PRENATAL ALCOHOL USE AMONG URBAN AMERICAN INDIAN / ALASKA NATIVE WOMEN

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Abstract: This paper examines prenatal drinking among American Indian/Alaska Native women using the 1988 Urban Indian Oversample for the National Maternal and Infant Health Survey. Using univariate, bivariate, and multivariate analyses, alcohol consumption during pregnancy was examined by demographic and behavioral variables. Although one out of every five American Indian/ Alaska Native women consumed some amount of alcohol during pregnancy, those who used alcohol drank less than one drink per month.

Prenatal alcohol use, particularly moderate to heavy alcohol use, defined as six or more drinks per week, is associated with adverse structural, behavioral, and cognitive deficits in children exposed in utero (Waterson & Murray-Lyon, 1990). The amount and timing of alcohol exposure during pregnancy can have a wide ranging impact upon the fetus' neurological and physiological development (Day, 1992). The most severe result of prenatal alcohol consumption is fetal alcohol syndrome (FAS), a condition distinguished by growth retardation, central nervous system impairments, and facial dysmorphia (Aase, 1994). FAS is believed to be the most common preventable cause of mental retardation in the United States (Able & Hanningan, 1995).

Because no lower limit has been established for safely consuming alcohol while pregnant, recommendations of no alcohol consumption during pregnancy have been advocated by health care providers and public health agencies (Morbidity and Mortality Weekly Report, 1995). Investigations into the teratogenic effects associated with FAS have implicated relatively high levels of alcohol consumption in the production of observable adverse effects (Jacobson & Jacobson, 1994). However, the effect of lighter alcohol consumption on fetal development continues to be of relevance since the relationship between lower levels of alcohol use and more subtle alcohol-

related birth defects (ARBD) have yet to be determined definitively (Faden, Graubard, & Dufour, 1997). When identified early, interventions that target the cessation of alcohol consumption early in pregnancy can prevent further damage and provide time for fetal catch-up growth (Serdula, Williamson, Kendrick, Anda, & Byers, 1991).

American Indians and Alaska Natives (AI/ANs) reportedly have a higher risk for FAS relative to other racial and ethnic groups; however, estimates of FAS among AI/ANs vary widely by tribal group and geographical location (Burd & Moffatt, 1994; Morbidity and Mortality Weekly Report, 1988). The use of International Classification of Diseases, Version 9 (ICD-9) coding to ascertain cases of FAS produced a prevalence rate of 2.1 per 1,000 live births among American Indians living in the Aberdeen area during 1981-1992, which approximates the rate found among Alaska Natives during 1978-1991—2.1 per 1,000 live births (Morbidity and Mortality Weekly Report, 1993; Morbidity and Mortality Weekly Report, 1995). Within the southwestern United States alone, prevalence estimates per 1,000 live births ranged from 1.4 among the Navajo to 9.8 among the American Indians in the Southwest plains during 1980-1982 (May, Hymbaugh, & Aase, 1983). Capturing the true prevalence rate of FAS among AI/ANs has proven difficult to ascertain because of the wide variation in the diagnostic criteria used to ascertain cases (Burd & Moffat, 1994; Egeland, Perham-Hester, & Hook, 1995).

Given that estimate rate of FAS appears to be higher among AI/ANs at least in certain instances, further attention needs to be drawn to the extent and characteristics of AI/AN women's alcohol consumption during pregnancy. Little information is available using national, population-based studies in general, particularly among urban AI/ANs. This paper describes the prenatal consumption of alcohol among a subgroup of urban AI/AN women by available demographic and behavioral characteristics.

Methods

The sample used in this study is the Urban Indian Oversample conducted as part of the 1988 National Maternal and Infant Health Survey (NMIHS) (U.S. Department of Health and Human Services, 1991). Reports from the 1990 U.S. Census indicate that nearly two-thirds of AI/ANs live outside identified tribally owned lands or reservations (U.S. Bureau of the Census, 1994). To provide more detailed information than previously available for urban AI/ANs, these women were oversampled using the same survey methods for the general NMIHS as described elsewhere (Sugarman, Brenneman, LaRoque, Warren, & Goldberg, 1994). Birth certificates were used to identify all AI/AN women who delivered a live-born infant during the calendar year of 1988 and lived off reservation in the catchment areas of selected urban American Indian clinics in 21 states. A random sample of these AI/AN women were mailed questionnaires for inclusion in the

oversample (personal communication, Johnathan Sugarman, 1996). Of 1,254 possible respondents, 763 completed questionnaires for a response rate of 60.8% (Sugarman et al., 1994). To date, the NMIHS oversample is one of the few available large-scale, population-based studies characterizing the health of urban AI/ANs, and has not been repeated with the subsequent administration of the NMIHS.

All respondents were asked if they consumed any alcoholic beverages during the twelve months preceding their delivery. Those who answered yes were then asked to recall the weekly or monthly average number of drinks they consumed after they learned they were pregnant, and whether or not they reduced their alcohol consumption during their pregnancy. The choice of explanatory variables was guided by similar research from national surveys on the socio-demographic determinants of drinking while pregnant, but clearly limited by the variables contained in the urban American Indian oversample of the NMIHS. Several of these variables have been found to be significant in predicting whether or not women drink alcohol knowing they are pregnant, including cigarette smoking, older age, unmarried, higher income, and higher education (Ebrahim et al., 1998; Morbidity and Mortality Weekly Report, 1995; Serdula, et al., 1991). In this paper, the prevalence of AI/AN women's drinking during pregnancy was analyzed by demographic and behavioral variables including maternal age, education, total household income, parity, cigarette consumption, time of pregnancy recognition, and prenatal care.

Because only 10 out of 763 women reported drinking heavily (six or more drinks per week) after they knew they were pregnant, separate analyses of the heavy drinkers could not be developed due to the small sample size. For example, polytomous logistic regression was attempted in which the dependent variable was categorized as no, little to moderate, and frequent drinking, but the model proved to be an inadequate fit based on the Pearson chi-square statistic. Consequently, the drinking variable was dichotomized in the logistic regression analysis in order to compare any or no drinking after learning of the pregnancy. Miltivariate logistic modeling was used to compute odds ratios for each characteristic after controlling for all other characteristics. All independent variables were treated as categorical variables using dummy variable coding in a single model.

To examine further the effects of risk factors on only those who reported drinking during pregnancy, a multiple linear regression model was used to assess the relationship between each of the demographic and behavioral variables and alcohol consumption. The dependent variable consisted of continuous scores used to approximate the number of drinks per month or per week: (a) less than one drink per month, (b) two to three drinks a month, (c) one drink a week, (d) two drinks a week, (e) three to five drinks a week, (f) six to eight drinks a week, (g) 9 to 13 drinks a week, (h) 14 to 20 drinks a week, and (i) 21or more drinks per week.

Sample data were not weighted for purposes of this analysis. Previous researchers attempted three different weighting strategies using the urban American Indian oversample and concluded that weighting the data did not alter the results derived from the unweighted data (Sugarman et al., 1994). All statistical analyses were performed using SAS 6.12 software (SAS Institute Inc., Cary, NC).

Results

Approximately 47% of the urban American Indian oversample reported drinking some amount of alcohol in the twelve months prior to their delivery; however, nearly 90% of those who reported drinking reduced their drinking after they realized they were pregnant. Overall, 22% of urban AI/AN respondents who had a live birth in 1988 reported consuming alcoholic beverages[1] after they learned of their pregnancies as shown in Table 1. Of those women who reported drinking while pregnant, 6% drank six or more drinks per week, 22% drank one to five drinks per week, 28% drank one to three drinks per month, and 44% drank less than one drink per month. Only four respondents reported drinking at the highest alcohol consumption level, 21 or more drinks per week. The median level of alcohol consumption among those who reported any drinking during their pregnancies was one drink per month.

The data in Table 2 show that the prevalence of prenatal alcohol use did not vary markedly by maternal age. Women with 16 or more years of education were more than twice as likely to consume some amount of alcohol after they knew they were pregnant as women with 12 years of education were. Similarly, women with total household incomes of $40,000 or more per year were nearly twice as likely to drink during pregnancy as women with household incomes of $10,000 or less per year were. The prevalence of drinking during pregnancy did not vary appreciably by parity or birth order. Among all AI/AN respondents, 34% reported smoking cigarettes in the 12 months before they learned they were pregnant. Women who smoked during pregnancy were nearly three times as likely to report drinking than nonsmokers. More than 97% of all AI/AN women in this sample received some prenatal care; however, the prevalence of prenatal drinking did not differ significantly between those who did and did not receive prenatal care.

Multiple linear regression was conducted among only those who reported *any* level of alcohol use after they learned of their pregnancy. Table 3 presents the bivariate and adjusted multivariate regression coefficients for the subsample of AI/AN women who drank during pregnancy. Several significant bivariate relationships emerge. Alcohol consumption during pregnancy has a positive relationship with age, marital status, and cigarette smoking, but has a negative relationship with education and total household income. The relationships with marital status and cigarette

Table 1
Number and Percent of Drinks Consumed by Urban AI/AN Women
After They Knew They Were Pregnant

Average Number of Drinks	**(*n*)**	**%**
21 or more per week	4	0.5
14 to 20 per week	0	0.0
9 to 13 per week	3	0.4
6 to 8 per week	3	0.4
3 to 5 per week	13	1.7
2 per week	14	1.8
1 per week	10	1.3
2 or 3 per month	23	3.0
1 per month	24	3.1
<1 per month	75	9.8
None	594	77.8

smoking are particularly strong in the bivariate regression analysis, explaining 10% and 12% of the variance, respectively.

In the full ordinary least squares (OLS) model, marital status and cigarette smoking remain significant at the .05 level when controlling for all other variables in the model. The linear combination of all eight independent variables accounts for 18% of the variance in predicting alcohol consumption. This multivariate regression analysis indicates that women who are unmarried (divorced, separated, widowed, or never married) and who smoke cigarettes are more likely to consume alcohol during pregnancy. Moreover, income level, which inversely correlates with drinking and explains 7% of variance, loses significance in the full model. Further investigation into the loss of total household income's significance in the full model shows that when marital status enters the model, income effects no longer are direct. Thus, total household income appears to be an important variable regarding drinking during pregnancy, although any direct affect on alcohol consumption appears absorbed by marital status.

Discussion

The NMIHS is one of the few population-based studies of AI/AN women that contains information regarding health behaviors during pregnancy. The urban American Indian oversample queried women about the amount of alcohol they consumed *after they knew they were pregnant*. While 1 in 5 women reported some alcohol use after pregnancy recognition, less than one-third of those who reported drinking were consuming alcohol

Table 2
Number and Percent of Urban American Indian Women Reporting Any Drinking During Pregnancy and Adjusted Odds Ratios and 95% Confidence Intervals by Selected Characteristics

Characteristic	**Interviewed Women**	**Crude %**	**Adjusted Or**	**95%CI**
AGE				
19 or younger	119	22.7	1.2	0.6 – 2.1
20 – 24	234	21.4	1.1	0.7 – 1.8
25 – 29	217	21.7	1.0	referent
30 – 34	136	23.5	0.9	0.6 – 1.6
35 or older	57	22.8	0.9	0.4 – 1.9
EDUCATION (years)				
0 – 11	222	21.2	1.1	0.7 – 1.7
12	289	19.0	1.0	referent
13 – 15	183	24.6	1.5	1.0 – 2.4
16*	69	31.9	2.2	1.1 – 4.1
HOUSEHOLD INCOME				
<$10,000	276	20.3	1.0	referent
$10,000 – $24,999	257	20.6	1.2	0.7 – 1.8
$25,000 – $39,999	122	23.0	1.4	0.8 – 2.4
$40,000 +*	108	29.6	1.9	1.1 – 3.5
MARITAL STATUS				
Married	407	20.9	1.0	referent
Unmarried	356	23.6	1.3	0.9 – 2.0
PARITY				
1	212	22.2	1.0	referent
2	117	26.5	1.4	0.8 – 2.5
3 or more	434	21.0	1.9	0.6 – 1.4
SMOKING STATUS				
0	577	17.9	1.0	referent
1 – 10/ day*	137	36.5	3.0	1.9 – 4.5
> 10/ day*	49	32.7	2.7	1.4 – 5.1
PRENATAL CARE				
Yes	744	22.0	1.0	referent
No	19	26.3	1.1	0.4 – 3.3
WEEKS PREGNANT AT RECOGNITION				
First Trimester	700	91.7	1.0	referent
Second Trimester	57	7.5	0.6	0.3 – 1.2
Third Trimester	6	0.8	1.4	0.2 – 13.7
Total	**763**	**22.1**		

*Indicates significance at .05 level

Table 3
Unstandardized and Standardized Coefficients from the Regression of Alcohol Consumption on Social and Demographic Characteristics

Independent Variables	Bivariate Relationships *b*	R2	Model *b*
Age	.064*	.03	.012
	(.168)		(.032)
Education	-.175*	.03	.009
	(-.185)		(.010)
Income	-.113**	.07	-.057
	(-.271)		(-.138)
Marital Status[1]	1.36**	.10	.781*
	(.312)		(.178)
Parity	-.006	.00	-.038
	(-.003)		(-.022)
Cigarette Smoking	.094**	.12	.074**
	(.340)		(.267)
Prenatal Care	.874	.00	.551
	(.067)		(.043)
Weeks at Recognition	.024	.00	-.011
	(.054)		(-.024)
Total R2		.18	

[1]Married=1, divorced=2, separated=3, widowed=4, never married=5.

on a weekly basis. Only 6% were consuming levels of 6 or more drinks per week. Given the small sample size of drinkers, it was not possible to use multivariate statistics to compare risk factors for women who reported consuming any prenatal alcohol use versus those who reported consuming moderate to heavy amounts. AI/AN women in this study who reported drinking after they knew they were pregnant tended to be better educated, more affluent, or cigarette smokers relative to those who reported no drinking after they knew they were pregnant. Among the one-fifth of AI/AN women who reported any drinking, cigarette smoking and unmarried predicted alcohol use.

The proportion of all women who reported drinking during their pregnancies in the nationally representative sample of NMIHS (20.7%) was equivalent to the proportion in the urban American Indian oversample. However, within the national NMIHS, AI/AN women who drank six or more drinks per week had a higher proportion of heavy drinkers relative to their numbers in the population than other ethnic and racial groups (Faden, Graubard, & Dufour, 1997). With the exception of age and prenatal care,

the socio-demographic patterns observed in these data follow those observed in the general birth population of the NMIHS (Morbidity and Mortality Weekly Report, 1995). Similarly, the results from the 1985-1988 Behavioral Risk Factor Surveillance System (BRFSS) on trends in alcohol consumption showed that pregnant women who smoked cigarettes and who were unmarried consistently reported a higher prevalence of alcohol use throughout all four years (Serdula, et al.,1991). The median number of drinks consumed by pregnant women was 4.2 drinks per month in the 1985-1988 BRFSS compared to one drink per month in the urban American Indian oversample of NMIHS.

Overall, only a small percentage of urban AI/ANs drank six or more drinks per week, the level considered at the greatest risk for FAS. The majority of respondents who reported drinking after they knew they were pregnant drank at levels considered to be light (Jacobson & Jacobson, 1994). Only averages of drinking per week or per month were obtained from the respondents; consequently, whether or not the light to moderate drinkers were engaging in binge drinking cannot be ascertained from the data here. Futhermore, given the particularly high use of prenatal care among the sample, respondents may have possibly received appropriate education about substance use during pregnancy, which may in turn account for relatively low levels of alcohol use during pregnancy.

Cigarette smoking appears as the most consistently significant and persistent correlate of alcohol use across studies despite controlling for other covariates. It is also important to note that cigarette smoking and alcohol consumption are highly correlated with each other, but do not appear to have a causal relationship. In other words, some other unmeasured variable not captured by the questions in the NMIHS appears to be driving both alcohol and cigarette use simultaneously rather than one driving the other. Interventions designed to target the prevention of alcohol use during pregnancy need to address the issue of smoking as well.

The low response rate limits extrapolation of the results to the general population of urban AI/ANs. No information exists describing the non-respondents in the NMIHS oversample; thus, it is not known if the non-respondents in the oversample noticeably differ from the respondents. However, the data do provide some observations of an understudied population of women and suggests a need to apply further efforts to conducting population-based surveys of pregnant AI/AN women. Special attention will need to be paid to obtaining adequate response rates, which will increase the generalizability of findings. As observed with other self-reports of alcohol use during pregnancy, these findings may be subject to underreporting by respondents who may minimize the frequency of their alcohol consumption in light of the increasing awareness about alcohol use and pregnancy (Bull, Kvigne, Leornardson, Lacinda, & Welty, 1999). Because these data are now over ten years old, they may not reflect more recent shifts in the drinking patterns of urban AI/ANs while pregnant.

The manifestation of FAS is often described as only the "tip of the iceberg" because of the more prevalent, yet more subtle effects of alcohol exposure during pregnancy (May, 1995). Until effects of lower-level alcohol use are fully elucidated, any level of alcohol use during pregnancy remains unacceptable for a healthy pregnancy outcome. Thus, only complete abstinence from alcohol use during pregnancy will prevent any possibility of FAS or alcohol-related birth defects from occurring (May, 1995). Given that at least 20% of the respondents reported some level of alcohol use during pregnancy, these NMIHS data support the on-going need to screen pregnant women for substance use. Early pregnancy recognition and early prenatal care will increase the possibility of identifying, counseling, and referring pregnant women who drink. Moreover, if pregnant women cease consuming alcohol early in their pregnancies, alcohol damage to the fetus can be minimized.

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Footnote

[1]A drink is 12 ounces of beer, 4 ounces of wine, or 1½ ounces of liquor.