

A 10-Year National Trend Study of Alcohol Consumption, 1984–1995: Is the Period of Declining Drinking Over?

ABSTRACT

Objectives. Data from the 1984, 1990, and 1995 National Alcohol Surveys were used to investigate whether declines shown previously in drinking and heavy drinking across many demographic subgroups have continued.

Methods. Three alcohol consumption indicators—current drinking (vs abstaining), weekly drinking, and weekly heavy drinking (5 or more drinks in a day)—were assessed for the total US population and for demographic subgroups.

Results. Rates of current drinking, weekly drinking, and frequent heavy drinking, previously reported to have decreased between the 1984 and 1990 surveys, remained unchanged between 1990 and 1995. Separate analyses for each beverage type (beer, wine, and spirits) and most demographic subgroups revealed similar temporal patterns.

Conclusions. Alcohol consumption levels, declining since the early 1980s, may reach a minimum by the 21st century. Consumption levels should be monitored carefully over the next few years in the event that long-term alcohol consumption trends may be shifting. (*Am J Public Health.* 2000;90:47–52)

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Between 1964 and 1979, the US alcohol consumption rate rose from 2.23 to 2.75 gal (8.5 to 10.45 L) of ethanol per person 14 years or older. The high of 2.76 gallons in 1980 and 1981 culminated an extended rise in consumption lasting from the repeal of Prohibition.^{1,2} Consumption then began to fall, reaching 2.65 gallons per capita in 1984 and 2.46 by 1990, a reduction of nearly 11% in the decade of the 1980s. Per capita consumption has continued to fall, to 2.17 gallons in 1995.¹

Since the 1960s, there have also been changes in the relative proportions of sales-based, “apparent” per capita ethanol consumption accounted for by wine, beer, and spirits.¹ Reflecting the overall downturn, per capita beer sales have fallen since about 1980 but at a much lower rate than sales of spirits, which began to drop a decade before. Earlier survey comparisons also showed significant decreases in consumption of all 3 beverage types between 1984 and 1990,³ again with the decline for beer less than the decline for wine and spirits.

Surveys examining respondents’ consumption have an advantage over aggregate sales/taxation reports in that individual-level demographic characteristics and drinking patterns can be considered. US National Alcohol Survey data indicate that during the 1980s, rates of 12-month abstinence showed an overall increase³ after having remained more or less stable for 50 years.⁴ Also, shifts in drinking patterns toward lighter consumption were apparent across many sociodemographic categories.³ White respondents, but not Black or Hispanic respondents, reported significantly lower alcohol use on all measures: current drinking (previous 12 months), weekly drinking, and consumption of 5 or more drinks on one occasion at least once a week.^{3,5} There was some indication of a slight convergence between the sexes; younger men (in 1984, the heaviest drinkers), especially those aged 30 to 39 years, showed the largest

decreases as of 1990.³ Rates of drinking decreased in all regions except the South.

Although trends in consumption patterns are of interest in themselves,³ trend analyses are most useful as indicators of changing risks in terms of social and health harms.^{6,7} In general, we would expect changes in drinking patterns over time to be linked to changes in acute and chronic health and behavior problems,⁸ although empirical relationships tend to vary according to the type of problem.⁹ In the United States, both liver cirrhosis rates¹⁰ and alcohol-related traffic fatalities¹¹ have declined steadily since about 1970, a decade before the downturn in overall consumption levels.

The purpose of this study was to examine changes in alcohol consumption trends from 1984 to 1995 using measures that could be compared across time in 3 US National Alcohol Survey data sets. An earlier paper examined trends in alcohol problems.⁹ Here we address the following research questions: (1) Did the prevalence of abstention increase across the 10-year period? (2) Did the prevalence of heavy drinking decrease, along with per capita consumption, over the same period? (3) Are observable 10-year trends uniform across demographic subgroups?

We focused on the following variables: current drinking vs abstention, defined as not having had one full drink in the previous 12 months (also examined by beverage type); frequency of drinking, overall and for each beverage; and occurrence and frequency of heavy drinking, defined as the consumption of

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5 or more drinks in a single day. The latter measure has proved serviceable in a number of studies with regard to predicting various social and health harms.^{6,12-14} Paradoxical reports of alcohol-related problems by individuals who are low-volume consumers are generally explained by concurrent episodic heavy drinking (e.g., consumption of 5+ drinks at a single time at least once in the previous year).¹⁵

Methods

Study Samples

Fieldwork for the 1984, 1990, and 1995 National Alcohol Surveys was conducted by the Institute for Survey Research of Temple University. Each survey involved a stratified national household probability sample of 100 primary sampling units within the 48 contiguous states (in 1984, as described later, 110 sampling units were used). In each survey, interviews were conducted face to face with adults 18 years and older selected randomly within a household. All respondents were paid for participating in the surveys.

The 1995 version of the National Alcohol Survey was conducted between April 1995 and April 1996. In addition to a main sample consisting of 2178 interviews, oversamples of African American and Hispanic individuals were collected. However, to maintain the closest possible comparability between the 1990 and 1995 samples, we used only the main sample, which included proportionally sampled ethnic minority respondents, in the current analysis. The response rate for the main sample was 77%. Interviews took place in respondents' residences and lasted 67 minutes on average.

The 1990 version of the National Alcohol Survey involved an equivalent design with no oversampling; there were 2058 completed interviews and a response rate of 70%.³ In the 1984 survey, African American and Hispanic respondents were oversampled within 100 primary sampling units as well as by the selection of an additional 10 sampling units that comprised large African American and Hispanic populations. The design of the 1984 sample precluded the separation of the main and oversampled respondents, so the entire sample was included ($n = 5221$; response rate: 74%). However, weights were applied so that oversampled respondents were downweighted to population proportions based on US census data.^{16,17}

On the basis of census data, the 3 data sets were weighted for representativeness of the US national household population in 1984, 1990, and 1995 according to age, sex, ethnicity (White, Black, Hispanic), region,

and nonresponse rates. Clustered sample designs result in standard errors that are larger than those found with a simple random sample; thus, the SUDAAN statistical package¹⁸ was used in adjusting standard errors for statistical comparisons (taking into account strata, primary sampling units, and survey year).

Dependent Variables

Several indicators of drinking levels (each within the preceding year) that were available across all 3 surveys are the focus here: current drinking, weekly drinking, and weekly consumption of 5 or more drinks on one occasion (heavy drinking). Estimates of frequency of drinking (any quantity) and heavy drinking were determined from 2 identical questions asked in each survey (by beverage type). The questions were presented in the form of a self-administered booklet. The question "How often do you usually have [wine/beer/drinks containing whiskey or liquor]?" was read to respondents. The 11 response categories included in the booklet ranged from "never" to "three or more times a day" for each beverage.

Respondents that reported drinking any beverage more often than "less than once a year" or "never" were coded as current drinkers. During analysis, the responses were recoded to the implied midpoint of each interval to allow estimation of the number of days each beverage had been consumed in the preceding year. A maximum of 360 days was allowed for each beverage, and multiple occasions per day were counted as 1 day of drinking.¹⁹

An additional question with similar wording allowed estimation of the frequency of heavy consumption of any alcoholic beverage. For each beverage type (wine, beer, spirits), respondents were asked to "think of the times you have had [wine/beer/drinks containing whiskey or liquor]. When you drink [wine/beer/drinks containing whiskey or liquor], how often do you have as many as five or six [glasses/12-ounce cans or bottles/drinks]?" Response categories included "nearly every time," "more than half the time," "less than half the time," "once in a while," and "never" (recoded in analyses as the proportions 0.9, 0.7, 0.3, 0.1, and 0, respectively).

For each beverage type, total number of drinking days were calculated by multiplying the category proportion by the associated beverage frequency, allowing estimation of the number of heavy drinking days. The resultant figures were then summed across all beverages for a total.¹⁹ Indicators for any weekly drinking and weekly heavy drinking

were derived from the estimates of total and heavy drinking days.

Independent Variables

We used 11 demographic variables—sex, age, marital status, ethnicity, income, employment status, religion, importance of religion, education, urbanicity, and region—to investigate changes within specific population subgroups and potential time trends that could be due to the influence of demographic characteristics. Age was combined into 5 groups: 18 to 29, 30 to 39, 40 to 49, 50 to 59, and 60+ years. Marital status categories considered were married, separated, divorced, widowed, and never married. Ethnicity was subdivided into White, African American, Hispanic, and "other" groups.

Family income and employment were each collapsed into dichotomous variables: respondents earning less than the approximate median sample income (\$30 000) vs those earning the median or more and part-time or full-time employment vs other (including homemaker). Religious identification was coded as liberal, moderate, and fundamentalist Christian²⁰; other religions were grouped together as a result of small numbers. Importance of religion "in everyday life" was assessed with a 4-point scale ("very important" vs 3 lower levels of importance).

Education was dichotomized as high school or less vs higher levels. Urbanicity classifications were based on the characteristics of the primary sampling units; categories included metropolitan areas with populations above 50 000, metropolitan areas with populations below 50 000, and nonmetropolitan areas. Region was divided into 5 groups: Northeast, South, Midwest, Mountain, and West.

Data Analysis

Chi-square tests of independence were used in examining frequency of categorical consumption variables (e.g., abstention rates, weekly drinking) across time. Log-transformed estimates of drinking days, heavy drinking days, and beverage-specific drinking days were compared via *t* tests (drinkers only).

To test the significance of subgroup trends, we used separate logistic regression analyses for each demographic variable, dummy variables for contrasts between survey years (1984 vs 1990 and 1990 vs 1995), and interaction terms for differences by category across survey years. For example, a model regressing current drinking on sex was operationalized with dummy variables indicating male sex, 1984 respondent, 1995

respondent (relative to 1990 respondents), and interactions between male sex and each period dummy variable. If shown by the Wald test to be significant, the first interaction would indicate differences in 1984 to 1990 trends between male and female respondents, and the second would indicate similar results for the 1990 to 1995 trends. Finally, we used logistic regression to assess changes in abstention, frequent drinking, and frequent heavy drinking while controlling for all demographic variables (entered simultaneously).

Results

Percentages of respondents that reported any drinking, consumption of specific beverages, and heavy drinking are shown in Table 1 for each of the 3 surveys. A relatively clear pattern is evident across the range of measures. With the exception of consumption of 5 or more drinks at a time at least once during the previous year, the percentages for all of the indicators dropped sharply between 1984 and 1990 but remained essentially level from 1990 to 1995. This observation is borne out by the χ^2 statistics for drinking indicators across study years. In all cases except yearly heavy consumption, there was a significant reduction for the entire study period (see Table 1); when only the 1990 and 1995 levels were compared, however, no significant findings emerged (data not shown).

Table 1 also summarizes time trend results (*t* tests on log-transformed measures)

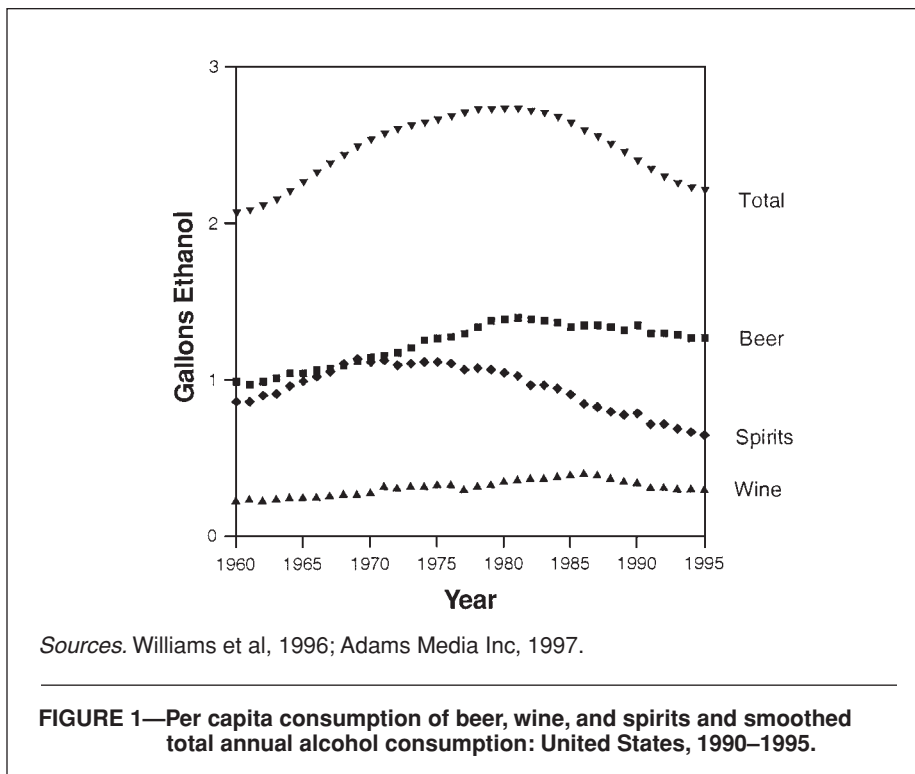


FIGURE 1—Per capita consumption of beer, wine, and spirits and smoothed total annual alcohol consumption: United States, 1990–1995.

for total number of drinking days and total number of heavy drinking days in the previous 12 months. Frequency of drinking dropped significantly between 1984 and 1990 and did not change significantly thereafter. Similarly, frequency of beer drinking declined from 1984 to 1990 but showed no significant change from 1990 to 1995. Consumption of spirits showed a different pattern; the 1984 to

1990 decline was not statistically significant, but there was a significant drop from 1990 to 1995 ($P = .05$). Changes in wine drinking were not significant for either comparison.

For frequency of heavy drinking of any form of alcohol, the decline from a mean of 19 days in 1984 to 13 in 1990 was considerable but did not change further (mean of 13 days in 1995). Wine and spirits were much less impli-

TABLE 1—Percentages and Means: 1984, 1990, and 1995 National Alcohol Survey Respondents Reporting Drinking Behaviors (Weighted)

	1984 (n = 5221)	1990 (n = 2058)	1995 (n = 2178)	χ^2	<i>t</i>	
					1984–1990	1990–1995
All respondents, % (SE)						
Current drinking	69.4 (1.6)	65.0 (1.4)	64.6 (1.6)	6.06*		
Wine	51.2 (1.8)	43.6 (1.5)	42.7 (1.9)	15.45***		
Beer	51.5 (1.3)	45.2 (1.4)	48.0 (1.6)	9.44**		
Spirits	51.8 (1.8)	43.5 (1.3)	42.6 (1.7)	17.29***		
Weekly drinking	35.9 (1.5)	29.0 (1.2)	29.2 (1.3)	16.04***		
5+ drinks ever in previous year	30.0 (1.2)	28.6 (1.2)	27.6 (1.4)	1.78		
5+ drinks weekly in previous year	6.1 (0.6)	3.9 (0.5)	4.5 (3.3)	10.00**		
Current drinkers, mean (SE)						
Total drinking days	109.7 (4.6)	82.9 (3.9)	87.7 (3.9)		4.00***	0.05
Wine	39.8 (2.5)	39.3 (3.0)	39.5 (3.0)		0.13	0.05
Beer	95.8 (4.1)	72.2 (3.9)	75.4 (3.6)		4.19***	0.59
Spirits	34.1 (1.9)	31.5 (1.9)	26.2 (1.9)		0.98	1.98*
Total heavy drinking days	19.3 (1.5)	13.2 (1.2)	13.2 (1.3)		2.71**	0.07
Wine	1.9 (0.4)	1.5 (0.4)	1.0 (0.2)		0.63	0.99
Beer	13.9 (1.1)	9.4 (0.9)	10.5 (1.0)		2.74**	0.91
Spirits	3.7 (0.5)	2.6 (0.5)	1.9 (0.3)		1.37	1.26

* $P < .05$; ** $P < .01$; *** $P < .001$.

TABLE 2—Logistic Regression Results for Current Drinking, Weekly Drinking, and Weekly Heavy Drinking: 1984, 1990, and 1995 National Alcohol Survey Respondents (Weighted)

	Current Drinking		Weekly Drinking		Weekly Heavy Drinking	
	OR	95% CI	OR	95% CI	OR	95% CI
Survey year (1990)						
1984	1.44***	1.20, 1.72	1.59***	1.34, 1.90	1.96***	1.36, 2.84
1995	1.12	0.93, 1.34	1.15	0.96, 1.37	1.44	0.98, 2.13
Male	1.57***	1.35, 1.82	2.79***	2.42, 3.22	5.09***	3.67, 7.06
Age, y (60+)						
18–29	2.04***	1.61, 2.59	1.19	0.92, 1.53	6.50***	3.19, 13.24
30–39	1.77***	1.43, 2.20	1.24	0.96, 1.60	6.15***	3.05, 12.41
40–49	1.46***	1.17, 1.82	1.07	0.80, 1.43	5.71***	2.64, 12.35
50–59	1.21	0.94, 1.55	1.25	0.97, 1.61	4.94***	2.28, 10.68
Marital status (never married)						
Married	1.05	0.84, 1.30	0.98	0.82, 1.18	0.65*	0.46, 0.91
Separated	1.87**	1.20, 2.91	1.11	0.73, 1.69	0.79	0.30, 2.07
Divorced	1.55**	1.15, 2.09	1.49**	1.15, 1.92	0.97	0.59, 1.58
Widowed	0.97	0.70, 1.34	0.92	0.62, 1.38	1.08	0.44, 2.63
Race/ethnicity (White)						
African American	1.44*	1.14, 1.81	1.39**	1.10, 1.74	1.41	0.91, 2.18
Hispanic	0.58**	0.42, 0.79	0.63	0.49, 0.81	1.35	0.81, 2.25
Other	0.72	0.48, 1.08	0.66*	0.44, 0.99	1.06	0.41, 2.70
Income below \$30 000	0.70***	0.60, 0.82	0.83*	0.72, 0.96	1.48*	1.08, 2.02
Employed	1.47***	1.25, 1.72	0.84*	0.71, 0.98	1.04	0.73, 1.49
Religion (other)						
Liberal Christian	2.16**	1.26, 3.70	1.66	0.92, 3.00	4.55	0.94, 21.97
Moderate Christian	2.64***	1.56, 4.47	1.65	0.90, 3.03	4.18	0.85, 20.48
Fundamentalist Christian	0.77	0.45, 1.30	0.72	0.39, 1.32	2.95	0.57, 15.38
Religion very important	0.38***	0.32, 0.44	0.48***	0.41, 0.57	0.31***	0.22, 0.45
Less than high school education	0.65***	0.54, 0.77	0.86	0.70, 1.05	1.60*	1.12, 2.28
Urbanicity (nonmetropolitan)						
Metropolitan, ≥50 000	1.24*	1.04, 1.48	1.27**	1.08, 1.50	1.19	0.86, 1.63
Metropolitan, <50 000	1.68***	1.36, 2.08	1.33**	1.09, 1.63	1.31	0.83, 2.05
Region (West)						
Northeast	1.42	0.99, 2.04	0.98	0.68, 1.41	0.38	0.23, 0.64
South	1.19	0.84, 1.68	0.84	0.59, 1.19	0.71	0.45, 1.12
Midwest	1.24	0.87, 1.76	0.98	0.65, 1.47	0.71	0.42, 1.20
Mountain	0.94	0.67, 1.32	0.87	0.61, 1.23	0.63	0.41, 0.98

Note. Reference categories are given in parentheses for predictor variables with more than 2 levels. OR = odds ratio; CI = confidence interval. * $P < .05$; ** $P < .01$; *** $P < .001$.

cated in heavy drinking occasions than beer, and their nonsignificant declines were smaller. Mean heavy beer drinking declined significantly from 14 days in 1984 to 9 days in 1990 and was substantively unchanged at 11 days in 1995.

Few distinctive subgroup trends were evident from the logistic regressions involving interactions between survey year and demographic subgroups (data not shown). Although the number of significant subgroup differences at the .05 level was no more than would be expected by chance, it is worth noting that Hispanic respondents reported lower rates of any drinking in 1995 (55%) than in 1990 (67%), while African American respondents reported somewhat higher rates of frequent (weekly) heavy drinking across the same period (9% in 1995 vs 3% in 1990). Caetano and Clark²¹ reported similar results with oversamples of African American and Hispanic respondents.

To confirm that the temporal differences observed in Table 1 were independent of demographic changes in the sampled adult population, we conducted logistic regression analyses in which all demographics were entered simultaneously, along with 2 study period dummy variables (1984 vs 1990 and 1990 vs 1995). A summary of the results is displayed in Table 2.

After control for demographic variables, significant declines were seen from 1984 to 1990, but not from 1990 to 1995, for all 3 indicators (current drinking, weekly drinking, and weekly heavy drinking). Male gender was a significant predictor of all 3 drinking indicators, and younger age was associated with higher rates of current drinking and weekly heavy drinking. Of particular interest are findings of higher rates of current and weekly drinking among African Americans and of current drinking among Hispanic respondents

(vs Whites), although these differences were not evident for weekly heavy drinking.

Discussion

An overall decline in current drinking, drinking frequency, and heavy drinking frequency in the United States over the 10-year period is evident in the National Alcohol Survey data. However, analyses partitioning changes into the first and second 5-year periods (before and after 1990) showed that the reductions reported earlier by Midanik and Clark³ have not been sustained. Virtually no changes occurred between 1990 and 1995. In the case of beer, though, there was even a hint of an increase (nonsignificant), both in the amount of drinking and in the frequency of drinking. Conversely, consumption rates of spirits continued to fall between 1990 and

1995. Multiple logistic regressions on the 3 drinking indicator variables (drinking, weekly drinking, and weekly heavy drinking) provide evidence that the results cannot be attributed to demographic shifts in the population between the study years.

The results would be less compelling if they did not reflect the aggregate reductions seen in sales data. Inspection of the apparent per capita ethanol consumption estimates reported by Williams et al.¹ shows that declines in consumption appear to have slowed in recent years. The latest aggregate data also confirm the survey finding that, on a per capita basis, consumption of spirits continues to fall, whereas beer and wine consumption levels are essentially unchanged.

Figure 1 presents a Savitzky–Golay smoothed plot of the Williams et al. data.²² There is an apparent flattening of the overall decline. Asymmetrical changes by beverage type (by-beverage-sales data are not smoothed) parallel the present findings, with the consumption of spirits declining most. The survey trend data, with a 5-year sampling interval, are less temporally fine grained and have more variability than the yearly aggregate findings, but they provide insight into demographic partitioning and drinking pattern time trends (Table 2). With regard to heavy drinking, the critical result is that the significant declines seen from 1984 to 1990, overall and for beer, were not sustained from 1990 to 1995.

The overall evidence of changing relationships between demographic variables and consumption is modest at best. With regard to the 1984 National Alcohol Survey, the decline in frequent heavy drinking by the majority of the population appears not to have been shared by African American or Hispanic groups, and this is of concern. Although the present results were not significant when corrected via multiple comparisons, they are in accord with findings recently reported by Caetano and Clark.²¹

The generalizability of the National Alcohol Survey results is limited to some extent by the relatively low response rate (70%) in the 1990 survey. In addition, the aggregated sales data reported by Williams et al.¹ cannot be regarded as a perfect criterion; factors such as breakage, home production, and differential state reporting mechanisms have been noted elsewhere.²³ However, the extent of any bias in sales-based per capita estimates due to such methodological problems, although unknown, is believed to be small.¹

Conclusion

This analysis reveals a slowing of the broad US decline in drinking seen in the 1980s³ following the peak at the beginning of

that decade.²⁴ It is likely that a complex mixture of demographic, social, economic, and cultural factors has as much to do with these long-term shifts²⁵ as do the public health efforts and the changes in the alcohol treatment system that were burgeoning throughout the 1980s.²⁶

Nonetheless, findings related to trends in restraining pressure applied by friends and relatives²⁷ and to individuals' beliefs about the appropriateness of drinking and drunkenness in specific circumstances—what we have labeled situational drinking norms¹⁶—suggest that these informal normative structures may have much to do with the decline. This, in turn, suggests that the vigor of the social movements toward moderate drinking or abstinence has somewhat abated.

The commodity of alcohol is always poised in a dynamic rather than a static equilibrium—promoted by commercial interests and held in check by social policy and mores.²⁸ At this time, we have no new recommendation or solution to add to the many that have been widely discussed in recent years.²⁹ But the suggestion that the overall decline is flattening and may be ending should not go unnoticed by the public health community. □

Contributors

T. K. Greenfield and L. T. Midanik planned the study. J. D. Rogers analyzed the data in collaboration with T. K. Greenfield and L. T. Midanik. All 3 authors participated in the writing and revision of the paper and take full responsibility for its content.

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