

NEW DATA ON THE EPIDEMIOLOGY OF ADULT DRINKING AND SUBSTANCE USE AMONG AMERICAN INDIANS OF THE NORTHERN STATES: MALE AND FEMALE DATA ON PREVALENCE, PATTERNS, AND CONSEQUENCES

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Abstract: The quantity, frequency, and variability of alcohol and other substance use is described in a random sample of 1,436 enrolled members of four tribes from the northern United States. Overall, males begin regular drinking at an earlier age than do females (17 vs. 18.1 years), and more males drink alcohol than females (70.7% to 60.4%). There are some very heavy drinkers who drink daily in these populations, but most drinkers are binge drinkers. On any typical day abstinence from alcohol is the modal pattern. That is, most respondents indicated very infrequent drinking, and among the older age groups (40+), there is a high rate of abstinence. Males drink more frequently and in larger quantities than females. The number of drinking days per month is 4.7 for males and 2.1 for females, and on those days when drinking occurs, the males consume an average of 5.7 drinks and females an average of 3.1. The highest prevalence of drinking and the heaviest drinking occur among those who are under the age of 30. With the exception of tobacco use, which is high in all age categories, the use of other drugs is highest in those under 30.

Literature on drinking among American Indians numbers in the hundreds of articles, chapters, and books (Mail & McDonald, 1980). But those works that describe a complete epidemiology of adult drinking are quite rare (see May, 1994; 1996). Some works have very extensively described the epidemiology and drinking patterns of particular tribes, such as the Navajo (Kunitz & Levy, 1994; Levy & Kunitz, 1974), and others have provided epidemiology overviews in the form of articles in published journals (Beltrame & McQueen, 1979; Longclaws, Barnes, Grieve, & Dumoff, 1980; May & Smith, 1988; Whittaker, 1962; 1982). Still others have presented substance abuse epidemiology data for a subset of the American Indian

population as part of a study of another health problem (Welty et al., 1995). In total, there are fewer than two dozen studies published that contain detailed information on the quantity, frequency, and variability of drinking among American Indian adults (see May, 1996 for a review).

The above books and articles describe a number of patterns that seem to be unique, or at least more common, among American Indian adult populations. Many tribes are described as participating in alcohol abusive or heavy binge drinking behaviors, and the quantity of alcohol consumed exceeds that consumed by other western region populations, even though some other western populations practice relatively similar binge patterns (Jessor, Graves, Hanson, & Jessor, 1968). In fact, heavy drinking among a certain sub-segment of the American Indian population has been emphasized as a truly unique American Indian pattern of drinking (Arbogast, 1995; Brod, 1975; Lamarine, 1988; Lurie, 1971). While some of the earliest works have attributed binge-drinking behavior to such phenomena as socio-cultural deprivation (Dozier, 1966), others have pointed to unique alcohol beverage control laws (such as prohibition) as having been influential on such behaviors over many years (May, 1976; May, 1977).

Of major concern in the epidemiology of American Indian drinking is the fact that drinkers and their drinking patterns generate a large and disproportionate toll in terms of morbidity and mortality. Even though a number of American Indians are abstainers at any one period in time, those who do drink tend to ingest excessive amounts over a short period of time, producing high blood alcohol levels. Such a drinking pattern produces a high rate of alcohol-related mortality and morbidity as measured by the number of arrests (May, 1976), mental health co-morbidity (May, 1988; Parker et al., 1997), motor vehicle crashes (May, 1989), and Fetal Alcohol Syndrome and Alcohol-Related Birth Defects in some isolated American Indian communities (May, 1991).

Drinking among American Indians, as in virtually all American populations, is more prevalent in the younger age groups. Higher rates of substance use and abuse are recorded among those under 40 and are even more highly concentrated in those under the age of 30. Therefore, the consequences of alcohol-related morbidity and mortality are also greatest in the younger age groups (Kunitz & Levy, 1994; May, 1996). As a result of the extensive body of literature that has been generated from school surveys on drinking among American Indian adolescents (Beauvais, 1992; Oetting & Beauvais, 1989), our understanding of the social and psychological correlates of drinking among American Indian youth substantially exceeds our knowledge of these correlates among adults (Liban & Smart, 1982; Oetting, Beauvais, & Edwards, 1988).

A handful of studies has shown that American Indians, more so than other ethnic groups in the United States, have a tendency to give up alcohol during the middle years of adulthood (Kunitz & Levy, 1994; Levy &

Kunitz, 1974; Leung, Kinzie, Boehnlein, & Shore, 1993; Welty et al., 1995). Nevertheless, knowledge about the social and psychological reasons for drinking among adult American Indians and why American Indians quit drinking in adulthood is very limited. If more studies could be conducted on the epidemiology of adult drinking which examine patterns throughout the life course, we would have more adequate information on which to base our theories and from which to plan programs of targeted prevention to address alcohol-related problems (May & Moran, 1995). Truly, our knowledge of the prevalence and susceptibility to alcohol problems among American Indians is not as well developed as we would hope (Kunitz & Levy, 1994; May, 1982).

The data that follow come from an extensive study of the epidemiology of drinking among four tribes from the northern Plains and Rocky Mountain states of the United States. Their identities are kept anonymous. The data are aggregated across the four reservations, for examination of general patterns of drinking indicated that they do not vary greatly among the four reservations.

Previous studies of drinking epidemiology among Plains and Plateau tribes are rare in the published literature. Whittacker (1962; 1982) studied the Standing Rock Sioux and found a declining rate of drinking over a twenty-year period. From 69% of the population (15 years and older) drinking in 1962 (males 82%, females 55%), the prevalence of drinking dropped to 58% in 1980. Consumption of alcohol by females dropped the most during this period of time from 55% down to 35%; males dropped only 10% from 82% to 72%. Nevertheless, Whittacker wrote emphatically that heavy and abusive drinking was very common in both time periods. Among the Cheyenne River Sioux in 1987 (Welty, 1988), a study of health promotion and health risk behavior indicated that 46% of the Cheyenne River Sioux drank; but the study did not present the data by male and female. Another Plains study among the Ojibwa on a small reserve in Canada (Longclaws et al., 1980) found that 84% of people there drank alcohol; but again the difference between male and female patterns was not described. Longclaws et al., (1980) did describe details of the social nature of drinking. Finally, an age-specific study focused only on those American Indians 45 years of age and older among the Cheyenne River Sioux, the Devil's Lake Sioux, and the Oglala Sioux found that 47% of the middle and older age adults drank, (60% males, 37% females) (Welty et al., 1995). Among the American Indians in Oklahoma, the same paper reported a lower percentage of drinking among the Apache, Caddo, Delaware, Comanche, and Kiowa. Among these Oklahoma tribes, 37% of the adults 45 years and older drank (49% of the men and 28% of the women). In summary, drinking tapered off in the middle years and older ages among all of the Plains Indians, and drinking was substantially lower among the southern Plains Indians than among the northern Plains tribes.

Several extensive studies of drinking epidemiology have been carried out among the Navajo who are not a Plains culture tribe. These studies have also shown that a lower percentage of the adults of this southwestern Athabaskan tribe drink. The Navajo data indicate that only 30% to 52% of the adult population drinks (Levy & Kunitz, 1974; May & Smith, 1988), and that more males than females drink (64% for males, 40% for females).

Binge drinking, generally in social groups and gatherings, is common throughout all of these American Indian specific studies and particularly among Plains Indians. Binges are described as sporadic and heavy, clustering on weekends and special occasions.

The following study is currently being completed among four northern tribes. Most of the data, as described in the methodology section below, are gathered from northern Plains Indian and Plateau tribes. Therefore, the most meaningful comparisons of data about other American Indian tribes should generally be with data from Plains Indians rather than data from the southwestern tribes. In general, southwestern tribes and the Plains tribes of Oklahoma appear to have lower prevalence rates of drinking than do northern Plains tribes. To our knowledge there are no published studies of drinking among any of the Plateau culture tribes, another northern culture represented in this paper. In future analyses we will compare the Plateau tribes drinking data with the various other tribes to analyze subtle differences.

Methods

The new data presented in this paper come from a random sample of 1,436 American Indians selected from the tribal rolls of four different reservations in the north central and northern Rocky Mountain states of the country. Three of these reservations are of tribes classified as Plains culture and one as a Plateau culture. Approximately 380 of the respondents (26.7%) were from the Plateau culture and the remainder from the three Plains culture reservations. No large differences in drinking pattern were revealed between the Plateau sample and the Plains sample in gross descriptive analysis. Once copies of the tribal rolls were obtained from the officials of each tribe, a separate random sample of 384 individuals was drawn for each reservation via computer. The samples were drawn only from those zip codes that were on the four reservations and also from the counties and key border towns surrounding the reservations. Therefore, the sample contains both on and off reservation residents although the bulk is comprised of reservation residents.

All respondents in the sample were 16 years of age and older. Each was asked to complete a questionnaire that contained approximately 200 items. These items covered a variety of topics including the following: the use of alcohol and other drugs as measured by quantity, frequency,

and variability of use; the social context and consequences of drinking; the respondent's knowledge, attitudes, beliefs, and opinions about drinking and its acceptability; knowledge and opinions about alcohol policy that might be implemented on the reservation; demographic data, including various measures of socioeconomic status; and questions about levels of traditionality, adherence to mainstream norms, and acculturation. Most questions on the prevalence of drinking were similar or identical to those of National Institute on Drug Abuse (NIDA) and National Institute on Alcohol Abuse and Alcoholism (NIAAA) national surveys; so they are generally comparable across surveys. Drinks (ethanol units) were standardized to the national surveys as well.

Respondents were given the option of answering the questions by pencil and paper alone or by direct interview. This option was provided so that respondents would feel at ease with the questionnaire and provide the most accurate responses. After completion by the respondents, the questionnaires were scanned for completeness and sealed, along with the informed consent form, in an envelope that had a unique identification number on it. It was not opened until the data were entered at the University of New Mexico. This further protected confidentiality. Although the percentages choosing the pencil and paper vs. the interview option varied by reservation, approximately 80% of the entire sample chose pencil and paper. All interviews (20%) were completed by enrolled members of the tribe being surveyed, and respondents were offered the option of using either English or the native language. Less than 5% of the entire sample chose a native language interview. Respondents were provided a \$10 stipend for compensation.

A formal tribal council resolution of approval preceded all activity at each site. Furthermore, the protocols of the survey were reviewed and approved by a variety of institutional review boards including: the Arts and Sciences and Health Science Center Review Boards at The University of New Mexico, local service unit and/or tribal boards at each site, and the institutional review boards of the Indian Health Service area and national offices. The data presented here have been presented back to each tribe in analyzed form for their use in a variety of activities. Furthermore, the tribes have been provided the option of having the complete data sets analyzed further for them, and/or for the return of the complete survey results in electronic form.

Results

Demographics and Social Indicators

Tables 1 and 2 contain summaries of the social and demographic characteristics of the sample. Table 1 provides standard demographic indicators, while Table 2 summarizes traditional vs. modern values

regarding acculturation, language preference, and health care provider preference.

In Table 1 the ages of the male and female respondents are detailed. The median age of the female respondents is 1.6 years older than the males. This is not a surprise, as the male mortality rate is substantially higher among American Indians (more so than many other human groups), leaving more females at the older ages. Overall the sample is very well balanced given these differential mortality trends between male and female and appear to be a representative one. This is evidenced by the fact that most of the extra females in the sample are found in the 50 and older age category.

Educational attainment is also found in Table 1. Males in the sample are generally less educated in the formal sense and tend to cluster more at the lower levels. Fewer males have graduated from high school. The marital status of males and females is generally similar; 34.6% of both males and females in the sample are currently married. Males, however, are more likely to have never been married.

The socioeconomic status measures indicate that male and female income is relatively equal. Furthermore, when the sample is classified by occupation using the Hollingshead Occupational Codes (Hollingshead & Redlich, 1958), males are more likely to be in the skilled and unskilled manual labor categories while females dominate the homemaker, clerical, and administrative categories.

Finally, the last variable in Table 1 describes one isolated aspect of the respondents' social life, TV watching. On average, the males and females watch 3.1 to 2.7 hours, respectively, of TV per day and approximately 16.1 to 18 hours per week. Males report watching slightly more TV than do females. Males prefer to watch police shows and sports, while females are more likely to watch drama and soap operas.

Table 2 indicates that males and females are relatively equal in perception of their own levels of acculturation. Forty-two percent of the males and 43.5% of the females describe themselves as equally American Indian and White in their living practices. However, at the two extremes males are more likely to describe themselves as American Indian only or mainly American Indian, whereas females are more likely to describe themselves as mostly acculturated (White man's world with some American Indian). Language spoken provides another indicator of biculturalism and/or acculturation. Both males and females report speaking primarily English at home and with friends (95-98%). However, at work tribal languages are used more frequently: 23% of the women and 17.6% of the men report speaking traditional language at work.

Religious preference is described differently by the males and females. Males cite a higher adherence to traditional religious practices while females report more adherence to Christian practices, both Catholic and Protestant.

Table 1
Social and Demographic Characteristics of the Sample (N = 1,436)

Variable	Males	Females
Age (on day of interview) (%)		
<i>n</i> =	625	783
16-19	10.7	7.8
20-29	24.8	23.4
30-39	24.2	24.4
40-49	18.6	18.1
50+	21.8	26.3
Mean	37.3	39.9
Mode	19	34
$\chi^2 = 6.58, df = 4, p = 0.160$		
$t = 3.019145, p = 0.003$		
Educational Attainment (%)		
<i>n</i> =	629	790
Less than high school or GED	28.6	22.3
High school graduate or GED	24.2	25.4
Vocational schooling	8.7	4.9
Some college	27.7	31.3
College graduate and above	10.8	16.1
$\chi^2 = 22.10, df = 4, p = 0.000$		
Marital Status (%)		
<i>n</i> =	628	792
Single (never married)	35.2	27.4
Married	34.6	34.6
Living with significant other/common law partner	14.3	13.6
Separated	3.8	2.4
Divorced	10.0	13.4
Widowed	2.1	8.6
$\chi^2 = 38.73, df = 5, p = 0.000$		

Table Continues

Table 1 (Continued)
Social and Demographic Characteristics of the Sample (N = 1,436)

Variable	Males	Females
Occupation (Hollingshead Occupational Codes) (%)		
<i>n</i> =	572	717
Higher executives, major professionals, owners of large businesses	3.7	6.3
Business managers, medium businesses, lesser professionals	1.6	2.5
Administrative personnel, small businesses, minor professionals	7.7	9.3
Clerical and sales, technician, little businesses	6.8	18.4
Skilled manual	45.5	11.0
Semiskilled	8.4	6.3
Unskilled (unspecified and unemployed)	12.2	13.2
Homemaker	1.6	21.8
Student, disabled, or no occupation	12.6	11.2
$\chi^2 = 286.29, df = 8, p = 0.000$		
Yearly Income (%)		
<i>n</i> =	601	756
Less than \$9,999	32.9	38.6
\$10,000 to \$19,999	23.3	26.1
\$20,000 to \$29,999	18.3	15.1
\$30,000 to \$39,999	10.3	8.3
\$40,000 or above	15.1	11.9
$\chi^2 = 10.19, df = 4, p = 0.0374$		
Television Watching Habits		
<i>n</i> =	580	702
Mean hours TV watched yesterday	3.1	2.7
$t = 2.733915, p = 0.006$		
<i>n</i> =	618	770
Mean hours TV watched last week	18.2	16.1
$t = 2.671754, p = 0.008$		

Table Continues

Table 1 (Continued)
Social and Demographic Characteristics of the Sample (N = 1,436)

Variable	Males	Females
Television Watching Habits (Continued)		
Most watched TV shows (in alphabetical order) (top 6 each sex) (%)		
<i>n</i> =	629	792
Cops	3.0	
Day of our Lives	-	3.7
ER	-	5.1
Friends	2.7	3.3
Home Improvement	4.0	2.7
News (varied)	8.8	7.1
Seinfeld	4.3	3.1
Sports (varied)	6.7	-

Health-care-provider choices complete Table 2. When physically ill, there is no difference between males and females, for both sexes are equally likely to consult medical doctors from the Indian Health Service (IHS) or in private practice over 50% of the time. However, a substantial number (34-35%) consult *both* traditional healers and medical doctors. Few utilize only traditional healers. Regarding mental distress, males are more likely to consult a traditional healer than are females (17% to 12.9%). This male preference for traditional healers may be linked to issues of substance abuse.

Prevalence of Drinking

The prevalence (quantity, frequency, and variability) of drinking is summarized in Table 3. Males begin regular drinking at an earlier age than do females, (17.0 vs. 18.1 years), and are more likely to have consumed alcohol (at least once) in the last 12 months (70.7% for males, 60.4% for females). This is virtually identical to the overall U.S. population levels reported by the NIDA (1999, p. 85) National Household Survey (males = 68.3% and females = 60.0%). The *quantity* of drinks consumed by males is greater than females when measured over the last 12 months. The median number of drinks consumed per drinking day for drinking males was over 5 drinks, while the median number for drinking females is over 3 drinks.

Table 2
Social and Demographic Variables—Traditional Values vs. Modern Values, Language Preference, and Health Care Provider Preference

Variable	Males	Females
Level of Acculturation (%)		
<i>n</i> =	617	779
Indian only	8.4	5.0
Mainly Indian, some White man's world	23.5	20.3
Equally Indian and White man's world	42.0	43.5
Mostly White man's world, some Indian	24.5	29.3
White man's world only	1.6	1.9
Mean	2.8	3.0
Mode	3	3
$\chi^2 = 11.11, df = 4, p = 0.02534183$		
$t = 3.179652, p = 0.002$		
Languages spoken at home (%)		
<i>n</i> =	628	790
Respondents choosing English	94.9	96.3
$\chi^2 = 1.72, p = 0.189$		
Languages spoken with friends (%)		
<i>n</i> =	629	790
Respondents choosing English	96.2	97.6
$\chi^2 = 2.37, p = 0.124$		
Languages spoken at work (%)		
<i>n</i> =	629	790
Respondents choosing English	82.4	77.0
$\chi^2 = 6.21, p = 0.013$		
Religious Preference (%)*		
<i>n</i> =	628	791
Catholic	36.7	44.1
Traditional	48.5	36.4
Protestant	14.7	29.4
$\chi^2 = 24.95, df = 2, p = 0.000$		

Table Continues

Table 2 (Continued)
Social and Demographic Variables—Traditional Values vs. Modern Values, Language Preference, and Health Care Provider Preference

Variable	Males	Females
Preferred health care provider when physically ill (%)		
<i>n</i> =	622	784
Traditional healer	5.5	4.7
Medical doctor from IHS	35.4	37.2
Medical doctor in private practice	22.0	21.0
Both traditional healers and medical doctors	33.9	34.8
Other	3.2	2.2
$\chi^2 = 2.40, df = 4, p = 0.663$		
Preferred health care provider when mentally ill (%)**		
<i>n</i> =	627	789
Traditional healer	17.0	12.8
Counselor from IHS	16.5	16.5
Counselor in private practice	12.9	14.8
Clergy	7.2	9.1
Elder, relative, friend	19.5	22.0
Doctor or psychiatrist	16.2	16.1
High school counselor or social worker	1.4	1.1
Combination	4.9	5.7
Other	4.0	1.6
$\chi^2 = 23.67, df = 8, p = 0.003$		

* Respondents can choose more than one religion.

** Respondents can choose more than one type of provider.

Table 3
Population Experience with Alcohol: Prevalence of Drinking
(Adults, age 16 years +)

Variable	American Indian Males	Females
Age began drinking regularly		
<i>n</i> =	580	650
Range	3 - 49	2.5 - 60
Mean	17.0	18.1
Mode	18	18
S.D.	3.388	5.061
<i>t</i> = 4.505447, <i>p</i> = 0.000		
Drank alcohol in last 12 months (%)*		
<i>n</i> =	635	801
Respondents answering affirmatively	70.7	60.4
$\chi^2 = 16.46$, <i>p</i> = 0.000		
Alcoholic drinks consumed per day in last 12 months (%)**		
<i>n</i> =	507	566
0 drinks	13.6	27.2
1 to 2 drinks	15.0	19.8
3 to 4 drinks	17.2	17.7
5 to 6 drinks	14.2	14.3
7 to 9 drinks	14.6	10.2
10 or more drinks	25.4	10.8
$\chi^2 = 63.95$, <i>p</i> = 0.000		
Days consumed alcohol in last 30 days**		
<i>n</i> =	551	614
Mean	4.7	2.1
Median	2	1
Mode	0	0
S.D.	6.922	4.285
<i>t</i> = 7.686728, <i>p</i> = 0.000		

Table Continues

Table 3 (Continued)
Population Experience with Alcohol: Prevalence of Drinking
(Adults, age 16 years +)

Variable	American Indian	
	Males	Females
Alcoholic drinks consumed per day in last 30 days**		
<i>n</i> =	533	603
Mean	5.7	3.1
Median	4	1
Mode	0	0
S.D.	6.701	5.023
<i>t</i> = 7.361097, <i>p</i> = 0.000		
Number of days when 5+ alcoholic drinks were consumed in last 30 days**		
<i>n</i> =	544	612
Mean	3.0	1.3
Median	1	0
Mode	0	0
S.D.	5.368	3.443
<i>t</i> = 6.746823, <i>p</i> = 0.000		
Most alcoholic drinks consumed on any day in last 30 days**		
<i>n</i> =	529	597
Range	0 - 48	0 - 48
Mean	7.5	3.7
Median	6	0
Mode	0	0
S.D.	.390	5.899
<i>t</i> = 8.897953, <i>p</i> = 0.000		

* Includes all respondents, lifetime abstainers, current abstainers, and current drinkers.

** Data pertain only to those respondents who report having consumed alcoholic beverages in the past year (current drinkers).

Regarding the *frequency* of drinking, males are twice as likely to have drunk alcoholic beverages in the last 30 days than females. Males report an average of 4.7 drinking days in the last month while females report 2.1. On these drinking days, males report almost twice as many drinks consumed as females, 5.7 and 3.1. It should be emphasized here that the *modal* response for all of the above questions was *zero*. On most days, the respondents in this sample *consume no alcohol at all*.

As a measure of *binge* drinking (variability), we asked respondents to tell us how many days they drank 5 or more drinks. Males reported having 5 or more drinks on 3 days in the last month while females report 1.3 days of heavy drinking in the past month. Finally, when asked the most alcoholic drinks consumed on any one day in the last 30 days, males and females reported an equal range of 0-48 drinks. However, males reported drinking an average peak of 7.5 (S.D.=8.390) drinks on their highest drinking day, and females reported 3.7 (S.D.=5.898). All of these measures, therefore, indicate binge drinking among those who drink. Even though respondents are not drinking on *most* days, on days when they do drink, consumption is substantial.

Substance Use By Age

Table 4 provides the prevalence of drinking by key age categories. The prevalence of drinking by age group differs substantially between males and females. For males 20-29 years, over 86.2% drink as opposed to 72.8% for females. In the 50+ age group, 57.1% of the males in these tribes are still drinking as are 43.8% of the females. Therefore, drinking is more prevalent among the younger age groups as is true for other populations in the United States.

The quantity of alcohol consumed by age is also presented in Table 4. Over 60% of all males under the age of 40 report drinking 5 or more drinks per occasion in the last 30 days. Among females in the same age groups, 39-45% report drinking similarly large quantities. By ages 50 and older, over twice as many males (33.9%) than females (14.7%) are still drinking large quantities. However, alcohol consumption in the past 30 days is much higher among males under 40 than among older males and females. Male drinkers in this sample who are under 40 consume 9 to 10 drinks per occasion, whereas female drinkers of the same age consume 4.5 to 5.7 drinks. In the older categories (50+), males drink an average peak of 4.3 drinks per day while for most females consumption is 1.4 drinks.

Tobacco Use

A very high percentage of both males and females of these northern tribes smoke. The peak smoking prevalence for males is in the 16-19 year age group (76.9%), and it declines to 67.7% among 20-29 year-old males.

Rates of smoking among females in these age categories are 77.4% for the 16-19 year age group, and 70.0% for the 20-29 year age group. Unlike drinking, which tapers off in the older-age categories, smoking persists through the 50+-age category and involves almost half of all males (52.1%) and females (41.3%). These rates of smoking are much higher than national data, which indicate that overall 32.8% of males and 28.4% of females smoke (NIDA, 1999, p. 91). The highest national rates are reported in the 18 to 25 year olds at 50.3% for males and 43.9% for females (NIDA, 1999).

Smokeless tobacco use, as could be anticipated, is higher among males than among females. Among males below 40 years of age, almost one-third use smokeless tobacco while less than 10% of women below age 40 chew or “dip.” These rates also exceed national averages where about 13% of males and 1% of females are current users of smokeless tobacco (NIDA, 1999, p. 97).

Other Substances

The use of other drugs is also summarized in Table 4. Marijuana use is highest in the 16-19 age group with 55.4% of the males and 38.7% of the females having used marijuana in the last 12 months. The use of marijuana stays high in both groups until age 40, when it begins to taper off dramatically, especially among males. In most age groups marijuana use exceeds national averages (NIDA, 1999, p. 25). Non-prescription painkillers are used more by males than females in the younger age categories. In the older categories, the use is equally modest for both genders. Methamphetamine use is reported to be higher for very young males than females, but both genders show a tapering off in use in the older age groups.

For other drugs of abuse, females consistently report *no use*. For example, females report no use of inhalants or solvents in the past 12 months. Among the males, inhalant use is extremely low. Less than 1% of males report using the inhalant or volatile substances in Table 4. What little use that does occur, occurs before age 30 (see May & Del Vecchio, 1997). These inhalants or solvents include gasoline or lighter fluid, spray paints, metallic spray paints, rubber cement, markers, lacquer thinner or paint solvents, correction fluids, or hair spray. Gasoline or lighter fluid is the most commonly inhaled substance with approximately 4.6% of the under-20 males having used it in the last 12 months. Although inhalant use has been reported as high among American Indian youth in school and dropout surveys (Beauvais, 1992) its use is not frequently reported among adults.

Therefore, the picture of low use of substances other than alcohol, marijuana, or tobacco is quite consistent in this sample for both males and females. Inhalants are primarily used by youth when it is difficult to obtain alcohol (May & Del Vecchio, 1997), and marijuana use among this sample tapers off with age. Alcohol use also tapers off, but not as dramatically so as demonstrated in several southwestern tribal studies (Kunitz & Levy, 1994).

Table 4
Prevalence of Substance Use by Age for Males and Females
(Adults, age 16 years +)

Variable to	Males					Females				
	16 to 19	20 to 29	30 to 39	40 to 49	50+	16 to 19	20 to 29	30 to 39	40 to 49	50+
Consumed alcohol in past 12 months (%)*										
<i>n</i> =	631					790				
Respondents answering affirmatively	80.0	86.2	72.7	59.8	57.1	73.3	72.8	67.9	53.8	43.8
(Males) $\chi^2 = 40.66, df = 4, p = 0.000$										
(Females) $\chi^2 = 47.36, p = 0.000$										
Consumed 5 or more drinks of alcohol on one or more days in past 30 days (%)**										
<i>n</i> =	542					606				
Respondents answering affirmatively	68.6	67.4	60.9	49.0	33.9	44.7	40.5	38.9	25.4	14.7
(Males) $\chi^2 = 36.45, df = 4, p = 0.000$										
(Females) $\chi^2 = 33.01, df = 4, p = 0.000$										
Most drinks of alcohol on any day in past 30 days**										
<i>n</i> =	528					592				
Mean	9.9	9.2	8.9	6.0	4.3	5.7	4.5	5.0	3.0	1.4
Median	8	8	8	4	0	3	2	3	0	0
Mode	0	0	0	0	0	0	0	0	0	0
S.D.	9.639	8.060	9.050	7.494	6.782	8.488	6.028	6.568	5.230	3.182
(Males) $F = 8.716, p = 0.000$										
(Females) $F = 9.408, p = 0.000$										
Smoked cigarettes in past 12 months (%)										
<i>n</i> =	624					786				
Respondents answering affirmatively	76.9	67.7	60.0	52.6	52.1	77.4	70.0	67.4	56.6	41.3
(Males) $\chi^2 = 17.81, df = 4, p = 0.001$										
(Females) $\chi^2 = 50.49, df = 4, p = 0.000$										

Table Continues

Table 4 (Continued)
Prevalence of Substance Use by Age for Males and Females
(Adults, age 16 years +)

Variable to	Males					Females				
	16 to 19	20 to 29	30 to 39	40 to 49	50+	16 to 19	20 to 29	30 to 39	40 to 49	50+
Used smokeless tobacco in past 12 months (%)										
<i>n</i> =	622					783				
Respondents answering affirmatively	30.8	33.3	30.7	14.9	10.0	19.4	10.6	3.1	0.7	1.4
(Males) $\chi^2 = 32.98, df = 4, p = 0.000$										
(Females) $\chi^2 = 48.96, df = 4, p = 0.000$										
Used marijuana in past 12 months (%)										
<i>n</i> =	624					786				
Respondents answering affirmatively	55.4	37.4	32.0	14.0	2.9	38.7	24.4	17.6	11.9	1.4
(Males) $\chi^2 = 90.02, df = 4, p = 0.000$										
(Females) $\chi^2 = 69.88, df = 4, p = 0.000$										
Used non-prescription painkillers in past 12 months (%)										
<i>n</i> =	623					786				
Respondents answering affirmatively	21.5	8.4	12.7	9.6	5.0	6.5	7.8	9.3	11.2	9.6
(Males) $\chi^2 = 14.66, df = 4, p = 0.005$										
(Females) $\chi^2 = 1.73, df = 4, p = 0.786$										
Used methamphetamines in past 12 months (%)										
<i>n</i> =	624					786				
Respondents answering affirmatively	21.5	12.9	10.0	1.8	2.1	12.9	7.2	5.2	4.9	1.4
(Males) $\chi^2 = 31.91, df = 4, p = 0.000$										
(Females) $\chi^2 = 14.90, df = 4, p = 0.005$										

Table Continues

Table 4 (Continued)
Prevalence of Substance Use by Age for Males and Females
(Adults, age 16 years +)

Variable to	Males					Females				
	16 to 19	20 to 29	30 to 39	40 to 49	50+	16 to 19	20 to 29	30 to 39	40 to 49	50+
Used gasoline or lighter fluid in past 12 months (%)										
<i>n</i> =	624					762				
Respondents answering affirmatively	4.6	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Males) $\chi^2 = 14.03, df = 4, p = 0.007$										
Used (regular) spray paints in past 12 months (%)										
<i>n</i> =	624					786				
Respondents answering affirmatively	0.0	1.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Males) $\chi^2 = 3.77, df = 4, p = 0.437$										
Used metallic spray paints in past 12 months (%)										
<i>n</i> =	624					786				
Respondents answering affirmatively	0.0	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Males) $\chi^2 = 2.10, df = 4, p = 0.717$										
Used rubber cement in past 12 months (%)										
<i>n</i> =	624					786				
Respondents answering affirmatively	0.0	1.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Males) $\chi^2 = 3.77, df = 4, p = 0.437$										
Used markers in past 12 months (%)										
<i>n</i> =	624					786				
Respondents answering affirmatively	0.0	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Males) $\chi^2 = 2.10, df = 4, p = 0.717$										

Table Continues

Table 4 (Continued)
Prevalence of Substance Use by Age for Males and Females
(Adults, age 16 years +)

Variable to	Males					Females				
	16 to 19	20 to 29	30 to 39	40 to 49	50+	16 to 19	20 to 29	30 to 39	40 to 49	50+
Used lacquer thinner/paint solvents in past 12 months (%)										
<i>n</i> =			624					786		
Respondents answering affirmatively	0.0	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Males) $\chi^2 = 2.10, df = 4, p = 0.717$										
Used correction fluids in past 12 months (%)										
<i>n</i> =			624					786		
Respondents answering affirmatively	0.0	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Males) $\chi^2 = 2.10, df = 4, p = 0.717$										
Used hair spray in the past 12 months (%)										
<i>n</i> =			624					786		
Respondents answering affirmatively	0.0	0.6	0.7	0.0	1.4	0.0	0.0	0.0	0.0	0.0
(Males) $\chi^2 = 2.52, df = 4, p = 0.641$										

* Includes all respondents, lifetime abstainers, current abstainers, and current drinkers

** Data pertain only to those respondents who report having consumed alcoholic beverages in the past year (current drinkers).

The Context and Consequences of Drinking

The settings and consequences of drinking are presented in Table 5. Both male and female respondents report social factors as the main reason that they drink. To socialize, celebrate a special occasion, and to fit into a group of acquaintances are social contexts reported equally by males and females as the major reasons for drinking. The above variables tell us that most people drink in groups. Results from two other questions also confirm this result. The question, “When drinking, do you socialize with others?” was answered affirmatively by 97% of the males and 96% of the

females. Asked in another way, “When drinking, do you isolate yourself and drink alone?” only 20% of the males and 12% of the females said that they occasionally or frequently drink alone. Therefore, drinking is primarily a social experience and is rarely done in isolation.

Regarding the consequences of drinking, males were more likely to respond affirmatively to the risky behaviors and negative consequences. For example, males were more likely to report driving while intoxicated, getting arrested, passing out, and staying away from home for long periods of time when drinking. Sixty-two percent of the males and 45% of the females said they drove while intoxicated. Forty-seven percent of the males and 25% of the females reported having been arrested while drinking. The only variable where women reported greater negative consequences from drinking was leaving children alone; 9.2% of the females and 7.6% of the males reported this as a consequence of their drinking.

Discussion

The above data illustrate the value of separating male and female drinking data. On virtually all of the alcohol variables, males report heavier drinking, more frequent drinking, and more prevalent negative consequences. Even though males and females seem to drink primarily for social reasons, the males drink more heavily and get into more trouble when drinking. These differences occur in spite of the fact that the social, demographic, and cultural backgrounds of the two sexes are similar. Therefore, most of the differences between the groups lie along gender lines (sex roles) than along socioeconomic or cultural lines.

Not to be missed or ignored from these data is the great variability in drinking behaviors from one day to the next and from one individual to the next. An over-emphasis on drinking among American Indians, while ignoring the abstinence measures, has been common in the past among journalists, academics, and others. That is, even though the males (and to some extent the females) of this sample drink substantial quantities when they do drink, on most days no drinking occurs at all. Similarly, approximately 35% of the adults are complete abstainers. Therefore, abstinence days in each month and year far outnumber drinking days. On average, males only drink 5 days per month and females 2 days per month. Conversely, males are not drinking 25 days in a average month, and females are not drinking 28 days of each month. If the point prevalence of drinking is taken as any day, particularly a weekday, the modal pattern of drinking among American Indians is abstinence. This is not intended to minimize the fact that heavy drinking causes a tremendous number of problems ranging from adverse social consequences, morbidity, and mortality. It is, however, intended to emphasize the clearly documented strengths rather than the weaknesses exhibited in this particular population. The modal category on most of the frequency of drinking variables is zero drinks for both males and females.

Table 5
The Context of Drinking and Its Consequences by Sex
(Adults age 16 years +)

Variable	American Males	Indian Females
Reasons for dinking (top 4)(%)*		
<i>n</i> =	594	718
To be sociable	59.9	58.8
To celebrate a special occasion	57.1	53.8
Because the people I know drink	46.0	40.4
To be part of a group	37.5	34.8
When drinking, do (did) you socialize with others? (%)		
<i>n</i> =	569	678
Respondents answering “occasionally” or “frequently”	97.2	96.0
$\chi^2 = 1.27, p = 0.259$		
When drinking, do (did) you isolate yourself and drink alone? (%)		
<i>n</i> =	493	569
Respondents answering “occasionally” or “frequently”	19.9	12.0
$\chi^2 = 12.59, p = 0.000$		
When drinking, do (did) you drive while intoxicated? (%)*		
<i>n</i> =	542	647
Respondents answering “occasionally” or “frequently”	61.8	44.8
$\chi^2 = 34.13, p = 0.000$		
When drinking, do (did) you get arrested? (%)*		
<i>n</i> =	534	633
Respondents answering “occasionally” or “frequently”	47.4	25.3
$\chi^2 = 61.88, p = 0.000$		

Table Continues

Table 5 (Continued)
The Context of Drinking and Its Consequences by Sex
(Adults age 16 years +)

Variable	American Indian	
	Males	Females
When drinking, do (did) you pass out? (%)* <i>n</i> =	540	641
Respondents answering "occasionally" or "frequently" $\chi^2 = 17.19, p = 0.000$	57.0	44.9
When drinking, do (did) you stay away from home for long periods? (%)* <i>n</i> =	539	640
Respondents answering "occasionally" or "frequently" $\chi^2 = 38.81, p = 0.000$	41.7	24.7
When drinking, do (did) you leave your kids alone? (%) <i>n</i> =	497	608
Respondents answering "occasionally" or "frequently" $\chi^2 = 0.86, p = 0.354$	7.6	9.2

* Data pertain only to those respondents who report having consumed alcoholic beverages at sometime during their lifetime.

Two items that underscore this point can be added here: First a very high percentage of the males (82.3%) and females (83.1%) report having quit drinking at least once in their lifetime. While some of these have relapsed, a very high percentage have successfully quit drinking, many without the aid of formal treatment (see also Kunitz & Levy, 1994; Leung, et al., 1993; Levy & Kunitz, 1974). Using abstinence in the past year as a benchmark, 29.3% of the males and 39.6% of the females are abstainers. Secondly, in the items that surveyed the respondents' opinions about alcohol policy, most expressed conservative values. For example, when asked of their tribal council should be drug free, 75.5% agree or strongly agree. Furthermore, when asked if bar hours should be limited, if alcohol should be less available on the reservation, or if DWI laws should be strictly enforced, an even larger percentage of respondents (over 78%) responded affirmatively. Therefore, the values of abstinence and of reducing drinking

problems are common among American Indians, particularly those over 30 (see also May & Smith, 1988). Furthermore, the vast majority of the respondents have conservative ideas about alcohol use and abuse, but as in all other human populations their individual behaviors do not always conform to these high standards.

The picture painted in this survey is one that has been sketched by some authors and painted by others using different data. Problem drinking among American Indians is most highly concentrated in the lower age groups (Beauvais, 1992; Oetting & Beauvais, 1989; Oetting, Beauvais, & Edwards, 1988), and drinking is sporadic (Longclaws et al., 1980; Whittaker, 1962; 1982). However, when drinking occurs, it has a large number of consequences for the drinker, particularly because large quantities are consumed in short periods of time. Furthermore, the overall percentage of the population drinking in this sample (65%) is higher than found in studies of the Navajo of the southwest and of the Plains tribes in Oklahoma. These data therefore indicate that annual drinking prevalence and heavy drinking are higher among northern tribes than among southwestern tribes.

One unique aspect of this survey is that all four of these reservations are "wet." Even though only approximately 40% of all reservations have ever legalized alcohol (legal sale, purchase, and possession), all four of these reservations have legalized alcohol since the late 1950s (May, 1976). Although we do not have historical data on the characteristics of drinking on these reservations, one would suspect that the normative drinking patterns documented here have been developed and shaped by a number of factors including: historical patterns in response to prohibition prior to the late 1950s, availability through a number of outlets (including bars, grocery stores, and drive-up windows at some sites), and social and cultural norms. Therefore, the present pattern of binge drinking may be residual from the norms developed in the American Indian prohibition years. They may also be a response to minority status and the related inadequate environmental and social conditions. It would be very instructive to have data on the non-Indian population of these same regions. Are the American Indian drinking patterns substantially different from that of the non-Indians in these areas? Is it simply a matter of difference as measured by the quantity and frequency, or do non-Indians of the northern states have totally different patterns?

Conclusion

This study has found a pattern of heavy binge drinking among the four tribes studied, and these binges are isolated to relatively few days per week, per month, and per year. While this is one of the first completely random samples of drinking on and around the reservations of the northern states collected from the entire population (not just phone interviews), this binge pattern of heavy, sporadic drinking has confirmed some findings from other studies. As this study shows very clearly, when quantity,

frequency, and variability are taken together, there are many more non-drinking days than there are drinking days in these populations. The public health challenge that emerges from this study is how to prevent or minimize the consequences of heavy drinking on those occasions when it occurs.

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