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Trends in Alcohol-Related Morbidity and Mortality

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Synopsis

Two major trends regarding alcohol use and consequences of alcohol abuse in the United States are showing significant improvement. Continued declines are evident in age-adjusted rates of liver cirrhosis mortality, and per capita alcohol consumption is at its lowest level in 15 years. Two other trends, however, are less clear. After declining in 1982 and continuing through 1984, alcohol-related morbidity—as measured by principal diagnoses listed on short-stay, community hospital discharges—showed a slight increase in 1985. Similarly, after declining every year but one since 1981, alcohol-related motor vehicle fatalities showed a significant increase in 1986.

The downward trends suggest that progress is being made in efforts to reduce alcohol-related deaths and morbidity, but there are no easy explanations for any of the trends. Reductions in liver cirrhosis death rates may reflect coding changes in liver disease categories, less chronic heavy drinking, or better medical care. Lower per capita alcohol consumption may indicate the public's increased awareness of drinking risks or the aging of the U.S. population. Ironically, the recent increase in alcohol-related motor vehicle fatalities may reflect stronger enforcement of drunk driving laws and increased BAC (blood alcohol content) testing.

THE NATIONAL INSTITUTE on Alcohol Abuse and Alcoholism (NIAAA) regularly examines trends in mortality related to liver cirrhosis, alcohol-related fatal traffic accidents, apparent per capita alcohol consumption, and alcohol-related diagnoses in discharges from non-Federal, short-stay community hospitals. These surveillance activities allow the Institute to monitor and analyze both alcohol consumption and key mortality and morbidity indicators that are related to the use and abuse of alcohol.

This paper reports on trends in apparent alcohol consumption and three alcohol problem indicators. The report updates several sections of the epidemiology chapter in the Secretary's "Sixth Special Report to the U.S. Congress on Alcohol and Health" (*1*). However, the information presented is necessarily brief. More detailed information can be

obtained from the individual reports (*2–5*), which are available upon request from NIAAA's Alcohol Epidemiologic Data System.

Liver Cirrhosis Mortality

Liver cirrhosis is the ninth leading cause of death in the United States. However, among 25- to 44- and 45- to 64-year-olds, respectively, liver cirrhosis is the sixth and the fifth leading cause of death. According to mortality data from the National Center for Health Statistics (NCHS), liver cirrhosis accounted for 454,722 of the 29.4 million deaths in the United States during the years 1971–85. A total of 26,927 deaths was attributed to liver cirrhosis in 1985, the latest year for which the mortality data are available (*2*).

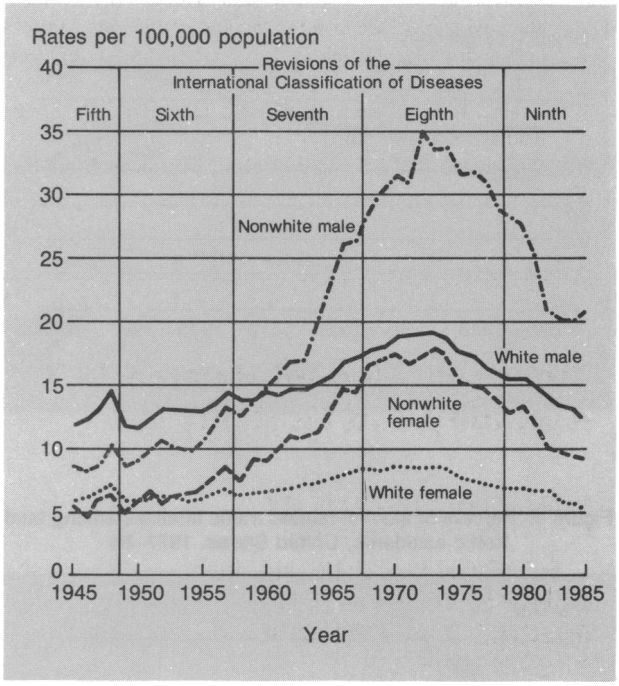
After a sharp increase and then a decline in the years 1945 through 1949, the overall age-adjusted death rate for liver cirrhosis generally increased through the 1950s and 1960s until the rate peaked at 15.0 per 100,000 population in 1973 (data not shown). Since then, the overall cirrhosis death rate has decreased each year, except for a very slight increase in 1980. In 1985, the age-adjusted death rate for liver cirrhosis declined to 9.7 per 100,000 population, a reduction of 35.3 percent since 1973, and the lowest rate in 30 years.

According to race-sex breakdowns of liver cirrhosis death rates, the risk of liver cirrhosis death for males is consistently higher than for females, regardless of race (fig. 1). The most dramatic change in cirrhosis mortality since 1945 occurred among nonwhite males, whose rate increased fourfold by 1973, surpassing the rate for white males in 1960. Rates for white and nonwhite females were virtually identical from 1945 to 1952, but by 1973 the rate for nonwhite females was more than twice the rate for white females.

Declines in cirrhosis mortality, however, have not been consistent across different age-specific race and sex groups (data not shown). Between 1971 and 1985, for example, cirrhosis death rates increased for white and nonwhite women over age 64 and for nonwhite men ages 75 and older. Also, nonwhite men and women ages 25 to 44 years had greater rates of cirrhosis mortality than white men and women in the same age group.

Unlike overall rates for liver cirrhosis, death rates for subcategories of liver cirrhosis have not declined uniformly. Since 1973, specified cirrhosis deaths without mention of alcohol have been declining more rapidly than either unspecified cirrhosis without mention of alcohol or cirrhosis with

Figure 1. Age-adjusted death rates from liver cirrhosis by race and sex, United States, 1945-85



mention of alcohol. Age-adjusted death rates for alcohol-related cirrhosis were 5.9 per 100,000 in 1971 and 4.4 per 100,000 in 1985, even though proportionate mortality for alcohol-related cirrhosis increased by 12.1 percent. Such discrepancies may be due to true changes or to the use of a greater number of liver cirrhosis subcategories in the International Classifications of Diseases, Ninth Revision (ICD-9) compared to ICD-8 (*2,6*).

Apparent Per Capita Alcohol Consumption

Each year NIAAA produces estimates of the average per person consumption of alcoholic beverages in gallons of ethanol. The estimates apply to the U.S. population 14 years of age and older, the assumed drinking age population. The per capita estimates of alcohol consumption are based on beverage sales or tax receipt data, or both, from individual States, plus some data from beverage industry sources (*3*).

Trends in apparent per capita alcohol consumption for all alcoholic beverages combined indicate that alcohol consumption rose rapidly from the repeal of Prohibition through 1946, declined in 1947 and 1948, remained relatively stable during the 1950s, and started to rise again in the 1960s and 1970s (data not shown). In the latter period, per capita consumption of all alcoholic beverages

Figure 2. Apparent per capita consumption of alcoholic beverages by beverage type, United States, 1950–86

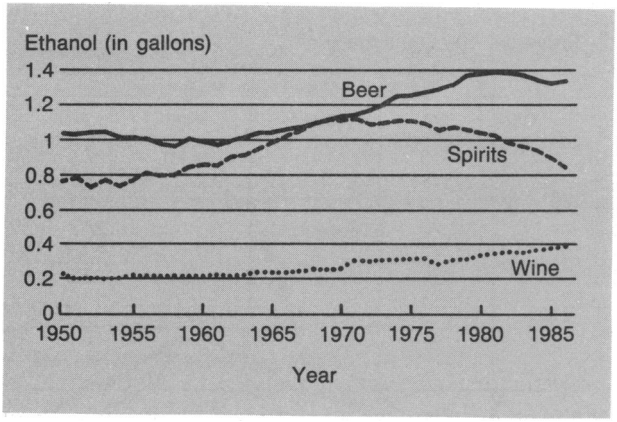
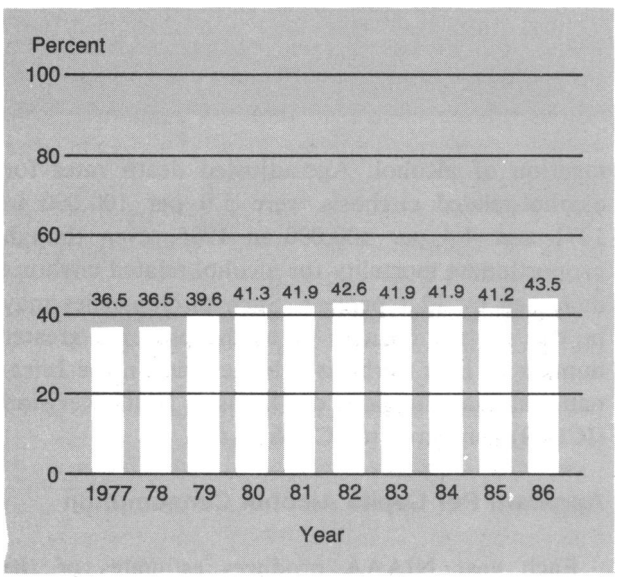


Figure 3. Percent of alcohol-related traffic fatalities among fatal traffic accidents, United States, 1977–86



combined rose 39.4 percent from 1958 to 1981, when the figure peaked at 2.76 gallons. Since then, however, overall per capita consumption has decreased for 5 successive years, ending at 2.58 gallons of ethanol per person in 1986, a decrease of 6.5 percent.

The 1950–86 trends in per capita alcohol consumption by beverage type, on the other hand, show different patterns for beer, wine, and spirits. As shown in figure 2, spirits consumption started to level off or decline around 1970, while beer consumption continued to increase and surpassed spirits consumption by 1970. Per capita spirits consumption declined 20.5 percent between 1978, its peak year, and 1986, the latest year for which the per capita figures have been calculated by NIAAA. Consumption of wine remained relatively stable at around .22 gallons of ethanol per person until 1960. Since then, it has evidenced a rather steady increase to .39 gallons in 1986, an overall increase of 77.3 percent. However, most of the increase in wine consumption since 1984 has been attributed to wine cooler sales (*7*).

Short-Stay Community Hospital Discharges

NIAAA examines alcohol-related morbidity using data from the National Hospital Discharge Survey (NHDS) (*4,8*). The NHDS stratifies non-Federal community hospitals in the United States by size and geographic region and then randomly samples discharges at those hospitals with six or more beds and an average length of stay of less than 30 days. Each hospital discharge record contains from 1 to 7 diagnostic codes that allow examination of principal mention (first-listed) diagnoses and any mention (all-listed) diagnoses. (All-listed or any mention means listed anywhere on the medical record.)

Annual discharges from short-stay community hospitals for persons ages 14 years and older have ranged from 32 to 35 million between 1979 and 1985. Discharges with principal mention of an alcohol-related diagnosis have ranged between 1.7 and 1.9 percent of the total; discharges with any mention of an alcohol-related diagnosis have ranged between 3.0 and 3.5 percent. Obviously, examination of principal diagnoses alone masks morbidity that is associated with alcohol abuse.

Discharge rates per 10,000 population for principal mention and any mention of an alcohol-related diagnosis for 1979 through 1985 are as follows (*4*):

Year	*Principal mention (first-listed)*	*Any mention (all-listed)*
1985	31.2	58.3
1984	30.8	57.6
1983	31.5	57.1
1982	34.4	59.5
1981	37.5	61.8
1980	37.4	61.1
1979	36.1	59.1

Discharges with principal mention of an alcohol-related diagnosis were at a high of 37.5 per 10,000 population in 1981 and decreased steadily to 30.8 per 10,000 population in 1984, a drop of 17.9 percent. In 1985, rates for principal mention of an alcohol-related diagnosis were up slightly from 1984 to 31.2 per 10,000 population but, over the 7 years, rates for principal mention of an alcohol-

Rates per 10,000 population for specific principal diagnoses[1] among hospital discharges with any mention of an alcohol-related diagnosis, United States, 1979–85

Year	Alcohol dependence syndrome	Chronic liver disease and cirrhosis	Alcoholic psychoses	Nondependent abuse of alcohol	Not alcohol-related
1985	21.1	4.6	3.3	2.1	27.4
1984	21.6	4.4	2.8	1.9	27.0
1983	21.6	5.2	2.5	2.2	25.7
1982	23.4	5.4	3.1	2.6	25.1
1981	25.2	4.2	4.0	2.1	24.5
1980	25.2	6.5	3.7	2.1	23.7
1979	25.6	5.8	2.6	2.2	23.0

[1]See Stinson (*4*) for the components of each of the alcohol-related diagnostic categories.

related diagnosis decreased by 13.6 percent. However, there was no similar decrease in the rates of discharges with any mention of an alcohol-related diagnosis. This disparity suggests that, even though alcohol-related morbidity among hospital discharges has not diminished in recent years, the severity of alcohol-related morbidity may be decreasing.

Also, there has been general consistency in the relative prevalence of specific categories of an alcohol-related principal diagnosis among hospital discharges with any mention of an alcohol-related diagnosis (*4*, see table).

The most prevalent category of alcohol-related principal diagnosis is alcohol dependence syndrome, followed in diminishing order by chronic liver disease and cirrhosis, alcoholic psychoses, and nondependent abuse of alcohol. Among discharges with any mention of an alcohol-related diagnosis, however, the prevalence of nonalcohol-related principal diagnoses has increased steadily from 1979 to 1985, overtaking the prevalence of alcohol dependence syndrome in 1982. This demonstrates again that discharges with a principal alcohol-related diagnosis have decreased proportionately more than discharges with any mention of an alcohol-related diagnosis.

Alcohol-Related Traffic Fatalities

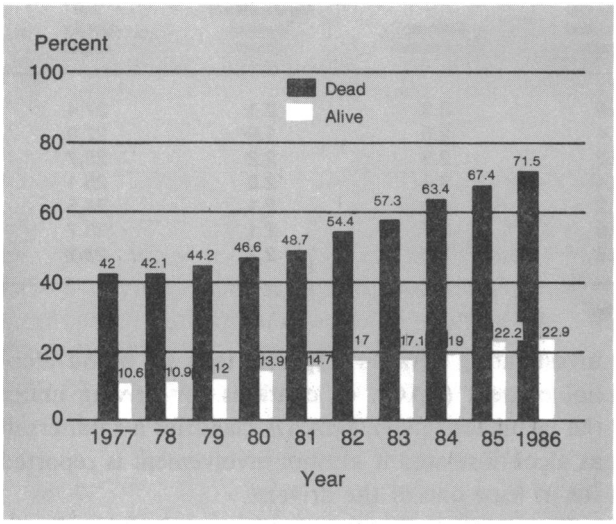
Traffic crashes are the leading cause of death for persons ages 1 to 40 years. Nearly 470,000 traffic fatalities occurred on the nation's highways between 1977 and 1986, and about 191,000 of them (41 percent) were alcohol related (*5*). NIAAA reports annually on proportionate mortality from alcohol-related traffic fatalities using data in the Fatal Accident Reporting System (FARS) of the National Highway Traffic Safety Administration. Alcohol involvement in FARS is determined by investigating officers' reports, tests of blood alcohol content (BAC), or citations for driving under the influence (DUI). NIAAA classifies a fatal crash as alcohol-related if alcohol involvement is reported for at least one of the drivers.

Figure 3 presents the percentage of traffic fatalities attributed to alcohol for the years 1977 through 1986. After increasing each year between 1977 and 1982, the proportion of alcohol-related traffic fatalities among all traffic fatalities remained fairly stable at about 41 percent until 1986. The rate increased to 43.5 percent in 1986, when alcohol-related traffic crashes claimed 20,038 lives. Overall, traffic accident mortality due to alcohol increased 19.2 percent between 1977 and 1986.

Over the same period, there has been a substantial increase in BAC testing among the States. Although some States still have extremely low testing rates, overall BAC testing has increased by 81 percent since 1977. Average BAC testing for both dead and alive drivers was 24.2 percent in 1977 and 43.8 percent in 1986. Figure 4 presents the percentage of driver BAC testing by survival status, that is, dead or alive, for 1977 through 1986.

Young drivers have been and continue to be overrepresented in drinking driver deaths. In 1986, drivers 16 to 24 years old accounted for 38 percent of all drinking driver deaths but only 17 percent of the licensed driver population (data not shown). Also, in 1986 there were 8,483 deaths in crashes involving young drinking drivers (4,532 were the young drivers themselves), up 14 percent from 1985's total of 7,462. Data for 1977–86 indicate that the youngest drivers (16– to 19–year-olds) tend to become involved in fatal accidents at lower BAC levels than do older drivers. This suggests that younger drivers are at an increased risk for alcohol-related fatal accidents because of their lower tolerance to alcohol and their limited driving experience.

Figure 4. Percent of blood alcohol content testing of drivers in fatal traffic accidents according to survival status, United States, 1977–86



Discussion

Specific reasons for the declines in liver cirrhosis mortality are not known, but one reason could be successful alcohol abuse awareness and prevention programs that reduce the population at risk. Another reason could be the changes in definitions, procedures, and coding practices brought about by revisions to the ICD. Grant and her colleagues (*6*) showed that reductions in cirrhosis attributable to alcohol were nearly four times greater with ICD-9 (1978–83 data) than with ICD-8 (1973–78 data). Still another factor influencing the declines could be increased effectiveness of medical treatment for cirrhosis. Powell and Klatskin (*9*) compared survival rates of cirrhosis patients for 1916–36 with those for 1951–63. They found that survival rates in the latter period had increased substantially.

Reasons for the recent declines in apparent per capita alcohol consumption also are unclear. The declines could be attributed to such factors as increased awareness of the risks of heavier drinking (*10*), an increasing preference for beverages with lower alcohol content (*7*), or the aging of the U.S. population, among others. Alcohol consumption tends to decrease with age, and older segments in the U.S. population are increasing relative to the total population. In addition, members of the baby boom generation are starting to enter their mid-40s, near the age when drinking levels start to decline.

Since alcohol-related morbidity and alcohol-related traffic fatalities have both exhibited recent increases after several years of decline, the trends are difficult to interpret. The recent increases may indicate temporary fluctuations in descending trend lines, or the increases could signal either a leveling off or reversals in the rates. Stronger enforcement of drunk driving laws and increased BAC testing, however, have been proposed as part of the reason for the 1986 increase in fatal motor vehicle fatalities (*5*). Stronger enforcement and increased BAC testing may be identifying more alcohol-involved drivers on the nation's highways.

In summary, many factors may have influenced the trends in alcohol-related events, including reductions in per capita alcohol consumption, improved medical management, health promotion efforts, and changes in diagnostic practices of reporting, coding, and classifying morbidity and mortality. Future research should focus on the variability in alcohol problem rates over time. The study of changes in drinking practices (such as level of consumption and binge versus continuous daily drinking) deserves special attention. There is a need to consider variation in rates due to different etiological factors that may be genetic or environmental in origin. Finally, unresolved issues about the reliability and validity of both the alcohol consumption measures and the alcohol problem indicators need to be addressed.

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Assessment of the Potential for Surveillance of Alcohol-Related Casualties Using National Hospital Discharge Survey Data

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Synopsis

It is well known that alcohol abuse is significantly involved in the incidence of casualties (that is, accidents and injuries as they are defined for the purpose of coding diagnoses in the International Classification of Diseases). Thus, a study was conducted of the feasibility of using data from the National Hospital Discharge Survey (NHDS) for the surveillance of alcohol-related casualties. Trends were analyzed over 7 years (1979–85), and results were discussed from three aspects: number and rates for comorbidity of injuries and accidents with alcohol-related diagnoses, percent of alcohol involvement for injuries and accidents, and proportionate morbidity for alcohol-related and nonalcohol-related injuries and accidents.

The incidence of comorbidity and percent of alcohol involvement were found to be relatively low for both accidents and injuries—underreporting being a likely cause. Comorbidity rates over the 7-year period showed no major trends in the rates for injuries that were associated with alcohol use, but the rates for accidents that were associated with alcohol use increased in all but one of the years. Proportionate morbidity as reflected in hospital discharge records with alcohol-related diagnoses showed only small differences by sex and age group (except the 14 to 25 years group) for either injuries or accidents. Only the 25- to 44-year-old group showed a time-trend increase, and that is only for the accident category. For these reasons, we have concluded that data from the NHDS are not currently adequate for use in the surveillance of alcohol-related injuries and accidents.

THE NATIONAL INSTITUTE on Alcohol Abuse and Alcoholism (NIAAA) conducts periodic surveillance of apparent per capita alcohol consumption, mortality from cirrhosis, alcohol-related fatal traffic accidents, and alcohol-related morbidity (*1–4*). This article presents results from an assessment of the potential of the National Hospital Discharge Survey (NHDS) as an appropriate data source for a new area of surveillance, alcohol-related casualties. It is well known that alcohol abuse is significantly involved in the incidence of casualties, which are defined for coding purposes as "accidents" and "injuries" in the Ninth Revision of the International Classification of Diseases, Clinical Modification (ICD-9-CM) (*5, 6*).

The NHDS appears to be a potentially useful source of such data because

- NHDS data are national in scope
- Data collection is ongoing, and new data are published annually
- Definitions, data collection methods, and sam-