



# INJURY MORTALITY IN MICHIGAN 1999 - 2001

*Michigan Department  
of Community Health*



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## EXECUTIVE SUMMARY

This is the third report on deaths due to injury and poisoning among Michigan residents and the first that has examined deaths that were coded using ICD-10. While the primary focus is on deaths occurring during 1999-2001, temporal analyses utilized data back to 1990 to allow for a more meaningful evaluation. The report identifies where the change to ICD-10 from ICD-9 coding in 1999 may have affected trends. The salient findings are:

- Between 1999 and 2001, an average of 5,232 Michigan residents died each year due to injuries and poisonings. This corresponds to an average annual rate of 52.6 deaths per 100,000 Michigan residents.
- The rate of injury death in Michigan decreased from 1990 to 1998, then increased slightly through 2001. Part of this increase was due to the change to ICD-10 coding.
- The leading causes of fatal injury were: motor vehicle traffic crashes (25.6% of all deaths); firearm suicides (10.2%); firearm homicides (9.6%); and unintentional falls (8.4%).
- Between 1999 and 2001, an average of 171 people died annually while working in Michigan. Nationally, from 1992 to 2001, work-related injury death rates decreased slightly, while Michigan had no such decrease. However, during this period, the work-related injury death rate for Michigan was 27% lower than the national rate.
- Trends were clearly evident for several causes of injury death.
  - Upward trend
    - Unintentional poisonings* – During 1999-2001, rates increased each year. From 1990 to 2001, the death rate for this cause nearly tripled.
    - Unintentional falls* - During 1999-2001, rates increased each year. From 1998 to 2001, the rate increased 55%.
    - Unintentional suffocations/strangulations* - During 1999-2001, rates increased each year. From 1998 to 2001, the rate increased 33%.
  - Downward trend
    - Homicides* – From 1991 to 2001, the homicide rate decreased each year.
- In several cause of injury categories, death rates for certain demographic groups greatly exceeded the state rate.
  - Firearm homicides* – Black males aged 20-24 (nearly 37 times the state rate)
  - Unintentional suffocation/strangulations* – White males under age one (more than 17 times the state rate)
  - Unintentional falls* – White males aged 75 and older (14 times the state rate)
- For some injury causes, certain counties had rates that substantially surpassed the state rate.
  - Firearm homicides* – Wayne County residents had a death rate that was three times the state rate.
  - Unintentional poisonings* – Calhoun County residents had a death rate three times the state rate.

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## INTRODUCTION

Injury and poisoning (hereafter “injury”) are one of the most under-recognized public health problems facing society. In 2001, injuries (unintentional injuries, suicides, and homicides) were the fourth leading cause of death among Michigan residents.<sup>1</sup> Although information on the overall numbers of injury deaths is reported annually by the Michigan Department of Community Health (MDCH), analyses of specific injury causes and the demographics of injury victims have been limited. Such analyses are an essential component in the process of monitoring the magnitude and characteristics of injury deaths and developing targeted injury prevention programs.

This report illustrates the average annual numbers and rates of injury deaths that occurred among Michigan residents between 1999 and 2001. Age, sex, race, and county of residence of victims are presented for injury overall and for causes of primary interest. These analyses help to identify segments of the Michigan population at high risk for injury. In addition, temporal analyses, using data for the U.S. as reference, were conducted utilizing data covering the period 1990 to 2001. Data for the years 1990-1998 were included to develop a more informative profile of changes over time than would be possible over a three-year period. These temporal analyses illustrate trends for specific causes of injury and differences in rates between Michigan and the nation.

This report was designed to be consistent with previous reports on injury mortality in Michigan which covered the periods 1991-1995<sup>2</sup> and 1994-1998.<sup>3</sup> The years 1999-2001 were selected for inclusion as this was the most recent three-year period for which data were available utilizing ICD-10<sup>4</sup> coding.

## DATA SOURCES AND METHODS

### Data Sources

#### *Injury Deaths*

Death certificates were the primary source of data for injury deaths. Funeral directors, attending physicians, and medical examiners document cause of death and demographics of the decedent on the death certificate. In Michigan, these data are aggregated and maintained by the MDCH Vital Records and Health Data Development Section. MDCH maintains data on all deaths occurring within Michigan and on Michigan resident deaths occurring out-of-state. Death certificate data pertaining to the United States were obtained from the Web-based Injury Statistics Query and Reporting System (WISQARS)<sup>5</sup> which is managed by the U.S. Centers for Disease Control and Prevention (CDC). WISQARS is an interactive website in which users can generate customized reports by selecting injury cause, region/state, year of death, and decedent demographics. The sources of data to calculate population-based injury death rates included the 1990 census, 2000 census and intercensal estimates.<sup>6,7</sup>

#### *Work-related Injury Deaths*

The Census of Fatal Occupational Injuries (CFOI) provided information on work-related injury deaths. CFOI utilizes several data sources (e.g., death certificates, police reports, workers' compensation records) to optimize case ascertainment. CFOI data for Michigan are collected and

maintained by the Department of Consumer and Industry Services (MDCIS), MIOSHA Division. Cases in the Michigan CFOI are defined as work-related injury deaths occurring within the state. CFOI figures for Michigan include out-of-state residents/employees dying in Michigan and exclude Michigan residents/employees dying out-of-state. National CFOI data are maintained by the U.S. Department of Labor, Bureau of Labor Statistics. Under the CFOI system, an incident is considered work-related if the decedent was “employed (that is working for pay, compensation, or profit) at the time of the event, engaged in legal work activity or present at the site of the incident as a requirement of his or her job.”<sup>8</sup>

The Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics<sup>9</sup> provided data on the number of employed Michigan residents which allowed for the calculation of worker-based rates. These statistics were based on the Current Population Survey, a monthly household interview survey limited to those aged 16 years and older.

## **Methods**

### *Injury Deaths*

A Michigan injury death was defined as a death occurring to a Michigan resident for which the underlying cause was coded within the ICD-10 range V01-Y89 (1999-2001) or within the ICD-9 range E800-E999 (1990-1998).

ICD-10 codes V01-Y98 specify the external cause of injury, including the mechanism (e.g., struck by object) and the intentionality (e.g., homicide) of the incident. A framework for presenting cause of injury information has been developed by the CDC.<sup>10</sup> This framework defines standard mechanism/intentionality groups. Tables 17 and 18 illustrate the annual average number of deaths for each group and the corresponding annual death rates. In addition, analyses were performed for the cause of injury groups of most significance. These analyses included age/sex/race, year of death (1990-2001) and county of residence. County of residence was not performed for an injury cause type unless statistically reliable rates could be calculated for at least ten of the state’s 83 counties.

To calculate rates for the age/sex/race and county of residence tables, the three-year total number of deaths was averaged and divided by the appropriate population per the 2000 census; the result was multiplied by 100,000. For the temporal analyses, the annual number of deaths was divided by the state population for that year and multiplied by 100,000. The data for the national number of deaths and the corresponding death rate was ascertained directly from WISQARS.

As mentioned above, data for 1990-1998 were included to allow temporal analyses to be performed. Such analyses would not have been meaningful if data were limited to 1999-2001. However, including pre-1999 deaths meant utilizing data that were coded under ICD-9. Thus, some of the differences in numbers and rates of deaths between the two time periods could have been due to differences between ICD-9 and ICD-10. The CDC National Center for Health Statistics evaluated the effects of implementing ICD-10 on mortality statistics for selected causes of death.<sup>11</sup> The effect on injuries overall was minor: the ICD-10/ICD-9 comparability ratio (the number of deaths coded as injuries using ICD-10 divided by the number coded as injuries using ICD-9) was 1.014. A comparability ratio of 1.00 indicates that the same number of deaths would

be assigned to a certain cause under both ICD-9 and ICD-10. However, the ratio varies by injury cause and in some cases is significant. The report notes the appropriate ratio in the temporal analysis for each injury cause.

Rates for cells having less than six deaths over the three-year period were not calculated due to the corresponding lack of statistical stability. In the tables, such instances are noted with an “\*.” Cells in which no deaths occurred are noted by a “-.”

*Work-related Injury Deaths*

The definition of a work-related injury death was based on the definition used in CFOI described above (injury death occurring within Michigan in which the incident was considered work-related). The decedent’s age was not a limitation in the case definition. However, rates were calculated using BLS data which was limited to workers aged 16 and older. The numerator in the rate calculation could not be limited to ages 16 and older due to restrictions by MDCIS in releasing information on less than three deaths. While this methodology resulted in an overstatement of death rates, the effect would have been minor since, according the death certificate data, there were very few work-related deaths to those under age 16. Also note that the BLS employment figures for Michigan pertain to employed Michigan residents, while the numerator in the rate calculation were workers dying within the state. It is not clear what effect this discrepancy had.

**SYMBOLS USED IN TABLES**

No deaths occurred within category	-
Quantity greater than zero but less than 0.5	0
Rate is considered statistically unreliable	*

# INJURIES AND POISONINGS

## Demographic Characteristics

Between 1999 and 2001, an average of 5,232 Michigan residents died each year due to injuries and poisonings (Table 1). This corresponds to an average annual death rate of 52.6 deaths per 100,000 Michigan residents for this period (Table 2). Death rates ranged from a low of 8.3 for children aged 5 to 9 years to a high of 165.4 for persons aged 75 years and older. Persons aged 20 to 24 had the second highest death rate (68.3). The death rate for males (73.5) was 2.3 times higher than the rate for females (32.6). Male death rates equaled or exceeded female death rates in all age and race groups for which a statistically reliable rate could be calculated.

The injury and poisoning death rate among black residents (82.1) was 64% greater than the rate among white residents (50.0) and 5.7 times the rate among residents of other races (14.4). Death rates for black residents were higher than the rates for whites and other races in every age and gender category, except among whites aged 75 and older. Overall, the group with the highest death rate was 20 to 24 year old black males (264.0).

## Temporal Trends

The number of deaths among Michigan residents due to injuries and poisonings between 1990 and 2001 was highest in 1991 (5,411) and lowest in 1998 (4,979) (Table 3). Death rates decreased from 58.0 in 1990 to 50.7 in 1998, a difference of 13%. The rate increased to 53.0 in 2000 and 2001. A portion of the increase in numbers and rates of death for 1999-2001 can be attributed to the change in mortality coding from ICD-9 to ICD-10.\* The largest change in death rates occurred between 1991 and 1992 (57.6 and 53.5, respectively). In each year during 1990-2001, the Michigan injury death rate was lower than the national rate (Table 3 and Figure 1).

## Geographic Distribution

The average number of injury deaths ranged from one per year (Keweenaw County) to 1,407 (Wayne County) (Table 4). Injury deaths among Wayne County residents accounted for 27% of the state's injury deaths (Wayne County residents comprised 21% of the state's population in 2000). Death rates ranged from 31.0 in Isabella County to 97.1 in Lake County. Of the state's ten most populous counties, Wayne County had the highest rate (68.3), followed by Genesee (61.8) and Kalamazoo (54.3).

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for all injury/poisoning is 1.014. Thus, the coding change to ICD-10 from ICD-9 by itself would have had the effect of increasing the number of cases and the corresponding rates by 1.4%.

TABLE 1  
Average Annual Number of Deaths Due to Injuries and Poisonings  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	25	17	42	13	9	22	0	1	1	39	27	66
1-4	34	17	51	16	13	29	0	0	1	50	30	81
5-9	24	14	37	17	7	24	0	0	0	41	21	62
10-14	33	21	54	16	6	21	0	1	1	49	27	76
15-19	175	73	248	65	15	81	5	4	9	246	92	338
20-24	220	62	281	130	19	149	5	4	9	355	85	440
25-29	188	50	237	127	20	147	5	2	7	319	72	391
30-34	204	60	264	95	28	122	3	3	6	302	91	393
35-44	503	186	689	144	59	203	13	4	17	663	250	913
45-54	401	146	547	116	49	165	5	5	10	522	200	723
55-64	234	104	338	48	17	66	5	3	8	288	125	413
65-74	207	118	326	31	20	51	3	3	6	242	142	384
75+	423	443	867	39	41	80	3	2	6	466	487	953
Total	2,672	1,311	3,982	857	303	1,160	49	32	80	3,583	1,649	5,232

Includes ICD-10 codes: V01 – Y89.

Numbers in columns and rows may not total exactly due to rounding.

Decedents with unknown race (n=30) not illustrated but included in totals.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 2  
Average Annual Death Rates Due to Injuries and Poisonings  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	51.8	36.8	44.5	117.5	82.5	100.3	*	*	*	57.0	41.4	49.4
1-4	16.9	8.8	13.0	33.0	28.2	30.6	*	*	*	18.3	11.5	15.0
5-9	8.4	5.2	6.9	23.5	10.4	17.0	*	*	*	10.7	5.8	8.3
10-14	11.3	7.5	9.5	23.9	9.0	16.6	*	*	*	12.7	7.4	10.1
15-19	61.0	26.7	44.3	117.5	28.0	73.1	19.5	16.8	18.2	66.8	26.2	47.0
20-24	88.4	25.4	57.3	264.0	36.1	146.4	19.9	15.2	17.7	109.4	26.5	68.3
25-29	75.8	20.5	48.4	243.7	34.6	132.8	17.8	*	12.4	97.4	21.9	59.7
30-34	72.9	22.0	47.7	190.9	49.2	115.6	11.7	11.7	11.7	85.2	25.8	55.5
35-44	76.6	28.5	52.6	149.3	52.1	97.0	32.4	10.6	21.9	83.6	31.1	57.1
45-54	70.4	25.5	47.9	146.6	52.6	95.5	19.1	18.4	18.8	77.3	28.9	52.8
55-64	64.6	27.5	45.6	113.5	33.2	69.3	38.5	21.4	29.9	68.8	28.1	47.8
65-74	81.2	38.8	58.2	109.3	49.5	74.5	45.4	42.1	43.6	83.4	40.2	59.7
75+	225.0	135.3	168.0	207.1	123.2	153.7	99.8	45.0	66.5	221.5	133.1	165.4
Total	68.2	32.4	50.0	128.2	40.7	82.1	17.0	11.6	14.4	73.5	32.6	52.6

Rates are the number of deaths per 100,000 population.

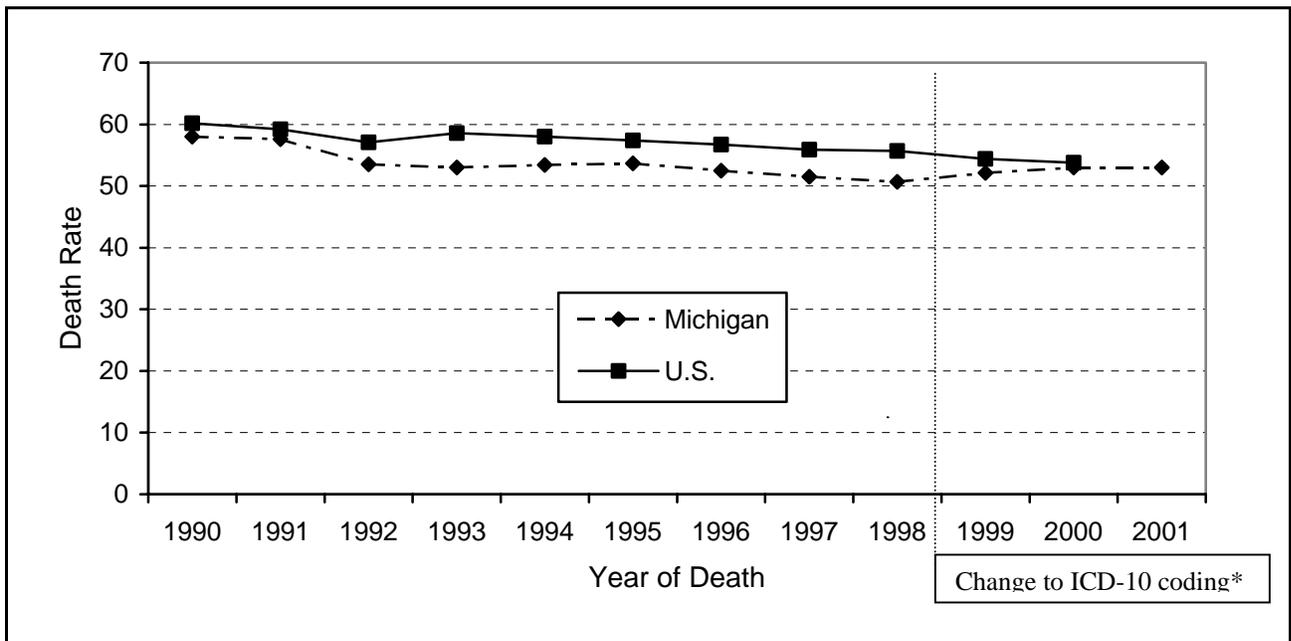
Decedents with unknown race not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 3  
 Number of Deaths and Death Rates Due to Injuries and Poisonings  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	5,400	150,211	58.0	60.2
1991	5,411	149,187	57.6	59.2
1992	5,062	145,655	53.5	57.1
1993	5,046	151,061	53.0	58.6
1994	5,115	150,940	53.4	58.0
1995	5,183	150,809	53.7	57.4
1996	5,111	150,298	52.5	56.7
1997	5,043	149,691	51.5	55.9
1998	4,979	150,445	50.7	55.7
CHANGE TO ICD-10 CODING*				
1999	5,137	148,286	52.1	54.4
2000	5,263	148,209	53.0	53.8
2001	5,297	not available	53.0	not available

FIGURE 1  
 Death Rates Due to Injuries and Poisonings  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E800 – E999

1999-2001: ICD-10 codes V01 – Y89

Sources: Vital Records and Health Data Development Section, MDCH  
 Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention  
 U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 4  
Average Annual Number of Deaths and Death Rates Due to Injuries and Poisonings  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	5	42.7	Lapeer	42	48.2
Alger	7	67.6	Leelanau	10	45.8
Allegan	54	50.8	Lenawee	49	49.5
Alpena	21	66.0	Livingston	60	38.0
Antrim	12	50.5	Luce	4	52.2
Arenac	8	48.3	Mackinac	7	55.8
Baraga	6	64.8	Macomb	325	41.2
Barry	37	65.8	Manistee	17	69.3
Bay	56	50.8	Marquette	41	63.4
Benzie	10	64.6	Mason	18	62.5
Berrien	90	55.4	Mecosta	19	46.9
Branch	21	46.6	Menominee	11	43.4
Calhoun	91	65.9	Midland	32	38.2
Cass	33	63.9	Missaukee	11	76.0
Charlevoix	13	49.8	Monroe	62	42.7
Cheboygan	13	50.4	Montcalm	47	76.7
Chippewa	22	57.1	Montmorency	8	80.8
Clare	21	68.3	Muskegon	101	59.5
Clinton	24	37.6	Newaygo	30	62.7
Crawford	9	65.4	Oakland	462	38.7
Delta	21	53.7	Oceana	17	64.5
Dickinson	14	51.0	Ogemaw	16	75.5
Eaton	45	43.4	Ontonagon	4	51.2
Emmet	15	48.8	Osceola	13	57.5
Genesee	270	61.8	Oscoda	5	56.6
Gladwin	16	61.5	Otsego	13	55.8
Gogebic	12	69.1	Ottawa	87	36.5
Grand Traverse	36	46.4	Presque Isle	9	62.5
Gratiot	21	49.7	Roscommon	15	60.2
Hillsdale	31	67.3	Saginaw	113	53.8
Houghton	15	42.6	St. Clair	85	51.8
Huron	27	75.8	St. Joseph	38	60.3
Ingham	115	41.1	Sanilac	33	74.8
Ionia	34	54.7	Schoolcraft	8	86.1
Iosco	17	61.0	Shiawassee	38	53.0
Iron	11	83.7	Tuscola	39	66.4
Isabella	20	31.0	Van Buren	49	64.3
Jackson	78	49.0	Washtenaw	115	35.5
Kalamazoo	130	54.3	Wayne	1,407	68.3
Kalkaska	7	44.3	Wexford	19	63.4
Kent	249	43.4	Unknown	4	
Keweenaw	1	*			
Lake	11	97.1	Michigan	5,232	52.6

Includes ICD-10 codes: V01 – Y89.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

## **UNINTENTIONAL INJURIES**

“Unintentional injuries” are injuries that the general public has historically referred to as accidents. These include car crashes, fires, falls, being cut by sharp objects and many other causes. Because the word “accident” implies that the event could not have been prevented, public health professionals instead use the term “unintentional injuries.” Note that the following analyses exclude complications of medical and surgical care.

### **Demographic Characteristics**

The average annual number of deaths to Michigan residents due to all unintentional injuries between 1999 and 2001 was 3,214 (Table 5). This corresponds to an average annual death rate of 32.3 deaths per 100,000 Michigan residents (Table 6). The death rate for those aged 75 and older (139.7) was much higher than the rates for any other age group. The lowest rates were for those aged 5-14.

The unintentional injury death rate for males (42.0) was 82% higher than the rate for females (23.1). Male death rates exceeded female rates in every age and race category where rates could be calculated except for 20-24 year olds in the Other race category. The death rate for blacks (36.5) slightly exceeded the rate for whites (33.2). Both greatly exceeded the rate for other races (9.1). The highest unintentional injury death rate among any age, race and sex group occurred among white males aged 75 and older (175.0).

### **Temporal Trends**

Between 1990 and 2001, the number of deaths among Michigan residents due to unintentional injuries ranged from a low of 2,742 in 1993 to a high of 3,248 in 2001 (Table 7). A portion of the increase in numbers and rates of death for 1999-2001 can be attributed to the change in mortality coding from ICD-9 to ICD-10.\* There was no clear trend in death rates for Michigan residents over this period, with the lowest rates occurring during 1992-1994 (Table 7 and Figure 2). During the 12-year period, unintentional injury death rates for Michigan residents were consistently lower than national rates by about four deaths per 100,000.

### **Geographic Distribution**

The average number of unintentional injury deaths ranged from one per year (Keweenaw County) to 668 (Wayne County) (Table 8). Death rates ranged from 21.2 in Arenac County to 63.6 in Schoolcraft County. Several of the state’s most populous counties had relatively low rates: Washtenaw (21.6), Macomb (23.0), Oakland (23.2), Ingham (25.4), Ottawa (26.9) and Kent (30.6).

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for unintentional injury is 1.031. Thus, the coding change to ICD-10 from ICD-9 by itself would have had the effect of increasing the number of cases and the corresponding rates by 3.1%.

**TABLE 5**  
Average Annual Number of Deaths Due to Unintentional Injuries  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	19	13	32	11	6	17	0	0	0	30	19	49
1-4	28	14	43	10	10	20	0	0	1	39	24	63
5-9	22	11	33	13	6	19	0	0	0	35	18	53
10-14	25	17	42	11	5	16	0	1	1	37	22	59
15-19	122	59	181	17	6	23	3	3	6	142	68	210
20-24	138	42	180	21	9	29	3	3	5	161	53	214
25-29	104	32	136	24	8	32	2	1	4	131	42	172
30-34	114	31	144	22	12	35	1	2	3	138	45	183
35-44	272	100	372	58	29	88	7	2	9	339	132	471
45-54	224	80	304	62	29	91	4	3	7	290	112	402
55-64	145	67	212	34	11	45	4	2	6	183	80	263
65-74	135	95	230	20	14	34	2	2	4	158	111	269
75+	329	403	733	31	36	67	3	2	5	363	442	805
Total	1,678	964	2,642	333	182	515	30	21	51	2,045	1,169	3,214

Includes ICD-10 codes: V01 – X59, Y85 – Y86.

Decedents with unknown race (n=17) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

**TABLE 6**  
Average Annual Death Rates Due to Unintentional Injuries  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	39.5	28.1	34.0	94.0	55.0	74.9	*	*	*	43.9	29.6	36.9
1-4	14.0	7.4	10.8	21.1	21.0	21.0	*	*	*	14.0	9.3	11.7
5-9	7.7	4.3	6.1	18.0	9.0	13.5	*	*	*	9.2	4.9	7.1
10-14	8.7	6.2	7.5	17.3	7.4	12.5	*	*	*	9.6	6.1	7.9
15-19	42.5	21.5	32.3	30.0	11.6	20.8	13.0	11.2	12.1	38.6	19.3	29.2
20-24	55.4	17.3	36.6	42.0	16.5	28.8	9.9	11.1	10.5	49.6	16.7	33.3
25-29	42.1	13.2	27.8	46.2	14.2	29.2	8.3	*	6.8	39.9	12.7	26.3
30-34	40.7	11.2	26.1	45.0	21.9	32.8	*	8.8	6.9	38.8	12.8	25.9
35-44	41.4	15.3	28.4	60.3	26.0	41.9	18.3	*	11.6	42.8	16.4	29.5
45-54	39.3	13.9	26.6	78.6	30.9	52.7	15.3	11.1	13.1	43.0	16.1	29.4
55-64	40.1	17.6	28.6	79.1	21.7	47.5	26.4	14.3	20.3	43.7	18.1	30.5
65-74	52.9	31.2	41.1	68.6	35.2	49.2	35.3	25.2	29.8	54.3	31.6	41.8
75+	175.0	123.1	142.1	162.8	110.1	129.3	89.8	38.6	58.7	172.6	120.8	139.7
Total	42.8	23.8	33.2	49.8	24.5	36.5	10.6	7.5	9.1	42.0	23.1	32.3

Rates are the number of deaths per 100,000 population.

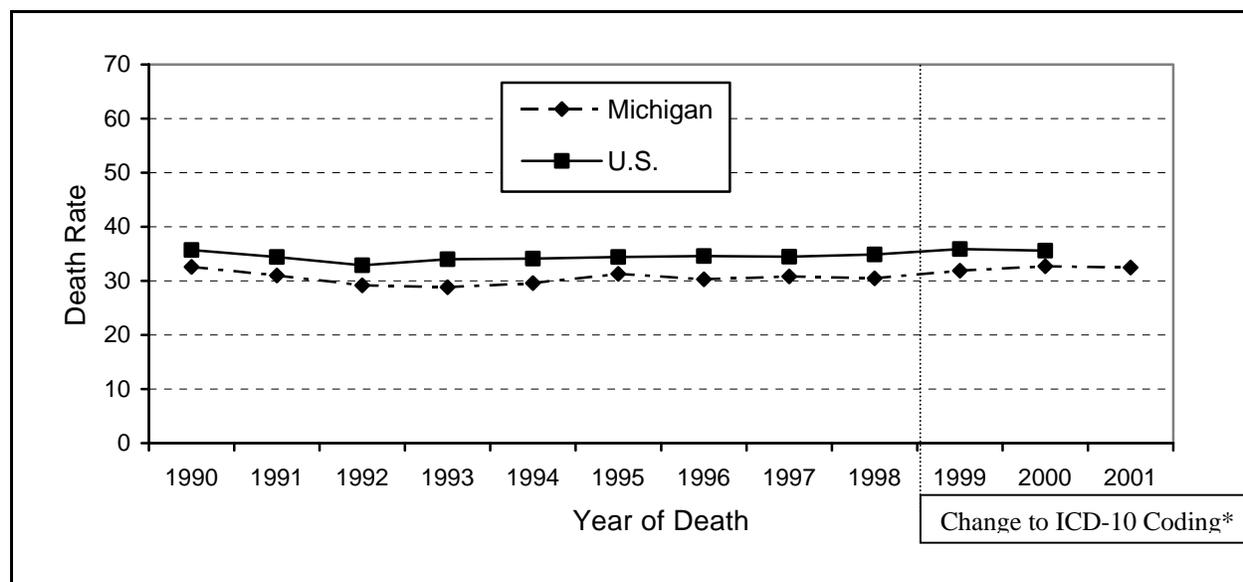
Decedents with unknown race not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

**TABLE 7**  
**Number of Deaths and Death Rates Due to Unintentional Injuries**  
**By Year of Death, Michigan and U.S. Residents, 1990-2001**

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	3,031	89,148	32.6	35.7
1991	2,908	86,711	31.0	34.4
1992	2,763	83,952	29.2	32.9
1993	2,742	87,598	28.8	34.0
1994	2,840	88,649	29.6	34.1
1995	3,026	90,402	31.3	34.4
1996	2,951	91,776	30.3	34.6
1997	3,017	92,353	30.8	34.5
1998	2,999	94,331	30.5	34.9
<b>CHANGE TO ICD-10 CODING*</b>				
1999	3,151	97,860	31.9	35.9
2000	3,243	97,900	32.7	35.6
2001	3,248	not available	32.5	not available

**FIGURE 2**  
**Death Rates Due to Unintentional Injuries**  
**Michigan and U.S. Residents, 1990-2001**



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E800 – E869, E880 – E929

1999-2001: ICD-10 codes V01 – X59, Y85 – Y86

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 8  
Average Annual Number of Deaths and Death Rates Due to Unintentional Injuries  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	4	31.3	Lapeer	32	36.4
Alger	5	54.1	Leelanau	8	36.3
Allegan	39	36.6	Lenawee	31	31.0
Alpena	13	41.5	Livingston	38	24.0
Antrim	8	36.1	Luce	3	47.5
Arenac	4	21.2	Mackinac	5	41.9
Baraga	5	53.4	Macomb	182	23.0
Barry	30	52.9	Manistee	13	51.6
Bay	38	34.2	Marquette	29	44.4
Benzie	8	47.9	Mason	13	46.0
Berrien	63	38.6	Mecosta	16	38.6
Branch	17	37.1	Menominee	8	30.3
Calhoun	62	45.2	Midland	22	26.5
Cass	20	38.5	Missaukee	7	48.3
Charlevoix	10	37.1	Monroe	45	30.8
Cheboygan	9	35.3	Montcalm	37	59.8
Chippewa	16	41.5	Montmorency	6	61.4
Clare	15	46.9	Muskegon	72	42.1
Clinton	16	25.2	Newaygo	23	48.7
Crawford	7	46.7	Oakland	277	23.2
Delta	15	39.8	Oceana	14	52.1
Dickinson	8	27.9	Ogemaw	10	47.7
Eaton	30	28.6	Ontonagon	2	29.8
Emmet	14	43.5	Osceola	10	44.5
Genesee	149	34.2	Oscoda	4	42.5
Gladwin	11	43.6	Otsego	10	44.3
Gogebic	8	46.1	Ottawa	64	26.9
Grand Traverse	27	34.8	Presque Isle	8	53.2
Gratiot	17	41.0	Roscommon	10	38.0
Hillsdale	25	53.7	Saginaw	74	35.4
Houghton	11	30.5	St. Clair	55	33.7
Huron	20	54.5	St. Joseph	28	44.3
Ingham	71	25.4	Sanilac	25	56.9
Ionia	24	39.6	Schoolcraft	6	63.6
Iosco	12	42.7	Shiawassee	27	37.7
Iron	7	53.3	Tuscola	28	48.6
Isabella	14	22.1	Van Buren	38	50.3
Jackson	52	32.8	Washtenaw	70	21.6
Kalamazoo	88	36.7	Wayne	668	32.4
Kalkaska	6	34.2	Wexford	16	52.5
Kent	176	30.6	Unknown	2	
Keweenaw	1	*			
Lake	7	61.8	Michigan	3,214	32.3

Includes ICD-10 codes: V01 – X59, Y85 – Y86.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# SUICIDES

## Demographic Characteristics

An average of 996 Michigan residents died each year between 1999 and 2001 due to suicide (Table 9). The corresponding death rate was 10.0 per 100,000 residents (Table 10). Among the age groups, the highest death rate was for those aged 75 years and older (15.0). The suicide rate for males (16.5) was 4.3 times the rate for females (3.8). The suicide rate for whites (11.1) was 71% higher than the rate for blacks (6.5) and 11 times the rate for other races (1.0). The highest rate among age, race and sex groups was 36.5 for white males aged 75 and older. There were no suicides during this three-year period among those under age 10. Generally, medical examiners, who determine cause and manner of death for fatal injuries, do not consider suicide a valid manner of death for young children as it is assumed that they do not fully comprehend the consequences of killing themselves.

## Temporal Trends

Between 1990 and 2001, the greatest number of suicides among Michigan residents occurred during 1991 (1,139) (Table 11). The suicide rate for the state was also highest that year (12.1). Conversely, the least number of suicides occurred in 1998 (965). The suicide rate was lowest during 1998-2000 (9.8). (Note that the change in mortality coding from ICD-9 to ICD-10 in 1999 would have had minimal effect.\*) Michigan suicide rates were consistently lower than national rates (on average, Michigan was lower by about one death per 100,000) (Table 11 and Figure 3).

## Geographic Distribution

Between 1999 and 2001 there were no suicides among residents of two counties: Keweenaw and Luce (Table 12). The greatest number of suicides occurred among Wayne County residents (annual average: 201). Suicide rates ranged from 5.8 in Branch County and Mecosta County to 30.4 in Iron County. Counties with the highest suicide rates tended to be rural. Conversely, only one of the ten most populous counties in the state (Genesee) had a suicide rate that exceeded the statewide rate.

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for suicide is 0.996. Thus, the coding change to ICD-10 from ICD-9 by itself would have the effect of decreasing the number of cases and the corresponding rates by 0.4%.

**TABLE 9**  
Average Annual Number of Deaths Due to Suicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	5	2	7	1	0	2	-	-	-	6	3	9
15-19	40	7	47	7	1	8	1	1	2	48	10	58
20-24	56	9	65	9	1	9	1	1	2	66	10	76
25-29	61	9	70	11	2	13	2	0	3	74	11	86
30-34	67	11	78	11	3	14	1	-	1	79	14	93
35-44	156	47	203	15	4	19	3	1	4	175	51	226
45-54	134	36	169	11	4	14	1	1	2	145	41	186
55-64	71	24	95	3	1	4	1	0	1	75	25	100
65-74	59	11	70	4	1	5	1	1	2	64	13	77
75+	69	14	83	2	0	3	-	0	0	71	15	86
Total	717	170	887	75	16	91	11	6	17	805	192	996

Includes ICD-10 codes: X60 – X84, Y87.0.

Decedents with unknown race (n=4) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

**TABLE 10**  
Average Annual Death Rates Due to Suicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	1.7	0.8	1.3	*	*	*	-	-	-	1.7	0.7	1.2
15-19	13.8	2.7	8.4	12.6	*	7.6	*	*	1.6	13.1	2.8	8.1
20-24	22.5	3.6	13.2	17.6	*	9.2	*	*	*	20.2	3.1	11.8
25-29	24.6	3.8	14.3	21.2	*	11.4	2.8	*	1.7	22.7	3.5	13.1
30-34	23.9	4.0	14.0	22.8	4.7	13.2	*	*	*	22.4	3.9	13.1
35-44	23.8	7.1	15.5	15.9	3.6	9.2	2.5	*	1.6	22.0	6.4	14.1
45-54	23.4	6.2	14.8	13.5	3.9	8.3	*	*	1.5	21.5	5.9	13.6
55-64	19.7	6.3	12.8	7.8	*	4.2	*	*	*	18.0	5.6	11.6
65-74	23.2	3.5	12.5	13.9	*	7.3	*	*	*	22.0	3.6	11.9
75+	36.5	4.4	16.1	12.4	*	5.1	*	*	*	33.9	4.1	15.0
Total	18.3	4.2	11.1	11.2	2.2	6.5	1.3	0.7	1.0	16.5	3.8	10.0

Rates are the number of deaths per 100,000 population.

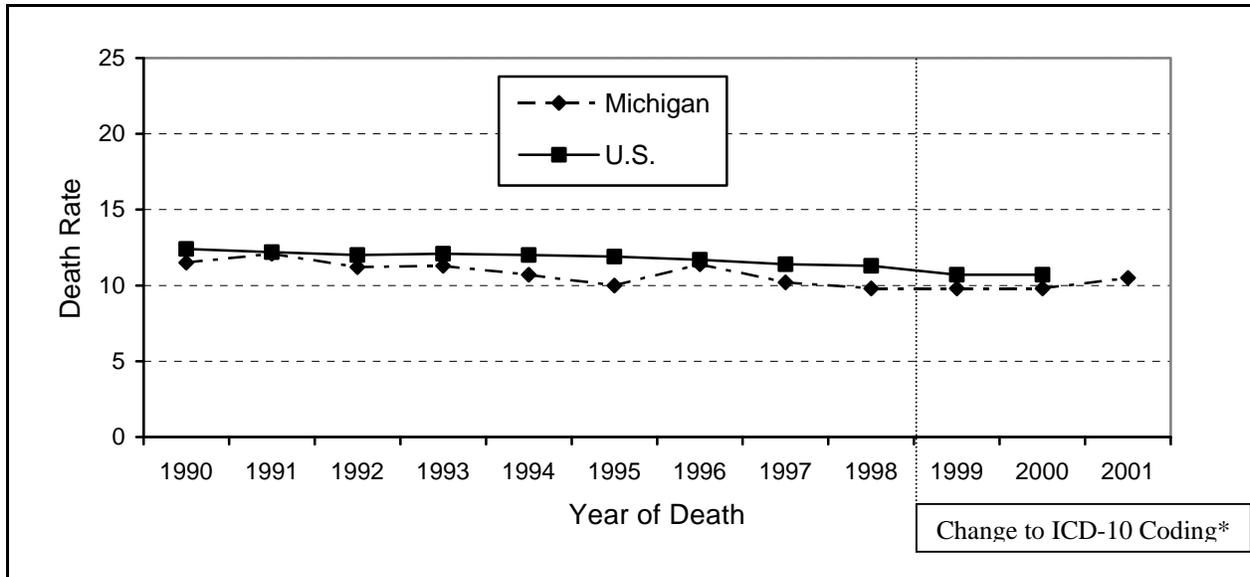
Decedents with unknown race not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 11  
 Number of Deaths and Death Rates Due to Suicides  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	1,068	30,906	11.5	12.4
1991	1,139	30,810	12.1	12.2
1992	1,063	30,484	11.2	12.0
1993	1,078	31,102	11.3	12.1
1994	1,022	31,142	10.7	12.0
1995	969	31,284	10.0	11.9
1996	1,107	30,903	11.4	11.7
1997	1,003	30,535	10.2	11.4
1998	965	30,575	9.8	11.3
CHANGE TO ICD-10 CODING*				
1999	969	29,199	9.8	10.7
2000	975	29,350	9.8	10.7
2001	1,045	not available	10.5	not available

FIGURE 3  
 Death Rates Due to Suicides  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E950 – E959

1999-2001: ICD-10 codes X60 – X84, Y87.0

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 12  
Average Annual Number of Deaths and Death Rates Due to Suicides  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	1	*	Lapeer	8	9.5
Alger	1	*	Leelanau	1	*
Allegan	8	7.9	Lenawee	12	11.8
Alpena	6	18.1	Livingston	16	10.0
Antrim	3	11.5	Luce	-	-
Arenac	4	21.2	Mackinac	1	*
Baraga	1	*	Macomb	79	10.0
Barry	6	10.6	Manistee	4	14.9
Bay	14	12.4	Marquette	9	13.4
Benzie	1	*	Mason	4	13.0
Berrien	14	8.4	Mecosta	2	5.8
Branch	3	5.8	Menominee	2	9.2
Calhoun	16	11.8	Midland	8	9.3
Cass	9	18.3	Missaukee	4	25.3
Charlevoix	3	11.5	Monroe	13	9.1
Cheboygan	4	13.9	Montcalm	8	13.6
Chippewa	5	13.8	Montmorency	2	*
Clare	6	18.1	Muskegon	19	11.2
Clinton	6	9.3	Newaygo	6	12.5
Crawford	2	14.0	Oakland	104	8.7
Delta	5	13.0	Oceana	3	11.2
Dickinson	5	19.4	Ogemaw	5	21.6
Eaton	10	10.0	Ontonagon	2	*
Emmet	2	*	Osceola	3	11.5
Genesee	46	10.6	Oscoda	1	*
Gladwin	3	12.8	Otsego	2	8.6
Gogebic	3	17.3	Ottawa	17	7.0
Grand Traverse	8	10.3	Presque Isle	1	*
Gratiot	3	7.9	Roscommon	4	17.0
Hillsdale	5	11.5	Saginaw	16	7.8
Houghton	4	11.1	St. Clair	19	11.8
Huron	6	17.6	St. Joseph	8	12.3
Ingham	27	9.7	Sanilac	6	13.5
Ionia	8	13.0	Schoolcraft	2	*
Iosco	4	14.6	Shiawassee	7	9.8
Iron	4	30.4	Tuscola	9	16.0
Isabella	6	8.9	Van Buren	7	8.7
Jackson	18	11.2	Washtenaw	24	7.4
Kalamazoo	23	9.5	Wayne	201	9.8
Kalkaska	1	*	Wexford	3	9.8
Kent	47	8.2	Unknown	1	
Keweenaw	-	-			
Lake	2	20.6	Michigan	996	10.0

Includes ICD-10 codes: X60 – X84, Y87.0.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# HOMICIDES

## Demographic Characteristics

The average annual number of homicides that occurred among Michigan residents between 1999 and 2001 was 717 (Table 13). This corresponds to an average annual homicide rate of 7.2 per 100,000 residents (Table 14). Among the age groups, the lowest rate was for those aged 5 to 14 (0.9) and the highest was for those aged 20-24 (21.0). The homicide rate for males (11.4) was 3.6 times higher than the rate for females (3.2). Male rates exceeded female rates in every age and race category. The death rate for blacks (34.9) was 12.9 times higher than the rate for whites (2.7), and 21.8 times higher than the rate for other races (1.6). Homicide rates for blacks exceeded corresponding rates for whites in every age and sex category. The homicide rate for black males aged 20 to 24 (197.7) was 27.5 times higher than the statewide rate.

## Temporal Trends

The number of homicides between 1990 and 2001 among Michigan residents ranged from a low of 684 in 2001 to a high of 1,129 in 1991 (Table 15). Homicide rates ranged from a low of 6.8 in 2001 to a high of 12.0 in 1991. (Note that the change in mortality coding from ICD-9 to ICD-10 in 1999 would have had minimal effect.\*) Michigan's homicide rate was higher than the U.S. rate between 1990 and 2000 (2001 national data not yet available) by about one death per 100,000. Both nationally and in Michigan, homicide rates dropped consistently after 1991 (Figure 4).

## Geographic Distribution

Between 1999 and 2001, there were no homicides among residents of 21 Michigan counties (noted by “-” in Table 16). Wayne County residents sustained the greatest number of homicides (456 per year). Of the 24 counties for which rates could be calculated with statistical reliability, homicide rates ranged from 1.0 in Ottawa County to 22.1 in Wayne County. Only two counties had homicide rates that exceeded the statewide rate: Wayne and Genesee. These are the first and fifth most populous counties in the state, respectively.

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for homicide is 0.998. Thus, the coding change to ICD-10 from ICD-9 by itself would have the effect of decreasing the number of cases and the corresponding rates by 0.2%.

TABLE 13  
Average Annual Number of Deaths Due to Homicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	4	4	8	3	2	5	0	0	1	7	6	14
1-4	5	3	7	5	3	7	-	-	-	9	5	15
5-9	1	2	3	3	1	4	-	-	-	4	2	7
10-14	2	1	3	3	1	3	-	-	-	5	2	7
15-19	10	5	15	40	8	48	0	0	1	51	13	64
20-24	19	8	27	97	9	107	1	-	1	118	18	135
25-29	15	6	20	89	10	99	0	-	0	104	15	119
30-34	13	11	24	59	12	70	0	1	1	72	24	96
35-44	31	17	48	65	19	84	2	1	3	99	37	136
45-54	16	9	25	34	9	43	-	0	0	49	19	68
55-64	9	6	14	8	2	10	1	1	1	18	8	26
65-74	6	4	9	5	2	8	-	-	-	11	6	17
75+	4	5	9	4	1	5	0	-	0	8	6	15
Total	134	80	214	415	78	493	6	3	9	555	162	717

Includes ICD-10 codes: X85 – Y09, Y87.1.

Decedents with unknown race (n=4) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 14  
Average Annual Death Rates Due to Homicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	8.9	7.9	8.4	23.5	21.4	22.5	*	*	*	10.7	9.7	10.2
1-4	2.3	1.4	1.9	9.8	5.8	7.8	-	-	-	3.4	2.0	2.7
5-9	*	*	0.6	4.1	*	2.6	-	-	-	1.1	0.6	0.9
10-14	0.7	*	0.6	4.1	*	2.6	-	-	-	1.2	0.5	0.9
15-19	3.4	2.0	2.7	72.5	14.0	43.5	*	*	*	13.7	3.8	8.9
20-24	7.6	3.3	5.5	197.7	17.8	104.8	*	-	*	36.3	5.5	21.0
25-29	5.9	2.3	4.1	171.2	16.5	89.2	*	-	*	31.7	4.7	18.2
30-34	4.7	4.1	4.4	118.3	20.8	66.5	*	*	*	20.3	6.7	13.5
35-44	4.7	2.5	3.6	67.6	16.9	40.3	5.0	*	3.9	12.4	4.6	8.5
45-54	2.7	1.6	2.2	42.7	10.0	24.9	-	*	*	7.3	2.7	5.0
55-64	2.4	1.5	1.9	19.6	*	10.6	*	*	*	4.2	1.8	3.0
65-74	2.2	1.2	1.7	18.6	5.9	11.2	-	-	-	3.8	1.7	2.6
75+	2.1	1.5	1.7	21.2	*	10.3	*	-	*	4.0	1.7	2.5
Total	3.4	2.0	2.7	62.1	10.5	34.9	2.0	1.2	1.6	11.4	3.2	7.2

Rates are the number of deaths per 100,000 population.

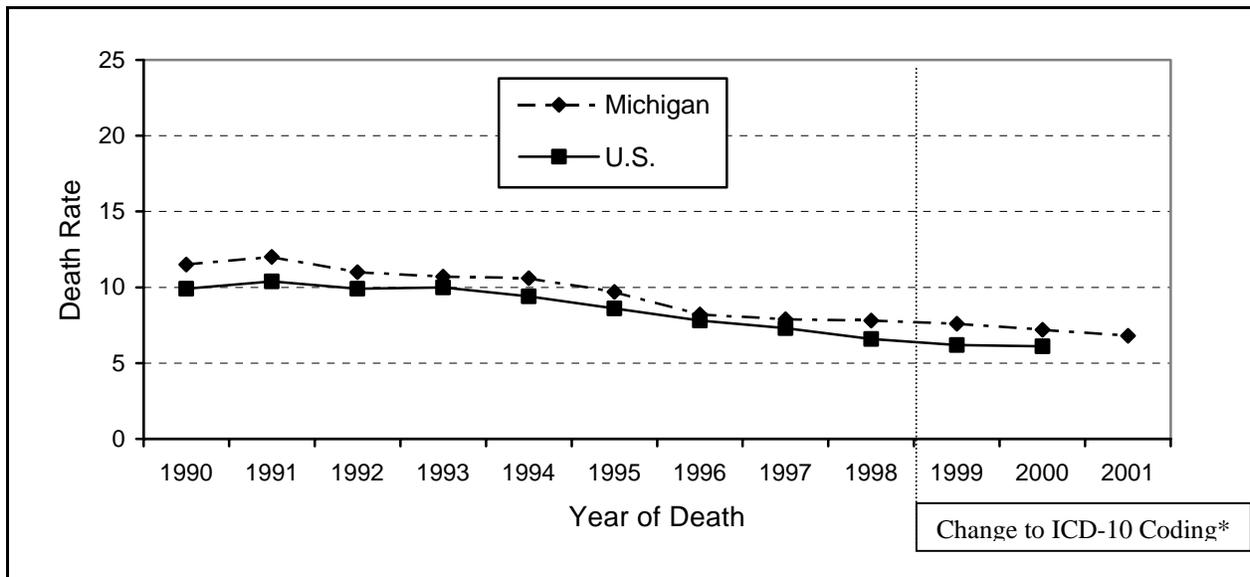
Decedents with unknown race not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 15  
 Number of Deaths and Death Rates Due to Homicides  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	1,068	24,614	11.5	9.9
1991	1,129	26,254	12.0	10.4
1992	1,042	25,144	11.0	9.9
1993	1,024	25,653	10.7	10.0
1994	1,015	24,547	10.6	9.4
1995	938	22,552	9.7	8.6
1996	795	20,634	8.2	7.8
1997	772	19,491	7.9	7.3
1998	763	17,893	7.8	6.6
CHANGE TO ICD-10 CODING*				
1999	749	16,889	7.6	6.2
2000	719	16,765	7.2	6.1
2001	684	not available	6.8	not available

FIGURE 4  
 Death Rates Due to Homicides  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E960 - E969

1999-2001: ICD-10 codes X85 - Y09, Y87.1

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 16  
Average Annual Number of Deaths and Death Rates Due to Homicides  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	2	*
Alger	-	-	Leelanau	0	*
Allegan	4	3.8	Lenawee	4	3.7
Alpena	1	*	Livingston	2	*
Antrim	1	*	Luce	0	*
Arenac	1	*	Mackinac	0	*
Baraga	-	-	Macomb	22	2.8
Barry	-	-	Manistee	-	-
Bay	2	2.1	Marquette	2	3.1
Benzie	0	*	Mason	0	*
Berrien	11	6.6	Mecosta	1	*
Branch	1	*	Menominee	1	*
Calhoun	9	6.5	Midland	1	*
Cass	3	5.2	Missaukee	0	*
Charlevoix	0	*	Monroe	2	1.4
Cheboygan	0	*	Montcalm	2	*
Chippewa	0	*	Montmorency	-	-
Clare	1	*	Muskegon	5	3.1
Clinton	1	*	Newaygo	0	*
Crawford	0	*	Oakland	42	3.5
Delta	-	-	Oceana	-	-
Dickinson	1	*	Ogemaw	1	*
Eaton	3	3.2	Ontonagon	-	-
Emmet	-	-	Osceola	0	*
Genesee	46	10.5	Oscoda	-	-
Gladwin	1	*	Otsego	0	*
Gogebic	0	*	Ottawa	2	1.0
Grand Traverse	1	*	Presque Isle	-	-
Gratiot	-	-	Roscommon	1	*
Hillsdale	1	*	Saginaw	14	6.5
Houghton	-	-	St. Clair	3	1.6
Huron	1	*	St. Joseph	2	3.2
Ingham	12	4.2	Sanilac	-	-
Ionia	0	*	Schoolcraft	-	-
Iosco	0	*	Shiawassee	1	*
Iron	-	-	Tuscola	1	*
Isabella	-	-	Van Buren	3	3.9
Jackson	3	2.1	Washtenaw	11	3.5
Kalamazoo	11	4.5	Wayne	456	22.1
Kalkaska	-	-	Wexford	-	-
Kent	19	3.3	Unknown	1	
Keweenaw	-	-			
Lake	2	*	Michigan	717	7.2

Includes ICD-10 codes: X85 – Y09, Y87.1.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# EXAMINATION OF SPECIFIC CAUSES OF INJURY DEATH

## OVERVIEW

Tables 17 and 18 illustrate the average annual numbers and rates of injury deaths by mechanism and manner/intent between 1999 and 2001 for Michigan residents. The Centers for Disease Control and Prevention (CDC) developed this matrix<sup>10</sup> to create a standard design which would allow readers to readily locate individual mechanism/intent categories (e.g., unintentional falls) as well as the total number of injuries caused by a particular mechanism (e.g., firearms) or the total number of injuries comprising an intent type (e.g., suicide). Cells that are shaded indicate that no ICD code exists for that category. See Appendix B Table B-1 for a complete listing of ICD-10 codes defining each cell.

The matrices used on Tables 17 and 18 differ in a number of ways from those used in the previous report on Michigan injury mortality<sup>3</sup> which were based on ICD-9 codes. Snowmobile crashes, boat-related drownings, and bites/stings are not listed as separate mechanisms. Per national recommendations, boat-related drownings are included in “Other Transport.” The other two mechanisms are not listed due to differences in ICD-9 and ICD-10 coding. Finally, “Other Land Transport” has been separated out from “Other Transport.”

Highlights of the data contained in these tables include:

- Of the injury deaths that occurred between 1999 and 2001, unintentional injuries comprised 61%, suicide 19%, homicide 14%, and 6% were of undetermined intent or adverse effects of healthcare.
  - The leading causes of death by individual mechanism/intent classifications were:
    - motor vehicle traffic crashes, occupants (11.7%)
    - firearm suicides (10.2%)
    - firearm homicides (9.6%)
    - unintentional falls (8.4%)
  - On average, 1,342 Michiganders died each year due to motor vehicle traffic crashes. For 33.9% of fatal traffic crashes, the person type killed (e.g., occupant, pedestrian) was not specified on the death certificate.
  - Pedestrian fatalities accounted for 13% of all traffic crash deaths.
  - Firearms were used in 70.3% of homicides and 53.8% of suicides.
  - Unintentional firearm deaths comprised 1.5% of all firearm fatalities.
- On average, 32 bicyclists died each year during the three-year period. Most of these incidents (75%) involved a motor vehicle traffic crash.

TABLE 17 (Page 1 of 2)  
Average Annual Number of Deaths Due to Injury and Poisoning  
By Mechanism & Manner/Intent  
Michigan Residents, 1999-2001

Mechanism	Manner/Intent					Total
	Unintentional	Suicide	Homicide	Undetermined	Other	
Cut/pierce	1	18	60	1	-	81
Drowning <sup>a</sup>	111	10	2	9		132
Fall	437	9	-	2		448
Fire/hot object or substance	155	6	12	5		179
<i>Fire/flame/smoke</i>	152	6	12	5		176
<i>Hot object/substance</i>	3	-	-	-		3
Firearm	16	536	504	7	11	1,073
Machinery	27					27
All Transport	1,511	4	4	1	-	1,520
<i>Motor vehicle traffic</i>	1,342					1,342
<i>Occupant</i>	610					610
<i>Motorcyclist</i>	75					75
<i>Pedal Cyclist</i>	24					24
<i>Pedestrian</i>	178					178
<i>Other specified</i>	0					0
<i>Unspecified</i>	455					455
<i>Pedal Cyclist, non-traffic</i>	8					8
<i>Pedestrian, non-traffic</i>	32					32
<i>Other land transport</i>	88					88
<i>Other transport</i>	41					41
Natural/environmental	49					49
Overexertion	0					0
Poisoning	317	189	2	160	-	668

a) Non-boat-related drownings only. Per national recommendations, boat-related drownings are included in "Other Transport."

TABLE 17 (Page 2 of 2)  
Average Annual Number of Deaths Due to Injury and Poisoning  
By Mechanism & Manner/Intent  
Michigan Residents, 1999-2001

Mechanism	Manner/Intent					Total
	Unintentional	Suicide	Homicide	Undetermined	Other	
Struck by, against	20	-	6	-	-	26
Suffocation, hanging, strangulation	180	208	30	4		423
Other specified & classifiable	48	5	18	-	-	71
Other specified, not elsewhere classifiable	39	6	32	3	-	79
Unspecified	304	6	45	9	-	364
Adverse effects/events					94	94
<i>Medical care</i>					84	84
<i>Drugs</i>					10	10
<b>Total</b>	<b>3,214</b>	<b>996</b>	<b>717</b>	<b>200</b>	<b>105</b>	<b>5,232</b>

See Appendix B Table B-1 for ICD-10 codes that comprise each cell.  
Cells may not sum exactly to row and column totals due to rounding.  
Table does not include recently added ICD-10 codes for deaths pertaining to terrorism.  
Source: Vital Records and Health Data Development Section, MDCH

TABLE 18 (Page 1 of 2)  
Average Annual Death Rates Due to Injury and Poisoning  
By Mechanism & Manner/Intent  
Michigan Residents, 1999-2001

Mechanism	Manner/Intent					Total
	Unintentional	Suicide	Homicide	Undetermined	Other	
Cut/pierce	*	0.2	0.6	*	-	0.8
Drowning <sup>a</sup>	1.1	0.1	0.0	0.1		1.3
Fall	4.4	0.1	-	0.0		4.5
Fire/hot object or substance	1.6	0.1	0.1	0.1		1.8
<i>Fire/flame/smoke</i>	<i>1.5</i>	<i>0.1</i>	<i>0.1</i>	<i>0.1</i>		<i>1.8</i>
<i>Hot object/substance</i>	<i>0.0</i>	<i>-</i>	<i>-</i>	<i>-</i>		<i>0.0</i>
Firearm	0.2	5.4	5.1	0.1	0.1	10.8
Machinery	0.3					0.3
All Transport	15.2	0.0	0.0	*	-	15.3
<i>Motor vehicle traffic</i>	<i>13.5</i>					<i>13.5</i>
<i>Occupant</i>	<i>6.1</i>					<i>6.1</i>
<i>Motorcyclist</i>	<i>0.8</i>					<i>0.8</i>
<i>Pedal Cyclist</i>	<i>0.2</i>					<i>0.2</i>
<i>Pedestrian</i>	<i>1.8</i>					<i>1.8</i>
<i>Other specified</i>	<i>*</i>					<i>*</i>
<i>Unspecified</i>	<i>4.6</i>					<i>4.6</i>
<i>Pedal Cyclist, non-traffic</i>	<i>0.1</i>					<i>0.1</i>
<i>Pedestrian, non-traffic</i>	<i>0.3</i>					<i>0.3</i>
<i>Other land transport</i>	<i>0.9</i>					<i>0.9</i>
<i>Other transport</i>	<i>0.4</i>					<i>0.4</i>
Natural/environmental	0.5					0.5
Overexertion	*					*
Poisoning	3.2	1.9	0.0	1.6	-	6.7

a) Non-boat-related drownings only. Per national recommendations, boat-related drownings are included in "Other Transport."

TABLE 18 (Page 2 of 2)  
Average Annual Death Rates Due to Injury and Poisoning  
By Mechanism & Manner/Intent  
Michigan Residents, 1999-2001

Mechanism	Manner/Intent					Total
	Unintentional	Suicide	Homicide	Undetermined	Other	
Struck by, against	0.2	-	0.1	-	-	0.3
Suffocation, hanging, strangulation	1.8	2.1	0.3	0.0		4.3
Other specified & classifiable	0.5	0.0	0.2	-	-	0.7
Other specified, not elsewhere classifiable	0.4	0.1	0.3	0.0	-	0.8
Unspecified	3.1	0.1	0.5	0.1	-	3.7
Adverse effects/events					0.9	0.9
<i>Medical care</i>					0.8	0.8
<i>Drugs</i>					0.1	0.1
<b>Total</b>	<b>32.3</b>	<b>10.0</b>	<b>7.2</b>	<b>2.0</b>	<b>1.1</b>	<b>52.6</b>

See Appendix B Table B-1 for ICD-10 codes that comprise each cell.  
Cells may not sum exactly to row and column totals due to rounding.  
Table does not include recently added ICD-10 codes for deaths pertaining to terrorism.  
Rates are number of deaths per 100,000 population.  
Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# UNINTENTIONAL INJURIES

## DROWNINGS

While Tables 17 and 18 excluded boat-related drownings from the Drowning category (to be consistent with national recommendations for matrix design), the two drowning types are combined for analysis in this section. Of all unintentional drownings to Michigan residents between 1999 and 2001, 14% were boat-related.

### Demographic Characteristics

Between 1999 and 2001, an average of 129 Michigan residents died annually due to unintentional drowning (Table 19). The corresponding death rate was 1.3 per 100,000 residents (Table 20). Death rates were highest for those under age 5. The drowning rate for males (2.1) was more than four times the rate for females (0.5). The death rate for blacks (1.7) was 31% higher than the rate for whites (1.3).

### Temporal Trends

The number of Michigan residents who died as a result of unintentional drowning between 1990 and 2001 ranged from 107 in 1997 to 137 in 1991 (Table 21). Drowning rates ranged from 1.1 in 1997 to 1.5 in 1991. Michigan's drowning rate was consistently lower than the national rate (Table 21 and Figure 5). While national drowning rates declined slightly between 1990 and 1999 (no national data were available for 2000 and 2001), no trend was evident among Michigan residents. (Note that the change in mortality coding from ICD-9 to ICD-10 in 1999 would have had minimal effect.\*)

### Geographic Distribution

Between 1999 and 2001, there were no unintentional drownings among residents of 18 Michigan counties (noted by "-" in Table 22). Wayne County residents sustained the greatest number of drownings (23 deaths annually). However, that county's rate (1.1) was less than the state rate. Of the 17 counties for which a statistically reliable rate could be calculated, Newaygo County had the highest rate (4.2) while Ingham, Kent, and Washtenaw had the lowest rates (0.8).

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for unintentional, non-boat-related drowning is 0.997. (In the measurement of comparability ratios, boat-related drownings were combined with other types of transport. They could not be pulled out and included with non-boat-related drownings to develop an overall drowning comparability ratio.) Thus, the coding change to ICD-10 from ICD-9 by itself would have the effect of decreasing the number of cases and the corresponding rates by approximately 0.3%.

TABLE 19  
Average Annual Number of Deaths Due to Unintentional Drownings<sup>a</sup>  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	1	1	2	1	0	1	-	-	-	1	1	3
1-4	9	4	14	1	0	1	-	-	-	10	5	15
5-9	5	1	5	2	1	3	-	-	-	7	1	8
10-14	2	0	2	4	0	4	-	-	-	6	1	7
15-19	7	0	7	2	1	3	0	-	0	10	1	11
20-24	7	1	8	2	-	2	0	-	0	9	1	10
25-29	5	2	7	1	-	1	1	-	1	7	2	9
30-34	10	2	12	1	0	1	-	-	-	11	2	13
35-44	11	3	13	2	-	2	1	-	1	14	3	17
45-54	9	2	11	2	0	2	0	-	0	11	2	13
55-64	8	1	9	1	0	1	-	-	-	9	2	10
65-74	3	2	5	1	-	1	-	-	-	3	2	5
75+	4	4	8	-	1	1	0	0	1	4	5	9
Total	80	22	102	19	4	23	3	0	3	102	27	129

a) Includes boat-related and non-boat-related incidents.  
Includes ICD-10 codes: V90, V92, W65 – W74.  
Decedents with unknown race (n=2) not illustrated, but included in totals.  
Numbers in columns and rows may not total exactly due to rounding.  
Source: Vital Records and Health Data Development Section, MDCH

TABLE 20  
Average Annual Death Rates Due to Unintentional Drownings<sup>a</sup>  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

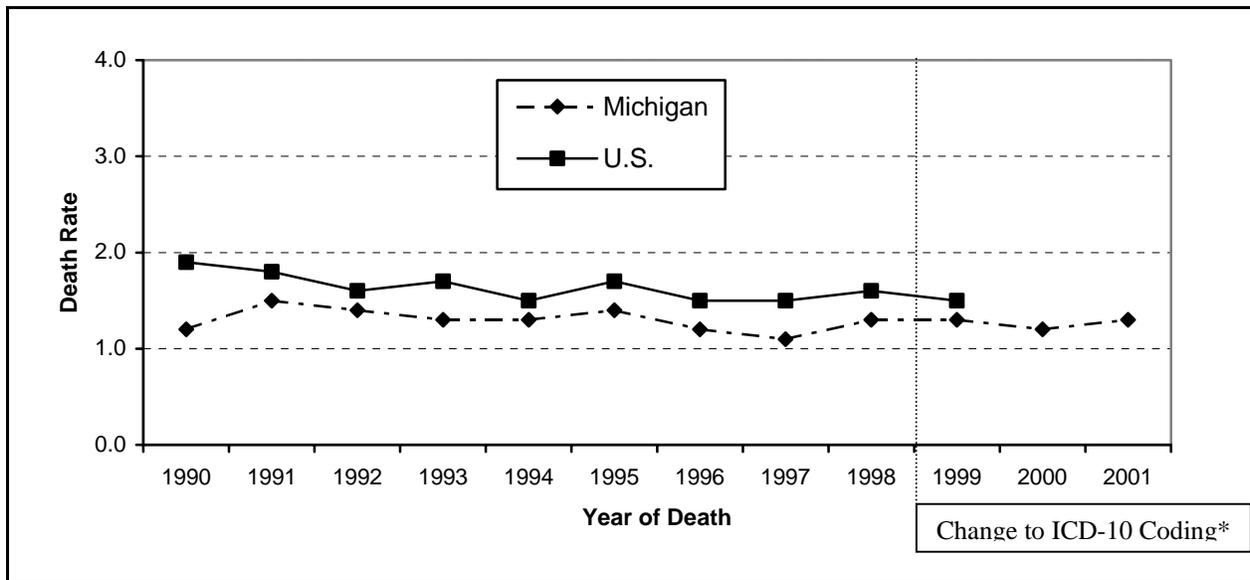
Age	White			Black			Other			Total		
	Male	Female	Total									
<1	*	*	*	*	*	*	-	-	-	*	*	2.0
1-4	4.6	2.2	3.5	*	*	*	-	-	-	3.6	1.8	2.7
5-9	1.7	*	1.0	2.8	*	1.9	-	-	-	1.7	*	1.1
10-14	0.7	*	0.4	6.1	*	3.4	-	-	-	1.6	*	0.9
15-19	2.4	*	1.3	4.2	*	2.7	*	-	*	2.6	*	1.5
20-24	2.8	*	1.6	4.1	-	2.0	*	-	*	2.9	*	1.6
25-29	2.0	*	1.4	*	-	*	*	-	*	2.1	*	1.3
30-34	3.6	*	2.1	*	*	*	-	-	-	3.0	0.6	1.8
35-44	1.6	0.4	1.0	2.1	-	1.0	*	-	*	1.7	0.4	1.0
45-54	1.6	*	0.9	2.5	*	1.4	*	-	*	1.7	0.3	1.0
55-64	2.2	*	1.2	*	*	*	-	-	-	2.1	*	1.2
65-74	1.0	0.7	0.8	*	-	*	-	-	-	1.1	0.6	0.8
75+	2.1	1.1	1.5	-	*	*	*	*	*	2.1	1.4	1.6
Total	2.0	0.5	1.3	2.8	0.6	1.7	1.1	*	0.6	2.1	0.5	1.3

a) Includes boat-related and non-boat-related incidents.  
Decedents with unknown race not illustrated but included in totals.  
Rates are number of deaths per 100,000 population.  
Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 21  
 Number of Deaths and Death Rates Due to Unintentional Drownings<sup>a</sup>  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	115	4,685	1.2	1.9
1991	137	4,621	1.5	1.8
1992	128	4,186	1.4	1.6
1993	124	4,390	1.3	1.7
1994	120	3,942	1.3	1.5
1995	133	4,350	1.4	1.7
1996	118	3,959	1.2	1.5
1997	107	4,051	1.1	1.5
1998	128	4,406	1.3	1.6
CHANGE TO ICD-10 CODING*				
1999	132	4,030	1.3	1.5
2000	124	not available	1.2	not available
2001	131	not available	1.3	not available

FIGURE 5  
 Death Rates Due to Unintentional Drownings<sup>a</sup>  
 Michigan and U.S. Residents, 1990-2001



a) Includes boat-related and non-boat-related incidents.

Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E830, E832, E910

1999-2001: ICD-10 codes V90, V92, W65-W74

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

Compressed Mortality Data, U.S., 1999

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 22  
Average Annual Number of Deaths and Death Rates Due to Unintentional Drownings<sup>a</sup>  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	1	*
Alger	0	*	Leelanau	0	*
Allegan	2	*	Lenawee	2	*
Alpena	1	*	Livingston	2	1.3
Antrim	0	*	Luce	-	-
Arenac	0	*	Mackinac	1	*
Baraga	1	*	Macomb	8	1.1
Barry	1	*	Manistee	1	*
Bay	1	*	Marquette	2	*
Benzie	1	*	Mason	-	-
Berrien	2	1.4	Mecosta	-	-
Branch	2	*	Menominee	-	-
Calhoun	3	2.4	Midland	1	*
Cass	1	*	Missaukee	-	-
Charlevoix	0	*	Monroe	1	*
Cheboygan	-	-	Montcalm	1	*
Chippewa	1	*	Montmorency	-	-
Clare	1	*	Muskegon	3	1.6
Clinton	1	*	Newaygo	2	4.2
Crawford	1	*	Oakland	14	1.2
Delta	2	*	Oceana	1	*
Dickinson	-	-	Ogemaw	1	*
Eaton	2	1.9	Ontonagon	-	-
Emmet	-	-	Osceola	0	*
Genesee	5	1.2	Oscoda	-	-
Gladwin	0	*	Otsego	-	-
Gogebic	-	-	Ottawa	1	*
Grand Traverse	0	*	Presque Isle	0	*
Gratiot	1	*	Roscommon	0	*
Hillsdale	0	*	Saginaw	4	2.1
Houghton	-	-	St. Clair	2	1.2
Huron	1	*	St. Joseph	1	*
Ingham	2	0.8	Sanilac	1	*
Ionia	1	*	Schoolcraft	1	*
Iosco	1	*	Shiawassee	1	*
Iron	-	-	Tuscola	2	*
Isabella	0	*	Van Buren	1	*
Jackson	3	1.7	Washtenaw	3	0.8
Kalamazoo	3	1.4	Wayne	23	1.1
Kalkaska	0	*	Wexford	1	*
Kent	5	0.8			
Keweenaw	-	-			
Lake	-	-	Michigan	129	1.3

a) Includes boat-related and non-boat-related incidents.

Includes ICD-10 codes: V90, V92, W65-W74.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# UNINTENTIONAL INJURIES

## FALLS

### Demographic Characteristics

An average of 437 Michigan residents died annually between 1999 and 2001 as a result of unintentional falls (Table 23). This corresponds to a death rate of 4.4 per 100,000 residents (Table 24). The death rate for males (5.0) was 32% greater than the rate for females (3.8). Death rates increased with age with the most dramatic increase among those aged 75 and older. The rate for whites (4.9) was 88% greater than the rate for blacks (2.6). The difference between the races was especially substantial among women (white females: 4.4, black females: 1.7).

### Temporal Trends

Between 1990 and 2001, the numbers and rates of Michigan resident deaths resulting from unintentional falls ranged from a low of 236 deaths (or 2.5 per 100,000 population) in 1993 to a high of 508 deaths (or 5.1 per 100,000 population) in 2001\* (Table 25). The rate in 1993 was anomalous compared to Michigan's other unintentional fall fatality rates during this twelve-year period (Figure 6). While Michigan's rates increased during 1990-2001, they were consistently lower than national rates. The state has recently had a dramatic increase in fatal falls: from 1998 to 2001, the rate increased 55%. (Note that the change in mortality coding from ICD-9 to ICD-10 in 1999 presumably would have had minimal effect.\*)

### Geographic Distribution

Between 1999 and 2001, residents of six counties sustained no deaths due to unintentional falls (noted by "-" in Table 26). Of the counties for which a statistically reliable rate could be calculated, Huron County had the highest rate (9.2) while Allegan County had the lowest rate (1.6). Three of the state's most populous counties had notably excessive fall death rates: Kalamazoo (98% greater than the state rate); Kent (75%); and Muskegon (64%).

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for unintentional falls is 0.841. This ratio implies that the change from ICD-9 to ICD-10 coding by itself would reduce the number of fatal injuries coded as unintentional falls by 15.9%. The study upon which this is based attributed this reduction entirely on the elimination of "Fracture, Cause Unspecified" (E887) from the ICD-10 definition of an unintentional fall. However, our study did not include deaths coded with E887 in the definition of an unintentional fall for the period 1990-1998. Thus, a comparability ratio of 1.0 was assumed for this section (i.e., the change to ICD-10 coding by itself would have had no effect on the number of deaths coded as unintentional falls).

TABLE 23  
Average Annual Number of Deaths Due to Unintentional Falls  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	0	0	1	0	0	1	-	-	-	1	1	1
1-4	1	-	1	0	0	1	-	-	-	1	0	1
5-9	1	-	1	-	-	-	-	-	-	1	-	1
10-14	-	0	0	-	-	-	-	-	-	-	0	0
15-19	1	1	2	-	-	-	-	-	-	1	1	2
20-24	2	0	2	-	-	-	0	-	0	2	0	3
25-29	3	0	3	-	-	-	-	-	-	3	0	3
30-34	4	1	5	1	0	1	0	-	0	5	2	6
35-44	18	3	20	3	0	3	0	0	1	21	3	24
45-54	22	4	26	5	1	6	-	0	0	26	6	32
55-64	22	6	28	6	2	7	1	1	2	28	9	37
65-74	30	19	49	2	1	4	0	1	1	33	22	55
75+	112	142	255	8	7	15	1	1	2	121	150	271
Total	215	179	393	24	12	37	4	3	7	243	194	437

Includes ICD-10 codes: W00 – W19.

Decedent with unknown race (n=1) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 24  
Average Annual Death Rates Due to Unintentional Falls  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	*	*	*	*	*	*	-	-	-	*	*	*
1-4	*	-	*	*	*	*	-	-	-	*	*	*
5-9	*	-	*	-	-	-	-	-	-	*	-	*
10-14	-	*	*	-	-	-	-	-	-	-	*	*
15-19	*	*	*	-	-	-	-	-	-	*	*	*
20-24	0.8	*	0.5	-	-	-	*	-	*	0.7	*	0.4
25-29	1.2	*	0.7	-	-	-	-	-	-	0.9	*	0.5
30-34	1.3	*	0.9	*	*	*	*	-	*	1.3	*	0.9
35-44	2.7	0.4	1.6	2.8	*	1.4	*	*	*	2.6	0.4	1.5
45-54	3.8	0.8	2.3	5.9	*	3.3	-	*	*	3.9	0.8	2.3
55-64	6.0	1.7	3.8	13.3	*	7.7	*	*	*	6.8	2.0	4.3
65-74	11.7	6.3	8.8	8.1	*	5.4	*	*	*	11.4	6.2	8.5
75+	59.7	43.4	49.4	40.7	21.2	28.3	*	*	23.5	57.7	41.0	47.1
Total	5.5	4.4	4.9	3.6	1.7	2.6	1.3	1.1	1.2	5.0	3.8	4.4

Decedent with unknown race not illustrated but included in totals.

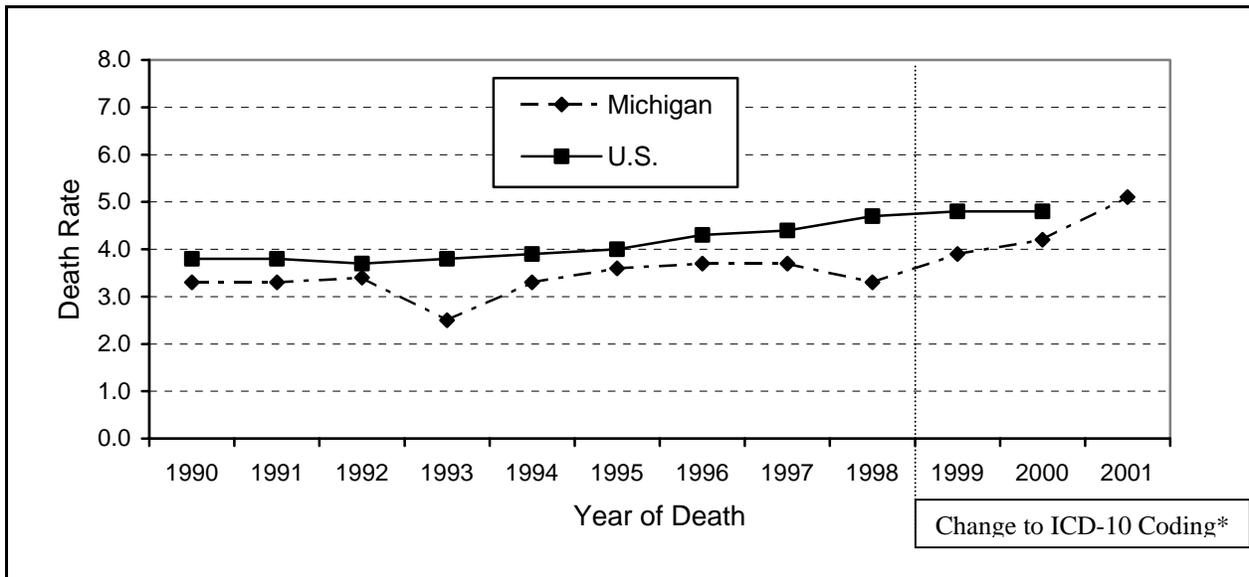
Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 25  
 Number of Deaths and Death Rates Due to Unintentional Falls  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	308	9,476	3.3	3.8
1991	314	9,655	3.3	3.8
1992	322	9,529	3.4	3.7
1993	236	9,788	2.5	3.8
1994	320	10,088	3.3	3.9
1995	349	10,483	3.6	4.0
1996	361	11,292	3.7	4.3
1997	366	11,858	3.7	4.4
1998	328	12,595	3.3	4.7
CHANGE TO ICD-10 CODING*				
1999	389	13,162	3.9	4.8
2000	414	13,322	4.2	4.8
2001	508	not available	5.1	not available

FIGURE 6  
 Death Rates Due to Unintentional Falls  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E880 – E886, E888

1999-2001: ICD-10 codes W00 – W19

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 26  
Average Annual Numbers and Rates of Deaths Due to Unintentional Falls  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	2	*
Alger	2	*	Leelanau	-	-
Allegan	5	1.6	Lenawee	4	3.7
Alpena	1	*	Livingston	6	3.6
Antrim	1	*	Luce	-	-
Arenac	-	-	Mackinac	1	*
Baraga	1	*	Macomb	31	3.9
Barry	2	4.1	Manistee	1	*
Bay	2	1.8	Marquette	5	7.7
Benzie	1	*	Mason	1	*
Berrien	7	4.3	Mecosta	1	*
Branch	3	6.6	Menominee	1	*
Calhoun	7	5.1	Midland	1	*
Cass	1	*	Missaukee	0	*
Charlevoix	1	*	Monroe	5	3.2
Cheboygan	1	*	Montcalm	2	3.3
Chippewa	2	*	Montmorency	1	*
Clare	1	*	Muskegon	12	7.2
Clinton	2	*	Newaygo	2	*
Crawford	1	*	Oakland	56	4.7
Delta	2	6.1	Oceana	1	*
Dickinson	1	*	Ogemaw	-	-
Eaton	4	3.9	Ontonagon	0	*
Emmet	1	*	Osceola	1	*
Genesee	11	2.4	Oscoda	0	*
Gladwin	1	*	Otsego	1	*
Gogebic	1	*	Ottawa	8	3.4
Grand Traverse	3	4.3	Presque Isle	1	*
Gratiot	2	5.5	Roscommon	1	*
Hillsdale	2	*	Saginaw	5	2.4
Houghton	3	7.4	St. Clair	5	3.0
Huron	3	9.2	St. Joseph	3	4.8
Ingham	12	4.3	Sanilac	1	*
Ionia	3	5.4	Schoolcraft	0	*
Iosco	2	7.3	Shiawassee	1	*
Iron	1	*	Tuscola	1	*
Isabella	1	*	Van Buren	5	7.0
Jackson	10	6.5	Washtenaw	16	5.1
Kalamazoo	21	8.7	Wayne	82	4.0
Kalkaska	-	-	Wexford	1	*
Kent	44	7.7			
Keweenaw	0	*			
Lake	0	*	Michigan	437	4.4

Includes ICD-10 codes: W00 – W19.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# UNINTENTIONAL INJURIES

## FIRE/FLAMES & SMOKE

Fatalities examined in this section represent deaths caused directly by fires or from the inhalation of smoke from fires.

### Demographic Characteristics

An average of 152 Michigan residents died annually between 1999 and 2001 as a result of unintentional exposure to fire/flames and smoke (Table 27). This corresponds with an annual death rate of 1.5 per 100,000 residents (Table 28). Death rates were significantly elevated for the very young (under age 5) (3.0) and the elderly (aged 75 and older) (4.3). The death rate for males (1.8) was 38% higher than the death rate for females (1.3). The rate for blacks (3.6) was nearly three times the rate for whites (1.3).

### Temporal Trends

The number of deaths due to unintentional exposure to fire/flames and smoke among Michigan residents between 1990 and 2001 ranged from 128 in 1996 to 199 in 1992 (Table 29). Death rates were lowest in 1996 and 2001 (1.3 per 100,000 residents) and highest in 1992 (2.1). (Note that the change in mortality coding from ICD-9 to ICD-10 in 1999 would have slightly decreased the numbers and rates of death for this cause.\*) Michigan rates exceeded national rates every year except for 1996 (Table 29 and Figure 7). Between 1990 and 2000, national death rates consistently declined (data for 2001 not currently available). While Michigan also experienced a decline between 1990 and 2001, the trend was less consistent.

### Geographic Distribution

There were no unintentional fire/flames and smoke deaths among residents of 22 Michigan counties (noted by “-” in Table 30). All of these counties were located in either the Upper Peninsula or the northern portion of the Lower Peninsula. Of the 15 counties for which a statistically reliable rate could be calculated, Washtenaw County had the lowest rate (0.6) and Hillsdale County had the highest rate (7.2).

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for deaths due to unintentional exposure to fire/flames and smoke is 0.974. Thus, the coding change to ICD-10 from ICD-9 by itself would have had the effect of decreasing the number of cases and the corresponding rates by 2.6%.

TABLE 27  
Average Annual Number of Deaths Due to Unintentional Fire/Flames and Smoke  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	1	1	2	1	1	2	-	-	-	2	2	4
1-4	6	3	9	4	4	8	-	-	-	10	7	16
5-9	3	2	5	5	2	7	-	-	-	8	3	11
10-14	2	2	4	1	2	3	-	-	-	3	4	7
15-19	4	1	5	1	0	1	0	-	0	6	1	7
20-24	2	2	4	2	1	2	-	0	0	4	3	7
25-29	2	1	3	1	0	1	-	-	-	3	1	4
30-34	3	1	4	-	0	0	-	-	-	3	2	4
35-44	8	4	12	4	2	6	0	-	0	13	6	19
45-54	8	4	12	2	2	4	-	-	-	9	7	16
55-64	6	5	11	2	3	5	-	-	-	8	8	16
65-74	6	5	11	2	3	5	-	0	0	8	8	16
75+	10	8	18	2	5	7	-	-	-	12	13	25
Total	61	39	100	27	25	51	1	1	1	88	64	152

Includes ICD-10 codes: X00 – X09.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 28  
Average Annual Death Rates Due to Unintentional Fire/Flames and Smoke  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	*	*	2.5	*	*	*	-	-	-	2.9	3.1	3.0
1-4	3.0	1.4	2.2	7.7	8.7	8.2	-	-	-	3.5	2.5	3.0
5-9	1.1	*	0.9	6.9	*	4.7	-	-	-	2.1	0.9	1.5
10-14	0.8	*	0.7	*	3.2	2.1	-	-	-	0.8	1.0	0.9
15-19	1.5	*	0.9	*	*	*	*	-	*	1.5	*	0.9
20-24	0.9	*	0.8	*	*	2.3	-	*	*	1.2	0.8	1.0
25-29	0.9	*	0.6	*	*	*	-	-	-	1.0	*	0.7
30-34	1.0	*	0.7	-	*	*	-	-	-	0.8	*	0.6
35-44	1.2	0.7	0.9	4.5	*	2.9	*	-	*	1.6	0.7	1.2
45-54	1.3	0.8	1.1	*	2.5	2.3	-	-	-	1.4	1.0	1.2
55-64	1.6	1.3	1.4	5.5	5.7	5.6	-	-	-	1.9	1.8	1.9
65-74	2.3	1.8	2.0	7.0	6.7	6.8	-	*	*	2.8	2.4	2.5
75+	5.1	2.4	3.4	12.4	15.1	14.1	-	-	-	5.7	3.6	4.3
Total	1.6	1.0	1.3	4.0	3.3	3.6	*	*	*	1.8	1.3	1.5

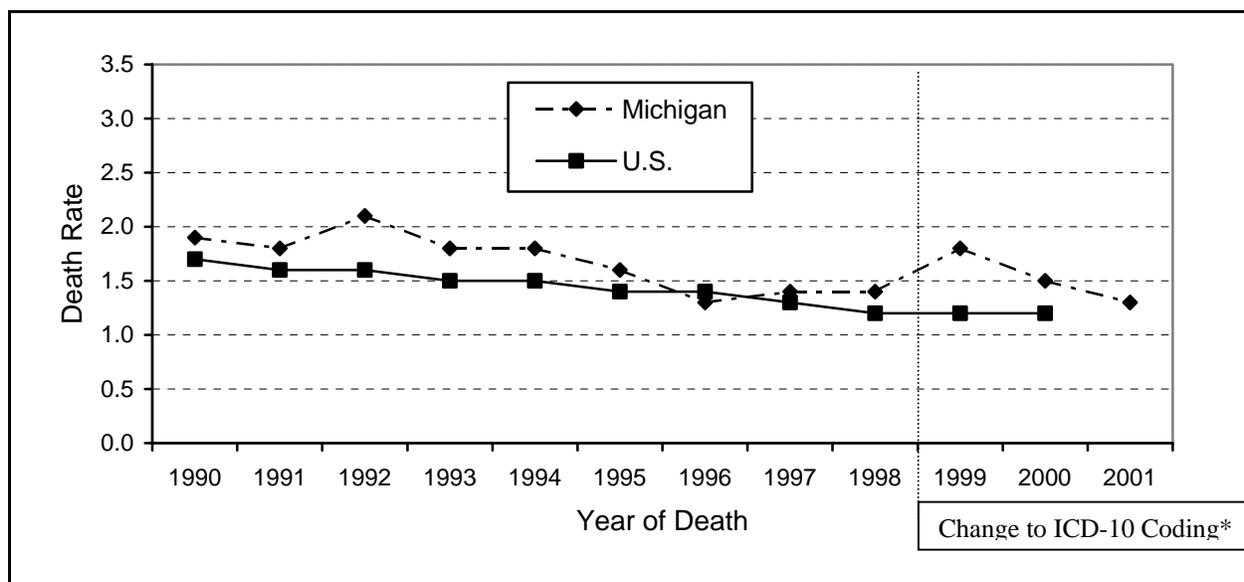
Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 29  
 Number of Deaths and Death Rates Due to Unintentional Fire/Flames and Smoke  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	177	4,175	1.9	1.7
1991	173	4,120	1.8	1.6
1992	199	3,958	2.1	1.6
1993	172	3,900	1.8	1.5
1994	174	3,986	1.8	1.5
1995	158	3,761	1.6	1.4
1996	128	3,741	1.3	1.4
1997	139	3,490	1.4	1.3
1998	141	3,255	1.4	1.2
CHANGE TO ICD-10 CODING*				
1999	181	3,348	1.8	1.2
2000	146	3,377	1.5	1.2
2001	130	not available	1.3	not available

FIGURE 7  
 Death Rates Due to Unintentional Fire/Flames and Smoke  
 Michigan and U.S. Residents, 1990 – 2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E890 – E899

1999-2001: ICD-10 codes X00 – X09

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 30  
Average Annual Number and Rates of Deaths Due to Unintentional Fire/Flames and Smoke  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	1	*
Alger	0	*	Leelanau	-	-
Allegan	0	*	Lenawee	1	*
Alpena	1	*	Livingston	1	*
Antrim	-	-	Luce	0	*
Arenac	-	-	Mackinac	-	-
Baraga	-	-	Macomb	8	1.0
Barry	2	*	Manistee	2	*
Bay	1	*	Marquette	1	*
Benzie	-	-	Mason	2	7.1
Berrien	4	2.3	Mecosta	1	*
Branch	1	*	Menominee	1	*
Calhoun	1	*	Midland	1	*
Cass	1	*	Missaukee	-	-
Charlevoix	-	-	Monroe	2	*
Cheboygan	0	*	Montcalm	2	3.8
Chippewa	0	*	Montmorency	-	-
Clare	-	-	Muskegon	2	1.4
Clinton	1	*	Newaygo	1	*
Crawford	-	-	Oakland	14	1.2
Delta	1	*	Oceana	2	*
Dickinson	1	*	Ogemaw	1	*
Eaton	1	*	Ontonagon	-	-
Emmet	-	-	Osceola	1	*
Genesee	11	2.6	Oscoda	1	*
Gladwin	1	*	Otsego	0	*
Gogebic	-	-	Ottawa	2	0.8
Grand Traverse	1	*	Presque Isle	-	-
Gratiot	1	*	Roscommon	-	-
Hillsdale	3	7.2	Saginaw	5	2.2
Houghton	0	*	St. Clair	2	*
Huron	1	*	St. Joseph	1	*
Ingham	2	0.8	Sanilac	1	*
Ionia	1	*	Schoolcraft	-	-
Iosco	-	-	Shiawassee	1	*
Iron	-	-	Tuscola	0	*
Isabella	0	*	Van Buren	3	3.5
Jackson	2	*	Washtenaw	2	0.6
Kalamazoo	1	*	Wayne	45	2.2
Kalkaska	0	*	Wexford	1	*
Kent	5	0.9			
Keweenaw	-	-			
Lake	-	-	Michigan	152	1.5

Includes ICD-10 codes: X00 – X09.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# UNINTENTIONAL INJURIES

## FIREARMS

### Demographic Characteristics

An average of 16 Michigan residents died annually between 1999-2001 due to unintentional firearm injuries (Table 31). This corresponds to a death rate of 0.2 per 100,000 residents (Table 32). Of the 47 individuals who died over the three-year period, 43 (91%) were male.

### Temporal Trends

Between 1990 and 2001, the number of unintentional firearm injury deaths among Michigan residents ranged from 14 in 1999 to 34 in 1992 (Table 33). These years also had the lowest and highest death rates (0.1 and 0.4, respectively). The relatively low numbers and rates of death during 1999-2001 is especially noteworthy as the change in mortality coding from ICD-9 to ICD-10 in 1999 by itself would have caused numbers to increase (by about one death per year).<sup>\*</sup> National death rates consistently exceeded Michigan rates (Table 33 and Figure 8). Both nationally and in Michigan, the number of deaths and the corresponding death rates decreased significantly (about 50%) over the study period.

### Geographic Distribution

Statistically reliable death rates could be calculated for only one county, thus a geographical analysis was not performed.

<sup>\*</sup> The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for deaths due to unintentional firearm injuries is 1.058. Thus, the coding change to ICD-10 from ICD-9 by itself would have had the effect of increasing the number of cases and the corresponding rates by 5.8%.

TABLE 31  
Average Annual Number of Deaths Due to Unintentional Firearm Injuries  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	1	-	1	0	-	0	-	-	-	2	-	2
15-19	3	-	3	1	-	1	-	-	-	4	-	4
20-24	1	1	2	0	-	0	-	-	-	2	1	2
25-29	0	-	0	-	-	-	-	-	-	0	-	0
30-34	1	-	1	-	-	-	-	-	-	1	-	1
35-44	2	0	3	0	-	0	-	-	-	3	0	3
45-54	1	-	1	-	-	-	-	-	-	1	-	1
55-64	1	-	1	-	-	-	-	-	-	1	-	1
65-74	0	-	0	-	-	-	-	-	-	0	-	0
75+	0	0	1	0	-	0	-	-	-	1	0	1
Total	11	1	13	3	-	3	-	-	-	14	1	16

Includes ICD-10 codes: W32 – W34.

Decedent with unknown race (n=1) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 32  
Average Annual Death Rates Due to Unintentional Firearm Injuries  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	*	-	*	*	-	*	-	-	-	*	-	*
15-19	0.9	-	0.5	*	-	*	-	-	-	1.1	-	0.6
20-24	*	*	0.4	*	-	*	-	-	-	*	*	0.4
25-29	*	-	*	-	-	-	-	-	-	*	-	*
30-34	*	-	*	-	-	-	-	-	-	*	-	*
35-44	0.4	*	0.2	*	-	*	-	-	-	0.3	*	0.2
45-54	*	-	*	-	-	-	-	-	-	*	-	*
55-64	*	-	*	-	-	-	-	-	-	*	-	*
65-74	*	-	*	-	-	-	-	-	-	*	-	*
75+	*	*	*	*	-	*	-	-	-	*	*	*
Total	0.3	*	0.2	0.4	-	0.2	-	-	-	0.3	*	0.2

Rates are number of deaths per 100,000 population.

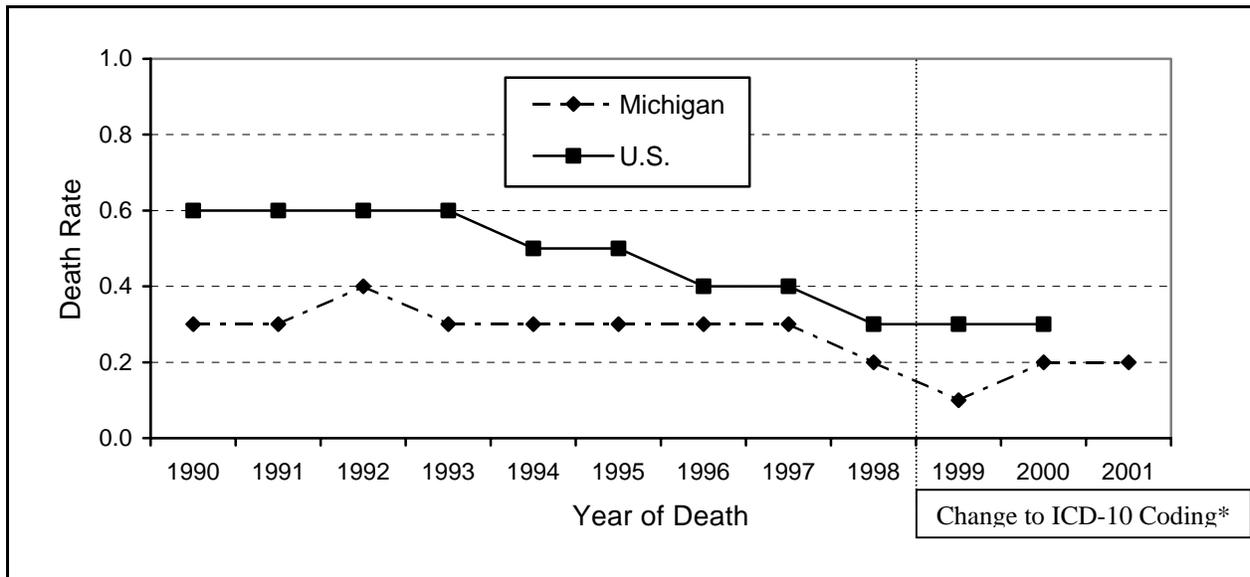
Decedent with unknown race (n=1) not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 33  
 Number of Deaths and Death Rates Due to Unintentional Firearm Injuries  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	32	1,416	0.3	0.6
1991	27	1,441	0.3	0.6
1992	34	1,409	0.4	0.6
1993	26	1,521	0.3	0.6
1994	29	1,356	0.3	0.5
1995	28	1,225	0.3	0.5
1996	25	1,134	0.3	0.4
1997	26	981	0.3	0.4
1998	22	866	0.2	0.3
CHANGE TO ICD-10 CODING*				
1999	14	824	0.1	0.3
2000	18	776	0.2	0.3
2001	15	not available	0.2	not available

FIGURE 8  
 Death Rates Due to Unintentional Firearm Injuries  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 code E922

1999-2001: ICD-10 codes W32 - W34

Sources: Vital Records and Health Data Development Section, MDCH  
 Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention  
 U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

# UNINTENTIONAL INJURIES

## MOTOR VEHICLE TRAFFIC CRASHES

Among transportation fatalities, traffic crashes involving motor vehicles were the leading cause of death (see Table 17 on page 21). The individuals primarily comprising this category were occupants of motor vehicles, motorcyclists, pedal cyclists, and pedestrians. A “traffic crash” is defined as an incident that occurs on a public trafficway. A “motor vehicle” includes a car, pick-up truck, van, heavy transport vehicle, bus, motorcycle, or off-road motorized vehicle.

### Demographic Characteristics

An average of 1,342 Michigan residents died annually between 1999 and 2001 as a result of unintentional motor vehicle (MV) traffic crashes (Table 34). This corresponds to an annual death rate of 13.5 per 100,000 residents (Table 35). The death rate for males (18.0) was nearly double the rate for females (9.2). Rates were substantially below the statewide rate for those under age 15, but increased dramatically for those aged 15-24. Residents aged 75 years and older had the highest rate (27.4), which was twice the statewide rate. Death rates for blacks and whites overall were not substantially different although there were differences between the two races in specific age groups. The rate for other races (4.3) was noticeably low, about one-third of the overall rate.

### Temporal Trends

Between 1990 and 2001, the number of deaths among Michigan residents due to unintentional MV traffic crashes ranged from 1,289 in 2001 to 1,639 in 1990 (Table 36). Death rates were lowest (12.9) and highest (17.6) for these years. Michigan’s death rate was generally less than the national rate, except in 1995 (Table 36 and Figure 9). Michigan’s unintentional MV traffic crash death rate decreased 27% between 1990 and 2001. A portion of the decrease in numbers and rates of death for 1999-2001 can be attributed to the change in mortality coding from ICD-9- to ICD-10 in 1999.\*

### Geographic Distribution

Every county in Michigan had at least one resident die due to an unintentional MV traffic crash during 1999-2001 (Table 37). Death rates ranged from 7.3 in Iosco County to 33.7 in Montcalm County. Of the ten most populous counties in the state, six had rates that were lower than the statewide rate: Washtenaw, Ingham, Oakland, Macomb, Wayne, and Kent. Conversely, rural counties tended to have the highest rates.

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for “Motor vehicle accidents” is 0.975. [Motor vehicle traffic crashes between 1999 and 2001 in Michigan comprised 98% of “Motor vehicle accidents” as defined in the CDC study on comparability ratios.<sup>11</sup> Thus, this comparability ratio is applicable to this section.] Therefore, the coding change to ICD-10 from ICD-9 by itself would have had the effect of decreasing the number of cases and corresponding rates by about 2.5%.

**TABLE 34**  
**Average Annual Number of Deaths Due to Unintentional Motor Vehicle Traffic Crashes**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	1	1	1	-	0	0	-	0	0	1	1	2
1-4	5	3	8	4	5	8	0	-	0	9	8	17
5-9	10	7	18	4	2	6	-	-	-	14	10	24
10-14	15	13	28	4	2	6	-	1	1	19	15	35
15-19	89	51	140	10	5	15	2	2	4	101	58	159
20-24	92	32	125	15	7	22	1	2	3	108	42	150
25-29	63	19	82	16	6	22	1	1	3	80	27	107
30-34	55	20	75	18	9	27	0	2	2	73	31	104
35-44	119	52	170	26	10	36	2	0	2	147	62	209
45-54	91	40	131	20	10	30	2	1	4	113	51	164
55-64	62	34	97	10	2	12	1	1	3	74	38	112
65-74	46	39	85	8	6	14	1	1	2	56	46	102
75+	74	70	145	7	5	12	0	0	1	82	76	158
Total	722	383	1,105	142	70	212	13	12	24	878	464	1,342

Includes ICD-10 codes: V30 – V79 (.4-.9), V83 – V86 (.0-.3), V20 – V28 (.3-.9), V29.4-V29.9, V12 – V14 (.3-.9), V19.4-V19.6, V02 – V04 (.1, .9), V09.2, V80(.3-.5), V81.1, V82.1, V87(.0-.8), V89.2

Decedents with unknown race (n=3) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

**TABLE 35**  
**Average Annual Death Rates Due to Unintentional Motor Vehicle Traffic Crashes**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	*	*	*	-	*	*	-	*	*	*	*	1.5
1-4	2.5	1.7	2.1	7.7	10.1	8.9	*	-	*	3.3	3.0	3.2
5-9	3.7	2.8	3.2	5.5	3.3	4.4	-	-	-	3.8	2.7	3.2
10-14	5.1	4.7	4.9	6.6	*	4.7	-	*	*	5.0	4.2	4.6
15-19	31.0	18.8	25.1	18.0	8.5	13.3	9.1	*	8.1	27.5	16.4	22.1
20-24	37.2	13.3	25.4	29.8	14.0	21.6	*	8.3	6.5	33.4	13.1	23.3
25-29	25.3	8.0	16.7	30.8	10.2	19.9	*	*	5.0	24.4	8.2	16.3
30-34	19.6	7.4	13.6	35.6	16.6	25.5	*	*	4.1	20.5	8.9	14.7
35-44	18.1	7.9	13.0	27.2	8.9	17.4	*	*	2.6	18.5	7.7	13.1
45-54	16.0	7.0	11.5	24.9	10.7	17.2	8.9	*	6.9	16.7	7.4	12.0
55-64	17.2	9.1	13.1	24.3	3.8	13.0	*	*	9.6	17.7	8.5	12.9
65-74	18.1	12.7	15.2	27.9	15.9	20.9	*	*	13.8	19.3	13.1	15.9
75+	39.5	21.5	28.0	38.9	15.1	23.8	*	*	*	39.0	20.7	27.4
Total	18.4	9.5	13.9	21.2	9.4	15.0	4.4	4.3	4.3	18.0	9.2	13.5

Rates are number of deaths per 100,000 population.

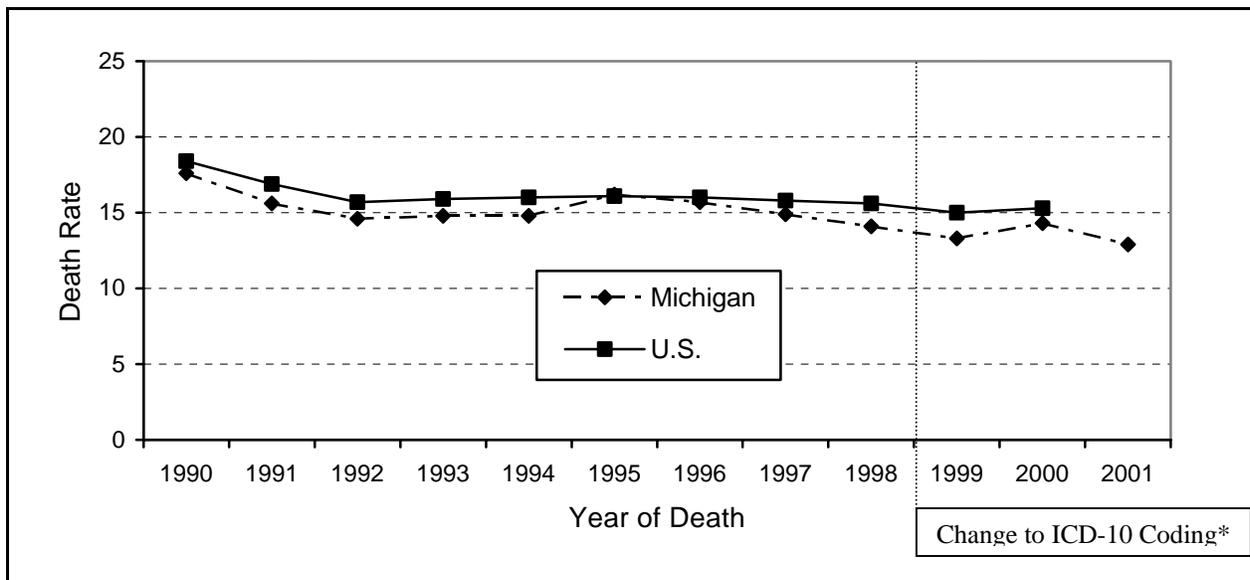
Decedents with unknown race (n=3) not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 36  
 Number of Deaths and Death Rates Due to Unintentional Motor Vehicle Traffic Crashes  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	1,639	45,827	17.6	18.4
1991	1,464	42,621	15.6	16.9
1992	1,380	39,985	14.6	15.7
1993	1,408	40,899	14.8	15.9
1994	1,415	41,507	14.8	16.0
1995	1,565	42,331	16.2	16.1
1996	1,525	42,522	15.7	16.0
1997	1,462	42,340	14.9	15.8
1998	1,389	42,191	14.1	15.6
CHANGE TO ICD-10 CODING*				
1999	1,315	40,965	13.3	15.0
2000	1,422	41,994	14.3	15.3
2001	1,289	not available	12.9	not available

FIGURE 9  
 Death Rates Due to Unintentional Motor Vehicle Traffic Crashes  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E810-819

1999-2001: ICD-10 codes V30 – V79 (.4-.9), V83 – V86 (.0-.3), V20 – V28 (.3-.9), V29.4-V29.9, V12 – V14 (.3-.9), V19.4-V19.6, V02 – V04 (.1, .9), V09.2, V80(.3-.5), V81.1, V82.1, V87(.0-.8), V89.2

Sources: Vital Records and Health Data Development Section, MDCH  
 Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention  
 U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 37  
Average Annual Number and Rates of Deaths Due to Unintentional Motor Vehicle Traffic Crashes  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	2	17.1	Lapeer	18	20.1
Alger	1	*	Leelanau	3	15.8
Allegan	17	15.8	Lenawee	15	15.2
Alpena	5	16.0	Livingston	19	11.9
Antrim	5	21.6	Luce	1	*
Arenac	3	15.4	Mackinac	2	16.7
Baraga	1	*	Macomb	72	9.1
Barry	15	27.0	Manistee	5	20.4
Bay	18	16.0	Marquette	8	12.9
Benzie	4	25.0	Mason	6	20.0
Berrien	27	16.8	Mecosta	9	21.4
Branch	8	16.7	Menominee	3	10.5
Calhoun	24	17.2	Midland	8	9.3
Cass	12	23.5	Missaukee	4	25.3
Charlevoix	5	17.9	Monroe	23	15.8
Cheboygan	5	17.6	Montcalm	21	33.7
Chippewa	6	14.7	Montmorency	2	*
Clare	7	23.5	Muskegon	28	16.6
Clinton	7	10.8	Newaygo	12	24.4
Crawford	2	16.3	Oakland	105	8.8
Delta	5	13.8	Oceana	4	14.9
Dickinson	3	9.7	Ogemaw	4	18.5
Eaton	14	13.8	Ontonagon	1	*
Emmet	6	19.1	Osceola	5	20.1
Genesee	69	15.8	Oscoda	2	21.2
Gladwin	5	17.9	Otsego	4	18.6
Gogebic	4	23.0	Ottawa	32	13.6
Grand Traverse	10	13.3	Presque Isle	4	27.8
Gratiot	6	14.2	Roscommon	4	15.7
Hillsdale	11	24.4	Saginaw	31	14.8
Houghton	4	11.1	St. Clair	24	14.8
Huron	7	20.3	St. Joseph	12	19.8
Ingham	24	8.7	Sanilac	13	29.9
Ionia	12	20.0	Schoolcraft	2	22.5
Iosco	2	7.3	Shiawassee	15	20.9
Iron	2	17.8	Tuscola	14	24.0
Isabella	9	14.2	Van Buren	18	23.2
Jackson	22	13.9	Washtenaw	28	8.6
Kalamazoo	36	15.2	Wayne	251	12.2
Kalkaska	2	14.1	Wexford	7	24.1
Kent	71	12.4	Unknown	1	
Keweenaw	0	*			
Lake	3	29.4	Michigan	1,342	13.5

Includes ICD-10 codes: V30 – V79 (.4-.9), V83 – V86 (.0-.3), V20 – V28 (.3-.9), V29.4-V29.9, V12 – V14 (.3-.9), V19.4-V19.6, V02 – V04 (.1, .9), V09.2, V80(.3-.5), V81.1, V82.1, V87(.0-.8), V89.2

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# UNINTENTIONAL INJURIES

## MOTOR VEHICLE TRAFFIC CRASHES - MOTOR VEHICLE OCCUPANTS

### Demographic Characteristics

Of the 4,026 Michigan residents fatally injured between 1999 and 2001 in motor vehicle (MV) traffic crashes, 1,830 (45%) were MV occupants.\* An average of 610 Michigan residents died annually during this period as MV occupants (Table 38). This corresponds to an average annual death rate of 6.1 per 100,000 residents (Table 39).

The death rate for males (8.1) was 88% greater than the rate for females (4.3). Rates were relatively low for those under age 15, but increased significantly for those aged 15-24. Thereafter, rates were lower but peaked again for those aged 75 and older. White residents had a rate (6.6) that was 25% greater than for blacks (5.3) and three times the rate for other races (2.1).

### Temporal Trends

Between 1990 and 2001, the number of MV occupant traffic deaths among Michigan residents ranged from 483 in 2001 to 1,153 in 1990 (Table 40). Death rates for those years also represented the lowest and highest rates during this period (4.8 and 12.4 deaths per 100,000 residents, respectively). While death rates for both the U.S. and Michigan declined over this period, the decrease was more substantial for Michigan (Table 40 and Figure 10). Between 1990 and 2001, the Michigan MV occupant death rate decreased 61%. (Note that the change in mortality coding from ICD-9 to ICD-10 in 1999 by itself would have slightly decreased the numbers and rates of death for this cause. Had the coding system remained the same, the increase seen in 1999 and 2000 would have been greater.\*\*)

### Geographic Distribution

Residents in two Michigan counties (Keweenaw and Schoolcraft) sustained no deaths as motor vehicle occupants in traffic crashes during 1999-2001 (Table 41). Death rates ranged from 2.6 per 100,000 residents in Grand Traverse County to 18.5 per 100,000 residents in Presque Isle County. Of the ten most populous counties in the state, seven had rates that were lower than the statewide rate: Oakland, Saginaw, Macomb, Wayne, Ingham, Washtenaw, and Kent. Conversely, rural counties tended to have the highest rates.

\* For a large proportion of traffic deaths (34%) the type of person involved was unspecified (see Table 17). Thus, motor vehicle occupants likely comprise a higher proportion of all traffic deaths than indicated here.

\*\* The report on comparability ratios<sup>11</sup> did not derive an estimate specifically for motor vehicle occupants involved in traffic crashes. Assuming the ratio is the same as for "motor vehicle accidents" (0.975), the coding change to ICD-10 from ICD-9 by itself would have had the effect of decreasing the number of cases and corresponding rates by 2.5%.

**TABLE 38**  
**Average Annual Number of Deaths Due to Unintentional Motor Vehicle Traffic Crashes-MV Occupants**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	1	1	1	-	0	0	-	0	0	1	1	2
1-4	2	1	3	1	2	3	0	-	0	3	3	6
5-9	3	2	5	-	-	-	-	-	-	3	2	5
10-14	5	5	10	1	0	1	-	1	1	6	6	12
15-19	49	27	76	5	3	8	1	1	1	54	31	85
20-24	48	16	64	6	4	10	1	1	2	55	21	76
25-29	31	11	43	6	3	9	1	1	2	38	16	54
30-34	28	10	38	7	4	10	-	1	1	34	15	50
35-44	53	22	75	8	4	12	1	0	1	62	26	88
45-54	42	17	59	5	3	9	1	1	1	48	21	69
55-64	25	17	42	4	1	5	0	-	0	30	18	48
65-74	23	18	41	2	2	4	0	1	1	25	21	46
75+	31	34	65	3	1	3	-	-	-	33	35	68
Total	340	183	523	47	27	74	6	6	12	393	217	610

Includes ICD-10 codes: V30 – V79 (.4-.9), V83 – V86 (.0-.3).

Decedents with unknown race (n=2) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

**TABLE 39**  
**Average Annual Death Rates Due to Unintentional Motor Vehicle Traffic Crashes-MV Occupants**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	*	*	*	-	*	*	-	*	*	*	*	1.5
1-4	1.0	*	0.8	*	*	2.9	*	-	*	1.2	1.1	1.2
5-9	1.2	0.8	1.0	-	-	-	-	-	-	0.9	0.6	0.7
10-14	1.7	1.9	1.8	*	*	*	-	*	*	1.5	1.7	1.6
15-19	17.0	9.9	13.6	8.4	6.1	7.2	*	*	*	14.7	8.8	11.9
20-24	19.3	6.7	13.1	12.9	7.0	9.8	*	*	*	17.0	6.5	11.8
25-29	12.7	4.7	8.7	10.9	5.7	8.1	*	*	4.3	11.7	4.8	8.2
30-34	9.9	3.8	6.9	13.4	6.5	9.8	-	*	*	9.7	4.3	7.0
35-44	8.0	3.4	5.7	8.3	3.3	5.6	*	*	*	7.8	3.2	5.5
45-54	7.3	3.0	5.2	6.8	3.6	5.0	*	*	*	7.1	3.1	5.0
55-64	6.9	4.6	5.7	10.2	*	5.6	*	-	*	7.1	4.1	5.6
65-74	8.9	6.0	7.3	7.0	5.0	5.8	*	*	*	8.6	6.1	7.2
75+	16.3	10.4	12.5	14.2	*	6.4	-	-	-	15.8	9.5	11.8
Total	8.7	4.5	6.6	7.1	3.6	5.3	2.0	2.3	2.1	8.1	4.3	6.1

Rates are number of deaths per 100,000 population.

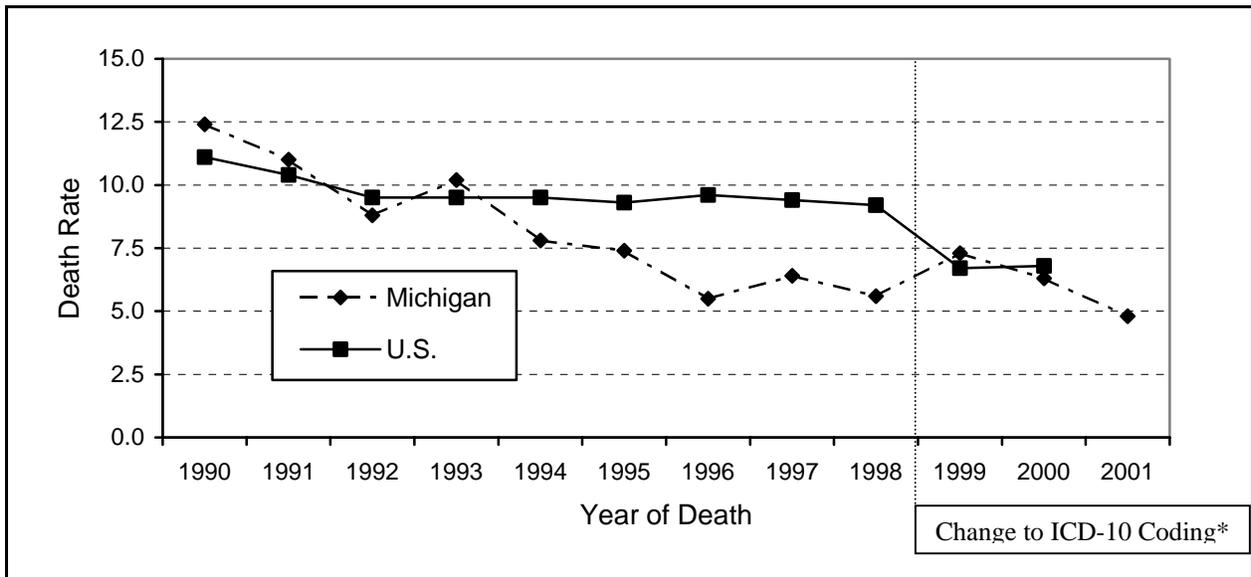
Decedents with unknown race (n=2) not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 40  
 Number of Deaths and Death Rates Due to Unintentional Motor Vehicle Traffic Crashes-MV Occupants  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	1,153	27,725	12.4	11.1
1991	1,036	26,139	11.0	10.4
1992	830	24,299	8.8	9.5
1993	975	24,586	10.2	9.5
1994	748	24,818	7.8	9.5
1995	718	24,359	7.4	9.3
1996	533	25,378	5.5	9.6
1997	622	25,089	6.4	9.4
1998	550	24,783	5.6	9.2
CHANGE TO ICD-10 CODING*				
1999	717	18,326	7.3	6.7
2000	630	18,650	6.3	6.8
2001	483	not available	4.8	not available

FIGURE 10  
 Death Rates Due to Unintentional Motor Vehicle Traffic Crashes-MV Occupants  
 By Year of Death, Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E810-819 (.0, .1)

1999-2001: ICD-10 codes V30 - V79 (.4-.9), V83 - V86 (.0-.3)

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 41  
Average Annual Numbers and Rates of Deaths Due to  
Unintentional Motor Vehicle Traffic Crashes-MV Occupants  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	1	*	Lapeer	6	7.2
Alger	1	*	Leelanau	1	*
Allegan	10	9.5	Lenawee	6	6.4
Alpena	2	6.4	Livingston	12	7.9
Antrim	2	8.7	Luce	1	*
Arenac	1	*	Mackinac	1	*
Baraga	1	*	Macomb	30	3.8
Barry	7	12.3	Manistee	3	12.2
Bay	9	8.2	Marquette	4	5.7
Benzie	1	*	Mason	2	8.3
Berrien	13	7.8	Mecosta	3	8.2
Branch	6	13.1	Menominee	1	*
Calhoun	13	9.2	Midland	3	3.2
Cass	6	11.1	Missaukee	3	18.4
Charlevoix	2	8.9	Monroe	13	9.1
Cheboygan	2	8.8	Montcalm	11	18.0
Chippewa	3	6.9	Montmorency	1	*
Clare	4	12.8	Muskegon	16	9.4
Clinton	3	5.1	Newaygo	8	17.4
Crawford	1	*	Oakland	35	2.9
Delta	1	*	Oceana	2	8.7
Dickinson	2	*	Ogemaw	2	9.2
Eaton	7	6.8	Ontonagon	0	*
Emmet	4	11.7	Osceola	2	8.6
Genesee	40	9.1	Oscoda	0	*
Gladwin	3	10.2	Otsego	1	*
Gogebic	2	13.4	Ottawa	16	6.9
Grand Traverse	2	2.6	Presque Isle	3	18.5
Gratiot	3	7.9	Roscommon	2	9.2
Hillsdale	3	6.4	Saginaw	7	3.5
Houghton	3	8.3	St. Clair	12	7.1
Huron	3	8.3	St. Joseph	6	9.1
Ingham	13	4.5	Sanilac	7	15.7
Ionia	6	9.8	Schoolcraft	-	-
Iosco	1	*	Shiawassee	11	14.9
Iron	1	*	Tuscola	6	10.9
Isabella	4	5.8	Van Buren	11	14.4
Jackson	14	8.6	Washtenaw	16	4.9
Kalamazoo	15	6.3	Wayne	90	4.4
Kalkaska	1	*	Wexford	3	10.9
Kent	35	6.0			
Keweenaw	-	-			
Lake	2	*	Michigan	610	6.1

Includes ICD codes: V30 – V79 (.4-.9), V83 – V86 (.0-.3).

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# **UNINTENTIONAL INJURIES**

## **MOTOR VEHICLE TRAFFIC CRASHES - MOTORCYCLISTS**

### **Demographic Characteristics**

An average of 75 Michigan residents died annually between 1999 and 2001 as motorcyclists involved in traffic crashes (Table 42). This corresponds to an annual death rate of 0.8 per 100,000 residents (Table 43). The death rate for males (1.4) was 14 times the death rate for females (0.1). Overall and among males, those aged 20-34 had the highest rates. The death rate for black males (1.8) was 29% higher than the rate for white males (1.4). Overall, the group with the highest motorcycle traffic fatality rate were black males aged 30-34 (8.7).

### **Temporal Trends**

Between 1990 and 2001, the number of motorcyclist deaths among Michigan residents ranged from 36 in 1998 to 86 in 2001 (Table 44). Michigan death rates were lowest (0.4) in 1992, 1997, and 1998, and highest (0.9) in 1990 and 2001. Rates in the U.S. and Michigan were relatively high in the early 1990's, decreased in the mid-1990's, and returned to their original levels in 2000/2001\* (Table 44 and Figure 11). Michigan rates were lower (by about 0.2 per 100,000) than national rates throughout the period of study.

### **Geographic Distribution**

Statistically reliable death rates could be calculated for only nine counties, thus a geographical analysis was not performed.

\* The effect of the change in mortality coding to ICD-10 in 1999 on identifying fatally injured motorcyclists is unknown. The report on ICD-9/ICD-10 comparability ratios<sup>11</sup> did not derive an estimate specifically for this cause of death. It would appear, however, that ICD-10 coding by itself would increase the number of cases identified as motorcyclists. Under ICD-9, when the death certificate did not specify whether the motorcyclist was the operator or a passenger, the case would be coded as "Motor Vehicle Traffic Crash – Unspecified Person." None of these cases could be categorized as motorcyclist deaths. ICD-10 contains codes that indicate "Motorcyclist – Type Unspecified." During 1999 – 2001 in Michigan an average of 24 cases a year were coded using these newly available codes.

TABLE 42  
Average Annual Number of Deaths Due to Unintentional Motor Vehicle Traffic Crashes - Motorcyclists  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	-	0	0	-	-	-	-	-	-	-	0	0
15-19	3	0	4	-	-	-	-	-	-	3	0	4
20-24	10	0	10	2	0	2	-	-	-	12	1	12
25-29	6	-	6	4	-	4	-	-	-	10	-	10
30-34	7	1	9	4	-	4	-	-	-	12	1	13
35-44	14	2	17	1	-	1	-	-	-	16	2	18
45-54	7	2	9	-	-	-	0	-	0	8	2	9
55-64	5	0	6	-	-	-	-	0	0	5	1	6
65-74	1	-	1	0	-	0	-	-	-	2	-	2
75+	0	-	0	-	-	-	-	-	-	0	-	0
Total	55	7	62	12	0	12	0	0	1	67	7	75

Includes ICD-10 codes: V20 – V28 (.3-.9), V29.4 – V29.9.  
Numbers in columns and rows may not total exactly due to rounding.  
Source: Vital Records and Health Data Development Section, MDCH

TABLE 43  
Average Annual Death Rates Due to Unintentional Motor Vehicle Traffic Crashes - Motorcyclists  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

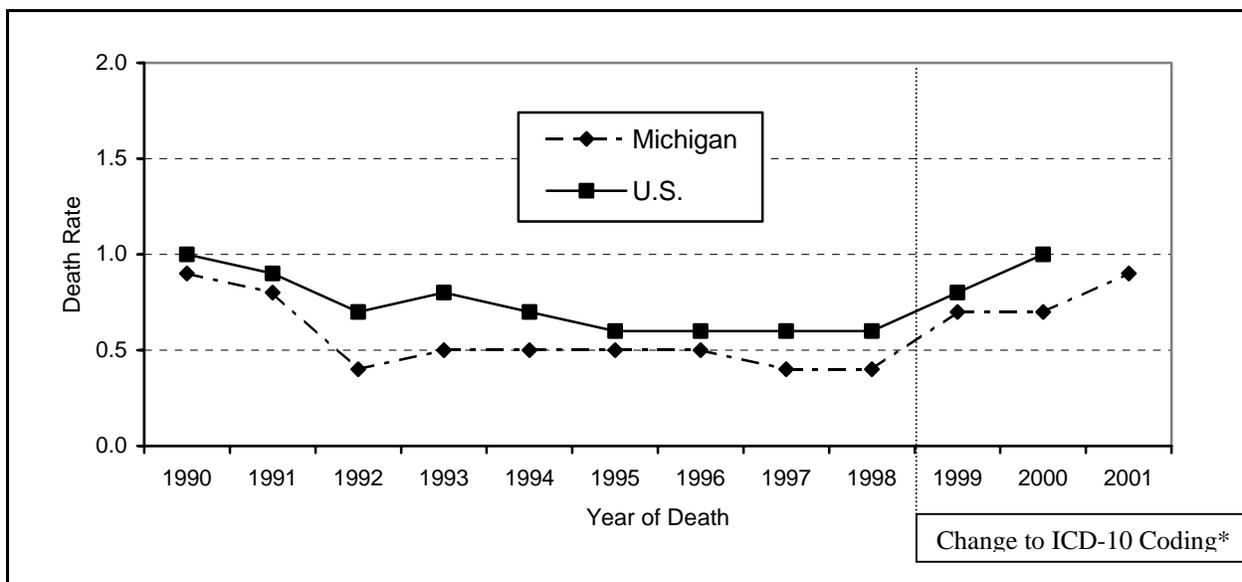
Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	-	*	*	-	-	-	-	-	-	-	*	*
15-19	1.2	*	0.7	-	-	-	-	-	-	0.9	*	0.5
20-24	3.9	*	2.0	4.1	*	2.3	-	-	-	3.6	*	1.9
25-29	2.4	-	1.2	7.7	-	3.6	-	-	-	3.1	-	1.5
30-34	2.6	*	1.6	8.7	-	4.1	-	-	-	3.3	*	1.8
35-44	2.2	0.4	1.3	*	-	*	-	-	-	2.0	0.3	1.1
45-54	1.3	*	0.8	-	-	-	*	-	*	1.1	*	0.7
55-64	1.5	*	0.8	-	-	-	-	*	*	1.3	*	0.7
65-74	*	-	*	*	-	*	-	-	-	*	-	*
75+	*	-	*	-	-	-	-	-	-	*	-	*
Total	1.4	0.2	0.8	1.8	*	0.9	*	*	*	1.4	0.1	0.8

Rates are number of deaths per 100,000 population.  
Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 44  
 Number of Deaths and Death Rates Due to  
 Unintentional Motor Vehicle Traffic Crashes - Motorcyclists  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	82	2,600	0.9	1.0
1991	77	2,301	0.8	0.9
1992	39	1,853	0.4	0.7
1993	49	1,927	0.5	0.8
1994	45	1,748	0.5	0.7
1995	51	1,661	0.5	0.6
1996	52	1,641	0.5	0.6
1997	37	1,645	0.4	0.6
1998	36	1,691	0.4	0.6
CHANGE TO ICD-10 CODING*				
1999	66	2,254	0.7	0.8
2000	72	2,704	0.7	1.0
2001	86	not available	0.9	not available

FIGURE 11  
 Death Rates Due to Unintentional Motor Vehicle Traffic Crashes - Motorcyclists  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E810-819 (.2, .3)

1999-2001: ICD-10 codes V20 - V28 (.3-.9), V29.4 - V29.9

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

# UNINTENTIONAL INJURIES

## MOTOR VEHICLE TRAFFIC CRASHES – PEDAL CYCLISTS

A “pedal cyclist” is an operator or passenger riding on a vehicle operated solely by pedals (e.g., unicycle, bicycle, tricycle) or in a sidecar or trailer attached to such a vehicle. This section excludes pedal cyclists involved in non-traffic crashes.

### Demographic Characteristics

Between 1999 and 2001, an average of 24 pedal cyclist deaths occurred annually among Michigan residents as a result of unintentional motor vehicle traffic crashes (Table 45). The corresponding rate was 0.2 deaths per 100,000 residents (Table 46). The death rate for males (0.4) was four times the rate for females (0.1). The highest death rate (0.9) was among white males aged 10-14.

### Temporal Trends

The number of pedal cyclist traffic deaths among Michigan residents between 1990 and 2001 ranged from 19 in 1999 to 33 in 1991 (Table 47). Michigan and national rates were similar throughout the period of study (Table 47 and Figure 12). While the number of deaths decreased nationally between the early 1990’s and 2000, this trend was not evident in Michigan.\*

### Geographic Distribution

Statistically reliable death rates could be calculated for only three counties, thus a geographical analysis was not performed.

\* The effect of the change in mortality coding to ICD-10 in 1999 on identifying fatally injured pedal cyclists is unknown. The report on ICD-9/ICD-10 comparability ratios<sup>11</sup> did not derive an estimate specifically for this cause of death. However, based on how these deaths were coded in ICD-9 as compared to ICD-10, it is likely that the effect was negligible.

**TABLE 45**  
**Average Annual Number of Deaths Due to Unintentional Motor Vehicle Traffic Crashes – Pedal Cyclists**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	2	1	3	-	-	-	-	-	-	2	1	3
10-14	3	1	4	1	-	1	-	-	-	4	1	5
15-19	1	-	1	0	-	0	-	-	-	2	-	2
20-24	1	0	1	-	-	-	-	-	-	1	0	1
25-29	0	-	0	-	-	-	-	-	-	0	-	0
30-34	1	0	1	-	-	-	-	-	-	1	0	1
35-44	3	0	3	1	-	1	-	-	-	4	0	4
45-54	2	1	3	1	-	1	-	-	-	2	1	3
55-64	1	-	1	0	-	0	0	-	0	2	-	2
65-74	0	-	0	-	-	-	0	-	0	1	-	1
75+	2	-	2	-	-	-	-	-	-	2	-	2
Total	16	4	19	4	-	4	1	-	1	20	4	24

Includes ICD-10 codes: V12 – V14 (.3-.9), V19.4 – V19.6.  
Numbers in columns and rows may not total exactly due to rounding.  
Source: Vital Records and Health Data Development Section, MDCH

**TABLE 46**  
**Average Annual Death Rates Due to Unintentional Motor Vehicle Traffic Crashes – Pedal Cyclists**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

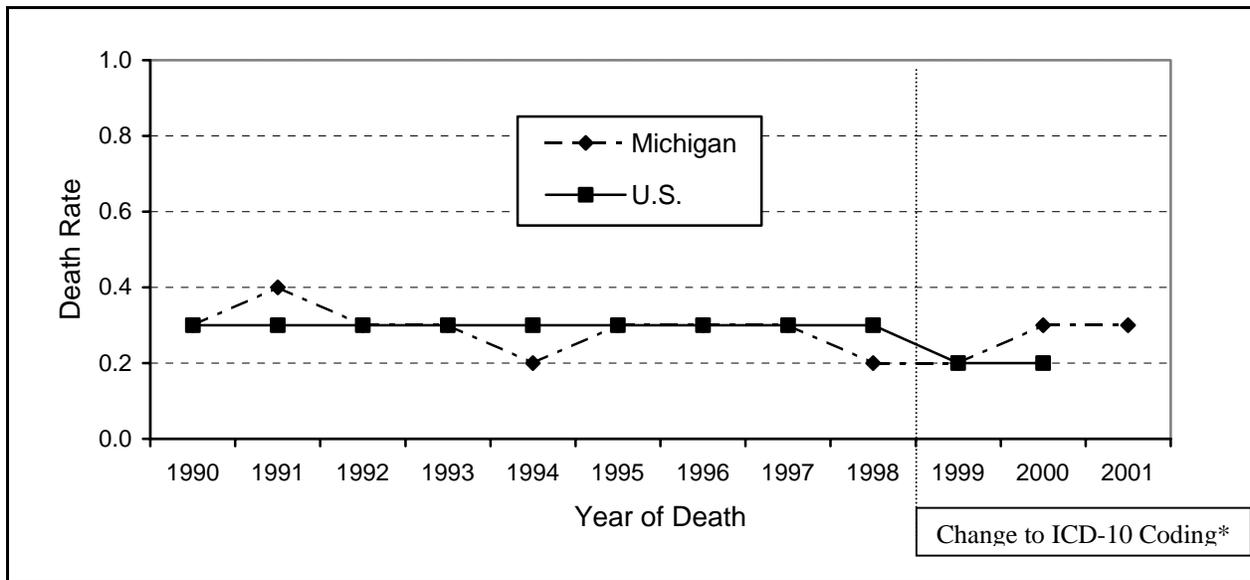
Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	0.7	*	0.5	-	-	-	-	-	-	0.5	*	0.4
10-14	0.9	*	0.6	*	-	*	-	-	-	1.0	*	0.7
15-19	*	-	*	*	-	*	-	-	-	*	-	*
20-24	*	*	*	-	-	-	-	-	-	*	*	*
25-29	*	-	*	-	-	-	-	-	-	*	-	*
30-34	*	*	*	-	-	-	-	-	-	*	*	*
35-44	0.4	*	0.2	*	-	*	-	-	-	0.5	*	0.3
45-54	*	*	0.2	*	-	*	-	-	-	0.3	*	0.2
55-64	*	-	*	*	-	*	*	-	*	0.5	-	0.2
65-74	*	-	*	-	-	-	*	-	*	*	-	*
75+	*	-	*	-	-	-	-	-	-	*	-	*
Total	0.4	0.1	0.2	0.5	-	0.3	*	-	*	0.4	0.1	0.2

Rates are number of deaths per 100,000 population.  
Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 47  
 Number of Deaths and Death Rates Due to  
 Unintentional Motor Vehicle Traffic Crashes – Pedal Cyclists  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	25	814	0.3	0.3
1991	33	794	0.4	0.3
1992	32	679	0.3	0.3
1993	27	789	0.3	0.3
1994	23	730	0.2	0.3
1995	27	783	0.3	0.3
1996	31	695	0.3	0.3
1997	26	757	0.3	0.3
1998	21	683	0.2	0.3
CHANGE TO ICD-10 CODING*				
1999	19	615	0.2	0.2
2000	26	572	0.3	0.2
2001	26	not available	0.3	not available

FIGURE 12  
 Death Rates Due to Unintentional Motor Vehicle Traffic Crashes – Pedal Cyclists  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E810-819 (.6)

1999-2001: ICD-10 codes V12 – V14 (.3-.9), V19.4 – V19.6

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

# UNINTENTIONAL INJURIES

## MOTOR VEHICLE TRAFFIC CRASHES - PEDESTRIANS

### Demographic Characteristics

An average of 178 Michigan residents died annually between 1999 and 2001 as pedestrians involved in unintentional motor vehicle traffic crashes (Table 48). This corresponds to an annual death rate of 1.8 per 100,000 residents (Table 49). The death rate for males (2.6) was 2.6 times the death rate for females (1.0). Those aged 75 and older, particularly males, had the highest rates (3.1 and 6.5, respectively). The rate for black residents (4.2) was 2.8 times the rate for whites (1.5) and more than eight times the rate for other races (0.5). Overall, black males aged 45-54 had the highest pedestrian traffic fatality rate (13.1).

### Temporal Trends

Between 1990 and 2001, the number of Michigan residents who were killed as pedestrians in traffic crashes ranged from 163 in 1998 to 230 in 1990 (Table 50). Rates were lowest (1.7) in 1998 and 1999 and highest (2.5) in 1990. Michigan pedestrian death rates were equal to or less than national rates throughout the period, except for 2000 (Figure 13). Between 1990 and 2001, pedestrian death rates in Michigan decreased 28%.\*

### Geographic Distribution

There were no pedestrian deaths among residents of 21 Michigan counties (noted by “-” in Table 51). Of the 16 counties for which a statistically reliable rate could be calculated, Washtenaw County had the lowest rate (0.9) and Wayne County had the highest rate (3.2). Note that these 16 counties were among the 17 most populous in the state.

\* The effect of the change in mortality coding to ICD-10 in 1999 on identifying fatally injured pedestrians is unknown. The report on ICD-9/ICD-10 comparability ratios<sup>11</sup> did not derive an estimate specifically for this cause of death. However, based on how these deaths were coded in ICD-9 as compared to ICD-10, it is likely that the effect was negligible.

**TABLE 48**  
**Average Annual Number of Deaths Due to Unintentional Traffic-related Injuries – Pedestrians**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	2	1	3	2	1	3	-	-	-	4	3	6
5-9	2	2	5	3	2	5	-	-	-	5	4	10
10-14	5	3	8	1	1	2	-	-	-	6	4	10
15-19	5	3	8	2	-	2	1	-	1	8	3	10
20-24	5	1	6	2	1	3	-	0	0	7	2	9
25-29	6	1	7	2	1	3	-	0	0	8	3	10
30-34	5	2	7	2	1	3	-	-	-	7	3	10
35-44	16	5	22	11	4	15	-	-	-	27	9	36
45-54	14	4	18	10	3	13	1	-	1	25	7	32
55-64	7	3	10	4	-	4	-	0	0	11	3	14
65-74	6	4	10	2	0	2	-	-	-	8	4	12
75+	11	4	15	2	0	3	0	-	0	14	4	18
Total	84	32	116	43	16	59	2	1	3	129	49	178

Includes ICD-10 codes: V02 – V04 (.1, .9), V09.2.

Decedent with unknown race (n=1) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

**TABLE 49**  
**Average Annual Death Rates Due to Unintentional Traffic-related Injuries – Pedestrians**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	*	*	0.8	4.2	*	3.6	-	-	-	1.3	1.0	1.2
5-9	0.8	0.9	0.9	4.1	2.8	3.5	-	-	-	1.4	1.2	1.3
10-14	1.7	1.0	1.4	*	*	1.8	-	-	-	1.7	1.0	1.3
15-19	1.9	1.0	1.4	*	-	*	*	-	*	2.1	0.8	1.4
20-24	2.0	*	1.2	*	*	2.9	-	*	*	2.1	0.7	1.4
25-29	2.3	*	1.4	3.8	*	3.0	-	*	*	2.3	0.8	1.6
30-34	1.8	*	1.2	4.0	*	3.2	-	-	-	2.0	0.8	1.4
35-44	2.5	0.8	1.7	11.0	3.6	7.0	-	-	-	3.4	1.2	2.3
45-54	2.5	0.6	1.5	13.1	3.2	7.7	*	-	*	3.7	1.0	2.3
55-64	1.9	0.8	1.4	9.4	-	4.2	-	*	*	2.6	0.8	1.7
65-74	2.2	1.3	1.7	*	*	2.9	-	-	-	2.6	1.2	1.9
75+	5.8	1.2	2.9	12.4	*	5.1	*	-	*	6.5	1.2	3.1
Total	2.1	0.8	1.5	6.4	2.2	4.2	*	*	0.5	2.6	1.0	1.8

Rates are number of deaths per 100,000 population.

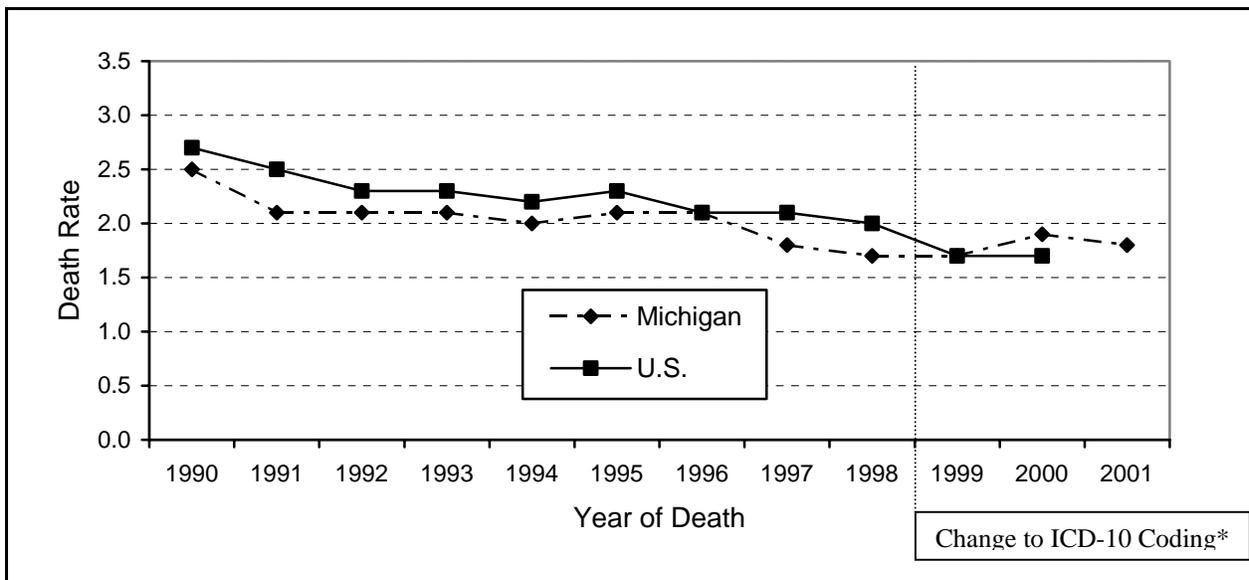
Decedent with unknown race (n=1) not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 50  
 Number of Deaths and Death Rates Due to  
 Unintentional Traffic-related Injuries – Pedestrians  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	230	6,804	2.5	2.7
1991	199	6,189	2.1	2.5
1992	195	5,895	2.1	2.3
1993	199	5,978	2.1	2.3
1994	194	5,786	2.0	2.2
1995	203	5,935	2.1	2.3
1996	208	5,667	2.1	2.1
1997	176	5,497	1.8	2.1
1998	163	5,362	1.7	2.0
CHANGE TO ICD-10 CODING*				
1999	171	4,545	1.7	1.7
2000	188	4,598	1.9	1.7
2001	175	not available	1.8	not available

FIGURE 13  
 Death Rates Due to Unintentional Traffic-related Injuries – Pedestrians  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E810-819 (.7)

1999-2001: ICD-10 codes V02 – V04 (.1, .9), V09.2

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 51  
Average Annual Numbers and Rates of Deaths Due to Unintentional Traffic-related Injuries – Pedestrians  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	1	*
Alger	0	*	Leelanau	-	-
Allegan	1	*	Lenawee	1	*
Alpena	0	*	Livingston	2	1.3
Antrim	0	*	Luce	-	-
Arenac	-	-	Mackinac	0	*
Baraga	-	-	Macomb	10	1.3
Barry	1	*	Manistee	-	-
Bay	2	*	Marquette	1	*
Benzie	-	-	Mason	2	*
Berrien	3	1.6	Mecosta	1	*
Branch	-	-	Menominee	0	*
Calhoun	2	1.4	Midland	1	*
Cass	1	*	Missaukee	-	-
Charlevoix	0	*	Monroe	2	1.4
Cheboygan	0	*	Montcalm	0	*
Chippewa	0	*	Montmorency	0	*
Clare	1	*	Muskegon	2	1.2
Clinton	1	*	Newaygo	-	-
Crawford	0	*	Oakland	19	1.6
Delta	1	*	Oceana	1	*
Dickinson	-	-	Ogemaw	1	*
Eaton	2	*	Ontonagon	-	-
Emmet	0	*	Osceola	-	-
Genesee	9	2.0	Oscoda	1	*
Gladwin	-	-	Otsego	0	*
Gogebic	-	-	Ottawa	2	*
Grand Traverse	1	*	Presque Isle	-	-
Gratiot	-	-	Roscommon	0	*
Hillsdale	1	*	Saginaw	5	2.4
Houghton	-	-	St. Clair	3	1.6
Huron	1	*	St. Joseph	1	*
Ingham	4	1.4	Sanilac	1	*
Ionia	2	*	Schoolcraft	1	*
Iosco	0	*	Shiawassee	1	*
Iron	-	-	Tuscola	1	*
Isabella	1	*	Van Buren	1	*
Jackson	2	1.3	Washtenaw	3	0.9
Kalamazoo	3	1.4	Wayne	66	3.2
Kalkaska	-	-	Wexford	1	*
Kent	8	1.4			
Keweenaw	-	-			
Lake	1	*	Michigan	178	1.8

Includes ICD-10 codes: V02 – V04 (.1, .9), V09.2.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# UNINTENTIONAL INJURIES

## POISONINGS

### Demographic Characteristics

Between 1999 and 2001, an average of 317 Michigan residents died annually due to unintentional poisonings (Table 52). The corresponding average annual death rate was 3.2 deaths per 100,000 residents (Table 53). Death rates for males (4.5) were more than twice the rate for females (1.9). After age 14, rates increased with age peaking with the 35-44 year old age group (7.0). Thereafter, rates decreased with age until the oldest age group, whereupon rates again increased. Rates for black residents (5.7) were nearly twice the rates for white residents (2.9) and 4.4 times the rate for residents of other races (1.3). Of all age/sex/race groups, black males aged 45-54 had the highest unintentional poisoning death rate (27.9).

### Temporal Trends

Between 1990 and 2001, the number of fatal unintentional poisonings among Michigan residents ranged from 106 in 1992 to 337 in 2001\* (Table 54). Death rates for those years also represented the lowest and highest rates during this period (1.1 and 3.4 deaths per 100,000 residents, respectively). Michigan unintentional poisoning death rates were consistently lower than national rates throughout the period (Figure 9) (on average, Michigan's rates were lower by 1.7 deaths per 100,000 residents). Both nationally and in Michigan, death rates increased dramatically during the study period. In Michigan, the unintentional poisoning death rate nearly tripled between 1990 and 2001.

### Geographic Distribution

Between 1999 and 2001, 39% of fatal unintentional poisoning victims were Wayne County residents (Table 55). Of the 23 counties for which a statistically reliable death rate could be calculated, rates were lowest for Oakland County (0.9) and highest for Calhoun County (9.9). The rate for Calhoun County was more than three times the state rate. The rate for Wayne County (6.0) was also noteworthy as it was nearly twice the state rate.

\* Differences in numbers and rates of death in pre- and post-1999 data may be due in part to the change in coding systems for mortality (ICD-9 to ICD-10). The study conducted by the CDC<sup>11</sup> estimated "comparability ratios" for various causes of death. These ratios indicate how the coding system change by itself would affect the number of deaths classified under a certain cause. The study provided no comparability ratio data for unintentional poisonings. Thus, the degree of the increase in poisonings in 1999-2001 that was due solely to the change in coding systems cannot be estimated.

TABLE 52  
Average Annual Number of Deaths Due to Unintentional Poisonings  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	0	0	1	-	-	-	-	-	-	0	0	1
5-9	-	-	-	-	0	0	-	-	-	0	0	0
10-14	0	0	1	-	-	-	-	-	-	0	0	1
15-19	4	1	4	0	1	1	-	0	0	4	2	6
20-24	7	3	9	-	-	-	1	-	1	7	3	10
25-29	10	6	16	3	1	4	-	-	-	13	7	21
30-34	22	5	27	2	1	3	1	0	1	25	6	31
35-44	60	23	84	14	13	27	1	1	2	75	37	113
45-54	42	13	55	22	12	34	1	1	2	65	26	91
55-64	9	4	13	7	2	9	1	-	1	17	6	23
65-74	4	3	7	0	0	1	-	-	-	4	3	7
75+	6	6	12	1	0	1	-	-	-	6	7	13
Total	164	65	229	49	31	80	5	2	7	218	98	317

Includes ICD-10 codes: X40 – X49.

Decedent with unknown race (n=1) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 53  
Average Annual Death Rates Due to Unintentional Poisonings  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	*	*	*	-	-	-	-	-	-	*	*	*
5-9	-	-	-	-	*	*	-	-	-	-	*	*
10-14	*	*	*	-	-	-	-	-	-	*	*	*
15-19	1.3	*	0.8	*	*	*	-	*	*	1.1	*	0.8
20-24	2.7	1.1	1.9	-	-	-	*	-	*	2.3	0.8	1.6
25-29	4.2	2.5	3.3	5.8	*	3.9	-	-	-	4.1	2.2	3.2
30-34	7.9	1.8	4.9	4.7	*	2.8	*	*	*	7.1	1.7	4.4
35-44	9.2	3.6	6.4	14.1	11.5	12.7	*	*	3.0	9.5	4.6	7.0
45-54	7.3	2.3	4.8	27.9	13.1	19.9	*	*	3.8	9.7	3.8	6.7
55-64	2.6	1.1	1.8	15.7	4.5	9.5	*	-	*	4.1	1.4	2.7
65-74	1.4	1.0	1.2	*	*	*	-	-	-	1.4	0.9	1.1
75+	3.0	1.9	2.3	*	*	*	-	-	-	3.0	1.8	2.3
Total	4.2	1.6	2.9	7.3	4.2	5.7	1.8	0.9	1.3	4.5	1.9	3.2

Rates are number of deaths per 100,000 population.

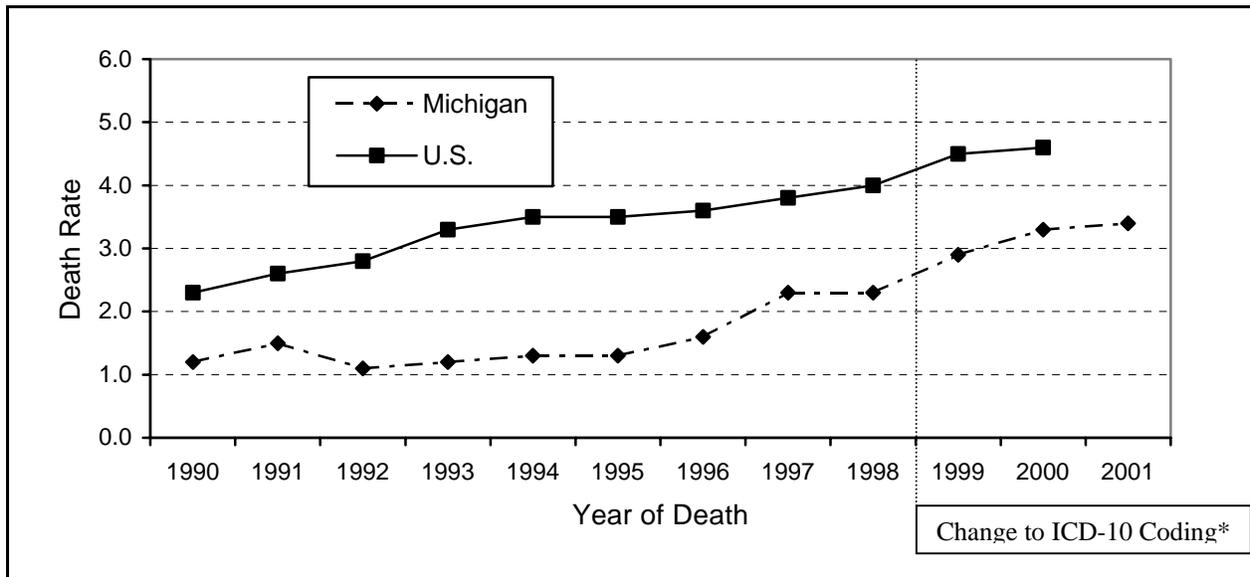
Decedent with unknown race (n=1) not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 54  
 Number of Deaths and Death Rates Due to Unintentional Poisonings  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	114	5,803	1.2	2.3
1991	138	6,434	1.5	2.6
1992	106	7,082	1.1	2.8
1993	110	8,537	1.2	3.3
1994	129	8,994	1.3	3.5
1995	127	9,072	1.3	3.5
1996	153	9,510	1.6	3.6
1997	222	10,163	2.3	3.8
1998	226	10,801	2.3	4.0
CHANGE TO ICD-10 CODING*				
1999	288	12,186	2.9	4.5
2000	325	12,757	3.3	4.6
2001	337	not available	3.4	not available

FIGURE 14  
 Death Rates Due to Unintentional Poisonings  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E850 – E869

1999-2001: ICD-10 codes X40 – X49

Sources: Vital Records and Health Data Development Section, MDCH  
 Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention  
 U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 55  
Average Annual Numbers and Rates of Deaths Due to Unintentional Poisonings  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	1	*
Alger	-	-	Leelanau	0	*
Allegan	2	2.2	Lenawee	1	*
Alpena	1	*	Livingston	1	*
Antrim	1	*	Luce	1	*
Arenac	-	-	Mackinac	-	-
Baraga	1	*	Macomb	11	1.4
Barry	2	*	Manistee	1	*
Bay	2	*	Marquette	4	5.7
Benzie	0	*	Mason	1	*
Berrien	6	3.7	Mecosta	1	*
Branch	1	*	Menominee	0	*
Calhoun	14	9.9	Midland	1	*
Cass	2	*	Missaukee	1	*
Charlevoix	1	*	Monroe	4	2.7
Cheboygan	1	*	Montcalm	3	5.4
Chippewa	0	*	Montmorency	2	*
Clare	1	*	Muskegon	7	4.3
Clinton	2	*	Newaygo	1	*
Crawford	2	*	Oakland	11	0.9
Delta	-	-	Oceana	2	7.4
Dickinson	2	*	Ogemaw	1	*
Eaton	2	2.3	Ontonagon	0	*
Emmet	2	6.4	Osceola	0	*
Genesee	18	4.1	Oscoda	-	-
Gladwin	1	*	Otsego	0	*
Gogebic	1	*	Ottawa	4	1.5
Grand Traverse	2	3.0	Presque Isle	1	*
Gratiot	0	*	Roscommon	1	*
Hillsdale	0	*	Saginaw	2	*
Houghton	1	*	St. Clair	5	3.0
Huron	2	*	St. Joseph	2	*
Ingham	11	3.8	Sanilac	-	-
Ionia	1	*	Schoolcraft	1	*
Iosco	1	*	Shiawassee	2	2.8
Iron	1	*	Tuscola	1	*
Isabella	-	-	Van Buren	2	*
Jackson	2	1.5	Washtenaw	4	1.2
Kalamazoo	7	2.9	Wayne	123	6.0
Kalkaska	1	*	Wexford	1	*
Kent	18	3.1			
Keweenaw	0	*			
Lake	1	*	Michigan	317	3.2

Includes ICD-10 codes: X40 – X49.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# UNINTENTIONAL INJURIES

## SUFFOCATIONS/STRANGULATIONS

This classification is comprised of deaths due to unintentional exposure to several types of threats to breathing. These include, but are not limited to, the following: suffocation due to pillows, bed linen, mother's body, plastic bag; lack of oxygen due to cave-in or other low oxygen environment; and choking on food, gastric contents or other object.

### Demographic Characteristics

Between 1999 and 2001, an average of 180 Michigan residents died annually due to unintentional suffocations and strangulations (Table 56). This corresponds to an average annual death rate of 1.8 per 100,000 residents (Table 57). The rate for males (2.2) was 57% greater than the rate for females (1.4). Rates were highest for those under age one (27.7) and for those aged 75 and older (11.6). Both of these rates far exceeded the overall rate. The rate for blacks (2.2) exceeded the rate for whites (1.8) by 22%. Black males under age one had a rate (70.5) that was 39 times the overall rate.

### Temporal Trends

Between 1990 and 2001, the number of fatal unintentional suffocations or strangulations among Michigan residents ranged from 123 in 1992 to 198 in 2001\* (Table 58). Death rates ranged from 1.3 (1992, 1994) to 2.0 (2001). The Michigan death rate was slightly less than the national rate throughout the study period (Figure 10). While no trend in Michigan rates was apparent between 1990 and 1998, rates increased noticeably (by 33%) between 1998 and 2001.

### Geographical

Between 1999 and 2001, there were no unintentional suffocations or strangulations among residents of 20 Michigan counties (noted by "-" in Table 59). Of the 23 counties for which a statistically reliable rate could be calculated, Washtenaw County had the lowest rate (0.9) while Chippewa County had the highest rate (5.2).

\* Differences in numbers and rates of death in pre- and post-1999 data may be due in part to the change in coding systems for mortality (ICD-9 to ICD-10). The study conducted by the CDC<sup>11</sup> estimated comparability ratios for various causes of death. These ratios indicate how the coding system change by itself would affect the number of deaths classified under a certain cause. The study provided no comparability ratio data for unintentional suffocations and strangulations. Thus, the degree of the increase in suffocations/strangulations in 1999 – 2001 that was due solely to the change in coding systems cannot be estimated.

**TABLE 56**  
**Average Annual Number of Deaths Due to Unintentional Suffocations/Strangulations**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	15	9	25	8	4	12	-	-	-	23	14	37
1-4	3	0	3	1	-	1	-	0	0	3	1	4
5-9	1	0	1	0	-	0	-	-	-	1	0	1
10-14	1	-	1	-	-	-	-	-	-	1	-	1
15-19	3	0	3	0	-	0	-	-	-	3	0	3
20-24	1	-	1	0	-	0	-	-	-	1	-	1
25-29	2	1	3	-	-	-	-	-	-	2	1	3
30-34	1	-	1	-	0	0	-	-	-	1	0	2
35-44	11	1	12	1	1	1	0	-	0	12	2	14
45-54	8	4	12	2	1	2	-	-	-	10	4	14
55-64	4	3	8	1	0	2	-	-	-	6	4	9
65-74	11	9	20	2	1	3	-	-	-	12	10	23
75+	27	31	57	4	4	8	0	0	1	31	36	67
Total	88	59	147	19	12	31	1	1	1	107	72	180

Includes ICD-10 codes: W75 – W84.

Decedents with unknown race (n=2) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

**TABLE 57**  
**Average Annual Death Rates Due to Unintentional Suffocations/Strangulations**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	31.3	20.2	25.9	70.5	39.7	55.4	-	-	-	34.1	20.9	27.7
1-4	1.3	*	0.8	*	-	*	-	*	*	1.2	*	0.7
5-9	*	*	*	*	-	*	-	-	-	*	*	*
10-14	*	-	*	-	-	-	-	-	-	*	-	*
15-19	0.9	*	0.5	*	-	*	-	-	-	0.8	*	0.5
20-24	*	-	*	*	-	*	-	-	-	*	-	*
25-29	0.9	*	0.6	-	-	-	-	-	-	0.7	*	0.5
30-34	*	-	*	-	*	*	-	-	-	*	*	*
35-44	1.6	*	0.9	*	*	*	*	-	*	1.5	0.3	0.9
45-54	1.5	0.6	1.1	*	*	1.4	-	-	-	1.5	0.6	1.0
55-64	1.2	0.9	1.0	*	*	*	-	-	-	1.4	0.8	1.1
65-74	4.2	3.0	3.5	*	*	4.4	-	-	-	4.2	2.9	3.5
75+	14.2	9.4	11.1	21.2	13.1	16.1	*	*	*	14.7	9.8	11.6
Total	2.2	1.5	1.8	2.8	1.6	2.2	*	*	*	2.2	1.4	1.8

Rates are number of deaths per 100,000 population.

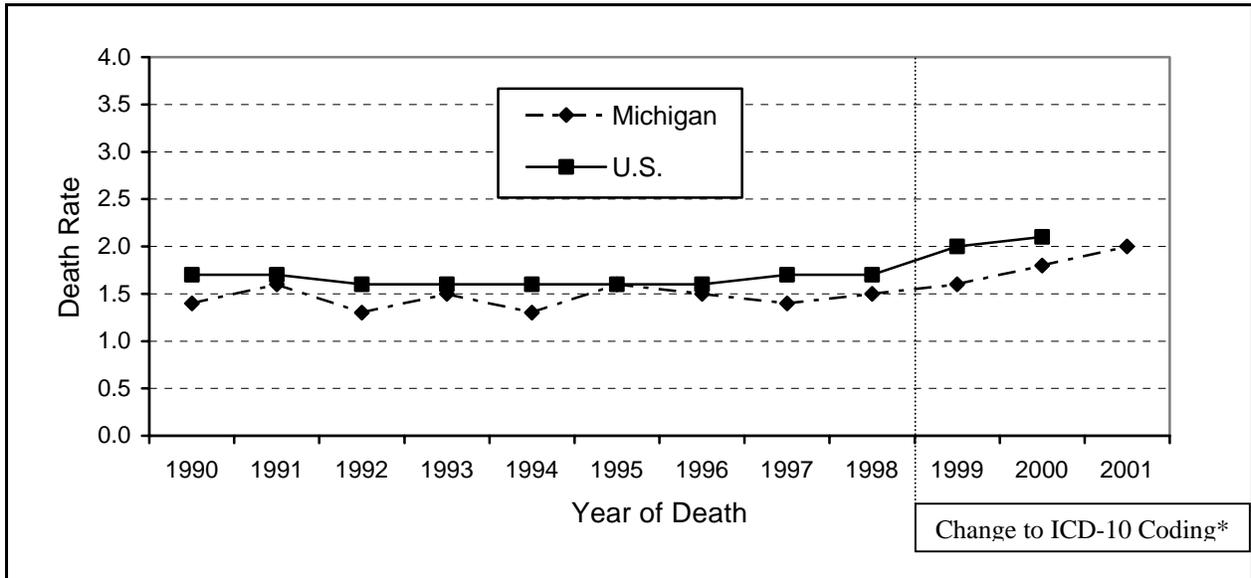
Decedents with unknown race (n=2) not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

**TABLE 58**  
**Number of Deaths and Death Rates Due to Unintentional Suffocations/Strangulations**  
**By Year of Death, Michigan and U.S. Residents, 1990-2001**

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	135	4,195	1.4	1.7
1991	155	4,195	1.6	1.7
1992	123	4,062	1.3	1.6
1993	144	4,178	1.5	1.6
1994	128	4,143	1.3	1.6
1995	153	4,247	1.6	1.6
1996	143	4,320	1.5	1.6
1997	139	4,420	1.4	1.7
1998	146	4,585	1.5	1.7
<b>CHANGE TO ICD-10 CODING*</b>				
1999	160	5,503	1.6	2.0
2000	181	5,648	1.8	2.1
2001	198	not available	2.0	not available

**FIGURE 15**  
**Death Rates Due to Unintentional Suffocations/Strangulations**  
**Michigan and U.S. Residents, 1990-2001**



Rates are number of deaths per 100,000 population.  
 1990-1998: ICD-9 codes E911 – E913  
 1999-2001: ICD-10 codes W75 – W84  
 Sources: Vital Records and Health Data Development Section, MDCH  
 Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention  
 U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 59  
Average Annual Numbers and Rates of Deaths Due to Unintentional Suffocations/Strangulations  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	2	2.7
Alger	-	-	Leelanau	1	*
Allegan	2	*	Lenawee	1	*
Alpena	1	*	Livingston	4	2.3
Antrim	-	-	Luce	1	*
Arenac	0	*	Mackinac	-	-
Baraga	-	-	Macomb	11	1.4
Barry	2	4.1	Manistee	-	-
Bay	2	2.1	Marquette	1	*
Benzie	0	*	Mason	1	*
Berrien	3	1.8	Mecosta	0	*
Branch	1	*	Menominee	0	*
Calhoun	3	2.4	Midland	1	*
Cass	0	*	Missaukee	-	-
Charlevoix	-	-	Monroe	2	1.4
Cheboygan	-	-	Montcalm	1	*
Chippewa	2	5.2	Montmorency	-	-
Clare	1	*	Muskegon	3	2.0
Clinton	1	*	Newaygo	1	*
Crawford	-	-	Oakland	25	2.1
Delta	1	*	Oceana	1	*
Dickinson	0	*	Ogemaw	-	-
Eaton	1	*	Ontonagon	-	-
Emmet	-	-	Osceola	0	*
Genesee	6	1.4	Oscoda	-	-
Gladwin	1	*	Otsego	1	*
Gogebic	0	*	Ottawa	3	1.1
Grand Traverse	1	*	Presque Isle	0	*
Gratiot	1	*	Roscommon	0	*
Hillsdale	2	4.3	Saginaw	5	2.4
Houghton	0	*	St. Clair	3	2.0
Huron	2	*	St. Joseph	1	*
Ingham	5	1.7	Sanilac	2	*
Ionia	2	*	Schoolcraft	-	-
Iosco	1	*	Shiawassee	-	-
Iron	1	*	Tuscola	3	4.6
Isabella	1	*	Van Buren	1	*
Jackson	3	1.7	Washtenaw	3	0.9
Kalamazoo	4	1.5	Wayne	40	2.0
Kalkaska	-	-	Wexford	1	*
Kent	8	1.4			
Keweenaw	-	-			
Lake	-	-	Michigan	180	1.8

Includes ICD-10 codes: W75 – W84.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# **SUICIDES**

## **FIREARMS**

### **Demographic Characteristics**

An average of 536 Michigan residents committed suicide with a firearm annually between 1999 and 2001 (Table 60). This corresponds to a death rate of 5.4 per 100,000 residents (Table 61). The firearm suicide rate for males (9.8) was more than eight times the rate for females (1.2). Rates were fairly consistent for those between the ages of 20 and 64, but increased for the two oldest groups. This profile was true for males, but not for females. Among the races, whites had the highest rate (6.0), which was 58% higher than the rate for blacks (3.8) and six times the rate for other races (1.0). The highest overall rate (28.2) was among white males aged 75 and older.

### **Temporal Trends**

Between 1990 and 2001, the number and rate of firearm suicides among Michigan residents peaked in 1991 (658 deaths, 7.0 per 100,000 residents) and was lowest in 2000\* (529, 5.3) (Table 62). Both Michigan and the nation experienced decreasing rates throughout this period (Figure 16). Michigan rates were consistently lower than national rates (an average of nearly 0.8 per 100,000 annually).

### **Geographic Characteristics**

There were two Michigan counties in which no resident committed suicide with a firearm between 1999 and 2001 (Keweenaw and Luce) (Table 63). Among the 58 counties for which a reliable rate could be calculated, rates ranged from 3.0 per 100,000 residents in Washtenaw County to 17.6 per 100,000 residents in Lake County. Most of the counties that had rates exceeding the statewide rate were the sparsely populated counties located in the Upper Peninsula, northern Lower Peninsula, and Thumb region. Each of the state's ten most populous counties had rates that were less than the state rate.

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for firearm suicide is 0.998. Thus, the coding change to ICD-10 from ICD-9 by itself would have the effect of decreasing the number of cases and the corresponding rates by 0.2%.

TABLE 60  
Average Annual Number of Deaths Due to Firearm Suicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	4	1	5	-	-	-	-	-	-	4	1	5
15-19	21	2	23	5	1	6	1	-	1	27	3	30
20-24	34	2	36	5	-	5	0	0	1	40	3	42
25-29	32	4	36	7	1	8	1	-	1	40	5	45
30-34	32	4	36	6	1	7	-	-	-	38	5	43
35-44	79	13	92	9	2	11	1	0	1	89	15	104
45-54	76	10	85	5	2	6	0	0	1	81	12	92
55-64	46	9	55	3	-	3	0	-	0	50	9	59
65-74	48	3	52	4	1	5	1	-	1	53	4	57
75+	53	3	56	2	0	3	-	-	-	55	3	58
Total	425	51	475	46	8	54	5	1	6	476	59	536

Includes ICD-10 codes: X72 – X74.

Decedents with unknown race (n=2) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 61  
Average Annual Death Rates Due to Firearm Suicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	1.3	*	0.8	-	-	-	-	-	-	1.0	*	0.6
15-19	7.2	0.9	4.1	9.6	*	5.4	*	-	*	7.4	0.9	4.2
20-24	13.7	1.0	7.4	10.8	-	5.2	*	*	*	12.2	0.8	6.6
25-29	12.9	1.5	7.3	13.5	*	7.5	*	-	*	12.2	1.5	6.9
30-34	11.5	1.3	6.4	12.1	*	6.6	-	-	-	10.7	1.3	6.0
35-44	12.0	2.0	7.0	9.3	*	5.1	*	*	*	11.3	1.9	6.5
45-54	13.3	1.7	7.5	5.9	*	3.7	*	*	*	11.9	1.7	6.7
55-64	12.8	2.4	7.5	7.0	-	3.2	*	-	*	11.9	2.0	6.8
65-74	18.9	1.1	9.2	12.8	*	6.8	*	-	*	18.1	1.2	8.9
75+	28.2	0.8	10.8	12.4	*	5.1	-	-	-	26.3	0.8	10.1
Total	10.8	1.3	6.0	6.9	1.0	3.8	1.6	*	1.0	9.8	1.2	5.4

Rates are number of deaths per 100,000 population.

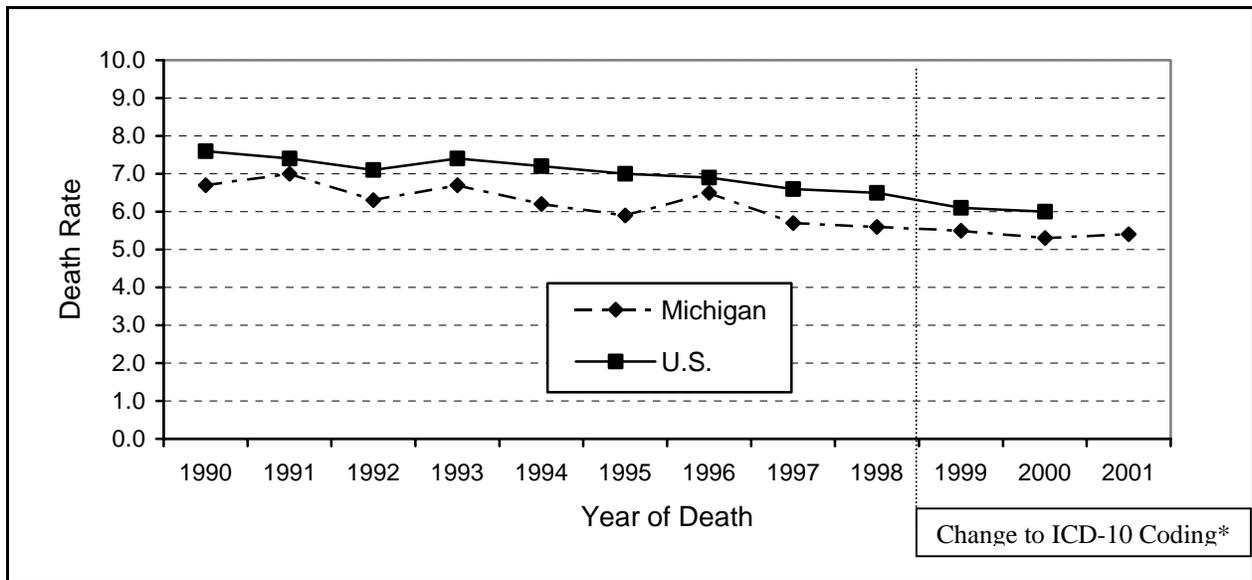
Decedents with unknown race (n=2) not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 62  
 Number of Deaths and Death Rates Due to Firearm Suicides  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	628	18,885	6.7	7.6
1991	658	18,526	7.0	7.4
1992	597	18,169	6.3	7.1
1993	638	18,940	6.7	7.4
1994	594	18,765	6.2	7.2
1995	572	18,503	5.9	7.0
1996	629	18,166	6.5	6.9
1997	555	17,566	5.7	6.6
1998	551	17,424	5.6	6.5
CHANGE TO ICD-10 CODING*				
1999	538	16,599	5.5	6.1
2000	529	16,586	5.3	6.0
2001	540	not available	5.4	not available

FIGURE 16  
 Death Rates Due to Firearm Suicides  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E955.0 – E955.4

1999-2001: ICD-10 codes X72 – X74

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 63  
Average Annual Number and Rates of Deaths Due to Firearm Suicides  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	1	*	Lapeer	7	7.6
Alger	1	*	Leelanau	1	*
Allegan	5	4.7	Lenawee	7	6.7
Alpena	3	10.6	Livingston	10	6.4
Antrim	2	10.1	Luce	-	-
Arenac	2	13.5	Mackinac	1	*
Baraga	0	*	Macomb	42	5.3
Barry	3	5.3	Manistee	2	8.2
Bay	8	7.6	Marquette	7	10.3
Benzie	0	*	Mason	4	13.0
Berrien	8	4.7	Mecosta	2	*
Branch	2	4.4	Menominee	1	*
Calhoun	7	5.1	Midland	3	4.0
Cass	6	11.7	Missaukee	2	16.1
Charlevoix	1	*	Monroe	7	4.8
Cheboygan	2	*	Montcalm	5	7.6
Chippewa	4	11.2	Montmorency	2	*
Clare	4	11.7	Muskegon	12	7.2
Clinton	3	5.1	Newaygo	3	5.6
Crawford	1	*	Oakland	50	4.2
Delta	2	6.1	Oceana	1	*
Dickinson	4	13.3	Ogemaw	4	16.9
Eaton	6	5.5	Ontonagon	1	*
Emmet	1	*	Osceola	2	10.1
Genesee	23	5.2	Oscoda	1	*
Gladwin	2	7.7	Otsego	1	*
Gogebic	1	*	Ottawa	9	3.9
Grand Traverse	4	5.2	Presque Isle	1	*
Gratiot	2	4.7	Roscommon	3	13.1
Hillsdale	3	6.4	Saginaw	10	4.8
Houghton	1	*	St. Clair	8	4.7
Huron	4	11.1	St. Joseph	4	6.4
Ingham	13	4.7	Sanilac	4	9.0
Ionia	5	8.7	Schoolcraft	1	*
Iosco	2	8.5	Shiawassee	6	7.9
Iron	2	15.2	Tuscola	5	9.2
Isabella	2	*	Van Buren	4	4.8
Jackson	10	6.1	Washtenaw	10	3.0
Kalamazoo	11	4.7	Wayne	105	5.1
Kalkaska	1	*	Wexford	2	7.7
Kent	21	3.7	Unknown	1	
Keweenaw	-	-			
Lake	2	17.6	Michigan	536	5.4

Includes ICD-10 codes: X72 – X74.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

## **SUICIDES**

### **POISONINGS**

#### **Demographic Characteristics**

Between 1999 and 2001, an average of 189 Michigan residents died annually due to suicide via poisoning (Table 64). This corresponds to an average annual death rate of 1.9 per 100,000 residents (Table 65). The death rate for this cause was 53% greater for males than for females. Those aged 35-54 had the highest rates. White residents had a death rate (2.2) that was 3.6 times the death rate for black residents (0.6).

#### **Temporal Trends**

The number of poisoning suicides among Michigan residents ranged from 170 in 1995 to 250 in 1992 (Table 66). Rates were lowest (1.8) in 1995, 1997, 1998, and 1999, and highest (2.6) in 1992. Death rates in Michigan were similar to national rates over the study period (Figure 17). The rate of poisoning suicide declined slightly in Michigan between 1990 and 2001.\*

#### **Geographic Distribution**

There were no poisoning suicides among residents of 15 counties during 1999-2001 (noted by “-” in Table 67). Among the 20 counties for which a reliable rate could be calculated (all of these counties were located in the Lower Peninsula), Kalamazoo County had the lowest rate (1.3) and Newaygo County had the highest rate (6.3).

\* The report on comparability ratios<sup>11</sup> (see Appendix A for discussion of comparability ratios) did not develop an estimate specifically for poisoning suicides. The ratio for non-firearm suicides is 0.990. Thus, the coding change to ICD-10 from ICD-9 by itself would have the effect of decreasing the number of cases and the corresponding rates by approximately 1.0%.

TABLE 64  
Average Annual Number of Deaths Due to Poisoning Suicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	-	0	0	-	-	-	-	-	-	-	0	0
15-19	3	2	4	-	-	-	-	-	-	3	2	4
20-24	6	2	8	0	0	1	0	0	1	7	2	9
25-29	6	2	9	-	-	-	1	0	1	7	3	10
30-34	10	2	12	1	1	2	1	-	1	12	3	15
35-44	34	22	56	1	1	2	-	-	-	35	23	58
45-54	26	20	46	2	2	4	-	-	-	28	22	50
55-64	10	10	20	-	0	0	-	0	0	10	11	21
65-74	6	5	11	-	-	-	-	-	-	6	5	11
75+	5	5	11	-	-	-	-	-	-	5	5	11
Total	107	70	177	5	4	9	2	1	3	113	76	189

Includes ICD-10 codes: X60 – X69.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 65  
Average Annual Death Rates Due to Poisoning Suicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	-	*	*	-	-	-	-	-	-	-	*	*
15-19	0.9	*	0.8	-	-	-	-	-	-	0.7	*	0.6
20-24	2.5	*	1.6	*	*	*	*	*	*	2.2	0.7	1.4
25-29	2.6	1.0	1.8	-	-	-	*	*	*	2.1	0.8	1.5
30-34	3.6	0.9	2.2	*	*	2.2	*	-	*	3.4	0.9	2.2
35-44	5.1	3.4	4.2	*	*	1.0	-	-	-	4.4	2.9	3.6
45-54	4.6	3.5	4.0	2.5	*	2.1	-	-	-	4.1	3.1	3.6
55-64	2.8	2.6	2.7	-	*	*	-	*	*	2.4	2.4	2.4
65-74	2.5	1.5	2.0	-	-	-	-	-	-	2.2	1.3	1.7
75+	2.8	1.6	2.1	-	-	-	-	-	-	2.5	1.5	1.9
Total	2.7	1.7	2.2	0.7	0.6	0.6	*	*	0.5	2.3	1.5	1.9

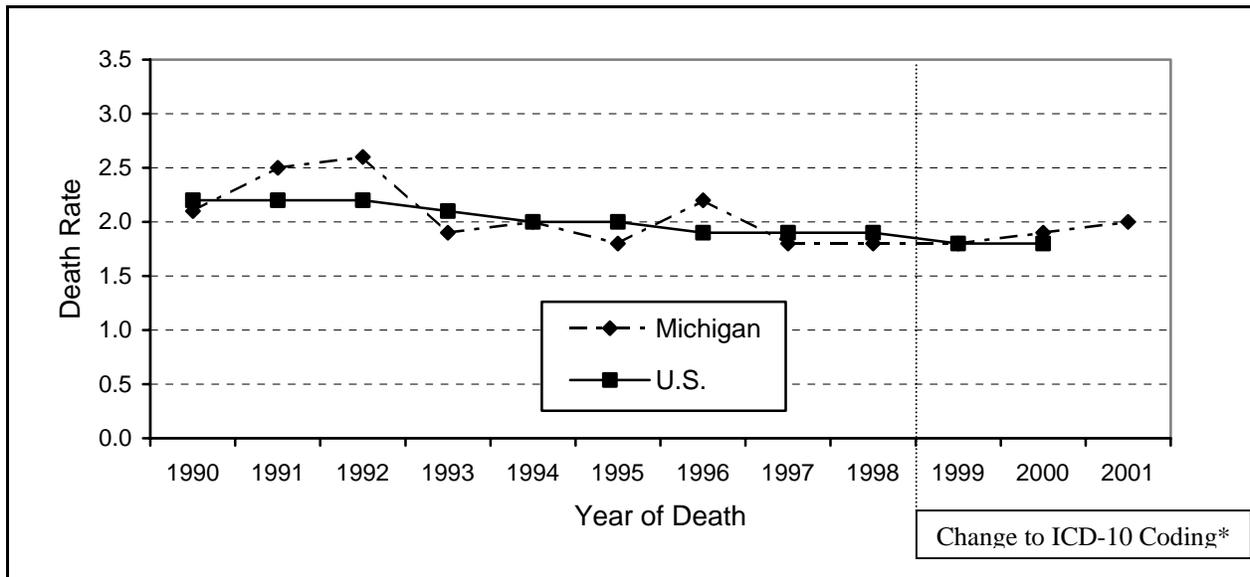
Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 66  
 Number of Deaths and Death Rates Due to Poisoning Suicides  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	200	5,424	2.1	2.2
1991	239	5,544	2.5	2.2
1992	250	5,495	2.6	2.2
1993	185	5,271	1.9	2.1
1994	194	5,273	2.0	2.0
1995	170	5,147	1.8	2.0
1996	213	5,080	2.2	1.9
1997	175	5,128	1.8	1.9
1998	176	5,072	1.8	1.9
CHANGE TO ICD-10 CODING*				
1999	178	4,893	1.8	1.8
2000	185	4,859	1.9	1.8
2001	203	not available	2.0	not available

FIGURE 17  
 Death Rates Due to Poisoning Suicides  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E950 – E952

1999-2001: ICD-10 codes X60 – X69

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 67  
Average Annual Numbers and Death Rates of Deaths Due to Poisoning Suicides  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	0	*
Alger	-	-	Leelanau	-	-
Allegan	1	*	Lenawee	1	*
Alpena	1	*	Livingston	2	1.5
Antrim	0	*	Luce	-	-
Arenac	1	*	Mackinac	-	-
Baraga	-	-	Macomb	16	2.1
Barry	1	*	Manistee	1	*
Bay	2	2.1	Marquette	1	*
Benzie	1	*	Mason	-	-
Berrien	3	1.6	Mecosta	0	*
Branch	0	*	Menominee	0	*
Calhoun	4	3.1	Midland	3	3.2
Cass	1	*	Missaukee	1	*
Charlevoix	1	*	Monroe	2	1.4
Cheboygan	1	*	Montcalm	2	*
Chippewa	0	*	Montmorency	-	-
Clare	1	*	Muskegon	2	1.4
Clinton	1	*	Newaygo	3	6.3
Crawford	1	*	Oakland	26	2.2
Delta	2	*	Oceana	1	*
Dickinson	1	*	Ogemaw	1	*
Eaton	2	*	Ontonagon	0	*
Emmet	-	-	Osceola	-	-
Genesee	9	2.0	Oscoda	-	-
Gladwin	1	*	Otsego	1	*
Gogebic	1	*	Ottawa	2	*
Grand Traverse	2	2.6	Presque Isle	-	-
Gratiot	0	*	Roscommon	1	*
Hillsdale	2	*	Saginaw	1	*
Houghton	1	*	St. Clair	5	3.0
Huron	1	*	St. Joseph	1	*
Ingham	6	2.0	Sanilac	1	*
Ionia	0	*	Schoolcraft	1	*
Iosco	1	*	Shiawassee	1	*
Iron	1	*	Tuscola	2	*
Isabella	3	4.2	Van Buren	1	*
Jackson	4	2.3	Washtenaw	5	1.7
Kalamazoo	3	1.3	Wayne	31	1.5
Kalkaska	1	*	Wexford	-	-
Kent	12	2.0			
Keweenaw	-	-			
Lake	-	-	Michigan	189	1.9

Includes ICD-10 codes: X60 – X69.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

## **SUICIDES**

### **SUFFOCATIONS/STRANGULATIONS/HANGINGS**

#### **Demographic Characteristics**

Between 1999 and 2001, an average of 208 Michigan residents committed suicide annually via suffocation, strangulation, or hanging (Table 68). This corresponds to an average annual death rate of 2.1 per 100,000 residents (Table 69). The death rate for males (3.4) was more than four times the rate for females (0.8). Among males, the rate peaked among those aged 25-29; this trend was not true among females. The rate for white residents (2.3) was 64% greater than the rate for black residents (1.4). Overall, white males aged 25-29 had the highest rate (8.1).

#### **Temporal Trends**

Between 1990 and 2001, the number of deaths resulting from suffocation/strangulation/hanging suicide among Michigan residents ranged from 167 in 1992 to 246 in 2001\* (Table 70). Death rates ranged from 1.7 in 1995 to 2.5 in 2001. Michigan's rates were similar to national rates throughout the study period (Figure 18). While there was some slight increase nationally in death rates for this cause, there was no clear trend in Michigan. However, Michigan's rate in 2001 was substantially higher than the previous eleven years.

#### **Geographic Distribution**

There were no suffocation/strangulation/hanging suicides among residents of 15 counties during 1999-2001 (noted by "-" in Table 71). Among the 24 counties for which a reliable rate could be calculated, Berrien County and Saginaw County had the lowest rate (1.4) and Cass County had the highest rate (3.9). All of the counties with reliable rates were located in the southern portion of the Lower Peninsula, generally the more populous counties of the state. Within these 24 counties, there was no noticeable correlation between population density and rates of suffocation/strangulation/hanging suicide.

\* The report on comparability ratios<sup>11</sup> (see Appendix A for discussion of comparability ratios) did not develop an estimate specifically for suffocation/strangulation/hanging suicides. The ratio for non-firearm suicides is 0.990. Thus, the coding change to ICD-10 from ICD-9 by itself would have the effect of decreasing the number of cases and the corresponding rates by approximately 1.0%.

**TABLE 68**  
**Average Annual Number of Deaths Due to Suffocation/Strangulation/Hanging Suicides**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	1	1	2	1	0	2	-	-	-	3	1	4
15-19	14	3	17	1	1	2	0	1	1	15	5	20
20-24	14	3	17	1	-	1	0	-	0	15	3	18
25-29	20	3	23	3	0	3	0	-	0	23	3	27
30-34	20	4	24	2	1	3	0	-	0	23	4	28
35-44	34	8	42	4	1	5	1	0	2	39	9	48
45-54	22	3	26	3	0	3	0	1	1	26	5	30
55-64	11	2	13	0	0	1	0	-	0	12	3	14
65-74	3	2	5	0	-	0	-	1	1	4	3	6
75+	7	5	12	-	-	-	-	0	0	7	5	12
Total	146	35	181	16	3	20	3	3	7	167	42	208

Includes ICD-10 code: X70.

Decedents with unknown race (n=2) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

**TABLE 69**  
**Average Annual Death Rates Due to Suffocation/Strangulation/Hanging Suicides**  
**By Age, Race, and Sex**  
**Michigan Residents, 1999-2001**

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	*	*	0.4	*	*	*	-	-	-	0.7	*	0.5
15-19	4.8	1.2	3.0	*	*	1.8	*	*	*	4.2	1.4	2.8
20-24	5.5	1.4	3.5	*	-	*	*	-	*	4.5	1.0	2.8
25-29	8.1	1.2	4.7	5.8	*	3.0	*	-	*	7.1	1.0	4.1
30-34	7.3	1.3	4.3	4.7	*	2.8	*	-	*	6.6	1.2	3.9
35-44	5.1	1.3	3.2	4.1	*	2.2	*	*	*	4.9	1.2	3.0
45-54	3.9	0.6	2.2	3.8	*	1.9	*	*	*	3.8	0.7	2.2
55-64	3.0	0.6	1.8	*	*	*	*	-	*	2.8	0.6	1.7
65-74	1.3	0.7	1.0	*	-	*	-	*	*	1.3	0.8	1.0
75+	3.7	1.4	2.3	-	-	-	-	*	*	3.5	1.4	2.1
Total	3.7	0.9	2.3	2.4	0.4	1.4	1.2	1.2	1.2	3.4	0.8	2.1

Rates are number of deaths per 100,000 population.

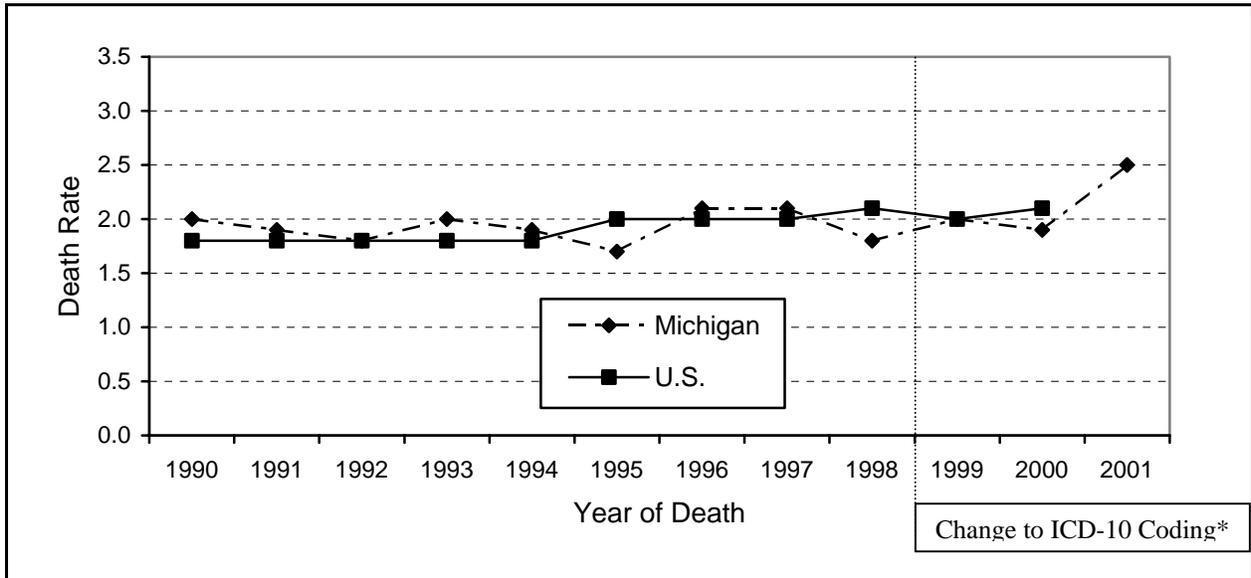
Decedents with unknown race (n=2) not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 70  
 Number of Deaths and Death Rates Due to Suffocation/Strangulation/Hanging Suicides  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	182	4,444	2.0	1.8
1991	178	4,561	1.9	1.8
1992	167	4,678	1.8	1.8
1993	195	4,627	2.0	1.8
1994	182	4,745	1.9	1.8
1995	169	5,217	1.7	2.0
1996	203	5,330	2.1	2.0
1997	207	5,413	2.1	2.0
1998	173	5,726	1.8	2.1
CHANGE TO ICD-10 CODING*				
1999	194	5,427	2.0	2.0
2000	185	5,688	1.9	2.1
2001	246	not available	2.5	not available

FIGURE 18  
 Death Rates Due to Suffocation/Strangulation/Hanging Suicides  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 code E953

1999-2001: ICD-10 code X70

Sources: Vital Records and Health Data Development Section, MDCH  
 Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention  
 U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 71  
Average Annual Numbers and Death Rates of Deaths Due Suffocation/Strangulation/Hanging Suicides  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	0	*	Lapeer	1	*
Alger	-	-	Leelanau	-	-
Allegan	2	1.9	Lenawee	3	2.7
Alpena	1	*	Livingston	3	1.7
Antrim	-	-	Luce	-	-
Arenac	-	-	Mackinac	-	-
Baraga	1	*	Macomb	18	2.2
Barry	2	*	Manistee	0	*
Bay	2	1.8	Marquette	1	*
Benzie	-	-	Mason	-	-
Berrien	2	1.4	Mecosta	0	*
Branch	0	*	Menominee	1	*
Calhoun	4	2.9	Midland	1	*
Cass	2	3.9	Missaukee	0	*
Charlevoix	0	*	Monroe	4	2.7
Cheboygan	1	*	Montcalm	2	*
Chippewa	1	*	Montmorency	-	-
Clare	1	*	Muskegon	4	2.4
Clinton	1	*	Newaygo	0	*
Crawford	0	*	Oakland	19	1.6
Delta	0	*	Oceana	1	*
Dickinson	1	*	Ogemaw	-	-
Eaton	2	2.3	Ontonagon	-	-
Emmet	0	*	Osceola	0	*
Genesee	13	2.9	Oscoda	-	-
Gladwin	1	*	Otsego	0	*
Gogebic	1	*	Ottawa	5	2.2
Grand Traverse	2	*	Presque Isle	0	*
Gratiot	1	*	Roscommon	0	*
Hillsdale	1	*	Saginaw	3	1.4
Houghton	1	*	St. Clair	4	2.4
Huron	1	*	St. Joseph	2	3.7
Ingham	7	2.5	Sanilac	1	*
Ionia	2	3.3	Schoolcraft	-	-
Iosco	1	*	Shiawassee	0	*
Iron	1	*	Tuscola	1	*
Isabella	1	*	Van Buren	1	*
Jackson	3	2.1	Washtenaw	6	1.9
Kalamazoo	5	2.2	Wayne	51	2.5
Kalkaska	-	-	Wexford	1	*
Kent	10	1.7	Unknown	0	
Keweenaw	-	-			
Lake	0	*	Michigan	208	2.1

Includes ICD-10 code: X70.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

# **HOMICIDES**

## **CUTTING/PIERCING OBJECTS**

### **Demographic Characteristics**

An average of 60 Michigan residents died annually between 1999 and 2001 due to cutting/piercing homicides (Table 72). The corresponding death rate was 0.6 per 100,000 residents (Table 73). Overall, death rates were elevated among those aged 20-54. The rate for males (0.8) was twice the rate for females (0.4). The rate for blacks (2.4) was eight times higher than the rate for whites (0.3). Black males aged 45-54 had the highest rate overall. Their rate of 7.2 was twelve times the overall state rate.

### **Temporal Trends**

The number and rate of cutting/piercing homicides was highest in 1990 (177; 1.9 per 100,000) and lowest in 2000\* (53; 0.5) (Table 74). Between 1990 and 2000, Michigan's rate decreased 74% (Table 74 and Figure 19). During the study period, Michigan's rates were similar to national rates.

### **Geographic Distribution**

Statistically reliable death rates could be calculated for only four counties, thus a geographical analysis was not performed.

\* The report on comparability ratios<sup>11</sup> (see Appendix A for discussion of comparability ratios) did not develop an estimate specifically for cutting/piercing homicides. The ratio for non-firearm homicides is 1.002. Thus, the coding change to ICD-10 from ICD-9 by itself would have the effect of increasing the number of cases and the corresponding rates by approximately 0.2%.

TABLE 72  
Average Annual Number of Deaths Due to Cutting/Piercing Homicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	0	0	-	0	0	-	-	-	0	1	1
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	0	0	-	-	-	-	-	-	0	0	0
10-14	-	0	0	-	0	0	-	-	-	0	1	1
15-19	1	1	2	1	1	1	-	-	-	2	2	3
20-24	3	1	4	2	2	4	-	-	-	5	3	7
25-29	3	0	4	3	1	3	0	-	0	6	1	7
30-34	1	1	2	3	1	5	-	0	0	4	3	7
35-44	4	3	7	6	4	10	-	-	-	11	7	17
45-54	1	2	4	6	1	7	-	-	-	7	3	10
55-64	1	0	1	0	0	1	-	0	0	1	1	2
65-74	1	-	1	1	0	1	-	-	-	2	0	2
75+	-	1	1	1	0	1	-	-	-	1	1	2
Total	15	11	26	23	11	34	0	1	1	38	22	60

Includes ICD-10 code: X99.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 73  
Average Annual Death Rates Due to Cutting/Piercing Homicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	*	*	-	*	*	-	-	-	-	*	*
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	*	*	-	-	-	-	-	-	-	*	*
10-14	-	*	*	-	*	*	-	-	-	-	*	*
15-19	*	*	0.4	*	*	*	-	-	-	*	*	0.5
20-24	1.1	*	0.7	4.1	*	3.6	-	-	-	1.4	0.8	1.1
25-29	1.3	*	0.7	5.1	*	3.0	*	-	*	1.9	*	1.1
30-34	*	*	0.4	6.7	*	4.4	-	*	*	1.1	0.8	1.0
35-44	0.7	0.4	0.5	6.5	3.6	4.9	-	-	-	1.3	0.8	1.1
45-54	*	0.4	0.3	7.2	*	3.9	-	-	-	1.0	0.5	0.8
55-64	*	*	*	*	*	*	-	*	*	*	*	0.2
65-74	*	-	*	*	*	*	-	-	-	*	*	0.3
75+	-	*	*	*	*	*	-	-	-	*	*	0.3
Total	0.4	0.3	0.3	3.4	1.5	2.4	*	*	*	0.8	0.4	0.6

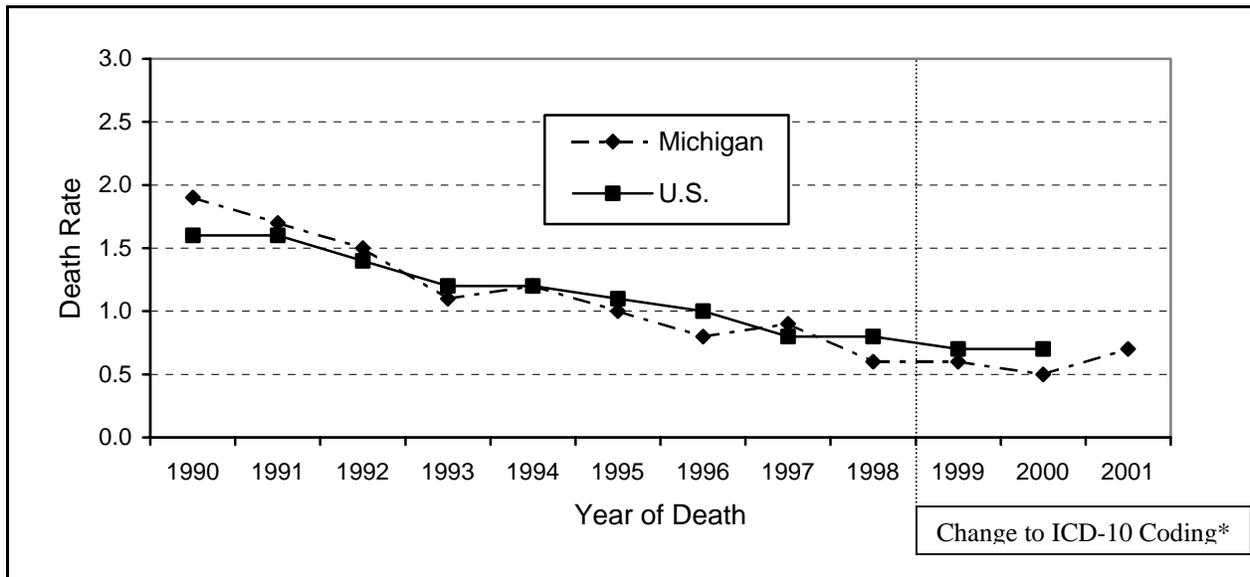
Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 74  
 Number of Deaths and Death Rates Due to Cutting/Piercing Homicides  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	177	4,101	1.9	1.6
1991	157	4,030	1.7	1.6
1992	142	3,528	1.5	1.4
1993	103	3,204	1.1	1.2
1994	118	3,026	1.2	1.2
1995	96	2,780	1.0	1.1
1996	78	2,619	0.8	1.0
1997	84	2,246	0.9	0.8
1998	62	2,087	0.6	0.8
CHANGE TO ICD-10 CODING*				
1999	61	1,879	0.6	0.7
2000	53	1,805	0.5	0.7
2001	67	not available	0.7	not available

FIGURE 19  
 Death Rates Due to Cutting/Piercing Homicides  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 code E966

1999-2001: ICD-10 code X99

Sources: Vital Records and Health Data Development Section, MDCH  
 Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention  
 U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

# HOMICIDES

## FIREARMS

### Demographic Characteristics

An average of 504 firearm homicides occurred annually among Michigan residents between 1999 and 2001 (Table 75). The corresponding death rate was 5.1 per 100,000 residents (Table 76). Death rates were elevated among those aged 20-34, peaking among 20-24 year olds. The death rate for males (8.7) was nearly six times the rate for females (1.5). The rate for black residents (27.4) was nearly 20 times the rate for white residents (1.4). The group with the highest rate was 20-24 year old black residents with a rate (186.8) that was 36.6 times the statewide rate.

### Temporal Trends

The number of firearm homicides that occurred between 1990 and 2001 among Michigan residents ranged from 497 in 2001\* to 783 in 1991 (Table 77). The death rates in these years were also the lowest and highest during this period (5.0 and 8.3, respectively). Michigan's firearm homicide rate was consistently higher than the national rate (Table 77 and Figure 20). Rates in Michigan and the U.S. declined throughout this period, appearing to level off recently. Between 1991 and 2001, Michigan's firearm homicide rate decreased 40%.

### Geographic Distribution

There were no firearm homicides among residents of 36 counties during 1999-2001 (noted by "-" in Table 78). Among the 15 counties for which a reliable rate could be calculated, Kent County, Macomb County, and Muskegon County had the lowest rate (1.6) and Wayne County had the highest rate (17.2). Wayne County's rate was more than three times the state rate. All of the counties with reliable rates were located in the southern portion of the Lower Peninsula, generally the more populous counties of the state. Within these 15 counties, there was no noticeable correlation between county population and rates of firearm homicide (i.e., firearm homicide rates did not consistently increase – or decrease – with increasing county population).

\* The estimated comparability ratio<sup>11</sup> (see Appendix A for discussion of comparability ratios) for firearm homicide is 0.997. Thus, the coding change to ICD-10 from ICD-9 by itself would have the effect of decreasing the number of cases and the corresponding rates by 0.3%.

TABLE 75  
Average Annual Number of Deaths Due to Firearm Homicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	0	0	-	-	-	-	-	-	-	0	0
1-4	1	-	1	0	0	1	-	-	-	1	0	2
5-9	1	1	1	1	0	2	-	-	-	2	1	3
10-14	1	1	2	2	-	2	-	-	-	4	1	4
15-19	8	3	10	38	5	43	0	0	1	47	8	55
20-24	13	3	17	92	6	98	1	-	1	106	9	116
25-29	8	3	11	81	8	89	-	-	-	89	11	100
30-34	10	5	15	52	7	59	-	0	0	62	12	75
35-44	19	11	30	47	9	56	2	0	2	68	20	88
45-54	8	4	12	21	5	26	-	-	-	29	9	37
55-64	4	3	7	7	-	7	1	-	1	12	3	14
65-74	2	2	3	2	1	3	-	-	-	4	3	6
75+	1	1	2	2	-	2	-	-	-	3	1	4
Total	76	35	111	346	42	388	4	1	5	426	78	504

Includes ICD-10 codes: X93 – X95.

Decedent with unknown race (n=1) not illustrated but included in totals.

Numbers in columns and rows may not total exactly due to rounding.

Source: Vital Records and Health Data Development Section, MDCH

TABLE 76  
Average Annual Death Rates Due to Firearm Homicides  
By Age, Race, and Sex  
Michigan Residents, 1999-2001

Age	White			Black			Other			Total		
	Male	Female	Total									
<1	-	*	*	-	-	-	-	-	-	-	*	*
1-4	*	-	*	*	*	*	-	-	-	*	*	*
5-9	*	*	*	*	*	*	-	-	-	0.5	*	0.4
10-14	*	*	0.4	3.6	-	1.8	-	-	-	1.0	*	0.6
15-19	2.7	1.0	1.8	68.9	9.1	39.3	*	*	*	12.7	2.3	7.6
20-24	5.4	1.4	3.4	186.8	11.4	96.3	*	-	*	32.8	2.9	18.0
25-29	3.2	1.1	2.2	156.5	13.6	80.7	-	-	-	27.3	3.3	15.3
30-34	3.7	1.8	2.8	104.8	12.5	55.8	-	*	*	17.6	3.5	10.6
35-44	2.9	1.6	2.3	48.6	8.0	26.8	*	*	2.6	8.5	2.5	5.5
45-54	1.4	0.6	1.0	26.2	5.3	14.9	-	-	-	4.2	1.3	2.7
55-64	1.1	0.7	0.9	16.4	-	7.4	*	-	*	2.8	0.6	1.7
65-74	*	*	0.6	7.0	*	4.4	-	-	-	1.3	0.8	1.0
75+	*	*	0.5	*	-	*	-	-	-	1.4	*	0.7
Total	1.9	0.9	1.4	51.7	5.6	27.4	1.3	*	0.8	8.7	1.5	5.1

Rates are number of deaths per 100,000 population.

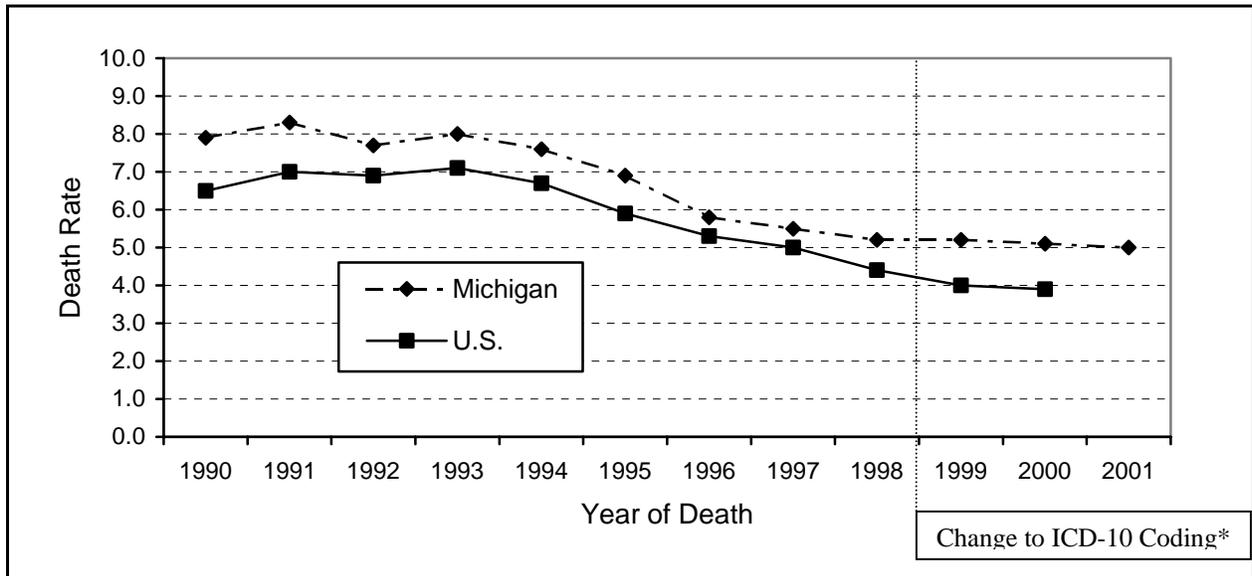
Decedent with unknown race (n=1) not illustrated but included in totals.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

TABLE 77  
 Number of Deaths and Death Rates Due to Firearm Homicides  
 By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	731	16,218	7.9	6.5
1991	783	17,746	8.3	7.0
1992	728	17,488	7.7	6.9
1993	762	18,253	8.0	7.1
1994	732	17,527	7.6	6.7
1995	662	15,551	6.9	5.9
1996	562	14,037	5.8	5.3
1997	543	13,252	5.5	5.0
1998	506	11,798	5.2	4.4
CHANGE TO ICD-10 CODING*				
1999	512	10,828	5.2	4.0
2000	503	10,801	5.1	3.9
2001	497	not available	5.0	not available

FIGURE 20  
 Death Rates Due to Firearm Homicides  
 Michigan and U.S. Residents, 1990-2001



Rates are number of deaths per 100,000 population.

1990-1998: ICD-9 codes E965.0-.4

1999-2001: ICD-10 codes X93 - X95

Sources: Vital Records and Health Data Development Section, MDCH

Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention

U.S. Census Data

\* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. See Appendix A for more detailed discussion of the effect of the change to ICD-10 coding.

TABLE 78  
Average Annual Numbers and Rates of Deaths Due to Firearm Homicides  
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	1	*
Alger	-	-	Leelanau	-	-
Allegan	2	*	Lenawee	2	2.0
Alpena	-	-	Livingston	1	*
Antrim	0	*	Luce	-	-
Arenac	1	*	Mackinac	-	-
Baraga	-	-	Macomb	13	1.6
Barry	-	-	Manistee	-	-
Bay	1	*	Marquette	1	*
Benzie	-	-	Mason	-	-
Berrien	5	3.1	Mecosta	-	-
Branch	1	*	Menominee	0	*
Calhoun	5	3.4	Midland	-	-
Cass	2	4.6	Missaukee	-	-
Charlevoix	-	-	Monroe	1	*
Cheboygan	0	*	Montcalm	1	*
Chippewa	-	-	Montmorency	-	-
Clare	1	*	Muskegon	3	1.6
Clinton	-	-	Newaygo	0	*
Crawford	0	*	Oakland	27	2.2
Delta	-	-	Oceana	-	-
Dickinson	-	-	Ogemaw	0	*
Eaton	2	1.9	Ontonagon	-	-
Emmet	-	-	Osceola	-	-
Genesee	30	6.9	Oscoda	-	-
Gladwin	0	*	Otsego	-	-
Gogebic	0	*	Ottawa	1	*
Grand Traverse	1	*	Presque Isle	-	-
Gratiot	-	-	Roscommon	0	*
Hillsdale	0	*	Saginaw	11	5.4
Houghton	-	-	St. Clair	1	*
Huron	1	*	St. Joseph	2	*
Ingham	6	2.3	Sanilac	-	-
Ionia	0	*	Schoolcraft	-	-
Iosco	0	*	Shiawassee	0	*
Iron	-	-	Tuscola	0	*
Isabella	-	-	Van Buren	1	*
Jackson	1	*	Washtenaw	6	1.9
Kalamazoo	6	2.7	Wayne	355	17.2
Kalkaska	-	-	Wexford	-	-
Kent	9	1.6			
Keweenaw	-	-			
Lake	1	*	Michigan	504	5.1

Includes ICD-10 codes: X93 - X95.

Rates are number of deaths per 100,000 population.

Sources: Vital Records and Health Data Development Section, MDCH  
2000 U.S. Census

## WORK-RELATED INJURY FATALITIES

Death certificates can be used to identify work-related injury fatalities. For every injury death in Michigan, a physician or medical examiner must indicate on the death certificate whether the injury occurred at work. The MDCH Division for Vital Records and Health Statistics provides these certifiers with a manual containing instructions on how to code the “Injury at Work?” item. These instructions are simply “Check <Yes> if the injury occurred at work and <No> if it did not.” MDCH annually provides the National Institute for Occupational Safety and Health (NIOSH) with these data for their National Traumatic Occupational Fatality (NTOF) surveillance system.

The Census of Fatal Occupational Injuries (CFOI), initiated in 1992 by the U.S. Bureau of Labor Statistics, uses multiple data sources to compile the most complete roster of occupational injury fatalities. In addition to death certificates, CFOI utilizes data from the Fatality Analysis Reporting System (for traffic deaths), worker’s compensation reports, reports to various regulatory agencies, medical examiner reports, and the media. Studies have found that death certificates alone undercount occupational injury deaths, especially motor vehicle crashes and homicides.<sup>12</sup> Between 1992 and 2001, death certificates identified an average of 144 work-related injury deaths per year occurring in Michigan, 23% less than the 165 per year identified by CFOI (Table 79). Because of its greater sensitivity to ascertain cases, CFOI is used in this section to examine the incidence and profile of work-related injury fatalities. Where informative, comparisons are made with death certificate data.

TABLE 79  
Case Ascertainment Comparison - Death Certificates and CFOI  
Michigan Work-related Injury Fatalities, All Ages  
By Year of Death, 1992-2001

Year	Number of Work-related Injury Deaths		% DC/CFOI
	Death Certificates (DC)	CFOI	
1992	135	143	94.4
1993	148	160	92.5
1994	164	180	91.1
1995	121	149	81.2
1996	138	155	89.0
1997	140	174	80.5
1998	150	179	83.8
1999	155	182	85.2
2000	148	156	94.9
2001	139	175	79.4
Total	1,438	1,653	87.0

Death certificate data:

1990-1998: ICD-9 codes E800-E999

1999-2001: ICD-10 codes V01 – Y89

Sources: Vital Records and Health Data Development Section, MDCH  
MIOSHA Information Division, MDCIS

Some attributes of CFOI are worth noting here. First, the system ascertains incidents that occur in Michigan (specifically, deaths occurring within the state). Thus, out-of-state residents are included and Michigan residents fatally injured out-of-state are excluded. Second, rate calculations use a denominator that represents the number of employed Michigan residents creating a slight inconsistency between the numerator and the denominator. Third, employment figures used in calculating rates are limited to people aged 16 and older. Due to MIOSHA standards limiting the type of data that can be released, the numerator in rate calculations could not exclude those under age 16. Note that per death certificate data, only five of the 1,438 deaths occurring between 1992 and 2001 were to those under age 16; 93% of the deaths were to Michigan residents.

### **Cause of Injury**

To code cause of injury, CFOI utilizes the Occupational Injury and Illness Classification System (OIICS) whereas death certificates utilize ICD-10.<sup>2</sup> Because of the use of different coding systems and CFOI's ability to ascertain more cases than death certificates, the cause of injury profiles generated by these two sources are distinct. Table 80 illustrates the leading causes of occupational injury deaths during 1999-2001 per CFOI and death certificates. Transportation-related events were the leading cause of death according to both sources. However, these incidents comprised one-third of all cases per CFOI but only one-quarter per death certificates. Also notable was that nearly 20 people per year were victims of work-related homicide.

### **Demographic Characteristics**

Those aged 35-44 sustained the greatest number of work-related injury deaths (Table 81). Workers in the oldest age group had the highest mortality rate (8.8 per 100,000 workers). Males had a mortality rate (5.9) that was about ten times the rate for females (0.6) (Table 82).

### **Temporal Trends**

Table 83 illustrates the annual number of deaths and death rates due to work-related injuries occurring in Michigan during 1992-2001 and the corresponding U.S. data. The annual number of deaths in Michigan ranged from 143 in 1992 to 182 in 1999. Michigan death rates ranged from 3.1 per 100,000 workers in 2000 to 4.0 per 100,000 workers in 1994. The Michigan occupational injury fatality rate was consistently lower than the national rate for the ten-year period (Figure 21). On average, the Michigan rate was 27% lower than the national rate. The national rate decreased slightly between 1992 and 2001, while Michigan had no such decrease.

**TABLE 80**  
**Average Annual Number of Work-related Injury Deaths by Cause**  
**Comparison of Census of Fatal Occupational Injuries and Death Certificates**  
**All Ages, Occurrences in Michigan, 1999-2001**

Cause of Injury	CFOI		Death Certificates	
	No.	%	No.	%
Transportation	58	33.9	38	25.9
Contact with objects, equipment, machinery including struck by objects/crushed	34	19.9	27	18.4
Fall	22	12.9	19	12.9
Homicide	19	11.1	16	10.9
Suicide	10	5.8	10	6.8
Fire/explosion	10	5.8	8	5.4
Electrocution	8	4.7	7	4.8
Other and Unknown	9	5.3	23	15.6
<b>Total</b>	<b>171</b>	<b>100.0</b>	<b>147</b>	<b>100.0</b>

Source of CFOI data: MIOSHA Information Division, Michigan Department of Consumer and Industry Services

Source of death certificate data: Vital Records and Health Data Development Section, MDCH

Includes ICD-10 codes: V01 – Y89.

Cells may not sum to totals due to rounding.

See Appendix C Table C-1 for ICD-10 codes used to define causes of injury per death certificate data.

Out-of-state residents sustaining an injury in Michigan are included. Michigan residents sustaining an injury out-of-state are excluded.

**TABLE 81**  
**Average Annual Number of Work-related**  
**Injury Deaths, By Age**  
**Michigan Occurrences, 1999-2001**

Age Group	Number	Rate
<20	6	1.6
20-24	15	2.8
25-34	33	3.1
35-44	44	3.3
45-54	35	3.0
55-64	26	6.1
65+	12	8.8
<b>Total</b>	<b>171</b>	<b>3.4</b>

Rates are number of deaths per 100,000 employed persons.

Cells may not sum to totals due to rounding.

Sources: Census of Fatal Occupational Injuries, MIOSHA Information Division, MDCIS  
 Local Area Unemployment Statistics, Bureau of Labor Statistics

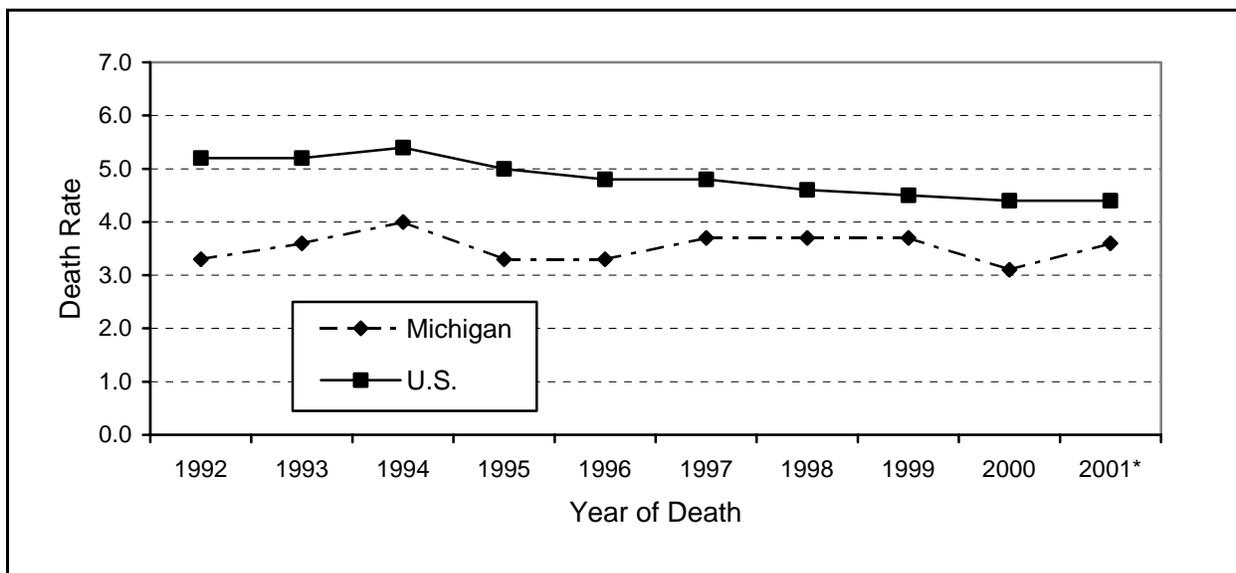
**TABLE 82**  
**Average Annual Number of Work-related**  
**Injury Deaths, By Sex**  
**Michigan Occurrences, 1999-2001**

Sex	Number	Rate
Male	157	5.9
Female	14	0.6
<b>Total</b>	<b>171</b>	<b>3.4</b>

TABLE 83  
 Number of Deaths and Death Rates Due to Work-related Injuries  
 By Year of Death, Michigan and U.S., 1992-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1992	143	6,217	3.3	5.2
1993	160	6,271	3.6	5.2
1994	180	6,588	4.0	5.4
1995	149	6,210	3.3	5.0
1996	155	6,112	3.3	4.8
1997	174	6,218	3.7	4.8
1998	179	6,026	3.7	4.6
1999	182	6,023	3.7	4.5
2000	156	5,915	3.1	4.4
2001	175	5,900*	3.6	4.4*

FIGURE 21  
 Death Rates Due to Work-related Injuries  
 Michigan and U.S., 1992-2001



Rates are number of deaths per 100,000 workers.

Sources: MIOSHA Information Division, MDCIS  
 Census of Fatal Occupational Injuries, Bureau of Labor Statistics, U.S. Department of Labor  
 Bureau of Labor Statistics, Current Population Survey

\* The 2,886 work-related deaths caused by terrorists on 9/11/01 are not included.

# **APPENDIX A**

**Effects of change from ICD-9 to ICD-10 coding**

## ICD-9/ICD-10 COMPARABILITY RATIOS

Death certificates contain descriptions of the underlying and contributing causes of death. These descriptions are translated by nosologists into codes to allow statistical management and analysis of mortality data. This translation into codes is possible via the International Classification of Diseases (ICD). The ICD has been revised approximately every ten years since 1900. While these revisions are necessary to reflect advances in medical science, they create challenges in analyzing long-term trends of disease and injury mortality.

The International Classification of Disease – 9<sup>th</sup> Revision (ICD-9) was used to code deaths occurring between 1979 and 1998. To specify the cause of injury deaths, nosologists used supplemental ICD-9 codes. These codes became known as “E-codes” because they indicated the external cause. Starting in 1999, deaths were coded using ICD-10 and codes for injury deaths were no longer labeled E-codes. Under ICD-10, cause of injury codes, which begin with the letters V, W, X, Y, are more detailed and injury categories have been narrowed or broadened.

In 2001, the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention released preliminary results of a study of the comparability of cause of death coding under ICD-9 and ICD-10.<sup>11</sup> Comparability studies involve examining similar categories in successive ICD revisions to measure the extent of breaks in trends caused by the revision. The data in the report are based on cause-of-death information from a non-random sample of 1,852,671 U.S. resident deaths occurring in 1996. The underlying cause of death for each record was originally classified by ICD-9. These cases were subsequently coded using ICD-10. Not all of this coding was accomplished in time for the preliminary report. However, the authors noted that the incomplete coding would not have a significant impact on the results. All cases were classified according to the List of 113 Selected Causes of Death that is used as the standard method to present mortality statistics.

Comparability ratios represent the number of deaths due to a specific cause as classified by ICD-10 divided by the number of deaths of the same cause as classified by ICD-9. A comparability ratio less than 1.00 indicates that fewer deaths were classified to a specific cause under ICD-10 as compared with ICD-9. A ratio greater than 1.00 indicates that a larger number of deaths were classified to a specific cause under ICD-10 as compared with ICD-9.

Because the death certificates used in the study were a sample of all records, standard errors are associated with each comparability ratio estimate. These standard errors were used to generate 95% confidence intervals around the estimates. Table A-1 illustrates the results from this report as they pertain to injury deaths.

TABLE A-1  
Comparability Ratios for Selected Causes of Injury Death

Cause of Death	Number of deaths allocated according to:		Estimated comparability ratio	95% Confidence Interval Limits (Lower, Upper)
	ICD-10	ICD-9		
<b>Unintentional Injury</b>	31,084	30,163	1.0305	1.0278, 1.0333
Transport incident	17,547	17,586	0.9978	0.9966, 0.9990
Motor vehicle crash	14,539	17,051	0.8527*	0.8473, 0.8581
Other land transport	N.A.	N.A.	N.A.	N.A.
Air, water, space and other transport	351	347	1.0115	0.9706, 1.0525
Non-transport Incident	13,537	12,577	1.0763	1.0696, 1.0831
Fall	5,173	6,152	0.8409**	0.8313, 0.8505
Firearm	493	466	1.0579	1.0331, 1.0828
Drowning	283	284	0.9965	0.9716, 1.0213
Exposure to fire/flames	493	506	0.9743	0.9568, 0.9918
Poisoning	N.A.	N.A.	N.A.	N.A.
Other & unspecified non-transport	6,698	4,721	1.4188	1.3947, 1.4428
<b>Suicide</b>	18,352	18,422	0.9962	0.9952, 0.9972
Firearm	14,157	14,183	0.9982	0.9968, 0.9996
Other & unspecified means	4,195	4,239	0.9896	0.9850, 0.9942
<b>Homicide</b>	12,287	12,308	0.9983	0.9972, 0.9994
Firearm	8,718	8,745	0.9969	0.9953, 0.9985
Other & unspecified means	3,569	3,563	1.0017	0.9969, 1.0064

\* The report notes that most states adopted a change in the original ICD-10 coding rules as they pertain to motor vehicle crashes which broadens the types of incidents that should get classified under “Motor Vehicle Crash.” For these states, the appropriate comparability ratio is 0.9754. Per personal communication with a nosologist at the Michigan Department of Community Health, 0.9754 is the comparability ratio that applies to Michigan deaths.

\*\* The primary reason for this relatively low comparability ratio is that this study classified injury deaths coded by ICD-9 as E887 (“Fracture, cause unspecified”) under “Falls.” Under ICD-10, such cases are excluded from this category. Note that many injury prevention professionals exclude E887 from “Falls” (for example, this exclusion was made in the 1994-1998 injury mortality report for Michigan<sup>3</sup>). If this exclusion is made, the comparability ratio should be much closer to unity.

N.A. – Not Available; result does not meet standards of reliability or precision.

Source: *Comparability of cause of death between ICD-9 and ICD-10: Preliminary estimates.*<sup>11</sup>



# **APPENDIX B**

## **Index of ICD-10 Codes for Tables 17, 18**

Table B-1 (Page 1 of 2)  
Index of ICD-10 Codes for Tables 17, 18

Mechanism	Manner/Intent				
	Unintentional	Suicide	Homicide	Undetermined	Other
Cut/pierce	W25-W29, W45	X78	X99	Y28	Y35.4
Drowning	W65-W74	X71	X92	Y21	
Fall	W00-W19	X80	Y01	Y30	
Fire/hot object or substance	X00-X19	X76, X77	X97, X98	Y26, Y27	Y36.3
Fire/flame/smoke	X00-X09	X76	X97	Y26	
Hot object/substance	X10-X19	X77	X98	Y27	
Firearm	W32-W34	X72-X74	X93-X95	Y22-Y24	Y35.0
Machinery	W24, W30, W31				
All Transport	V01-V99	X82	Y03	Y32	Y36.1
Motor vehicle traffic					
Occupant	V30-V79 (.4-.9), V83-V86 (.0-.3)				
Motorcyclist	V20-V28 (.3-.9), V29.4-V29.9				
Pedal Cyclist	V12-V14 (.3-.9), V19 (.4-.6)				
Pedestrian	V02-V04 (.1, .9), V09.2				
Other specified	V80 (.3-.5), V81.1, V82.1				
Unspecified	V87 (.0-.8), V89.2				
Pedal Cyclist, non-traffic	V10, V11, V12-V14 (.0-.2), V15-V18, V19 (.0-.3, .8, .9)				
Pedestrian, non-traffic	V01, V02-V04 (.0), V05, V06, V09 (.0, .1, .3, .9)				

Table B-1 (Page 2 of 2)  
Index of ICD-10 Codes for Tables 17, 18

Mechanism	Manner/Intent				
	Unintentional	Suicide	Homicide	Undetermined	Other
Other land transport	V20-V28 (.0-.2), V29 (.0-.3), V30-V79 (.0-.3), V80 (.0-.2, .6-.9), V81-V82 (.0, .2-.9), V83-V86 (.4-.9), V87.9, V88, V89 (.0, .1, .3, .9)	X82	Y03	Y32	
Transport, other	V90-V99				Y36.1
Natural/environmental	W42, W43, W53-W64, W92-W99, X20-X39, X51-X57				
Overexertion	X50				
Poisoning	X40-X49	X60-X69	X85-X90	Y10-Y19	Y35.2
Struck by, against	W20-W22, W50-W52	X79	Y00, Y04	Y29	Y35.3
Suffocation, strangulation, hanging	W75-W84	X70	X91	Y20	
Other specified & classifiable	W23, W35-W41, W44, W49, W85-W91, Y85	X75, X81	X96, Y02, Y05-Y07	Y25, Y31	Y35 (.1, .5), Y36 (.0, .2, .4-.8)
Other specified, not elsewhere classifiable	X58, Y86	X83, Y87.0	Y08, Y87.1	Y33, Y87.2	Y35.6, Y89 (.0, .1)
Unspecified	X59	X84	Y09	Y34, Y89.9	Y35.7, Y36.9
Adverse effects/events					Y40-Y84, Y88
Medical care					Y40-Y59, Y88.0
Drugs					Y60-Y84, Y88 (.1-.3)

Source: U.S. Centers for Disease Control and Prevention, National Center for Health Statistics<sup>10</sup>  
Table does not include recently added ICD-10 codes for deaths pertaining to terrorism.



# **APPENDIX C**

## **ICD-10 Codes Used in Categories of Causes of Work-related Injuries for Table 80**

**Table C-1**  
**Categories of Cause of Work-related Injury Used in Table 80**  
**With Corresponding ICD-10 Codes**

<u>Cause of Injury Category</u>	<u>ICD-10 Codes</u>
Contact with objects, equipment, machinery	
including struck by objects/crushed.....	W20 – W31, W50 – W52
Electrocution.....	W85 – W87
Fall.....	W00 – W19
Fire/Explosion.....	W35 – W40, X00 – X09
Homicide.....	X85 – Y09, Y87.1
Suicide.....	X60 – X84, Y87.0
Transportation.....	V01 – V99, Y85

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