Technical Report Documentation Page

1. Report No. UM-HSRI-77-23	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Extension of the NEISS Data Analysis Including CPSC In-Depth Reports on Bicycle-Associated Accidents		5. Report Date March, 1977 6. Performing Organization Code 320619
7. Author(s) Jairus D. Flora, Robert D. Abbott, and Richard J. Kaplan		8. Performing Organization Report No. UM-HSRI-77-23
9. Performing Organization Name and Address Highway Safety Research Institute The University of Michigan Ann Arbor, Michigan 48109		10. Work Unit No. (TRAIS) 11. Contract or Grant No. 13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address Bicycle Manufacturers Association 1101 Fifteenth Street, N.W. Washington, D.C. 20005		14. Sponsoring Agency Code
15. Supplementary Notes		

16. Abstract

Reports of bicycle-associated accidents collected by the National Electronic Injury Surveillance System (NEISS) run by the Consumer Product Safety Commission are analyzed. These accidents represent a probability sample of such injuries treated in hospital emergency rooms. These data are used to obtain estimates of the national totals of bicycle-associated accidental injuries. Analysis of these data shows that bicycle-associated injuries are highly seasonal, and have increased very slightly with time over the past three and one-half years. A slight increase in the age of persons injured is also noted.

The second phase of the analysis deals with 646 in-depth investigations of bicycle accidents. The in-depth reports are restricted to severe injuries. Among these reports, mechanical components of the bicycle are identified as a contributing cause of the accident in about 17% of the cases. The proportion of cases with a mechanical component as a contributing cause is higher for older bicycles than for newer ones, indicating that either newer bicycles are better mechanically, or that maintenance may be implicated in the mechanical failures. The proportion of mechanical causes is also considerably less (8%) for accidents selected from the NEISS than for accidents from all sources.

17. Key Words		18. Distribution Statement	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages	22. Price

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

TABLE OF CONTENTS

1. INTRODUCTION AND SUMMARY

This report describes the Highway Safety Research Institute's continuing research effort sponsored by the Bicycle Manufacturer's Association. This work began in 1974 with the study and evaluation of the National Electronic Injury Surveillance System operated by the Consumer Product Safety Commission. That study looked closely at the total operation of NEISS in general, and at the data produced by CPSC as they related to bicycle-associated accidents in particular.

The effort this year extends the analysis of the NEISS data to include calendar year 1975 and the first six months of 1976. The HSRI standard summary, developed earlier in this program, is provided for bicycle-associated accidents for this time period. In addition to this analysis, a study was made of a number of in-depth case reports provided to the Institute by BMA. These reports were coded and the data elements built into a computer digital file for the analysis.

Conclusions are presented from both the larger data set and the smaller but significantly more detailed collection of in-depth reports, and recommendations are made for continued study of bicycle-associated accidents.

2. ANALYSIS OF NEISS DATA

The data gathered by the CPSC through the NEISS represent the most nearly nationally representative data available on product-associated injuries treated in hospital emergency rooms. This section analyzes the injuries reported through the NEISS which were associated with bicycles during calendar 1975 and January through June of 1976. The data are quite limited in detail. In particular, they contain no information about causation of the accident or how a particular product was associated with an injury. Hence it is important to bear in mind that these data are mere associations, not necessarily caused by a product and most often not due to a product defect or failure. The strengths and weaknesses of the NEISS have been discussed elsewhere.*

Table 2-1 presents the estimated national total of bicycle-associated injuries treated in hospital emergency rooms during the years 1972 - June, 1976. The table also presents estimated sampling errors associated with these numbers. A gradual yearly increase in these reported injuries is noted. However, 1972 (the first year) has an unusually low estimated number, suspected to be the result of start-up problems. Since the sample is only of injuries treated in hospital emergency rooms (not elsewhere), these estimates could also be affected by a change in the source of treatment. That is, if more people go to a hospital emergency room rather than to a clinic or private physician for treatment, these estimates will increase, even though the total number of bicycle-associated injuries might not.

*Flora, J., et al. (1975). The national electronic injury surveillance system and bicycle-associated accidents. UM-HSRI-SA-75-18. pp.79-96.

Table 2-1

Estimated National Total Bicycle-Associated Injuries

	1972	1973	1974	1975	1976 (Jan-Jun)
Estimated Total	334,100	419,920	457,380	476,810	207,040
Estimated Standard Deviation	17,649	20,810	23,296	23,124	13,339

More detail on the trend in bicycle-associated injuries with time is presented in Table 2-2, which gives the estimated number for each month from January, 1972 - June, 1976. As one would expect, there is a very large seasonal component. The monthly totals are plotted in Figure 2-1, and Table 2-3 gives average totals for each month.

The smooth curve in Figure 2-1 represents a mathematical model for predicting the total number of accidents per month. The estimated model is

$$\hat{Y} = 32{,}022 + 76X + 18{,}974 \text{ sine}\left[\frac{\pi(X-4)}{6}\right] ,$$

where $\hat{Y}$ is the estimated monthly total, and X is the number of the month, beginning with one for January, 1973 and ending with 42 for June, 1976.

An important item to note in this model is that the linear trend is extremely small relative to the seasonal effect. That is, the best estimate is that there are on the average 76 more bicycle-associated accidents each month after adjusting for season. This is not statistically different from zero. That is, with the variability in these data, the apparent increasing trend may well result from chance. This represents a change from the data through 1974. In those data, the increasing total was significant, although relatively small.* It seems reasonable that most of the apparent trend was due to the low estimated total in 1972, which was probably an artifact of the beginning of the data collection system.

This model fits the data quite well, explaining 94.5% of the month-to-month variation in the estimated number of bicycle-associated injuries. There appears to be a consistent small increase in accidents above the predicted values in January. This may be associated with new bicycles being received for Christmas.

*Op.Cit. p.91.

Table 2-2

Estimated Total Bicycle Injuries by Month

Month	1972	1973	1974	1975	1976
Jan	3,580	7,158	15,700	12,827	9,197
Feb	3,940	7,371	14,353	10,209	15,776
Mar	10,510	18,909	24,356	21,404	25,743
Apr	28,899	32,611	43,180	34,536	41,617
May	40,443	45,540	55,010	67,258	50,520
Jun	47,100	63,887	64,245	72,572	64,184
Jul	56,016	72,666	73,323	78,429	
Aug	63,496	69,797	69,210	74,569	
Sep	46,697	51,897	48,732	51,249	
Oct	21,194	31,058	26,053	28,905	
Nov	8,439	11,233	15,188	15,047	
Dec	6,781	7,794	8,034	9,807	
Total	337,095	419,921	457,384	476,810	207,040
Estimated Standard Deviation of Total	17,650	20,810	23,300	23,124	13,339

Figure 2-1. Estimated Monthly Injuries Model with Seasonal and Trend Effects

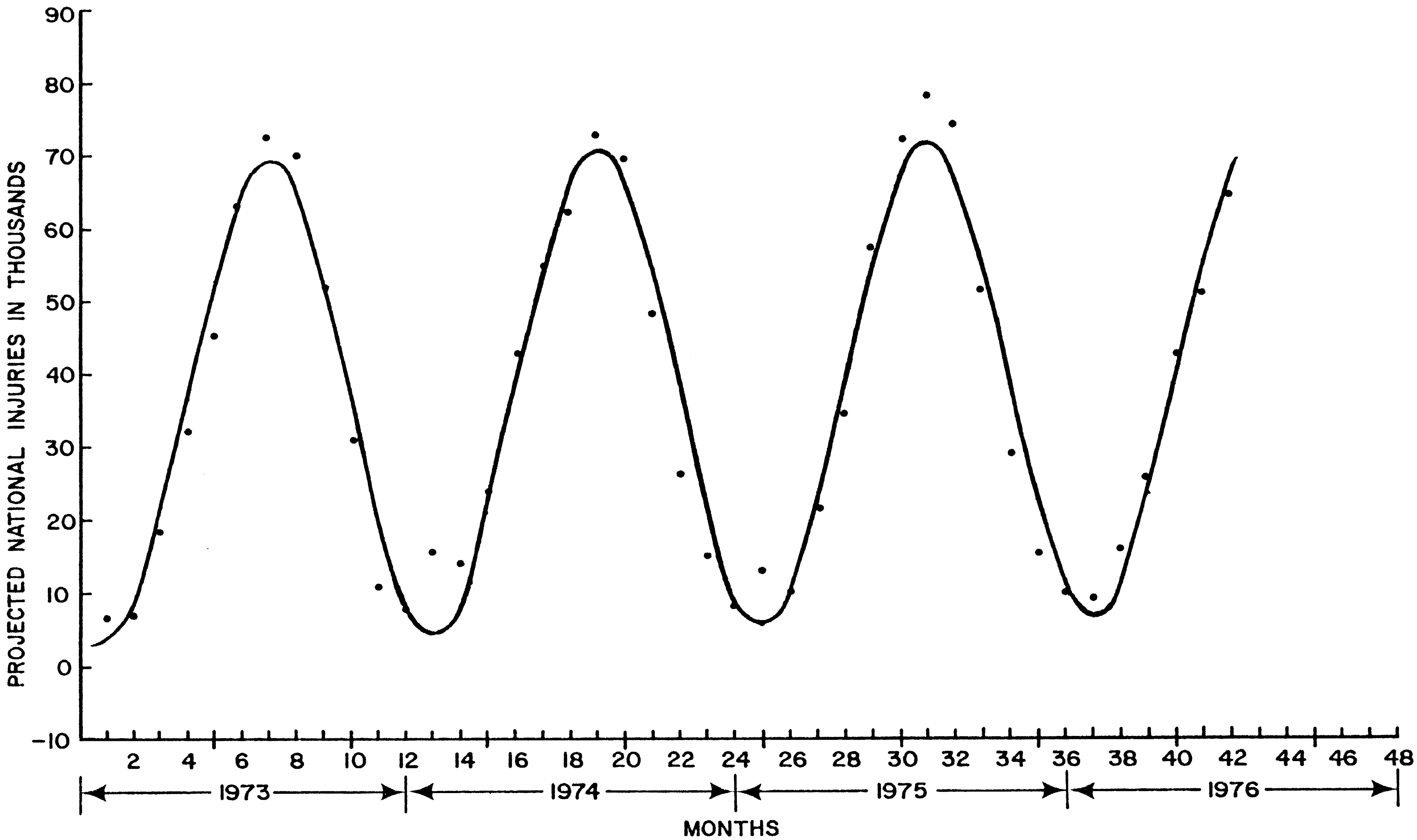
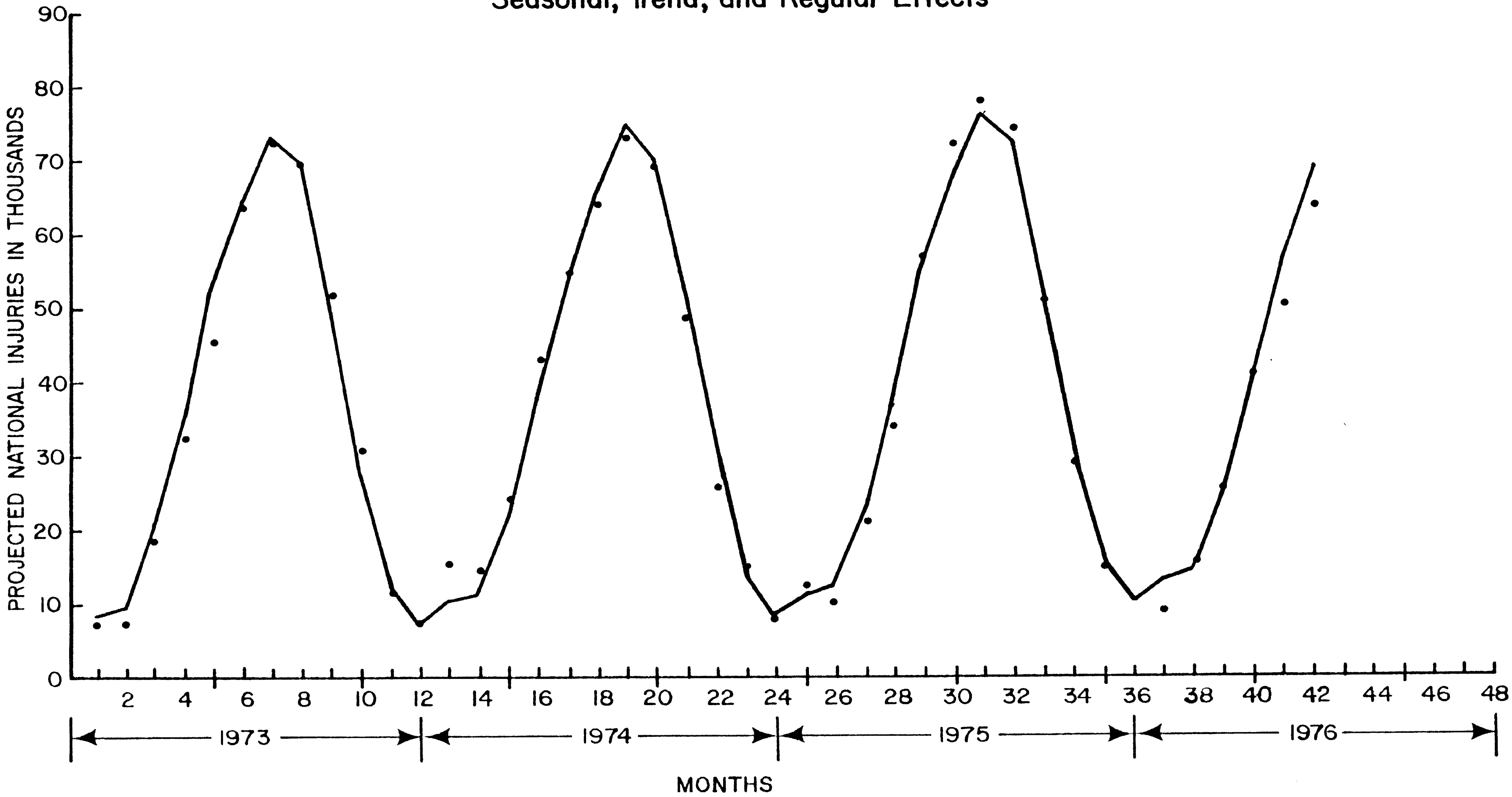


Table 2-3

Average Number of Bicycle-Associated Injuries by Month

January	11,221
February	11,927
March	22,603
April	37,986
May	54,582
June	66,222
July	74,806
August	71,192
September	50,626
October	28,672
November	13,822
December	8,545

Figure 2-2. Estimated Monthly Injuries — Models with Seasonal, Trend, and Regular Effects



An alternative model which incorporates monthly effects, such as Christmas, is estimated as

$$\hat{Y} = -2587.5 + 120.4X + Mi \ ,$$

where $\hat{Y}$ and X are as before, and Mi represents the monthly average of accidents. This model fits only slightly better, explaining 98% of the variation. Again, only a very small increasing trend is estimated. This model is plotted in Figure 2-2.

The estimated distribution of these accidents by age and sex is given in Table 2-4 for 1975. This distribution is also presented graphically in Figure 2-3. The data from the first half of 1976 were not included since the seasonal differences would have tended to give a misleading impression.

Approximately twice as many males as females were involved in these accidents. As is to be expected with bicycle accidents, children predominate. The age groups 5-9 and 10-14 each accounted for nearly a third of the bicycle accidents. A slight shift toward more use of bicycles by older persons is observed. In 1974, 77.1% of the accidents occurred to persons under 15, while in 1975 this figure was reduced to 75%. Also, persons over 20 accounted for 11.6% of the accidents in 1974, while this has increased to 13% in 1975. These shifts are small, however; since older persons tend to have fewer accidents for the same exposure, the usage shift may be greater than that seen in the accident data.

Table 2-5 reproduces the severity matrix used by the CPSC to scale severity of injury. The estimated distribution of injuries by severity is tabled in Table 2-6 and presented visually in Figure 2-4. No significant changes in the distribution of injury severities have become apparent over the period 1972 to 1976.

Table 2-7 defines the injury diagnoses and body part classifications used by the CPSC. Table 2-8 gives the estimated distribution of bicycle-associated injuries for these classifications. The most

Table 2-4

Estimated Number of Bicycle Injuries by Age and Sex for the United States, 1975

Age	Males	Females	Total	Row %
Under 2	2,895	1,385	4,280	0.1
2-4	26,562	18,818	45,380	9.5
5-9	94,073	55,322	149,395	31.4
10-14	117,599	44,523	162,122	34.0
15-19	41,263	15,692	56,955	12.0
20-29	17,984	11,768	29,752	6.2
30-39	6,637	5,543	12,180	2.6
40-49	3,050	3,798	6,848	1.4
50-59	2,004	2,650	4,654	1.0
60-64	1,460	675	2,135	0.4
65-69	858	369	1,227	0.3
70+	863	477	1,340	0.3
Total	315,248	161,020	476,268	
Column %	66.2	33.8		

TABLE 2-5. NEISS Injury Matrix

SUMMARY OF SEVERITY INDEX

Category 7 - Category 6's who are hospitalized and deaths - Severity Value of 2516

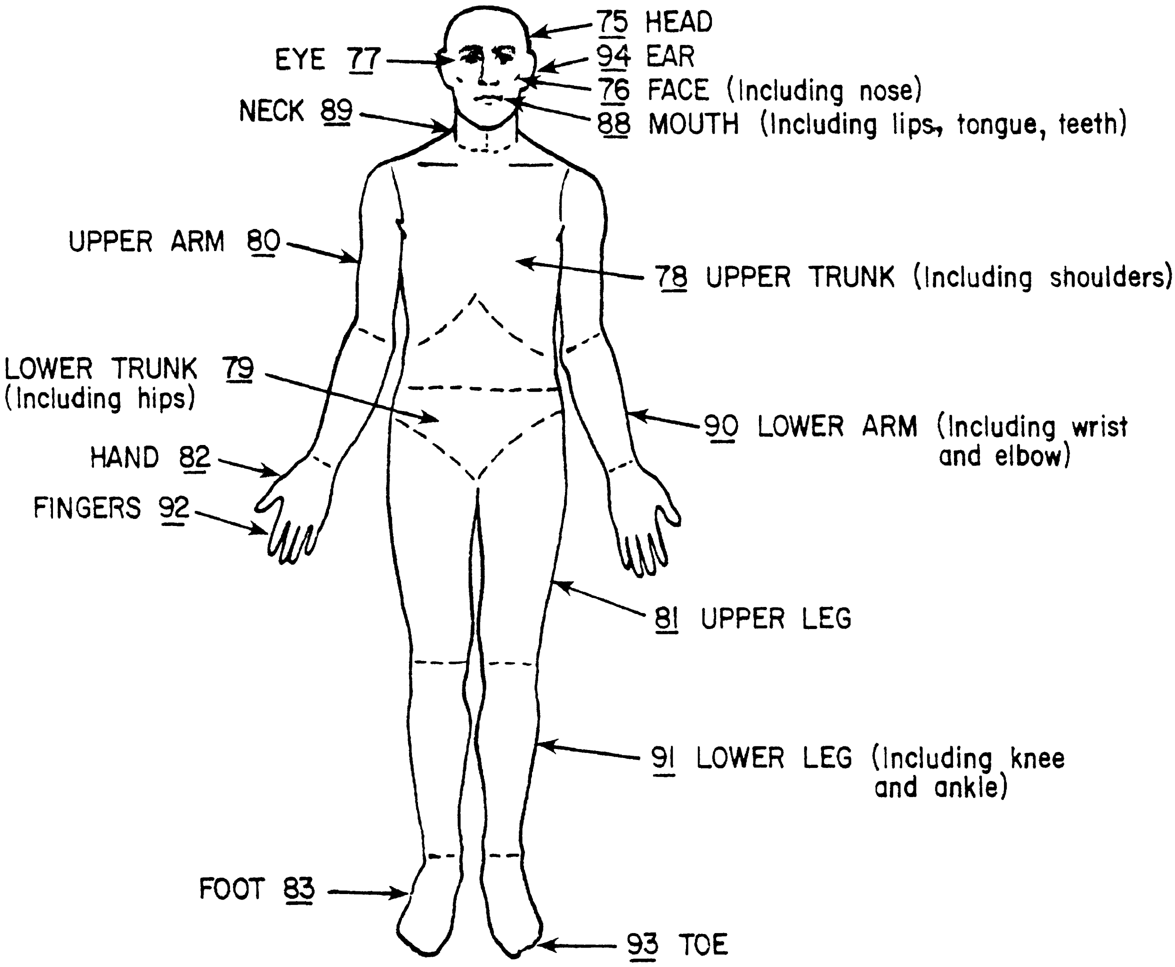
Diagnosis	Severity Category 6 Severity Value - 360	Severity Catetory 6 Severity Value - 81	Severity Category 4 Severity Value - 31	Severity Category 3 Severity Value - 17	Severity Category 2 Severity Value - 12	Severity Category 1 Severity Value - 10
Amputation	Any part of body					
Avulsion	25% of body +	head, eye, upper trunk	lower trunk	leg, arm, hand, foot, finger, toe	mouth, ear	
Burns	25% of body + or eye	all single body parts except finger, toe, ear			ear, finger, toe	
Cell Damage	25% of body +	head, face, eye, upper or lower trunk		leg, arm, hand, foot, finger, toe		
Concussion	25% of body +	head				
Contusion or Abrasion	25% of body +			head, upper trunk	ear, mouth, neck, eye, lower trunk	arm, leg, hand, foot, finger, toe
Crushing	head, arm, leg, trunk, foot, hand		finger, toe			
Dislocation	25% of body +	head, upper trunk	lower trunk, eye		arm, leg, hand, foot, finger, toe	
Foreign Body	25% of body +	head, upper trunk	lower trunk	mouth	arm, leg, hand, foot, finger, toe, eye	
Fracture	25% of body +	head, neck, upper and lower trunk	eye	arm, leg, hand, foot, finger, toe, mouth		
Hematoma	25% of body +	head, upper trunk	eye, lower trunk	arm, leg, hand, foot	finger, toe, ear, mouth, neck	
Internal Organ Injury	25% of body +	head, neck, upper or lower trunk	mouth, eye			
Laceration	25% of body +		head, eye, upper or lower trunk		arm, leg, hand, foot, finger, toe, ear	
Nerve Damage	25% of body +	all other body parts				
Puncture	25% of body +	head, face, upper trunk	eye or lower trunk		arm, leg, hand, foot, finger, toe, mouth	
Strain or Sprain	25% of body +			neck, upper trunk	lower trunk, eye	arm, leg, hand, foot, finger, toe, ear
	anoxia, electric shock, submersion	ingested or aspirated foreign object				
Dermatitis			25% of body +		head, face, eye, upper and lower trunk	arm, leg, hand, foot, finger, toe, ear

Table 2-6

Estimated Number of Bicycle Injuries by NEISS
Severity Category for 1972-1975, 1976 (Jan-Jun)

Severity	1972	%	1973	%	1974	%	1975	%	1976	%
0	5,986	1.8	2,712	0.6	3,818	0.8	4,119	0.9	202	0.1
1	78,232	23.1	105,808	25.1	119,651	26.2	127,453	26.7	57,350	27.7
2	79,161	23.4	92,658	22.1	85,073	18.7	94,698	19.9	32,389	15.6
3	68,372	20.2	86,288	20.6	108,585	23.8	108,439	22.7	47,953	23.2
4	73,135	21.6	95,020	22.7	100,372	22.0	98,982	20.8	46,660	22.5
5	18,875	5.6	22,356	5.3	26,591	5.8	28,490	6.0	13,153	6.4
6	9,305	2.7	13,150	3.1	11,316	2.5	13,986	2.9	9,017	4.4
7	686	0.2	1,775	0.4	339	0.1	366	0.1	241	0.1
8	122	0.04	245	0.1	89	0.02	279	0.1	73	0.03
Total	338,884		419,284		455,834		476,812		207,038	

TABLE 2-7. BODY PART AND INJURY DIAGNOSIS



INJURY DIAGNOSIS	CODE
Amputation	50
Anoxia	65
Avulsion	72
Burns (not specified)	47
Burns (scale from hot liquids)	48
Burns (thermal)	51
Burns (chemical, caustics, etc.)	49
Cell damage by radiation, except thermal (radiation burns by ultraviolet, x-rays, radio-active materials, etc.)	73
Concussion	52
Contusions/Abrasions	53
Crushing	54
Dermatitis, Conjuntivitis	74
Dislocation	55
Electric Shock	67
Foreign Body	56
Fracture	57
Hematoma	58
Internal Organ Injury	62
Laceration	59
Nerve Damage	61
Poisoning	68
Puncture	63
Strain or Sprain	64
Submersion (including drowning)	69
Other	81
Not stated	70
Ingested foreign object	4100
Aspirated foreign object	4200

BODY PART	CODE
Head	75
Ear	94
Eyeball	77
Face (including nose)	76
Mouth (lips, tongue, teeth)	88
Neck	89
Upper trunk (including shoulders)	78
Lower trunk (including hips)	79
Upper arm	80
Lower arm (including wrist and elbow)	90
Hand	82
Finger	92
Upper Leg	81
Lower Leg (including knee and ankle)	91
Foot	83
Toe	93
25-50% of Body	84
All parts of body	85
Other	86
Not stated	87

TABLE 2-8 1975 **ESTIMATED NATIONAL DISTRIBUTION OF BICYCLE INJURIES BY BODY PART AND DIAGNOSIS.**

Body Part

Diagnosis	Internal Ingested or Aspirated	Head	Ear	Eyeball	Face Includ-ing Nose	Mouth Including Lips, Tongue, Teeth	Neck	Upper Trunk Including Shoulders	Lower Trunk Including Hips	Upper Arm	Lower Arm Including Wrist & Elbow	Hand	Finger	Upper Leg	Lower Leg Including Knee & Ankle	Foot	Toe	25-50% of Body	All Parts of Body	Other	Not Stated	Row Total	Row %
Amputation						16							353				146					515	0.1
Anoxia																							0
Avulsion			46		15	167		25	6		27	182	1252		529	409	879					3588	0.8
Burns (Not Specified)					21																	21	0.0
Burns (Hot Liquid)																							
Burns (Thermal)															38	12						50	0.0
Burns (Chemical)																							
Cell Damage (Radiation)		19		136	69				11					8			45					298	0.1
Concussion		9641																				9641	2.0
Contusion, Abrasions		20791	192	606	23550	2673	689	16705	7588	1413	24577	6057	4061	2974	37011	14772	2380	4510	216	22	395	171119	36.0
Crushing		34			12								180	16	54	240	16		150			702	0.1
Dermatitis, Conjunctivitis																							
dislocation					34	1336		744	27		443	57	282		294		26					3843	0.8
Electric Shock																							
Foreign Body		27		738								49	25		36	45						370	0.2
Fracture		1610			2839	577	72	12340	621	1201	22170	2430	5775	774	6864	1863	1341					60477	12.7
Hematoma		2836		22	1229	15	16	213	326		179	54	336	292	526	191	92					6327	1.3
Internal Organ				6				110	515													631	0.1
Laceration		2477	914	190	51100	11491	193	1030	4387	1247	9927	4836	8164	4030	33246	9462	4590	185	99	9	14	169891	35.8
Nerve Damage					13																	13	0.0
Poisoning																							
Puncture		308		34	482	294		43	27	2	212	263	35	111	1045	222						3078	0.6
Sprain/Strain							512	3294	692	56	12504	1375	1751	120	15057	3377	334	94				39166	8.2
Submersion																							
Other		521	15			16	9	9	36		37	2		31	46				37		16	775	0.2
Not Stated		475	94		4	37	2	608	310	53	421	131	226		614	607		2	53		247	3884	0.8
Ingested Foreign Object																							
Aspirated Foreign Object																							
Column Total		61090	1198	1782	79368	16622	1493	35121	14546	3972	70497	15436	23040	8356	95360	31200	9849	4791	555	31	672	474979	
Column %		12.9	0.3	0.4	16.7	3.5	0.3	7.4	3.1	0.8	14.8	3.2	4.9	1.3	20.1	6.6	2.1	1.0	0.1	0.1	0.1		

†Discrepencies in total projected figures from chart to chart are due to missing values for variables used in a particular stratification.
*Comprises less than .1% of total.

Figure 2-3. Age and Sex Distribution of Bicycle Associated Injuries, 1975

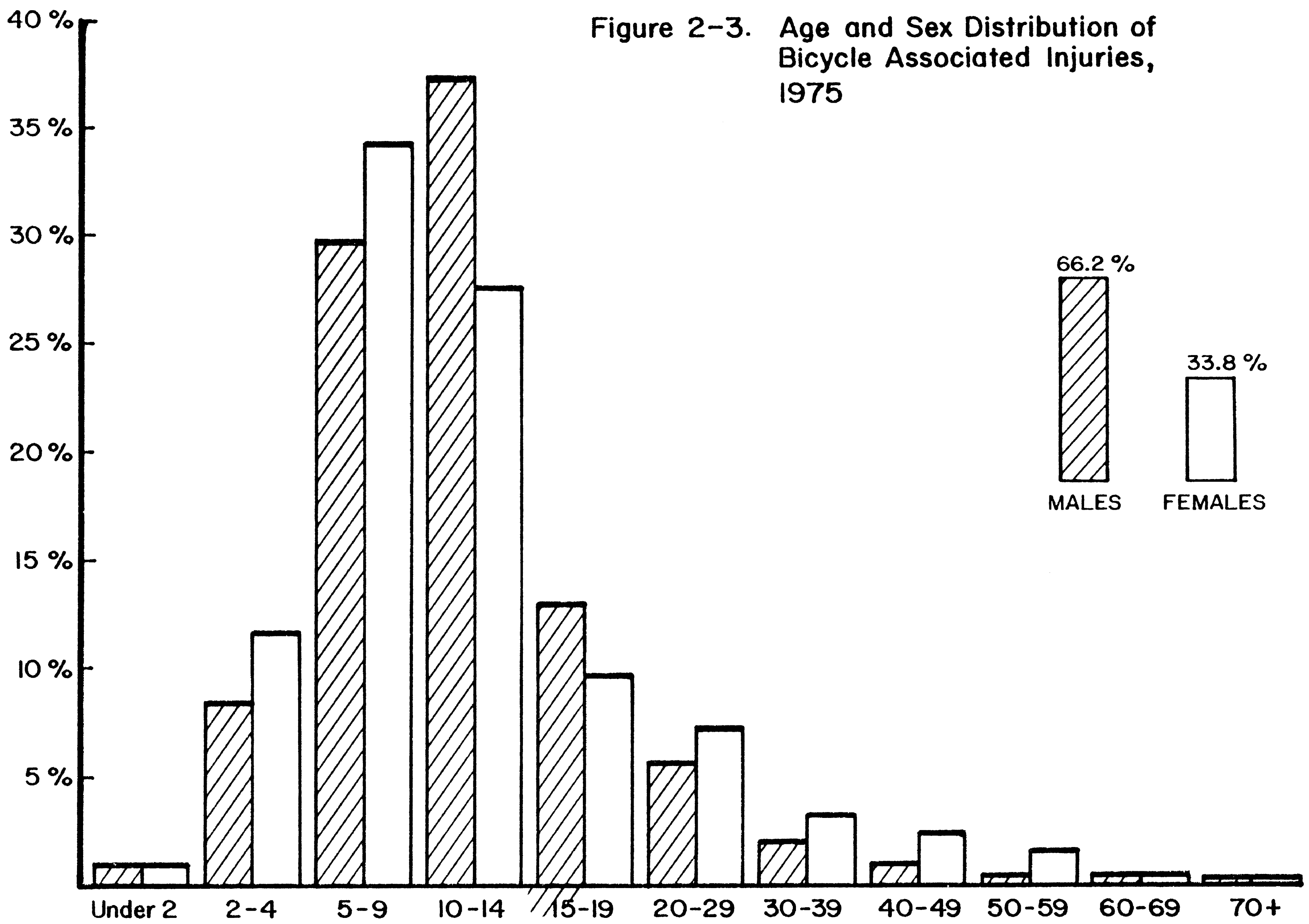
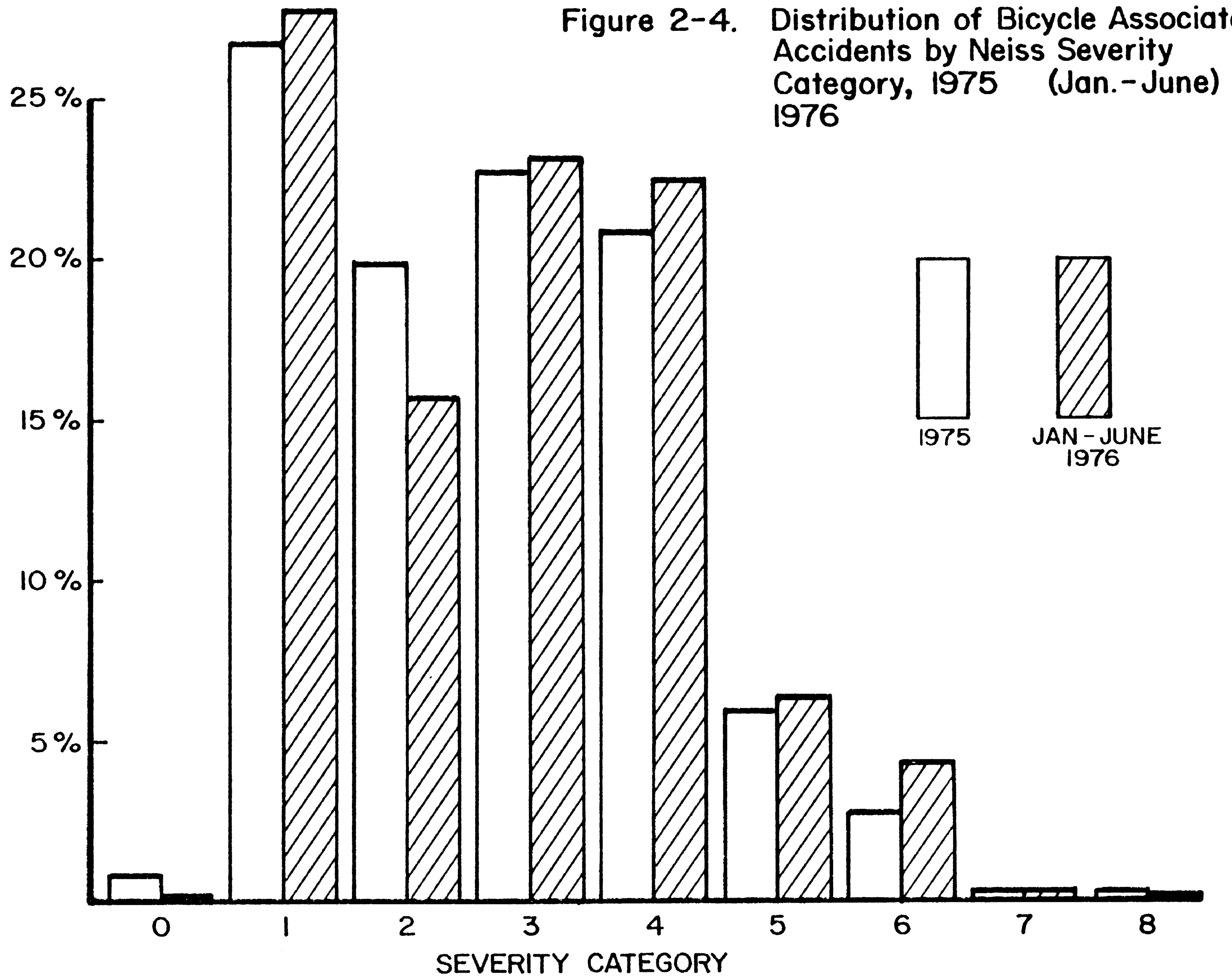


Figure 2-4. Distribution of Bicycle Associated Accidents by Neiss Severity Category, 1975 (Jan.-June) 1976



frequent injuries are contusion or abrasion (36.0% of the cases), followed closely by lacerations (35.8% of the cases). Next in frequency are fractures (12.8%) and strains or sprains (8.2%). The only other diagnoses which account for more than 19% of the cases are concussions (2%) and hematomas (1.2%).

The most frequently injuried body parts are the lower leg (20.1%), the face (16.7%), the lower arm (14.8%), and the head (12.9%). In general, the extremities (feet, legs, hands, and arms) account for over half (52.5%) of the injuries, while the head and face account for about a third (33.8%) of the cases. This represents little change from 1974.

In general, much of the results of the analysis of the latest data are quite similar to the analysis of the 1974 data. No changes in severity were noted. There was a very slight shift toward older ages for persons involved in the accidents. The most important change is a reduction in the increasing trend for national totals after correcting for seasonality. That is, after correcting for the seasonality of bicycle accidents, there is no significant increasing trend for the time period 1973 - June of 1976.

3. ANALYSIS OF IN-DEPTH INVESTIGATIONS

The data utilized in this section consist of 646 in-depth investigations of accidents involving bicycles. The investigations were conducted by the CPSC during the years 1972-1976, although only four cases were from 1976. During this period, the reporting form has changed twice, with corresponding changes in the data recorded. The more recent investigations appear to have been more carefully done, in the sense that the data are more complete. The criteria for selecting cases for investigation have also varied during this time period. Consequently it is difficult, if not impossible, to define the population from which these cases were drawn. The analysis is thus restricted to description of this set of cases--results should not be generalized to all bicycle accidents.

A list of all variables abstracted from the data forms and currently available in a computer file is presented in the Appendix. The appendix also lists the marginal frequencies of most of these variables. In the case of a continuous variable, such as age, the mean and standard deviation are presented rather than a tabular distribution.

Currently, the cases selected for in-depth investigations seem to come primarily from two sources: cases selected from the NEISS and cases initiated by consumer complaints. As would be expected, a high proportion of the cases investigated because of consumer complaints involve some sort of a product failure. A much lower proportion of those initiated from the NEISS involve any sort of product failure. Previously, a third major source of cases was from news sources or hospital records--presumably reported by local investigators rather than through the NEISS. The CPSC seems to be moving in the direction of making the in-depth investigations relatable to the NEISS cases, which is a desirable goal. Currently, the bulk of the cases involving bicycles which are selected for in-depth investigation are from the NEISS, but they are restricted to the four highest severity categories. Thus, they represent only about 30% of the cases, which involve the most severe injuries.

The cases which were identified through the NEISS comprise about 40% of the total of the cases. This sub-group is the most reliable as representative of a larger population of bicycle-associated injuries. It is still biased toward the more severe injuries, and has special emphasis on deaths. In addition, it is clearly not representative of the NEISS data in many respects. Figure 3-1 shows a distribution of these cases by month of occurrence, compared with a similar distribution for NEISS cases. There are rather large differences. Similarly, these cases do not begin to come from the hospitals in the NEISS in anything like the proportions expected by the number of NEISS cases or the probabilities of the hospitals. In part this is due to some hospitals refusing to allow follow-up investigations, in part due to remote geographical location of some hospitals (relative to the field offices of the CPSC), and in part due to the differential selection for severity. However, if any extrapolations were to be made from these data, they would be based on the subset of cases identified through the NEISS.

Looking at the combined set of cases, the initial cause of the accident is tabulated as variable 54 in the appendix. From this, 16.4% of the cases had "product failure" as the initial cause. In addition, 0.8% of the cases had "product exposure" as the initial cause. Together, then, about 17% of the in-depth cases appear to be "product-caused" in some sense. This is the figure quoted by the CPSC previously.

It would be incorrect to infer from this, however, that 17% of bicycle accidents are "product-caused." Aside from the fact that attention has been restricted to the more severe injuries, the data

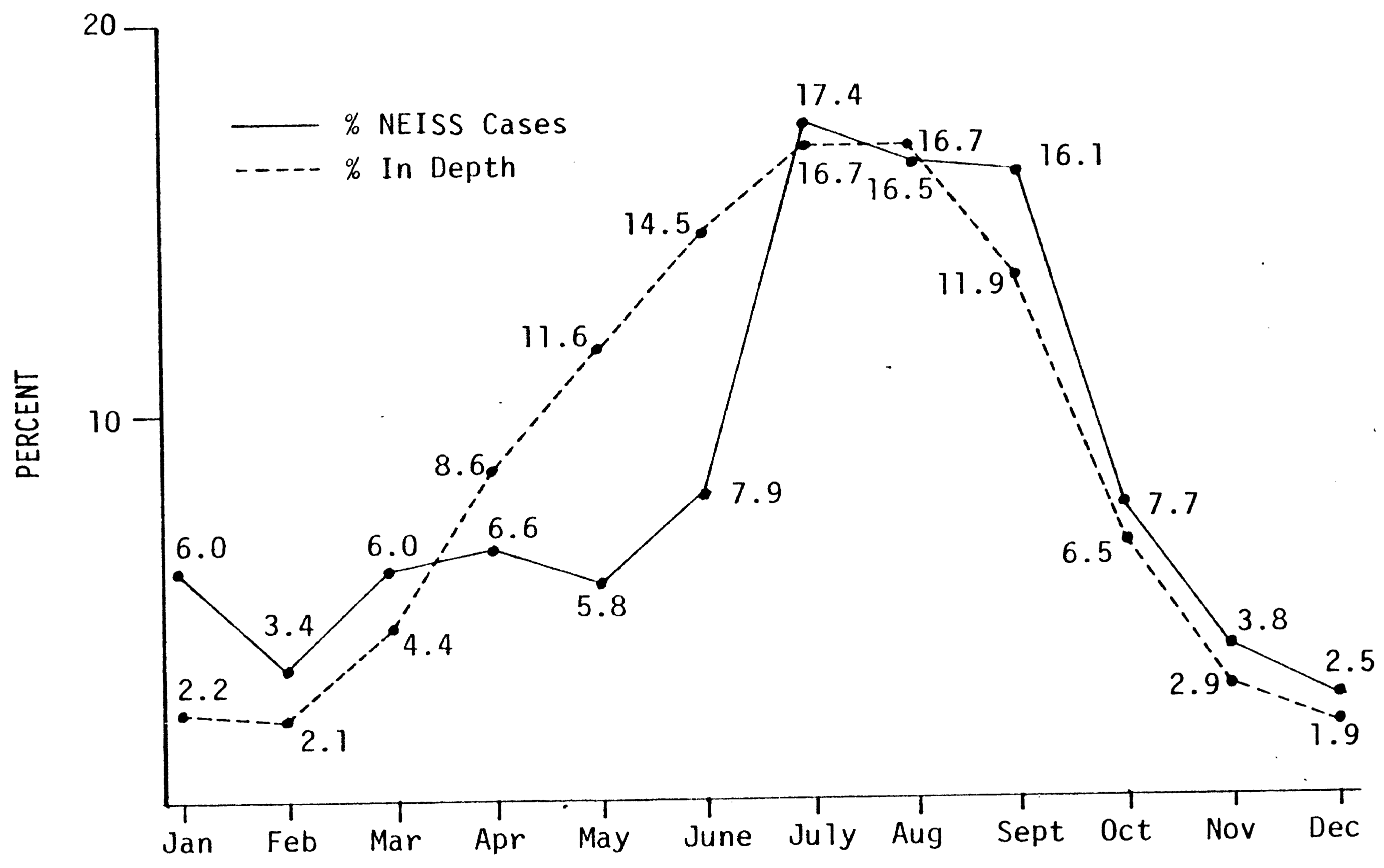


Figure 3-1

Comparison of NEISS and In-Depth Cases

are not a probability sample of bicycle accidental injuries. Table 3-1 gives the distribution of initial cause of accident for three sources of the in-depth cases: NEISS, consumer complaint, and other. The cases identified through the NEISS show only 7.8% of the accidents to have been caused by product failure or exposure, while 78.5% of the cases arising from consumer complaints were recorded as caused by the product. Slightly over 12% of the cases from the other sources had product failure listed as the cause of the accident. There is no guarantee that the cases identified through the NEISS are representative of the accidents with the highest four injury severity levels, but at least there are no obvious biases. To this extent, one might interpret these data as meaning that about 8% of the more severe bicycle accidents were caused by a failure of some bicycle components. (An approximate 95% confidence interval for the true proportion of product-caused bicycle accidents would be from 5% to 14%.)

Table 3-1 presents the distribution of primary cause of the accident for each of the three major sources of cases. The proportion of cases which may be caused by the product ranges from about 8% for the NEISS-identified data to nearly 80% for the consumer complaints identified data.

Table 3-2 relates the cause--product failure or no product failure--to the age of the bicycle for each of the main data sources. Again, the data from the NEISS would be the most representative. One can see from this table that the proportion of product failures tends to increase with the age of the bicycle. This might be interpreted to mean that what has been recorded as product failure may also be due in part to wear-out or poor maintenance of the bicycle. The increase of the proportion of product failures with the age of the bicycle is quite evident in the cases identified through the NEISS. On the other hand, cases investigated because of consumer complaints averaged about 87% product failures, and the data identified from other sources (news accounts, hospital records, unknown source) averaged 21% product failures. The latter two sources showed little trend with the age of the bicycle.

Table 3-1

Distribution of bicycle accidents by case source and primary cause

	Operator negligence	Road hazard	Product failure or exposure	Unknown or not applicable	Caused by another individual	Deliberate misuse	Poor maintenance	Total in sample
Data provided by NEISS	55.1%	4.3%	7.8%	2.3%	8.6%	17.2%	4.7%	256
Data provided by consumer complaint	9.2%	0.0%	78.5%	3.1%	1.5%	7.7%	0.0%	65
Data provided by an unknown source, hospital record or newspaper	48.3%	2.5%	12.3%	2.5%	6.5%	21.8%	6.2%	325

Table 3-2

Distribution of bicycle accidents by product component failure, year of bicycle manufacture and case source

Data provided by NEISS:

Year	Product Component Failure	No product Component Failure	Uncertain	Total in Sample
1950-1969	25.8%	74.2%	0.0%	31
1970	35.7%	64.3%	0.0%	14
1971	17.4%	82.6%	0.0%	23
1972	10.5%	89.5%	0.0%	38
1973	8.3%	91.7%	0.0%	48
1974	8.1%	90.3%	1.6%	62
1975	0.0%	100.0%	0.0%	2

Data provided by consumer complaint:

Year	Product Component Failure	No product Component Failure	Uncertain	Total in Sample
1950-1969	100.0%	0.0%	0.0%	1
1970	0.0%	100.0%	0.0%	1
1971	100.0%	0.0%	0.0%	1
1972	88.9%	11.1%	0.0%	9
1973	90.0%	6.7%	3.3%	30
1974	85.7%	7.1%	7.1%	14
1975	----	----	---	--

Data provided by an unknown source, hospital record, or newspaper:

Year	Product Component Failure	No product Component Failure	Uncertain	Total in Sample
1950-1969	13.3%	83.3%	3.3%	60
1970	26.3%	73.7%	0.0%	38
1971	17.9%	80.6%	1.5%	67
1972	25.8%	74.2%	0.0%	66
1973	16.7%	83.3%	0.0%	30
1974	80.0%	20.0%	0.0%	5
1975	----	----	---	--

Table 3-3 shows the distribution of the initial causes of the accident separately for bicycles which were identified as BMA/6 certified.* Again, this is presented separately for the different sources which initiated the case. As before, the data identified through the NEISS would presumably be the most representative. In general the distributions are quite similar. No significant differences are noted. It is of interest that the data identified through the NEISS show that BMA/6 certified bicycles may have a slightly lower rate of poor maintenance and deliberate misuse. On the other hand, the BMA/6 certified bicycles had a slightly higher rate of product failure than the others among the cases identified from hospital records, news accounts, or other sources. Pooling all the sources, product failure was listed as the cause of the accident in 28.8% of the accidents involving BMA/6 certified bicycles, and in 15.0% of the accidents involving bicycles not identifiable as BMA/6 certified.

The 153 accidents which had a product component failure identified as a cause of the accident were investigated further to determine which components were listed as having failed. Detailed distributions are shown in Table 3-4. For all the accidents listing product failure as a cause, the components most often identified were: wheels (20% of the cases), frame (20% of the cases), and caliper brakes (19% of the cases). Nothing was listed in 20% of the cases. Among the 31 cases involving product failure which were identified from the NEISS, 35% had no specific component listed. Among those components listed, caliper brakes led, involving 19% of the cases. The other components were wheels, 13% of the cases; handlebars and chains, 9.7% each.

*BMA/6 certified bicycles are those which are certified by the manufacturer as complying with a voluntary safety standard developed by the Bicycle Manufacturer's Association. This standard is denoted BMA/6.

Among BMA/6 certified bicycles, wheels were the most frequently failing component (30% of the cases), followed by caliper brakes (22% of the cases). About a quarter of the cases had no component specified. A somewhat different pattern of component failure was observed among the non-BMA/6 certified bicycles. In this group, the

Table 3-3

Distribution of bicycle accidents by initial cause, BMA/6 certification and case source

	Operator Negligence	Road Hazard	Product failure or exposure	Unknown or not applicable	Caused by another individual	Deliberate Misuse	Poor Maintenance	Total in Sample
Data provided by NEISS:								
BMA/6 certified bicycles	66.7%	5.3%	8.8%	0.0%	7.0%	12.3%	0.0%	57
Others	51.8%	4.0%	7.5%	3.0%	9.0%	18.6%	6.0%	199
Data provided by consumer complaint:								
BMA/6 certified bicycles	4.8%	0.0%	81.0%	4.8%	0.0%	9.5%	0.0%	21
Others	11.4%	0.0%	77.3%	2.3%	2.3%	6.8%	0.0%	44
Data provided by an unknown source, hospital record, or newspaper:								
BMA/6 certified bicycles	30.8%	3.8%	30.8%	0.0%	11.5%	15.4%	7.7%	26
Others	48.8%	2.3%	10.7%	2.7%	6.0%	22.4%	6.0%	299

Table 3-4

Distribution of bicycle accidents by product component involved.

BMA/6 certified bicycles:

	Caliper brake (1)	Coaster brake (2)	Other or unspecified (3)	Wheel (4)	Frame (5)	Handlebars (6)	None (7)	Pedal (8)	Chain (9)	Total in Sample
Data provided by NEISS	12.5%	0.0%	12.5%	0.0%	0.0%	25.0%	25.0%	12.5%	12.5%	8
Data provided by consumer-complaint	27.7%	0.0%	11.1%	38.9%	0.0%	0.0%	5.6%	5.6%	11.1%	18
Data provided by an unknown source, hospital record, or news-paper	18.2%	0.0%	9.0%	36.4%	9.0%	0.0%	27.3%	0.0%	0.0%	11
Total BMA/6	21.6%	0.0%	10.8%	29.7%	2.7%	5.4%	16.2%	5.4%	8.1%	37
Others:										
Data provided by NEISS	21.7%	0.0%	4.3%	17.4%	4.3%	4.3%	39.1%	0.0%	8.7%	23
Data provided by consumer-complaint	12.5%	0.0%	5.0%	22.5%	47.5%	5.0%	5.0%	0.0%	2.5%	40
Data provided by an unknown source, hospital record, or newspaper	18.9%	9.4%	5.7%	13.2%	18.9%	1.9%	24.5%	3.8%	3.8%	53
Total other	17.2%	4.3%	5.2%	17.2%	25.9%	3.4%	20.7%	1.7%	4.3%	116
Total NEISS	19.3%	0.0%	6.4%	12.9%	3.2%	9.7%	35.5%	3.2%	9.7%	31
All	18.3%	3.3%	6.5%	20.2%	20.2%	3.9%	19.6%	2.6%	5.2%	153

frame (26% of the cases) was the most frequently failing component, followed by wheels and caliper brakes (17% of the cases each). As the frame was listed as failing in only one out of the 37 BMA/6 cases, it appears that the BMA/6 standard results in stronger frames than the general run of bicycles.

Table 3-5 shows the distribution of cases by injury diagnosis and body part injured. For comparison, the same distribution from the surveillance data from the NEISS are shown. That is, the types of injury and the body parts injured in the 646 in-depth investigations are compared with the types of injury and body parts injured as reported from the twenty thousand plus reports from the NEISS, which are used to form the national estimates. The percentages reported are based on the national estimates. Some differences are quite apparent, reflecting the fact that the in-depth cases are restricted to the more severe injury categories. For example, concussions account for over 10% of the injuries reported in the in-depth investigations, while occurring in only 2% of the cases nationally. Similarly, fractures account for a third of the injuries in the in-depth investigations, but only 14% of the cases in the surveillance data. On the other hand, contusions and abrasions are a third of the injuries nationally, but only 14% of the in-depth case injuries. The main conclusion to be drawn is that the injuries in the in-depth investigations are not representative of the set of all bicycle accidents. However, the differences may be mainly due to the severity criterion.

It is interesting to note that about 7% of the cases involved collision with a motor vehicle. This compares with about 3% estimated from the NEISS data. On the other hand, according to the Metropolitan Life Statistical Bulletin,* in 1974, 89.9% of the fatalities in bicycle accidents resulted from collisions with motor vehicles. It seems apparent that an accident involving a motor

*Cycling Accident Fatalities in the United States. STatistical Bulletin, Metropolitan Life. June, 1976.

Table 3-5

Distribution of bicycle accidents by* primary injury and body part involved

	Concussion	Contusions/ Abrasions	Fracture	Laceration	Strain/ Sprain	Other	Marginal Frequencies
Head and face	10.2% (2.1%)	5.0% (9.7%)	9.3% (0.9%)	14.7% (19.5%)	0.2% (0.0%)	2.0% (1.9%)	41.4% (34.1%)
Trunk	0.0% (0.0%)	1.7% (4.7%)	5.9% (2.3%)	0.5% (1.1%)	0.6% (1.2%)	2.0% (0.7%)	10.7% (10.0%)
Arm and hand	0.0% (0.0%)	1.9% (7.3%)	10.2% (7.4%)	3.1% (4.6%)	1.5% (3.6%)	1.1% (1.6%)	17.8% (24.5%)
Leg and foot	0.0% (0.0%)	4.2% (11.4%)	7.7% (3.0%)	9.3% (10.5%)	2.2% (4.4%)	1.1% (1.2%)	24.5% (30.5%)
Other	0.0% (0.0%)	0.8% (0.6%)	0.2% (0.0%)	0.3% (0.2%)	0.0% (0.0%)	4.5% (0.1%)	5.8% (0.9%)
Marginal Frequencies	10.2% (2.1%)	13.6% (33.7%)	33.3% (13.6%)	27.9% (35.9%)	4.5% (9.2%)	10.7% (5.5%)	

*The percentages within parentheses are from the 1974 estimated national distribution of bicycle injuries by body part and diagnosis (see The National Electronic Injury Surveillance System and Bicycle Associated Accidents, J.D. Flora, et al, UM-HSRI-SA-75-18, October 1975).

vehicle and a bicycle is more dangerous to the bicycle rider than one not involving a motor vehicle. The proportion of accidents involving motor vehicles probably increases sharply with the increase in the severity of the injury.

Since the submission of the interim report, the 646 in-depth investigations were reread to determine the road condition at the time of the accident. In 39% of the cases it was not possible to determine the condition of the road surface (wet or dry) from the report. Thirty-one cases were identified as definitely involving wet or slippery surfaces, and 363 were definitely identified as dry. Most of the unknown 252 cases were probably dry, but this cannot be determined with any accuracy.

The following tables are provided to help indicate the role surface conditions played in the 646 in-depth cases. Entries in each table are column percents followed in parentheses by the number of accidents involved.

Table 3-6 indicates that exposure to wet surfaces was similar for all brake types. Consequently, no association between brake type and surface condition is apparent. The data were not detailed enough to determine whether difficulty in stopping contributed to the cause of the accident.

With only 31 accidents involving wet surfaces it is difficult to find substantial support in an association between bicycle accidents and a product or manufacturer defect when considering the initial cause. Further breakdown of the data by whether or not there was a product component failure that was at all contributory is provided in the next table.

It would be expected that accidents involving wet surfaces would tend to aggravate a product component failure and result in a higher percentage of accidents on wet surfaces then with other conditions. However, this is not the case as shown above. With only 31 accidents involving wet surfaces it would be difficult to say that surface conditions even contributed to a component failure.

Table 3-9 helps to indicate directly which product components failed to function in the course of the accident. With only two accidents involving wet conditions and faulty brakes it is hardly proper to propose a connection between brakes and surface. It should be pointed out that the one accident involving a caliper brake failure with an accident on a wet surface has been directly associated with the moisture present. Regardless of this, one accident in 31 does not permit generalization of this relationship.

Table 3-6

Type of Brake

	Caliper	Coaster	Unknown	Other
Dry	61.5 (163)	52.3 (145)	54.4 (49)	42.9 (6)
Unknown	34.0 (90)	42.2 (117)	41.1 (37)	57.1 (8)
Wet	4.5 (12)	5.4 (15)	4.4 (4)	0.0 (0)
Total	265	277	90	14

Table 3-7

		Dry	Unknown	Wet
Initial cause of accident	Operator negligence	45.2 (164)	47.2 (119)	67.7 (21)
	Obstruction caused	2.5 (9)	2.8 (7)	0.0 (0)
	Rough off-road terrain	.8 (3)	0.0 (0)	0.0 (0)
	Manufacturer defect	19.0 (69)	14.3 (36)	3.2 (1)
	Unknown or not applicable	1.4 (5)	3.6 (9)	6.5 (2)
	Caused by another person	6.9 (25)	6.0 (15)	12.9 (4)
	Deliberate misuse	16.8 (61)	22.2 (56)	9.7 (3)
	Maintenance	6.3 (23)	3.6 (9)	0.0 (0)
	Product exposure	1.1 (4)	.4 (1)	0.0 (0)
Total		363	252	31

Table 3-8

		Dry	Unknown	Wet
Did product component failure contribute to the accident?	Yes	27.5 (100)	20.2 (51)	6.5 (2)
	No	71.9 (261)	77.8 (196)	90.3 (28)
	Uncertain	.6 (2)	2.0 (5)	3.2 (1)
Total		363	252	31

Table 3-9

		Dry	Unknown	Wet
Component contributing to the accident	Broken caliper brake	6.1 (22)	3.2 (8)	3.2 (1)
	Broken coaster brake	.8 (3)	2.0 (5)	3.2 (1)
	Broken other	3.3 (12)	4.4 (11)	3.2 (1)
	Wheel	6.3 (23)	3.6 (9)	0.0 (0)
	Frame	7.7 (28)	5.2 (13)	0.0 (0)
	Handlebars	1.4 (5)	1.6 (4)	0.0 (0)
	None	71.9 (261)	77.8 (196)	90.3 (28)
	Pedal	.3 (1)	1.2 (3)	0.0 (0)
	Chain	2.2 (8)	1.2 (3)	0.0 (0)
Total		363	252	31

4. CONCLUSIONS AND RECOMMENDATIONS

In HSRI's report to BMA approximately one year ago, it was noted that the variation in the data could be explained by two concurrent trends. The first was a cyclical variation due to differential use of bicycles with seasonal changes, and this has remained unchanged as the NEISS-reported bicycle-associated accidents have been extended into the next eighteen months. The second trend was a linearly increasing number of accidents with time. This trend has continued into the time period January, 1975 through June, 1976, but it has become statistically non-significant when viewed over the total time period considered.

Another observation made from the extended analysis of the NEISS data is that there appears to be an upward shift in the age distribution of riders in bicycle-associated accidents. This implies that bicycles are being used more by an older segment of the population for recreational purposes, as a means of transportation, or both.

With regard to the 646 in-depth cases of bicycle-associated accidents analyzed, it is abundantly clear that this sample is not representative of the total population of such accidents. The occurrence of accidents involving motor vehicles, for example, was 7% in the in-depth sample, and only 3% in the complete NEISS-reported data. Accidents attributed to identifiable product failure are exaggerated in about the same proportion between the NEISS sample (8%) and the in-depth reports (17%).

The reason for these discrepancies probably lies in the method of selection of in-depth studies. Only a small proportion of them were triggered by the NEISS reporting system itself; the rest were initiated as a result of newspaper accounts or consumer complaint to

CPSC. This later group contains also a greater proportion of injuries in the more severe categories. The situation is further complicated by the fact that a sizable group of the hospitals in the NEISS sample declined to participate in the conduct of in-depth studies.

The capability to draw inferences from the in-depth data reports is limited by the lack of specificity about each of the accidents. The form used by the NEISS investigators is necessarily general since it has to be used over a very wide range of products, and cannot, therefore, provide sufficient detail about product performance to infer the exact cause of a failure if one existed. We would like, for example, be able to say about a broken bicycle wheel whether the break was due to normal wear, to the trauma of the accident, to lack of maintenance, to misuse during operation, or to some other cause. This determination cannot be made without a revision of the data collection form specifically asking for this information.

The extended time period for the present analysis provided an opportunity to compare in the in-depth studies the differences between the products built to the BMA/6 standard and pre-standard bicycles. While the amount of data is too small to draw any positive conclusions, there are indications that the BMA/6 products have fewer reported failures of the frames and are maintained in generally better condition than are the older bicycles. These differences should be explored over a larger set of data to provide a basis for partial evaluation of this standard.

When viewed over the entire time period, bicycle-associated accidents appear to be a reasonably stable phenomenon. The NEISS data provide the best means available for monitoring the performance of bicycles as a consumer product, and it is recommended that this surveillance be continued in the interests of both the public and the manufacturers. This is especially true in our present environment of increasing bicycle use in general and among an older segment of the population in particular.

APPENDIX A

Codebook: CPSC Bicycle Accident
In-Depth Reports

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
1	Case No.	001-646		646	3
2	Data card	1		646	1
3	Month of Accident	0-Unknown	1.1	7	2
		1-January	5.9	38	
		2-February	3.4	22	
		3-March	5.9	38	
		4-April	6.5	42	
		5-May	5.7	37	
		6-June	7.9	51	
		7-July	17.3	112	
		8-August	16.4	106	
		9-September	16.1	104	
		10-October	7.6	49	
		11-November	3.7	24	
		12-December	2.5	16	
4	Day of month of accident	01-31 00-unknown		646	2
5	Year of accident	72-1972	18.4	119	2
		73-1973	25.4	164	
		74-1974	24.3	157	
		75-1975	30.2	195	
		76-1976	.6	4	
		99-unknown	1.1	7	
6	Hospital ID	01-Not stated	61.6	398	2
		02-10517004	3.3	21	
		03-11436006	1.5	10	
		04-11106017	1.7	11	
		05-10113016	.2	1	
		06-11106002	.2	1	
		07-10137025	2.0	13	
		08-11106007	1.5	10	
		09-11436008	.3	2	
		10-10325004	.3	2	
		11-11436016	1.4	9	
		12-11136006	.2	1	
		13-11019007	.5	3	
		14-10849001	1.2	8	
		15-11542003	1.4	9	
		16-11255007	.9	6	
		17-10121015	.9	6	
		18-11106013	.6	4	
		19-11106011	1.2	8	
		20-10121019	.5	3	

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
		21-11606002	.3	2	
		22-11255005	.5	3	
		23-11542004	4.3	28	
		24-11029005	.5	3	
		25-11753001	.6	4	
		26-10112018	1.1	7	
		27-11106018	.9	6	
		28-11019001	.3	2	
		30-11029006	.2	1	
		31-11255004	.2	1	
		32-11106006	.5	3	
		33-11436017	.5	3	
		34-10748005	.9	6	
		35-11542007	.5	3	
		36-10121023	.2	1	
		37-11554008	.2	1	
		38-10112003	.2	1	
		39-11436004	.2	1	
		40-11019002	.2	1	
		41-10112004	.2	1	
		42-10517012	.2	1	
		43-11434006	.2	1	
		44-10639006	.2	1	
		45-11436012	.2	1	
		46-10112002	.2	1	
		47-11106016	.3	2	
		48-11524005	.2	1	
		49-10113001	.5	3	
		50-20251001	.9	6	
		51-10145010	.3	2	
		52-10113012	.2	1	
		53-11606001	.3	2	
		54-10748004	.2	1	
		55-10113024	.2	1	
		56-11020009	.3	2	
		57-10224004	.2	1	
		58-11542009	.2	1	
		59-10748002	.3	2	
		60-10325001	.2	1	
		61-10748001	.2	1	
		62-11436003	.3	2	
		63-10808004	.2	1	
		64-11436007	.2	1	
		65-11741003	.3	2	
		66-10147008	.3	2	
		67-11524004	.2	1	
		68-11434008	.2	1	
7	Case Source	1-NEISS	39.6	256	1
		3-Newspaper	1.9	12	
		4-Consumer complaint	10.1	65	
		5-Unknown	3.1	20	
		6-Hospital record	45.4	293	

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
8	State	01-New Jersey	1.2	8	2
		02-Illinois	4.0	26	
		03-New York	5.6	36	
		04-California	21.2	137	
		05-Georgia	1.4	9	
		06-Florida	3.6	23	
		07-Alabama	.5	3	
		08-North Carolina	2.2	14	
		09-Michigan	.3	2	
		11-Kansas	.3	2	
		12-Washington	7.6	49	
		13-Missouri	.9	6	
		14-Massachusetts	1.9	12	
		15-Iowa	.8	5	
		16-Utah	1.2	8	
		17-Pennsylvania	26.5	171	
		18-Wisconsin	2.0	13	
		19-Kentucky	1.9	12	
		20-New Hampshire	.2	1	
		21-Texas	2.0	13	
		22-Oregon	.6	4	
		23-Connecticut	.5	3	
		24-Colorado	.3	2	
		25-Ohio	.6	4	
		26-Tennessee	7.4	48	
		27-Louisiana	.3	2	
		28-South Carolina	.6	4	
		29-Maryland	1.2	8	
		31-West Virginia	.2	1	
		32-Virginia	1.1	7	
		33-Minnesota	.9	6	
		34-Indiana	.2	1	
		35-Rhode Island	.2	1	
		99-Unknown	.8	5	
9	Location	1-Area not suited for bicycle use	10.2	66	1
		2-Highway	3.4	22	
		3-Neighborhood side-walk or recreation area	23.2	150	
		4-Neighborhood street	62.1	401	
		9-Not stated	1.1	7	
10	Sex	1-Male	68.1	440	1
		2-Female	31.4	203	
		3-Not stated	.5	3	
11	Age	01-84 Mean 12.63 Standard Deviation 8.94			2
		99-Not stated	.6	4	

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
12	Height	26-78			2
		Mean 56.27			
		Standard Deviation 10.50			
		99-Not stated	4.8	31	
13	Handedness	1-Right	82.4	532	1
		2-Left	10.4	66	
		3-Both	1.7	11	
		4-Unknown	5.7	37	
14	Time of Accident	0000-0600	1.2	8	4
		0600-1200	11.8	76	
		1200-1800	57.4	371	
		1800-2400	27.6	178	
		9999-Not stated	2.0	13	
15	Day of Week	1-Sunday	16.1	104	
		2-Monday	15.3	99	
		3-Tuesday	13.6	88	
		4-Wednesday	13.0	84	
		5-Thursday	12.1	78	
		6-Friday	12.5	81	
		7-Saturday	14.9	96	
		8-Not stated	2.5	16	
16	Time seen in emergency room	0000-0600	1.9	12	4
		0600-1200	10.7	69	
		1200-1800	46.0	297	
		1800-2400	34.1	220	
		9999-Not stated or Not applicable	7.4	48	
17	Number of days between accident and visit to emergency room	0	85.8	554	1
		1	6.0	39	
		2	.3	2	
		3	.2	1	
		4	.3	2	
		5	.3	2	
		6	.2	1	
		8-greater than 7 days	.2	1	
		9-Unknown or not applicable	6.8	44	
18	Number of days incapacitated	000-180			3
		Mean 18.56			
		Standard Deviation 27.78			
		999-Not stated or not applicable	62.7	405	

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
19	Patient disposition	1-treated & released	62.5	404	1
		2-treated & admitted	24.6	159	
		3-treated & transferred	2.3	15	
		4-expired in emergency room	.8	5	
		5-expired after first day	1.2	8	
		6-dead on arrival	2.0	13	
		7-other or unknown	6.5	42	
20	Hospital length of stay	000-100			3
		Mean 2.03			
		Standard deviation 7.63			
		999-other or not applicable	4.0	26	
21	Number of injuries	0	2.5	16	1
		1	70.9	458	
		2	16.9	109	
		3	5.7	37	
		4	2.8	18	
		5	.9	6	
		9-not stated	.3	2	
22	Injury diagnosis 1 -				2
		50-Amputation	.6	4	
		51-Burns (thermal)	.2	1	
		52-Concussion	10.2	66	
		53-Contusion/Abrasion	13.5	87	
		54-Crushing	.2	1	
		55-Dislocation	.8	5	
		57-Fracture	33.3	215	
		58-Hematoma	1.2	8	
		59-Laceration	27.9	180	
		62-Internal organ injury	1.4	9	
		63-Puncture	.2	1	
		64-Strain or sprain	4.5	29	
		70-Not stated or not applicable	3.6	23	
		71-Other	2.6	17	
23	Body Part 1 -				2
		75-Head	23.4	151	
		76-Face	11.9	77	
		77-Eyeball	.6	4	
		78-Upper trunk	8.5	55	
		79-Lower trunk	2.2	14	
		80-Upper arm	1.4	9	
		81-Upper leg	4.6	30	

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
		82-Hand	1.9	12	
		83-Foot	3.3	21	
		84-25-50% of body	1.1	7	
		85-All parts of body	1.1	7	
		87-Not stated or not applicable	3.6	23	
		88-Mouth	4.8	31	
		89-Neck	.6	4	
		90-Lower arm	12.1	78	
		91-Lower leg	15.0	97	
		92-Finger	2.5	16	
		93-Toe	1.5	10	
24	Injury diagnosis 2 - see above				2
		00-None	73.8	477	
		52	.9	6	
		53	11.3	73	
		54	.2	1	
		55	.6	4	
		57	3.9	25	
		58	.3	2	
		59	5.0	32	
		62	.3	2	
		63	.2	1	
		64	1.9	12	
		71	1.5	10	
		72	.2	1	
25	Bodypart 2	see above			2
		00-Not applicable	73.8	477	
		75	2.9	19	
		76	3.7	24	
		78	3.7	24	
		79	1.1	7	
		80	.3	2	
		81	.8	5	
		82	.6	4	
		84	1.9	12	
		85	.8	5	
		88	3.1	20	
		89	.5	3	
		90	4.6	30	
		91	1.4	9	
		92	.5	3	
		93	.3	2	
26	Injury diagnosis - see above				2
		00	90.6	585	
		52	.3	2	
		53	5.3	34	
		55	.2	1	
		57	.9	6	
		59	1.7	11	
		64	.3	2	
		71	.6	4	
		72	.2	1	

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
27	Body part 3	See above			2
		00	90.6	585	
		71	.2	1	
		75	.8	5	
		76	1.4	9	
		78	.9	6	
		79	.5	3	
		80	.2	1	
		81	.5	3	
		82	.5	3	
		84	.3	2	
		85	.6	4	
		88	.9	6	
		90	.8	5	
		91	1.9	12	
		93	.2	1	
28	Injury diagnosis 4	see above			2
		00	96.3	622	
		52	.2	1	
		53	1.5	10	
		57	.6	4	
		59	.6	4	
		64	.5	3	
		71	.3	2	
29	Body part 4	see above			
		00	96.3	622	
		75	.3	2	
		76	.6	4	
		78	.5	3	
		81	.2	1	
		82	.2	1	
		83	.3	2	
		84	.2	1	
		88	.6	4	
		90	.3	2	
		91	.6	4	
30	Injury diagnosis 5	see above			2
		00	99.1	640	
		53	.5	3	
		55	.2	1	
		64	.2	1	
		71	.2	1	
31	Body part 5	see above			2
		00	99.1	640	
		76	.2	1	
		78	.2	1	
		79	.2	1	
		89	.2	1	
		90	.3	2	

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
32	Product involved 1st	1-bicycle	99.5	643	1
		2-motor vehicle	0.0	0	
		3-other	.5	3	
		4-not applicable	0.0	0	
33	Product involved 2nd	1-bicycle	2.3	15	1
		2-motor vehicle	7.3	47	
		3-other	5.0	32	
		4-not applicable	85.4	552	
34	Product involved 3rd	1-bicycle	0.0	0	1
		2-motor vehicle	0.0	0	
		3-other	0.0	0	
		4-not applicable	100.0	646	
(*)35	Familiarity	1-own a bicycle enjoy riding, expresses knowledge of bicycle riding	76.3	493	1
		2-learning or experiencing new bicycle type	9.3	60	
		3-learning or inexperienced	6.3	41	
		4-unknown	8.0	52	
36	Frequency of use times/week	00-90 Mean 8.74 Standard deviation 8.93			2
		99-unknown	69.3	448	
37	Time per use minutes/use	000-240 Mean 55.81 Standard deviation 41.4			3
		999-unknown	75.4	487	
(*)38	Length of time bicycle owned in months	000-144 Mean 21.28 Standard deviation 22.49			3
		999-unknown	36.5	236	
39	Number of bicycles in family	0-8 Mean 2.14 Standard deviation 1.39			1
		9-not stated	73.8	477	

(*) denotes that the information is obtained from the narrative of the in-depth report.

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
40	Manufacturer	1-American	45.4	293	1
		2-Foreign	27.6	178	
		3-unknown	27.1	175	
41	Certification	1-yes	24.5	158	
		2-no	35.8	231	
		3-unknown	26.3	170	
		4-not applicable	13.5	87	
42	Safety devices present	1-yes	47.8	309	1
		2-no	35.0	226	
		3-unknown	8.4	54	
		4-not applicable	8.8	57	
43	Safety device in use	1-yes	36.5	236	1
		2-no	32.7	211	
		3-unknown	11.5	74	
		4-not applicable	19.3	125	
(*)44	Safety device or warning statement contributed to accident	1-yes	13.9	90	1
		2-no	43.2	279	
		3-unknown	39.9	258	
		4-not applicable	2.9	19	
45	Case number	001-646		646	3
46	Data card	2		646	1
47	Age of bicycle in months	000-300			3
		Mean 27.37			
		Standard deviation 31.14			
		998-more than 997 months	.2	1	
		999-unknown	14.2	92	
48	Product status	1-owned	74.3	480	1
		2-borrowed	14.2	92	
		3-rented	3.6	23	
		4-other or unknown	7.9	51	
(*)49	How was product maintained?	1-well	51.4	332	1
		2-poor	15.2	98	
		3-uncertain	33.4	216	
(*)50	Product modified	1-addition	2.6	17	1
		2-removal	3.6	23	
		3-replacement	5.3	34	
		4-no	69.5	449	
		5-unknown	15.3	99	
		6-overhaul	3.7	24	

(*) denotes that the information is obtained from the narrative of the in-depth report.

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
(*)51	Brake type	1-Caliper	41.0	265	1
		2-Coaster	42.9	277	
		3-unknown	13.9	90	
		4-other	2.2	14	
(*)52	Bicycle type				2
		1-10/5 speed racer	2.5	16	
		2-10 speed lightweight	26.3	170	
		4-3 speed lightweight	5.4	35	
		5-1 speed lightweight	2.2	14	
		7-1 speed middleweight	8.7	56	
		8-5 speed 20" high rise	2.5	16	
		9-3 speed 20" high rise	.5	3	
		10-1 speed 20" high rise	31.1	201	
		12-1 speed 16" high rise	2.5	16	
		13-other	2.3	15	
		14-unknown	16.1	104	
(*)53	Bicycle use	1-pleasure	80.5	520	
		2-transportation	11.1	72	
		3-other	.5	3	
		4-unknown	7.9	51	
(*)54	Initial cause of accident	1-operator negligence	47.1	304	2
		2-obstruction caused	2.5	16	
		3-rough off road terrain	.5	3	
		4-manufacturer defect	16.4	106	
		5-unknown or not applic.	2.5	16	
		6-caused by another individual	6.8	44	
		7-deliberate misuse	18.6	120	
		8-maintenance	5.0	32	
		10-product exposure	.8	5	
(*)55	Secondary cause of accident	same as above			2
		1	7.1	46	
		2	4.3	28	
		3	.5	3	
		4	2.9	19	
		5	75.1	485	
		6	1.9	12	
		7	.9	6	
		8	3.7	24	
		10	3.6	23	

(*) denotes that the information is obtained from the narrative of the in-depth report.

Variable number	Variable name	Variable coding	% of cases	No. of cases	No. of digits in code
(*)56	BMA/6 approved	1-yes	16.1	104	1
		2-no	83.9	542	
(*)57	Victim pre-accident state	1-normal	97.8	632	1
		2-physical or mental problems (e.g., retarded or handicapped in some way)	1.9	12	
		3-uncertain	.3	2	
(*)58	Victim post-accident state	same as above			1
		1	93.8	606	
		2	6.0	39	
		3	.2	1	
(*)59	Product component failure contribute to accident	1-yes	23.7	153	1
		2-no	75.1	485	
		3-uncertain	1.2	8	
(*)60	Component contributing to accident	1-broken caliper	4.8	31	2
		2-broken coaster	1.4	9	
		3-broken other or unspecified	2.5	16	
		4-wheel	5.0	32	
		5-frame	6.3	41	
		7-handlebars	1.4	9	
		8-none	75.1	485	
		9-unknown	1.2	8	
		10-Pedal	.6	4	
		11-chain	1.7	11	
(*)61	Pavement Condition	1-dry	56.2%	363	
		2-unknown	39.0%	252	
		3-wet	4.8%	31	
62	Hospital Weights for NEISS hospitals	not applicable	not applicable		

(*) denotes that the information is obtained from the narrative of the in-depth report.