

An Evaluation of Alcoholism Services in Minnesota Using a Social Indicator Method

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Abstract: Alcohol-related events in Minnesota are assessed using a social indicator method. Eight events have shown rate average increases of 2.0 to 13.5 per cent per year over the last 7 to 14 years, with most events increasing 5 to 7 per cent. These include traffic fatalities, alcoholic cirrhosis deaths, alcohol deaths, arrest for liquor law violations, convictions for driving while intoxicated (first and repeat), and state hospital admissions (first and repeat). Statistical analyses of these increases shows that, even with relatively few sample years, the rate and direction of rate increases are highly significant for most events. (*Am J Public Health* 1980; 70:1209-1211.)

Introduction

Alcoholism and drug abuse have become increasingly important as public health issues over the last decade. In Minnesota alone, the amount of federal, state, local, and private funds expended on this problem has increased from a few million dollars per year in 1968 to almost \$50 million during 1978. Assessment of alcohol abuse in a society is not easy; although we possess specific diagnostic criteria^{1, 2} and clinical rating instruments,³⁻⁶ epidemiologic studies are time-consuming and expensive.⁷⁻¹²

Social indicator methods—widely used as barometers for economic and other social phenomena—have been suggested as a means to assess the extent of alcohol-related problems in populations,¹³ and a trial study indicated that the method might have utility.¹⁴

Method

The method consists of three steps: the selection of "problem events" which have a direct relationship to alcohol (e.g., arrest for driving while intoxicated); the routine collection of data on these events by a government agency (e.g., State Department of Health, Public Welfare and Public

Safety); and the analysis of the events, using state population data to obtain incidence rates.¹¹

Population by year was obtained from the Division of Vital Statistics, Minnesota State Department of Health, which uses the 10-year census data plus information on annual population changes (e.g., births, deaths, migration estimates) to estimate annual state population.

The method detects alcohol-related events, but not "cases" of alcoholism, since a single person could be counted more than one time. This "multiplier" effect is not necessarily an undesirable feature, since a very active case would have a strong influence on the indicator system by producing multiple events; and the successful treatment of a case would have a similar impact by reducing multiple events.

In this paper we refer to "average annual increases." This is the sum of all annual increases (both positive and negative) over the time period studied, divided by the number of years for which we have data. Such use of annual percentage increases tends to infer increases at a geometric rate, but we do not want to imply that there is indeed a geometric progression of alcohol-related problems. On the contrary, our plotting of data on graphs suggested more a linear progression (at least over the relatively short time under consideration).

Findings

Traffic Fatalities (drivers, passengers, and pedestrians dying from vehicular accidents): In Minnesota, state law requires blood alcohol testing for all traffic fatalities aged 18 or over. Accidents with a blood alcohol level (BAL) at or above 0.10 gram per cent are considered alcohol-related. Statewide data were first collected in 1968.

Victims of alcohol-related traffic accidents were predominantly young, and the average age has progressively fallen from 38 years in 1965 to 33 years in 1978. There was a 5.2 per cent average annual increase in traffic fatalities per 100,000 population in Minnesota from 1968 to 1977 (Table 1). However, there is considerable fluctuation in the rate. Statistical testing failed to show either significant increase or decrease (Table 2).

Death from Alcoholic Cirrhosis: Average age at death (about 57 years) has remained stable from 1965 to 1978, but the alcoholic cirrhosis death rate has risen annually by an average 5.7 per cent (Table 1), the increase being statistically significant (Table 2).

Death from Alcoholism (primarily delirium tremens, Korsakoff's psychosis, and acute alcohol overdose): Aver-

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TABLE 1—Rates per 100,000 Population and Number of Problematic Events Related to Alcohol Abuse

Event	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Traffic fatalities BAL ≥ .10*				3.4 (124)	4.2 (159)	4.1 (157)	4.8 (185)	6.3 (242)	6.6 (256)	6.0 (234)	4.1 (159)	4.9 (194)	4.6 (183)	
Cirrhosis fatality for alcoholism**	2.8 (101)	3.4 (121)	3.8 (136)	4.0 (145)	3.6 (135)	3.2 (122)	3.8 (148)	3.6 (139)	4.3 (166)	5.6 (218)	4.8 (187)	5.0 (200)	5.3 (210)	5.3 (213)
Alcoholism death**	1.23 (44)	2.03 (73)	1.48 (54)	1.42 (52)	1.62 (61)	2.44 (93)	2.33 (90)	1.93 (75)	1.59 (62)	1.91 (75)	1.68 (66)	2.14 (85)	1.98 (79)	2.07 (83)
Arrests, Liquor laws†						468.1 (17,817)	467.2 (18,035)	472.5 (18,319)	464.5 (18,069)	505.3 (19,796)	504.9 (19,821)	526.7 (20,885)		
Convictions for DWI first conviction**			138.6 (5,025)	169.0 (6,161)	186.5 (6,979)	180.7 (6,875)	201.4 (7,772)	233.1 (9,036)	281.6 (10,953)	267.2 (10,468)	263.6 (10,349)	222.5 (8,902)		
Convictions for DWI repeat conviction**			26.3 (952)	34.8 (1,270)	39.9 (1,492)	46.3 (1,760)	49.6 (1,915)	58.5 (2,267)	53.8 (2,094)	72.9 (2,857)	86.2 (3,382)	76.0 (3,012)		
State hospital admission for alcohol abuse	36.1 (1,287)	36.2 (1,299)	33.1 (1,201)	35.8 (1,304)	34.4 (1,286)	40.8 (1,554)	42.9 (1,656)	48.2 (1,867)	44.7 (1,737)	42.5 (1,666)	53.4 (2,096)			
State hospital admission for alcohol abuse	26.5 (943)	26.1 (936)	29.9 (1,087)	31.7 (1,157)	32.2 (1,207)	34.2 (1,302)	38.4 (1,380)	48.5 (1,882)	45.2 (1,759)	40.9 (1,603)	48.3 (1,895)			

*Of all traffic fatality victims 35-45% have been tested for BAL during 1972-78.
 **100% collection.
 †80% estimated collection.

age at death (56 years) has remained stable; average annual increase was 7.0 per cent per 100,000 population (Table 1). Statistical testing failed to show either a significant increase or a decrease (see Table 2).

Alcohol-Related Arrests (arrests reported to the State Bureau of Criminal Apprehension): The Bureau estimates that about 80 per cent of all arrests in Minnesota have been reported to them over the last several years. The most common category of alcohol-related arrest is "Driving while in-

toxicated with alcohol," verified by examination of blood and breath. There has been a persistent annual increase of 2.0 per cent in the arrest rate (Table 1) that is statistically significant (Table 2).

Convictions for Driving While Intoxicated (cases in which a judge or jury has convicted a person for driving while intoxicated (DWI), or revoked the driver's license due to a blood alcohol level above 0.10 gram per cent): These cases are completely reported for the entire State of Minne-

TABLE 2—Statistical Significance of Rate Changes in Alcohol-Related Events

Event	Correlation Coefficient	Slope*	Degrees of Freedom	Statistical Significance**
Traffic fatalities BAL ≥	.190	—	8	P = not significant
Cirrhosis fatality	.866	+ .18	12	P < .001
Alcoholism death	.432	—	12	P = not significant
Arrests, liquor laws	.883	+10.14	5	P < .01
Convictions for DWI (first)	.838	+13.05	8	P < .01
Convictions for DWI (repeat)	.960	+6.08	8	P < .001
State hospital admission (first)	.852	+1.64	9	P < .001
State hospital admission (repeat)	.930	+2.31	9	P < .001

*Slope: direction and average increase in number of events per year.
 **Statistical Significance: probability above the .05 level is "not significant."

sota. The average rate of first DWI convictions has increased 6.0 per cent per year (Table 1), the increase being statistically significant (Table 2). Over the same period the average rate of DWI reconviictions increased 13.5 per cent per year (Tables 1 and 2).

State Hospital Admission for Alcohol Abuse (all admissions to state hospitals for alcohol abuse, recorded as first or subsequent admission on a life-time basis): Diagnostic schema have changed over this period, but the vast majority of admissions (about 95 per cent) were for chronic alcoholism, with the remainder for chronic dementias and psychoses associated with alcoholism. The rate of first admissions per 100,000 people increased an average of 5.4 per cent per year (Table 1), statistically significant at the .001 level (Table 2). Similarly, over the same period, the rate of readmissions per 100,000 people increased an average of 6.7 per cent per year (see Table 1), also statistically significant at the .001 level (Table 2).

Discussion

These annual rates of increase mostly ranged between 5 and 7 per cent, with one event at 2 per cent and one at 13.5 per cent per 100,000 people per year. Six of these increases were statistically significant at the .01 to .001 level, the two exceptions being traffic fatality and alcoholism deaths. The consistency and magnitude of these findings is the more notable in that they originated from several different agencies which surveyed several different types of events and used different data collecting methods.

With regard to traffic fatality, the apparent cause of the recent decline is the 55 mile-per-hour speed law passed in late 1974. All traffic fatalities decreased markedly almost immediately. The proportion of alcohol-related traffic fatalities continued to remain a fairly constant per cent of all traffic fatalities (at 23 per cent \pm 5 per cent). Thus, traffic laws rather than effective alcohol prevention or treatment probably account for this phenomenon.

Alcoholism death (e.g., from delirium tremens, Korsakoff's psychosis, acute alcohol overdose) presents more of a dilemma. It should be remembered that the number of cases is small, and random variation of a few cases can produce relatively large changes in the rate (i.e., the Poisson problem in statistics). Another possibility is that the recent widespread availability of detoxification treatment facilities and medical treatment for alcohol-related emergencies has held these deaths at a fairly constant rate while other manifestations of acute and chronic alcoholism are increasing.

Alcohol-related social indicators can be influenced by changes in technology, reporting practices, social policy, and social attitudes. An example of incomplete reporting is traffic fatality: coroners in small towns and rural areas were often reluctant (prior to a recent state law) to test for alcohol on all accident victims who died within six hours of the crash. A technological limitation is that an accurate blood

alcohol cannot be detected with present methods under certain circumstances. Changed social policy, as reflected in lower speed limits, can affect the number of alcohol-related traffic fatalities. Cirrhosis fatality, alcoholism death, and admission to treatment facilities as indicators of alcohol problems could be sensitive to changing diagnostic and therapeutic attitudes. Increasing acceptance by the public of treatment for alcohol problems may play a role in increasing state hospital rates.

However, we believe that the increases in alcohol-related problems in Minnesota are not illusory. It stretches the imagination to believe that thousands of reporting sources throughout the state, representing different disciplines, and reporting in different modes to different agencies should, in concert, erroneously report rates that show 5 to 7 per cent annual increases over a 7 to 14 year period—and do so in a manner which is statistically significant. Such reliability does not guarantee validity, but strongly suggests its presence.

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