U.S. Department of Transportation

National Highway Traffic Safety Administration

FINAL REPORT:

"NHTSA Pilot Study: Non-Traffic Motor Vehicle Safety Issues"

An Examination of Selected 1997 Death Certificates and Related Activity

May 6, 2002

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This report was prepared by Ken Hardie, Safety Standards Engineer in NHTSA's Office of Crash Avoidance Standards, and Glenn Gamber of ALCOSYS, Inc., the contractor that completed the research on which this report is based.

Executive Summary

In the summer of 1998, in a one-month period, a total of 11 children died in three separate incidents in which the children became locked in car trunks and subsequently died from heat exposure. (A 12th such 1998 death has been uncovered as a result of the research effort reported here.)

These incidents raised considerable concern in Congress and within NHTSA. Following a review of trunk entrapment by an expert panel assembled in January 1999, NHTSA on October 20, 2000, published a Final Rule in the Federal Register establishing a new Federal Motor Vehicle Safety Standard, (FMVSS) No. 401; Internal Trunk Release, that requires all new passenger cars with trunks to be equipped with a release latch inside the trunk compartment beginning on September 1, 2001.

When it concluded its work in June 1999, the trunk entrapment panel recommended that NHTSA "should establish a national data system designed to measure the frequency and consequences of trunk entrapment." The trunk entrapment issue, however, raised Congressional and agency interest in other possible non-traffic non-crash motor vehicle safety issues and pointed out the agency's lack of data or other information that might reveal these issues even though its data on traffic safety issues are extensive. As a result, NHTSA decided to conduct a pilot study in which it would examine 1997 death certificates, selected according to specific relevant criteria, with the goal of determining whether or not death certificates represent a good source of information on non-traffic non-crash motor vehicle safety issues. A second goal was to gather whatever non-traffic non-crash motor vehicle safety related information was available in death certificates as a first step in building a repository of data and information relating to these safety issues.

The pilot study focused on three specific non-traffic non-crash motor vehicle safety issues for 1997:

1. Children left in a vehicle's passenger compartment in hot weather or who lock themselves in the trunk of a vehicle,
2. Kidnap victims who are locked in the trunk of a vehicle, or
3. Children strangled by a vehicle's power window or sunroof.

Working closely and in cooperation with the Center's for Disease Control's National Center for Health Statistics (NCHS), NHTSA developed selection criteria based on standard codes in the International Classification of Diseases – 9th Revision reflecting incidents likely to involve motor vehicles and the types of situations in the study. Applying these and certain age-related criteria to NCHS's 1997 Multiple Cause of Death (MCOD) data file, NHTSA and NCHS identified a total of 1792 death certificates of interest.

Following NCHS procedures, NHTSA contacted each of the 50 states, New York City and the District of Columbia and requested copies of the death certificates that had been identified. Where applicable, NHTSA complied with documentation or other requirements of the jurisdictions for obtaining death certificates for research purposes. It also paid all necessary fees.

As of the date of this report, 1626 of the 1792 death certificates of interest from 47 states and the District of Columbia have been received and reviewed. Some of the remaining death certificates have reportedly been mailed, but seem to have been considerably delayed because of the precautions now being taken to guard against anthrax. Others are in the process of being compiled and sent.

This pilot study confirmed the value of death certificate research in identifying incidents of non-traffic non-crash motor vehicle safety hazards. A total of 29 deaths, 25 passenger compartment heat-related deaths and 4 deaths involving a vehicle window, were identified in the certificates reviewed. No deaths involving trunk entrapment or kidnap victims were identified among the death certificates reviewed.

Of the 29 passenger compartment heat-related deaths, 16 of the victims were three years old or younger and four of the victims were 60 or older. The remaining victims were 19, 20, 36, 38 and 47.

All of those who died through interaction with a vehicle window were four years old or younger.

Research was also conducted using Lexis-Nexis™, which proved to be a good source of information on the types of incidents of concern. Eight passenger compartment heat-related incidents were found in Lexis-Nexis™ for 1997. Six of these involved deaths that were not located in the death certificates. Two involved injuries only. Incidents of the type in the pilot study were also found in Lexis-Nexis™ for the years 1998 – 2001. A summary of those incidents appears below.

Lexis-Nexis™ Research of Pilot Study Issues for 1998-2001–Incidents (see note) and Deaths

(NOTE: An Incident May Not Involve A Death and May Involve More Than One Victim)

	1998		***1999***		***2000***		***2001***	
Children (10 or younger) left in a vehicle's	PC	TR	PC	TR	PC	TR	PC	TR
passenger compartment(PC) in hot weather or who lock themselves in the trunk(TR) of a vehicle	19	12	29	2	17	3	38	2
DEATHS FROM HEAT/TRUNK INCIDENTS	17	12	22	1	14	3	27	2
****Kidnap victims locked in the trunk of a vehicle***	1		4		5		4	
Children strangled by a vehicle's power window or sunroof	2		1		0		2	
DEATHS FROM POWER WINDOW/SUNROOF INCIDENTS	2		1		0		1	

**Deaths are not reported here. Because kidnap incidents often involve violence, whether or not the absence of a means of escape from a vehicle trunk was a factor in a kidnapping death is usually difficult to determine, at least from a news article account.*

NHTSA's mission is to prevent and reduce as many motor vehicle related deaths and injuries as possible. While the number of incidents and deaths found as part of the pilot study and Lexis-Nexis™ research is small, a large proportion of the victims consisted of children. As the incidents that triggered the pilot study amply demonstrate, the death of a child has a

particularly pronounced impact on the families and communities involved. While research conducted to date may not have provided a critical mass of information needed to drive agency action, it has shown the need for and importance of further research to obtain a more complete picture of non-traffic non-crash vehicle hazards.

The fact that deaths not found in the death certificate research were located in Lexis-Nexis™ demonstrates the importance of using various tools to locate incidents of non-traffic non-crash motor vehicle hazards. Further, the fact that Lexis-Nexis™ identified incidents of non-traffic non-crash motor vehicle hazards that resulted in injury and not death underscores the need for NHTSA to do research into this dimension of non-traffic non-crash issues. It may be that deaths represent only a small percentage of the overall impact of non-traffic non-crash motor vehicle hazards.

Based on the pilot study results and related activity, NHTSA plans to conduct another round of death certificate research covering the year 1998 for the three non-traffic non-crash safety issues that were the subject of the pilot study as well as additional hazards including off-road backing incidents and carbon monoxide poisoning. Steps the agency may take include:

- Closely examining data from three regular health surveys conducted by NCHS – the National Health Interview Survey (NHIS), the National Ambulatory Medical Care Survey (NAMCS) and the National Hospital Ambulatory Care Survey (NHACS), as well as the National Pediatric Trauma Registry and the National Electronic Injury Surveillance System (NEISS) to determine how those data might be used to project national totals of injuries resulting from non-traffic non-crash motor vehicle safety incidents.
- Searching MedLine, a comprehensive on-line database of research abstracts maintained by the National Library of Medicine, to look for information that may be useful in both identifying and characterizing the magnitude of non-traffic non-crash motor vehicle safety issues.
- Conducting a pilot study of police reports of non-traffic non-crash motor vehicle safety deaths with NHTSA's National Center for Statistics and Analysis (NCSA). This will involve asking states that now collect police reports of traffic deaths as part of the Fatality Analysis Reporting System (FARS) to collect reports of non-traffic non-crash motor vehicle related deaths for a period of time to see how valuable a source of information these reports represent.

It is hoped that these efforts will both add to the agency's information on non-traffic non-crash vehicle safety issues and demonstrate a process by which the agency will be able to continually add to that information through ongoing annual data collection and analyses.

Introduction

This is the final report of a pilot program of the National Highway Traffic Safety Administration (NHTSA) titled "Non-Traffic Motor Vehicle Safety Issues." The goals of this study were twofold. First, NHTSA wanted to determine whether or not death certificates are a good source for gathering information on non-traffic non-crash motor vehicle related safety issues. Second, using the year 1997 as its sample, NHTSA wanted to get a sense for the number of incidents that occur annually in which deaths result from one of the following three non-traffic non-crash motor vehicle related safety issues:

(1) children who die as a result of being left unattended in a motor vehicle's passenger compartment in hot weather or who die as a result of locking themselves in the trunk of a vehicle,
(2) kidnap victims who die as a result of being locked in the trunk of a vehicle, and
(3) children who die as a result of being strangled by a motor vehicle power window or sunroof.

In addition to the pilot study, NHTSA was interested in determining the value of Lexis-Nexis™ as a source for non-traffic non-crash motor vehicle safety incidents. Lexis-Nexis™ is a widely recognized and highly regarded online information search service that includes an extensive library of news articles, which were the focus of NHTSA's research. Also, the agency had an interest in identifying other possible sources of information for these safety issues.

This report includes both the results of the death certificate research for 1997 and Lexis-Nexis™ searches for the years 1997 through 2001. Conclusions and recommendations that stem from these research results are provided.

Other possible sources of information that were identified and that the agency intends to include in its future research activities are described at the end of this report.

Background

NHTSA is responsible for reducing deaths and injuries associated with motor vehicles. The agency collects detailed data on a census of fatal traffic crashes through the Fatality Analysis Reporting System (FARS), a national sample of towaway traffic crashes through the National Automotive Sampling System (NASS) Crashworthiness Data System (CDS), a national sample of police-reported traffic crashes through the NASS General Estimates System (GES), and the traffic crash files for those states that participate in the State Data System (SDS).

NHTSA is also responsible, however, for motor vehicle safety when there is not a crash or the event occurs off the public trafficway. NHTSA decided to initiate the Non-Traffic Motor Vehicle Safety Issues pilot study because none of its extensive data files focus on determining the number of non-traffic non-crash motor vehicle related deaths and injuries that occur. When the agency tries to quantify safety problems associated with non-traffic non-crash situations it often finds that it has little or no data and must rely on the data gathering efforts of others. While providing interesting and useful information, the data available from others

usually provide insufficient detail to guide NHTSA as to whether or not a regulatory or some other response is needed and, if so, what that response should be.

Sometimes issues arise requiring ad hoc information gathering efforts. This was the case in January 1999 when the agency assembled a panel of experts composed of industry, safety advocates, medical experts, law enforcement, and other relevant groups to address the non-traffic non-crash safety issue of trunks that cannot be opened from the inside should someone accidentally or through criminal intent become trapped inside. In June 1999, this panel recommended that NHTSA "should establish a national data system designed to measure the frequency and consequences of trunk entrapment." On October 20, 2000, NHTSA published a Final Rule in the Federal Register establishing a new Federal Motor Vehicle Safety Standard, (FMVSS) No. 401: Internal Trunk Release, that requires all new passenger cars with trunks to be equipped with a release latch inside the trunk compartment beginning September 1, 2001.

The Non-Traffic Motor Vehicle Safety Issues Pilot Study was officially initiated in March 2000 when NHTSA contacted the vital statistics office or health department in 10 states to acquire selected mortality data. The objective of this initial effort was to obtain and examine specifically identified death certificates for the year 1997 to document:

1. the number of children who died as a result of being left unattended in a motor vehicle's passenger compartment in hot weather or who died as a result of locking themselves in the trunk of a vehicle,
2. kidnap victims who die as a result of being locked in the trunk of a vehicle, and
3. the number of children strangled by motor vehicle power windows.

The certificates received from the 10 states initially contacted confirmed the value of proceeding with a pilot study involving all 50 states, the District of Columbia and New York City.

This study was conducted by NHTSA's Office of Safety Performance Standards (NPS). Invaluable assistance and guidance concerning the death certificate research was provided by the National Center for Health Statistics (NCHS).

History and Methodology of Death Certificate Research

State laws require death certificates to be completed for all deaths, and Federal law mandates national collection and publication of death and other vital statistics data. NCHS publishes annual reports of all deaths in the United States using information derived from death certificates. The deaths are broken down according to various codes relating to the disease or condition directly leading to death, antecedent causes, and other significant conditions. The U.S. Standard Death Certificate, developed in cooperation with the states and other registration areas, aids in the collection and collation of this information. A copy is attached to this report as Appendix A.

The NCHS made available to NHTSA the public use version of its electronic multiple cause of death (MCOD) file. For the year 1997, the underlying cause of death, and the other specific injuries, diseases, and conditions for death are classified and coded on the basis of the International Classification of Diseases, 9th Revision (ICD-9). ICD-9 is designed for the

classification of morbidity and mortality information for statistical purposes, for the indexing of hospital records by disease and operations, and for data storage and retrieval. ICD-9 also contains a supplementary classification of external causes of injury that permit the classification of environmental events (E-Codes), circumstances, and conditions as the cause of injury and other adverse effects.

NHTSA identified what it considered to be the ICD-9 codes most likely to be indicated on death certificates reflecting a non-traffic non-crash motor vehicle event involving one of the three safety issues included in the pilot study. These codes cover deaths involving excessive heat, suffocation, strangulation or asphyxiation. Clearly, not all deaths assigned ICD-9 codes suggestive of these conditions involve non-traffic non-crash motor vehicle events. However, deaths with these codes probably would contain deaths resulting from non-traffic non-crash injury events.

Some preliminary tabulations derived from documentation for the MCOD file isolated death certificates that might include people who died in a non-traffic non-crash motor-vehicle related event. In all, there were 1792 death certificates from 1997 of interest to NHTSA for this pilot study.

In November 1998, NHTSA met with NCHS officials to discuss NHTSA's review of the data and how to proceed with the pilot study. NCHS recommended a protocol that had been used for similar studies. It involved the following:

(1) Submission of a formal proposal by NHTSA to NCHS that described the purpose of the study and how information on the death certificates would be used.
(2) The submission by NCHS of a request to each state for permission to release the death certificate numbers to NHTSA in support of this study.
(3) Assistance to NHTSA from NCHS in identifying the selection criteria from the information available in the electronic files with special attention paid to the injury codes.
(4) Release of death certificate numbers to NHTSA by NCHS as states agreed to this.
(5) NHTSA's submission of a request to each state asking for copies of death certificates (by identifying number), including any applicable fee for the service. In the request, NHTSA stated that it would under no circumstances attempt to contact family members of the decedents. In some cases additional paperwork and approvals were required for research of this sort to be conducted.
(6) NHTSA's review of death certificates, taking precautions to protect all information obtained from them. States consider both the death certificate numbers and the identifying information on the certificates to be confidential, and are sensitive to the risk of "identity theft."

NHTSA initiated and followed the recommended protocol. NCHS staff reviewed a NHTSA suggested list of selection criteria for the three non-traffic non-crash motor vehicle issues to be studied and proposed some additional selection criteria. Table I identifies the three non-traffic non-crash motor vehicle safety issues of interest and indicates the final list of data filters and E-codes that were used to select the death certificates for this study. Table II provides

language describing the external events, circumstances, and conditions represented by each E-code that reflects the cause of death or injury.

Table I: Three Non-Traffic Non-Crash Motor Vehicle Safety Issues And Data Filters and Injury Codes (E-Code) for Identifying Death Certificates in NCHS Electronic Files

Non-traffic non-crash motor vehicle safety issues	Issue 1	Issue 2	Issue 3
Safety issues under investigation in the pilot study:	Children left unattended in a vehicle's passenger compartment in hot weather or who lock themselves in the trunk of a vehicle	Kidnap victims who are locked in the trunk of a vehicle	Children strangled by a vehicle's power window or sunroof
Filter 1: The following ages were used as a filter for identifying deaths that might be relevant to the study:	Under 9 years	9 years and older (younger people will be captured under Issue 1)	Under 11 years
Filter 2: The cause of death for the cases of which we were aware appeared to be described as follows:	1) Overheating or 2) Suffocation	1) Overheating or 2) Suffocation	1) Strangulation or 2) Asphyxiation
We are using the following injury variables in defining our third data filter:	All 20 record axis conditions	The underlying cause of death	All 20 record axis conditions
Filter 3: The following specific injury codes (E-code from the ICD-9) were used for the situations in which we are interested, and as a filter for identifying deaths that might be relevant to the study: **NOTE: See Table II for explanation of E-codes.**	1) E900.0 2) E900.1 3) E900.9 4) E904 (all) 5) E913.2 6) E913.8 7) E913.9 8) E953.8 9) E953.9 10) E963 11) E983.8 12) E983.9	1) E900.0 2) E900.1 3) E900.9 4) E904 (all) 5) E913.2 6) E913.9 8) E953.8 9) E963 11) E983.8 12) E983.9	1) E818.1 2) E825.1 3) E913.2 4) E913.8 5) E913.9 6) E918 7) E963 8) E983.0 9) E983.8 10) E983.9

Table II: E-Codes and Injury Classification as Found in ICD-9 Volume 1

E818	*Other non-collision motor vehicle traffic accident Includes accidental poisoning from exhaust; injury from moving part
E818.1	Passenger in motor vehicle other than motorcycle
E825	*Other motor vehicle non-traffic accident of other and unspecified nature
E825.1	Passenger in motor vehicle other than motorcycle
E900	Excessive heat
E900.0	Due to weather conditions Excessive heat as the external cause of ictus solaris siriasis sunstroke
E900.1	Of man-made origin Heat (in): boiler room drying room factory furnace room Heat (in): generated in transport vehicle kitchen
E900.9	Of unspecified origin
E904	Hunger, thirst, exposure, and neglect (Includes abandonment or neglect of infants and helpless persons and exposure to weather conditions resulting from abandonment or neglect)
E913	Accidental mechanical suffocation Excludes: mechanical suffocation from or by: Accidental inhalation or ingestion of: Food (E911) foreign object (E912) cataclysm (E908-E909) explosion (E921. – E923., -)
E913.2	Due to lack of air (in closed space) Accidentally closed up in refrigerator or other airtight enclosed space Excludes: suffocation by plastic bag (E913.1)
E913.8	Other specified means
E913.9	Unspecified Asphyxia, mechanical NOS Suffocation NOS Strangulation NOS
E918	Caught accidentally in or between objects
E953	Suicide and self-inflicted injury by hanging, strangulation, and suffocation
E953.8	Other specified means
E953.9	Unspecified means
E963	Assault by hanging and strangulation
E983	Hanging by strangulation, or suffocation, undetermined whether accidentally or purposely nflicted
E983.8	Other specified means
E983.9	Unspecified means

**A motor vehicle non-traffic accident (as defined in ICD-9 under E-codes) is any motor vehicle accident that occurs entirely in a place other than a public trafficway.*

NHTSA used the victim's age and injury mechanism as the data filters to identify cases for further review. The MCOD file includes a variable for the "Underlying Cause of Death" and variables for up to 20 other injuries or diseases described as "The Record Axis Conditions." As stated earlier, the underlying cause of death and the record axis conditions are coded from ICD-9, which is available on the NCHS internet web site.

NHTSA expected that deaths caused by non-traffic non-crash motor vehicle related injuries would be a subset of those with codes for the underlying cause of death, and did not think it would be necessary to examine records according to the 20 record axis conditions. However, in cases involving young children, NHTSA requested a search that included both the underlying cause of death and all 20 record axis conditions. Note that the list of codes used to identify children who might have died as a result of being left in a vehicle (Issue 1) overlaps the list of codes used to identify children who might have died by power window strangulation (Issue 3). NHTSA thought that either type of death might be ascribed to suffocation (codes E913.2, E913.8, and E913.9) or strangulation (E963, E983.8, and E983.9). The overlap in the codes did not present any practical or analytical problems because staff intended to review each death certificate for all types of non-traffic non-crash motor vehicle injuries and classify them based on this review.

The data compiled for Issue 2 allowed for the study of trunk entrapments involving people who were at least nine years old at the time of death. The selection criteria were the same as those NHTSA would have specified to identify people who had died from overheating or suffocating in the passenger compartment of a vehicle.

All 52 jurisdictions contacted by NCHS agreed to participate in this study, and NCHS was able to provide NHTSA with the death certificate numbers NHTSA needed to request specific death certificates. The information was sent to NHTSA on three computer diskettes to avoid the risks associated with email transmission. In October 1999, NHTSA received death certificate information for 50 states and the District of Columbia. In March 2000, the agency received death certificate numbers for New York City. NHTSA reviewed the data, requested some small revisions, and received a final version of the complete data (for all 52 jurisdictions) in April 2000. NHTSA kept all the data (both computer disks and paper copies) under lock-and-key continuously. Draft versions of the paper copies were disposed of in the special bins NHTSA provides for disposal of confidential information. A list of death certificates and information relating to each, derived from the NCHS data, was used as an attachment in the letters written to each state requesting the specific death certificates.

NHTSA created a Corel QuatroPro spreadsheet from the public use data provided by NCHS for the 1,792 deaths. As death certificates arrived, NHTSA used the public use data from the electronic files as a quality check to ensure that it had the correct death certificate, then entered additional information from each death certificate in the spreadsheet. The data entered do not include personal identifiers or the death certificate numbers. Data are saved electronically.

An Interim Report on the progress of the Pilot Study was completed in July 2001. By then, 606 death certificates had been received from 13 states. A total of 11 deaths relating to the non-traffic non-crash motor vehicle related safety issues of interest had been found. Based on

these numbers, it was projected that between 32 and 33 deaths relating to the pilot study safety issues would be found in the 1792 death certificates.

Following the completion of this Interim Report, in early September 2001, an outside contractor, ALCOSYS, Inc., was contracted to complete the project. Data gathered to that point were imported into a Microsoft Access database, which has since been used to gather and store data.

The 52 physical files containing information (correspondence, notes, etc.) reflecting the status of contacts between NHTSA and the appropriate state officials relating to the requests for death certificates were reviewed. The status of the various files ranged from complete, with all requested certificates having been received, to a few instances in which no initial request for death certificates had ever been mailed. Most of the files were in some interim state with either no response having been received after an initial mail request was sent or some follow up step or steps required in response to a state's reply to the initial mail request. Typical follow up steps included the submission of a research protocol and/or a research confidentiality agreement and/or prepayment of applicable fees.

Research Results – Pilot Study

As of the date of this final report, NHTSA has received 1626 death certificates from a total of 47 states and the District of Columbia. The breakdown by state is included in Table III.

Table III: Death Certificates Received by the Date of This Report

State	Requested	Received
Alabama	32	32
Alaska	4	4
Arizona	67	65
Arkansas	17	17
California	204	204
Colorado	26	26
Connecticut	17	17
Delaware	1	1*
District of Columbia	10	10
Florida	102	102
Georgia	38	38
Hawaii	4	4
Idaho	8	0
Illinois	97	0
Indiana	48	48
Iowa	16	16
Kansas	18	18
Kentucky	46	46
Louisiana	38	38
Maine	3	3

State	Requested	Received
Maryland	21	21*
Massachusetts	11	11
Michigan	65	65
Minnesota	42	42
Mississippi	23	23
Missouri	55	55
Montana	6	6
Nebraska	14	14
Nevada	17	17
New Hampshire	7	7
New Jersey	39	39
New Mexico	22	22
New York City	47	0
New York State	43	43
North Carolina	44	44
North Dakota	1	1
Ohio	60	60
Oklahoma	29	29
Oregon	24	24
Pennsylvania	61	61
Rhode Island	2	2
South Carolina	32	32
South Dakota	3	3
Tennessee	35	35
Texas	153	151
Utah	17	17
Vermont	1	1
Virginia	39	39
Washington	27	27
West Virginia	10	10
Wisconsin	36	36
Wyoming	7	0
TOTAL	1792	1626

* *Information concerning these deaths was provided by phone. Actual death certificates were not received.*

All data types that were examined during the review of death certificates are included in Table IV. The variables include some that were available on the public use version of the MCOD files (such as age, sex, and state) and text from the narrative portions of the death certificate (such as the list of conditions that caused death and the description of how the injury occurred). Examining these variables was very useful in determining whether the victim was in a vehicle at the time of the injury and the circumstances surrounding the injury and death.

Not all death certificates were filled out completely. In such cases, available information was recorded and an assessment of that information was made to arrive at a determination as to whether the death involved was relevant. For example, if an 80 year old person died of heat exposure in July in Arkansas and the place of death was listed as "home", the case was not considered relevant even though whether or not an automobile was involved was not specifically indicated or excluded by the information contained in the certificate. In some cases, particularly homicides and suicides, only limited information was recorded since the cause of death indicated on the death certificate made clear that a vehicle was not involved.

In the case of Maryland and Delaware, death certificates were not actually received. However, representatives of these two states indicated by phone or email that the deaths from those states did not involve any of the types of incidents under investigation. Certificates were also not received from Rhode Island, but sufficient information was provided by phone to fill in appropriate information in NHTSA's database. Information relating to one death certificate from Arkansas, a homicide, was also obtained in this fashion because the certificate was omitted from those that were returned.

Table IV: Variables in Database of 1997 Death Certificates Reviewed

Field Name	Description
State	State in which death occurred
Case Count Nation	Each of the 1792 certificates requested was assigned an identifying Case Count Nation number*
Case Count State	Within the group of death certificates from each state, each certificate was assigned a Case Count State number*
Receipt Status	Indicates whether or not certificate has been received.
FIPS County Code	Code for county in which death occurred.
Cause of Death (ICD-9)	ICD-9 Code listed in death certificate as the cause of death
Manner of Death	Accident, Homicide, Suicide, Natural
Of Interest	Whether or not the case is one of interest to NHTSA, either for the Pilot Study or possible future studies
Interest Area	Safety issue of interest to NHTSA
Place of Injury	Where the injury that caused death occurred
Place of Death	Where the person died
Month	Month in which the death occurred
Day	Day of the week on which the death occurred
Age Units	Days, Weeks, Months, Years – Units in which age is expressed
Age	Number of Age Units
Sex	Sex of the decedent
Reported to the ME/Cororner?	Whether or not the death was reported to the Medical Examiner or Coroner
Autopsy Performed?	Whether or not an autopsy was performed
How Injury Occurred	A description of how the injury that caused death occurred
Part 1: Diseases, Injuries, Complications	Primary condition or conditions that caused death
Part 2: Other Significant Conditions	Any other conditions that contributed to, but did not directly cause death
Comments	Any comments that help explain the data

**These numbers allowed NHTSA to be sure that data were entered in the correct record for each death certificate reviewed. They further eliminated the need to record information that specifically identified the decedent, such as name, address, etc.*

The distribution of the manner of death among the death certificates that were received is shown in Table V.

Table V: Manner of Death
For Death Certificates Received by January 31, 2002

Manner of Death	Number
Left Blank	62
Accident	626
Homicide	603*
Natural	222
Pending	9
Suicide	16
Undetermined	66
Reported as not relevant	22
TOTAL	1626

**It is anticipated that the experience gained in the pilot study will allow NHTSA to cut back significantly on the number of homicide related death certificates it receives in future research.*

Research of death certificates from 1997 identified 29 deaths relating to the non-traffic non-crash motor vehicle safety issues in the pilot study – 25 involving exposure to heat in the passenger compartment of a vehicle, four involving vehicle windows. The totals in each category are shown below in Table VI. Detailed information on the heat-related deaths follows in Table VII. Detailed information on the window related deaths appears in Table VIII.

Table VI: Non-Traffic Non-Crash Motor Vehicle Related Deaths
Identified in 1997 Death Certificates Reviewed

Incident Type	Number
Heat exposure - enclosed vehicle	25
Vehicle window	4*
Trunk entrapment	0

**Only one death certificate makes it clear the window involved was a power window. One incident was found to involve a power window based on a report of the incident found in Lexis-Nexis™. Two incidents are not clear as to whether the window involved was a power window or the result of the power feature of the window.*

Based on these numbers, it is expected that there will be about 32 relevant death certificates in the total of 1792 death certificates when all outstanding certificates are eventually received. This is consistent with the total projected from the results in the previously mentioned interim report of this study.

Table VII – Death Certificate Cause of Death Search
Individuals Who Died in 1997 As A Result of Exposure to Heat in the Passenger Compartment of a Vehicle

Item No.	Age	How Injury Occurred	Cause of Death in Descending Order of Contribution	Comments
1	4 mos.	Exposure to heat	Systemic hyperthermia	Place of injury – parked van-Accident
2	4 mos.	Decedent was left inside of closed vehicle	heat stroke (hyperthermia)	Accident
3	5 mos.	unattended strapped in a car seat	death due to hyperthermia	-Accident -Place of death-car seat
4	10 mos.	left in parked car	hyperthermia	-Place of Injury - Parking lot-Accident
5	11 mos.	Left unattended in back seat of closed car with outside ambient temp. of 92+ degrees	Complications due to environmental hyperthermia	Homicide
6	1	child left in closed automobile	Heat stroke	-Pending investigation Place of injury-parking lot
7	1	Inside enclosed car exposed to sun	Hyperthermia	-Accident Place of injury-residence (car)
8	2	Unattended in van	Hyperthermia with massive cerebral edema	Accident
9	2	child found in closed automobile in sun	brain stem herniation; cerebral edema; accidental hyperthermia	Accident
10	2	child playing in car - temperature was 120 degrees	heat stroke (hyperthermia)	Accident
11	2	Found in hot car	Hypothermia and dehydration	Accident
12	2	He was discovered closed up in an automobile on a hot summer afternoon	Heat stroke (rectal temperature greater than 108 degrees), fibrous focal pleural adhesions on the right IV entering right wrist, multiple venous puncture wounds of right side of neck	Accident
13	2	Decedent left in overheated car interior	Heat stroke, environmental hyperthermia	Accident
14	3	Trapped in enclosed, disabled vehicle	Hyperthermia	-Place of injury-parked automobile -Accident
15	3	Trapped in enclosed, disabled vehicle	Hyperthermia	-Place of injury-parked automobile -Accident

Item No.	Age	How Injury Occurred	Cause of Death in Descending Order of Contribution	Comments
16	3	deceased suffered hyperthermia	Hyperthermia (heat stroke)	Place of injury – inside vehicle-Accident
17	19	environmental exposure	environmental hyperthermia, fatty liver	-Place of death – found in auto -Accident -Pending Investigation -Possible contribution of medical condition
18	20	(Locked in Car) Exposure to High Environmental Temperature	Hyperthermia, cerebral palsy	-Not indicated whether trunk or not -Place of injury-car/yard -Accident
19	36	heatstroke, sitting in closed vehicle	Probable heatstroke	Accident
20	38	decedent found in vehicle on hot day	Heat stroke, Colloid cyst of choroid plexus hydrocephalus	-Accident -Possible contribution of medical condition
21	47	exposed to hot environment in enclosed vehicle	Hyperthermia, large parathyroid adenoma	-Accident -Possible contribution of medical condition -Place of injury- gas station-Time – 3 p.m.
22	61	exposure to high temperature (100+degrees) – place of injury - motorhome	environmental hyperthermia, hypertension	-Place of injury-motorhome -Not sure of relevance
23	72	patient took amitriptyline - remained in auto in sun	acute dehydration secondary to heat stroke; amitriptyline toxicity	-Accident -Medication a factor
24	79	exposed to hot ambient temperature	suspect electrolyte imbalance; exposure to heat, hypertensive heart disease	-Place of injury – inside vehicle in front of residence -Possible contribution of medical condition
25	91	found in vehicle during extreme heat	body fluid / electrolyte loss; hypothalamic failure / exhaustion; heat stroke	-Accident -Possible contribution of medical condition

Table VIII – Death Certificate Cause of Death Search
Individuals Who Died in 1997 As A Result of Interaction with a Vehicle's Window

Item No.	Age	How Injury Occurred	Cause of Death in Descending Order of Contribution	Comments
1	3	head/neck caught in auto's power window	brain death with respiratory failure; asphyxia; strangulation by car window	Parked auto
2	3	victim's head was wedged in an automobile window	compression asphyxia	-No clear mention of power window Listed as accident Place of Injury - Home
3	3	Not filled in	Traumatic asphyxiation, entrapment of neck in vehicle window	No clear mention of power window -Pending investigation
4	4	victim accidentally rolled rear driver side window onto his neck	asphyxiation secondary to mechanical impairment of respiration	-No clear mention of power window -Incident occurred in '91 Lincoln Continental, report later located in Lexis-Nexis™ confirms it was a power window

In addition to the 29 incidents of the type in the pilot study, the research found an additional 64 instances of deaths involving or in some way tangentially related to a motor vehicle. These deaths were identified because of the multiple situations to which an ICD-9 Code might apply. For example, the description of the types of incidents covered by the E-code, E818 "Other non collision motor vehicle traffic accident" includes "fall, jump, or being accidentally pushed from" a motor vehicle. Several of the 64 deaths involved people falling from vehicles. Others of the 64 deaths were identified because of similarly broad definitions of codes that were used to select the death certificates.

These 64 additional deaths included:

- 7 incidents, each with unique circumstances not involving a situation of the sort being investigated in the pilot study.
- 7 involving car seats in which the victim either was strangled, entrapped, or suffocated.
- 3 deaths resulting from a single incidence of a vehicle fire.
- 2 deaths that resulted from vehicle rollaway.
- 1 death caused by suffocation in a closed vehicle. (Death certificate listed circumstances as (a) asphyxiation and (b) depletion of environmental oxygen. The description of how the injury occurred read, "while sleeping in truck." This incident occurred in one of the cooler months in a cooler region of the country so heat does not appear to have been a factor.)
- 44 traffic and other moving vehicle incidents of various types, but not involving any of the non-traffic non-crash circumstances under study. Some of these incidents are of the type identified and collected in NHTSA's Fatality Analysis Reporting System (FARS).

Full descriptive information for each of these 44 traffic and other moving vehicle incidents, including those of the sort typically found in FARS, appears in Appendix B of this report. The other incidents are described in Table IX below.

Table IX: Deaths Found in Pilot Study Not Involving Issues in Pilot Study and Not Traffic or Other Moving Vehicle Incidents

Item No.	Age	How Injury Occurred	Cause of Death in Descending Order of Contribution
UNIQUE CIRCUMSTANCES			
1	4	fell and became wedged between two parked semi-trailers	blunt trauma to the abdomen
2	6	Stuck in pocket door (place of death – travel trailer)	Mechanical asphyxication; external compression
3	27	strangled when shirt caught in moving drive shaft	strangulation asphyxia; motor vehicle non-traffic accident; caught in moving part
4	87	wedged under trailer	positional asphyxia
5	57	Froze while attempting to free stuck vehicle	exposure to hypothermic conditions
6	19	Working under vehicle and manually took out of gear. Vehicle rolled onto victim.	Mechanical compression
7	9	Fell from horse trailer and was subsequently run over	Massive hemorrhage, multiple trauma
CAR SEATS			
1	11 mos.	strangulation by security strap of infant car seat/carrier being used as a swing	asphyxiation; ligature around neck, clinical
2	10 mos.	infant left unattended in child car safety seat, slides down in seat and is strangled by restraint strap	strangulation; car seat strap
3	1	strangulation in infant car seat restraint	compatible with strangulation
4	5 mos.	unattended child toppled over in car seat and suffocated on covers of bed	Positional asphyxia
5	5 mos.	entrapped in overturned car seat	entrapment asphyxia
6	3 mos.	face down in tipped over car seat	positional asphyxia
7	2 mos.	Suffocation due to occlusion of airway by car seat	(blank)
VEHICLE FIRE			
1	4,7,10	vehicle fire - rear passengers - charred	smoke inhalation and thermal burns
ROLLAWAY			
1	5	decedent was a passenger in the back of a pickup truck which rolled off a bridge without a driver in cab	multiple blunt force trauma; motor vehicle accident
2	3	child in parked vehicle that rolled into lake	Multiple traumatic injuries
VEHICLE AIRFLOW			
1	42	while asleep in truck	asphyxiation; depletion of environmental oxygen

LEXIS-NEXIS™ Search

The Lexis-Nexis™ News-Large Group File was searched for any news articles from 1997 dealing with any of the three non-traffic non-crash motor vehicle safety issues of this pilot study. These Lexis-Nexis™ files include articles from more than 45 major newspapers as well as magazines, journals, newsletters, wire services and broadcast transcripts.

Eight passenger compartment heat related incidents were found in Lexis-Nexis™ for 1997. Six of these involved deaths not located in death certificates. Two involved injuries only. Only 9 of the 25 deaths from passenger compartment heat located in death certificates were found in Lexis-Nexis™.

For years beyond 1997, the Lexis-Nexis™ search was much more fruitful. Results for years 1998-2001 appear in Table X below.

Table X: Results of Lexis-Nexis Research for Articles Relevant to Pilot Study (1998-2001)

Yr.	Type	Incidents	Victims	Victims 10 & under	Victims 10 and over	Victims unknown age	Deaths
98	Heat(passenger compartment)	17	19	19			17
	Vehicle Window	2	2	2			2
	Trunk Entrapment(child)	4	12	12			12
	Trunk(kidnap victim)	1	1		1		*
99	Heat(passenger compartment)	29	33	32		1	22
	Vehicle Window	1	1	1			1
	Trunk Entrapment(child)	2	2	2			1
	Trunk (kidnap victim)*	4			3	1	*
00	Heat(passenger compartment)	17	22	19	2	1	17
	Power Window	0					
	Trunk Entrapment (child)	3	4	3	1		4
	Trunk (kidnap victim)	5	5		5		*
01	Heat(passenger compartment)	38	47	45		2	27
	Power Window	2	2	2			1
	Trunk Entrapment (child)	2	2	2			2
	Trunk (kidnap victim)*	4	5		5		*

**Because extensive criminal activity and intentional infliction of injury is often involved in kidnappings, it is difficult to determine the extent to which the absence of a trunk escape mechanism contributed to the deaths involved. Deaths are therefore not reported here.*

While the Lexis-Nexis™ News-Large Group File is a comprehensive source of news articles, it is not complete. Incidents that occur in more rural areas, for example, would seem to be less likely to be found in a Lexis-Nexis™ search. Also, the realities of the news gathering process are such that whether or not an incident appears in a media outlet included in the Large Group File is the product of many variables, including whether or not the incident ever comes to the attention of news gatherers. The number of incidents found in a Lexis-Nexis™ search for any given year therefore is not likely to represent the total number of such incidents in that year. There is nothing in Lexis-Nexis™ that would allow one to predict national totals based on the

number of incidents found for a year, although ongoing experience with Lexis-Nexis™ and other data sources may allow one to see a pattern on which one could base very rough predictions.

The Lexis-Nexis™ search did support the agency's growing awareness that non-traffic non-crash motor vehicle safety issues are reflected not only in deaths, but also in injuries, from the very minor to serious, even lifelong impairments. These search results spurred agency interest in sources of injury data. These sources as well as additional sources of death data are discussed in detail following the Conclusions and Recommendations from the pilot study and related activity.

Conclusions/Recommendations from the Pilot Study and Related Activity

Further Death Certificate Research Is Warranted

Death certificates represent a fruitful source of information on non-traffic non-crash motor vehicle safety hazards. NHTSA was able to document 25 cases of motor vehicle passenger compartment heat-related deaths and 4 cases of vehicle window related deaths from 1997 that NHTSA previously had no means of documenting. More than half of the heat related cases involved children three years old or younger. All of the vehicle window deaths involved children four years old or younger. Based on this experience, the agency anticipates that deaths resulting from other types of non-traffic non-crash motor vehicle safety hazards will be identified in further death certificate research.

Further death certificate research should become more efficient as it proceeds because of the many time consuming and start-up steps and phases that were involved in initiating research of this type. In some cases, these will not need to be repeated. In others, they will occur more quickly as the result of experience. Examples of why efficiencies should occur include:

- A protocol is established and in place with the National Center for Health Statistics,
- Contacts have been established with appropriate people in the appropriate offices of the various jurisdictions,
- Where required, research agreements are in effect and will remain so at least for the next round of research,
- Steps required for each jurisdiction, particularly whether or not prepayment is required, are now known, and
- NHTSA's experience with the pilot study should allow the agency to pare down the number of death certificates requested so as to avoid receiving irrelevant certificates based ICD-9 codes that did not produce applicable incidents in the pilot study and whose definitions strongly suggest little likelihood of uncovering deaths of interest.

NHTSA's immediate plans call for researching 1998 death certificates for incidents of the type included in the pilot study as well as other non-traffic non-crash deaths resulting from incidents including vehicles backing up and vehicle produced carbon monoxide.

ONGOING LEXIS-NEXIS™ RESEARCH IS WARRANTED

Lexis-Nexis™ proved to be a valuable source of incidents of non-traffic non-crash motor vehicle safety hazards that were part of the pilot study and had the added value of identifying incidents in which injury rather than death was the outcome. NHTSA plans to periodically research Lexis-Nexis™ (on an ongoing basis) to identify the latest non-traffic non-crash motor vehicle safety incidents. This could become at least a component of a kind of early warning system to identify new types of non-traffic non-crash motor vehicle hazards that arise.

ADDITIONAL RESEARCH SHOULD INCLUDE INJURY DATABASES AND OTHER SOURCES

The focus of the pilot study was to determine whether or not death certificates represented a good source of information on non-traffic non-crash motor vehicle safety issues. The next phase of NHTSA's efforts will be in the nature of a demonstration project to determine whether or not the various resources identified can be utilized on an ongoing basis to keep the agency informed about non-traffic non-crash motor vehicle safety issues. If this demonstration project is successful, the following should occur:

- The agency will have a database of incidents of non-traffic non-crash motor vehicle safety hazards consisting of those located in death certificates from 1997 and 1998 and reports of deaths and injuries found in Lexis-Nexis. Whether or not a substantial number of incidents of injury will be identified in the injury databases discussed in this report will depend on whether or not those databases allow for the retrieval of information down to the incident level. None of the injury databases represent a total census of injuries.
- The agency may have means by which to make gross estimates of the extent to which certain non-traffic non-crash motor vehicle safety hazards exist nationally. This could result from investigations of the four databases mentioned earlier in this report and described below.

Other Data Sources for Future Study

The Internet was the primary tool used to look for additional data sources that might provide information relating to non-traffic non-crash motor vehicle safety issues. Each of the four main sources identified includes injury information, which logic suggests could be more extensive than death certificate data relating to non-traffic non-crash motor vehicle safety issues.

The other data sources identified are:

CENTERS FOR DISEASE CONTROL, NATIONAL CENTER FOR HEALTH STATISTICS

The Centers for Disease Control and Prevention (CDC), an agency of the Department of Health and Human Services headquartered in Atlanta, GA, is recognized as the lead federal agency for providing credible information to enhance health decisions. It serves as the national focus for developing and applying disease prevention and control, environmental health, and health promotion and education activities designed to improve the health of the people of the United States. The National Center for Health Statistics (NCHS) is a part of the CDC and is the federal government's principal vital and health statistics agency. Headquartered in Hyattsville, MD, NCHS provides a wide variety of data with which to monitor the nation's health.

National Health Interview Survey (NHIS)

This is a personal interview household survey involving a nationwide sample of the civilian, non-institutionalized population. The survey includes a "core" set of questions and one or more special health topics that vary annually.

National Ambulatory Medical Care Survey (NAMCS)

This survey covers a sample of visits to non-federally employed office-based physicians primarily engaged in direct patient care. The specialties of anesthesiology, pathology, and radiology are excluded from this survey. It has been conducted annually since 1989.

National Hospital Ambulatory Care Survey (NHACS)

This survey consists of a national sample of visits to the emergency departments and outpatient departments of non-institutional general and short-stay hospitals, exclusive of federal, military, and VA hospitals. Hospitals from all of the 50 states and the District of Columbia are included in this annual survey, which began in 1992.

Public use versions of these three databases are available from the CDC. It is NHTSA's intent to obtain the public use version of each of these databases and conduct a thorough analysis of the data to determine if the data contain non-traffic non-crash motor vehicle safety incidents in sufficient quantity to be able to make some raw national projections as to the extent these issues are a problem.

NATIONAL ELECTRONIC INJURY SURVEILLANCE SYSTEM (NEISS)

The scope of NEISS was recently expanded to include injuries resulting from interaction with a motor vehicle. This extensive database therefore now represents a potentially very good source of information on injuries resulting from non-traffic non-crash motor vehicle safety hazards.

NATIONAL PEDIATRIC TRAUMA REGISTRY (NPTR)

The National Pediatric Trauma Registry was established in 1985 to study the causes, circumstances, and consequences of injuries to children. The Registry is a national resource to understand the unique aspects of pediatric injuries. Participants include pediatric trauma centers or children's hospitals with a pediatric trauma unit. As of October 1996, there were 78 participating centers located in 28 states, Puerto Rico and Ontario, Canada. Participants fund their own data collection. Only admissions are recorded, including DOAs. All types of injuries, except those caused by burns, poison, or near drowning are included in the database. The age range covered is 0 to 19 years.

Searches of the NPTR are conducted by the NPTR upon request for a nominal fee. NHTSA will explore how best to search the NPTR data to identify non-traffic non-crash motor vehicle safety incidents.

RESEARCH LITERATURE

Another source of information that was identified is MedLine, a National Library of Medicine database of than 11 million articles published in 4300 biomedical journals. This database is accessible free on line, although only abstracts of articles are available in most cases. A preliminary search of this database produced relatively few articles relating to the issues

examined by the pilot study. In the area of heat inside an enclosed vehicle, for example, only two articles were found, both dealing with the evaluation of how overheated the passenger compartments of cars become when closed up and left in the sun. While these articles did not identify non-traffic non-crash motor vehicle safety incidents, they may provide valuable information should the agency ever decide to take some form of action relating to this hazard.

In other areas that are likely to be examined in the future, particularly incidents in which a person, oftentimes a child, is struck by a vehicle backing up, there were quite a few articles.

Appendix A

TYPE/PRINT IN PERMANENT BLACK INK FOR INSTRUCTIONS SEE OTHER SIDE AND HANDBOOK

LOCAL FILE NUMBER

U.S. STANDARD CERTIFICATE OF DEATH

STATE FILE NUMBER

NAME OF DECEDENT: For use by physician or institution

DECEDENT

1. DECEDENT'S NAME *(First, Middle, Last)* | 2. SEX | 3. DATE OF DEATH *(Month, Day, Year)*

4. SOCIAL SECURITY NUMBER | 5a. AGE—Last Birthday *(Years)* | 5b. UNDER 1 YEAR: Months, Days | 5c. UNDER 1 DAY: Hours, Minutes | 6. DATE OF BIRTH *(Month, Day, Year)* | 7. BIRTHPLACE *(City and State or Foreign Country)*

8. WAS DECEDENT EVER IN U.S. ARMED FORCES? *(Yes or no)*

9a. PLACE OF DEATH *(Check only one; see instructions on other side)*
HOSPITAL: ☐ Inpatient ☐ ER/Outpatient ☐ DOA
OTHER: ☐ Nursing Home ☐ Residence ☐ Other *(Specify)*

9b. FACILITY NAME *(If not institution, give street and number)* | 9c. CITY, TOWN, OR LOCATION OF DEATH | 9d. COUNTY OF DEATH

SEE INSTRUCTIONS ON OTHER SIDE →

10. MARITAL STATUS—Married, Never Married, Widowed, Divorced *(Specify)* | 11. SURVIVING SPOUSE *(If wife, give maiden name)* | 12a. DECEDENT'S USUAL OCCUPATION *(Give kind of work done during most of working life. Do not use retired.)* | 12b. KIND OF BUSINESS/INDUSTRY

13a. RESIDENCE—STATE | 13b. COUNTY | 13c. CITY, TOWN, OR LOCATION | 13d. STREET AND NUMBER

13e. INSIDE CITY LIMITS? *(Yes or no)* | 13f. ZIP CODE | 14. WAS DECEDENT OF HISPANIC ORIGIN? (Specify No or Yes—If yes, specify Cuban, Mexican, Puerto Rican, etc.) ☐ No ☐ Yes *Specify:* | 15. RACE—American Indian, Black, White, etc. *(Specify)* | 16. DECEDENT'S EDUCATION *(Specify only highest grade completed)* Elementary/Secondary (0-12) | College (1-4 or 5+)

PARENTS

17. FATHER'S NAME *(First, Middle, Last)* | 18. MOTHER'S NAME *(First, Middle, Maiden Surname)*

INFORMANT

19a. INFORMANT'S NAME *(Type/Print)* | 19b. MAILING ADDRESS *(Street and Number or Rural Route Number, City or Town, State, Zip Code)*

DISPOSITION

20a. METHOD OF DISPOSITION
☐ Burial ☐ Cremation ☐ Removal from State
☐ Donation ☐ Other *(Specify)* _____

20b. PLACE OF DISPOSITION *(Name of cemetery, crematory, or other place)* | 20c. LOCATION—City or Town, State

21a. SIGNATURE OF FUNERAL SERVICE LICENSEE OR PERSON ACTING AS SUCH ▶ | 21b. LICENSE NUMBER *(of Licensee)* | 22. NAME AND ADDRESS OF FACILITY

SEE DEFINITION ON OTHER SIDE →

PRONOUNCING PHYSICIAN ONLY

Complete items 23a-c only when certifying physician is not available at time of death to certify cause of death.

23a. To the best of my knowledge, death occurred at the time, date, and place stated. *Signature and Title* ▶ | 23b. LICENSE NUMBER | 23c. DATE SIGNED *(Month, Day, Year)*

ITEMS 24-26 MUST BE COMPLETED BY PERSON WHO PRONOUNCES DEATH

24. TIME OF DEATH M | 25. DATE PRONOUNCED DEAD *(Month, Day, Year)* | 26. WAS CASE REFERRED TO MEDICAL EXAMINER/CORONER? *(Yes or no)*

CAUSE OF DEATH

27. **PART I.** Enter the diseases, injuries, or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure. List only one cause on each line.

Approximate Interval Between Onset and Death

IMMEDIATE CAUSE (Final disease or condition resulting in death) → a. _____ DUE TO (OR AS A CONSEQUENCE OF):

SEE INSTRUCTIONS ON OTHER SIDE

Sequentially list conditions, if any, leading to immediate cause. Enter **UNDERLYING CAUSE** (Disease or injury that initiated events resulting in death) **LAST**

b. _____ DUE TO (OR AS A CONSEQUENCE OF):

c. _____ DUE TO (OR AS A CONSEQUENCE OF):

d. _____

PART II. Other significant conditions contributing to death but not resulting in the underlying cause given in Part I.

28a. WAS AN AUTOPSY PERFORMED? *(Yes or no)* | 28b. WERE AUTOPSY FINDINGS AVAILABLE PRIOR TO COMPLETION OF CAUSE OF DEATH? *(Yes or no)*

29. MANNER OF DEATH
☐ Natural ☐ Pending Investigation
☐ Accident ☐ Could not be Determined
☐ Suicide
☐ Homicide

30a. DATE OF INJURY *(Month, Day, Year)* | 30b. TIME OF INJURY M | 30c. INJURY AT WORK? *(Yes or no)* | 30d. DESCRIBE HOW INJURY OCCURRED

30e. PLACE OF INJURY—At home, farm, street, factory, office building, etc. *(Specify)* | 30f. LOCATION (Street and Number or Rural Route Number, City or Town, State)

SEE DEFINITION ON OTHER SIDE →

CERTIFIER

31a. CERTIFIER *(Check only one)*

☐ CERTIFYING PHYSICIAN *(Physician certifying cause of death when another physician has pronounced death and completed Item 23)*
To the best of my knowledge, death occurred due to the cause(s) and manner as stated.

☐ PRONOUNCING AND CERTIFYING PHYSICIAN *(Physician both pronouncing death and certifying to cause of death)*
To the best of my knowledge, death occurred at the time, date, and place, and due to the cause(s) and manner as stated.

☐ MEDICAL EXAMINER/CORONER
On the basis of examination and/or investigation, in my opinion, death occurred at the time, date, and place, and due to the cause(s) and manner as stated.

31b. SIGNATURE AND TITLE OF CERTIFIER ▶ | 31c. LICENSE NUMBER | 31d. DATE SIGNED *(Month, Day, Year)*

32. NAME AND ADDRESS OF PERSON WHO COMPLETED CAUSE OF DEATH (ITEM 27) *(Type/Print)*

REGISTRAR

33. REGISTRAR'S SIGNATURE ▶ | 34. DATE FILED *(Month, Day, Year)*

DEPARTMENT OF HEALTH AND HUMAN SERVICES – PUBLIC HEALTH SERVICE – NATIONAL CENTER FOR HEALTH STATISTICS – 1989 REVISION

PHS-T-003

Appendix B – Traffic and Other Moving Vehicle Incidents of Various Types Found in 1997 Death Certificates (includes some that would typically be found in FARS)

Item No.	Age	How Injury Occurred	Cause of Death in Descending Order of Contribution
1	2	Chld fell out of car and it ran over him	Massive head injury and (illegible) thorax
2	8	Subject ejected from vehicle	Cardiopulmonary arrest related to apparent blunt force trauma due to motor vehicle crash
3	1	Passenger ejected from car	Craniocerebral trauma
4	1	decedent fell from moving vehicle (passenger)	head and chest trauma; blunt impact; motor vehicle accident
5	7	passenger in all terrain vehicle	multiple injuries severe; subarachnoid bleeding; cerebral edema; fractured cervical spine, contused lung
6	3	the decedent (passenger) was ejected from vehicle	hypovolemic shock; multiple traumatic injuries
7	86	Exposure following motor vehicle accident	(blank)
8	3	Fell from moving car	Subdural hematoma; blunt impact to head
9	1	Unrestrained passenger went through windshield	Blunt trauma injuries
10	8	Unrestrained passenger ejected from motor vehicle	Multiple injuries
11	11 mos.	Child fell from motor vehicle then run over	Blunt force craniocerebral injuries
12	10	Ejected passenger in motor vehicle accident	Multiple blunt trauma injuries
13	9	passenger in MVH ejected/run over by MVA	multiple blunt injuries with crush head injuries
14	4	passenger in car that the driver lost control	blunt force injuries of head, chest & abdomen
15	5	fall from passenger door, opened accidentally while truck moving	skull fracture/head injury; fall from moving vehicle
16	3	passenger fell from moving vehicle	brain damage; multiple skull fractures; fall from motor vehicle
17	2	victim fell from vehicle & was run over by the car	severe blunt force head trauma
18	1	Ejected and pinned under car	Asphyxia, head injury
19	6	defective door on vehicle came open, ejecting unrestrained passenger	severe acute traumatic head injury (MVA), multiple traumatic injuires
20	8	ejected from car in a vehicle accident	severe head trauma; multiple trauma; blunt force; motor vehicle accident
21	7	passenger in vehicle in a vehicle accident	severe head trauma; multiple trauma; blunt force; motor vehicle accident

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Item No.	Age	How Injury Occurred	Cause of Death in Descending Order of Contribution
22	1	passenger ejected from vehicle	Closed head injury
23	7	Ejected passenger in motor vehicle/motor vehicle collision	Multiple blunt force injuries
24	8	fell from pickup truck bed, striking head	carniocerebral trauma, fall from motor vehicle (pickup bed, passenger)
25	1 mos.	victim was thrown from vehicle	head trauma, multiple internal injuries
26	9	Single car accident, passenger ejected, not wearing seat belt	Cerebral trauma
27	7	ejected unrestrained passenger in MVA	Head trauma
28	9	Passenger of 4 wheeler that fell on top of decedent	Massive head trauma
29	4	Passenger unrestrained, thrown from vehicle	basilar skull fracture
30	4	moving vehicle, fell under right rear tire	Massive open head trauma, sudden crush injury to head
31	10	passenger fell from bed of pickup truck	Comminuted skull fracture
32	3	Pedestrian trapped between two cars	Cervical spinal cord contusion; cervical vertibral fracture; blunt force injury to head and neck
33	35	MVA Truck overturned into creek (slipped off bridge)	Traumatic compression
34	6	ejected during single motor vehicle accident	(Blank)
35	1 mos.	passenger in auto accident	(Blank)
36	3	child was a passenger in van - opened door and fell onto pavement	head trauma, MVA
37	4	fell out of back of moving pickup truck	massive head injuries
38	6	motor vehicle accident, passenger ejected	internal injuries, blunt force trauma
39	10	motor vehicle accident, passenger ejected	craniocerebral injuries, blunt force trauma
40	11	passenger ejected in crash	blunt force craniocerebral trauma, motor vehicle crash (hit and run)
41	4	Fell out of the back of a pickup truck	(blank)

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Item No.	Age	How Injury Occurred	Cause of Death in Descending Order of Contribution
42	4	motor vehicle accident	cervical cord compression, cranial-cervical disarticulation, passenger airbag* deployment
43	1	struck by deploying airbag* while sitting in lap of passenger in car accident	massive head & vertebral trauma consistent with air bag deployment; vehicular accident
44	3	unrestrained front seat passenger struck by deploying airbag*	Head trauma

**In-depth investigations of these airbag incidents were performed by the National Center for Statistics and Analysis Special Crash Investigations Branch of the Crash Investigations Division.*