

## Alcohol Consumption and Diabetes Mellitus Mortality in Different Countries

PEGGY ANN KEILMAN, PHD

**Abstract:** Alcohol consumption on a per capita country basis is associated with diabetes mortality rates for men. The relation is also positive for women, but not statistically significant. Countries that consume primarily beer have higher diabetes mortality rates than countries that consume primarily spirits or wine. (*Am J Public Health* 1983; 73:1316-1317.)

Alcohol consumption has been implicated as a risk factor in a number of diseases.<sup>1,2</sup> Alcohol sometimes indirectly causes diabetes by inducing pancreatitis.<sup>3</sup> The liver, which is adversely affected by alcohol consumption,<sup>4</sup> is an important organ in glucose metabolism. Both alcohol production and diabetes mellitus are rising throughout the reporting world.<sup>1,5</sup> This paper evaluates the association between diabetes mellitus mortality rates and per capita consumption of alcohol on a geographic basis.

### Materials and Method

Both diabetes mortality data (1966-67) and alcohol consumption data (1968-70) were available for 19 countries.\* Beverage preference data (wine, spirits, beer) were available cross-nationally for the years 1950-52.

World Health Organization statistics<sup>5</sup> provided mean annual sex-specific death rate from diabetes mellitus per 100,000 persons aged 45-64. Beverage preference in 1950-52 and total per capita consumption in liters absolute alcohol for 1968-70 were available from the World Alcohol Project data.<sup>1</sup> World Health Organization statistics for the cirrhosis death rate per 100,000 persons for 1965 were used.<sup>6</sup>

Correlation coefficients were computed relating the diabetes mortality and the alcohol consumption and relating the diabetes and cirrhosis mortality separately for men and women. Single-classification analysis of variance was done using beverage preference (either wine, beer, or spirits) as the independent variable with either alcohol consumption, diabetes death rate, or cirrhosis death rate as the dependent variable.

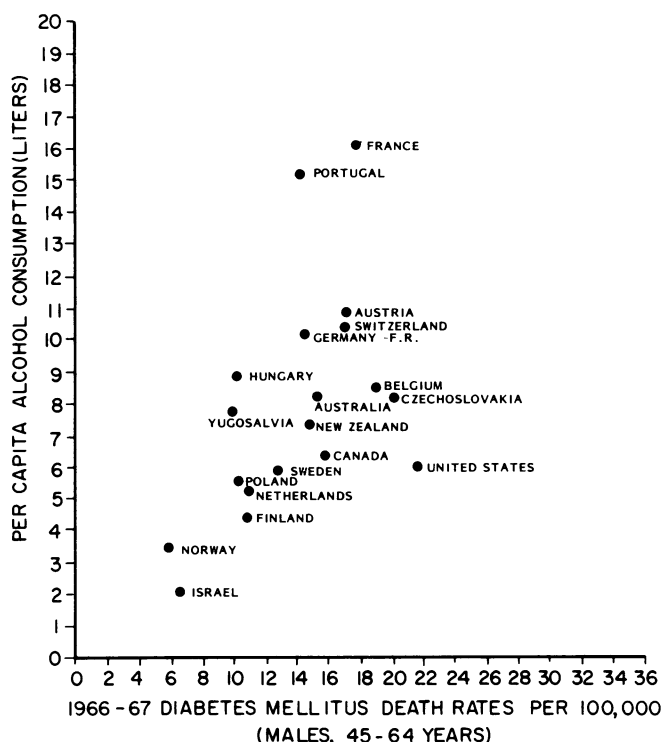
The mean value of alcohol consumed was multiplied by 1, 1.2, and 2 for spirits, wine, and beer respectively to examine calorie consumption.

### Results

Figure 1 shows the relationship between total alcohol consumption and diabetes mellitus mortality rates for men ages 45-64 years for 19 countries. Figure 2 shows the same

relationship for women. Both cirrhosis death rate and alcohol consumption are significantly related to diabetes mellitus death rates for males (Table 1). The correlations are positive for females but are not statistically significant.

The analyses of variance showed that both absolute alcohol consumed and cirrhosis mortality rate are significantly related to beverage preference\*\* ( $p < .01$  and  $p < .05$  respectively) with the wine drinking countries consuming the most alcohol and having the highest mortality from cirrhosis. The analyses of variance showed that diabetes mortality



**FIGURE 1**—Relationship of per capita Total Alcohol Consumption to 1966-1967 Diabetes Mellitus Mortality Rates for Men, Aged 45-64 Years, for 19 Countries

**TABLE 1**—Correlations between Diabetes Mortality Rates and Alcohol Consumption and between Diabetes and Cirrhosis Mortality Rates: 19 Countries

	Diabetes Mortality Rates	
	Males	Females
Liters absolute alcohol	.51**	.24 <sup>ns</sup>
Cirrhosis deaths	.44*	.16 <sup>ns</sup>

Significance levels: ns = not significant, \* =  $p \leq .05$ , \*\* =  $p \leq .025$

\*\*For beverage preference of each country see footnote to Table 2.

\*Australia, Austria, Belgium, Canada, Czechoslovakia, Finland, France, Germany-F.R., Hungary, Israel, Netherlands, New Zealand, Norway, Poland, Portugal, Sweden, Switzerland, United States, and Yugoslavia.

Address reprint requests to Peggy Ann Keilman, PhD, 7110 Cahill Avenue, San Antonio, TX 78223. This research was conducted by Dr. Keilman while she was at the Institute of Psychiatry, Northwestern University Medical School. This paper, submitted to the Journal July 6, 1982, was revised and accepted for publication March 14, 1983.

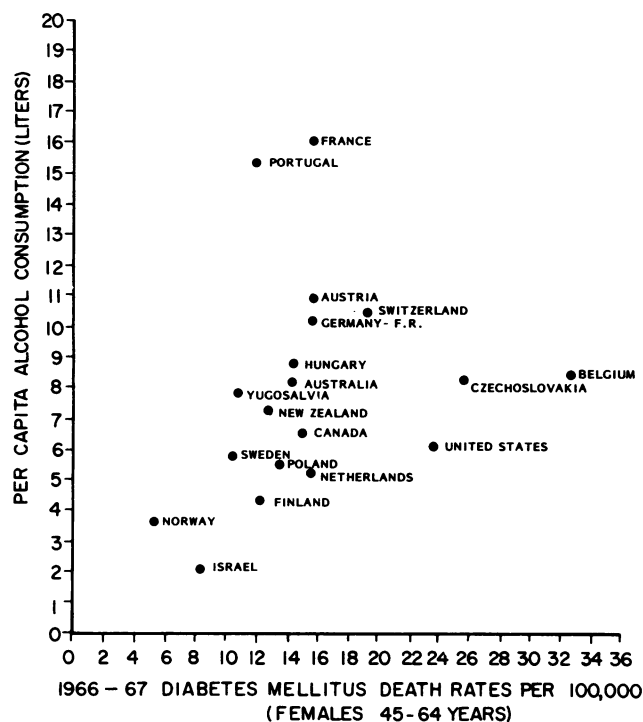


FIGURE 2—Relationships of per capita Total Alcohol Consumption to 1966-1967 Diabetes Mellitus Mortality Rates for Women, Aged 45-64 Years, for 19 Countries

rates are significantly related to beverage preference for men and women ( $p < .05$  and  $p < .01$  respectively) with the beer drinking countries having the highest diabetes mortality rates.

Mean values for the three groups of countries are presented in Table 2. The beer drinking countries have the highest diabetes mortality rates, a relationship that is significant for both men and women. In cirrhosis deaths, the death rate of a country increases as the amount of absolute alcohol consumed increases. For diabetes mortality, the death rate seems to increase as the caloric value of the absolute alcohol consumed increases. For instance, the beer drinking countries consume less absolute alcohol than the wine drinking countries, but the caloric value of the beverage consumed is greater.

TABLE 2—Mean Values for Alcohol Consumed, Relative Caloric Value of Alcohol Consumed, Cirrhosis Deaths, and Diabetes Deaths by Beverage Preference

Beverage Preference*	N	Alcohol Consumed	Relative Caloric Value	Diabetes Deaths		Cirrhosis Deaths
				Male	Female	
Spirits	7	4.91	4.91	9.60	10.87	5.21
Beer	8	8.18	16.36	17.26	19.38	12.58
Wine	4	12.63	15.16	14.78	15.25	22.38

\*The countries with a preference for spirits are Finland, Israel, Netherlands, Norway, Poland, Sweden, and Yugoslavia. The countries with a preference for beer are Australia, Austria, Belgium, Canada, Czechoslovakia, Germany-F.R., New Zealand, and the United States. The countries with a preference for wine are France, Hungary, Portugal, and Switzerland.

### Discussion

On the whole, diabetes mortality is higher in countries with a preference for beer; beer drinking countries consume more beverage calories per capita than countries which prefer wine or spirits. In contrast, cirrhosis mortality is higher in countries preferring wine; wine drinking countries consume the most absolute alcohol on a per capita basis. It is possible that beer consumption is also related to an increase in obesity and inactivity which may be the risk factors for diabetes.

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