



# SCHS Studies

A Special Report Series by the State Center for Health Statistics  
1908 Mail Service Center, Raleigh, N.C. 27699-1908  
[www.schs.state.nc.us/SCHS/](http://www.schs.state.nc.us/SCHS/)

No. 140

March 2004

## Suicide in North Carolina: Deaths, Hospitalizations, and Youth Survey Results

by

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### ABSTRACT

**Objectives:** Suicide is among the top five leading causes of death among persons ages 5 through 44. This study presents current data on suicide in North Carolina, using data on deaths, hospitalizations, and youth survey responses.

**Methods:** Death records for 1997-2001 were used to describe suicide deaths by demographics, suicide mortality rates, and the methods of suicide. Hospital discharge data for 1997-2001 were used to describe the demographic characteristics of North Carolina residents hospitalized for self-inflicted injury, hospitalization rates for self-inflicted injuries, and the methods of self-injury for persons admitted to a hospital. Data from the Youth Risk Behavior Survey for 1997 and 2001 show North Carolina middle school and high school students' attitudes and behavior related to suicide.

**Results:** In the five years 1997 through 2001, 4,563 North Carolina residents died by suicide. During the same time period, 19,717 North Carolina residents were hospitalized for self-inflicted injuries. The patterns for self-inflicted injuries resulting in a hospitalization and completed suicides are markedly different. The age-adjusted suicide rate for North Carolinians was 11.4, and the age-adjusted hospitalization rate for self-inflicted injuries was 48.8 per 100,000 North Carolina residents. Males had much higher suicide death rates than females, and whites had higher rates than minorities. Overall, the suicide death *rate* was highest in the 65 and older age group, though the highest *number* of suicides was among persons ages 25-44. Firearms were used in approximately two-thirds of suicide deaths in North Carolina during 1997-2001. Males were more likely to use firearms than females. Except in the 65 and older age group, female hospitalization rates for self-inflicted injury were much higher than the rates for males. More than 80 percent of hospitalizations for self-inflicted injury involved poisoning. Firearms, a much more lethal method of suicide, accounted for only 3.2 percent of hospitalizations for self-inflicted injury. In 1997-2001, for every one suicide death there were about four hospitalizations for self-inflicted injury. According to the Youth Risk Behavior Survey, 20.8 percent of middle school students reported in 2001 that they had seriously thought about killing themselves, compared to 18.1 percent of high school students. In 1997, 11.3 percent of middle school students and 8.8 percent of high school students reported that they had tried to kill themselves.

**Conclusions:** Suicide is a serious problem in North Carolina that requires raising the awareness of suicide, its risk factors, and possible signs; developing screening and intervention programs; fostering further research related to suicide; and creating partnerships across various agencies involved in suicide prevention and health care.



## Introduction

Suicide was among the ten leading causes of death for all persons ages 5-64, for males, and for whites in both North Carolina and the United States from 1997 through 2001. Suicide was ranked similarly for North Carolina and for the United States. The rankings for suicide as a leading cause of death for 2000 are shown in Table 1. Among 5-44 year olds, suicide was generally among the top five leading causes of death in North Carolina in the time period from 1997 through 2001. The high ranking for ages 5-14 is of special concern: suicide was the fourth leading cause of death in this age group in 1997, 1998, and 2000; the fifth in 1999; and the seventh leading cause in 2001.

Age/Gender	Rank of Suicide in the Leading Causes of Death	
	NC	US
5-14 years	4	5
15-24 years	3	3
25-44 years	5	4
45-64 years	9	8
65+ years	19	18
Females	17	19
Males	9	8

Note: A higher rank represents a lower number of suicide deaths.  
Source: State Center for Health Statistics, CDC/NCIPC

This study updates data in the 1998 report *Suicide in North Carolina*<sup>1</sup>, and the 1998 report *Firearm Deaths in North Carolina—1986-1996*,<sup>2</sup> and contributes additional information about suicide.

For the analysis of suicide deaths during 1997-2001 in North Carolina, North Carolina mortality data were used. North Carolina mortality data contain death certificate information for persons that died in North Carolina in a particular year. The underlying cause of death was coded with the use of the ICD-9 (International Classification of Diseases, 9<sup>th</sup> revision) for the years 1997-1998, and the ICD-10 for 1999-

2001.<sup>3</sup> For 1997-1998, the codes 950.0-959.9 were used, and for 1999-2001, the codes X60-X84 and Y87.0 were used to identify suicide deaths. Suicide deaths were analyzed by gender, race (white and other races), and the following age groups: 5-24 (subcategories 5-9, 10-14, 15-19, 20-24), 25-44, 45-64, and 65 years and older.

Self-inflicted injury hospitalizations were obtained from the North Carolina hospital discharge data, a database that contains records for inpatient stays occurring in North Carolina. The North Carolina hospital discharge database does not consistently include information on North Carolina residents admitted to the state's psychiatric hospitals, and may therefore underestimate the number of hospitalizations due to self-inflicted injuries. Intentional injuries are coded with an External Cause of Injury code, a so-called E-code. For the analysis, records with an E-code of E950.0-E959.9 were selected. Hospitalizations due to self-inflicted injury were analyzed by gender and age group, with the same age categories as for the death data. Hospital discharge data could not be analyzed by race because of the incomplete reporting of race on hospitalization records.

While data for all age groups are presented throughout the report, youth suicide receives special attention. For that reason, North Carolina's middle and high school students' responses to questions related to psychological health, suicidal thoughts, and suicide from the North Carolina Youth Risk Behavior Survey (YRBS) are included in this report. The YRBS is administered every two years to a random sample of North Carolina middle and high school students and includes questions on different aspects of physical and psychological health and personal well-being.

## Results

### *Suicide deaths*

During 1997 through 2001, 4,563 residents of North Carolina died by suicide; 3,616 (79.2%) of these were male, and 947 (20.8%) were female (see Figure 1). About 913 suicides were completed per year in the time period 1997-2001. Of the persons that died by suicide,

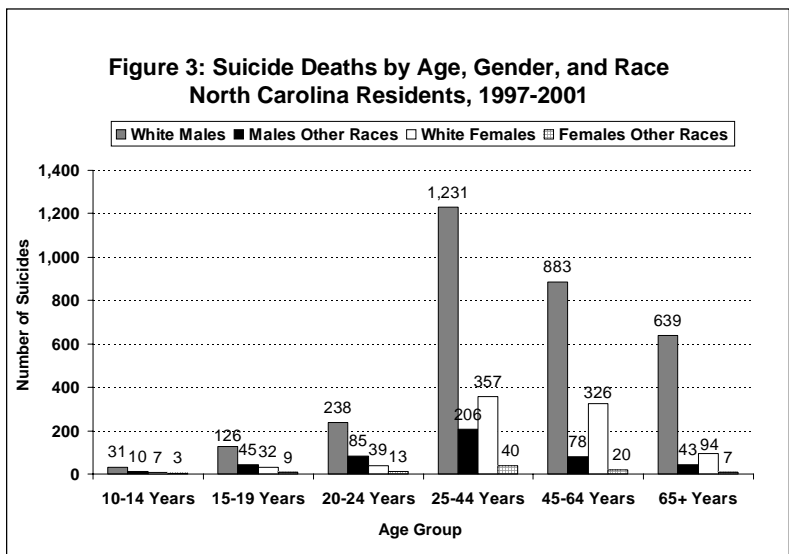
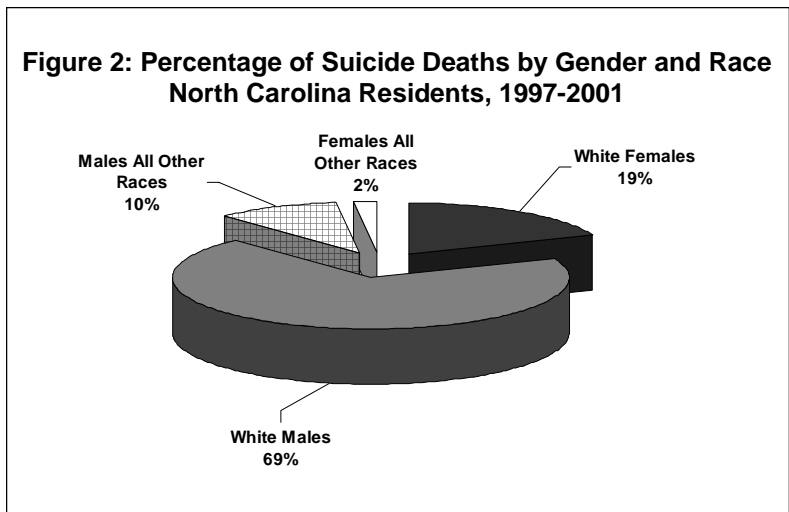
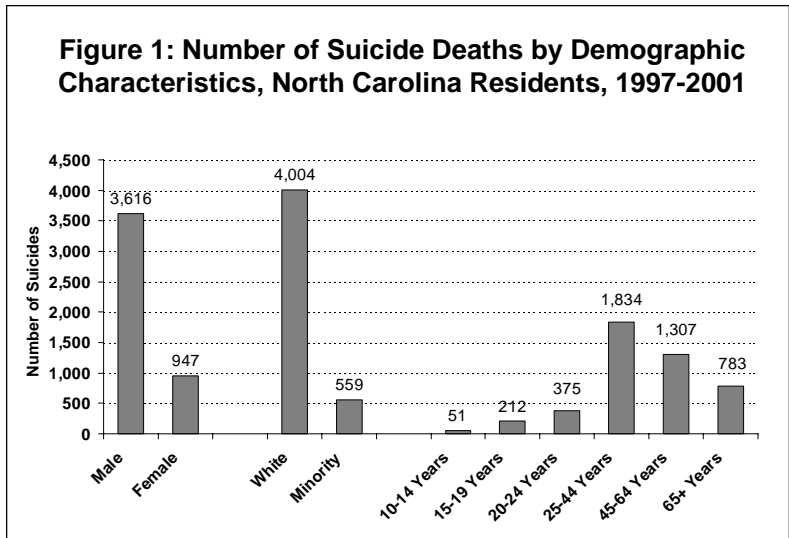
4,004 (87.7%) were white and 559 (12.3%) were of other races. The 2000 Census shows that 72.1 percent of North Carolinians were white, and the remaining 27.9 percent of the population selected one or more other races. Hence, it appears that whites complete suicide at a higher rate than persons of other races.

Most suicides were completed by 25-44 year olds (1,834 or 40.2%), followed by the 45-64 year olds (1,307 or 28.6%), persons 65 and older (783 or 17.2%), and 0-24 year olds (639 or 14.0%).

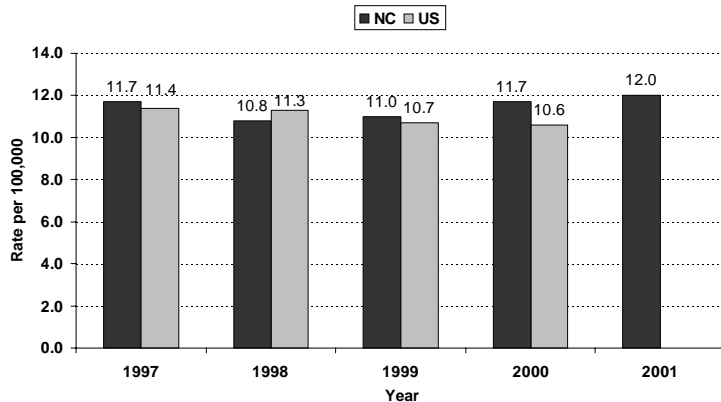
Figure 2 shows that the majority of suicides were completed by white males (3,149 or 69%). White females completed 855, or 19 percent, of the suicides. Ten percent (467) of all suicides were completed by males of other races, and only 2 percent (92) by females of other races.

The highest number of suicides for each of the gender-race groups occurred at ages 25-44, with 1,231 suicide deaths of white males in this age group (27.0% of all North Carolina suicides), 357 suicide deaths of white females (7.8%), 206 suicide deaths of males of other races (4.5%), and 40 suicide deaths of females of other races (0.9%). (See Figure 3.)

Generally, white male deaths by suicide were highest, followed by white female suicide deaths, suicide deaths by males of other races, and finally by females of other races. Among 10-24 year old suicide decedents, though, males of other races were the second largest group. Although males of other races accounted for 10.2 percent of all suicides, 21.9 percent of suicide decedents in the 10-24 year old age group were males of other races. For older age groups, the number of white female suicides clearly exceeded the number of suicides by males of other races.



**Figure 4: Age-Adjusted Suicide Rates for North Carolina and the United States, 1997-2001**



Note: These rates may differ slightly from previously published age-adjusted rates due to revised population estimates.

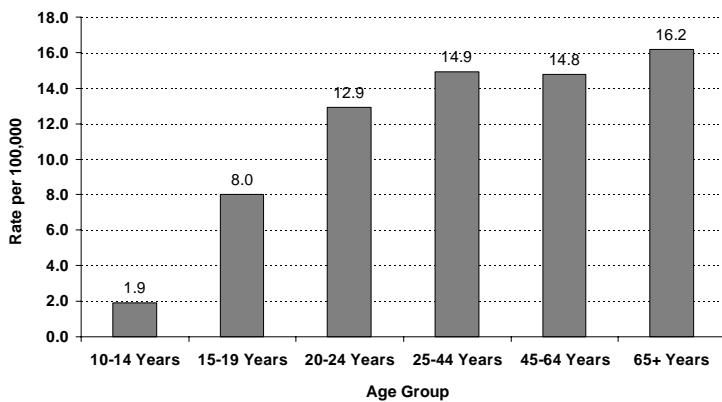
Source of U.S. rates: CDC/NCHS 2002, 2003.

### Suicide death rates

Age-adjusted death rates are used to control for differences in the age distributions of populations being compared.<sup>4</sup> Suicide death rates vary considerably by gender and race groups; therefore, the analysis of death rates will emphasize gender and race differences.

Figure 4 shows that, in general, the age-adjusted suicide rates for North Carolina were slightly higher than the suicide rates for the nation. The gap between the age-adjusted suicide rates for North Carolina and the nation increased from 1997 to 2000, except for 1998, when the rate for North Carolina was lower than the nation's.

**Figure 5: Suicide Death Rates by Age North Carolina Residents, 1997-2001**



For the time period 1997 through 2001, the age-adjusted suicide death rate in North Carolina was 11.4 per 100,000 North Carolinians.

The suicide death rate increased sharply from age 10 to age 24 (see Figure 5). The rate for ages 15-19 was 4.2 times the rate for ages 10-14, and the rate for ages 20-24 was 1.6 times the rate for ages 15-19. Suicide death rates were higher after ages 20-24, but the increase was smaller. The highest suicide death rate was found for persons age 65 and older while, as noted above, the highest **number** of suicides occurred at ages 25-44.

**Figure 6: Age-Adjusted Suicide Death Rates by Demographic Characteristics, North Carolina Residents, 1997-2001**

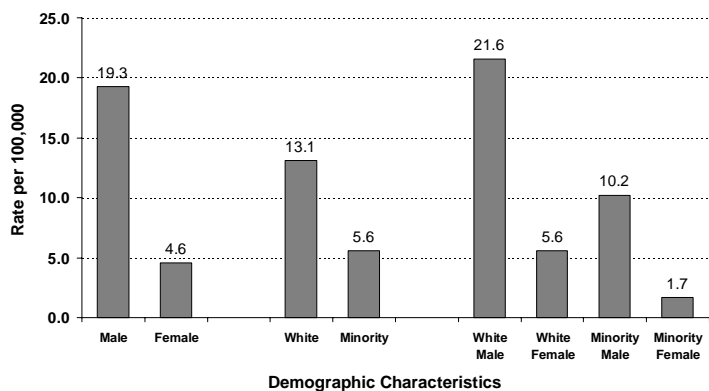


Figure 6 illustrates that males and whites had much higher age-adjusted suicide death rates than females and persons of other races. Males had an age-adjusted suicide rate four times as high as that for females, and the rate for whites was more than two times as high as that for persons of other races. Suicide death rates were highest for white males with about 22 deaths per 100,000 white male North Carolina residents, and lowest for females of other races with about 2 deaths per 100,000 female residents of other races.

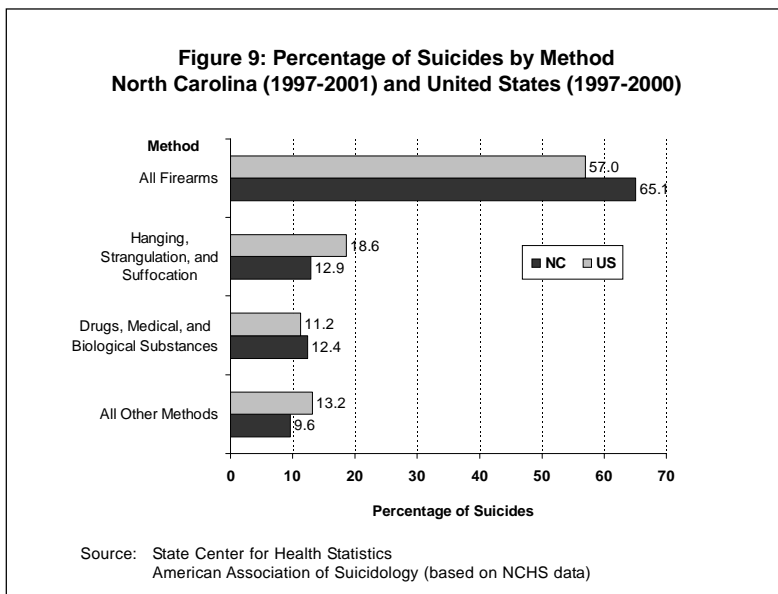
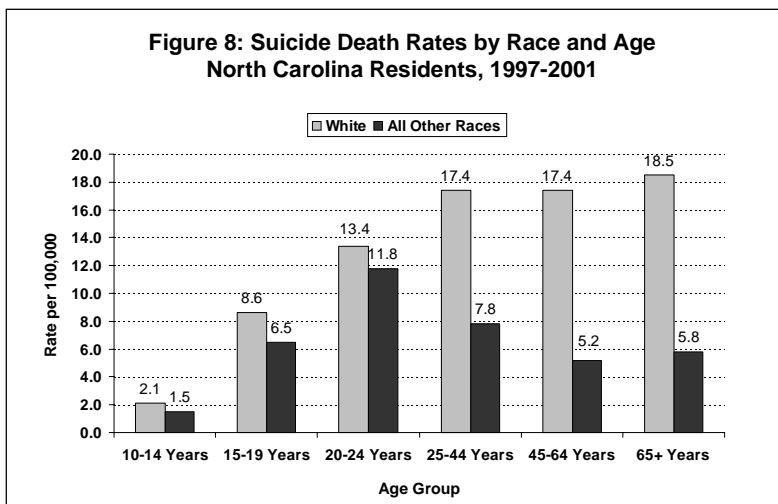
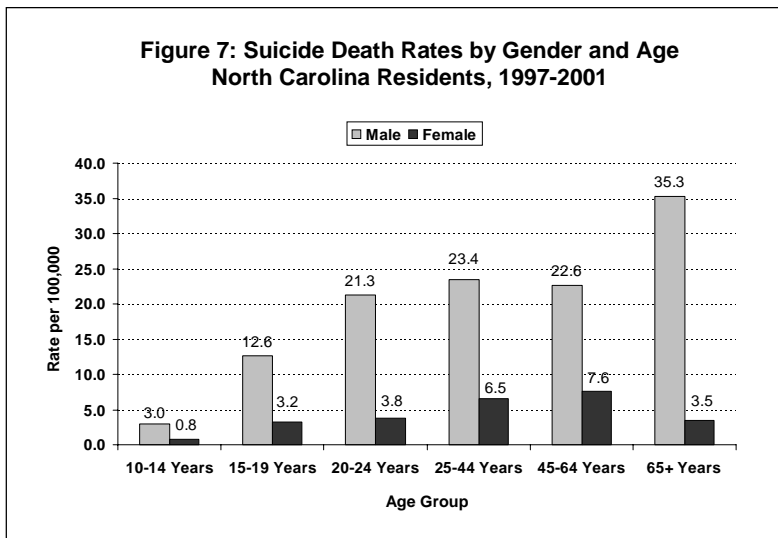
Male and female suicide death rates were most similar at ages 10-14 (3.0 versus 0.8), and diverged more and more with increasing age (Figure 7). Male and female rates were the most different for persons 65 and older (35.3 versus 3.5). The highest suicide rate for males was at age 65 and older (35.3), and the highest rate for females was at ages 45-64 (7.6).

White suicide rates and suicide rates for persons of other races were similar for ages 10-24 (see Figure 8). After age 24, the rates for persons of other races declined while the rates for whites increased. The highest suicide rate for whites was found for age 65 and older, while the highest suicide rate for persons of other races occurred at ages 20-24.

For ages 10-24 years, suicide death rates for white males and males of other races were much higher than the rates for white females and females of other races. White male suicide rates were only slightly higher than the rates for males of other races in the 10-24 years age group (rates per 100,000 population for 10-14 years: 3.3 versus 2.3; 15-19 years: 13.3 versus 10.9; and 20-24 years: 21.6 versus 20.6). For ages 25 and older, the suicide death rates for white males exceeded all other suicide rates considerably, including the suicide death rates for males of other races (25-44 years: 26.4 for white males versus 14.0 for males of other races; 45-64 years: 26.0 for white males versus 9.1 for males of other races; 65 and older: 39.5 for white males versus 13.8 for males of other races).

***Suicide deaths by suicide method***

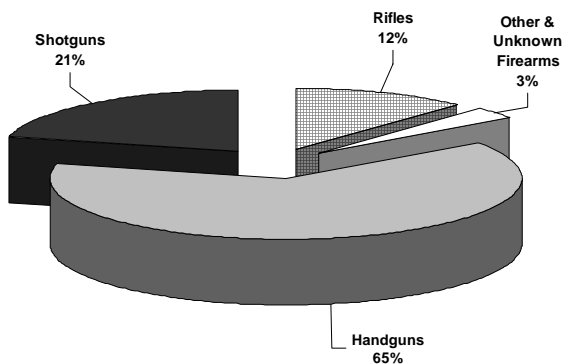
The use of external cause of injury codes on death certificates permits us to examine the suicide method used by the decedents. Figure 9 shows that of the 4,563 suicides completed in North Carolina in the time period 1997-2001, the majority was completed with the use of firearms (2,971



or 65.1%). A much smaller percentage of decedents hanged, strangled, or suffocated themselves (588 or 12.9%); used drugs, medical, and biological substances (564 or 12.4%); or used other methods (440 or 9.6%). Nationwide, 57.0 percent of all suicide deaths were caused by firearm discharge; 18.6 percent were caused by hanging, strangulation, and suffocation; 11.2 percent by drugs, medical, and biological substances; and 13.2 percent were caused by other methods in 1997-2000.<sup>5</sup> North Carolinians were more likely to use firearms and slightly more likely to use drugs, medical, and biological substances to take their lives than suicide decedents in the nation.

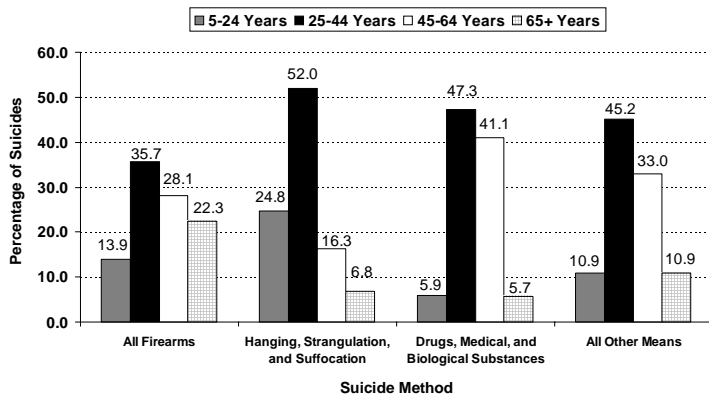
The reporting of the type of firearm used in North Carolina suicides is incomplete in the mortality data file. According to North Carolina death certificates, of the firearms used for suicide, 117 (4.0%) were handguns; 311 (10.5%) were rifles, shotguns or larger firearms; and 2,543 (85.6%) were unspecified firearms. The North Carolina Medical Examiner's data, on the other hand, are a more reliable source regarding the reporting of the type of firearms used in suicides. Of the 41,118 deaths investigated by the Medical Examiner during 1997-2001, 4,561 were suicides. Of the suicides investigated, 2,960 (64.9%) were completed with the use of guns. Handguns were used in 1,908 (64.5%) of the firearm suicides, shotguns in 607 (20.5%) of the firearm suicides, rifles in 343 (11.6%) of the firearm suicides, and other or unknown guns in 102 (3.4%) of the firearm suicides (Figure 10). In both North Carolina and the United States, most firearm suicides were carried out with handguns, although handguns were owned less frequently than other firearms.<sup>6</sup>

**Figure 10: Firearms Used by North Carolina Suicide Decedents, 1997-2001 (As Recorded by the Medical Examiner)**



Note: Percentages do not add to 100 percent due to rounding.

**Figure 11: Percentage of Suicides by Method and Age North Carolina Residents, 1997-2001**



The highest number of suicides was completed by persons ages 25-44, and 25-44 year olds also represented the highest proportion within each of the suicide-method groups (Figure 11). The 25-44 year olds accounted for 35.7 percent of all suicide fatalities by firearm discharge; 52.0 percent of all suicide fatalities by hanging, strangulation, and suffocation; 47.3 percent of all suicide fatalities by drugs, medical, and biological substances; and 45.2 percent of all suicide fatalities by other methods. About a quarter of the persons killed by hanging, strangulation, and suffocation were ages 5-24 although only 14 percent of all persons who died by suicide were age 24 and younger. Suicide decedents age 65 and older, representing 17 percent of all suicide deaths, accounted for about 22 percent of firearm suicide deaths.

A closer look at suicides by suicide method shows different gender preferences in the suicide method chosen (Figure 12). Seven out of ten suicides in men involved firearms. About one in seven men died by hanging, strangulation or suffocation. Firearms were used by approximately half of the female suicide decedents, and drugs, medical, and biological substances by about one-third. Both sexes were most likely to die from gunshot wounds. However, firearms clearly were the predominant method used by men, whereas women tended to choose either firearms or drugs, medical, and biological substances.

Overall, 65.5 percent of suicides of whites and 62.4 percent of suicides of persons of other races were by firearms.

***Hospitalizations for self-inflicted injury***

In the time period 1997-2001, there were 19,717 hospitalizations due to self-inflicted injury among North Carolina residents, about 3,943 hospitalizations per year. There were 274 persons hospitalized with self-inflicted injuries during 1997-2001 who died during medical care. Of all the hospitalizations, 7,704 (39.1%) were male, and 12,013 (60.9%) were female (Figure 13). The gender distribution for self-inflicted injury hospitalizations showed a strong contrast to the distribution of suicide deaths: whereas about 80 percent of the decedents by suicide were male and only about 20 percent were female, about 39 percent of persons hospitalized with self-inflicted injuries were male, and 61 percent were female. More women injured themselves but more men completed suicides.

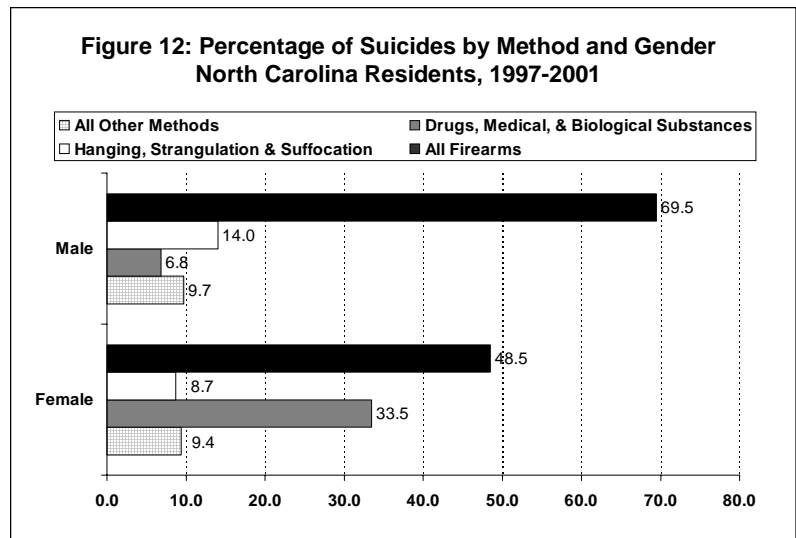
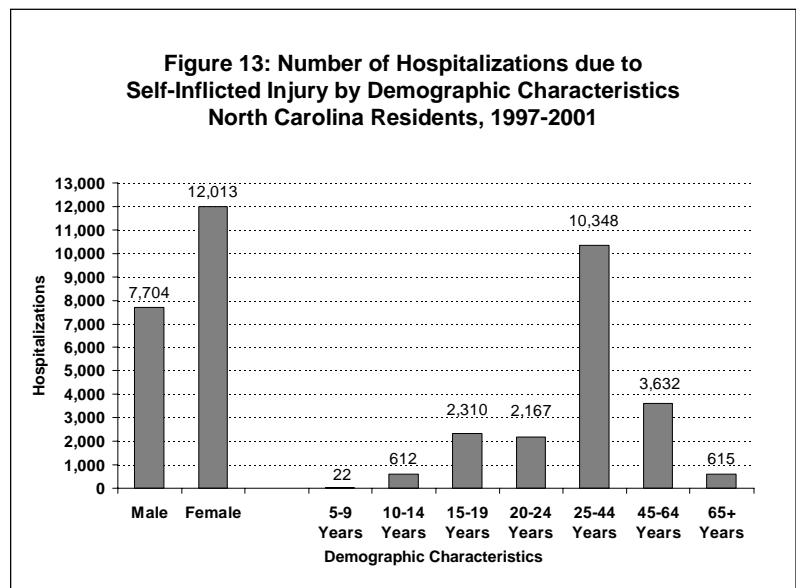


Figure 13 shows that 10,348 (52.5%) of persons hospitalized with self-inflicted injuries were 25-44 years old, at least twice the number of any of the other age groups. Hospitalizations due to self-inflicted injuries in persons under age 25 mostly occurred after age 15. However, even in children under age 10, there were 31 hospitalizations indicated to be due to self-inflicted injuries. Of the persons hospitalized with self-inflicted injuries, 5,111 (25.9%) were 5-24 years old, 3,632 (18.4%) were ages 45-64, and 615 (3.1%) were 65 years and older. Age was missing for two of the records.



For most age groups, females accounted for about 60 percent of the hospitalizations and males for about 40 percent. For ages 10-14, 80 percent of persons hospitalized for self-inflicted injury were female and 20 percent were male. For age 65 and older, the distribution was about 50/50.

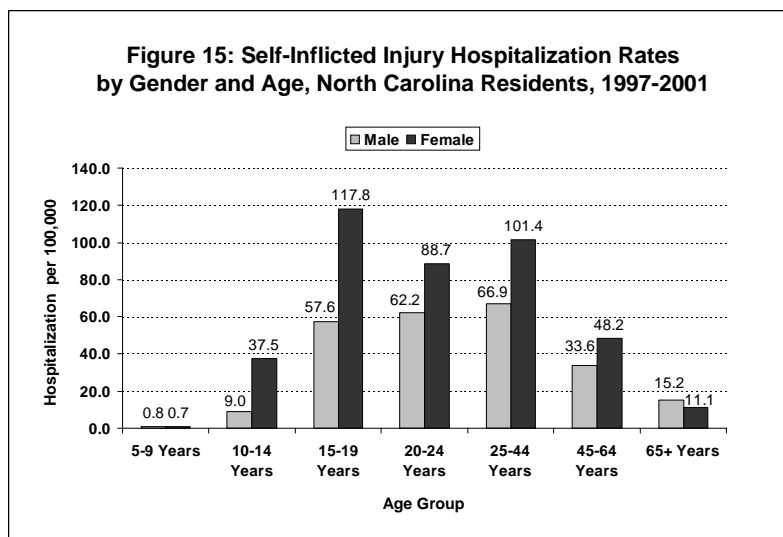
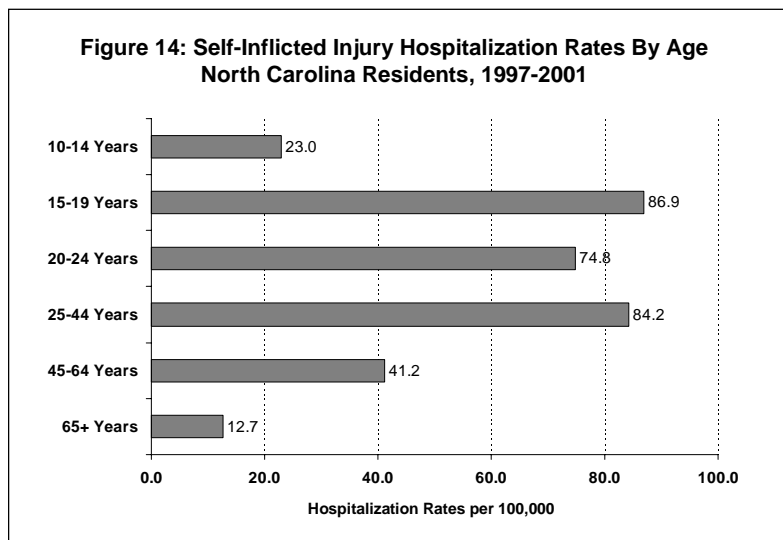
**Hospitalization rates for self-inflicted injury**

The age-adjusted hospitalization rate for self-inflicted injury for North Carolinians was 48.8 per 100,000 residents in the time period 1997-2001. Male North Carolina residents had an age-adjusted hospitalization rate for self-inflicted injury of 38.4, whereas females had an age-adjusted rate of 59.5. As mentioned earlier, the age-adjusted suicide death rates were 19.3 for males, and 4.6 for females.

Consequently, the ratio of self-inflicted injury hospitalizations to suicide deaths for males is about 2:1, and for females 13:1. In other words, for every two males with self-inflicted injuries that resulted in a hospitalization, one male completed a suicide. Among women, for every thirteen females hospitalized due to self-inflicted injuries there was one completed female suicide.

Age-specific self-inflicted injury hospitalization rates were highest for ages 15-19, 20-24, and 25-44, with the highest rate, 86.9, at ages 15-19 (see Figure 14). Two of the three highest rates pertained to persons age 24 and younger. Youth 10-14 years old had almost twice the hospitalization rate of persons age 65 and older, although the number of self-inflicted injury hospitalizations was almost the same. Since the population of persons age 65 and older was much greater than the population of 10-14 year olds, however, the rate for persons age 65 and older was considerably lower.

Female hospitalizations due to self-inflicted injuries were the main contributor to the high hospitalization rates for ages 15-44 (Figure 15). The differences between male and female rates diminished with age although female rates were higher than male rates until age 65. For ages 65 and older, the male hospitalization rate exceeded the female rate. The highest female hospitalization rate occurred at ages 15-19, the second highest at ages 25-44. For males, the highest rate was at ages 25-44, followed by the rate for the 20-24 year olds. In comparison, the highest suicide death rate for males was found at age 65 and older, and for females at ages 45-64. It appears that both males and females were more likely to engage in self-injury that did not result in death at a younger age, and more likely to die by suicide at an older age. The ratios of self-inflicted injury hospitalizations to suicide deaths were 22:1



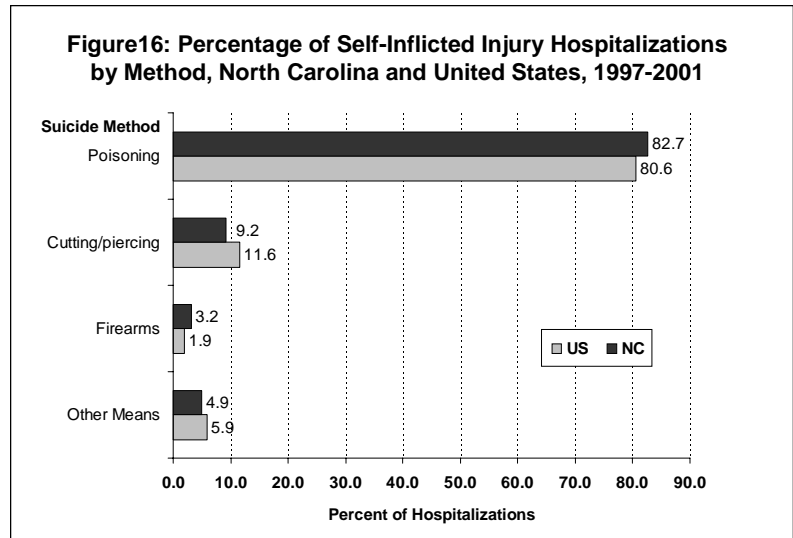


for ages 5-9, 12:1 for ages 10-14, 11:1 for ages 15-19, 6:1 for ages 20-24, 6:1 for ages 25-44, 3:1 for ages 45-64, and 1:1 for ages 65 and older.

**Self-inflicted injury hospitalizations by method of injury**

Of the 19,717 hospitalizations due to self-inflicted injury in North Carolina, 16,314 (82.7%) were related to self-poisonings; 1,816 (9.2%) were related to cutting and piercing injuries; 626 (3.2%) were related to firearm injuries; and 961 (4.9%) were related to injuries due to other methods (see Figure 16). The ICD-9-CM codes used to identify poisonings were E950.0-E950.9; only poisonings by solid or liquid substances are included in this category. Poisonings by gases in domestic use (E951) and poisonings by other gases and vapors (E952) were more rare. From 1997-2001, there were 4 hospitalizations due to poisonings by gases in domestic use, and 94 hospitalizations due to other gases and vapors. Sixty-one of the 94 hospitalizations due to other gases and vapors were related to poisonings by motor vehicle exhaust gas (E952.0). Since poisonings by gases in domestic use and other gases and vapors were relatively infrequent, they were included in the category *other methods*. The ICD-9-CM code to identify cutting and piercing injuries was E956; E955 was used to identify firearm injuries; and all other suicide and self-inflicted injury codes were subsumed under *other methods* (E951, E952, E953, E954, E957, E958, and E959).

North Carolina hospitalizations for self-inflicted injury by method were very similar to the national self-injury hospitalization estimates (Figure 16). National hospital discharge data estimates show that in the time period 1997-2001, 550,605 (80.6%) of the self-injury hospitalizations were poisonings; 79,097



(11.6%) were cutting and piercing injuries; 12,879 (1.9%) were firearm injuries; and 40,332 (5.9%) were injuries due to other methods.

Based on external cause of injury codes in the hospital discharge data in the years 1997-2001, 42 percent of the substances used for self-poisoning were tranquilizers and other psychotropic agents; about 25 percent were analgesics, antipyretics, and antirheumatics; 6 percent were barbiturates and other sedatives and hypnotics; and about 22 percent were other specified drugs and medicinal substances (Figure 17). Other substances were used in 7 percent of the cases. Most substances used for self-poisoning were prescribed medications.

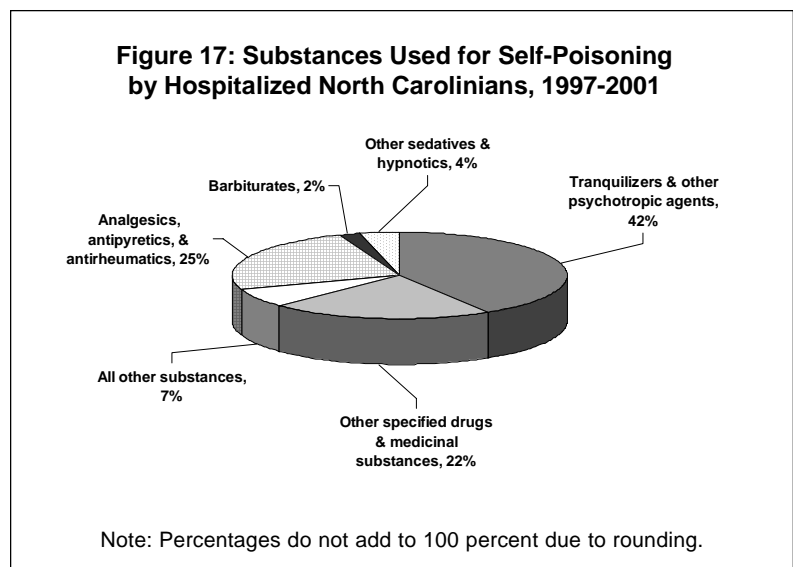
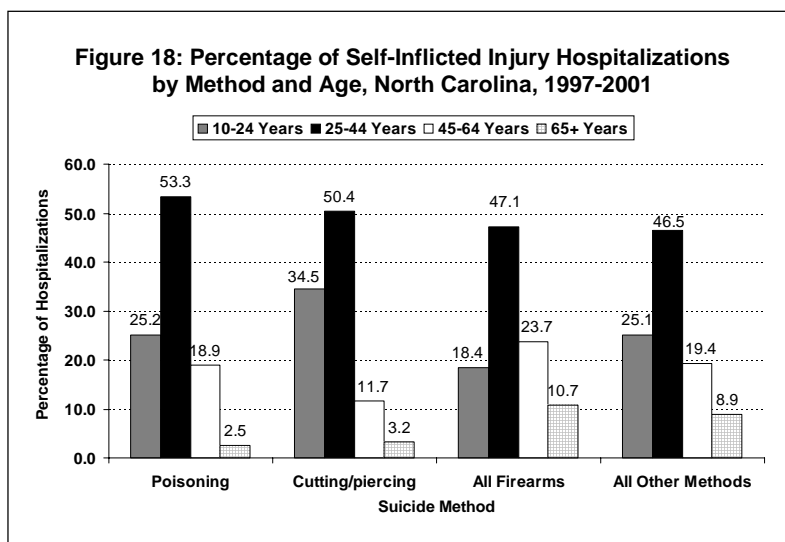


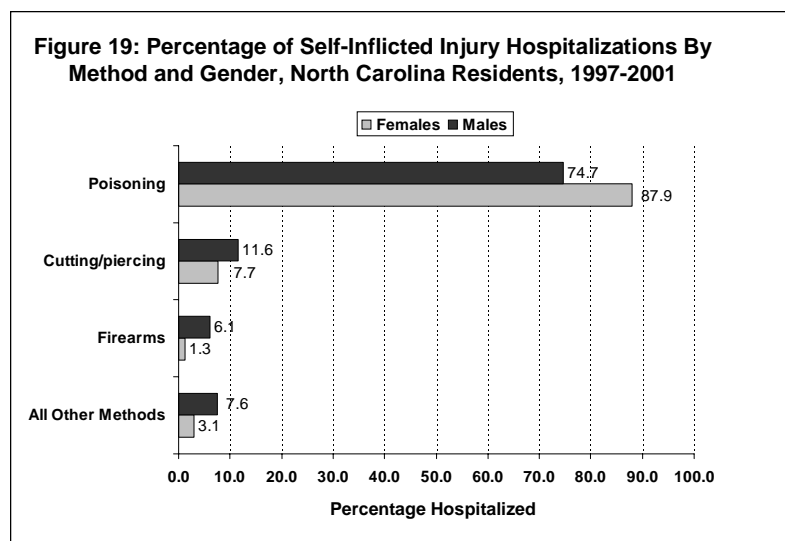
Figure 18 shows that self-inflicted injury hospitalizations peaked at ages 25-44. This age group represents the highest percentage of self-injury hospitalizations for each of the methods. Over a third of all persons hospitalized due to self-inflicted cutting and piercing injuries were 10-24 years old, although persons ages 10-24 accounted for only about a quarter of all persons with self-inflicted injuries. Eighteen percent of all self-inflicted injuries occurred among 45-64 year olds; however, 24 percent of all firearm-related injuries fall into this age group. The difference is even more noticeable for persons age 65 and older: 11 percent of all firearm-related hospitalizations occurred in this age group, although only about 3 percent of all hospitalizations due to self-inflicted injuries involved persons age 65 and older.

Three out of four self-inflicted injury hospitalizations of males and almost nine out of ten self-inflicted injury hospitalizations of females were due to poisoning. Another 12 percent of males inflicted cutting or piercing injuries upon themselves, and about 8 percent used other methods (Figure 19). About 8 percent of females hospitalized with self-inflicted injuries had cutting or piercing injuries; other methods were chosen very infrequently. These patterns for North Carolina did not differ from those shown by national hospital discharge data for the same time period.

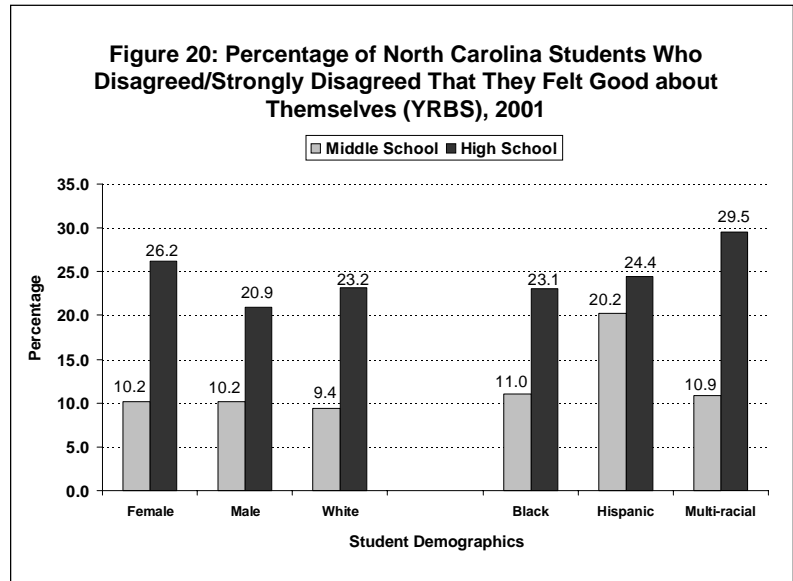


### North Carolina Youth Risk Behavior Survey

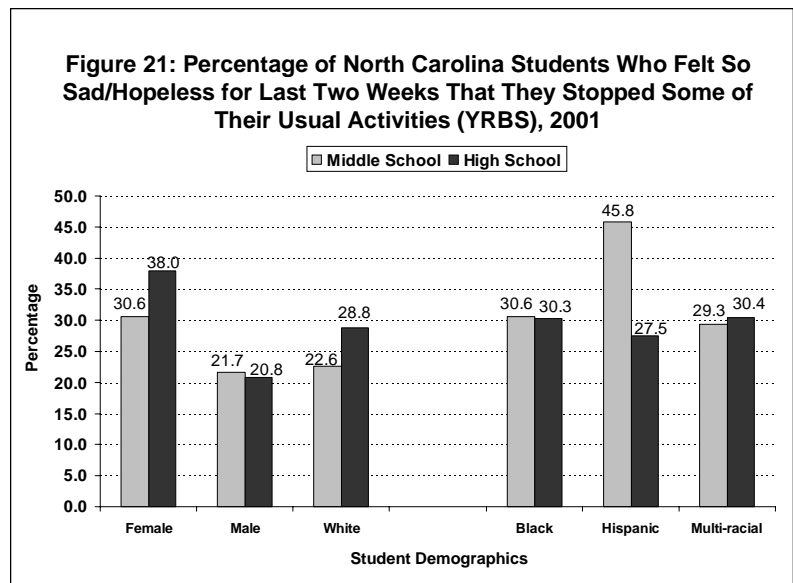
The Youth Risk Behavior Survey<sup>7</sup> is a national survey of school children (grades 6-12) supported by the Centers for Disease Control and Prevention (CDC) to assess and monitor youth health risk behaviors such as violence-related behavior, tobacco use, alcohol use, and other drug use. The survey also collects data on personal well-being such as personal safety, health education, physical health, nutrition, physical activity, psychological health, and the perceived safety of the school environment. A written survey is administered in North Carolina every two years to a random sample of approximately 2,200 middle school and approximately 2,500 high school students; participation is anonymous and voluntary. Local procedures related to parental permission are followed. YRBS data are reported by gender, race/ethnicity, and school grade. The middle school survey addresses grades 6-8 and the high school survey addresses grades 9-12. The YRBS was not conducted in North Carolina in 1999.



One of the questions middle and high school students were asked in 2001 was if they felt good about themselves. Students could select that they strongly agreed, agreed, were not sure, disagreed, or strongly disagreed that they felt good about themselves. More than twice as many North Carolina high school students as middle school students selected that they disagreed or strongly disagreed that they felt good about themselves. About 24 percent of the high school students and about 10 percent of the middle school students responded that they did not feel good about themselves on the most recent survey. Female (26.2%) and multi-racial (29.5%) high school students and Hispanic middle school students (20.2%) had a higher percent who disagreed that they felt good about themselves compared with other middle and high school students (Figure 20).



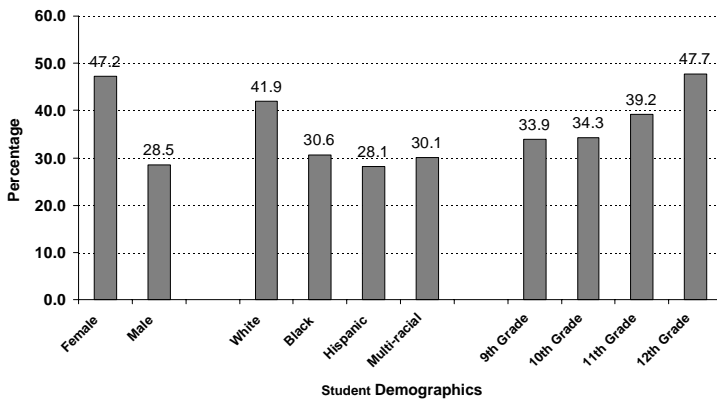
High school and middle school students were asked if, during the past 12 months, they ever felt so sad or hopeless for almost every day for two weeks or more in a row that they stopped doing some usual activities. About a quarter of the middle school students, and about 30 percent of the high school students responded in 2001 that they felt so sad and hopeless for two weeks or more in a row that they did stop some of their usual activities. Almost half of the Hispanic and over 30 percent of the female students in middle school, and 38 percent of the female high school students, selected this answer (Figure 21).



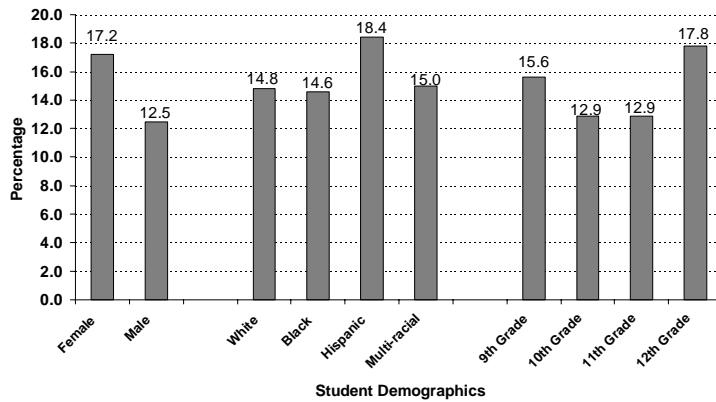
In the 2001 YRBS survey, high school students were asked how often they felt stress in their lives. The answer choices offered were that they never, rarely, sometimes, most of the time, or all of the time felt stress in their lives. Female, white, and 12<sup>th</sup> grade high school students reported most frequently that they felt

stress in their life most or all of the time. Almost one in two females, one in two 12<sup>th</sup> graders, and about 42 percent of the white students selected this response in the 2001 YRBS. Hispanic and male high school students were the least likely to feel stress in their life most or all of the time (Figure 22). (This question was not administered to middle school students.)

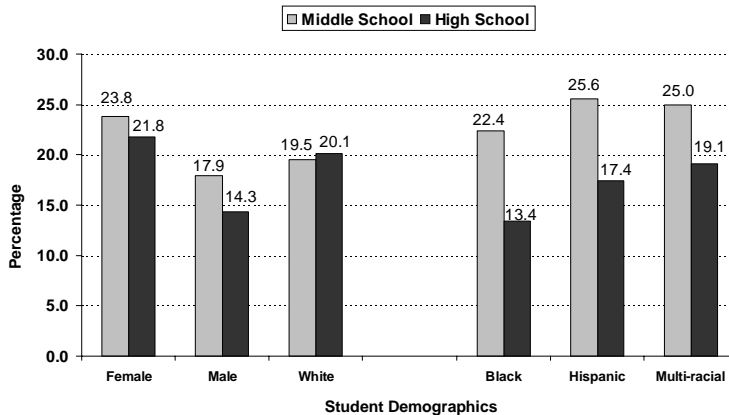
**Figure 22: Percentage of North Carolina High School Students Who Feel Stress in Their Life Most/All of the Time (YRBS), 2001**



**Figure 23: Percentage of North Carolina High School Students Who Feel Alone in Their Life (YRBS), 2001**



**Figure 24: Percentage of North Carolina Students Who Reported that They Had Seriously Thought about Killing Themselves (YRBS), 2001**



When presented with the statement *I feel alone in my life*, female, Hispanic, and 12<sup>th</sup> grade high school students agreed most frequently in 2001 that they did feel alone in their life (about 17% to 18%). Males, 10<sup>th</sup> graders, and 11<sup>th</sup> graders were least likely to select that answer (Figure 23). (This question was not administered to middle school students.)

Middle school students were more likely than high school students to report that they had ever seriously thought about killing themselves (Figure 24). For 2001, female, Hispanic, and multi-racial middle school students were the most likely to respond that they had ever seriously thought about killing themselves. Female, white, and multi-racial high school students were most likely to report that they had ever seriously considered attempting suicide during the past 12 months. (Note: The wording of the question differed slightly in the surveys. Middle school students were asked if they ever seriously thought about killing themselves, and high school students were asked if, during the past 12 months, they ever seriously considered attempting suicide.)

North Carolina middle school students not only reported seriously considering suicide more often than high school students, they also reported more frequently than high school students that they had attempted suicide in 1997 (11.3% versus 8.8%). (This question was not asked in 2001.) Among middle school students in 1997, females (14.7%), students of other races (14.5%), and 8<sup>th</sup> graders (13.2%) were most likely to report that they had tried to end their lives. Female (10.8%), 9<sup>th</sup> grade (12.0%), and 10<sup>th</sup> grade (9.2%) high school students reported most frequently that they had attempted suicide.

Slightly less than 3 percent of high school students reported in 1997 that they were injured, poisoned, or overdosed due to a suicide attempt. (This question was not asked in 2001.)

The accuracy of the information related to suicide that is self-reported by middle and high school students is not known.

## Summary and Discussion

At least 24,280 North Carolinians injured themselves or ended their lives in the time period from 1997 through 2001. In this time period, 4,563 completed suicides and 19,717 hospitalizations due to self-inflicted injuries were reported in North Carolina. This does not count persons treated in emergency rooms or doctors' offices who were not admitted to the hospital.

Males were considerably more likely than females to complete suicide (79% of all suicide fatalities were males). Sixty-nine percent of the suicide decedents were white males, and about 10 percent were males of other races. Females accounted for about 21 percent of the suicide deaths. The vast majority of female suicide decedents were white; females of other races were the least likely to die by suicide.

Among all the age groups, 25-44 year olds accounted for the highest number of suicides in North Carolina, but the highest suicide rate was found for persons age 65 and older. Suicide was the fourth leading cause of death in North Carolina for 5-14 year olds, and the third leading cause of death for 15-24 year olds for most years in the time period from 1997 through 2001. The highest suicide death rate for persons of other races was observed for ages 20-24, while the highest rate for whites occurred at age 65 and older. The number of suicides and age-specific suicide death rates per 100,000 population are shown in Table 2. For persons age 25 and older, more detailed age groups are shown than those used previously in this report. For North Carolina, within the age group 65 and older, persons ages 75 to 84 had the highest suicide rate in 1997-2001.

High suicide rates among senior citizens, especially among white males, have been noted before.<sup>8,9</sup> Nationwide, the highest suicide rate within the older population was found for white males age 85 and older.<sup>8,9</sup> Older Americans tended to use highly lethal methods,<sup>10</sup> have a smaller suicide attempt to suicide

**Table 2: Number of Suicides and Age-Specific Suicide Death Rates per 100,000 North Carolina Population 1997-2001**

Age	Number	Rate
5-9	1	0.0
10-14	51	1.9
15-19	212	8.0
20-24	375	12.9
25-34	825	13.7
35-44	1,009	16.1
45-54	822	15.5
55-64	485	13.7
65-74	417	15.6
75-84	288	17.7
85 and older	78	14.7

death ratio, and were likely to have visited their health care providers prior to the suicide (which provided an opportunity for intervention).<sup>8,11</sup> Untreated mental illness, loneliness, and physical health problems are risk factors for suicide among older Americans.<sup>8</sup>

In North Carolina, the number of suicide deaths by males of other races ages 10-24 was disproportionately high (males of other races comprised 21% of the suicides in this age group compared to only 10% of all suicides). In 1997-2001, the large majority of young male suicide decedents of other races (ages 10-24) in the state were African American (117 or 83.6%). Nationwide, an increase in suicides for African-American youth has raised concerns (e.g., The Surgeon General's Call to Action 1999<sup>8</sup>). The increase was particularly strong in the American South.<sup>12</sup> Due to this increase, the suicide rates of white and African American youths converged in recent decades in the nation as well as in North Carolina.<sup>1,13</sup> One factor that has been mentioned as contributing to the increase in African American youth suicides is the development of a new African American middle class, causing additional stress for adolescents having to orient themselves under these new circumstances.<sup>12,13</sup> This development may play a role in addition to the risk factors that apply to youth in general, such as a family or personal history of psychological problems,

including previous suicide attempts and suicidal thoughts; loneliness and despair; behavioral problems including violence; and access to lethal suicide methods such as firearms. More research is needed to substantiate that these or other risk factors are associated with the increase in suicides among African-American youth ages 10-24, and to develop specific suicide prevention programs.

About a quarter of all persons that ended their lives by hanging, strangulation, or suffocation were 5-24 years old, although only 14 percent of all suicide fatalities occurred in this age group. Similar patterns were seen in other areas of the United States.<sup>14, 15</sup>

North Carolina, a state with traditionally higher percentage of household firearm ownership (42% vs. 34% nationally),<sup>16, 17</sup> has a higher percentage of firearm suicides than the nation. In the study period 1997-2001, the majority of suicides by North Carolinians were carried out with firearms (65%), exceeding the national average (57%). Suicide by firearm discharge was the method chosen most frequently by both genders and in each of the age groups studied.

Data from the North Carolina Behavioral Risk Factor Surveillance System (BRFSS), a random telephone survey of state residents age 18 and older in households with telephones, were used to portray firearm ownership in North Carolina. Household firearm ownership data (as measured by the BRFSS) and

firearm suicides according to North Carolina death certificate data were analyzed by three regions: Eastern North Carolina, the Piedmont region, and Western North Carolina.<sup>18</sup> North Carolina age-adjusted firearm suicide rates varied by region, and were associated with the percentage of households owning firearms. Western North Carolina had the highest percentage of households owning firearms and the highest firearm suicide rate (see Table 3).

About 42 percent of North Carolinians age 18 and older reported in 2002 that they had a firearm in or around their home, according to the BRFSS for North Carolina. Nationwide, about 34 percent of persons age 18 and older reported having a firearm in or around the home. Among the persons who reported having a firearm at their home, 28 percent of North Carolinians versus 23 percent nationwide stated that the firearm was loaded. Fifty-nine percent of North Carolinians, and 60 percent nationwide, reported that the loaded firearm was not locked. (For issues related to the reporting of firearm ownership and storage practices by the owner or a non-owner see Azrael, Miller, and Hemenway 2000.<sup>19</sup>)

The association between the availability of firearms and suicide by firearm discharge has been discussed widely since the 1990s. A number of research studies have found associations between household firearm ownership and suicide rates,<sup>20-22</sup> between regional differences in firearm ownership and regional suicide rates,<sup>23,24</sup> and between recent firearm (handgun) purchase and suicide rates.<sup>25,26</sup>

<b>Table 3: Percentage of Households Keeping Firearms in or Around the House (BRFSS 2002) and Firearm Suicide Rates (1997-2001) for North Carolina Regions</b>		
<b>North Carolina Region</b>	<b>Percentage of Households Keeping Firearms (BRFSS 2002)</b>	<b>Age-Adjusted Firearm Suicide Rate (1997-2001)</b>
Eastern North Carolina	41.4	7.6
Piedmont Region	38.6	6.7
Western North Carolina	54.3	9.8

Note: 2002 BRFSS data were chosen because of the greater sample size.

The availability of firearms to suicidal persons poses a high risk for attempt and completion of a suicide. Firearm suicides, especially among young persons, are likely to be based on an impulsive decision. The lethality of firearms as a suicide method leads to death in most cases because of the severity of the injury and the small window of opportunity for rescue. Social isolation, particularly of older persons, makes rescue even more unlikely.

In addition to firearms, females tended to use biological and medical substances quite frequently (34% of all female suicides). In contrast, males tended to die by hanging, strangulation, or suffocation if they used a suicide method other than firearm discharge.

Characteristics of hospitalizations due to self-inflicted injury differed greatly from those of suicide deaths. In the time period 1997 through 2001, about 39 percent of North Carolinians hospitalized due to intentional self-injury were male and about 61 percent were female. Nationwide, the percentages of males and females hospitalized with self-inflicted injuries were very similar.

In North Carolina, more than four intentional self-injury hospitalizations were reported for every one completed suicide. The ratios of self-inflicted injury hospitalization to suicide death, however, differed considerably for specific age groups. For persons age 24 and younger, the ratio was about eight intentional self-injury hospitalizations to one completed suicide, but for older persons the ratio changed to about one completed suicide to one hospitalization. The Goldman Institute of Aging mentions, as reasons for the differences in ratios, that older persons who died by suicide tended to choose a more lethal suicide method, were socially more isolated, and had lower recuperative ability compared to younger persons.<sup>27</sup>

The ratio of self-inflicted injury hospitalization to suicide death for male North Carolinians was two self-injury hospitalizations to one completed suicide, and for females it was thirteen self-injury hospitalizations to one completed suicide. It could be hypothesized that self-injury by females allows for others to step in and help, while males appear to be more determined to end their lives.

For the study period, the highest self-injury hospitalization rates were found for young and middle-aged North Carolinians (ages 15-44). Female hospitalization rates were greater than male hospitalization rates up to age 64, then male rates surpassed female rates.

In North Carolina, about 83 percent of all self-inflicted injuries resulting in a hospital admission were due to poisoning. Poisoning was the method of self-injury chosen most frequently in all age groups studied, and cutting and piercing was chosen second. Tranquilizers and other psychotropic agents were used most frequently in poisonings that led to hospitalization, followed by analgesics, antipyretics, and anti-rheumatics. Of all 10-24 year olds that were hospitalized due to poisoning, 41 percent had used analgesics, antipyretics, or antirheumatics. Older North Carolinians hospitalized due to poisoning had used tranquilizers and other psychotropic agents most frequently (45% of 25-44 year olds, 50% of 45-64 year olds, and 45% of persons age 65 and older). In a study published in the early 1990s, psychotropics and analgesics were found to be the main drugs used for self-poisoning attempts in adults resulting in a hospitalization both in Western Europe and North America.<sup>28</sup> In North Carolina, older persons hospitalized with self-inflicted injuries were more likely to have used firearms, or other methods, than younger persons.

The U.S. Department of Health and Human Services *Healthy People 2010*,<sup>29</sup> a comprehensive national plan for health promotion and disease prevention, lists health objectives in 28 focus areas. Focus area 18 concentrates on mental health and mental disorders. It is here that objectives concerning suicide and suicide attempts were addressed. Objective 18-1 calls for a reduction of the age-adjusted suicide rate to 5.0 suicides per 100,000 population. North Carolina's age-adjusted suicide rate in the study period was 11.7 for 1997, 10.8 for 1998, 11.0 for 1999, 11.7 for 2000, and 12.0 for 2001, more than two times the Healthy People 2010 target rate.

Objective 18-2 calls for a reduction in the rate of suicide attempts by adolescents to a 12-month average of one percent. For this measure, data from the YRBS were used. The 2001 North Carolina YRBS did not include the question asking if a high school student had

attempted suicide in the last 12 months. In 1997, the most recent year the question was asked, 8.8 percent of the high school students reported that they had attempted suicide in the past 12 months. The percentage reported in 1997 did not differ much from previous years. Other measures, such as the percentage seriously considering attempting suicide, could be used as alternate indicators. In 2001, 18.1 percent of high school students, and 20.8 percent of middle school students reported that they had seriously considered attempting suicide in the past 12 months. These indicators suggest that much needs to be done in order to move toward the Healthy People 2010 goals.

## Conclusion

The 1999 Surgeon General's Call To Action announced that "The nation must address suicide as a significant public health problem and put into place national strategies to prevent the loss of life and the suffering suicide causes."<sup>8</sup> He published 15 key recommendations, based on an approach that involves awareness, intervention, and methodology (AIM). AIM and its recommendations are designed to outline a course for suicide prevention now and serve as a foundation for the more comprehensive National Strategy for Suicide Prevention.<sup>30</sup>

In the five years 1997 through 2001, 4,563 North Carolina residents died by suicide and 19,717 North Carolina residents were hospitalized for self-inflicted injuries. Persons who were treated for self-inflicted injuries in emergency rooms or at their doctor's office were not included in these counts. Additionally, suicide was among the ten leading causes of death for persons ages 5-64, for males, and for whites in North Carolina during the time period studied. Suicide and self-injuring behavior is a widespread problem in our state.

Data on hospitalizations related to self-poisoning emphasize the relationship between psychological problems and self-injuring behavior. In North Carolina, mental-health-related drugs such as tranquilizers and other psychotropic drugs were used as the main substance for self-poisoning by persons age 25 and older.

The information gathered in this report emphasizes that suicide is a serious public health problem that needs to be addressed. Reducing the number of suicides and self-inflicted injuries requires:

- Raising the awareness of suicide, its risk factors, and possible signs.
- Developing screening and intervention programs in order to help prevent suicide deaths and hospitalizations due to self-inflicted injuries.
- Fostering research focusing on improving the identification of suicide risk factors as well as protective factors and appropriate interventions.
- Creating partnerships across the various agencies involved in caring for suicidal persons in order to combine knowledge, resources, and efforts.

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18. The three North Carolina regions include:  
**Eastern North Carolina:** Beaufort, Bertie, Bladen, Brunswick, Camden, Carteret, Chowan, Columbus, Craven, Cumberland, Currituck, Dare, Duplin, Edgecombe, Gates, Greene, Halifax, Harnett, Hertford, Hoke, Hyde, Johnston, Jones, Lenoir, Martin, Nash, New Hanover, Northampton, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Pitt, Robeson, Sampson, Scotland, Tyrrell, Washington, Wayne, and Wilson counties.  
**Piedmont:** Alamance, Alexander, Anson, Cabarrus, Caswell, Catawba, Chatham, Cleveland, Davidson, Davie, Durham, Forsyth, Franklin, Granville, Guilford, Iredell, Lee, Lincoln, Mecklenburg, Montgomery, Moore, Orange, Person, Randolph, Richmond, Rockingham, Rowan, Stanly, Stokes, Union, Vance, Wake, Warren, and Yadkin counties.

- Western North Carolina:** Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, McDowell, Macon, Madison, Mitchell, Polk, Rutherford, Surry, Swain, Transylvania, Watauga, Wilkes, and Yancey counties.
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