UNINTENTIONAL AND SUICIDAL POISONING IN MICHIGAN

February 2004

Michigan Department of Community Health

MDCH

Jennifer M. Granholm, Governor
Janet Olszewski, Director

State of Michigan
Governor – Jennifer M. Granholm, JD

Michigan Department of Community Health
Director – Janet Olszewski, MSW
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Public Health Administration
Chief Administrative Officer – Jean Chabut, RN, MPH

Division for Vital Records and Health Statistics
Director – Carol V. Getts, MA, MPH

Authors
Thomas W. Largo, MPH – Bureau of Epidemiology, MDCH
Linda Scarpetta, MPH – Division of Chronic Disease and Injury Control, MDCH

Acknowledgments
Data for this report were provided by the Vital Records and Health Data Development Section of the Michigan Department of Community Health, the Michigan Health and Hospital Association, Children's Hospital of Michigan and DeVos Children's Hospital.

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This publication was supported by grant number U17/CCU519401-04 from the U.S. Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the U.S. Centers for Disease Control and Prevention.

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Three hundred copies of this report were printed. The total cost of printing was $642.37. The unit cost was $2.75.

EXECUTIVE SUMMARY

In 2002, a statewide taskforce identified unintentional poisoning and suicidal poisoning as priority areas for injury prevention in Michigan. This report provides a descriptive analysis of these two types of poisoning using death certificates, hospital discharge data, and poison control center data. The salient findings are as follows:

Unintentional Poisoning

Deaths

- Between 1992 and 2001, the unintentional poisoning death rate in Michigan more than tripled. The nation experienced a similar increase during this timeframe although to a lesser extent.
- Black males aged 45-54 were at highest risk of death. Their rate was nearly nine times the state rate during 1999-2001.
- The death rate was highest for Calhoun County residents. They had 14 deaths per year and a rate that was triple the state rate. The rate for Wayne County residents was nearly double the state rate.
- Most (87%) of the deaths were caused by medicinal agents. About half of medicinal substance deaths were caused by narcotics and hallucinogens. Among non-medicinal substances, carbon monoxide caused the most deaths (an average of 18 per year).
- While nearly all demographic groups experienced increased death rates during 1990-2001, the most substantial increases were for blacks and those aged 35-54.
- The drugs most responsible for the increase in death rates were heroin and cocaine. There was also a sizable increase in the number of deaths attributed to "unspecified" drugs. Unfortunately, the specific agents in these cases could not be identified.

Non-fatal Hospitalizations

- For non-fatal unintentional poisonings, the high risk groups differed from fatal cases. In 2001, the hospitalization rate was highest for those aged 1-4. Within this age group, one- and two-year olds were at highest risk. It was also very high for those aged 75 and older.
- Among the state's most populous counties, Saginaw and Wayne had the highest hospitalization rates for non-fatal unintentional poisoning, nearly double the state rate.
- Medicinal substances comprised most (82%) of the substances responsible for hospitalization. Analgesics, antipyretics, and antirheumatics, a group that includes heroin, methadone and other opiates/narcotics, were responsible for more than a quarter of the cases caused by medicinals. Local anesthetics, which includes cocaine, comprised nearly one tenth of the medicinal cases.
- Among non-medicinal substances, alcoholic beverages caused the greatest number of hospitalizations.

Calls to Poison Control Centers

- In 2001, there were 82,859 cases for which a call was made to a Michigan poison control center. More than half of all cases (58%) involved a child under age six years.
- In contrast to death and hospitalization cases, most calls (63%) to poison control centers pertained to non-medicinal substances. Most often reported were household cleaning substances, cosmetics/personal care products, plants, and pesticides.

Suicidal Poisoning

Deaths

- Poisoning was the method used in 19% of suicides during 1999-2001. It trailed firearms (54%) and hanging/suffocation (21%) as a means to commit suicide.
- Groups with high rates were whites, males, and those aged 35-54 years.
- The substance most frequently involved was carbon monoxide. It was the primary substance in 38% of poisoning suicides.

Non-fatal Hospitalizations

- Poisoning was the cause of 93% of non-fatal hospitalizations involving intentional self-harm.
- Females had higher rates than males. Females aged 14-18 years had the highest rates overall.
- Two-thirds of the cases involved psychotropic agents, analgesics, antipyretics, or antirheumatics.

Calls to Poison Control Centers

- Teenagers had the highest rate of suspected suicide attempts via poisoning.

The number of cases identified using the International Classification of Diseases (ICD) codes for unintentional and suicidal poisoning understates their magnitude. For 24% of poisoning deaths and 8.8% of poisoning hospitalizations, intent could not be determined.

A comprehensive examination of adverse outcomes of drug use would not rely solely on the poisoning ICD codes; many cases are coded elsewhere. For example, there were 369 deaths per year coded as "harmful use of psychoactive substances" and 485 non-fatal hospitalizations for "non-dependent abuse of drugs."

There were several study limitations. For a significant number of deaths and hospitalizations, the substances involved were not specified. In addition, the study identified only one substance per death or hospitalization, presumably the one most responsible for the outcome. Thus, the prevalence of certain substances may have been under-represented. According to ICD coding, unintentional poisonings include incidents that occur in medical/surgical procedures. There was no way to distinguish these cases from other poisonings. Cause of injury codes (E-codes), which are used to identify intent, were missing in 8% of poisoning hospitalizations. Some unintentional or suicidal poisonings may have been among these cases. Also, geographical analyses were not robust for hospitalizations because more than one-third of the state's counties had E-coding rates less than the 90% required for inclusion in this study. Finally, hospital discharge data contain incomplete data on patient race precluding analyses using this important demographic.

Populations at risk of poisoning and the substances involved vary greatly by the intent and lethality of the event. For certain groups (e.g., children under age six, teenage girls), performing additional data analyses is less important than starting to develop intervention strategies. For other groups, additional investigation should be considered. For example, substance abuse among middle-aged residents could be examined. An optimal analysis would include all drug-related cases and would identify all substances involved in each case. Such an effort would require collaboration with substance abuse experts in the state.

Questions or comments concerning this report should be directed to Linda Scarpetta, Michigan Department of Community Health, at (517) 335-8397 or e-mail at scarpettal@michigan.gov.

TABLE OF CONTENTS

INTRODUCTION 1

DATA SOURCES AND METHODS 2

UNINTENTIONAL POISONING 5
- Mortality 5
- Non-fatal Hospitalizations 10
- Poison Control Center Calls 14

SUICIDAL POISONING 16
- Mortality 16
- Non-fatal Hospitalizations 21
- Poison Control Center Calls 25

DISCUSSION 28
- Unintentional Poisonings 28
- Suicidal Poisonings 28
- Poisonings with Undetermined Intent 28
- Drug-related Non-poisonings 29
- Limitations 29

FUTURE DIRECTIONS IN DATA ANALYSIS AND POISONING PREVENTION 30

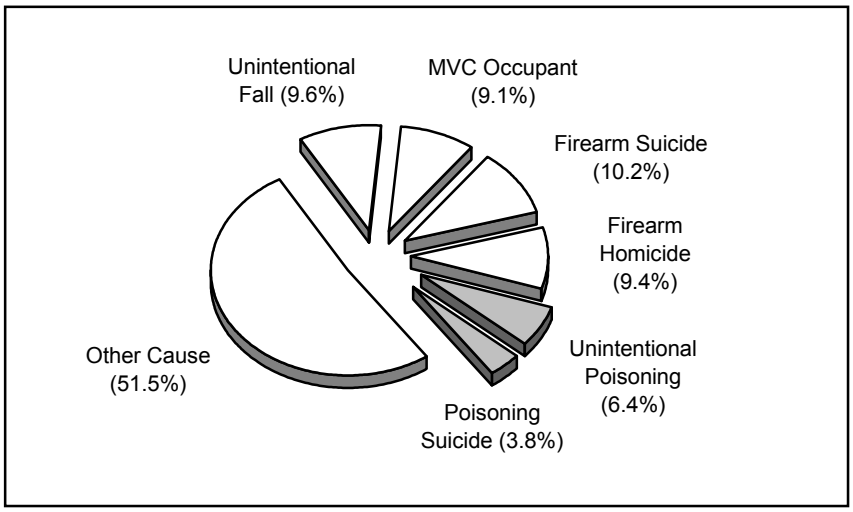
APPENDICES
- A. Data Tables for Unintentional Poisonings 31
- B. Data Tables for Suicidal Poisonings 37
- C. Data Tables for Poisonings with Undetermined Intent 43
- D. Data Tables for Other Drug-related Deaths and Hospitalizations 53

REFERENCES 60

INTRODUCTION

In October 2000, the Michigan Department of Community Health (MDCH) Injury Prevention Section received a Core Injury Capacity-Building grant from the Centers for Disease Control and Prevention (CDC). As part of this grant, a statewide taskforce was convened and provided input for the development of a state plan[1] for injury prevention. One component of this process was the identification of priority areas for injury prevention in the state. The taskforce evaluated the magnitude, severity and preventability of various causes of injury and identified four priority areas: 1) poisonings (unintentional and suicidal); 2) firearm-related suicides and homicides; 3) unintentional falls among adults age 65 and older; and 4) motor vehicle crashes (MVC) causing injuries to vehicle occupants. Figure 1 and Figure 2 illustrate the proportion of priority causes of injury among injury deaths and hospitalizations in 2001.

FIGURE 1
Injury Prevention Taskforce Priority Causes of Injury
Michigan Resident Injury Deaths, 2001 (N=5,297)



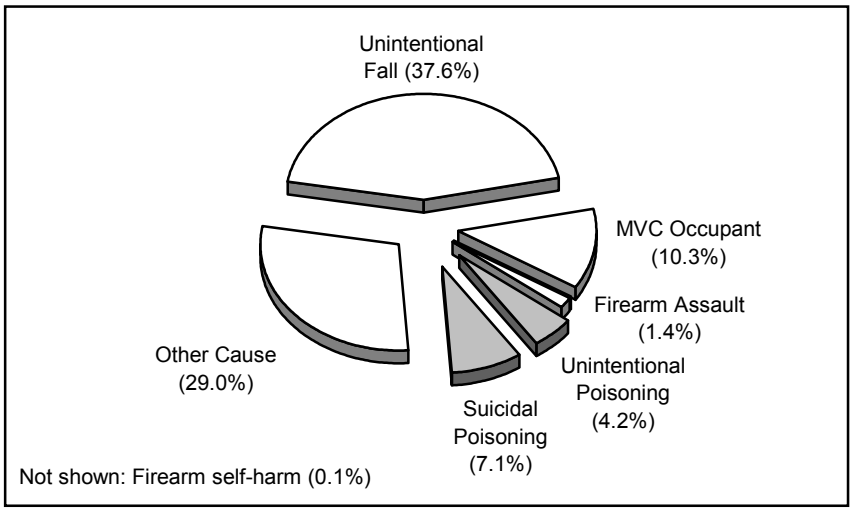
Source: Vital Records and Health Data Development Section, MDCH

Unintentional poisonings are the fifth leading cause of fatal injuries and the fourth leading cause of injury hospitalizations in Michigan. While rates for nearly all causes of fatal injury have decreased since 1990, unintentional poisoning death rates have increased significantly, both in Michigan and nationally.[2] Suicidal poisonings are the sixth leading cause of fatal injuries and third leading cause of injury hospitalizations.

This report provides basic descriptive information on unintentional and suicidal[*] poisonings using available data sources. In addition, the report provides some information on poisonings for which the intentionality of the event could not be determined. There are a significant number of these cases and they should be viewed as potential unintentional or suicidal poisonings.

[*] This report uses the term "suicidal poisonings" to refer to all poisonings involving intentional self-harm. Note, however, that not all intentional self-harm poisonings are necessarily suicide attempts. Some incidents may involve self-destructive behavior without the intent to end one's life.

FIGURE 2
Injury Prevention Taskforce Priority Causes of Injury
Michigan Resident Non-fatal Injury Hospitalizations, 2001 (N=39,012*)



* There were 39,012 hospitalizations for which cause of injury was available – these are illustrated in the figure. There were another 7,912 injury hospitalizations with no cause of injury information.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

Data Sources and Methods

Data Sources

Death certificates were the source of data for poisoning deaths. Funeral directors, attending physicians, and medical examiners document cause of death and demographics of the decedent on the death certificate. 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. Mortality data for the United States were obtained from the Web-based Injury Statistics Query and Reporting System (WISQARS)[3] which is managed by the CDC.

The Michigan Inpatient Database (MIDB) was the source of data on poisoning hospitalizations. The MIDB is the aggregation of hospital discharge data voluntarily provided to the Michigan Health and Hospital Association (MHA) by virtually every acute care hospital in Michigan (one very small hospital does not participate). In addition, hospitals in contiguous states (Indiana, Ohio, and Wisconsin) submit data on hospitalized Michigan residents to the MHA.

The state's two Poison Control Centers (PCC), located in Detroit and Grand Rapids, provided data on calls made to these centers. Calls originating from a Michigan area code are directed to one of these centers. All calls are tracked electronically and followed through final disposition if possible.

Population figures were provided by the 2000 census[4] and intercensal estimates.[5,6]

Methods

Deaths

A poisoning death was defined as a Michigan resident death for which the underlying cause was coded within the ICD-9[7] range E850-E869 (unintentional), E950-E952 (suicide), E980-E982

(undetermined intent) or the ICD-10[8] range X40-X49 (unintentional), X60-X69 (suicide),Y10-Y19 (undetermined intent). These ranges also were used to define national poisoning deaths.

Injury researchers[11] have found that a significant number of drug-related deaths are coded outside the poisoning ranges described above. These involve chronic substance abuse or drug dependence which historically have been viewed as "natural" deaths. Because the focus of this report is acute poisoning, these cases were not included in the case definition. However, tabulations pertaining to substance abuse deaths are included (Appendix D) to illustrate the magnitude and characteristics of these cases. Specifically examined were deaths for which the underlying cause was coded as F10-F19(.1) "mental and behavioral disorders due to psychoactive substance use – harmful use" and F55 ("abuse of non-dependence-producing substances").

Three years (1999-2001) of mortality data were used rather than a single year because these same data had been previously analyzed for a report on injury mortality in Michigan.[2] To examine mortality trends, data for the years 1990-2001 were utilized. An important consideration when examining mortality trends over this timeframe is that the system of coding deaths changed significantly in 1999. This was the first year in which deaths were coded using ICD-10; from 1979 to 1998, deaths had been coded using ICD-9. The CDC National Center for Health Statistics evaluated the effects of implementing ICD-10 on mortality statistics for selected causes of death.[9] Unfortunately, the study did not generate comparability ratios for poisoning deaths, thus the change in the number of deaths due to poisoning in 1999-2001 that was due solely to the change in coding systems cannot be estimated.

To calculate mortality rates using the 1999-2001 data, 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 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 corresponding death rates were ascertained directly from WISQARS.

For deaths coded using ICD-9, the type of substance involved was identified using the cause of injury code pertaining to the underlying cause of death. The external cause codes in ICD-10, however, do not provide specific information on the substance. Thus, for these cases, the substance was identified using the highest listed related cause of death code in the range T36-T65.

Hospitalizations

A poisoning hospitalization was defined as a Michigan resident hospitalized in Michigan or a contiguous state for poisoning and discharged in 2001. Excluded were out-of-state residents and in-hospital deaths. A poisoning was defined as a hospitalization for which the principal diagnosis was within the ICD-9-CM[10] range 960.0-989.9.[*] Poisonings were classified by intent using ranges of external cause of injury codes ("E-codes"): E850-E869 (unintentional); E950-E952 (suicide attempt/intentional self-harm); and E980-E982 (undetermined intent).

[*] Tabulations pertaining to substance abuse hospitalizations coded outside this range are included in Appendix D to illustrate the magnitude and characteristics of these cases. Specifically examined were hospitalizations for which the principal diagnosis was in the range 305.0 – 305.9. Other drug-related cases may be found using codes 303 and 304, however, these involve drug dependence or long-term use.

According to coding rules, an E-code should be assigned to every hospitalization involving an injury or poisoning. In 2001, the rate at which non-fatal poisoning hospitalizations were E-coded in Michigan was 92%. It is unknown if the characteristics of the cases for which an E-code was not provided were similar to the characteristics of cases for which this information was provided. Also, certain types of poisonings (e.g., unintentional) could have been E-coded at a rate greater to or less than 92%, but there was no way to determine this. Finally, because E-coding rates vary considerably by county of residence, a geographic analysis using hospital discharge data was limited to those counties with coding rates 90% or greater.

Michigan residents who were hospitalized more than once for the same incident in 2001 were counted for each hospital discharge. Optimally, these cases would have been counted once to reflect poisoning incidence. However, there was no way to sort out readmissions or identify patients admitted to different hospitals for the same incident. For this reason, the rates presented in the report represent rates of poisoning hospitalization, not poisoning incidence.

Hospitalization rates were calculated by dividing the number of hospital discharges by the appropriate 2001 population and multiplying by 100,000.

Analyses involving patient race were not performed because this information was unavailable for about 20% of injury hospitalizations.

Poison Control Center Calls
A poison control center call was defined as a call during 2001 to one of Michigan's two poison control centers involving a human exposure. Excluded were animal exposures and information-only inquiries. A number of pre-programmed, standard reports have been developed for use by PCCs. Two such reports were generated (#32 and #73) for this study. Some exposures are included in poison control center calls that are outside the definitions used in hospitalization and death data (e.g., bacterial food poisoning, matches/fireworks). These cases comprised about 7% of all substances reported. Poison control center call rates were calculated by dividing the number of individuals exposed by the appropriate 2001 population and multiplying by 100,000.

General
In addition to excluding certain cases of substance abuse, the case definitions for deaths and hospitalizations do not include cases involving therapeutic substances that cause adverse reactions. In these cases, the correct drug is properly administered in therapeutic or prophylactic dosage but results in an adverse effect including allergic or hypersensitivity reactions. These cases have historically been viewed by injury prevention professionals as being outside the purview of the field and are typically excluded from analyses.

Rates based on less than six cases were not calculated due to the corresponding lack of statistical stability. In the tables, such instances are noted with an "*". Cells in which no cases occurred are noted by a "-".

Symbols Used in Tables	
No cases occurred within category	-
Quantity greater than zero but less than 0.5	0
Rate is considered statistically unreliable	*

Unintentional Poisoning

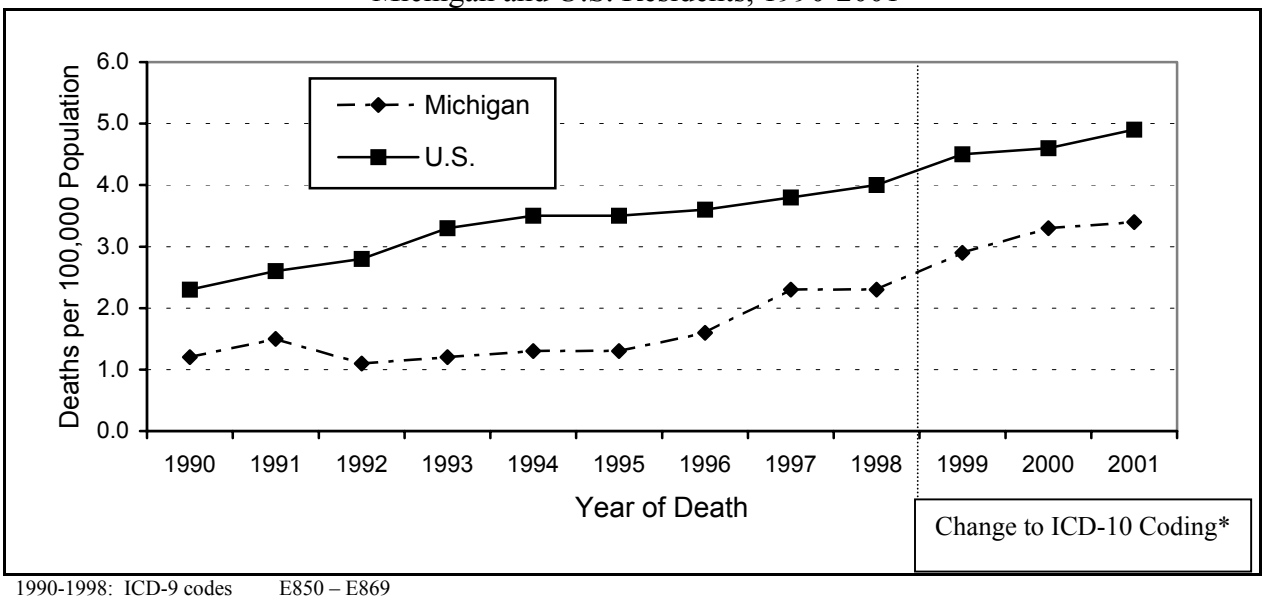
Incidents identified as unintentional poisonings involve substances that can be taken for medicinal purposes and toxic substances that are chiefly non-medicinal. The poisoning can be due to the individual unintentionally taking too much of a substance (e.g., overdose) or inadvertently taking a substance. It also includes "accidents" in the use of drugs in medical/surgical procedures. Excluded are adverse effects of the correct drug properly administered. Events must be acute; cases involving chronic drug abuse are excluded.

Mortality

Temporal Trends

Between 1990 and 2001, the number of fatal unintentional poisonings among Michigan residents ranged from 106 in 1992 to 337 in 2001.* 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) (see Table A-1 in Appendix A for tabular data). Michigan unintentional poisoning death rates were consistently lower than national rates throughout the period (Figure 3) (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 twelve-year period. Michigan's rate nearly tripled between 1990 and 2001.

FIGURE 3
Unintentional Poisoning Death Rates
Michigan and U.S. Residents, 1990-2001



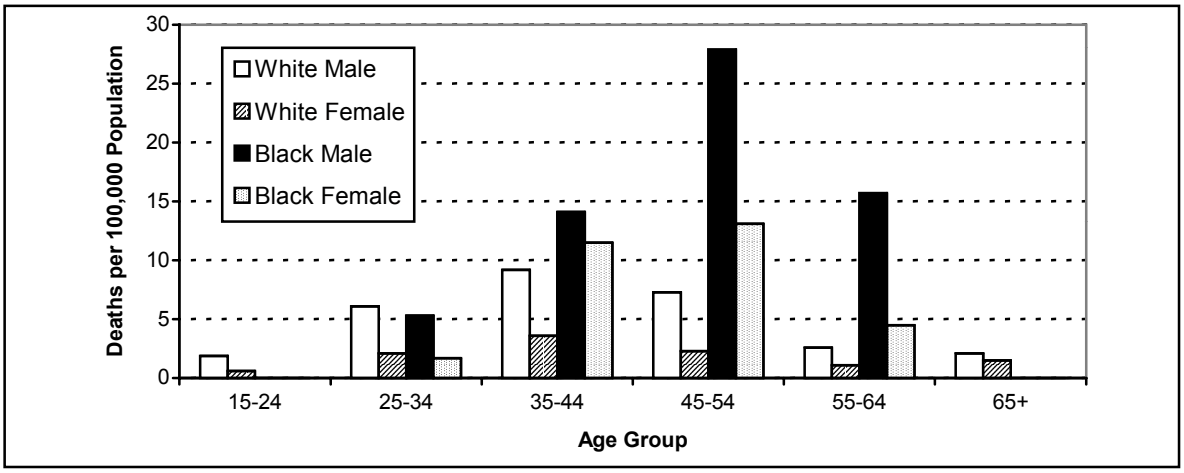
1990-1998: ICD-9 codes E850 – E869
1999-2001: ICD-10 codes X40 – X49
Sources: Vital Records and Health Data Development Section, MDCH
Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention
U.S. Census Data

* 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. A study by CDC[9] measured how the change in coding systems affected the number of deaths coded in certain categories. However, the study provided no information 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.

Demographic Characteristics
Between 1999 and 2001, an average of 317 Michigan residents died annually due to unintentional poisoning. The corresponding average annual death rate was 3.2 deaths per 100,000 residents. The death rate for males (4.5) was more than twice the rate for females (1.9). The rate for blacks (5.7) was about twice the rate for whites (2.9). (See Tables A-2 and A-3 in Appendix A for numbers and rates of death by age, sex and race.)

Figure 4 illustrates average annual death rates by age and sex for black and white residents. (Among those under age 15, there were only five deaths over the three-year period, too few to calculate statistically valid age/sex/race specific rates.) For all groups, rates peaked in middle age. For whites, rates were highest among those aged 35-44; for blacks, they were highest among those aged 45-54. The highest rate overall was among black males aged 45-54. At 27.9 per 100,000, their rate was nearly nine times the overall rate.

FIGURE 4
Average Annual Death Rates for Unintentional Poisoning
By Age, Sex, and Race
Michigan Residents, 1999-2001



There was an insufficient number of deaths to calculate rates for those under age 15, and blacks aged 15-24 and 65+.
Sources: Vital Records and Health Data Development Section, MDCH
2000 U.S. Census

Between 1990 and 2001, rates increased for males and females, blacks and whites, and all age groups between ages 15 and 64 years. The most substantial increases were for blacks (more than a fourfold increase in rates) and those in middle age (45-54 years: 443% increase; 35-44 years: 306% increase). Tables A-4 and A-5 in Appendix A contain demographic trend data.

Geographic Distribution
Table 1 illustrates average annual rates of fatal unintentional poisoning for 1999 – 2001 by county of residence. Of the 23 counties for which rates 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.

Substances
Table 2 lists all of the medicinal and non-medicinal poison categories by three-digit ICD-10 code and the corresponding average annual number of deaths during 1999-2001. Alcohol and certain drugs which can be used illicitly were highlighted in italics due to their importance in public health and substance abuse prevention efforts.

Medicinal agents comprised 87% of the substances involved in unintentional poisoning deaths during 1999-2001. The largest category within medicinals was Narcotics and Psychodysleptics (hallucinogens). This category included cocaine (51 deaths per year), heroin (49) and methadone (9). There was also a large number of deaths (N=105) for which the substance was classified as "Diuretics and Other and Unspecified Drugs, Medicaments, and Biological Substances." Nearly all (99%) of these cases were categorized within the sub-category "Other and unspecified" so there was no way to identify the specific substance.[*]

Carbon monoxide was identified in 43% of the non-medicinal poisonings; there were nearly 18 such cases a year. There were ten deaths a year due to toxic effects of alcohol. Most of these cases were categorized as "Alcohol, unspecified," thus the number of deaths specifically due to alcoholic beverages could not be determined.

The increase in unintentional poisoning deaths between 1990 and 2001 was due to medicinal substances; no trend was evident during that time period in deaths due to non-medicinal substances. The specific drugs most responsible for the increase were heroin and cocaine (see Table A-6 in Appendix A). On a lesser scale, there was also a noticeable jump in deaths due to methadone (from an average of two per year during 1990-1998 to nine per year during 1999-2001). There was also a considerable increase in the number of deaths for which the drug was unspecified. The most significant increase in "unspecified drug" deaths occurred between 1996 and 1997 (from 44 to 91 deaths). Finally, there was a noticeable increase in deaths between 2000 and 2001 within the category "Other medicinal" in Table A-6. The primary reason was the increase in the number of deaths due to opioids other than heroin and opium (ICD-10 T40.2).

[*] According to coding rules, when poisoning occurs by a combination of drugs classified to different cause of injury codes, the code for "Other and unspecified drugs, medicaments, and biological substances" should be used. Thus, for some portion of the cases in this category, specific substances could be identified. However, this more in-depth investigation was outside the scope of this study.

TABLE 1
Average Annual Number and Rate of Deaths Due to Unintentional Poisoning
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

* Statistically reliable rate could not be calculated.
Rates are number of deaths per 100,000 population.
Sources: Vital Records and Health Data Development Section, MDCH
2000 U.S. Census

TABLE 2
Average Annual Number of Deaths Due to Unintentional Poisoning
By Type of Substance,[a] Michigan Residents, 1999-2001

ICD-10 Code	Substance	No.	%
T36-T50	Drugs, Medicinal Substances, and Biologicals	276	87.1
T36	Systemic antibiotics	-	0.0
T37	Other systemic anti-infectives & antiparasitics	1	0.3
T38	Hormones & their synthetic substitutes & antagonists, n.e.c.[b]	1	0.3
T39	Nonopioid analgesics, antipyretics & antirheumatics	7	2.2
T40	Narcotics & psychodysleptics	136	42.9
T40.1	*Heroin*	*49*	*15.5*
T40.2	*Other opioid*	*12*	*3.8*
T40.3	*Methadone*	*9*	*2.8*
T40.5	*Cocaine*	*51*	*16.1*
T40(.4,.6-.9)	*Other & unspecified narcotics & psychodysleptics*	*15*	*4.7*
T41	Anesthetics & therapeutic gases	2	0.6
T42	Antiepileptic, sedative-hypnotic & antiparkinsonism drugs	6	1.9
T43	Psychotropic drugs, n.e.c.	7	2.2
T44	Drugs primarily affecting the autonomic nervous system	0	0.0
T45	Primarily systemic & haematological agents, n.e.c.	5	1.6
T46	Agents primarily affecting the cardiovascular system	5	1.6
T47	Agents primarily affecting the gastrointestinal system	-	0.0
T48	Agents primarily acting on smooth/skeletal muscles & respiratory system	0	0.0
T49	Topical agents primarily affecting skin & mucous membrane & by ophthalmological, otorhinolaryngological & dental drugs	1	0.3
T50	Diuretics & other & unspecified drugs, medicaments, biological substances	105	33.3
T50.9	*Other & unspecified drugs, medicaments, biological substances*	*105*	*33.1*
T51-T65	Non-Medicinal Substances	41	12.9
T51	Alcohol	10	3.2
T51.0	*Ethanol*	*3*	*0.9*
T51(.1-.8)	*Other alcohol*	*1*	*0.3*
T51.9	*Unspecified*	*6*	*1.9*
T52	Organic solvents	1	0.3
T53	Halogen derivatives of aliphatic & aromatic hydrocarbons	-	0.0
T54	Corrosive substances	0	0.0
T55	Soaps & detergents	-	0.0
T56	Metals	2	0.6
T57	Other inorganic substances	-	0.0
T58	Carbon monoxide	18	5.7
T59	Other gases, fumes & vapors	7	2.2
T60	Pesticides	-	0.0
T61	Noxious substances eaten as seafood	-	0.0
T62	Other noxious substances eaten as food	-	0.0
T63	Contact with venomous animals	-	0.0
T64	Aflatoxin & other mycotoxin food contaminants	-	0.0
T65	Other and unspecified non-medicinal substances	3	0.9
T36-T65	Total	317	100.0

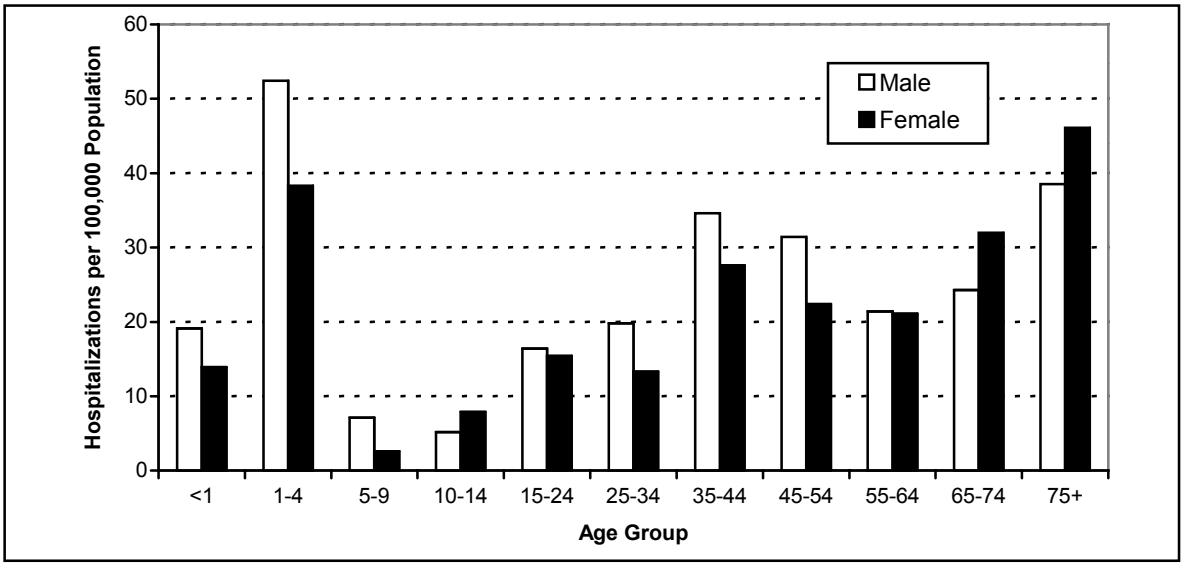
a. Only one substance enumerated per death. The substance identified was the one associated with the highest listed Related Cause of Death.
b. Not elsewhere classified
Source: Vital Records and Health Data Development Section, MDCH

Non-fatal Hospitalizations

In 2001, there were 2,345 hospitalizations for unintentional poisoning among Michigan residents.* Of these, 52 (2.2%) patients died while in the hospital. The following examines the characteristics of the 2,293 non-fatal unintentional poisoning hospitalizations.

Demographic Characteristics
Males had a rate of hospitalization for unintentional poisoning that was 13% greater than females. The rate for males was greater than that for females for each age group except 10-14, 65-74, and 75 and older (Figure 5). Those aged 1-4 had the highest rates. Rates were also elevated among the middle-aged and the elderly. (See Table A-7 in Appendix A for all age/sex specific rates.)

FIGURE 5
Non-fatal Unintentional Poisoning Hospitalization Rates
by Age and Sex
Michigan Residents, 2001

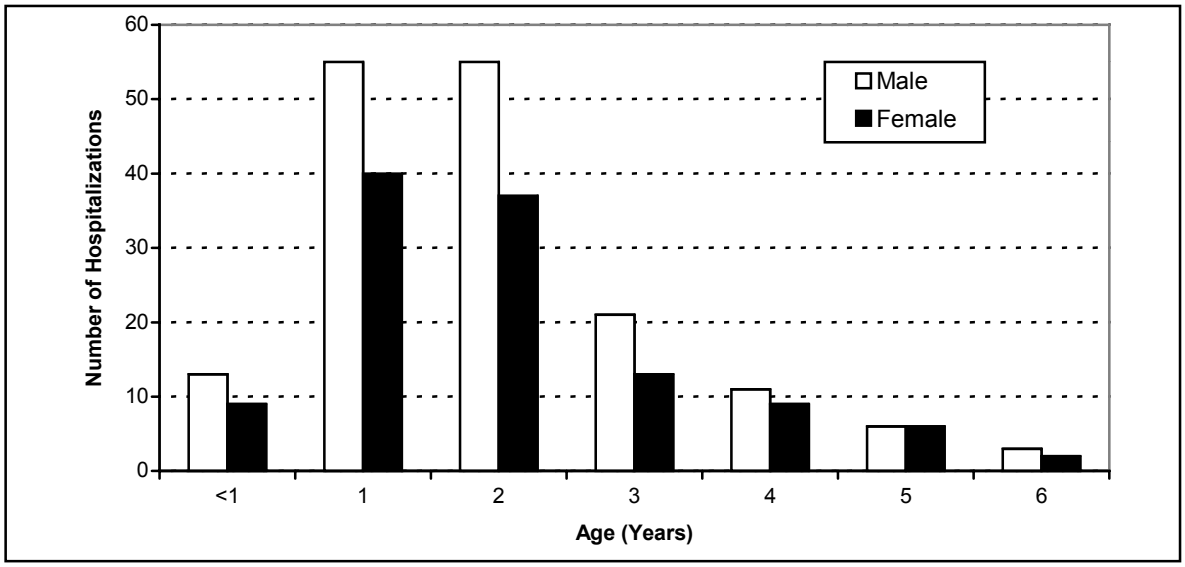


E-coding rate for all non-fatal poisoning hospitalizations: 92%.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

* There were likely more than 2,345 unintentional poisoning hospitalizations. "E-codes," which indicate the intent of poisonings, were missing in 8% of poisoning cases. It is unknown how many of these 8% were, in fact, unintentional.

Figure 6 illustrates the number of hospitalizations by sex for one-year age groups for those under age seven. (Note: the underlying populations of each age/sex group were very similar; therefore rates are not needed to make valid comparisons.) For both males and females, those aged one to two years had the highest number of hospitalizations.

FIGURE 6
Non-fatal Unintentional Poisoning Hospitalizations
By Age and Sex, Ages Six Years and Under
Michigan Residents, 2001



E-coding rate for non-fatal poisoning hospitalizations to ages six and under: 95%.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

Geographic Distribution
Table 3 illustrates the number and rate of non-fatal unintentional poisoning hospitalizations in 2001 by county of residence. Because E-coding rates varied substantially by county and differences in coding rates directly affect comparabilty across counties, data for 30 counties for which the E-coding rate was less than 90% were not included. Rates could be calculated for 34 of the remaining 53 counties.

Rates were lowest for Isabella County (9.4 per 100,000 residents) and highest for Crawford County (55.0). Among the ten most populous counties, Saginaw County had the highest rate (41.4).

Substances
Table 4 lists the substances involved in non-fatal unintentional poisoning hospitalizations. (Only one substance is listed per patient. The substance is based on the principal E-code, which presumably indicates the agent primarily responsible for the hospitalization.)

About four-fifths (82.0%) of unintentional poisonings were due to medicinal substances. As a group, Analgesics/Antipyretics/Antirheumatics comprised the largest number of cases. Within

TABLE 3
Numbers and Rates of Non-fatal Unintentional Poisoning Hospitalization
By County of Residence, Michigan Residents, 2001

County	Number	Rate	County	Number	Rate
Alcona	1	*	Lapeer	5	*
Alger	-[a]	-	Leelanau	2	*
Allegan	14	13.0	Lenawee	-[a]	-
Alpena	4	*	Livingston	19	11.6
Antrim	3	*	Luce	-[a]	-
Arenac	-[a]	-	Mackinac	-[a]	-
Baraga	-[a]	-	Macomb	157	19.6
Barry	6	10.4	Manistee	6	24.2
Bay	39	35.6	Marquette	11	17.0
Benzie	2	*	Mason	3	*
Berrien	37	22.8	Mecosta	-[a]	-
Branch	7	15.3	Menominee	5	*
Calhoun	16	11.6	Midland	16	19.1
Cass	14	27.3	Missaukee	5	*
Charlevoix	-[a]	-	Monroe	35	23.7
Cheboygan	3	*	Montcalm	-[a]	-
Chippewa	5	*	Montmorency	-[a]	-
Clare	7	22.3	Muskegon	-[a]	-
Clinton	-[a]	-	Newaygo	6	12.3
Crawford	8	55.0	Oakland	245	20.4
Delta	9	23.4	Oceana	-[a]	-
Dickinson	-[a]	-	Ogemaw	4	*
Eaton	-[a]	-	Ontonagon	-[a]	-
Emmet	4	*	Osceola	-[a]	-
Genesee	160	36.5	Oscoda	1	*
Gladwin	8	30.3	Otsego	3	*
Gogebic	-[a]	-	Ottawa	-[a]	-
Grand Traverse	29	36.3	Presque Isle	3	*
Gratiot	4	*	Roscommon	6	23.3
Hillsdale	13	27.8	Saginaw	87	41.4
Houghton	-[a]	-	St. Clair	25	15.0
Huron	-[a]	-	St. Joseph	12	19.2
Ingham	49	17.5	Sanilac	-[a]	-
Ionia	-[a]	-	Schoolcraft	-[a]	-
Iosco	4	*	Shiawassee	17	23.6
Iron	-[a]	-	Tuscola	-[a]	-
Isabella	6	9.4	Van Buren	16	20.9
Jackson	-[a]	-	Washtenaw	55	16.7
Kalamazoo	42	17.5	Wayne	814	39.6
Kalkaska	2	*	Wexford	8	26.1
Kent	-[a]	-	Unknown	1	-
Keweenaw	-[a]	-			
Lake	-[a]	-	Michigan	2,293	22.9

a. Data excluded from analysis because county had insufficient E-coding rate for poisonings (< 90%).
* Statistically reliable rate could not be calculated.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

this group were 97 hospitalizations for heroin and 29 for methadone. Tranquilizers and alcoholic beverages also comprised a substantial number of cases. The number of cases within a group of substances titled "Local Anesthetics" (N=158; 6.9%) was noteworthy. Cocaine is one of the substances coded within this group.*

TABLE 4
Non-fatal Unintentional Poisoning Hospitalizations
By Substance,[a] Michigan Residents, 2001

ICD-9-CM Code	Substance	No.	%
E850-E858	Drugs, Medicinal Substances, or Biologicals	1,880	82.0
E850	Analgesics, antipyretics, antirheumatics	530	23.1
E850.0	*Heroin*	*97*	*4.2*
E850.1	*Methadone*	*29*	*1.3*
E850.2	*Other opiates and related narcotics*	*166*	*7.2*
E850.3-E850.9	*Other and unspecified*	*238*	*10.4*
E851	Barbiturates	27	1.2
E852	Other sedatives and hypnotics	48	2.1
E853	Tranquilizers	234	10.2
E854	Other psychotropic agents	147	6.4
E855	Other drugs acting on central & autonomic nervous system	374	16.3
E855.2	*Local anesthetics (includes cocaine)*	*158*	*6.9*
E855.0,.1,.3-.9	*Other and unspecified*	*216*	*9.4*
E856	Antibiotics	4	0.2
E857	Other anti-infectives	5	0.2
E858	Other drugs	511	22.3
E860-E869	Non-Medicinal Substances	413	18.0
E860	Alcohol, n.e.c.[b]	210	9.2
E860.0	*Alcoholic beverage*	*180*	*7.8*
E860.1-E860.9	*Other and unspecified*	*30*	*1.3*
E861	Cleansing/polishing agents, disinfectants, paints, varnishes	44	1.9
E862	Petroleum products, other solvents, n.e.c.	19	0.8
E863	Agricultural, horticultural chemical & pharmaceutical preparations (other than plant foods and fertilizers)	11	0.5
E864	Corrosives, caustics, n.e.c.	27	1.2
E865	Poisonous foodstuffs, poisoning plants	18	0.8
E866	Other and unspecified solid or liquid substances	24	1.0
E867	Gas distributed by pipeline	3	0.1
E868	Other utility gas or other carbon monoxide	33	1.4
E869	Other gases or vapors	24	1.0
E850-E869	Total	2,293	100.0

E-coding rate for all non-fatal poisoning hospitalizations: 92%.
a. Only one substance listed per hospitalization. The substance identified was the one associated with the principal E-code.
b. Not elsewhere classified
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

* Most cases within this category are likely cocaine-related as other substances in the group (e.g., lidocaine, procaine) are less apt to result in hospitalization. Similar reasoning has led other authors to presume all fatal cases within this group to be "cocaine poisoning." [11]

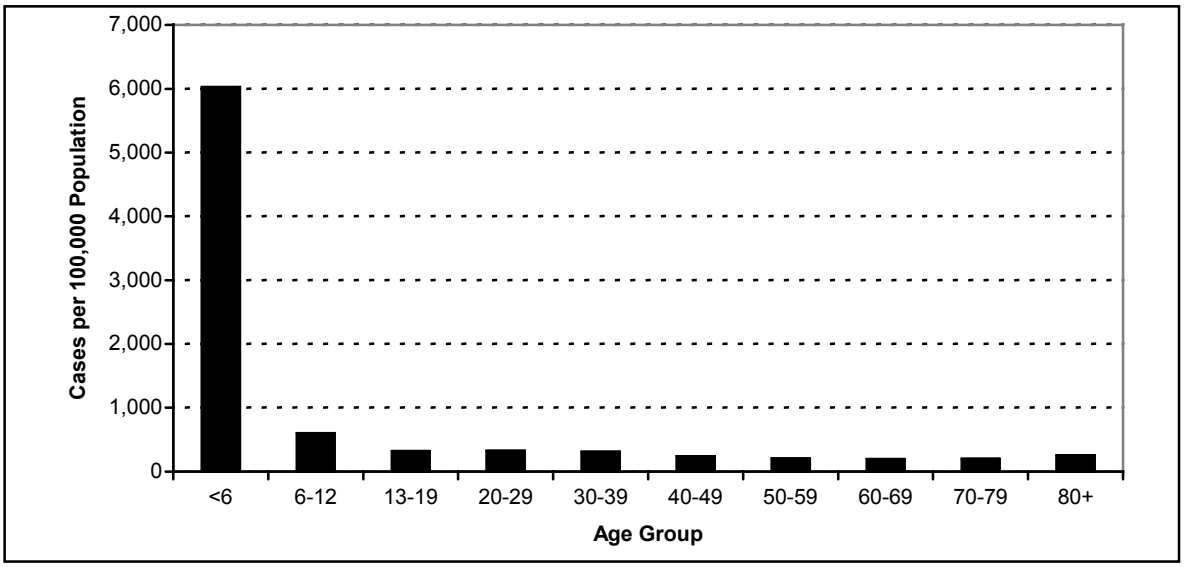
Poison Control Center Calls

In 2001, there were 82,859 cases of unintentional poisoning in which a call was made to one of Michigan's two poison control centers (Detroit and Grand Rapids). This corresponds to a rate of 828 per 100,000 residents. Because some calls (less than 10%) involved multiple substances, the total number of substances involved was 89,016.

Demographics

More than half (58.2%) of the calls pertained to victims less than six years old. There were 6,030 cases per 100,000 children in this age group. The next highest rate (for ages 6-12) was one-tenth this rate. Figure 7 illustrates rates by age group. Table A-8 in Appendix A contains the numbers and rates of cases by age group. (Poison control center report # 32 does not provide the number of cases by gender within each age group.)

FIGURE 7
Poison Control Center Calls for Unintentional Poisoning
Rates By Age Group of Poisoning Victim
Michigan, 2001



Note: Age was unknown for 6,841 of the 82,859 cases. These are not included in the figure.
Sources: DeVos Children's Hospital, Grand Rapids and Children's Hospital, Detroit; TESS Report #32.
U.S. Census Bureau, Population Estimates Branch

Substances

Nearly two-thirds of the substances were non-pharmaceuticals (Table 5). Among this group, the most prevalent substance types were; household cleaning substances, cosmetics/personal care products; plants; and pesticides. Among pharmaceutical substances, analgesics, topical preparations, and cough/cold preparations were most prevalent. The two regions were very similar in composition of substances with one exception: heavy metals comprised 0.7% of cases in the West Region, but 2.6% of the cases in the East Region. Three-quarters of the heavy metal cases in the East Region pertained to mercury.

TABLE 5
Poison Control Center Calls for Unintentional Poisoning
By Type of Substance
Michigan, 2001

Substance	West Region (Grand Rapids PCC)		East Region (Detroit PCC)		Total	
	Number	%	Number	%	Number	%
Pharmaceutical	12,972	39.4	19,917	35.5	32,889	36.9
Analgesic	2,196	6.7	3,132	5.6	5,328	6.0
Antihistamine	708	2.2	996	1.8	1,704	1.9
Antimicrobial	756	2.3	1,316	2.3	2,072	2.3
Cold and cough preparation	1,284	3.9	1,984	3.5	3,268	3.7
Gastrointestinal preparation	744	2.3	1,167	2.1	1,911	2.1
Hormone/hormone antagonist	741	2.3	1,195	2.1	1,936	2.2
Sedative/hypnotic/antipsychotic	540	1.6	706	1.3	1,246	1.4
Stimulant/street drug	293	0.9	395	0.7	688	0.8
Topical preparation	1,581	4.8	2,231	4.0	3,812	4.3
Other pharmaceutical	4,129	12.5	6,795	12.1	10,924	12.3
Non-Pharmaceutical	19,958	60.6	36,168	64.5	56,126	63.1
Alcohol	388	1.2	850	1.5	1,238	1.4
Cleaning substance (household)	3,285	10.0	4,812	8.6	8,097	9.1
Cosmetic/personal care product	3,129	9.5	4,696	8.4	7,825	8.8
Food product	1,054	3.2	2,291	4.1	3,345	3.8
Fume/vapor/gas	707	2.1	1,603	2.9	2,310	2.6
Heavy metal	239	0.7	1,447	2.6	1,686	1.9
Hydrocarbon	1,182	3.6	1,758	3.1	2,940	3.3
Pesticide	1,390	4.2	2,793	5.0	4,183	4.7
Plant	1,734	5.3	2,786	5.0	4,520	5.1
Other non-pharmaceutical	6,850	20.8	13,132	23.4	19,982	22.4
Total	32,930	100.0	56,086	100.0	89,016	100.0

More than one substance could have been indicated for each poisoning event.
For one case, the type of substance was not identified.
Sources: DeVos Children's Hospital, Grand Rapids and Children's Hospital, Detroit; TESS Report #73.

Suicidal Poisoning

A poisoning suicide is the intentional taking of one's life by exposure to a lethal dose of a substance. A non-fatal intentional self-harm poisoning is exposure to a substance with the intent of suicide (i.e., "unsuccessful suicide attempt") or to cause oneself harm, but not death.

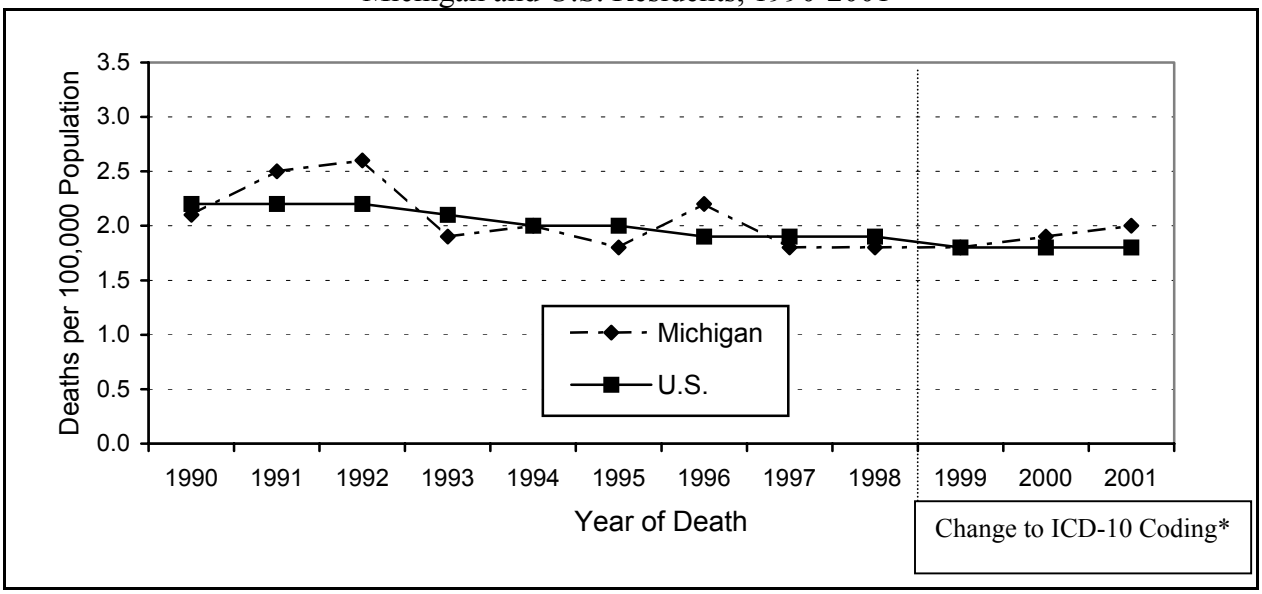
Mortality

Poisoning is the third leading mechanism for suicide in Michigan following firearms and hanging/suffocation. About 19% of Michigan suicides are due to poisoning.

Temporal Trends

Between 1990 and 2001, the number of annual poisoning suicides among Michigan residents ranged from 170 to 250. Rates ranged from 1.8 to 2.6 per 100,000. Death rates in Michigan were similar to national rates over this time period (Figure 8), both showing a modest decline.* (See Table B-1 in Appendix B for tabular data.) The rate of suicide by poisoning paralleled the overall suicide rate in Michigan between 1990 and 2001.

FIGURE 8
Poisoning Suicide Rates
Michigan and U.S. Residents, 1990-2001



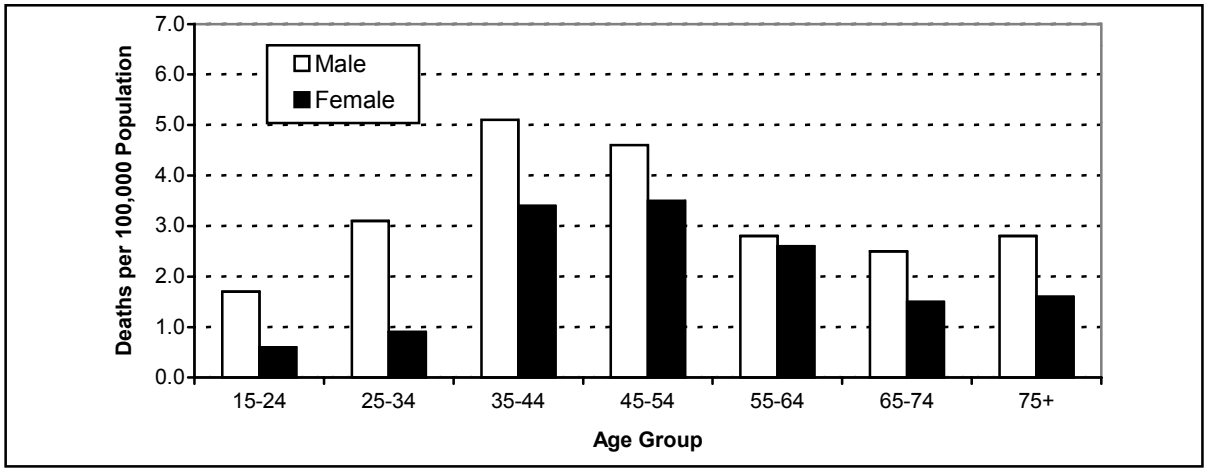
1990-1998: ICD-9 codes E950 – E952
1999-2001: ICD-10 codes X60 – X69
Sources: Vital Records and Health Data Development Section, MDCH
Web-based Injury Statistics Query and Reporting System, U.S. Centers for Disease Control and Prevention
U.S. Census Data

* 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. A study by CDC[9] measured how the change in coding systems affected the number of deaths coded in certain categories. This report did not develop an estimate specifically for poisoning suicides. The ratio for non-firearm suicides was 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%.

Demographic Characteristics
Between 1999 and 2001, an average of 189 Michigan residents died annually due to suicide via poisoning. This corresponds to an average annual death rate of 1.9 per 100,000 residents.

White residents comprised 94% of the decedents. Their rate was 3.8 times the rate of non-whites. The rate for males (2.3 per 100,000) was 53% greater than the rate for females (1.5). Figure 9 illustrates average annual death rates by age and sex for whites. (There were too few deaths to calculate statistically valid age and sex specific rates for non-white residents.) Within each age group, the rate for males exceeded the rate for females. Rates were highest for males aged 35-44. (See Tables B-2 and B-3 in Appendix B for numbers and rates of death by age, sex, and race.)

FIGURE 9
Average Annual Rates for Poisoning Suicide
By Age and Sex for White Residents*
Michigan, 1999-2001



* There was an insufficient number of deaths to calculate age/sex rates for non-white residents.
Sources: Vital Records and Health Data Development Section, MDCH
2000 U.S. Census

As with poisoning suicide overall, there were no demographic subgroups which demonstrated distinct trends during 1990-2001. (Tables B-4 and B-5 in Appendix B contain trend data by sex, race and agegroup.)

Geographic Distribution
Table 6 illustrates average annual rates of poisoning suicide for 1999-2001 by county of residence. There were no poisoning suicides among residents of 15 counties during 1999-2001 (noted by "-" in Table 6). 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). There was no clear geographic pattern.

Substances
Medicinal substances were the agents in more than half (59%) of poisoning suicides during 1999-2001 (Table 7). Unfortunately, most of the drugs could not be identified as they were coded as "Other and unspecified drugs, medicaments, and biologicals" (T50.9 in ICD-10).[*] Within non-medicinal substances, carbon monoxide was the agent in 92% of the deaths.

There were no clear trends by substance between 1990 and 2001 except for carbon monoxide. The number of suicides via carbon monoxide declined from about 107 per year in the early 1990's to 72 per year during 1999-2001. This reduction was not due simply to the decrease in the number of suicides during this time period. Carbon monoxide suicides as a percent of all suicides decreased from about 10% in the early 1990's to 6.4% in 2001 (Figure 10).

[*] According to coding rules, when poisoning occurs by a combination of drugs classified to different cause of injury codes, the code for "Other and unspecified drugs, medicaments, and biological substances" should be used. Thus, for some portion of the cases in this category, specific substances could be identified. However, this more in-depth investigation was outside the scope of this study.

TABLE 6
Average Annual Numbers and Rates of Poisoning Suicide
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

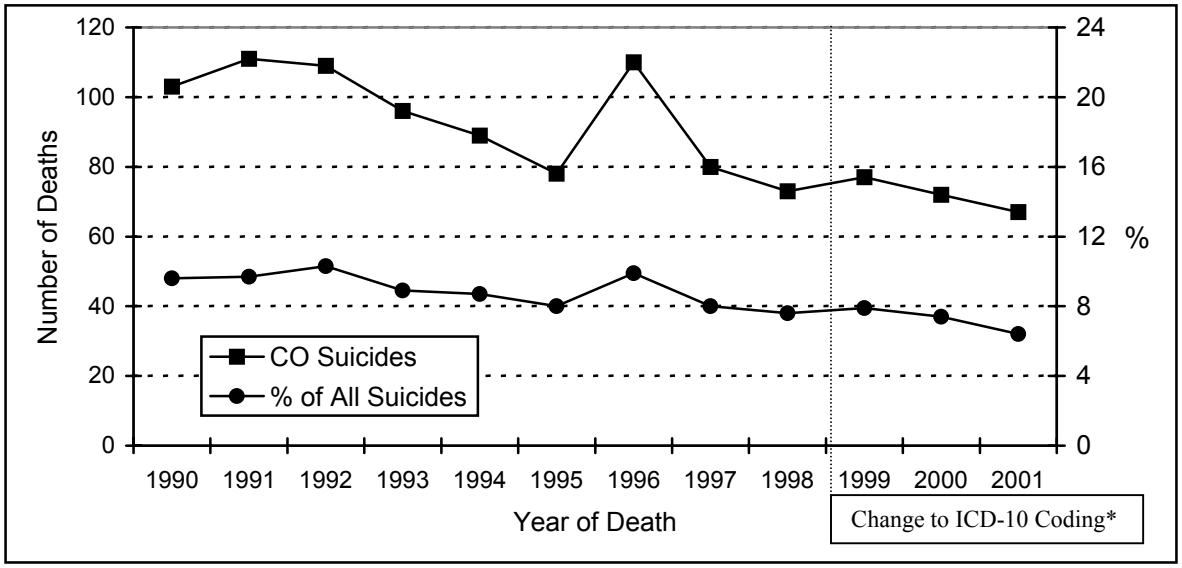
Includes ICD-10 codes: X60 – X69.
Rates are number of deaths per 100,000 population.
Sources: Vital Records and Health Data Development Section, MDCH
2000 U.S. Census

TABLE 7
Average Annual Number Poisoning Suicides
By Type of Substance,[a] Michigan Residents, 1999-2001

ICD-10 Code	Substance	No.	%
T36-T50	Drugs, Medicinal Substances, and Biologicals	111	58.7
T36	Systemic antibiotics	-	0.0
T37	Other systemic anti-infectives & antiparasitics	-	0.0
T38	Hormones & their synthetic substitutes & antagonists, n.e.c.[b]	2	0.9
T39	Nonopioid analgesics, antipyretics & antirheumatics	5	2.8
T40	Narcotics & psychodysleptics	9	4.9
T40.2	*Opioids other than heroin & opium*	*4*	*2.0*
T40.4	*Synthetic narcotics other than opium & methadone*	*4*	*2.1*
T41	Anesthetics & therapeutic gases	0	0.2
T42	Antiepileptic, sedative-hypnotic & antiparkinsonism drugs	4	1.9
T43	Psychotropic drugs, n.e.c.	8	4.1
T43.0	*Tricyclic & tetracyclic antidepressants*	*5*	*2.5*
T44	Drugs primarily affecting the autonomic nervous system	1	0.4
T45	Primarily systemic & haematological agents, n.e.c.	2	1.2
T46	Agents primarily affecting the cardiovascular system	1	0.7
T47	Agents primarily affecting the gastrointestinal system	-	0.0
T48	Agents primarily acting on smooth/skeletal muscles & respiratory system	0	0.2
T49	Topical agents primarily affecting skin & mucous membrane & by ophthalmological, otorhinolaryngological & dental drugs	-	0.0
T50	Diuretics & other & unspecified drugs, medicaments, biological substances	78	41.3
T50.9	*Other & unspecified drugs, medicaments, biological substances*	*78*	*41.2*
T51-T65	Non-Medicinal Substances	78	41.3
T51	Alcohol	2	0.9
T52	Organic solvents	2	0.9
T53	Halogen derivatives of aliphatic & aromatic hydrocarbons	-	0.0
T54	Corrosive substances	0	0.2
T55	Soaps & detergents	-	0.0
T56	Metals	-	0.0
T57	Other inorganic substances	-	0.0
T58	Carbon monoxide	72	38.2
T59	Other gases, fumes & vapors	1	0.5
T60	Pesticides	0	0.2
T61	Noxious substances eaten as seafood	-	0.0
T62	Other noxious substances eaten as food	-	0.0
T63	Contact with venomous animals	-	0.0
T64	Aflatoxin & other mycotoxin food contaminants	-	0.0
T65	Other and unspecified non-medicinal substances	1	0.5
T36-T65	Total	189	100.0

a. Only one substance enumerated per death. The substance identified was the one associated with the highest listed Related Cause of Death.
b. Not elsewhere classified
Source: Vital Records and Health Data Development Section, MDCH

FIGURE 10
Suicide by Carbon Monoxide Poisoning
Number of Deaths and Proportion of All Suicides, by Year
Michigan Residents, 1990-2001



1990-1998: ICD-9 codes E952.0, E952.1
1999-2001: ICD-10 code X67 with Related Cause of Death T58
Sources: Vital Records and Health Data Development Section, MDCH

Non-fatal Hospitalizations

In 2001, there were 3,895 hospitalizations for suicidal poisonings among Michigan residents.** Of these, 26 (0.7%) patients died while in the hospital. Poisoning was the mechanism in 93% of all suicidal events requiring hospitalization. The following examines the characteristics of the 3,869 non-fatal suicidal poisoning hospitalizations.

Demographic Characteristics
Females had a rate of hospitalization for suicidal poisoning that was 67% greater than males. Rates for females were greater than for males in every age group. (Figure 11). Females aged 15-19 had the highest rate overall (112 per 100,000). Among males, rates peaked for those aged 35-44. (See Table B-6 in Appendix B for all age/sex specific numbers and rates.)

Figure 12 illustrates the number of hospitalizations among females for one-year age groups for ages 12-21. Fifteen-year-old girls had the greatest number of hospitalizations (N=101). (Note: the number of individuals within each one-year age group was approximately 70,000.)

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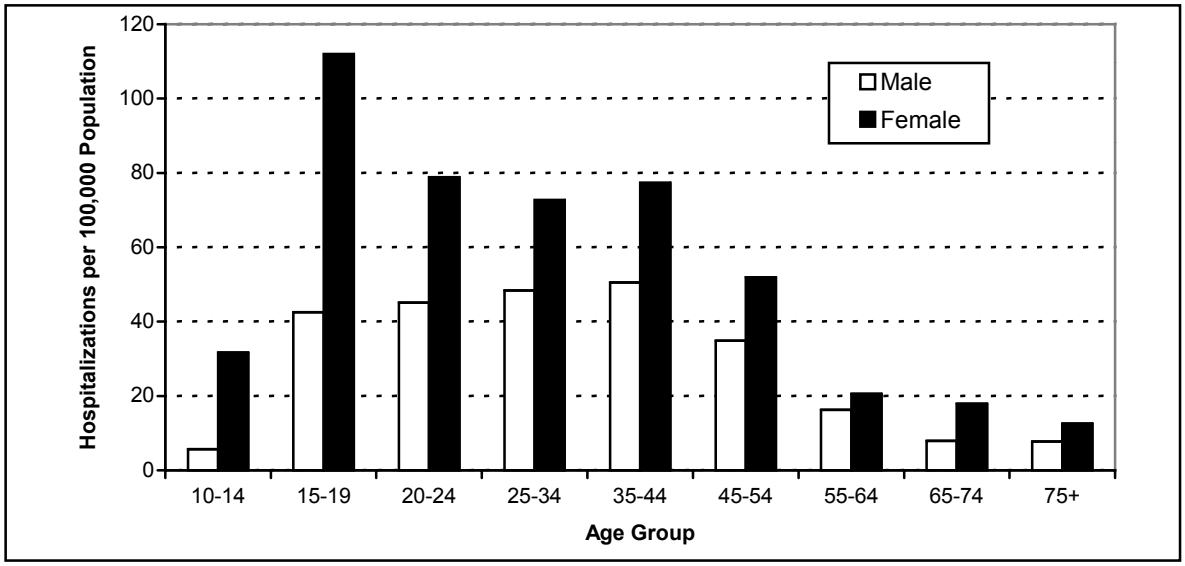
* Starting in 1999, cause of death has been coded using ICD-10, a completely different coding system than ICD-9. Thus, for certain causes of death, differences in numbers and rates of death in pre- and post-1999 data may be due to this change in coding systems. A study by CDC[9] measured how the change in coding systems affected the number of deaths coded in certain categories. This report did not develop an estimate specifically for poisoning suicides. The ratio for non-firearm suicides was 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%.

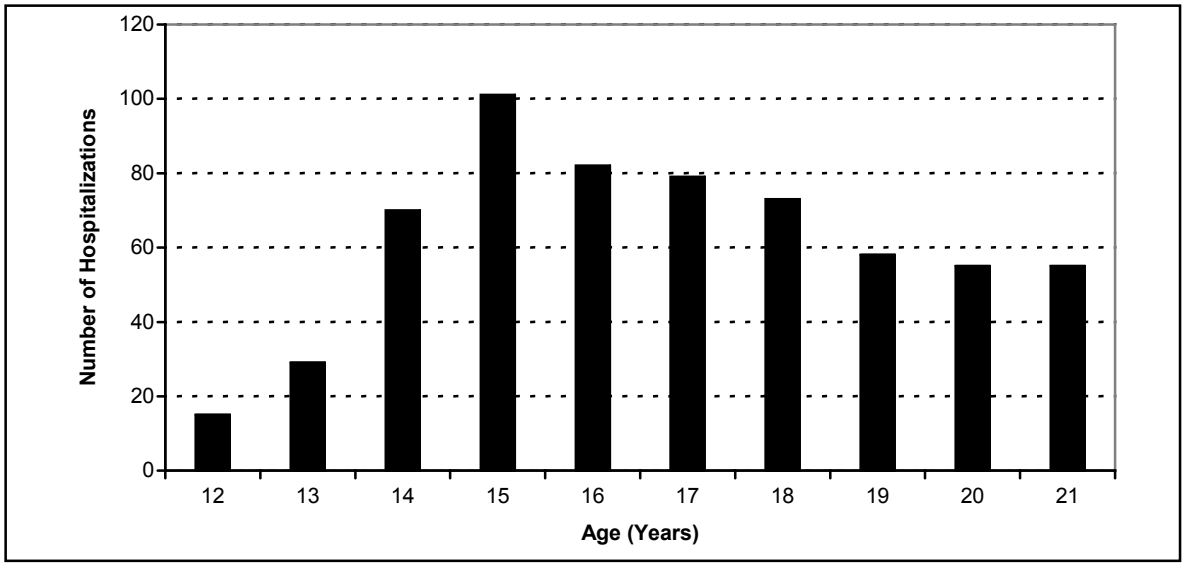
** There were likely more than 3,895 suicidal poisoning hospitalizations. "E-codes," which indicate the intent of poisonings, were missing in eight percent of poisoning cases. It is unknown how many of the eight percent were, in fact, suicidal cases.

FIGURE 11
Non-fatal Suicidal Poisoning Hospitalization Rates
by Age and Sex
Michigan Residents, 2001



There was an insufficient number of cases to calculate rates for those under age 10.
E-coding rate for all non-fatal poisoning hospitalizations: 92%.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

FIGURE 12
Non-fatal Suicidal Poisoning Hospitalizations
By Age for Females Aged 12-21
Michigan Residents, 2001



E-coding rate for non-fatal poisoning hospitalizations to ages 12-21: 95%.
Source: MI Resident Inpatient Files, Division for Vital Rrecords and Health Statistics, MDCH

Geographic Distribution
Table 8 illustrates the number and rate of non-fatal suicidal poisoning hospitalizations in 2001 by county of residence. Because E-coding rates varied substantially by county and differences in coding rates directly affect comparability across counties, data for 30 counties for which the E-coding rate wsa less than 90% were not included. Rates could be calculated for 46 of the remaining 53 counties.

Rates were lowest for Marquette County (20.1 per 100,000) and highest for Wexford County (71.8). Among the state's ten most populous counties, Genesee County had the highest rate (53.1).

Substances
As illustrated in Table 9, most (95%) of the agents used in suicidal poisonings that resulted in non-fatal hospitalization were medicinal substances (E950.0-E950.5). The most prevalent substances were tranquilizers/other psychotropic agents. Within this category, 80% of the substances were either antidepressants or benzodiazepine-based tranquilizers. Analgesics/antipyretics/antirheumatics were also utilized frequently. More than half (55%) of these substances were categorized in "Aromatic analgesics, not elsewhere classified." Carbon monoxide, which was often used in suicides (see Table 7), comprised less than 1% of the substances used.

TABLE 8
Numbers and Rates of Non-fatal Suicidal Poisoning Hospitalizations
By County of Residence, Michigan Residents, 2001

County	Number	Rate	County	Number	Rate
Alcona	5	*	Lapeer	24	26.8
Alger	-[a]	-	Leelanau	5	*
Allegan	39	36.2	Lenawee	-[a]	-
Alpena	22	70.4	Livingston	34	20.8
Antrim	4	*	Luce	-[a]	-
Arenac	-[a]	-	Mackinac	-[a]	-
Baraga	-[a]	-	Macomb	350	43.7
Barry	16	27.8	Manistee	8	32.3
Bay	53	48.3	Marquette	13	20.1
Benzie	4	*	Mason	9	31.6
Berrien	75	46.3	Mecosta	-[a]	-
Branch	17	37.1	Menominee	13	51.5
Calhoun	68	49.2	Midland	43	51.3
Cass	25	48.8	Missaukee	8	54.3
Charlevoix	-[a]	-	Monroe	72	48.7
Cheboygan	14	52.2	Montcalm	-[a]	-
Chippewa	14	36.3	Montmorency	-[a]	-
Clare	16	51.0	Muskegon	-[a]	-
Clinton	-[a]	-	Newaygo	16	32.8
Crawford	7	48.1	Oakland	478	39.8
Delta	20	52.1	Oceana	-[a]	-
Dickinson	-[a]	-	Ogemaw	10	46.1
Eaton	-[a]	-	Ontonagon	-[a]	-
Emmet	17	52.9	Osceola	-[a]	-
Genesee	233	53.1	Oscoda	2	*
Gladwin	16	60.6	Otsego	2	*
Gogebic	-[a]	-	Ottawa	-[a]	-
Grand Traverse	41	51.3	Presque Isle	5	*
Gratiot	20	47.2	Roscommon	13	50.5
Hillsdale	13	27.8	Saginaw	105	50.0
Houghton	-[a]	-	St. Clair	88	52.9
Huron	-[a]	-	St. Joseph	24	38.4
Ingham	104	37.1	Sanilac	-[a]	-
Ionia	-[a]	-	Schoolcraft	-[a]	-
Iosco	9	33.1	Shiawassee	35	48.6
Iron	-[a]	-	Tuscola	-[a]	-
Isabella	24	37.6	Van Buren	23	30.0
Jackson	-[a]	-	Washtenaw	101	30.7
Kalamazoo	102	42.6	Wayne	799	38.9
Kalkaska	6	35.6	Wexford	22	71.8
Kent	-[a]	-	Unknown	4	-
Keweenaw	-[a]	-			
Lake	-[a]	-	Michigan	3,869	38.7

a. Data excluded from analysis because county had insufficient E-coding rate for poisonings (< 90%).
* Statistically reliable rate could not be calculated.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE 9
Non-fatal Suicidal Poisoning Hospitalizations
By Substance,[a] Michigan Residents, 2001

ICD-9-CM Code	Substance	No.	%
E950	Solid or Liquid Substances	3,849	99.5
E950.0	Analgesics, antipyretics, antirheumatics	1,148	29.7
E950.1	Barbiturates	38	1.0
E950.2	Other sedatives and hypnotics	130	3.4
E950.3	Tranquilizers and other psychotropic agents	1,492	38.6
E950.4	Other specified drugs and medicinal substances	811	21.0
E950.5	Unspecified drug or medicinal substance	48	1.2
E950.6	Agricultural, horticultural chemical & pharmaceutical preparations (other than plant foods and fertilizers)	10	0.3
E950.7	Corrosive and caustic substances	20	0.5
E950.8	Arsenic and its compounds	1	0.0
E950.9	Other and unspecified solid and liquid substances	151	3.9
E951	Gases in Domestic Use	-	0.0
E951.0	Gas distributed by pipeline	-	0.0
E951.1	Liquefied petroleum gas distributed in mobile containers	-	0.0
E951.8	Other utility gas	-	0.0
E952	Other Gases and Vapors	20	0.5
E952.0	Motor vehicle exhaust gas	14	0.4
E952.1	Other carbon monoxide	2	0.1
E952.8	Other specified gases and vapors	4	0.1
E952.9	Unspecified gases and vapors	-	0.0
E950-E952	Total	3,869	100.0

E-coding rate for all non-fatal poisoning hospitalizations: 92%.
a. Only one substance listed per hospitalization. The substance identified was the one associated with the principal E-code.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

Poison Control Center Calls

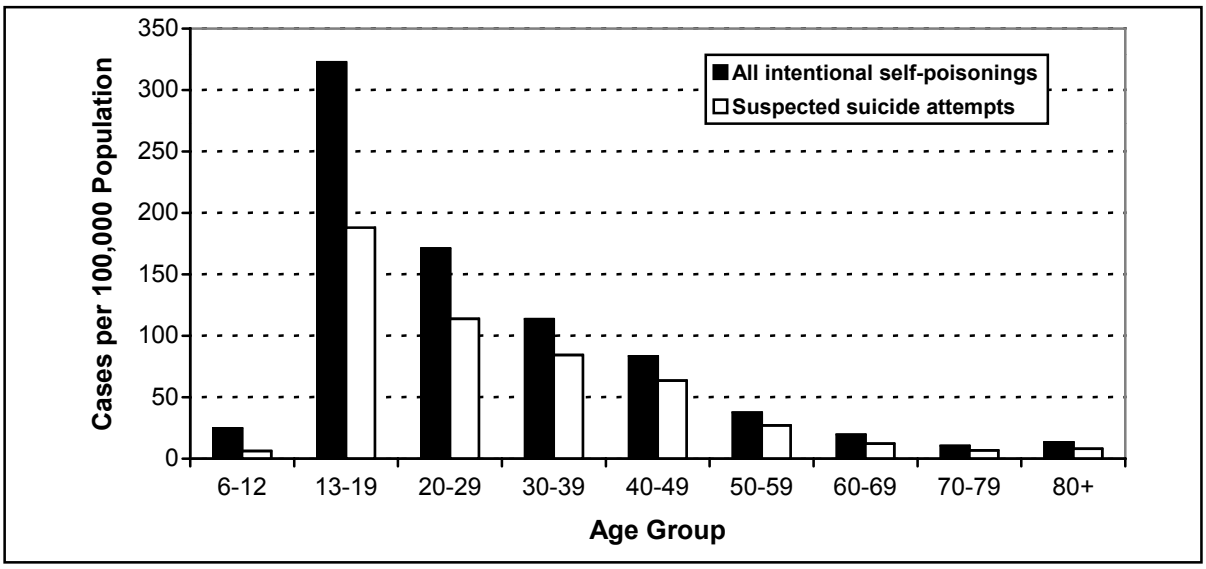
Poison control centers define "intentional" exposures as those in which a substance is intentionally consumed. Whether there was an intent for self-harm is not germane to the classification. There are three subgroups within "intentional" poisonings: a) suspected suicide; b) misuse; and c) abuse. (Note that cases classified as intentional exclude those of an assaultive nature.) Because the ultimate intent of the victim (e.g., self-harm, getting "high") cannot be determined, all cases classified as intentional have been included in this section. "Suspected suicide" cases, which comprise 64% of intentional poisonings, have been highlighted where possible.

In 2001, there were 10,203 cases of intentional poisoning in which a call was made to one of Michigan's two poison control centers. This corresponds to a rate of 102.0 per 100,000 residents. (Suspected suicide: 6,559 cases; 65.5 per 100,000).

Demographics

About one-third (32.1%) of all intentional poisonings were among those aged 13-19 years. Rates were highest for this age group for both intentional poisonings and suspected suicide attempts. Rates decreased with age thereafter (Figure 13). For nearly half (42%) of the intentional self-poisonings among those aged 13-19 the event was not suspected to be suicidal. Tables B-7 and B-8 in Appendix B contain the numbers and rates of cases by age group for all intentional self-poisonings and suspected suicide attempt cases.

FIGURE 13
Poison Control Center Calls for Intentional Self-Poisoning
By Age of Poisoning Victim
Michigan, 2001



Note: Age was unknown for 722 of the 10,203 cases. These are not included in the figure.
Data not included for those under age six years; it was assumed this group is too young to cognitively perform an act of intentional self-harm.
Sources: DeVos Children's Hospital, Grand Rapids and Children's Hospital, Detroit; TESS Report #32.
U.S. Census Bureau, Population Estimates Branch

Substances
Table 10 presents the most prevalent substances utilized in intentional self-poisonings (these data were unavailable for the subcategory "suspected suicide attempts").

The two poison control centers had very similar profiles regarding substances used. Pharmaceuticals comprised most (84.3%) of the substances. Analgesics were the leading type (24.6%) followed by sedatives/hypnotics/antipsychotics (15.6%) and antidepressants (12.7%). Alcohol was the most frequently used non-pharmaceutical substance. Fumes and vapors (which include carbon monoxide) were very rare (< 0.5%).

TABLE 10
Poison Control Center Calls for Intentional Self-Poisoning
By Type of Substance
Michigan, 2001

Substance	West Region (Grand Rapids PCC)		East Region (Detroit PCC)		Total	
	Number	%	Number	%	Number	%
Pharmaceutical	6,340	84.4	7,444	84.2	13,784	84.3
Analgesic	1850	24.6	2,167	24.5	4,017	24.6
Anticonvulsant	252	3.4	325	3.7	577	3.5
Antidepressant	1,014	13.5	1,063	12.0	2,077	12.7
Antihistamine	292	3.9	333	3.8	625	3.8
Antimicrobial	106	1.4	140	1.6	246	1.5
Cardiovascular drug	165	2.2	263	3.0	428	2.6
Cold and cough preparation	282	3.8	351	4.0	633	3.9
Muscle relaxant	173	2.3	232	2.6	405	2.5
Sedative/hypnotic/antipsychotic	1,229	16.4	1,314	14.9	2,543	15.6
Stimulant/street drug	418	5.6	525	5.9	943	5.8
Other pharmaceutical	477	6.3	652	7.4	1,129	6.9
Unknown pharmaceutical	82	1.1	79	0.9	161	1.0
Non-Pharmaceutical	1,175	15.6	1,394	15.8	2,569	15.7
Alcohol	734	9.8	777	8.8	1,511	9.2
Cleaning substance (household)	105	1.4	128	1.4	233	1.4
Other non-pharmaceutical	336	4.5	482	5.5	818	5.0
Unknown non-pharmaceutical	0	0.0	7	0.1	7	0.0
Total	7,515	100.0	8,838	100.0	16,353	100.0

More than one substance could have been indicated for each poisoning event.
Sources: DeVos Children's Hospital, Grand Rapids and Children's Hospital, Detroit; TESS Report #73.

DISCUSSION

Michigan poisoning death rates increased by 78% between 1995 and 2001. This increase appears to have been due primarily to unintentional poisonings; there was no increase in suicide poisoning rates over this time period, and homicide poisonings comprised less than 1% of all poisoning deaths. For about one-quarter of fatal poisonings, the intent could not be determined. It is likely that most of these were, in fact, unintentional or suicidal poisonings. The mortality and morbidity of unintentional and suicidal poisonings are discussed below as are poisonings of undetermined intent and drug-related non-poisonings.

Unintentional Poisonings

The characteristics of unintentional poisonings varied significantly by severity of the incident. Among those resulting in death, males, blacks and those aged 35-54 had the highest rates, and heroin and cocaine were most often involved. It was also this demographic group and these substances that were mainly responsible for the increase in death rates between 1990 and 2001. Among non-fatal hospitalizations, the very young (one to two years) and the elderly (75 years and older) had the highest rates, and the rate for males was only slightly greater than the rate for females. While heroin and cocaine were involved in a substantial number of cases, alcoholic beverages were most prominent. Finally, more than half of calls to poison control centers pertained to exposures to children less than six years old. In contrast to poisonings resulting in death or hospitalization, most of these cases involved non-medicinal substances such as household cleaning products.

Suicidal Poisonings

During 1999-2001, poisoning was the cause of 19% of suicides, trailing firearms (54%) and hanging/suffocation (21%) as means of committing suicide in Michigan. Among poisoning suicides, whites had nearly four times the rate as non-whites, males had 53% higher rates than females, and among all age groups those aged 35-54 had the highest rates. The substance most often involved was carbon monoxide. Poisoning was by far the leading means of non-fatal suicide attempts/intentional self-harm events that resulted in hospitalization (93% involved poisoning in 2001). Among these non-fatal cases, the rate for females was 67% greater than the rate for males. Among females, those aged 14-18 years had the highest rates. Because this group was not prominent among poisoning suicides, it appears that they either used less lethal substances or consumed insufficient doses to cause death compared to others who intentionally harmed themselves via poisoning. Two-thirds of the non-fatal hospitalized cases involved psychotropic agents, analgesics, antipyretics, or antirheumatics. Poison control center data provided similar results: teenagers had the highest rates and more than half of the substances involved were analgesics, antidepressants, sedatives, hypnotics, or antipsychotics.

Poisonings with Undetermined Intent

An average of 160 Michigan residents died each year during 1999-2001 for which the poisoning was specifically classified as "Undetermined Intent."[*] The death rate for these poisonings doubled between 1996 and 2001, a trend similar to unintentional poisonings. Between 1990 and 2001, rates increased more among whites than blacks, and the rate for those aged 35-54 increased more than the rate for any other age group (Table C-5, Appendix C). There were 591 non-fatal hospitalizations for poisoning with undetermined intent and 438 poison control center

[*] Certain medical examiners may be more likely to classify a poisoning as "Undetermined Intent" than others. Table C-7 in Appendix C illustrates this variation by county of decedent residence for the period 1999-2001.

cases for poisoning with "unknown reason" in 2001. Data characterizing all cases with unknown intent are provided in Appendix C.

Drug-related Non-poisonings
A significant number of drug-related cases occur that are classified outside of the injury and poisoning coding ranges of ICD-9 and ICD-10. This study examined a portion of these cases although this investigation certainly was not exhaustive. There were an average of 369 deaths per year (1999-2001) for which the underlying cause of death was harmful use of psychoactive substances (F10-F19(.1) in ICD-10). The intent of these events was largely unknown (missing in 69% of these cases). Of the deaths for which intent was specified, however, unintentional poisonings comprised 88% or about 101 deaths annually (see Table D-5 in Appendix D). There were 485 non-fatal hospitalizations due to non-dependent abuse of drugs (305.0 – 305.9 in ICD-9-CM) in 2001. A cause of injury code (E-code) was provided for only 16% of these cases. Of these E-coded cases, no particular cause of injury predominated (see Table D-9 in Appendix D). The demographics of victims and the type of substances involved in drug-related non-poisoning deaths and hospitalizations are provided in Appendix D.

Limitations
It is difficult to accurately quantify unintentional and suicidal poisonings. As described above, there are a significant number of poisonings for which the intent is unknown. E-codes are not provided in all poisoning hospitalizations (8% were missing in 2001). Poison control centers do not use an ICD-based system for categorizing cases thus intent classifications are not consistent with those used for deaths and hospitalizations. Underlying all these issues is the inherent difficulty for third parties (e.g., medical examiners, healthcare workers, nosologists) to accurately judge the intent of an individual who has poisoning him/herself. The distinction between overdosing with the intent to get "high" vs. the intent to harm oneself can be unclear.

For many deaths and hospitalizations, the substances involved cannot be identified through the ICD code. For example, one-third of all unintentional poisoning deaths during 1999-2001 were classified under E858.8 "Other and unspecified drugs, medicaments, biological substances." (Researchers[12] have found that illicit drugs comprise a significant proportion of cases coded as E858.8). Under ICD-9-CM, cocaine is coded within a broader group of anesthetics, a coding system which obfuscates analysis of this important drug. Finally, this study identified only one substance per death or hospitalization, presumably the one most responsible for the outcome, even in cases involving multiple substances.

The time period of the temporal analyses of fatal poisonings, 1990-2001, spanned two ICD coding systems. Unfortunately, there is no information on the effect the change in coding systems by itself had on enumerating poisonings. However, the trends that were apparent during 1990-1998 seemed to continue during 1999-2001 (e.g., unintentional poisoning death rates continued to increase).

It would be valuable to present data on victim race for more than poisoning deaths. However, the degree to which this information is missing within the Michigan Inpatient Database precludes a legitimate analysis. These data are completely unavailable in poison control center data.

FUTURE DIRECTIONS IN DATA ANALYSIS AND POISONING PREVENTION

Nationally and in Michigan, there is concern about recent increases in poisoning death rates. As a first step in identifying at-risk populations and causes of poisonings in the state, an in-depth analysis was conducted using existing public health databases to assess the magnitude and impact of the problem.

This analysis found that the populations at risk and the substances involved vary greatly by the intent and lethality of the poisoning event. For unintentional poisoning mortality, black males aged 35-54 consuming illicit street drugs (heroin, cocaine) are a high risk group. For non-fatal unintentional poisonings, exposure to household products by children under age six years is of primary concern. For poisoning suicides, carbon monoxide is the substance of choice for the 35-54 year old age group that has the highest rates. Finally, 14 to 18 year old girls have the highest rate of non-fatal suicide attempts. In these attempts, they tend to use anti-depressants, tranquilizers, and analgesics.

For certain populations (e.g., children under age six, 14 to 18 year old girls), it appears that performing additional data analyses is less important than developing intervention strategies. For these groups, resources might be better directed toward assessing the best public health practices for identifying those at risk and implementing proven interventions to reduce product poisonings and non-fatal suicide attempts.

For other at-risk groups (e.g., 35-54 year old substance abusers), additional analyses may be necessary. For example, the report touches on substance abuse issues because these are included in the poisoning codes. However, poisoning codes and even the additional codes considered (e.g, F10-F19(.1)) do not represent the full extent of substance abuse deaths and hospitalizations. Such an effort would have been outside the original intent of the report. An examination of substance abuse by itself seems warranted however as deaths due to illicit drugs such as heroin and cocaine have been increasing. In addition, while this report identified only one drug per case, a subsequent analysis could examine the involvement of all drugs in deaths and hospitalizations. It will be necessary to collaborate with substance abuse experts in the state to outline a plan for examining this problem.

This report considered poisoning deaths, hospitalizations, and calls to poison control centers. More could be learned about less severe poisoning cases through examination of emergency department data. The Michigan Department of Community Health, Injury Prevention Section coordinates the Michigan Emergency Department Community Injury Information Network (MEDCIIN) that collects data from a statistical sample of 23 hospital emergency departments throughout the state. To date, only aggregate data are available, however future plans include weighting of the data to allow the generation of statewide estimates of injuries seen in emergency departments. Future analyses of poisoning data should include this system once statewide weighted data are available.

APPENDIX A

Data Tables for Unintentional Poisonings

TABLE A-1
Number of Deaths and Death Rates Due to Unintentional Poisoning
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	14,078	3.4	4.9

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. A study by CDC[9] measured how the change in coding systems affected the number of deaths coded in certain categories. However, the study provided no information 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 A-2
Average Annual Number of Unintentional Poisoning Deaths
By Age, Race, and Sex
Michigan Residents, 1999-2001

Age Group	White			Black			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	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

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 A-3
Average Annual Unintentional Poisoning Death Rates
By Age, Race, and Sex
Michigan Residents, 1999-2001

Age Group	White			Black			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	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 A-4
Number of Deaths Due to Unintentional Poisoning
Sex, Race and Age by Year of Death
Michigan Residents, 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Male	81	96	79	72	74	83	101	164	151	201	232	222
Female	33	42	27	38	55	44	52	58	75	87	93	115
White	95	117	92	91	105	95	110	150	165	215	236	235
Black	19	20	13	17	19	29	40	71	60	62	87	92
0-14	3	3	-	4	5	3	3	5	4	2	1	2
15-24	15	16	17	7	14	3	7	13	16	10	11	26
25-34	24	32	24	23	22	24	26	35	34	47	59	49
35-44	26	33	25	32	37	41	59	81	85	103	119	116
45-54	13	13	8	11	23	31	26	52	52	72	94	108
55-64	13	12	8	10	6	5	5	9	14	23	26	21
65+	20	29	24	23	22	20	27	27	21	31	15	15

1990-1998: ICD-9 codes E850 – E869
1999-2001: ICD-10 codes X40 – X49
Source: Vital Records and Health Data Development Section, MDCH

TABLE A-5
Unintentional Poisoning Death Rates
Sex, Race and Age by Year of Death
Michigan Residents, 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Male	1.8	2.1	1.7	1.6	1.6	1.8	2.1	3.4	3.2	4.2	4.8	4.5
Female	0.7	0.9	0.6	0.8	1.1	0.9	1.0	1.2	1.5	1.7	1.8	2.3
White	1.2	1.5	1.2	1.1	1.3	1.2	1.4	1.8	2.0	2.6	2.9	2.8
Black	1.5	1.5	1.0	1.2	1.4	2.1	2.8	5.0	4.2	4.3	6.1	6.2
0-14	*	*	-	*	*	*	*	*	*	*	*	*
15-24	1.1	1.2	1.2	0.5	1.0	0.2	0.5	1.0	1.2	0.7	0.8	1.9
25-34	1.5	2.1	1.6	1.5	1.5	1.6	1.8	2.5	2.4	3.4	4.3	3.6
35-44	1.8	2.2	1.7	2.1	2.4	2.6	3.6	5.0	5.2	6.3	7.4	7.3
45-54	1.4	1.3	0.8	1.0	2.1	2.7	2.1	4.1	4.1	5.5	6.8	7.6
55-64	1.6	1.5	1.0	1.3	0.8	0.6	0.6	1.1	1.7	2.7	3.0	2.3
65+	1.8	2.6	2.1	2.0	1.9	1.7	2.2	2.2	1.7	2.5	1.2	1.2

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
U.S. Census Bureau, Population Estimates Branch

TABLE A-6
Number of Deaths Due to Unintentional Poisoning
Selected Substances by Year of Death
Michigan Residents, 1990-2001

Substance	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Medicinal[1]	76	89	62	75	95	95	109	184	199	235	295	306
Heroin[2]	*7*	*7*	*2*	*9*	*10*	*12*	*19*	*28*	*30*	*31*	*63*	*53*
Methadone[3]	*2*	*4*	*2*	*3*	*2*	*-*	*1*	*3*	*1*	*9*	*9*	*9*
Cocaine[4]	*8*	*15*	*9*	*12*	*9*	*10*	*14*	*25*	*24*	*42*	*62*	*49*
"Other Specified"[5]	*5*	*3*	*7*	*9*	*9*	*5*	*10*	*11*	*18*	-[6]	-[6]	-[6]
Unspecified[7]	*31*	*24*	*22*	*15*	*30*	*39*	*44*	*91*	*83*	*92*[8]	*110*[8]	*110*[8]
Other medicinal[9]	*23*	*36*	*20*	*27*	*35*	*29*	*21*	*26*	*43*	*61*	*51*	*85*
Non-medicinal[10]	38	49	44	35	34	32	44	38	27	53	30	31
Total[11]	114	138	106	110	129	127	153	222	226	288	325	337

1. 1990-1998: E850-E858 (ICD-9); 1999-2001: X40-X44 (ICD-10)
2. 1990-1998: E850.0; 1999-2001: T40.1*
3. 1990-1998: E850.1; 1999-2001: T40.3
4. 1990-1998: E855.2; 1999-2001: T40.5. Cocaine poisoning deaths are included in E855.2 "Local anesthetics." Other drugs in this category such as procaine and lidocaine rarely cause death.[11] Thus, all deaths coded as E855.2 are considered cocaine-related here.
5. 1990-1998: E858.8
6. In the ICD-10 system (1999-2001), "Other Specified Drug" was combined with "Unspecified Drug." Thus, there is no ICD-10 code that is equivalent to ICD-9 E858.8.
7. 1990-1998: E858.9; 1999-2001: T50.9. Note that T50.9 is defined as "Other and unspecified drugs."
8. Includes "Other specified drugs."
9. 1990-1998: E850.2-E855.1, E855.3-E858.7; 1999-2001: T40.0, T40.2, T40.4, T40.6-T50.8
10. 1990-1998: E860-E869; 1999-2001: X45-X49
11. 1990-1998: E850-E869; 1999-2001: X40-X49

Source: Vital Records and Health Data Development Section, MDCH

* In ICD-10, as opposed to ICD-9, the underlying cause of death codes do not indicate the specific substance. Specific substances were identified by examining related causes of death using the code range T36-T65.

TABLE A-7
Non-fatal Unintentional Poisoning Hospitalizations
By Age and Sex
Michigan Residents, 2001

Age Group	Male		Female		Total	
	Number	Rate	Number	Rate	Number	Rate
<1	13	19.1	9	13.9	22	16.5
1-4	142	52.4	99	38.3	241	45.5
5-9	26	7.1	9	2.6	35	4.9
10-14	20	5.2	29	7.9	49	6.5
15-24	116	16.4	105	15.4	221	15.9
25-34	133	19.8	89	13.3	222	16.5
35-44	273	34.6	220	27.6	493	31.1
45-54	221	31.4	162	22.4	383	26.9
55-64	93	21.4	97	21.1	190	21.2
65-74	70	24.3	111	32.0	181	28.5
75+	84	38.5	172	46.1	256	43.3
Total	1,191	24.3	1,102	21.6	2,293	22.9

Rates are number of hospitalizations per 100,000 population.
E-coding rate for all non-fatal poisoning hospitalizations: 92%.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE A-8
Poison Control Center Calls for Unintentional Poisoning
By Age of Poisoning Victim
Michigan, 2001

Age Group	DeVos Children's Hospital – Grand Rapids	Children's Hospital Detroit	Total	
	Number	Number	Number	Rate
<6	18,920	29,274	48,194	6,030
6-12	2,187	4,102	6,289	602
13-19	1,266	1,989	3,255	321
20-29	1,446	2,773	4,219	324
30-39	1,310	3,314	4,624	311
40-49	1,187	2,542	3,729	237
50-59	725	1,667	2,392	204
60-69	453	919	1,372	192
70-79	386	730	1,116	196
80+	301	527	828	251
Child[1] – Unknown Age	75	64	139	4.9
Adult[2] – Unknown Age	2,123	857	2,980	41.7
Unknown/Missing	242	3,480	3,722	-
Total	30,621	52,238	82,859	828

1. Under age 20 years.
2. Age 20 years and older.
Rates are cases per 100,000 population.
Sources: DeVos Children's Hospital, Grand Rapids and Children's Hospital, Detroit; TESS Report #32.
U.S. Census Bureau, Population Estimates Branch

APPENDIX B

Data Tables for Suicidal Poisonings

TABLE B-1
Number of Deaths and Death Rates Due to Poisoning Suicide
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	5,191	2.0	1.8

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. A study by CDC[9] measured how the change in coding systems affected the number of deaths coded in certain categories. This report did not develop an estimate specifically for poisoning suicides. The ratio for non-firearm suicides was 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 B-2
Average Annual Number of Poisoning Suicides
By Age, Race, and Sex
Michigan Residents, 1999-2001

Age Group	White			Black			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	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

Numbers in columns and rows may not total exactly due to rounding.
Source: Vital Records and Health Data Development Section, MDCH

TABLE B-3
Average Annual Poisoning Suicide Rates
By Age, Race, and Sex
Michigan Residents, 1999-2001

Age Group	White			Black			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	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 B-4
Number of Deaths Due to Poisoning Suicide
Sex, Race and Age by Year of Death
Michigan Residents, 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Male	107	145	145	118	116	93	132	103	113	103	115	121
Female	93	94	105	67	78	77	81	72	63	75	69	82
White	188	225	228	173	178	156	194	164	167	166	178	187
Black	7	8	19	9	11	11	13	9	9	10	4	13
0-14	-	1	1	-	1	-	1	-	-	-	-	1
15-24	19	26	25	18	24	11	19	12	10	14	12	15
25-34	36	45	56	29	34	35	33	28	34	23	27	25
35-44	60	60	70	57	62	47	62	45	52	60	55	58
45-54	25	35	49	40	35	36	55	42	42	51	40	58
55-64	33	26	23	15	12	11	17	22	14	16	18	28
65+	27	46	26	26	26	30	26	26	24	14	33	18

1990-1998: ICD-9 codes E950 – E952
1999-2001: ICD-10 codes X60 – X69
Source: Vital Records and Health Data Development Section, MDCH

TABLE B-5
Poisoning Suicide Rates
Sex, Race and Age by Year of Death
Michigan Residents, 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Male	2.4	3.2	3.2	2.5	2.5	2.0	2.8	2.2	2.4	2.1	2.4	2.5
Female	1.9	1.9	2.2	1.4	1.6	1.6	1.6	1.4	1.2	1.5	1.4	1.6
White	2.4	2.8	2.9	2.2	2.2	1.9	2.4	2.0	2.0	2.0	2.2	2.3
Black	0.5	0.6	1.4	0.7	0.8	0.8	0.9	0.6	0.6	0.7	*	0.9
0-14	-	*	*	-	*	-	*	-	-	-	-	*
15-24	1.4	1.9	1.8	1.3	1.8	0.8	1.4	0.9	0.7	1.0	0.9	1.1
25-34	2.3	2.9	3.7	1.9	2.3	2.4	2.3	2.0	2.4	1.7	2.0	1.9
35-44	4.2	4.1	4.7	3.7	4.0	3.0	3.8	2.8	3.2	3.7	3.4	3.7
45-54	2.6	3.6	4.8	3.7	3.1	3.1	4.5	3.4	3.3	3.9	2.9	4.1
55-64	4.2	3.3	2.9	1.9	1.6	1.4	2.2	2.8	1.7	1.9	2.1	3.1
65+	2.4	4.1	2.3	2.2	2.2	2.5	2.1	2.1	2.0	1.1	2.7	1.5

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
U.S. Census Bureau, Population Estimates Branch

TABLE B-6
Non-fatal Suicidal Poisoning Hospitalizations
By Age Group and Sex
Michigan Residents, 2001

Age Group	Male		Female		Total	
	Number	Rate	Number	Rate	Number	Rate
<5	-	-	-	-	-	-
5-9	-	-	1	*	1	*
10-14	22	5.7	117	31.7	139	18.4
15-19	157	42.5	393	112.0	550	76.4
20-24	153	45.1	262	78.8	415	61.8
25-34	326	48.4	487	72.7	813	60.5
35-44	398	50.5	618	77.4	1,016	64.1
45-54	245	34.9	375	51.9	620	43.5
55-64	71	16.3	95	20.6	166	18.5
65-74	23	8.0	62	17.9	85	13.4
75+	17	7.8	47	12.6	64	10.8
Total	1,412	28.8	2,457	48.2	3,869	38.7

Rates are number of hospitalizations per 100,000 population.
E-coding rate for all poisoning hospitalizations: 92%.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE B-7
Poison Control Center Calls for Intentional Self-poisoning
By Age of Poisoning Victim
Michigan, 2001

Age Group	DeVos Children's Hospital – Grand Rapids	Children's Hospital Detroit	Total	
	Number	Number	Number	Rate
<6	25[1]	22[1]	47[1]	5.9
6-12	121	137	258	24.7
13-19	1,502	1,769	3,271	322.7
20-29	958	1,266	2,224	171.0
30-39	725	962	1,687	113.5
40-49	544	767	1,311	83.4
50-59	182	258	440	37.4
60-69	52	88	140	19.6
70-79	24	35	59	10.3
80+	10	34	44	13.3
Child[2] – Unknown Age	3	7	10	-
Adult[3] – Unknown Age	389	106	495	-
Unknown/Missing	110	107	217	-
Total	4,645	5,558	10,203	102.0

1. These are the figures provided by the poison control centers. However, it is unclear if a child under age six years can cognitively intentionally consume an inappropriate substance.
2. Under age 20 years.
3. Age 20 years and older.

Rates are cases per 100,000 population.
Sources: DeVos Children's Hospital, Grand Rapids and Children's Hospital, Detroit; TESS Report #32.
U.S. Census Bureau, Population Estimates Branch

TABLE B-8
Poison Control Center Calls for Poisonings Classified as "Suspected Suicide"
By Age of Poisoning Victim
Michigan, 2001

Age Group	DeVos Children's Hospital – Grand Rapids	Children's Hospital Detroit	Total	
	Number	Number	Number	Rate
<6	1[1]	4[1]	5[1]	*
6-12	27	39	66	6.3
13-19	805	1,100	1,905	187.9
20-29	606	873	1,479	113.7
30-39	547	705	1,252	84.3
40-49	411	588	999	63.5
50-59	137	181	318	27.1
60-69	40	48	88	12.3
70-79	16	23	39	6.8
80+	7	20	27	8.2
Child[2] – Unknown Age	0	1	1	-
Adult[3] – Unknown Age	204	58	262	-
Unknown/Missing	64	54	118	-
Total	2,865	3,694	6,559	65.5

1. These are the figures provided by the poison control centers. However, it is doubtful that a child under age six years can cognitively consume a substance with suicide as the intent.
2. Under age 20 years.
3. Age 20 years and older.

Rates are cases per 100,000 population.

Sources: DeVos Children's Hospital, Grand Rapids and Children's Hospital, Detroit; TESS Report #32.
U.S. Census Bureau, Population Estimates Branch

APPENDIX C

Data Tables for Poisonings with Undetermined Intent

TABLE C-1
Number of Deaths and Death Rates Due to Poisonings with Undetermined Intent
By Year of Death, Michigan and U.S. Residents, 1990-2001

Year	Number		Rate	
	Michigan	U.S.	Michigan	U.S.
1990	80	1,118	0.9	0.4
1991	93	1,199	1.0	0.5
1992	78	1,596	0.8	0.6
1993	74	1,903	0.8	0.7
1994	90	1,957	0.9	0.7
1995	90	2,038	0.9	0.8
1996	83	2,028	0.9	0.8
1997	98	2,331	1.0	0.9
1998	109	2,433	1.1	0.9
CHANGE TO ICD-10 CODING*				
1999	121	2,595	1.2	0.9
2000	181	2,557	1.8	0.9
2001	178	2,909	1.8	1.0

Rates are number of deaths per 100,000 population.
1990-1998: ICD-9 codes E980 – E982
1999-2001: ICD-10 codes Y10 – Y19
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. A study by CDC[9] measured how the change in coding systems affected the number of deaths coded in certain categories. This report did not develop an estimate specifically for poisoning suicides. The ratio for non-firearm suicides was 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 C-2
Average Annual Number of Deaths Due to Poisonings with Undetermined Intent
By Age, Race, and Sex
Michigan Residents, 1999-2001

Age Group	White			Black			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
<1	0	-	0	-	-	-	-	-	-	0	0	0
1-4	0	-	0	-	-	-	-	-	-	0	0	0
5-9	-	-	-	0	0	1	-	-	-	0	0	1
10-14	-	-	-	-	-	-	-	-	-	-	-	-
15-19	2	1	2	-	-	-	-	-	-	2	1	2
20-24	4	3	7	1	-	1	-	-	-	5	3	8
25-29	4	2	6	1	1	2	-	-	-	6	3	8
30-34	9	6	15	2	1	2	0	-	0	11	7	18
35-44	38	19	57	2	4	6	0	1	1	40	24	64
45-54	22	14	36	6	5	11	-	-	-	28	19	47
55-64	3	2	5	1	0	2	-	-	-	5	2	7
65-74	-	1	1	1	-	1	-	-	-	1	1	2
75+	0	2	2	-	-	-	-	-	-	0	2	2
Total	84	49	133	14	12	25	1	1	1	98	61	160

ICD-10 codes Y10 – Y19
For one case, age, race and sex were unknown.
Numbers in columns and rows may not total exactly due to rounding.
Source: Vital Records and Health Data Development Section, MDCH

TABLE C-3
Average Annual Death Rates Due to Poisonings with Undetermined Intent
By Age, Race, and Sex
Michigan Residents, 1999-2001

Age Group	White			Black			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
<1	*	-	*	-	-	-	*	*	*	*	*	*
1-4	*	-	*	-	-	-	*	*	*	*	*	*
5-9	-	-	-	*	*	*	*	*	*	*	*	*
10-14	-	-	-	-	-	-	*	*	*	-	-	-
15-19	*	*	0.4	-	-	-	*	*	*	*	*	0.3
20-24	1.7	1.2	1.5	*	-	*	*	*	*	1.5	0.9	1.2
25-29	1.7	0.8	1.3	*	*	1.8	*	*	*	1.7	0.8	1.3
30-34	3.3	2.2	2.8	*	*	2.2	*	*	*	3.2	1.9	2.5
35-44	5.8	2.9	4.3	2.1	3.8	3.0	*	*	*	5.1	2.9	4.0
45-54	3.9	2.4	3.1	7.2	5.7	6.4	*	*	*	4.1	2.7	3.4
55-64	0.9	0.5	0.7	*	*	*	*	*	*	1.1	0.5	0.8
65-74	-	*	*	*	-	*	*	*	*	*	*	0.3
75+	*	*	0.4	-	-	-	*	*	*	*	*	0.3
Total	2.1	1.2	1.7	2.0	1.6	1.8	*	*	*	2.0	1.2	1.6

ICD-10 codes Y10 – Y19
Rates are number of deaths per 100,000 population.
Sources: Vital Records and Health Data Development Section, MDCH
2000 U.S. Census

TABLE C-4
Number of Deaths Due to Poisonings with Undetermined Intent
Sex, Race and Age by Year of Death
Michigan Residents, 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Male	50	50	47	43	54	54	49	61	61	72	114	109
Female	30	43	31	31	36	36	34	37	48	49	67	69
White	54	63	56	49	72	68	68	87	80	101	152	146
Black	26	29	21	25	18	21	15	11	29	20	28	29
0-14	2	0	0	1	2	1	1	0	1	1	3	0
15-24	4	7	5	6	3	4	6	4	5	11	11	9
25-34	31	27	31	14	35	14	15	23	20	24	25	30
35-44	20	38	30	36	31	52	36	42	48	45	74	74
45-54	8	10	8	7	11	10	16	20	27	33	53	54
55-64	9	6	2	6	5	6	9	6	2	4	9	8
65+	6	5	2	4	3	2	0	3	6	3	6	3

1990-1998: ICD-9 codes E980 – E982
1999-2001: ICD-10 codes Y10 – Y19
Source: Vital Records and Health Data Development Section, MDCH

TABLE C-5
Death Rates Due to Poisonings with Undetermined Intent
Sex, Race and Age by Year of Death
Michigan Residents, 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Male	1.1	1.1	1.0	0.9	1.2	1.1	1.0	1.3	1.3	1.5	2.3	2.2
Female	0.6	0.9	0.6	0.6	0.7	0.7	0.7	0.7	1.0	1.0	1.3	1.4
White	0.7	0.8	0.7	0.6	0.9	0.8	0.8	1.1	1.0	1.2	1.8	1.8
Black	2.0	2.2	1.6	1.8	1.3	1.5	1.1	0.8	2.0	1.4	2.0	2.0
0-14	*	-	-	*	*	*	*	-	*	*	*	-
15-24	*	0.5	*	0.4	*	*	0.4	*	*	0.8	0.8	0.6
25-34	2.0	1.7	2.0	0.9	2.4	1.0	1.0	1.6	1.4	1.8	1.8	2.2
35-44	1.4	2.6	2.0	2.3	2.0	3.3	2.2	2.6	2.9	2.8	4.6	4.7
45-54	0.8	1.0	0.8	0.7	1.0	0.9	1.3	1.6	2.1	2.5	3.8	3.8
55-64	1.1	0.8	*	0.8	*	0.8	1.2	0.8	*	*	1.0	0.9
65+	0.5	*	*	*	*	*	-	*	0.5	*	0.5	*

Rates are number of deaths per 100,000 population.
1990-1998: ICD-9 codes E980 – E982
1999-2001: ICD-10 codes Y10 – Y19
Sources: Vital Records and Health Data Development Section, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE C-6
Average Annual Number and Rate of Deaths Due to Poisonings with Undetermined Intent
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	0	*	Lapeer	-	-
Alger	-	-	Leelanau	-	-
Allegan	2	*	Lenawee	1	*
Alpena	-	-	Livingston	3	1.7
Antrim	-	-	Luce	-	-
Arenac	-	-	Mackinac	-	-
Baraga	-	-	Macomb	32	4.0
Barry	1	*	Manistee	0	*
Bay	1	*	Marquette	1	*
Benzie	-	-	Mason	-	-
Berrien	0	*	Mecosta	-	-
Branch	-	-	Menominee	-	-
Calhoun	0	*	Midland	-	-
Cass	-	-	Missaukee	-	-
Charlevoix	-	-	Monroe	1	*
Cheboygan	-	-	Montcalm	0	*
Chippewa	0	*	Montmorency	-	-
Clare	-	-	Muskegon	3	1.6
Clinton	0	*	Newaygo	0	*
Crawford	-	-	Oakland	24	2.0
Delta	-	-	Oceana	0	*
Dickinson	-	-	Ogemaw	-	-
Eaton	0	*	Ontonagon	-	-
Emmet	-	-	Osceola	-	-
Genesee	19	4.3	Oscoda	-	-
Gladwin	-	-	Otsego	-	-
Gogebic	-	-	Ottawa	2	*
Grand Traverse	0	*	Presque Isle	-	-
Gratiot	-	-	Roscommon	-	-
Hillsdale	0	*	Saginaw	6	2.7
Houghton	-	-	St. Clair	4	2.2
Huron	0	*	St. Joseph	-	-
Ingham	1	*	Sanilac	1	*
Ionia	-	-	Schoolcraft	0	*
Iosco	0	*	Shiawassee	1	*
Iron	-	-	Tuscola	-	-
Isabella	-	-	Van Buren	0	*
Jackson	2	1.3	Washtenaw	5	1.7
Kalamazoo	3	1.3	Wayne	42	2.0
Kalkaska	-	-	Wexford	-	-
Kent	2	0.3			
Keweenaw	-	-			
Lake	-	-	Michigan	160	1.6

ICD-10 codes Y10 – Y19
* Statistically reliable rate could not be calculated.
Rates are number of deaths per 100,000 population.
Sources: Vital Records and Health Data Development Section, MDCH
2000 U.S. Census

TABLE C-7
Number and Percent of All Poisoning Deaths Coded as Undetermined Intent
By County of Residence, Michigan Residents, 1999-2001
(for counties with at least 20 total poisoning deaths over the three-year period)

County	Total Poisonings[a]	Coded as Undetermined Intent[b]	
		Number	%
Berrien	28	1	3.6
Calhoun	55	1	1.8
Genesee	137	56	40.9
Ingham	51	2	3.9
Jackson	24	6	25.0
Kalamazoo	39	9	23.1
Kent	95	6	6.3
Macomb	178	95	53.4
Monroe	21	3	14.3
Muskegon	37	8	21.6
Oakland	186	72	38.7
Ottawa	21	5	23.8
Saginaw	25	17	68.0
St. Clair	41	11	26.8
Washtenaw	44	16	36.4
Wayne	590	127	21.5
Michigan	2,003	480	24.0

a. ICD-10 codes X40 – X49, X60 – X69, X85 – X90, Y10 – Y19, Y35.3
b. ICD-10 codes Y10 – Y19
Source: Vital Records and Health Data Development Section, MDCH

TABLE C-8
Average Annual Number of Deaths Due to Poisonings with Undetermined Intent
By Type of Substance,[a] Michigan Residents, 1999-2001

ICD-10 Code	Substance	No.	%
T36-T50	Drugs, Medicinal Substances, and Biologicals	156	97.5
T36	Systemic antibiotics	-	0.0
T37	Other systemic anti-infectives & antiparasitics	-	0.0
T38	Hormones & their synthetic substitutes & antagonists, n.e.c.[b]	-	0.0
T39	Nonopioid analgesics, antipyretics & antirheumatics	8	5.2
T40	Narcotics & psychodysleptics	39	24.6
T40.1	*Heroin*	*1*	*0.8*
T40.2	*Other opioid*	*15*	*9.2*
T40.3	*Methadone*	*2*	*1.3*
T40.4	*Other synthetic narcotics*	*3*	*1.7*
T40.5	*Cocaine*	*13*	*8.1*
T40.6	*Other & unspecified narcotics*	*6*	*3.5*
T40.9	*Other & unspecified psychodysleptics*	-	0.0
T41	Anesthetics & therapeutic gases	0	0.2
T42	Antiepileptic, sedative-hypnotic & antiparkinsonism drugs	2	1.3
T43	Psychotropic drugs, n.e.c.	4	2.5
T44	Drugs primarily affecting the autonomic nervous system	-	0.0
T45	Primarily systemic & haematological agents, n.e.c.	2	1.3
T46	Agents primarily affecting the cardiovascular system	1	0.6
T47	Agents primarily affecting the gastrointestinal system	-	0.0
T48	Agents primarily acting on smooth/skeletal muscles & respiratory system	-	0.0
T49	Topical agents primarily affecting skin & mucous membrane & by ophthalmological, otorhinolaryngological & dental drugs	-	0.0
T50	Diuretics & other & unspecified drugs, medicaments, biological substances	99	61.9
T50.9	*Other and unspecified drugs, medicaments and biological substances*	*99*	*61.7*
T51-T65	Non-Medicinal Substances	4	2.5
T51	Alcohol	2	1.0
T52	Organic solvents	0	0.2
T53	Halogen derivatives of aliphatic & aromatic hydrocarbons	-	0.0
T54	Corrosive substances	-	0.0
T55	Soaps & detergents	-	0.0
T56	Metals	-	0.0
T57	Other inorganic substances	-	0.0
T58	Carbon monoxide	2	1.3
T59	Other gases, fumes & vapors	-	0.0
T60	Pesticides	-	0.0
T61	Noxious substances eaten as seafood	-	0.0
T62	Other noxious substances eaten as food	-	0.0
T63	Contact with venomous animals	-	0.0
T64	Aflatoxin & other mycotoxin food contaminants	-	0.0
T65	Other and unspecified non-medicinal substances	-	0.0
T36-T65	Total	160	100.0

a. Only one substance enumerated per death. The substance identified was the one associated with the highest listed Related Cause of Death.
b. Not elsewhere classified
Source: Vital Records and Health Data Development Section, MDCH

TABLE C-9
Non-fatal Hospitalizations Due to Poisonings with Undetermined Intent
By Age and Sex
Michigan Residents, 2001

Age Group	Male		Female		Total	
	Number	Rate	Number	Rate	Number	Rate
<5	7	2.1	3	*	10	1.5
5-9	-	-	1	*	1	0.1
10-14	6	1.5	4	*	10	1.3
15-19	24	6.5	19	5.4	43	6.0
20-24	28	8.3	18	5.4	46	6.8
25-34	46	6.8	37	5.5	83	6.2
35-44	96	12.2	83	10.4	179	11.3
45-54	75	10.7	54	7.5	129	9.1
55-64	20	4.6	27	5.9	47	5.2
65-74	9	3.1	12	3.5	21	3.3
75+	8	3.7	14	3.7	22	3.7
Total	319	6.5	272	5.3	591	5.9

ICD-9 codes E980.0 – E982.9
Rates are number of hospitalizations per 100,000 population.
E-coding rate for all poisoning hospitalizations: 92%.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE C-10
Non-fatal Hospitalizations Due to Poisonings with Undetermined Intent
By Substance,[a] Michigan Residents, 2001

ICD-9-CM Code	Substance	No.	%
E980.0	Analgesics, antipyretics, antirheumatics	175	29.6
E980.1	Barbiturates	9	1.5
E980.2	Other sedatives and hypnotics	17	2.9
E980.3	Tranquilizers and other psychotropic agents	143	24.2
E980.4	Other specified drugs and medicinal substances	151	25.5
E980.5	Unspecified drug or medicinal substance	14	2.4
E980.6	Corrosive and caustic substances	-	0.0
E980.7	Agricultural and horticultural chemical and pharmaceutical preparations other than plant foods and fertilizers	2	0.3
E980.8	Arsenic and its compounds	1	0.2
E980.9	Other and unspecified solid and liquid substances	71	12.0
E981.0	Gas distributed by pipeline	1	0.2
E981.1	Liquefied petroleum gas distributed in mobile containers	-	0.0
E981.8	Other utility gas	-	0.0
E982.0	Motor vehicle exhaust gas	2	0.3
E982.1	Other carbon monoxide	4	0.7
E982.8	Other specified gases and vapors	-	0.0
E982.9	Unspecified gases and vapors	1	0.2
E980 – E982	All substances	591	100.0

E-coding rate for all non-fatal poisoning hospitalizations: 92%.
a. Only one substance listed per hospitalization. The substance identified was the one associated with the principal E-code.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE C-11
Numbers and Rates of Non-fatal Hospitalizations Due to Poisonings with Undetermined Intent
By County of Residence, Michigan Residents, 2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	-	-
Alger	-[a]	-	Leelanau	1	*
Allegan	6	5.6	Lenawee	-[a]	-
Alpena	1	*	Livingston	4	*
Antrim	2	*	Luce	-[a]	-
Arenac	-[a]	-	Mackinac	-[a]	-
Baraga	-[a]	-	Macomb	54	6.7
Barry	7	12.2	Manistee	2	*
Bay	1	*	Marquette	2	*
Benzie	1	*	Mason	4	*
Berrien	3	*	Mecosta	-[a]	-
Branch	1	*	Menominee	1	*
Calhoun	8	5.8	Midland	3	*
Cass	2	*	Missaukee	-	-
Charlevoix	-[a]	-	Monroe	16	10.8
Cheboygan	1	*	Montcalm	-[a]	-
Chippewa	8	20.8	Montmorency	-[a]	-
Clare	-	-	Muskegon	-[a]	-
Clinton	-[a]	-	Newaygo	2	*
Crawford	-	-	Oakland	88	7.3
Delta	3	*	Oceana	-[a]	-
Dickinson	-[a]	-	Ogemaw	2	*
Eaton	-[a]	-	Ontonagon	-[a]	-
Emmet	4	*	Osceola	-[a]	-
Genesee	34	7.7	Oscoda	-	-
Gladwin	4	*	Otsego	2	*
Gogebic	-[a]	-	Ottawa	-[a]	-
Grand Traverse	8	10.0	Presque Isle	-	-
Gratiot	1	*	Roscommon	-	-
Hillsdale	-	-	Saginaw	20	9.5
Houghton	-[a]	-	St. Clair	9	5.4
Huron	-[a]	-	St. Joseph	5	*
Ingham	12	4.3	Sanilac	-[a]	-
Ionia	-[a]	-	Schoolcraft	-[a]	-
Iosco	1	*	Shiawassee	10	13.9
Iron	-[a]	-	Tuscola	-[a]	-
Isabella	1	*	Van Buren	4	*
Jackson	-[a]	-	Washtenaw	10	3.0
Kalamazoo	11	4.6	Wayne	190	9.3
Kalkaska	-	-	Wexford	-	-
Kent	-[a]	-	Unknown	1	-
Keweenaw	-[a]	-			
Lake	-[a]	-	Michigan	591	5.9

ICD-9 codes E980.0 – E982.9
a. Data excluded from analysis because county had insufficient E-coding rate for poisonings (< 90%).
* Statistically reliable rate could not be calculated.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE C-12
Poison Control Center Calls for Poisoning with "Unknown Reason"
By Age of Poisoning Victim
Michigan, 2001

Age Group	DeVos Children's Hospital – Grand Rapids	Children's Hospital Detroit	Total	
	Number	Number	Number	Rate
<6	9	13	22	2.8
6-12	10	13	23	2.2
13-19	26	24	50	4.9
20-29	29	37	66	5.1
30-39	31	27	58	3.9
40-49	23	33	56	3.6
50-59	9	20	29	2.5
60-69	8	9	17	2.4
70-79	1	11	12	2.1
80+	3	6	9	2.7
Child[1]– Unknown Age	0	1	1	-
Adult[2]– Unknown Age	47	16	63	-
Unknown/Missing	14	18	32	-
Total	210	228	438	4.4

1. Under age 20 years.
2. Age 20 years and older.

Rates are cases per 100,000 population.

Sources: DeVos Children's Hospital, Grand Rapids and Children's Hospital, Detroit; TESS Report #32.
U.S. Census Bureau, Population Estimates Branch

APPENDIX D

Data Tables for Other Drug-related Deaths and Hospitalizations

TABLE D-1
Average Annual Number of Other Drug-related Deaths
(Underlying Cause of Death: ICD-10 codes F10-F19(.1),[1] F55[2])
By Age, Race, and Sex
Michigan Residents, 1999-2001

Age Group	White			Black			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	0	-	0	-	-	-	-	-	-	0	-	0
15-19	2	0	2	0	-	0	-	-	-	2	0	2
20-24	7	3	10	1	0	1	-	-	-	8	3	11
25-29	13	2	15	1	-	1	-	-	-	14	2	16
30-34	21	6	27	4	4	8	0	-	0	26	9	35
35-44	71	20	90	32	19	51	2	-	2	104	38	143
45-54	45	9	55	49	20	69	-	0	0	94	29	124
55-64	9	3	12	9	3	12	-	-	-	18	6	24
65-74	6	2	8	1	0	1	-	-	-	7	2	10
75+	2	1	4	-	-	-	-	-	-	2	1	4
Total	178	46	224	98	45	143	2	0	2	277	92	369

1. F10-F19: mental and behavioral disorders due to psychoactive substance use; .1 as fourth digit = harmful use
2. F55: abuse of non-dependence-producing substances

Note: F55 comprised only one case of the total 1,108 cases during the three-year period.
Numbers in columns and rows may not total exactly due to rounding.
Source: Vital Records and Health Data Development Section, MDCH

TABLE D-2
Average Annual Rates of Other Drug-related Deaths
(Underlying Cause of Death: ICD-10 codes F10-F19(.1),[1] F55[2])
By Age, Race, and Sex
Michigan Residents, 1999-2001

Age Group	White			Black			Other			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
<1	-	-	-	-	-	-	-	-	-	-	-	-
1-4	-	-	-	-	-	-	-	-	-	-	-	-
5-9	-	-	-	-	-	-	-	-	-	-	-	-
10-14	*	-	*	-	-	-	-	-	-	*	-	*
15-19	*	*	0.4	*	-	*	-	-	-	0.5	*	0.3
20-24	3.0	1.1	2.0	*	*	*	-	-	-	2.5	0.9	1.7
25-29	5.4	0.8	3.1	*	-	*	-	-	-	4.4	0.6	2.5
30-34	7.6	2.1	4.9	8.7	6.5	7.6	*	-	*	7.3	2.6	5.0
35-44	10.8	3.0	6.9	33.1	16.6	24.2	*	-	*	13.2	4.8	8.9
45-54	7.9	1.6	4.8	62.1	21.0	39.8	-	*	*	14.0	4.2	9.0
55-64	2.5	0.9	1.7	21.9	5.1	12.7	-	-	-	4.4	1.4	2.8
65-74	2.5	0.7	1.5	*	*	*	-	-	-	2.5	0.7	1.5
75+	1.2	*	0.7	-	-	-	-	-	-	1.1	*	0.6
Total	4.5	1.1	2.8	14.6	6.1	10.1	0.7	*	0.4	5.7	1.8	3.7

1. F10-F19: mental and behavioral disorders due to psychoactive substance use; .1 as fourth digit = harmful use
2. F55: abuse of non-dependence-producing substances

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

TABLE D-3
Average Annual Number and Rate of Other Drug-related Deaths
(Underlying Cause of Death: ICD-10 codes F10-F19(.1),[1] F55[2])
By County of Residence, Michigan Residents, 1999-2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	1	*
Alger	1	*	Leelanau	0	*
Allegan	2	2.2	Lenawee	0	*
Alpena	0	*	Livingston	3	2.1
Antrim	0	*	Luce	-	-
Arenac	1	*	Mackinac	-	-
Baraga	-	-	Macomb	28	3.5
Barry	0	*	Manistee	0	*
Bay	1	*	Marquette	0	*
Benzie	0	*	Mason	-	-
Berrien	2	1.2	Mecosta	-	-
Branch	0	*	Menominee	-	-
Calhoun	1	*	Midland	-	-
Cass	-	-	Missaukee	-	-
Charlevoix	-	-	Monroe	4	2.5
Cheboygan	-	-	Montcalm	-	-
Chippewa	-	-	Montmorency	0	*
Clare	1	*	Muskegon	5	2.7
Clinton	-	-	Newaygo	0	*
Crawford	-	-	Oakland	58	4.9
Delta	-	-	Oceana	-	-
Dickinson	-	-	Ogemaw	-	-
Eaton	1	*	Ontonagon	-	-
Emmet	-	-	Osceola	0	*
Genesee	6	1.5	Oscoda	-	-
Gladwin	1	*	Otsego	-	-
Gogebic	0	*	Ottawa	1	*
Grand Traverse	-	-	Presque Isle	0	*
Gratiot	-	-	Roscommon	1	*
Hillsdale	1	*	Saginaw	2	*
Houghton	1	*	St. Clair	2	*
Huron	-	-	St. Joseph	1	*
Ingham	4	1.4	Sanilac	1	*
Ionia	-	-	Schoolcraft	0	*
Iosco	0	*	Shiawassee	-	-
Iron	-	-	Tuscola	1	*
Isabella	-	-	Van Buren	1	*
Jackson	3	2.1	Washtenaw	17	5.4
Kalamazoo	3	1.1	Wayne	199	9.6
Kalkaska	-	-	Wexford	0	*
Kent	12	2.1	Unknown	1	-
Keweenaw	-	-			
Lake	-	-	Michigan	369	3.7

1. F10-F19: mental and behavioral disorders due to psychoactive substance use; .1 as fourth digit = harmful use
2. F55: abuse of non-dependence-producing substances Note: F55 comprised only one case during the three-year period.

* Statistically reliable rate could not be calculated.
Rates are number of deaths per 100,000 population.
Sources: Vital Records and Health Data Development Section, MDCH; 2000 U.S. Census

TABLE D-4
Average Annual Number of Other Drug-related Deaths
(Underlying Cause of Death: ICD-10 codes F10-F19(.1),[1] F55[2])
By Type of Substance,[3] Michigan Residents, 1999-2001

ICD-10 Code	Substance	Number	%
F101	Alcohol	80	21.7
F111	Opioids	27	7.3
F121	Cannabinoids	-	0.0
F131	Sedatives or hypnotics	-	0.0
F141	Cocaine	64	17.2
F151	Other stimulants	-	0.0
F161	Hallucinogens	0	0.1
F171	Tobacco	2	0.6
F181	Volatile solvents	1	0.2
F191	Multiple drugs use or other psychoactive substances	195	52.8
F55	Non-dependence-producing substances	0	0.1
Total		369	100.0

1. F10-F19: mental and behavioral disorders due to psychoactive substance use; .1 as fourth digit = harmful use
2. F55: abuse of non-dependence-producing substances Note: F55 comprised only one case during the three-year period.
3. Only one substance enumerated per death. The substance identified was the one associated with the underlying cause of death.

Source: Vital Records and Health Data Development Section, MDCH

TABLE D-5
Average Annual Number of Other Drug-related Deaths
(Underlying Cause of Death: ICD-10 codes F10-F19(.1),[1] F55[2])
By External Cause of Injury,[3] Michigan Residents, 1999-2001

Cause of Injury	Number	%
Unintentional	104	28.1
Poisoning	*101*	*27.3*
Choking/suffocation	*2*	*0.5*
Exposure to unspecified factor	*1*	*0.2*
Motor vehicle crash – occupant	*0*	*0.1*
Foreign body	*0*	*0.1*
Intentional	1	0.2
Suicide poisoning	*0*	*0.1*
Homicide poisoning	*0*	*0.1*
Undetermined Intent	8	2.2
Poisoning	*8*	*2.1*
Suffocation/choking	*0*	*0.1*
Medical/surgical procedure	2	0.5
No external cause of injury code provided	255	69.1
Total	369	100.0

1. F10-F19: mental and behavioral disorders due to psychoactive substance use; .1 as fourth digit = harmful use
2. F55: abuse of non-dependence-producing substances Note: F55 comprised only one case during the three-year period.
3. Cause of injury was based on the highest listed external cause of injury code within Related Causes of Death.

Source: Vital Records and Health Data Development Section, MDCH

TABLE D-6
Non-fatal Hospitalizations Due to Nondependent Abuse of Drugs
(Principal Diagnosis: ICD-9-CM codes 305.0 – 305.9)
By Age and Sex
Michigan Residents, 2001

Age Group	Male		Female		Total	
	Number	Rate	Number	Rate	Number	Rate
<5	1	*	-	-	1	*
5-9	-	-	-	-	-	-
10-14	6	1.5	4	*	10	1.3
15-19	28	7.6	20	5.7	48	6.7
20-24	20	5.9	9	2.7	29	4.3
25-34	48	7.1	26	3.9	74	5.5
35-44	88	11.2	44	5.5	132	8.3
45-54	96	13.7	28	3.9	124	8.7
55-64	23	5.3	9	2.0	32	3.6
65-74	14	4.9	3	*	17	2.7
75+	11	5.0	7	1.9	18	3.0
Total	335	6.8	150	2.9	485	4.8

Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE D-7
Non-fatal Hospitalizations Due to Nondependent Abuse of Drugs
(Principal Diagnosis: ICD-9-CM codes 305.0 – 305.9)
By Type of Substance Abuse,[a] Michigan Residents, 2001

ICD-9-CM Code	Diagnosis	No.	%
305.0	Alcohol abuse	324	66.8
305.1	Tobacco use disorder	4	0.8
305.2	Cannabis abuse	12	2.5
305.3	Hallucinogen abuse	3	0.6
305.4	Barbiturate and similarly acting sedative or hypnotic abuse	6	1.2
305.5	Opioid abuse	24	4.9
305.6	Cocaine abuse	55	11.3
305.7	Amphetamine or related acting sympathomimetic abuse	5	1.0
305.8	Antidepressant type abuse	-	0.0
305.9	Other, mixed or unspecified drug abuse	52	10.7
Total		485	100.0

a. Only one substance listed per hospitalization. The substance identified was the one associated with the principal diagnosis.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

TABLE D-8
Numbers and Rates of Non-fatal Hospitalizations Due to Nondependent Abuse of Drugs
(Principal Diagnosis: ICD-9-CM codes 305.0 – 305.9)
By County of Residence, Michigan Residents, 2001

County	Number	Rate	County	Number	Rate
Alcona	-	-	Lapeer	2	*
Alger	-	-	Leelanau	-	-
Allegan	1	*	Lenawee	9	9.0
Alpena	2	*	Livingston	2	*
Antrim	3	*	Luce	-	-
Arenac	1	*	Mackinac	-	-
Baraga	-	-	Macomb	28	3.5
Barry	-	-	Manistee	1	*
Bay	14	12.8	Marquette	6	9.3
Benzie	-	-	Mason	-	-
Berrien	9	5.6	Mecosta	1	*
Branch	1	*	Menominee	2	*
Calhoun	11	8.0	Midland	1	*
Cass	7	13.7	Missaukee	2	*
Charlevoix	-	-	Monroe	8	5.4
Cheboygan	-	-	Montcalm	1	*
Chippewa	1	*	Montmorency	-	-
Clare	1	*	Muskegon	3	*
Clinton	1	*	Newaygo	1	*
Crawford	-	-	Oakland	80	6.7
Delta	6	15.6	Oceana	1	*
Dickinson	20	73.3	Ogemaw	1	*
Eaton	3	*	Ontonagon	1	*
Emmet	2	*	Osceola	1	*
Genesee	19	4.3	Oscoda	-	-
Gladwin	1	*	Otsego	-	-
Gogebic	1	*	Ottawa	-	-
Grand Traverse	3	*	Presque Isle	1	*
Gratiot	5	*	Roscommon	1	*
Hillsdale	1	*	Saginaw	35	16.7
Houghton	-	-	St. Clair	6	3.6
Huron	1	*	St. Joseph	3	*
Ingham	5	*	Sanilac	-	-
Ionia	5	*	Schoolcraft	-	-
Iosco	1	*	Shiawassee	1	*
Iron	5	*	Tuscola	1	*
Isabella	2	*	Van Buren	5	*
Jackson	4	*	Washtenaw	12	3.6
Kalamazoo	7	2.9	Wayne	105	5.1
Kalkaska	-	-	Wexford	4	*
Kent	15	2.6			
Keweenaw	-	-			
Lake	2	*	Michigan	485	4.8

* Statistically reliable rate could not be calculated.
Rates are number of hospitalizations per 100,000 population.
Sources: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH
U.S. Census Bureau, Population Estimates Branch

TABLE D-9
Non-fatal Hospitalizations Due to Nondependent Abuse of Drugs
(Principal Diagnosis: ICD-9-CM codes 305.0 – 305.9)
By External Cause of Injury, [1] Michigan Residents, 2001

Cause of Injury	Number	%
Unintentional	43	8.9
Poisoning	*6*	*1.2*
Fall	*21*	*4.3*
Other	*16*	*3.3*
Intentional Self-harm	20	4.1
Poisoning	*9*	*1.9*
Other	*11*	*2.3*
Assault	6	1.2
Poisoning	*0*	*0.0*
Other	*6*	*1.2*
Undetermined Intent	4	0.8
Poisoning	*3*	*0.6*
Other	*1*	*0.2*
Other	3	0.6
No cause of injury code provided	409	84.3
Total	485	100.0

1. Cause of injury was based on the highest listed external cause of injury code.
Source: MI Resident Inpatient Files, Division for Vital Records and Health Statistics, MDCH

REFERENCES

1. Esdale A., Scarpetta L. *Michigan Injury Prevention Plan, 2003*. Michigan Department of Community Health. Lansing, Michigan. January 2004.
2. Largo T, Scarpetta L. *Injury Mortality in Michigan, 1999-2001*. Michigan Department of Community Health. Lansing, Michigan. April 2003.
3. U.S. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS). Data available on the following website: http://www.cdc.gov/ncipc/wisqars/default.htm.
4. Data from the United States Census Bureau as found on the following website: http://factfinder.census.gov/servlet/BasicFactsServlet
5. Data from the United States Census Bureau as found on the following website: http://eire.census.gov/popest/archives/state/st-99-3.txt
6. Census estimates for 2001 for Michigan can be found via the following website: http://www.michigan.gov/census.
7. World Health Organization (1977). *International Classification of Diseases: Manual on the International Statistical Classification of Diseases, Injuries, and Cause of Death.* 9th revision. Geneva, Switzerland.
8. World Health Organization, Geneva, 1992. *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision*. Updated and corrected by the U.S. National Center for Health Statistics, October 1998.
9. Anderson RN, Minino AM, Hoyert DL, Rosenberg HM. *Comparability of cause of death between ICD-9 and ICD-10: Preliminary estimates.* National vital statistics reports; 49(2). Hyattsville, Maryland: National Center for Health Statistics; 2001. Available from http://www.cdc.gov/nchs/data/nvsr/nvsr49/nvsr49_02.pdf.
10. *International Classification of Diseases, Ninth Revision, Clinical Modification*. Ann Arbor, MI: Commission on Professional and Hospital Activities; 1986.
11. Baker, SP, et. al. *The Injury Fact Book, 2nd Edition*. Oxford University Press. New York, New York. 1992.
12. Landen, MG, et. al. *Methodological issues in the surveillance of poisoning, illicit drug overdose, and heroin overdose deaths in New Mexico.* American Journal of Epidemiology. February 1, 2003; 157(3):273-278.