DATA EVALUATION AND METHODS RESEARCH

Series 2
Number 50

Optimum Recall Period for Reporting Persons Injured in Motor Vehicle Accidents

A methodological study designed to test the effectiveness of different recall periods for the reporting of motor vehicle injuries in health interviews, based on the comparison of data from motor vehicle accident report forms and data from household interviews.

DHEW Publication No. (HSM) 72-1050

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Services and Mental Health Administration
National Center for Health Statistics
Rockville, Md. April 1972

Vital and Health Statistics-Series 2-No. 50

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 - Price 45 cent

NATIONAL CENTER FOR HEALTH STATISTICS

DIVISION OF HEALTH INTERVIEW STATISTICS

Vital and Health Statistics-Series 2-No. 50

DHEW Publication No. (HSM) 72-1050
Library of Congress Catalog Card Number 78-179927

PREFACE

The accuracy of information obtained in the Health Interview Survey has been a major concern of the National Center for Health Statistics since the beginning of the survey. One technique used to improve the accuracy of reporting health-related events is to use as short a recall period as possible. The reporting of acute conditions, including motor vehicle injuries, is based on questions with a 2-week recall period. While this decreases the likelihood that a respondent will forget an event, it also reduces the absolute number of events reported, i.e., fewer persons would report a motor vehicle injury occurring in the past 2 weeks than one occurring in the past 4 weeks. Thus the amount of detailed analysis is restricted when a relatively short recall period is used.

This study was designed to determine if a longer recall period could be used to collect data on motor vehicle injuries, thus permitting more detailed analysis of the data but at the same time maintaining an acceptable level of accuracy in the data. Mr. Kenneth W. Haase, Chief, Survey Methods Branch, Division of Health Interview Statistics, was responsible for the basic study design and conducting the investigation. Mr. Earl Bryant, Deputy Director, Office of Statistical Methods, was responsible for the sample design and provided statistical consultation on all phases of the study. Special acknowledgment is given to Mr. Joseph K. Register, Division of Driver Education and Accident Records, Department of Motor Vehicles, State of North Carolina, who assisted in providing motor vehicle accident records from which the sample was selected. Mr. James T. Massey, Office of Statistical Methods, assisted in the planning and operations of the field work.

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OPTIMUM RECALL PERIOD FOR REPORTING PERSONS INJURED IN MOTOR VEHICLE ACCIDENTS

William S. Cash and Abigail J. Moss, *Division of Health Interview Statistics*

INTRODUCTION

Since the beginning of the Health Interview Survey in 1957, estimates on the annual incidence of injuries resulting from all types of accidents have been obtained. The most recent injury data indicate that during 1969 an estimated 49 million persons, 24.7 per 100 persons in the civilian, noninstitutional population, were injured. Of this number 3.7 million, or 1.8 per 100 persons, were injured in moving motor vehicle accidents. Even though the number of persons injured in moving motor vehicle accidents constitutes only 7.5 percent of the total injured population, motor vehicle injury data have been of particular interest to data consumers. One reason for this interest is that motor vehicle injuries are often of a more serious nature than other types of injuries. For example, the proportion of motor vehicle injuries resulting in activity restriction and bed disability is markedly higher than for other types of injuries.

Over the last several years, the National Center for Health Statistics has experienced an increased demand for more reliable and detailed statistics on motor vehicle injuries and other factors associated with motor vehicle accidents. Partly this demand has been the result of a greater public awareness of the high number of fatalities and personal injuries resulting from motor vehicle accidents. Since the National Center for Health Statistics had not previously collected motor vehicle injury data in sufficient detail to satisfy data requests, a decision was made to obtain more detailed information on this subject in a special supplement to the 1968 Health Interview Survey questionnaire.

In February 1967, an evaluation study was initiated to establish new estimating procedures for motor vehicle injury data. This was necessary since the Health Interview Survey's usual collection and sampling procedures for estimating the annual incidence of injuries would result in an exceedingly high sampling error if used to derive annual estimates for more detailed motor vehicle injury data. This report describes the methodological aspects of this special study, which was conducted from February to May 1967, and presents the findings, which were later utilized by the Health Interview Survey in determining the optimum method of data analysis.

In the past, estimates on the incidence of all types of injuries have been obtained by collecting information about injuries occurring during the 2-week period preceding the household interview and then inflating the frequencies to obtain annual estimates. Prior to 1968 the collection of injury data was limited to this short recall period, primarily because of evidence supporting the premise that some injuries have such little impact that a respondent may forget to report them after much time has elapsed between the occurrence of the accident and the date of the interview.

However, the degree of impact an injury has on an individual can be expected to vary depending on the severity of the injury involved and the type of accident that caused the injury. Therefore if injuries incurred in motor vehicle accidents have a greater impact on an individual than injuries from other kinds of accidents, one could expect a respondent to remember this type of injury for a longer period of time and report it in a household interview with a recall period in ex-

cess of 2 weeks. Increasing the length of the recall period for motor vehicle injuries would increase the number of injuries reported. This, in turn, would decrease the sampling error, making it feasible to collect and publish motor vehicle injury data in greater detail.

With these considerations in mind the evaluation study was specifically designed to answer two questions:

- Can the recall period for injuries resulting from motor vehicle accidents be increased without greatly affecting the respondent's ability to report such occurrences?
- If this is possible, what is the optimum length of recall for the reporting of motor vehicle injuries?

THE STUDY DESIGN

Description of the Survey Procedure

The Motor Vehicle Injury Evaluation Study was conducted in the Research Triangle Park area of North Carolina, where the Division of Health Interview Statistics has an experimental field interview unit established specifically for the conduct of methodological studies. After considering various alternatives, it was determined that the most satisfactory method of evaluating the optimum recall period for the reporting of motor vehicle injuries was a record check study. The Motor Vehicle Injury Evaluation Study consisted of interviews of a sample of persons known to have been in an injury-producing motor vehicle accident at some time during the 12-month period preceding the interview. Accident information obtained from the respondent during the interview was compared with data on the official report form filed at the time of the accident. Final analysis in the study consisted of a comparison between a person's injury status as recorded on the official accident record and his status on the household interview questionnaire. Of primary interest was the relationship between the respondent's ability to report motor vehicle injuries and the length of time between the occurrence of the motor vehicle accident and the date of the interview.

Sample.—The sample design used for this study had the following features. First the North Carolina Department of Motor Vehicles provided the Health Interview Survey staff with punchcards containing data on motor vehicle accidents. Only accidents that occurred in Durham, Orange, and Wake Counties in that State from February 1966 to February 1967 and met the following specifications were included in the study:

1. One or more persons involved in the accident were residents of Durham, Orange, or Wake County.
2. One or more persons in the accident were injured.
3. One or more persons survived the accident.

Next the punchcards were divided into three strata according to the time interval between the date of the accident and the expected date of interview. Stratum I included those accidents occurring approximately from December 1966 to February 1967 (less than 3 months before the interview); Stratum II, accidents occurring approximately from September to November 1966 (3-6 months before the interview); and Stratum III, accidents occurring approximately from February to August 1966 (7-12 months before the interview). Within these strata, the cards were ordered by whether or not a legal violation was involved and the most severe injury sustained in the accident, as reported by the police officer who completed the official accident report form. This procedure insured that each stratum was similar with respect to these two variables, which were thought to have a possible influence on whether or not an injury would be reported.

The sample for the Motor Vehicle Injury Evaluation Study was then selected from each stratum by a systematic process. The sampling fraction was 1/6 for Strata I and III and 1/5 for Stratum II. It was estimated that approximately 500 accidents were required to detect differences at the .05 significance level. The actual number of households finally interviewed, however, was considerably more than 500 since many of the accidents involved persons living at different addresses.

Motor Vehicle Accident Report Form.—After the sample was drawn, the North Carolina Department of Motor Vehicles provided the Division of Health Interview Statistics with a copy of the original accident report form for each sample accident. Listed on this form were the name and address of each driver involved in the accident and those of all other persons injured or killed in the accident. This form did not contain the names of any uninjured passengers. The record contained a classification of the type of injury each injured person sustained. The three injury classifications were as follows:

- *Type A* injuries included such visible signs of injury as a bleeding wound or distorted limb; an injury was also classified as a type A injury if the victim had to be carried from the accident scene.
- *Type B* injuries included other visible signs of injury such as bruises, abrasions, swelling, or limping.
- *Type C* injuries included those where there was no visible sign of injury but the person experienced momentary unconsciousness or complained of pain.

The record also included a complete description of how the accident happened and other circumstances of the accident. (See appendix II for a report form completed for a fictitious accident.)

Field operations.—After the motor vehicle accident report forms were received, the addresses of persons involved in the accidents and residing in the three-county area were abstracted from the records. The sample addresses were then grouped according to geographical proximity to one another and these groups assigned to the interviewers. An advance letter was sent to each sample address informing the residents that they would be contacted by an interviewer from the United States Public Health Service, who would ask them a series of questions about the health of the family.

Nine interviewers from the Health Interview Survey field staff conducted the survey over an 11-week period, from February 20 through May 5, 1967. The interviewers received their training from staff members of the Division of Health Interview Statistics. They used a substantially shortened version of the questionnaire used in the Health Interview Survey in 1967. The interviewers also completed a motor vehicle accident supplement to this questionnaire for each reported accident. The supplement contained detailed questions about the types of injuries sustained and other particulars of the accident (appendix III).

Since the sample for this study was selected from records representing accidents which in some instances occurred almost a year before the interview, it was expected that some of the sample persons would have moved from the address listed on the accident record. Consequently steps were taken to minimize the number of persons who might be lost from the sample for this reason.

During each interview several questions were asked to obtain the names and addresses of all persons who had lived at that address within the past 12 months but were now living somewhere else. This information was obtained in each household since the interviewers usually had no way of knowing whether or not the family they were interviewing included the persons involved in the sample accident. Before the end of the study an attempt was made to interview sample persons who had moved from the original address if they still lived within the three-county area and if the new address obtained at the original household contained sufficient information to locate them.

As can be seen in table A, an attempt was made to interview 939 households and 809 households were finally interviewed.

Of the 640 completed household interviews involving one or more sample persons, only 2.3 percent (15 interviews) were conducted at a followup address. This percentage is small when compared to the 97.7 percent where a sample person was found at the original address. However, the additional effort that went into locating these few sample persons seems worthwhile because 15 households, slightly over three-fourths of the 19 interviews conducted at a followup address, yielded a sample person.

About 14 percent of the households were never interviewed. Table B shows a breakdown of the households not interviewed by the reasons for noninterview.

The largest single contribution to the overall noninterview rate was made by 23 households in

Table A. Number and percent distribution of completed interviews and noninterviews by household interview status, according to place of interview: Durham, Orange, and Wake Counties, North Carolina, February 1966-February 1967

Interview status of household	All households	Completed interview	Place of interview	
			Original address	Followup address
	Number			
All households	939	...	...	...
Completed interview	809	809	790	19
One or more sample persons interviewed	640	640	625	15
Sample person not interviewed	169	169	165	4
Noninterview	130	...	...	...
	Percent distribution			
All households	100.0	...	...	...
Completed interview	86.2	100.0	100.0	100.0
One or more sample persons interviewed	68.2	79.1	79.1	78.9
Sample person not interviewed	18.0	20.9	20.9	21.1
Noninterview	13.8	...	...	...

Table B. Number and percent distribution of completed interviews and noninterviews by reason for noninterview: Durham, Orange, and Wake Counties, North Carolina, February 1966-February 1967

Interview status of household	Number	Percent distribution
All households	939	100.0
Completed interviews	809	86.2
Noninterviews	130	13.8
All eligible households	51	5.4
Refusal	18	1.9
Not at home after repeated calls	22	2.3
Other	11	1.2
All ineligible households	77	8.2
Vacant house	18	1.9
Not sample household	23	2.4
Could not locate house	17	1.8
Other	19	2.0
Unknown type of household	2	.2

which it was learned prior to the interview that the sample person no longer lived at that address. Another 17 households were never located by the interviewers. The problem of locating households occurred because some accident records contained an inaccurate or incomplete address. In other cases, interviewers had difficulty finding households with rural addresses, but the number of these unlocated households was reduced considerably because of assistance provided by local post offices.

REPORTING OF ACCIDENTS AND INJURIES IN AN INTERVIEW SURVEY

Before the basic objective of the study, the determination of the optimum recall period for injury reporting in a survey, could be accomplished, it was necessary to investigate the adequacy of injury reporting in the interview relative to the time interval between the occurrence of the injury and the date of interview.

Table C. Number and percent distribution of sample persons involved in motor vehicle accidents during the 12-month period prior to interview by whether or not accident was reported, according to recall period: Durham, Orange, and Wake Counties, North Carolina, February 1966-February 1967

Recall period	All sample persons	Accident reported	Accident not reported
	Number		
All recall periods	590	508	82
Less than 3 months	119	115	4
3-6 months	209	187	22
6-9 months	119	102	17
9-12 months	143	104	39
Less than 6 months	328	302	26
6-12 months	262	206	56
	Percent distribution		
All recall periods	100.0	86.1	13.9
Less than 3 months	100.0	96.6	3.4
3-6 months	100.0	89.5	10.5
6-9 months	100.0	85.7	14.3
9-12 months	100.0	72.7	27.3
Less than 6 months	100.0	92.1	7.9
6-12 months	100.0	78.6	21.4

Interviews were conducted with 590 sample persons (in 532 households) who were involved in an accident during the 12-month period prior to interview (table C).[1] A sample person is defined as any person listed on the motor vehicle record who resided within Durham, Orange, or Wake County, North Carolina, at the time of the accident. This includes all injured passengers and all drivers, whether or not they were listed on the official accident record as injured. Any person who reported an injury in the interview is also defined as a sample person regardless of his injury status on the official accident record.

Eighty-two sample persons, or 13.9 percent of the sample persons interviewed, did not report the accident (table C). The nonreporting of accidents increases as the time between the date of accident and interview increases, ranging from 3.4 percent for less than 3 months to a maximum of 27.3 percent for the interval of 9-12 months. The obvious reason for this trend is a decreased ability to recall the occurrence of a motor vehicle accident as the time between the date of accident and the date of interview increases.

[1]Excluded from this group are sample persons in 59 households who, due to delays in interviewing, were interviewed more than 12 months after the date of the accident and a special subsample of 49 households included to study the reporting of very recent accidents. Although not included in this analysis, all are included in tables A and B.

Reporting by Length of Recall Period

Of the 590 sample persons interviewed, 377 persons, or 63.9 percent, were classified on the motor vehicle accident record as being injured (table 1). For the recall period of less than 3 months, 87.3 percent of the 71 injured persons interviewed reported the injury sustained in the accident. This compares with 78.8 percent for a recall period of less than 6 months and 75.1 percent for less than 12 months.

Fifty-one persons, or 13.5 percent of the sample persons listed on the motor vehicle record as injured, reported the accident but not the injury. It is possible that the injury classification on the record was not always correct and that some of these 51 sample persons were not actually injured. However, since the record is being used as a criterion to estimate the respondent's ability to report motor vehicle injuries, the small amount of bias which may be introduced by inaccuracies in the record must be accepted. If the assumption that the record is correct is not accepted, no valid foundation exists on which to determine the optimum recall period. Other estimates of bias in the reporting of motor vehicle injuries or accidents and their effect on estimation are discussed in appendix I.

Forty-three persons, 11.4 percent of the sample persons classified on the record as being injured, did not report even the occurrence of the accident. This percentage increased as the recall period became longer.

Of the 590 sample persons involved in accidents who were interviewed, 213 persons, or 36.1 percent, were not listed as injured on the motor vehicle accident record (table 2), i.e., they were listed either as uninjured drivers or not listed at all. Of the persons in this group, 16.0 percent reported an injury when the record indicated none. Most of these injuries were reported within a 6-month recall period. This may indicate that they were minor injuries and therefore less likely to be reported as the recall period was extended beyond 6 months. Thirty-nine persons, or 18.3 percent of the uninjured sample persons, did not report the accident. When this percentage is compared with the 11.4 percent of the injured persons who did not report the accident (table 1), it seems that a respondent is more likely to report an accident in which he received an injury. The fact that some respondents reported injuries when the accident record showed none probably indicates an error in the record rather than response error. Such a discrepancy could occur if the sample person incurred only minor injuries in the accident or if the injury was not realized or visible and was therefore not entered on the accident record.

Reporting by Classification of Injury

The reporting of the accident and injury in the interview by injury classification recorded on the motor vehicle accident record is shown in table 3. For the recall period of less than 12 months, 85.5 percent of the type A injuries were reported compared with about 67 percent of the type B and type C injuries. This difference is statistically significant and is interpreted to be the result of the degree of severity of injury inherent in the definitions of types A, B, and C injuries. This trend by type of injury is also apparent for recall periods of 3 months and 6 months.

The completeness of reporting in the interview for type B injuries was similar to that for type C. This similarity was unexpected since type B injuries are by definition more severe than type C injuries. However, this difference in severity might not hold for injuries such as whiplash or accidents involving internal injury since the reporting was based only on visible injury.

For the recall period of less than 12 months, 10.7 percent of the sample persons who incurred type A injuries did not report the accident, compared with 13.3 percent for type B and 10.9 percent for type C. These percentages indicate that the accuracy of reporting an accident was not related to the severity of the injury. However, as indicated above, the reporting of the injury itself was apparently dependent on the type of injury received.

Reporting by Type of Respondent

Sample persons were classified into two response groups according to the following criteria. A sample person was classified as a self-respondent if he or some other person involved in the ac-

Table D. Number and percent distribution of sample persons by whether accident and injury were reported and whether injury was on record, according to type of respondent: Durham, Orange, and Wake Counties, North Carolina, February 1966-February 1967

Reporting of accident and injury	All sample persons	Type of respondent		All sample persons	Type of respondent	
		Self-respondent	Proxy respondent		Self-respondent	Proxy respondent
	Number			Percent distribution		
All sample persons-----	590	333	257	100.0	100.0	100.0
Reported accident and injury-----------	317	193	124	53.7	58.0	48.2
Injury on record----------	283	170	113	48.0	51.1	44.0
Injury not on record-------	34	23	11	5.8	6.9	4.3
Reported accident only---	191	109	82	32.4	32.7	31.9
Injury on record----------	51	29	22	8.6	8.7	8.6
Injury not on record-------	140	80	60	23.7	24.0	23.3
Did not report accident--	82	31	51	13.9	9.3	19.8
Injury on record----------	43	13	30	7.3	3.9	11.7
Injury not on record-------	39	18	21	6.6	5.4	8.2

cident participated in the interview. If this condition was not met, the sample person was considered to have a proxy respondent.[2]

The reporting of accidents and injuries is shown by type of respondent in table D. Self-respondents were more likely to report both the accident and the injury than were proxy respondents, but the differences are not great.

Reporting Date of Accident

Respondents' reporting of the date of accident by time interval is shown in table 4. From table C it can be seen that according to the records 119 sample persons had an accident which occurred within a 3-month period prior to interview and that 96.6 percent reported the accident. Six of these 115 sample persons, or 5.2 percent, reported the accident as occurring in the interval 3-6 months prior to interview, and the remainder reported the accident as occurring during the appropriate time period (table 4). This error in reporting the date of accidents occurring during the interval of less than 3 months is counterbalanced by the 16 persons, or 8.6 percent of the sample persons, who were involved in an accident during the interval 3-6 months prior to interview but reported that it occurred less than 3 months before the interview.

For the recall period of less than 6 months, five persons, or 1.7 percent of the 302 sample persons reporting the accident, reported it as occurring in the interval 6-9 months prior to interview. This compares with 18 sample persons, or 5.7 percent of the 314 sample persons, who reported the accident as occurring in the interval less than 6 months when, according to the record, the accident occurred 6-12 months prior to interview.

[2]It should be noted that this definition of proxy response is different from the usual Health Interview Survey definition.

The overall pattern indicates that a certain proportion of the people who reported the sample accidents said they had occurred more recently than they actually had. This phenomenon occurs at a slightly higher rate than that of reporting the occurrence of the accident on a date earlier than when it actually took place.[3] The net difference appears insignificant when examined for the three recall periods of less than 3 months, less than 6 months, and less than 12 months. For this reason, analysis of the optimum recall period will not take into account the bias in reporting of the date of the accident as shown in table 4.

DETERMINATION OF THE OPTIMUM RECALL PERIOD

In 1968, when motor vehicle injury data were collected in the Health Interview Survey, one of the questions asked of each household member was "During the past 12 months, have you been in a motor vehicle accident, either as a driver, passenger, or a pedestrian?" National estimates of persons injured in moving motor vehicle accidents, as well as information about factors relating to the accident, are to be published in a Vital and Health Statistics Series 10 publication.[4] The purpose of the Motor Vehicle Injury Evaluation Study was to help determine what length recall period for analysis of the Health Interview Survey data would give the most reliable estimate of P_{12}, the true proportion of persons injured in motor vehicle accidents in the United States during 1968. The concept and definition of a recall period have been discussed in a preceding section of this report. The procedure for estimating the proportion of persons injured in motor vehicle accidents in the United States during 1968 is directly related to the recall period selected.

An example will best illustrate this relationship. If a recall period of less than 3 months were selected for estimating the total number of motor vehicle injuries occurring within the year, the procedure would be to estimate the total number of injuries occurring within an average 3-month interval and inflate this estimate by a factor of 4 to represent the total number of motor vehicle injuries occurring within the year. A reported injury in the Health Interview Survey is classified as being within a 3-month interval if the respondent reported the injury as occurring within the 3 months prior to the date of interview. If the respondent reported the injury as occurring more than 3 months prior to date of interview, this injury would not be included in the estimation of the total number of motor vehicle injuries. A similar definition would hold for any other recall period. The recall periods which will be considered in this analysis are less than 3 months, less than 6 months, and less than 12 months.

For any recall period there are two components of precision which must be carefully examined. The first of these is the variance of the estimator $\hat{P}_{12}$. The second is the bias of $\hat{P}_{12}$, where $\hat{P}_{12}$ is the estimated proportion or rate of motor vehicle injuries occurring in the United States during the year 1968.

Two properties of variance and bias are important when considering the three recall periods:

- The variance of $\hat{P}_{12}$ decreases as the recall period is lengthened; thus the variance for $\hat{P}_{12}$ when using a 12-month recall period is smaller than the variance associated with data based on a 6-month or 3-month recall period.
- The bias of $\hat{P}_{12}$ increases as the recall period is lengthened.

Bias, as measured in this study, is the proportion or number of people who fail to report a motor vehicle injury. Bias increases because the ability of a respondent to recall a motor vehicle injury decreases as the recall period is lengthened.

The technique for determining the optimum recall period consists of selection of the recall period for which the mean square error (MSE) of $\hat{P}_{12}$ is a minimum.

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[3]Due to delays in interviewing, 59 sample persons were interviewed more than 12 months after the date of the accident. Of this number, five persons, or 8.5 percent, reported the accident as occurring within the past 12 months.

[4]Preliminary estimates based on a 3-month recall period can be found in *Monthly Vital Statistics Report*, Vol. 19, No. 4, Supplement, July 10, 1970.

Estimates of Variance, Mean Square Error, and Relative Root Mean Square Error

The sample size for the Health Interview Survey, estimators of the probability of injury, variance estimators based on assumptions of independence and lack of independence of observations, and the relative bias of $\hat{P}_{12}$ are shown in table 5. The subscripts 3, 6, and 12 used in the table refer to 3-month, 6-month, and 12-month recall periods.

The sample, consisting of approximately 134,000 persons interviewed in the Health Interview Survey during 1968, is constant for each of the three recall periods.

The true probability of a person's receiving a motor vehicle injury in the entire year is denoted by P_{12}. It is assumed that this probability is uniform over the 12-month period; hence $P_3 = 1/4\, P_{12}$ and $P_6 = 1/2\, P_{12}$, where P_3 and P_6 denote the probability of a person's receiving a motor vehicle injury in a 3-month or 6-month time interval, respectively.

The variance estimator for the probability of injury during the past 12 months is shown for each of the recall periods. The variance estimator used in the analysis is the one shown in table 5 where independent observations are not assumed. Independence of observations is not satisfied in the Health Interview Survey since the basic sampling unit is a household; that is, all respondents in a household tend to either report or not report the accident and injuries. When the effect of clustering of persons in households is taken into account, the variance of $\hat{P}_{12}$ is expected to be at least twice as large as it would be if independence were assumed.

The estimates of $\hat{K}_i$, the relative bias used in this analysis for the various recall periods, are also shown in table 5. These values are based on the proportion of people in the Evaluation Study who were reported on the accident record as being injured but failed to report the injury when interviewed. The subscript "i" refers to the length of the recall period.

Theoretically the bias of an estimator is the difference between the expected and true values of the estimator. For this study, the bias is expressed as a proportion of the true value. For example, the relative bias associated with a 12-month reference period is:

$$K_{12} = \frac{E(\hat{P}_{12}) - P_{12}}{P_{12}}$$

The mean square error (MSE) of $\hat{P}_{12}$, by definition, is equal to the variance of $\hat{P}_{12}$ plus the square of the bias of $\hat{P}_{12}$. The relative root mean square error (RRMSE) of $\hat{P}_{12}$ can be determined for each recall period from the formula

$$RRMSE(\hat{P}_{12}) = \sqrt{\frac{Var.(\hat{P}_{12}) + K_i^2}{(P_{12})^2}} \times 100\%$$

or

$$RRMSE(\hat{P}_{12}) = \frac{\sqrt{MSE(\hat{P}_{12})}}{P_{12}} \times 100\%$$

The recall period which results in the minimum MSE of $\hat{P}_{12}$ will also result in the minimum RRMSE of $\hat{P}_{12}$. This can be seen by examining the RRMSE formula. The RRMSE shows the error of the estimate $\hat{P}_{12}$ as a percentage of the true proportion, $\hat{P}_{12}$. In addition to selecting the recall period which gives the minimum RRMSE of $\hat{P}_{12}$, a further requirement is that the RRMSE of $\hat{P}_{12}$ for this recall period shall not exceed 25 percent. An RRMSE of 25 percent or less will be considered an acceptable level for showing estimates of proportions or totals.

For the purpose of this analysis, the sampling error component, X_1, of the RRMSE of $\hat{P}_{12}$ is defined as the relative standard error of $\hat{P}_{12}$, or

$$X_1 = \frac{\sqrt{Var(\hat{P}_{12})}}{P_{12}} \times 100\%$$

The bias component, X_2, of the RRMSE of $\hat{P}_{12}$ is defined as the difference between the RRMSE of $\hat{P}_{12}$ and the sampling error component, or

$$X_2 = RRMSE(\hat{P}_{12}) - \frac{\sqrt{Var(\hat{P}_{12})}}{P_{12}} \times 100\%$$

Note that if $\hat{P}_{12}$, is an unbiased estimator of P_{12}, the sampling error component is identical to the RRMSE.

In order to determine which recall period results in a minimum RRMSE from the equation shown above, it is necessary to assume a value for P_{12}. Data collected in the Health Interview Survey for 1968 (using a 2-week recall period) show that an estimated 3.4 million persons, or 1.7 persons per 100 population per year, were injured in moving motor vehicle accidents. An estimate of P_{12} based on these data is .017. It is desirable to show not only the estimated proportion of people injured but also a categorization of this proportion by the characteristics of age, sex, driver status, residence, region, and severity of accident and possibly other variables. Therefore it is necessary to take these into consideration in the methodology because an estimate of P_{12} based on these characteristics would be much smaller than .017. For this reason the optimum recall period is shown as a function of P_{12}. The following inequalities are solved for P_{12}:

$$1.1 \quad \text{RRMSE}\left(4\hat{P}_3\right) \leq \text{RRMSE}\left(2\hat{P}_6\right)$$
$$1.2 \quad \text{RRMSE}\left(4\hat{P}_3\right) \leq \text{RRMSE}\left(2\hat{P}_{12}\right)$$
$$1.3 \quad \text{RRMSE}\left(2\hat{P}_6\right) \leq \text{RRMSE}\left(\hat{P}_{12}\right)$$

Let the solution of equation 1.1 for P_{12} be P'_{12}. This implies that a 3-month recall period results in a smaller RRMSE than a 6-month recall for all values of P_{12} less than or equal to P'_{12}. A similar interpretation holds in equation 1.2, comparison of a 3-month recall with a 12-month recall, and equation 1.3, which compares a 6-month recall with a 12-month recall. When equations 1.1, 1.2, and 1.3 and their solutions are considered simultaneously, a graph can be constructed showing the values of P_{12} which result in a minimum RRMSE for each of the recall periods. However, solutions in terms of P_{12} have very little intuitive meaning. For this reason solutions are shown in terms of T_{12}, where T_{12} is the population size of injured persons which results when P_{12} is inflated to represent the total United States population; that is,

$$T_{12} = 200 \times 10^6 \times P_{12}.$$

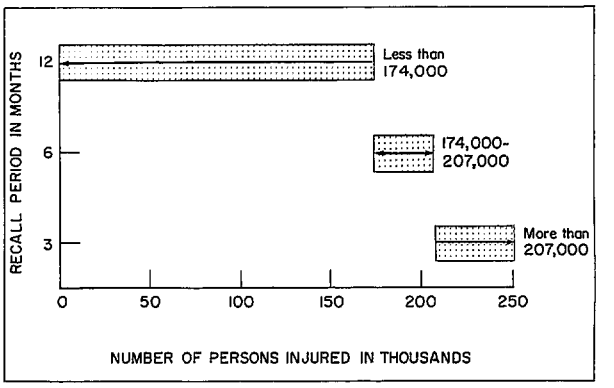

Figure 1. Range of estimates of persons injured in the United States for which 3-month, 6-month, and 12-month recall periods result in minimum values for the RRMSE: Health Interview Survey.

Figure 1 shows the population sizes of injured persons which result in a minimum RRMSE for each of the recall periods. The following statistics are of interest.

A 12-month recall period results in a minimum RRMSE for estimates on specific injured populations of size less than 174,000. For estimates ranging from size 174,000 to 207,000, a 6-month recall period results in a smaller RRMSE when compared with a 12-month recall period for injured populations of size greater than 195,000. For estimates larger than 207,000, a 3-month recall period yields the minimum RRMSE over both the 6-month and 12-month recall periods.

A 12-month recall period yields the minimum RRMSE for estimates on small populations of injured persons. As the population size increases, the 6-month recall period becomes optimum over the 12-month recall period. This occurs at a population of size 174,000. Eventually the population size increases to a point (207,000) where the 3-month recall yields the minimum RRMSE.

The Optimum Recall Period

The estimates shown above do not represent the actual value of the RRMSE but only the population sizes for which each recall period yields the minimum RRMSE. Table 6 shows the value of the RRMSE, the sampling error component, and the bias component for each recall period

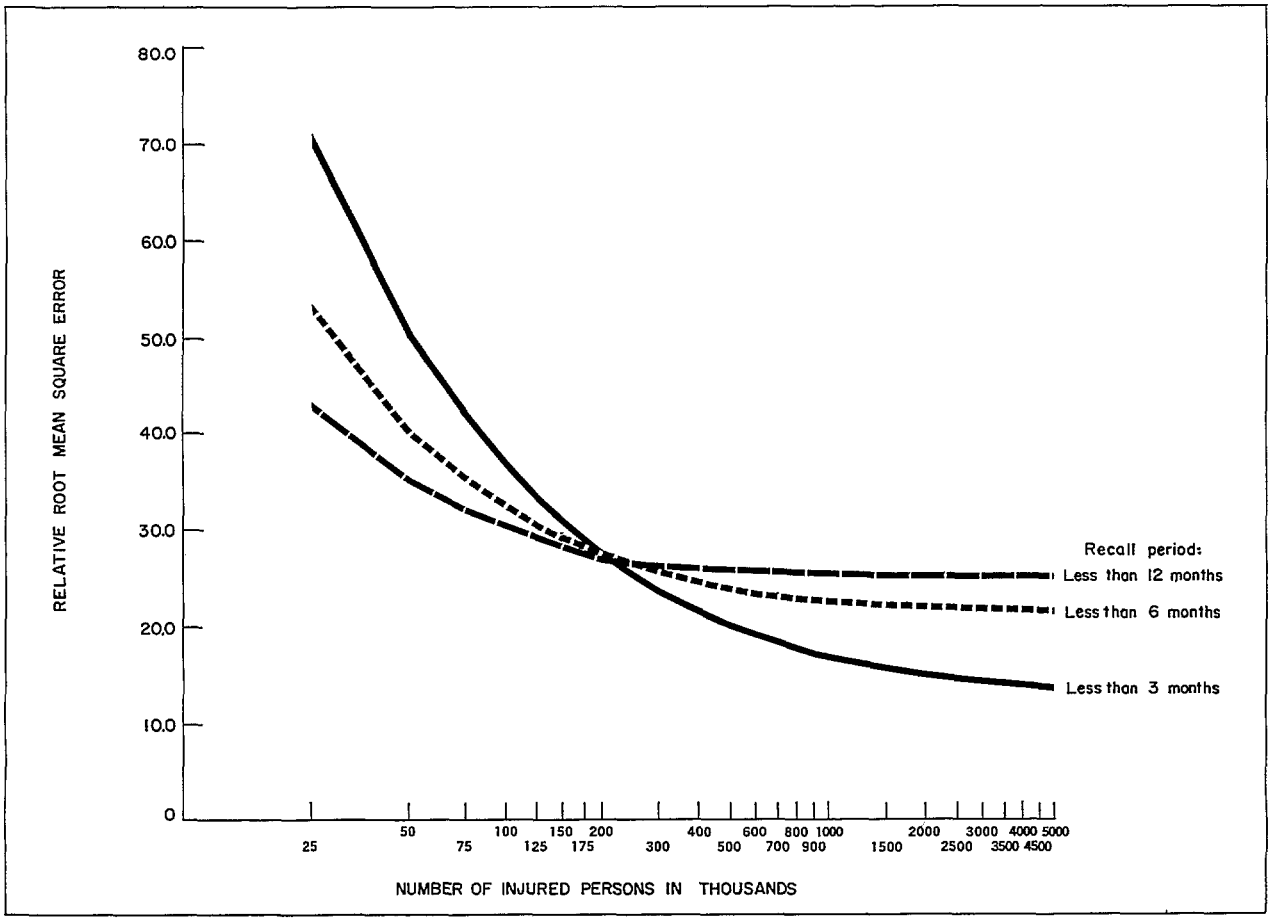

Figure 2. Relative root mean square error for aggregates, by recall period.

as the population of injured persons varies in size from 25 thousand to 5 million. According to data in table 6, the optimum recall period for estimating the total number of persons injured in motor vehicle accidents is one of less than 3 months. The RRMSE of estimates larger than 207,000 is a minimum for the less than 3-month recall period. As the size of the estimates increases, the RRMSE based on a recall period of 12 months decreases slightly, from 27.7 percent to 25.0 percent (table 6). For a recall period of less than 6 months, this decrease is from 27.3 percent to 21.5 percent. The largest decrease occurs in the 3-month recall period, where the RRMSE declines from a level of 27.5 percent to 13.6 percent.

Estimates of greatest interest are for populations of size greater than 207,000. Indeed, the single most important estimate is the total number of moving motor vehicle injuries, which is estimated to be nearly 4 million. The RRMSE's for an estimate of 4 million are 25.0 percent for a recall period of 12 months, 21.5 percent for 6 months, and 13.8 percent for 3 months. The difference in these three percentages led to the selection of a recall period covering the 3-month interval preceding the week of interview as the optimum recall period.

The sampling error component and bias component have certain effects on the value of the RRMSE. As the estimated number of persons injured increases, the variance component of the

RRMSE decreases, the bias component increases, and the RRMSE decreases (figure 2).

Data collected in the Health Interview Survey for the period July to December 1967 were used to make estimates of the total number of persons injured in motor vehicle accidents within the year using each of the recall periods. The estimated total numbers of persons injured are 3.2, 2.7, and 2.4 million, based on 3-month, 6-month, and 12-month recall periods, respectively. A comparison of these estimates indicates that the bias component of the RRMSE, which is a function of the ability of a respondent to recall a motor vehicle injury, increases over time at a rate greater than that estimated from the methodology study. Hence it appears that the results of this study, which led to the selection of a 3-month recall period, are conservative.

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LIST OF DETAILED TABLES

Table 1. Number and percent distribution of all persons indicated on the motor vehicle accident record as being injured by whether or not accident and injury were reported, according to recall period: Durham, Orange, and Wake Counties, North Carolina, February 1966-February 1967

Recall period	Record showed person injured	Accident reported in interview			Accident not reported in interview
		Total	Injury reported	No injury reported	
	Number				
All recall periods-----	377	334	283	51	43
Less than 3 months-----	71	70	62	8	1
3-6 months-----	141	127	105	22	14
6-9 months-----	71	64	57	7	7
9-12 months-----	94	73	59	14	21
Less than 6 months-----	212	197	167	30	15
6-12 months-----	165	137	116	21	28
	Percent distribution				
All recall periods-----	100.0	88.6	75.1	13.5	11.4
Less than 3 months-----	100.0	98.6	87.3	11.3	1.4
3-6 months-----	100.0	90.1	74.5	15.6	9.9
6-9 months-----	100.0	90.1	80.3	9.9	9.9
9-12 months-----	100.0	77.7	62.8	14.9	22.3
Less than 6 months-----	100.0	92.9	78.8	14.2	7.1
6-12 months-----	100.0	83.0	70.3	12.7	17.0

Table 2. Number and percent distribution of all persons indicated on the motor vehicle accident record as not being injured by whether or not accident and injury were reported, according to recall period: Durham, Orange, and Wake Counties, North Carolina, February 1966-February 1967

Recall period	Record showed person uninjured	Accident reported in interview			Accident not reported in interview
		Total	No injury reported	Injury reported	
	Number				
All recall periods----	213	174	140	34	39
Less than 3 months----------	48	45	30	15	3
3-6 months----------	68	60	50	10	8
6-9 months----------	48	38	34	4	10
9-12 months----------	49	31	26	5	18
Less than 6 months----------	116	105	80	25	11
6-12 months----------	97	69	60	9	28
	Percent distribution				
All recall periods----	100.0	81.7	65.7	16.0	18.3
Less than 3 months----------	100.0	93.8	62.5	31.3	6.3
3-6 months----------	100.0	88.2	73.5	14.7	11.8
6-9 months----------	100.0	79.2	70.8	8.3	20.8
9-12 months----------	100.0	63.3	53.1	10.2	36.7
Less than 6 months----------	100.0	90.5	69.0	21.6	9.5
6-12 months----------	100.0	71.1	61.9	9.3	28.9

Table 3. Number and percent distribution of all persons indicated on the motor vehicle accident record as being injured by injury classification on record and reporting of injury and accident, according to recall period: Durham, Orange, and Wake Counties, North Carolina, February 1966-February 1967

Injury classification on record[1] and reporting of injury and accident	All injured persons	Recall period					
		Less than 3 months	3-6 months	6-9 months	9-12 months	Less than 6 months	6 to 12 months
	Number						
Type A injury-----	159	29	59	27	44	88	71
Reported injury---------	136	27	53	24	32	80	56
Reported accident only--	6	2	1	1	2	3	3
Did not report accident-	17	-	5	2	10	5	12
Type B injury-----	90	13	34	16	27	47	43
Reported injury---------	61	11	23	13	14	34	27
Reported accident only--	17	2	7	1	7	9	8
Did not report accident-	12	-	4	2	6	4	8
Type C injury-----	128	29	48	28	23	77	51
Reported injury---------	86	24	29	20	13	53	33
Reported accident only--	28	4	14	5	5	18	10
Did not report accident-	14	1	5	3	5	6	8
	Percent distribution						
Type A injury-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Reported injury---------	85.5	93.1	89.8	88.9	72.7	90.9	78.9
Reported accident only--	3.8	6.9	1.7	3.7	4.5	3.4	4.2
Did not report accident-	10.7	-	8.5	7.4	22.7	5.7	16.9
Type B injury-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Reported injury---------	67.8	84.6	67.6	81.3	51.8	72.3	62.8
Reported accident only--	18.9	15.4	20.6	6.3	25.9	19.1	18.6
Did not report accident-	13.3	-	11.8	12.5	22.2	8.5	18.6
Type C injury-----	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Reported injury---------	67.2	82.8	60.4	71.4	56.5	68.8	64.7
Reported accident only--	21.9	13.8	29.2	17.9	21.7	23.4	19.6
Did not report accident-	10.9	3.4	10.4	10.7	21.7	7.8	15.7

[1]For definitions of types A, B, and C injuries, see "Reporting by Classification of Injury."

Table 4. Number and percent distribution of all persons reporting accident by time interval between accident and interview as reported in the interview, according to time interval since accident actually occurred: Durham, Orange, and Wake Counties, North Carolina, February 1966-February 1967.

Time interval reported in the interview	All persons reporting accident	Time interval since accident actually occurred (recall period)			
		Less than 3 months	3-6 months	6-9 months	9-12 months
	Number				
All intervals----	508	115	187	102	104
Less than 3 months-----	125	109	16	-	-
3-6 months----------	189	6	165	14	4
6-9 months----------	100	-	5	83	12
9-12 months----------	90	-	-	3	87
Unknown----------	4	-	1	2	1
	Percent distribution				
All intervals----	100.0	100.0	100.0	100.0	100.0
Less than 3 months-----	...	94.8	8.6	-	-
3-6 months----------	...	5.2	88.2	13.7	3.8
6-9 months----------	...	-	2.7	81.4	11.5
9-12 months----------	...	-	-	2.9	83.7
Unknown----------	...	-	.5	2.0	1.0

Table 5. Formulas used in this report to compute probabilities of injury, variances, and biases, by recall period

Item	Recall period		
	12 months	6 months	3 months
Number of sample persons (Health Interview Survey)	134,000	134,000	134,000
Probability of persons being injured during recall period	P_{12}	$P_6 = \frac{P_{12}}{2}$	$P_3 = \frac{P_{12}}{4}$
Estimator for probability of being injured during the year	$\hat{P}_{12}$	$\hat{P}_{12} = 2\hat{P}_6$	$\hat{P}_{12} = 4\hat{P}_3$
Variance estimator for probability of injury during year, assuming independence of observations	$Var.(\hat{P}_{12}) = \frac{P_{12}(1-P_{12})}{n}$	$Var.(2\hat{P}_6) = \frac{2P_{12}(1-\frac{P_{12}}{2})}{n}$	$Var.(4\hat{P}_3) = \frac{4P_{12}(1-\frac{P_{12}}{4})}{n}$
Variance estimator for probability of injury during year, *not* assuming independence of observations	$2Var.\hat{P}_{12}$	$2Var.(2\hat{P}_6)$	$2Var.(4\hat{P}_3)$
Relative bias (K_i) : proportion of recorded injuries that were not reported in the interview	$\hat{K}_{12} = .249$	$\hat{K}_6 = .212$	$\hat{K}_3 = .127$

Table 6. Relative root mean square error, sampling error component, and bias component for selected population sizes of injured persons, by recall period

Number of injured persons in thousands	Recall period								
	Less than 3 months			Less than 6 months			Less than 12 months		
	Relative root mean square error	Sampling error component	Bias component	Relative root mean square error	Sampling error component	Bias component	Relative root mean square error	Sampling error component	Bias component
	Percent								
25	70.3	69.1	1.2	53.2	48.8	4.4	42.6	34.6	8.0
50	50.5	48.9	1.6	40.5	34.5	6.0	34.9	24.4	10.5
75	41.9	39.9	2.0	35.3	28.2	7.1	31.9	19.9	12.0
100	36.8	34.5	2.3	32.3	24.4	7.9	30.3	17.3	13.0
125	33.4	30.9	2.5	30.4	21.8	8.6	29.3	15.4	13.9
150	30.9	28.2	2.7	29.1	19.9	9.2	28.6	14.1	14.5
175	29.0	26.1	2.9	28.1	18.5	9.6	28.1	13.1	15.0
200	27.5	24.4	3.1	27.3	17.3	10.0	27.7	12.2	15.5
300	23.6	19.9	3.7	25.5	14.1	11.4	26.8	10.0	16.8
400	21.4	17.3	4.1	24.5	12.2	12.3	26.3	8.6	17.7
500	20.0	15.5	4.5	23.8	10.9	12.9	26.1	7.7	18.4
600	19.0	14.1	4.9	23.4	10.0	13.4	25.9	7.1	18.8
700	18.2	13.0	5.2	23.1	9.2	13.9	25.7	6.5	19.2
800	17.6	12.2	5.4	22.9	8.6	14.3	25.6	6.1	19.5
900	17.1	11.5	5.6	22.7	8.1	14.6	25.6	5.8	19.8
1,000	16.7	10.9	5.8	22.5	7.7	14.8	25.5	5.5	20.0
1,500	15.5	8.9	6.6	22.1	6.3	15.8	25.3	4.5	20.8
2,000	14.9	7.7	7.2	21.9	5.5	16.4	25.2	3.9	21.3
2,500	14.5	6.9	7.6	21.8	4.9	16.9	25.1	3.4	21.7
3,000	14.2	6.3	7.9	21.6	4.4	17.2	25.1	3.1	22.0
3,500	14.0	5.8	8.2	21.6	4.1	17.5	25.0	2.9	22.1
4,000	13.8	5.4	8.4	21.5	3.8	17.7	25.0	2.7	22.3
4,500	13.7	5.1	8.6	21.5	3.6	17.9	25.0	2.6	22.4
5,000	13.6	4.9	8.7	21.5	3.5	18.0	25.0	2.4	22.6

APPENDIX I

OTHER ESTIMATES OF BIAS IN REPORTING MOTOR VEHICLE INJURIES AND THEIR EFFECT ON THE RELATIVE ROOT MEAN SQUARE ERROR

Table I shows four possible estimates of the bias in reporting of injuries or accidents for each recall period. All the bias estimates are derived from statistics shown in tables included in this report. The bias represents the proportion of people who failed to report the injury or accident according to each of four specific definitions.

Table I. Estimates of underreporting of motor vehicle injuries and accidents, by definitions of injuries and accidents and length of recall period

Definition	Recall period		
	Less than 3 months	Less than 6 months	Less than 12 months
	Proportion of injuries not reported		
Definition 1-	.127	.212	.249
Definition 2-	.095	.156	.209
Definition 3-	.069	.091	.145
Definition 4-	.034	.079	.139

Definitions of Injuries and Accidents

Definition 1.—The bias in reporting of motor vehicle injuries based on definition 1 represents the proportion of people who were indicated on the motor vehicle record as being injured but who failed to report the injury when interviewed. Estimates of the relative bias in the reporting of motor vehicle injuries based on this definition of injury yield $\hat{K}_3 = .127$, $\hat{K}_6 = .212$, and $\hat{K}_{12} = .249$. Subscripts 3, 6, and 12 refer to 3-month, 6-month, and 12-month recall periods, respectively. The estimate of bias based on this definition is the most accurate estimate of the true unknown bias in the reporting of motor vehicle injuries. Therefore this was the only estimate of bias used in determining the optimum recall period.

Definition 2.—The bias in reporting of motor vehicle injuries based on definition 2 represents the proportion of people who received a type A or type B injury classification on the record but did not report the injury when interviewed.

Definition 3.—The bias in reporting of motor vehicle injuries based on definition 3 represents the proportion of people who received a type A injury classification on the record but did not report the injury when interviewed.

Definition 4.—The bias in reporting of motor vehicle accidents based on definition 4 represents the proportion of people who were involved in motor vehicle accidents but failed to report the sample accident. This represents an accurate estimate of bias in reporting a motor vehicle accident because it is a known fact that each sample person was involved in the sample accident, which he either reported or did not report when interviewed.

The RRMSE's for estimates on specific population sizes based on the biases derived from definitions 2, 3, and 4 are shown in tables II, III, and IV respectively. These tables are based on the same equations and have the same interpretations as tables 5 and 6. The bias

Table II. Relative root mean square error, sampling error component, and bias component for selected population sizes based on type A and B injuries, by recall period

Number of injured persons in thousands	Recall period								
	Less than 3 months			Less than 6 months			Less than 12 months		
	Relative root mean square error	Sampling error component	Bias component	Relative root mean square error	Sampling error component	Bias component	Relative root mean square error	Sampling error component	Bias component
	Percent								
25	69.8	69.1	.7	51.3	48.9	2.4	40.4	34.6	5.8
50	49.8	48.1	.9	37.9	34.6	3.4	32.2	24.4	7.7
75	41.0	39.9	1.1	32.2	28.2	4.0	28.9	19.9	8.9
100	35.8	34.6	1.3	29.0	24.4	4.6	27.1	17.3	9.8
125	32.3	30.9	1.4	26.9	21.9	5.0	26.0	15.5	10.5
150	29.8	28.2	1.6	25.3	19.9	5.4	25.2	14.1	11.1
175	27.8	26.1	1.7	24.2	18.5	5.7	24.6	13.1	11.6
200	26.2	24.4	1.8	23.3	17.3	6.0	24.2	12.2	12.0
300	22.1	19.9	2.1	21.0	14.1	6.9	23.2	10.0	13.2
400	19.7	17.3	2.4	19.8	12.2	7.6	22.6	8.6	14.0
500	18.1	15.4	2.7	19.0	10.9	8.1	22.3	7.7	14.6
600	17.0	14.1	2.9	18.5	10.0	8.5	22.1	7.1	15.0
700	16.1	13.1	3.1	18.1	9.2	8.9	21.9	6.5	15.4
800	15.5	12.2	3.3	17.8	8.6	9.2	21.8	6.1	15.7
900	14.9	11.5	3.4	17.6	8.1	9.5	21.7	5.8	15.9
1,000	14.5	10.9	3.6	17.4	7.7	9.7	21.6	5.5	16.1
1,500	13.0	8.9	4.1	16.8	6.3	10.5	21.4	4.5	16.9
2,000	12.2	7.7	4.5	16.5	5.5	11.1	21.3	3.9	17.4
2,500	11.7	6.9	4.8	16.3	4.9	11.5	21.2	3.5	17.7
3,000	11.4	6.3	5.1	16.2	4.5	11.8	21.1	3.1	18.0
3,500	11.1	5.8	5.3	16.1	4.1	12.0	21.1	2.9	18.2
4,000	11.0	5.5	5.5	16.1	3.9	12.2	21.1	2.7	18.4
4,500	10.8	5.1	5.7	16.0	3.6	12.4	21.1	2.6	18.5
5,000	10.7	4.9	5.8	16.0	3.4	12.5	21.0	2.4	18.6

Table III. Relative root mean square error, sampling error component, and bias component for selected population sizes based on type A injuries, by recall period

Number of injured persons in thousands	Recall period								
	Less than 3 months			Less than 6 months			Less than 12 months		
	Relative root mean square error	Sampling error component	Bias component	Relative root mean square error	Sampling error component	Bias component	Relative root mean square error	Sampling error component	Bias component
	Percent								
25	69.5	69.1	.3	49.7	48.9	.8	37.5	34.6	2.9
50	49.4	48.9	.5	35.7	34.6	1.2	28.4	24.4	4.0
75	40.5	39.9	.6	29.6	28.2	1.4	24.7	19.9	4.7
100	35.2	34.6	.7	26.1	24.4	1.6	22.6	17.3	5.3
125	31.7	30.9	.8	23.7	21.9	1.8	21.2	15.5	5.7
150	29.0	28.2	.8	21.9	19.9	2.0	20.2	14.1	6.1
175	27.0	26.1	.9	20.6	18.5	2.1	19.5	13.1	6.5
200	25.4	24.4	1.0	19.5	17.3	2.3	19.0	12.2	6.7
300	21.1	19.9	1.2	16.8	14.1	2.7	17.6	10.0	7.6
400	18.6	17.3	1.3	15.2	12.2	3.0	16.9	8.6	8.2
500	16.9	15.4	1.5	14.2	10.9	3.3	16.4	7.7	8.7
600	15.7	14.1	1.6	13.5	9.8	3.5	16.1	7.1	9.1
700	14.8	13.1	1.7	13.0	9.2	3.7	15.9	6.5	9.4
800	14.0	12.2	1.8	12.5	8.6	3.9	15.7	6.1	9.6
900	13.4	11.5	1.9	12.2	8.1	4.1	15.6	5.8	9.8
1,000	12.9	10.9	2.0	11.9	7.7	4.2	15.5	5.5	10.0
1,500	11.3	8.9	2.4	11.1	6.3	4.8	15.2	4.5	10.7
2,000	10.4	7.7	2.6	10.6	5.5	5.2	15.0	3.9	11.1
2,500	9.8	6.9	2.9	10.3	4.9	5.4	14.9	3.5	11.2
3,000	9.3	6.3	3.0	10.1	4.5	5.7	14.8	3.1	11.7
3,500	9.0	5.8	3.2	10.0	4.1	5.9	14.8	2.9	11.9
4,000	8.8	5.5	3.3	9.9	3.9	6.0	14.8	2.7	12.0
4,500	8.6	5.1	3.5	9.8	3.6	6.2	14.7	2.6	12.2
5,000	8.4	4.9	3.7	9.7	3.4	6.3	14.7	2.4	12.3

Table IV. Relative root mean square error, sampling error component, and bias component for selected population sizes based on reporting of motor vehicle accidents, by recall period

Number of injured persons in thousands	Recall period								
	Less than 3 months			Less than 6 months			Less than 12 months		
	Relative root mean square error	Sampling error component	Bias component	Relative root mean square error	Sampling error component	Bias component	Relative root mean square error	Sampling error component	Bias component
	Percent								
25	69.2	69.1	.1	49.5	48.9	.6	37.2	34.6	2.7
50	49.0	48.9	.1	35.4	34.6	.9	28.1	24.4	3.7
75	40.0	39.9	.1	29.3	28.2	1.1	24.3	19.9	4.4
100	34.7	34.6	.2	25.7	24.4	1.2	22.2	17.3	4.9
125	31.1	30.9	.2	23.2	21.9	1.4	20.8	15.5	5.3
150	28.4	28.2	.2	21.5	19.9	1.5	19.8	14.1	5.7
175	26.3	26.1	.2	20.1	18.5	1.6	19.1	13.1	6.0
200	24.7	24.4	.2	19.0	17.3	1.7	18.5	12.2	6.3
300	20.2	19.9	.3	16.2	14.1	2.1	17.1	10.0	7.1
400	17.6	17.3	.3	14.5	12.2	2.3	16.4	8.6	7.7
500	15.8	15.4	.4	13.5	10.9	2.6	15.9	7.7	8.2
600	14.5	14.1	.4	12.7	10.0	2.8	15.6	7.1	8.5
700	13.5	13.1	.4	12.2	9.2	2.9	15.4	6.5	8.8
800	12.7	12.2	.5	11.7	8.6	3.1	15.2	6.1	9.1
900	12.0	11.5	.5	11.3	8.1	3.2	15.0	5.8	9.3
1,000	11.4	10.9	.5	11.0	7.7	3.3	14.9	5.5	9.5
1,500	9.5	8.9	.6	10.1	6.3	3.8	14.6	4.5	10.1
2,000	8.4	7.7	.7	9.6	5.5	4.1	14.4	3.9	10.6
2,500	7.7	6.9	.8	9.3	4.9	4.4	14.3	3.5	10.9
3,000	7.2	6.3	.9	9.1	4.5	4.6	14.3	3.1	11.1
3,500	6.7	5.8	.9	8.9	4.1	4.8	14.2	2.9	11.3
4,000	6.4	5.5	1.0	8.8	3.9	4.9	14.2	2.7	11.4
4,500	6.2	5.1	1.0	8.7	3.6	5.1	14.1	2.6	11.6
5,000	5.9	4.9	1.1	8.6	3.4	5.2	14.1	2.4	11.7

component, which is a function of the estimated bias in reporting injuries or motor vehicle accidents, is the only difference in the tables.

An optimum recall period based on the data in tables II, III, and IV is not of pertinent concern since this decision has already been made using the data in table 6. However, the following inferences can be made from the data shown in these tables:

1. The effect of bias on the RRMSE monotonically increases as the size of estimates increases.

2. The variance component (relative standard error) monotonically decreases as the size of estimates increases. The variance component is functionally independent of the bias component.

3. The larger estimates of bias favor the selection of a shorter recall period. For smaller estimates of bias, the effect of the bias component on the RRMSE is negligible and the longer recall period is optimum. This effect can be seen if table II is compared with table IV.

4. The variance component is inversely proportional to the sample size (table 5). The sample size used in the Health Interview Survey is 134,000. If a smaller sample size were used the variance component would increase; however, the bias component would not change. Hence the net effect would favor the selection of a longer recall period. If a larger sample size were used the effect would be to decrease the variance component and hence favor the use of a shorter recall period.

5. The use of the RRMSE in determining the optimum recall period is valid when estimates are being made for any health characteristic. The greatest problem in using the RRMSE technique is obtaining an accurate estimate of the bias in the reporting of the health characteristic which is being estimated.

APPENDIX II

MOTOR VEHICLE ACCIDENT REPORT FORM

A fictitious report form is shown here.

N. C. Department of Motor Vehicles DMV-349 (Rev. 4-1-65) TRAFFIC ACCIDENT REPORT

DATE — Date of Accident: April 26 19 65 — Day of Week: Monday — Hour: 4:00 — A.M. ☐ P.M. ☒

LOCATION — Accident occurred: in Scotland County, In City or town of ____ — Outside City or Town 3 Miles ☐N ☐E ☒S ☐W of Laurinburg (City or Town) ☒ Limits ☐ Center — On US 401 (Hwy. No. (I., U.S., N.C., R.P., R.U.) If no Hwy. No., identify by name.) at its intersection with ____ (Street or Hwy. no.) — If not at intersection, 75 ☐ Miles ☒ Feet ☒N ☐E ☐S ☐W From RU 1627 (Highway No., or Adjacent County Line) toward Laurinburg (Highway No., City, or Adjacent County Line)

ACCIDENT TYPE — Ran off Road: 1. Right, 2. Left; Non-collision in Road: 3. Overturned, 4. Other in road; Collision of Motor Vehicle in Road With: 5. Pedestrian, ☒ 6. Other Motor Vehicle, 7. Parked Vehicle, 8. Train, 9. Bicycle, 10. Animal, 11. Fixed Object, 12. Other Object

No. of Vehicles Involved: 2

VEHICLE NO. 1

Driver: Richard John Jones RFD 6, Box 115, Laurinburg, N.C. Date of Birth: Sept. 10 '43
(First, Middle, Last Name, Street or RFD, City and State, Month, Date, Year)

Age 21 Sex M Race W Driving Experience 4 Years Driver's License 1252757 NC (Number, State) ☒ Oper ☐ Chauff (Specify Restriction) ____ Member of Armed Forces: Yes ☐ No ☒

Veh: Year 55 Make Chev Color ____ Registration P3095 NC 65 (Number, State, Year) M.V.No. A5S8Y23692

Amount of Damage: $100.00 — Owned By: Driver (Name, Street or RFD, City and State) — Drivable: Yes ☐ No ☒ Vehicle Removed To Jim's Garage, Star, N. C. By Jim's Wrecker (Rotation) — Parts Damaged: Front, Frame

VEHICLE NO. 2 OR PEDESTRIAN

Driver or Pedestrian: Elmer Lee 213 Jay St. Raleigh, N. C. Date of Birth: Aug. 13, '11
(First, Middle, Last Name, Street or RFD, City and State, Month, Date, Year)

Age 53 Sex M Race W Driving Experience 32 Years Driver's License 636367 NC (Number, State) ☒ Oper ☐ Chauff Glasses (Specify Restriction) Member of Armed Forces: Yes ☐ No ☒

Veh: Year 65 Make Chev Color ____ Registration CU 1641 NC 65 (Number, State, Year) M.V.No. 41569Y131092

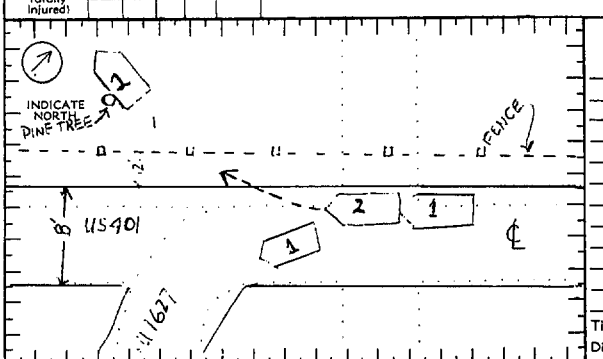
Amount of Damage: $3000.00 — Owned By: Driver (Name, Street or RFD, City and State) — Drivable: Yes ☐ No ☒ Vehicle Removed To New Car Co. Laurinburg, N.C. By New Car Wrecker — Parts Damaged: Front, Left Side, Rear

Amt. of Dam. Other Property Damage: $100.00 Fence — Owner and Address: Horace Ware, RFD 6, Laurinburg

Injury Class — K. Killed; A. Visible sign of injury as bleeding wound, distorted member or had to be carried from scene.; B. Other visible injury or bruises, abrasions, swelling, limping, etc.; C. No visible sign of injury but complaint of pain or momentary unconsciousness

INJURED PERSONS: 3 (Include fatally injured)

Veh.	Age	Sex	Race	Inj. Cl.	Name	Street or RFD	City	State
1				A	Driver No. 1			
2				K	Driver No. 2			
2	48	F	W	B	Minnie Moss Lee	213 Jay Street	Raleigh	N. C.



Injured taken to Scotland Cty. Hospital

Describe what happened: Vehicle No. 2 Reducing speed to turn into RU 1627 Struck in rear by Vehicle 1. Vehicle 2 lost control, ran off road through Fence and came to rest after sideswiping pine tree. Driver No. 2 DOA Scotland County Hospital

Tire impressions prior to impact: No. 1 0 No. 2 0

Distance of travel after impact: No. 1 80 ft No. 2 ____

ADDED BY ____ (Initial)

MARKS

WITNESSES — Name ____ Address ____ — Name ____ Address ____

Arrests: Name Edward Clifton Collins Charge(s) Manslaughter, FTC, Imp.Eqt. (Cit. No.) ____ — Name ____ Charge(s) ____ (Cit. No.) ____

Sign Here L. F. Green (Officer's rank and name) 0370 (Number) Troop B, District 4 (Department) April 27, 1965 (Date of report)

City Case No.

Zone No.

Tract No.

If city vehicle or prop. dam. give name of liability ins. co.

Veh. 1

Veh. 2

Authority for removal of vehicles:

Veh. 1 Drivers Request

Veh. 2 Drivers Request

Remarks:

VEHICLE 1 — POINT OF INITIAL CONTACT: 1

VEHICLE 2 — POINT OF INITIAL CONTACT: 5

DIRECTION OF TRAVEL

VEH. 1 ☐ N ☐ E ☒ S ☐ W ON US 401

VEH. 2 OR PED. ☐ N ☐ E ☒ S ☐ W ON US 401

POLICE ACTIVITY

Time Notified of Accident Apr 26 (Date) 4:15 (Hour) ☐ a.m. ☒ p.m.

Time Arrived at Scene 4:30 (Hour) ☐ a.m. ☒ p.m.

Source of information: Radio from Station (Officer at scene, drivers contacted station, etc.)

ROADWAY FEATURE (Check if applicable)

- ☐ 2. Bridge or Underpass
- ☐ 3. Driveway
- ☐ 4. Alley Intersection
- ☒ 5. Intersection of Two Roadways
- ☐ 6. Non-intersection Median Crossover
- ☐ 7. End or Beginning of Divided Highway

LOCALITY (Check one)

- ☐ 8. Business
- ☐ 10. Residential
- ☐ 11. School & Playground
- ☒ 12. Open Country

FIXED OBJECT STRUCK (Check first struck only)

- ☐ 1. Tree
- ☐ 2. Utility Pole
- ☒ 3. Fence or Fence Post
- ☐ 4. Guard Rail or Guard Post in Median
- ☐ 5. Guard Rail or Guard Post on Shoulder
- ☐ 6. Bridge
- ☐ 7. Underpass
- ☐ 8. Traffic island, curb, or median
- ☐ 9. Sign or Sign Post
- ☐ 10. Other Object
- ☐ 11. No object involved

ROAD CHARACTER (Check one)

- ☒ 1. Straight road—level
- ☐ 2. Straight road—hillcrest
- ☐ 3. Straight road—on grade
- ☐ 4. Sharp Curve—level
- ☐ 5. Sharp curve—hillcrest
- ☐ 6. Sharp curve—on grade
- ☐ 7. Other curve—level
- ☐ 8. Other curve—hillcrest
- ☐ 9. Other curve—on grade

ROAD CONDITION (Check one)

- ☒ 1. Dry
- ☐ 2. Wet
- ☐ 3. Oily
- ☐ 4. Muddy
- ☐ 5. Snowy
- ☐ 6. Icy

TRAFFIC CONTROL (Check one or more)

- ☐ 1. Stop Sign
- ☐ 2. Yield Sign
- ☐ 3. Stop and Go Signal
- ☐ 4. Flashing Signal with Stop Sign
- ☐ 5. Flashing Signal without Stop Sign
- ☐ 6. R. R. Gate and Flasher
- ☐ 7. R. R. Flasher
- ☐ 8. Officer
- ☐ 9. Other Device
- ☒ 10. No Control Present
- ☐ 11. Control not operating properly
- ☐ 12. Control not visible or legible

ROAD DEFECTS (Check one)

- ☐ 1. Loose material on surface
- ☐ 2. Holes, deep ruts
- ☐ 3. Low shoulders
- ☐ 4. Soft shoulders
- ☐ 5. Other defects
- ☐ 6 Road under construction
- ☒ 7. No defects

CONSTRUCTION (Check one)

- ☒ 1. Concrete
- ☐ 2. Smooth Asphalt
- ☐ 3. Coarse Asphalt
- ☐ 4. Gravel
- ☐ 5. Dirt or Sand
- ☐ 6. Other ..... (Specify)

LIGHT CONDITION (Check one)

- ☒ 1. Daylight
- ☐ 2. Dusk
- ☐ 3. Dawn
- ☐ 4. Darkness (street lighted)
- ☐ 5. Darkness (street not lighted)

WEATHER (Check one)

- ☒ 1. Clear
- ☐ 2. Cloudy
- ☐ 3. Raining
- ☐ 4. Snowing
- ☐ 5. Fog
- ☐ 6. Sleet or Hail

VEHICLE TYPE

Vehicle 1 2

- ☒ ☒ 1. Car ☐ House Trailer ☐ Trailer
- ☐ ☐ 2. Taxicab
- ☐ ☐ 3. Truck—2 axles
- ☐ ☐ 4. Truck—3 axles
- ☐ ☐ 5. Truck-Tractor and Semi-Trailer
- ☐ ☐ 6. Truck and Trailer
- ☐ ☐ 7. Bus ..... (Specify)
- ☐ ☐ 8. Other ..... (Describe)
- ☐ ☐ 9. Emergency Vehicle

VEHICLE CONDITION (Check one or more)

Vehicle 1 2

- ☒ ☐ 1. Defective brakes
- ☐ ☐ 2. Defective headlights
- ☐ ☐ 3. Defective rear lights
- ☐ ☐ 4. Defective steering
- ☐ ☐ 5. Defective tires
- ☐ ☐ 6. Other defective equipment ..... (Specify)
- ☐ ☐ 7. Not known if defective
- ☐ ☒ 8. No defects detected

VISION OBSTRUCTION (Check one)

Driver 1 2

- ☐ ☐ 10. Windshield or windows
- ☐ ☐ 11. Buildings, signs, bushes, etc.
- ☒ ☒ 12. No vision obstruction

Posted speed limit 60 mph

Speed of vehicle 1 60 mph

Speed of vehicle 2 30 mph

VIOLATION INDICATED (Check one or more for each driver)

Driver 1 2

- ☐ ☐ 1. Exceeding stated limit
- ☐ ☐ 2. Failed to yield right of way
- ☐ ☐ 3. Drove left of center
- ☐ ☐ 4. Improper overtaking
- ☐ ☐ 5. Passed stop sign
- ☐ ☐ 6. Disregarded traffic signal
- ☒ ☐ 7. Followed too closely
- ☐ ☐ 8. Made improper turn
- ☐ ☐ 9. Improper or no signal
- ☐ ☐ 10. Improper parking location
- ☐ ☐ 11. Other improper driving ..... (Describe)
- ☐ ☒ 12. No violation indicated

WHAT DRIVERS WERE DOING BEFORE ACCIDENT

Driver 1 2

(NON-MOVING Vehicles)

- ☐ ☐ 10. Stopped in Travel Lane
- ☐ ☐ 11. Parked out of travel lanes
- ☐ ☐ 12. Parked in travel lanes

(MOVING Vehicles)

- ☒ ☐ 1. Going straight ahead
- ☐ ☐ 2. Changing Lanes or Merging
- ☐ ☐ 3. Passing
- ☐ ☐ 4. Making right turn
- ☐ ☐ 5. Making left turn
- ☐ ☐ 6. Making U turn
- ☐ ☐ 7. Backing
- ☐ ☒ 8. Slowing or Stopping
- ☐ ☐ 9. Starting in Roadway
- ☐ ☐ 10. Parking
- ☐ ☐ 11. Leaving Parked Position
- ☐ ☐ 12. All Other

WHAT PEDESTRIAN WAS DOING (Check one)

- ☐ 1. Crossing at intersection
- ☐ 2. Crossing not at intersection
- ☐ 3. Coming from behind parked Vehicle
- ☐ 4. Walking in roadway with traffic
- ☐ 5. Walking in roadway against traffic
- ☐ 6. Getting on or off vehicle
- ☐ 7. Standing in roadway
- ☐ 8. Working in roadway
- ☐ 9. Playing in roadway
- ☐ 10. Lying in roadway
- ☐ 11. Other in roadway ..... (Specify)
- ☐ 12. Not in roadway

APPARENT PHYSICAL CONDITION (Other than sobriety)

Driver 1 2 or PED.

- ☐ ☐ 1. Ill
- ☐ ☐ 2. Fatigued
- ☐ ☐ 3. Asleep
- ☐ ☐ 4. Other Physical Impairment
- ☐ ☐ 5. Restriction not Complied with
- ☒ ☒ 6. Normal
- ☐ ☐ 7. Condition not known

APPARENT SOBRIETY

- ☒ ☒ 10. Had not been drinking
- ☐ ☐ 11. Drinking—Ability impaired
- ☐ ☐ 12. Drinking—Unable to determine impairment
- ☐ ☐ 13. Chemical test given

APPENDIX III

MOTOR VEHICLE ACCIDENT QUESTIONNAIRE

NOTICE: All information which would permit identification of the individual will be held in strict confidence, will be used only by persons engaged in and for the purposes of the survey, and will not be disclosed or released to others for any purposes.

FORM PHS T400 (Supplement)
Rev. 2/67

Budget Bureau No. 68-66048
Approval Expires December 31, 1967

DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
NATIONAL HEALTH SURVEY

PSU	Segment No.	Serial No.

MOTOR VEHICLE ACCIDENT SUPPLEMENT

ENTER THE PERSON NUMBER, AGE, AND NAME OF EACH PERSON INVOLVED IN THIS ACCIDENT IN A SEPARATE COLUMN.

Record the date of the accident on the line provided.

_____ **Date of accident**

You said that – – (and – – were) was in a motor vehicle accident on _____(date)_____.

(If 1 person, ask question 1b; if 2+ persons, ask question 1a and b)

1a. Were they in the same accident?

b. Besides – – was anyone else in the family involved in this accident? (List name, age, and person number of each family member reported)

c. Anyone else?

2a. Was – – hurt or injured in any way in this accident?

b. At the time of the accident, what part of – – body was hurt?

c. What kind of injury was it?

d. Did – – have any other injuries in this accident?

3a. Did – – ever see or talk to a doctor because of this injury (accident)**?**

b. How many minutes after the accident did – – see the doctor?

4a. Did the (injury from this) **accident keep – – in bed all or most of a day?**

b. How many days did the (injury from this) **accident keep – – in bed all or most of the day?**

c. Even though – – didn't have to remain in bed, did this injury (accident) **cause him to cut down on the things he usually does for all or most of a day?**

d. In total, how many days did – – have to cut down on the things he usually does for all or most of the day?

(If 6-16 years of age, ask)

e. How many days did the injury (accident) **keep – – from school?**

(17+ years of age, ask)

f. How many days did the injury (accident) **keep – – from work** (for females, add) **not counting work around the house?**

Person No. ____ Age ____	Person No. ____ Age ____	Person No. ____ Age ____	Person No. ____ Age ____
Name of Person	Name of person	Name of person	Name of person
☐ Injured (ask b) ☐ Not injured (go to 3)	☐ Injured (ask b) ☐ Not injured (go to 3)	☐ Injured (ask b) ☐ Not injured (go to 3)	☐ Injured (ask b) ☐ Not injured (go to 3)
Body Part / Kind of injury 1. ____ / ____ 2. ____ / ____ 3. ____ / ____	Body Part / Kind of injury 1. ____ / ____ 2. ____ / ____ 3. ____ / ____	Body Part / Kind of injury 1. ____ / ____ 2. ____ / ____ 3. ____ / ____	Body Part / Kind of injury 1. ____ / ____ 2. ____ / ____ 3. ____ / ____
☐ Yes (re-ask b-d) ☐ No (go to 3)	☐ Yes (re-ask b-d) ☐ No (go to 3)	☐ Yes (re-ask b-d) ☐ No (go to 3)	☐ Yes (re-ask b-d) ☐ No (go to 3)
☐ Yes (ask b) ☐ No (go to 4)	☐ Yes (ask b) ☐ No (go to 4)	☐ Yes (ask b) ☐ No (go to 4)	☐ Yes (ask b) ☐ No (go to 4)
____ Minutes ____ Hours ____ Days	____ Minutes ____ Hours ____ Days	____ Minutes ____ Hours ____ Days	____ Minutes ____ Hours ____ Days
☐ Yes (ask b) ☐ No (go to c)	☐ Yes (ask b) ☐ No (go to c)	☐ Yes (ask b) ☐ No (go to c)	☐ Yes (ask b) ☐ No (go to c)
____ Bed Days (go to d)	____ Bed Days (go to d)	____ Bed Days (go to d)	____ Bed Days (go to d)
☐ Yes (ask d) ☐ No (go to next person)	☐ Yes (ask d) ☐ No (go to next person)	☐ Yes (ask d) ☐ No (go to next person)	☐ Yes (ask d) ☐ No (go to next person)
____ Number of cut down days	____ Number of cut down days	____ Number of cut down days	____ Number of cut down days
☐ None ____ Number of school loss days	☐ None ____ Number of school loss days	☐ None ____ Number of school loss days	☐ None ____ Number of school loss days
☐ None ____ Number of work loss days	☐ None ____ Number of work loss days	☐ None ____ Number of work loss days	☐ None ____ Number of work loss days

5a. How many motor vehicles were involved in this accident? ☐ One (ask 5b) ☐ Two or more (go to 7)

b. Was the motor vehicle moving at the time of the accident? ☐ Yes (go to 7) ☐ No (ask 6)

6. How did the accident happen? (Note: if answer indicates that a moving motor vehicle was involved, go to question 7, otherwise STOP.)

☐ Moving (ask 7)

☐ Caught in door
☐ Fell getting in or out
☐ Injured while repairing vehicle
☐ Other (specify) _____

(If 14 years or over ask:)

7. At the time of the accident, was – – outside the vehicle, getting in or out of it, a passenger, or was he the driver?

(If under 14 years, ask:)

At the time of the accident, was – – outside the vehicle, getting in or out of it, or was he a passenger?

8. Was – – on foot, on a bicycle or in some other vehicle?

9a. Was – – sitting in the front or back seat?

b. Was – – wearing a seat belt?

c. Were there seat belts where he was sitting?

If no injuries were reported in question 2, ask:

10. As far as you know, was anyone injured in this accident? ☐ Yes ☐ No

INTERVIEWER CHECK BOX: Refer to questions 5 and 7 and check the appropriate box below)

☐ One motor vehicle with person inside (go to 14)
☐ Two or more vehicles with person inside (go to 12)
☐ Person outside motor vehicle (go to 11)

☐ Outside (ask 8) ☐ Passenger (go to 9a) ☐ Getting in or out ☐ Driver (go to 9b) (go to next person)	☐ Outside (ask 8) ☐ Passenger (go to 9a) ☐ Getting in or out ☐ Driver (go to 9b) (go to next person)	☐ Outside (ask 8) ☐ Passenger (go to 9a) ☐ Getting in or out ☐ Driver (go to 9b) (go to next person)	☐ Outside (ask 8) ☐ Passenger (go to 9a) ☐ Getting in or out ☐ Driver (go to 9b) (go to next person)
☐ On foot ☐ Bicycle ☐ Other specify _____ (go to next person)	☐ On foot ☐ Bicycle ☐ Other specify _____ (go to next person)	☐ On foot ☐ Bicycle ☐ Other specify _____ (go to next person)	☐ On foot ☐ Bicycle ☐ Other specify _____ (go to next person)
a. ☐ Front / ☐ Back (ask 9b) ☐ Other _____ (go to next person)	a. ☐ Front / ☐ Back (ask 9b) ☐ Other _____ (go to next person)	a. ☐ Front / ☐ Back (ask 9b) ☐ Other _____ (go to next person)	a. ☐ Front / ☐ Back (ask 9b) ☐ Other _____ (go to next person)
b. ☐ Yes (next person) ☐ No (ask c)	b. ☐ Yes (next person) ☐ No (ask c)	b. ☐ Yes (next person) ☐ No (ask c)	b. ☐ Yes (next person) ☐ No (ask c)
c. ☐ Yes / ☐ No (next person)	c. ☐ Yes / ☐ No (next person)	c. ☐ Yes / ☐ No (next person)	c. ☐ Yes / ☐ No (next person)

NOTE: If truck, determine type (i.e., pickup, dump, tractor-trailer) If outside, ask: 11a. What was the year, make and type of the motor vehicle involved?	_____ Year _____ Make ☐ Sedan ☐ Convertible ☐ Station wagon ☐ Other _____ (specify)
b. In what State was this vehicle registered?	_____ State (go to 17)
If inside, and 2 or more motor vehicles, ask: 12a. Was the motor vehicle – – was (they were) in moving at the time of the accident?	☐ Yes (go to 12c) ☐ No (ask 12b)
b. Was it moving the instant before the accident happened?	☐ Yes (ask 12c) ☐ No (ask 12c)
c. Was the other vehicle moving at the time of the accident?	☐ Yes (go to 13) ☐ No (ask 12d)
d. Was the other vehicle moving the instant before the accident happened?	☐ Yes (go to 13) ☐ No (go to 13)
13a. How did the accident happen; was it a head-on collision, rear-end collision or did it happen in some other way? If some other way, ask: b. How did the accident happen?	Two or more motor vehicles ☐ Head-on collision ☐ Rear-end collision ☐ Side collision ☐ No collision - 2 cars ☐ Other collision _____ (specify) (go to Q. 15)
If 1 vehicle, ask: 14a. How did the accident happen; was it a collision with some other object or did it happen in some other way?	☐ Collision with object (go to c) ☐ Other way (ask b)
b. How did the accident happen?	☐ Turned over ☐ Sudden stop (no collision) ☐ Other _____ (specify) (go to 15)
c. What was the object – – collided with?	_____ object
NOTE: If truck, determine type (i.e., pickup, dump, tractor-trailer, etc.) 15a. What was the year, make and type of the motor vehicle – – was (they were) in?	_____ Year _____ Make ☐ Sedan ☐ Convertible ☐ Station wagon ☐ Other _____ (specify)
b. In what State was this vehicle registered?	_____ State
c. In terms of dollars, about how much damage was done to the motor vehicle – – was (they were) in?	$ _____

16. What was the purpose of the trip—going to or from work, shopping, chauffeuring someone else, social or recreational, personal business, or something else?	☐ Work ☐ Social or recreational ☐ Shopping ☐ Personal business ☐ Chauffeuring ☐ Other _____ (specify)
17a. Did the accident happen on the road, on the shoulder of the road or somewhere else?	☐ On road (ask c) ☐ On shoulder (go to 18) ☐ Other _____ (specify)
If somewhere else, ask: b. Where did it happen? NOTE: If intersection, ask d; otherwise, go to 18.	(go to 18)
c. Did this accident happen at an intersection?	☐ Yes (ask d) ☐ No (go to 18)
d. Did the intersection have a traffic control, such as a policeman, a traffic light, a stop or yield sign or something else?	☐ Yes (ask e) ☐ No (go to 18)
e. What kind of control was this?	☐ Policeman ☐ Traffic light ☐ Stop sign ☐ Yield sign ☐ Other _____ (specify)
18a. Did the accident happen during daylight, dusk, dark, or dawn?	☐ Daylight ☐ Dark ☐ Dusk ☐ Dawn
b. About what time was it?	____A.M. ☐ Midnight ____P.M. ☐ Noon
19a. Did the accident happen in a residential or business district, in the open country or somewhere else?	☐ Residential ☐ Business ☐ Open country ☐ Other _____(specify)
b. What was the condition of the road at the time of the accident; was it wet, dry, icy or something else?	☐ Wet ☐ Dry ☐ Icy ☐ Other (specify) _____
20. What was the weather like at the time of the accident; was it clear, rainy, foggy, snowy, cloudy, or something else?	☐ Clear ☐ Foggy ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other (specify) _____
21. About how many miles from home did the accident happen?	☐ Less than 1 mile _____ Miles
22a. Did the police charge anyone in this accident?	☐ Yes (ask 22b) ☐ No (stop)
b. Who was charged?	_____ (specify)

☆ U. S. GOVERNMENT PRINTING OFFICE : 1972 482-005/18

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