraint Use by Seat Position

Rear Left

Rear Center

Rear Right
Figure 3.4: Restraint Use by Age

Age 0–3

Age 4–15

Age 16–29
Figure 3.4 (Continued): Restraint Use by Age

**Age 30–59**

- Dec 84: 18.4
- Apr 85: 25.9
- July 85: 61.8
- Dec 85: 44.2
- Apr 86: 44.9
- July 86: 47.7
- Dec 86: 44.5
- Apr 87: 45.8
- July 87: 47.0

**Age 60 and over**

- Dec 84: 14.6
- Apr 85: 21.8
- July 85: 55.9
- Dec 85: 54.0
- Apr 86: 52.5
- July 86: 55.2
- Dec 86: 53.1
- Apr 87: 55.9
- July 87: 54.0
the type of seat used, whether the automobile belt was fastened, snug, and routed correctly, whether a locking clip was used, and whether a tether was required, used, anchored, and anchored properly. Data were also collected on whether a shield and/or harness were used, whether the harness was snug, whether a harness clip was used, and the harness position. Findings from that study confirm that the problem of incorrect use remains pervasive.

As in previous survey waves, occupants age 60 years and older had a restraint use rate higher than any other age group except occupants age 0-3. Prior to enactment of the mandatory seat belt law, the 60 and older age group had the lowest rate of use of all age groups. Since December 1984, however, the 269.9% increase in restraint use among those age 60 years and older has been greater than all other age groups (0-3 increased 19.9%; 4-15 increased 38.1%; 16-29 increased 107.0%; and 30-59 increased 155.4%). The pattern of driver restraint use by age was similar to that of total occupants by age (Figure 3.5).

Restraint use continued to vary by occupant sex, with a greater proportion of females than males using restraints (48.9% versus 40.7%; Table 3.3). The rate of increase in belt use among both females and males, however, has been similar since December 1984.

The pattern of restraint use by type of vehicle has been similar throughout the series of surveys (Figure 3.6). Occupants of small cars and mid-sized cars had the highest rates of restraint use in the current wave (49.5% and 48.6%, respectively; Table 3.3). Use rates for occupants of other types of vehicles were: vans, 41.9%; large cars, 40.2%; pickup trucks, 32.2%; and other vehicles, 47.2%.

Consistent with previous survey waves, occupants in vehicles observed at freeway exits had a higher rate of restraint use than those observed at local intersections (49.8% versus 42.9% in the current wave; Table 3.3). However, the rate of increase in restraint use at freeway exits since December 1984 has been slightly less than that at local intersections (113.7% versus 128.2%).

In the current survey, restraint use was similar across all weather conditions (Table 3.3). Comparisons with previous waves continue to indicate no consistent pattern of restraint use by weather conditions.
Figure 3.5: Driver Restraint Use by Age

Age 16–29

Age 30–59

Age 60 and over
### TABLE 3.3
Percent Restraint Use by Sex, Type of Vehicle, Observation Site, and Weather Conditions

<table>
<thead>
<tr>
<th>Seat Position</th>
<th>Driver</th>
<th>Front Center</th>
<th>Front Right</th>
<th>Rear Left</th>
<th>Rear Center</th>
<th>Rear Right</th>
<th>Extra Seats&lt;sup&gt;2&lt;/sup&gt;</th>
<th>All&lt;sup&gt;3&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>42.9</td>
<td>19.8</td>
<td>38.3</td>
<td>35.8</td>
<td>26.5</td>
<td>27.6</td>
<td>18.9</td>
<td>40.7</td>
</tr>
<tr>
<td>Female</td>
<td>55.3</td>
<td>24.4</td>
<td>48.0</td>
<td>29.3</td>
<td>19.8</td>
<td>23.1</td>
<td>46.6</td>
<td>48.9</td>
</tr>
<tr>
<td><strong>Type of Vehicle</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Car</td>
<td>53.2</td>
<td>0.0</td>
<td>46.6</td>
<td>34.2</td>
<td>26.0</td>
<td>31.0</td>
<td>0.0</td>
<td>49.5</td>
</tr>
<tr>
<td>Mid-Sized Car</td>
<td>52.1</td>
<td>22.7</td>
<td>48.2</td>
<td>40.7</td>
<td>27.9</td>
<td>29.0</td>
<td>100.0</td>
<td>48.6</td>
</tr>
<tr>
<td>Large Car</td>
<td>44.1</td>
<td>22.1</td>
<td>43.7</td>
<td>19.1</td>
<td>13.8</td>
<td>14.8</td>
<td>0.0</td>
<td>40.2</td>
</tr>
<tr>
<td>Pickup Truck&lt;sup&gt;4&lt;/sup&gt;</td>
<td>33.2</td>
<td>26.6</td>
<td>31.8</td>
<td>22.4</td>
<td>0.0</td>
<td>18.1</td>
<td>—</td>
<td>32.2</td>
</tr>
<tr>
<td>Van</td>
<td>44.2</td>
<td>0.0</td>
<td>39.7</td>
<td>45.9</td>
<td>32.2</td>
<td>39.9</td>
<td>26.6</td>
<td>41.9</td>
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<td>Other</td>
<td>49.0</td>
<td>0.0</td>
<td>49.9</td>
<td>35.4</td>
<td>35.0</td>
<td>28.5</td>
<td>—</td>
<td>47.2</td>
</tr>
<tr>
<td><strong>Observation Site</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intersection</td>
<td>46.1</td>
<td>23.0</td>
<td>42.5</td>
<td>32.1</td>
<td>23.1</td>
<td>25.1</td>
<td>30.0</td>
<td>42.9</td>
</tr>
<tr>
<td>Freeway Exit</td>
<td>53.3</td>
<td>23.3</td>
<td>51.4</td>
<td>34.3</td>
<td>23.1</td>
<td>24.7</td>
<td>27.3</td>
<td>49.8</td>
</tr>
<tr>
<td><strong>Weather Conditions</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mostly Sunny</td>
<td>48.1</td>
<td>20.9</td>
<td>44.8</td>
<td>34.1</td>
<td>22.4</td>
<td>26.0</td>
<td>41.1</td>
<td>45.0</td>
</tr>
<tr>
<td>Mostly Cloudy</td>
<td>47.8</td>
<td>26.3</td>
<td>45.2</td>
<td>30.4</td>
<td>23.3</td>
<td>23.4</td>
<td>0.0</td>
<td>44.3</td>
</tr>
<tr>
<td>Raining</td>
<td>39.0</td>
<td>51.4</td>
<td>35.5</td>
<td>21.8</td>
<td>31.8</td>
<td>19.9</td>
<td>0.0</td>
<td>36.3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>47.7</td>
<td>23.1</td>
<td>44.5</td>
<td>32.7</td>
<td>23.1</td>
<td>25.0</td>
<td>29.4</td>
<td>44.5</td>
</tr>
</tbody>
</table>

<sup>1</sup>All percents are based on analyses weighted according to the sample design to accurately represent the entire state. Restraint use includes correct and incorrect use of child restraint devices.

<sup>2</sup>Based on only 43 observed occupants.

<sup>3</sup>Restraint use for all positions includes cargo areas, passengers held in laps, and passengers standing.

<sup>4</sup>Data on rear seat passengers includes 11 occupants, riding in crew cab.
Figure 3.6: Restraint Use by Vehicle Type

Small Automobiles

<table>
<thead>
<tr>
<th>Month</th>
<th>Restraint Use (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 84</td>
<td>27.4</td>
</tr>
<tr>
<td>July 85</td>
<td>63.3</td>
</tr>
<tr>
<td>Dec 85</td>
<td>47.5</td>
</tr>
<tr>
<td>Apr 86</td>
<td>48.8</td>
</tr>
<tr>
<td>July 86</td>
<td>50.9</td>
</tr>
<tr>
<td>Dec 86</td>
<td>48.5</td>
</tr>
<tr>
<td>Apr 87</td>
<td>49.3</td>
</tr>
<tr>
<td>July 87</td>
<td>49.5</td>
</tr>
</tbody>
</table>

Mid-size Automobiles

<table>
<thead>
<tr>
<th>Month</th>
<th>Restraint Use (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 84</td>
<td>33.9</td>
</tr>
<tr>
<td>July 85</td>
<td>61.1</td>
</tr>
<tr>
<td>Dec 85</td>
<td>45.6</td>
</tr>
<tr>
<td>Apr 86</td>
<td>46.3</td>
</tr>
<tr>
<td>July 86</td>
<td>48.4</td>
</tr>
<tr>
<td>Dec 86</td>
<td>48.0</td>
</tr>
<tr>
<td>Apr 87</td>
<td>46.8</td>
</tr>
<tr>
<td>July 87</td>
<td>48.6</td>
</tr>
</tbody>
</table>

Large Automobiles

<table>
<thead>
<tr>
<th>Month</th>
<th>Restraint Use (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 84</td>
<td>16.2</td>
</tr>
<tr>
<td>July 85</td>
<td>57.0</td>
</tr>
<tr>
<td>Dec 85</td>
<td>40.3</td>
</tr>
<tr>
<td>Apr 86</td>
<td>40.7</td>
</tr>
<tr>
<td>July 86</td>
<td>42.0</td>
</tr>
<tr>
<td>Dec 86</td>
<td>39.9</td>
</tr>
<tr>
<td>Apr 87</td>
<td>39.8</td>
</tr>
<tr>
<td>July 87</td>
<td>40.2</td>
</tr>
</tbody>
</table>
Figure 3.6 (Continued): Restraint Use by Vehicle Type

**Pickup Trucks**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Restraint Use (%)</td>
<td>10.4</td>
<td>45.8</td>
<td>30.3</td>
<td>33.2</td>
<td>32.8</td>
<td>30.7</td>
<td>31.8</td>
<td>32.2</td>
</tr>
</tbody>
</table>

**Vans**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Restraint Use (%)</td>
<td>19.3</td>
<td>53.1</td>
<td>38.2</td>
<td>39.5</td>
<td>44.2</td>
<td>39.0</td>
<td>38.9</td>
<td>41.9</td>
</tr>
</tbody>
</table>

**Other Vehicles**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Restraint Use (%)</td>
<td>17.2</td>
<td>53.6</td>
<td>52.1</td>
<td>54.2</td>
<td>48.7</td>
<td>43.8</td>
<td>46.1</td>
<td>47.2</td>
</tr>
</tbody>
</table>
As in previous survey waves, there was no consistent pattern of restraint use across time of day and day of week (Table 3.4).

Restraint use continued to vary by region of the state (Table 3.5 and Figure 3.7). Use rates were highest in the Northwest region (51.2%) and lowest in the Eastern upper peninsula (39.2%). By comparison, the Southeast region led restraint use in all previous survey waves except December 1985 and July 1986. The Eastern upper peninsula has had the lowest restraint use in every wave except April 1986. Five regions experienced decreases in restraint use between April 1987 and July 1987 and four regions experienced increases in restraint use.

There was also variability in restraint use by sampling area (Table 3.6). Low rates of restraint use were seen in Wayne County, City of Melvindale (29.3%), Dickinson County (31.6%), the City of Detroit (32.0%), and Delta County (32.6%). Sampling areas with high restraint use rates in the current survey included Washtenaw County, City of Ann Arbor (62.4%), Kent County (58.7%), Wayne County, City of Livonia (57.6%), and Grand Traverse County (54.3%). The pattern of change in restraint use from previous survey waves was not consistent across sampling areas. Twenty-two sampling areas exhibited decreases in restraint use and twenty-two exhibited increases. Most of these changes are presumably due to sampling error and are not of interest.

Although restraint use in all sampling areas has increased since December 1984 (before enactment of mandatory seat belt legislation), the magnitude of the increases has varied. The largest percentage increases were experienced in Berrien County (306.3%), Wayne County, City of Detroit (226.5%), Mecosta-Newago Counties (220.8%), and Delta County (219.6%). One reason for these large percentage increases is the low prelegislation rates of belt use in these areas.

Occupants riding in nonstandard positions were tallied separately (Table 3.7). Nonstandard positions included: lying, standing, sitting, or kneeling on the floor, seat, or cargo area; sharing seat belts; or riding on the lap of another occupant. Occupants in nonstandard seating positions were typically under 16 years of age, as might be expected. A total of 16.7% of occupants 0-3 years and 10.1% of occupants 4-15 years were observed in nonstandard seating positions. Within the 0-3 age group, the most common nonstandard seating position was sitting on the lap of another occupant. Within the 4-15 age group, the most common positions were sitting on the edge of the rear seat or in the cargo area.
### TABLE 3.4
Percent Restraint Use by Time of Day and Day of Week

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Driver</th>
<th>Front Center</th>
<th>Front Right</th>
<th>Rear Left</th>
<th>Rear Center</th>
<th>Rear Right</th>
<th>Extra Seats</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-8 AM</td>
<td>55.2</td>
<td>100.0</td>
<td>46.9</td>
<td>66.4</td>
<td>37.3</td>
<td>0.0</td>
<td>—</td>
<td>52.9</td>
</tr>
<tr>
<td>8-9 AM</td>
<td>49.4</td>
<td>24.2</td>
<td>43.6</td>
<td>30.1</td>
<td>21.8</td>
<td>31.1</td>
<td>0.0</td>
<td>47.3</td>
</tr>
<tr>
<td>9-10 AM</td>
<td>48.5</td>
<td>21.8</td>
<td>47.7</td>
<td>34.5</td>
<td>16.1</td>
<td>20.4</td>
<td>51.0</td>
<td>46.0</td>
</tr>
<tr>
<td>10-11 AM</td>
<td>48.4</td>
<td>34.7</td>
<td>42.9</td>
<td>33.0</td>
<td>27.3</td>
<td>34.2</td>
<td>54.7</td>
<td>45.3</td>
</tr>
<tr>
<td>11-12 AM</td>
<td>46.5</td>
<td>15.2</td>
<td>43.0</td>
<td>34.9</td>
<td>21.2</td>
<td>21.8</td>
<td>0.0</td>
<td>43.1</td>
</tr>
<tr>
<td>12-1 PM</td>
<td>49.4</td>
<td>14.2</td>
<td>49.8</td>
<td>37.8</td>
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<td>22.5</td>
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<td>37.8</td>
<td>43.9</td>
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| TOTAL       | 47.7   | 23.1         | 44.5        | 32.7      | 23.1        | 25.0       | 29.4        | 44.5 |

1 All percents are based on analyses weighted according to the sample design to accurately represent the entire state. Restraint use includes correct and incorrect use of child restraint devices.
2 Based on only 43 observed occupants.
3 Restraint use for all positions includes cargo areas, passengers held in laps, and passengers standing.
TABLE 3.5
Percent Restraint Use by Michigan Department of Transportation Regions

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<td>Rear Left</td>
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<td></td>
<td>Rear Center</td>
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<td>Rear Right</td>
</tr>
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<td></td>
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</tr>
<tr>
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<td>All³</td>
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¹All percents are based on analyses weighted according to the sample design to accurately represent the entire state. Restraint use includes correct and incorrect use of child restraint devices.
²Based on only 43 observed occupants.
³Restraint use for all positions includes cargo areas, passengers held in laps and passengers standing.
Figure 3.7: Restraint Use by Region

Western Upper Penninsula

Eastern Upper Penninsula

Northwest
Figure 3.7 (Continued): Restraint Use by Region

Northeast

West Central

East Central
Figure 3.7 (Continued): Restraint Use by Region

Southwest

Southeast

Metropolitan Detroit
TABLE 3.6
Restraint Use, Number of Vehicles Observed, and Number of Occupants Observed for Each Sampling Area

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<th>Sampling Area</th>
<th>Number of Vehicles Observed</th>
<th>Number of Occupants Observed</th>
<th>Percent Drivers Restrained</th>
<th>Percent Front Seat Passengers Restrained</th>
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1All percentages are based on weighted analyses.
2Includes correct and incorrect use of child restraint devices.
3For these sampling areas no signalized freeway exits existed. Therefore, freeway exits required by the sample design were selected from an adjacent county.
TABLE 3.7 Number of Occupants in Nonstandard Seat Positions by Age

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1 Data are not weighted.
The proportion of belted occupants observed using their seat belts incorrectly in the current survey wave was slightly higher than in the four previous survey waves (Figure 3.8; incorrect use of child restraint devices is not included here). The percentage of belted occupants with incorrect use was 3.7% in the current wave, 2.8% in April 1987, 2.9% in December 1986, 2.4% in July 1986, and 2.9% in April 1986. By comparison, incorrect use of belts was 5.1% in December 1985 and 6.1% in July 1985. One possible explanation for the apparent decline in incorrect belt use since July 1985 is that occupants who used their belts incorrectly immediately after the law took effect are no longer using them at all.

In reporting findings from earlier survey waves, it was noted that a number of occupants observed during the July 1985 survey wave employed methods to appear restrained, when they were not. The relative absence of such attempts at deception since July 1985 may be due to a perception by the public that strict enforcement of the mandatory seat belt law is not occurring. Such a perception may also explain the decline in restraint use from the peak restraint use rate observed immediately following implementation of the law. Findings from other studies on the effects of mandatory seat belt legislation support the conclusion that public perception of enforcement of compulsory use laws and actual enforcement efforts affect restraint use. In Elmira, New York, for example, seat belt use increased substantially following a seat belt use law enforcement and publicity campaign conducted in late 1985; use declined in a comparison city during the same period (Williams and others, 1986). In Texas, strong enforcement efforts have been associated with high levels of seat belt use one year after implementation of seat belt legislation. Approximately 7,000 tickets per month are issued by state highway patrol officers to motorists in Texas who fail to obey the law (Insurance Institute for Highway Safety, 1986). In Michigan, a total of 16,242 tickets were issued by state police in the first five months of 1987. However, the Texas law permits primary enforcement, in contrast to the Michigan law, which is limited to secondary enforcement.

Finally, restraint use in Illinois declined from 50% observed in August 1985, immediately after enforcement of the mandatory seat belt law began, to 30% one year later. Mortimer (1986) attributes the low use rates to lack of enforcement of the law and to the nature of the law, which permits only secondary enforcement.

Adherence to Michigan's seat belt law would be facilitated if it permitted primary enforcement. Even without such new legislation, however, stricter enforcement of the current law is needed, coupled with major publicity campaigns, in order to strengthen public perception about enforcement of the law and to ensure the law's continued success.
Figure 3.8: Percent of Belted Occupants with Incorrect Use

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<td>Apr 87</td>
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</tr>
<tr>
<td>July 87</td>
<td>3.7</td>
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4 REFERENCES


Mortimer, R.G. *Seat Belt Use by Front Seat Occupants in Illinois.* Champaign, IL: University of Illinois at Urbana-Champaign, Department of Health and Safety Studies. September 18, 1986.


APPENDIX A

MICHIGAN DEPARTMENT OF TRANSPORTATION
REGION MAP
Appendix B

SEAT BELT SURVEY CODEBOOK
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190 79.2 1. Intersection
50  20.8 2. Freeway Exit

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FREQ Prcnt SITE CHOICE
236 98.3 1. Primary
  4  1.7 2. Secondary

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FREQ Prcnt MONTH
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### MICHIGAN SEAT BELT SURVEY
Wave 9, July 1987

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### MICHIGAN SEAT BELT SURVEY

**Wave 9, July 1987**

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### MICHIGAN SEAT BELT SURVEY
#### Wave 9, July 1987

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Vehicle variables

Variables 20 through 34 describe the vehicle and driver. The frequencies for the vehicle variables reflect one record for each vehicle observed.

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FREQ Prcnt HOUR OF THE DAY THIS VEHICLE WAS OBSERVED

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Variable 27 | MINUTE OF OBSERVATION                                  | 88   | None | 2            | Numeric   |

Variable 28 | SITE WEIGHT                                           | None | None | 6            | Numeric   Implied Dec Places: 4 |

Variable 29 | TOTAL WEIGHT                                          | None | None | 6            | Numeric   Implied Dec Places: 4 |
### MICHIGAN SEAT BELT SURVEY
Wave 9, July 1987

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<tr>
<td>7</td>
<td>0.1</td>
<td>8. Missing data</td>
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</table>
Variables 35 through 37 describe the occupants. The frequencies for the occupant variables contain one record for each occupied occupant position.

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<th>Variable</th>
<th>POSITION</th>
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<tr>
<td>FREQ</td>
<td>POS</td>
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<tr>
<td>12219</td>
<td>01. Front Left 65.5</td>
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<tr>
<td>217</td>
<td>02. Front Center 1.2</td>
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<tr>
<td>4249</td>
<td>03. Front Right 22.8</td>
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<tr>
<td>635</td>
<td>04. Rear Left 3.4</td>
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<tr>
<td>407</td>
<td>05. Rear Center 2.2</td>
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<td>775</td>
<td>06. Rear Right 4.2</td>
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<tr>
<td>45</td>
<td>07. In Lap 0.2</td>
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<tr>
<td>48</td>
<td>08. Cargo Area 0.3</td>
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<tr>
<td>43</td>
<td>09. Extra Seat 0.2</td>
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<tr>
<td>25</td>
<td>10. Standing 0.1</td>
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<td>0</td>
<td>88. Missing Data 0.0</td>
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<table>
<thead>
<tr>
<th>Variable</th>
<th>BELTED (Y/N)</th>
<th>MD1: 8 Field Width: 1</th>
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<tr>
<td>FREQ</td>
<td>BELTED (Y/N)</td>
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<tr>
<td>10340</td>
<td>1. Not Belted 55.4</td>
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<tr>
<td>8303</td>
<td>2. Belted (any type) 44.5</td>
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<tr>
<td>20</td>
<td>8. Missing Data 0.1</td>
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<tr>
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<tr>
<td>FREQ</td>
<td>RESTRAINT USE</td>
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<tr>
<td>10340</td>
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<tr>
<td>8087</td>
<td>2. Belted 43.3</td>
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<td>140</td>
<td>3. CRD OK 0.8</td>
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<tr>
<td>76</td>
<td>4. CRD Wrong 0.4</td>
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<tr>
<td>20</td>
<td>8. Missing Data 0.1</td>
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### MICHIGAN SEAT BELT SURVEY

#### Wave 9, July 1987

<table>
<thead>
<tr>
<th>Variable</th>
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<td>Type: Numeric</td>
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**FREQ Prcnt**  
10082 54.0  
8574 45.9  
7 0.0  

1. Male  
2. Female  
8. Missing Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>AGE</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>MD2: None</td>
<td>Type: Numeric</td>
</tr>
</tbody>
</table>

**FREQ Prcnt**  
383 2.1  
1731 9.3  
5326 28.5  
9181 49.2  
2026 10.9  
16 0.1  

1. 0-3  
2. 4-15  
3. 16-29  
4. 30-59  
5. 60+  
8. Missing Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>SPECIAL TAG</th>
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<th>Field Width: 2</th>
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<tr>
<td></td>
<td>MD2: None</td>
<td>Type: Numeric</td>
<td></td>
</tr>
</tbody>
</table>

**FREQ Prcnt**  
18351 98.3  
312 1.7  
0 0.0  

00. None  
01. Shoulder Belt Misused  
02. Lap Belt Misused

<table>
<thead>
<tr>
<th>Variable</th>
<th>OCCUPANT # IN POSITION</th>
<th>MD1: 8</th>
<th>Field Width: 1</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>MD2: None</td>
<td>Type: Numeric</td>
</tr>
</tbody>
</table>

**Sequence number for occupants in same seat position.**  
(Includes cargo areas and extra seats)

**FREQ Prcnt**  
1. First Occupant  
2. Second Occupant