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Patterns of Alcohol Consumption among Pregnant African-American Women in Washington, D.C

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SUMMARY

The objective of this paper is to describe the patterns and associated behaviors related to alcohol consumption among a selected sample of pregnant women seeking prenatal care in inner city Washington D.C. Women receiving prenatal care at one of nine sites completed an anonymous, alcohol-screening questionnaire. Questions were from the TWEAK and AUDIT as well as quantity/frequency questions about the amount, type, and pattern of alcohol consumption. Women were determined to be at no, low, moderate or high risk for alcohol consumption during pregnancy. For comparisons of risk levels of drinking, bivariate associations were examined using Fisher's Exact Tests. Odds ratios and 95% confidence intervals were also computed. Although 31% of current/recent drinkers stated that they continued to drink during pregnancy, responses to quantity/frequency questions revealed that 42% continued to do so. Women who were high compared to moderate risk acknowledged that others were worried [OR=4.0, 95% CI=1.5,10.6], drinking upon rising [OR=6.7, 95% CI=1.8,26.9], a need to reduce drinking [OR=3.2, 95% CI=1.3,8.1] and in the past five years having fractures [OR=4.2, 95% CI=1.0,17.8] or traffic crash injury(-ies) [OR=3.4, 95% CI=1.0,12.2]. Women in the high/moderate compared to low risk group were more likely to have been injured in a fight or assault [OR=2.7,95% CI=1.3,5.6]. This study validated the usefulness of our questionnaire in identifying women who were at risk for alcohol consumption during pregnancy across a range of consumption levels. Using our screening tool, women were willing to disclose their drinking habits. This low cost method identifies and allows for targeting of interventions.

INTRODUCTION

Although alcohol consumption during pregnancy has long been discouraged, it was in 1973 that the first modern description of alcohol as a teratogen and the identification of the constellation of symptoms as fetal alcohol syndrome occurred.^{1,2} Alcohol consumption during pregnancy has both immediate and long term effects. It has been shown to raise the

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risk of spontaneous abortions,^{3,4} stillbirth,^{5,6} preterm delivery,⁷ intrauterine growth restriction,⁸ low birth weight,⁷ as well as intellectual development,^{9,10} and behavioral problems in childhood.^{11,12} Although these outcomes are consistent with heavy drinking during pregnancy, the negative effects of lighter alcohol consumption are less clear. Henderson and colleagues¹³ systematically reviewed the effects of low to moderate alcohol consumption during pregnancy on the same array of outcomes. Among the studies reviewed, there was no consistent effect demonstrated on spontaneous abortions, stillbirth, intrauterine growth, preterm birth, birthweight or malformations. Given that the evidence is mixed, it is impossible to conclude that it is safe to drink even moderate amounts of alcohol during pregnancy. Henderson and colleagues¹⁴ also did a careful review of binge drinking, reviewing the following outcomes: spontaneous abortions, stillbirth, birthweight, gestational age, impaired growth and birth defects including fetal alcohol syndrome and neurodevelopmental outcomes. Adding studies ^{6,15} that have been published after the Henderson reviews^{13,14} provide little additional information to that supplied by Henderson and colleagues. ^{13,14} Studies have various definitions of binge drinking which complicates interpretation. However, the evidence of adverse pregnancy outcomes due to binge drinking is mixed. It is unclear how timing of drinking as well as amount and pattern of consumption affect the fetus. Thus it is critical to identify women who are drinking or at risk for drinking during pregnancy.

There are a number of alcohol screening questionnaires that have been evaluated for use with women,¹⁶ as well as those that have focused their evaluations on use among pregnant women.^{17,18} The most commonly used screening questionnaires include the TWEAK,¹⁹ the T-ACE,²⁰ the Michigan Alcoholism Screening Test (MAST),²¹ the Alcohol Use Disorders Identification Test (AUDIT)²² and the CAGE.²³ (The actual questions used in each of these screening tools are available in Bradley et al.¹⁶) The MAST was originally developed for use in males and focuses more on lifetime use of alcohol rather than current which limits its usefulness in an obstetric population.²¹ The CAGE was also developed for use in male population and focuses on consequences rather than the amount and pattern of drinking.²³ The AUDIT was designed to distinguish between early versus late stage alcohol abuse in both male and female populations and may be self- or interviewer-administered.²²

The T-ACE and TWEAK were developed for and have been validated for use in pregnant populations.^{19,20,24} Because these questionnaires focus indirectly on measures of alcohol consumption, patients may be more willing to respond accurately.²⁵ The first study to evaluate the T-ACE in a population of inner-city African-American women found a 76% sensitivity and 79% specificity.²⁰ Refinement of the question on tolerance raised the sensitivity to 91% and specificity to 81% .¹⁹ Chang and colleagues found that the TWEAK was similar to the T-ACE in distinguishing drinking patterns, but outperformed the T-ACE in both lifetime and risk drinking.²⁶

In a review of 29 prospective studies, Abel concluded that in the United States the incidence of Fetal Alcohol Syndrome among low socioeconomic women, African-American and Native American was approximately ten times higher than among middle class, Caucasian women.²⁷ Based on studies from Europe as well as the United States, Able concluded that it was low socioeconomic status not race that was the major factor. A more recent publication from the 2001–2003 Behavioral Risk Factor Surveillance System reviewed drinking patterns among women of childbearing age and found that those who drank (classified as non-binge drinker, binge drinker with non-high usual consumption or binge drinker with high usual consumption) were more likely to be White (compared to non-White or Hispanic), to have some college education (compared to no college education), to be employed and to have annual incomes $\geq$ \$25,000 a year.²⁸ Thus neither who is drinking nor who is at greatest risk for poor pregnancy outcome due to alcohol consumption is clear. Additionally, a substantial

proportion of women who drink prior to pregnancy report that they continue to drink during their pregnancy.²⁵

The Surgeon General has issued warnings to women who are pregnant or who may become pregnant to abstain from alcohol.²⁹ The harmful effects of alcohol on the fetus are preventable if women abstain from drinking. The objective of this paper is to describe the patterns and associated behaviors related to alcohol consumption among a selected sample of pregnant women seeking prenatal care in inner city Washington D.C. The data were collected as part of a feasibility study to identify and test interventions for pregnant women consuming alcohol at levels that could place their fetuses at risk for fetal alcohol syndrome and other alcohol-related sequelae.

METHODS

Subjects

The study population included women who, in 1999 attended one of nine prenatal care sites in located in the poorest wards in the District of Columbia. Women were included in the study if they were District of Columbia residents, were 18 years or older, could understand and answer questions in English, and had their pregnancy confirmed by a clinician prior to enrollment in the study. A trained research assistant approached women in the waiting room and described the purpose of the study, the screening tool, and obtained a signed informed consent from interested patients who met the study criteria. Patients received reassurance of anonymity and that medical care would be provided regardless of their participation in the study. Of those approached 1,543 women were eligible and willing to be screened. Respondents were paid \$20 to participate in the screening. All study related activities were approved by the institutional review boards at the participating sites.

Mode of Interview

The alcohol-screening questionnaire was administered using an Audio-Computer Assisted Self Interview (ACASI), with a touch screen application. The alcohol-screening questionnaire was designed to detect any amount of alcohol consumption (risk behavior) by pregnant women. Details of the evaluation of the screening questions used are described elsewhere³⁰ as are details of the development³¹ and acceptability^{31,32} of the ACASI screening tool.

The screening questionnaire required 30–45 minutes to complete. The subjects were taken to a private room where the research assistant provided instructions on the use of ACASI. Once the patient conveyed that she understood the method, the research assistant retreated to a corner of the room where she would be available for any questions that arose, but also allowed the subject privacy. At the end of each day all accumulated data from the interviews were downloaded onto a disk and transported to the main computer for consolidation.

The questionnaire was designed using a “less direct to a more direct” approach in order to desensitize women prior to answering the most difficult questions. First, questions on socio-demographic information, including work status, education, living situations and income level were asked. These were followed by questions concerning experiences with injury, depression, smoking history, having family member or a partner with a drinking problem. Next there were questions regarding any history of having ever consumed alcohol. Women who replied “yes” to the question of “ever drinking alcohol in their life” were then asked a series of alcohol related questions which included some questions from the TWEAK alcohol screening questionnaire¹⁹ and some based on the AUDIT.³³ This was followed by questions regarding obstetric history, including the patient’s intention to be pregnant at that time (wantedness). Finally, there were direct questions (quantity/frequency questions) about

the amount, type, and pattern of alcohol consumption, which occurred three months prior to and during the current pregnancy. The questionnaire concluded with qualitative assessment questions about the ease or difficulty of using the ACASI tool, of liking or disliking the computerized format, and a self-assessment of reading skill and familiarity with the computer.

Definitions of Risk Drinking

A “current/recent drinker” was defined as one who has consumed any alcohol within the three months prior to or during the pregnancy. A “former drinker” was a woman who stated she had consumed alcohol sometime in her life, but had not drunk any alcohol in the 3 months before or during her pregnancy. A “lifetime abstainer” was one who had never consumed alcohol. For “current/recent drinkers” questions on drinking behavior were used to assign to risk status. Using the quantity/frequency questions, average daily alcohol consumption (in ounces of absolute alcohol) was calculated mathematically based on the amount of alcohol in each type of alcoholic beverage consumed. Because any alcohol consumption during pregnancy is considered to raise the potential risk to the fetus, the risk classifications were defined as follows: *Low Risk* was any alcohol consumed within the 3 month prior to pregnancy, but no alcohol consumed since pregnancy recognition. *Moderate Risk* was drinking during pregnancy at a frequency of less than or equal to 1 drink a day, or drinking 3 or more drinks at one time, at a frequency of less than once a month. *High Risk* was drinking greater than one drink a day, or consuming 3 or more drinks at one time on at least one or more occasion per month. Figure 1 illustrates the decision tree used to classify women into the three risk categories.

Statistical Methods

Statistical analyses were performed using Statistical Analysis Software (SAS Institute Inc., SAS/STAT *User's guide, version 8*, Cary, N.C.: SAS Institute Inc., 1999. pp 3884). For comparisons of risk levels of drinking, bivariate associations were examined with selected independent variables using Fisher's Exact Tests. Odds ratios and 95% confidence intervals were also computed. Independent variables were selected based on factors cited in the literature as having an impact on alcohol consumption.³⁴ These included socio-demographic variables (age, race/ethnicity, marital status, education, employment status, and whether the respondent received public assistance), pregnancy history (wantedness, number of times pregnant, number of live births, preterm births, births with defects), behavioral characteristics (smoking, history of treatment for alcohol problems or depression, or if she had been told or felt there was a need for help with depression), having a family member or partner with alcohol problems, responses to the TWEAK, and injuries to self/others questions.

The initial analysis compared the demographic and behavioral characteristics of current/recent versus former drinkers/abstainers. The remaining analyses focused on the current/recent drinkers. We compared their alcohol consumption three months prior to becoming pregnant and during pregnancy, and identified their alcohol preferences. Further analysis of the current/recent drinkers included comparisons of women classified as low risk for drinking during pregnancy to those women classified as being at moderate or high risk for drinking during pregnancy. Finally, we compared the women classified as being at moderate versus high risk for drinking during pregnancy.

RESULTS

There were 1,566 women who were approached for inclusion in the study. Forty-one percent (n=636) were eligible for inclusion in the study. Women were excluded from this study for

the following reasons: not pregnant, language barrier, younger than 18 years of age, and had already participated in study (women sought to be included an additional time for the incentive). Eighty percent (n= 507) of women successfully completed the interview. Data from one woman were eliminated because of insufficient information on her drinking status. Among the remaining 506 women, 56% (n=285) were classified as current/recent drinkers; 23% (n=118) were classified as former drinkers and the remaining 20% (n=103) were classified as lifetime abstainers. Among the current/recent drinkers, 58% (n=166) were assigned low risk status and of the remaining 119 women, 30% (n=85) were assigned moderate risk status, and 12% (n=34) were assigned high risk status.

Table 1 provides demographic information on women in this sample, comparing current drinkers to former drinkers and abstainers. The women in the sample were predominantly African American (94.7%) and non-Hispanic (94.3%). The mean age was 26.1 years and the range was 18–48 years. Seventy six percent of the women completed high school, 43% were unemployed, 30% received public assistance, and 38% reported a family member with a drinking problem. Compared to former drinkers and abstainers, current/recent drinkers were significantly more likely to smoke, to have been told/felt the need to seek help for depression, to never have been married and to report having a partner with a drinking problem.

Among the 285 current/recent drinkers, 13% (n=36) started drinking alcohol at less than 13 years of age; 16% started drinking at ages 14–15 years; 25% started drinking at 16–17 years of age; 31% started drinking at 18–20 years; 13% started drinking at age 21 years or older, and 3% of the women could not remember. The most popular alcoholic beverage among women who drank during pregnancy was beer. Nearly 40% the women drinking during pregnancy consumed only beer, 10% consumed only wine and nearly 2% consumed only liquor. The remaining women (49%) consumed different combinations of forms of alcohol, with no stated preference for the type of alcohol consumed.

When asked directly about changes in drinking behavior when the woman was sure she was pregnant, 31% (n=88) of the 285 current/recent drinkers stated that they continued to drink during pregnancy. This was assessed by the response to the question, “Since you were sure you were pregnant has your drinking of alcohol increased, stayed the same, decreased, or ceased entirely?” However, calculation of daily ethanol consumption based on the responses to the quantity/frequency questions, revealed that 42% (n=119) of these women continued to drink during pregnancy. This was assessed using the average daily ethanol intake, defined as the sum of average daily alcohol from all sources (beer, wine, etc) a woman stated she consumed. See the appendix (online) for all questions used to determine average daily alcohol consumption.

Tables 2 and 3 provide information on the women’s binge drinking, defined as consuming 3 drinks or more on one occasion. Among the 285 current/recent drinkers, nearly 60% consumed 3 or more drinks at one time on at least one occasion three months prior to pregnancy. Five percent of women reported consuming equal to or more than 3 drinks at a time every day of the week during the 3 month period before pregnancy, and 13% reported drinking this same amount once or twice per week. Among the 119 women who continued to drink during pregnancy, 44% (n=52) women said they had consumed 3 or more drinks on at least one occasion during pregnancy. Three women consumed 3 or more drinks on one occasion every day during pregnancy, and 17% (n=20) of women drank this amount at least monthly during pregnancy.

Binge drinking was further assessed by risk status (moderate vs. high) for women who continued to drink during pregnancy. As shown in Table 3, among women who were at

moderate risk for drinking during pregnancy, 27% (n=23) women consumed three or more drinks at one time once or twice during the pregnancy. Women who were high risk had more episodes of heavy alcohol consumption; over a third stated they consumed more than three drinks at one time at least 1–2 times per week during pregnancy. Among the women who continued to drink during their pregnancy, 44% acknowledged binge drinking during their pregnancy.

Table 4 presents socio-demographic characteristics comparing women at low risk to women at moderate risk and comparing women at moderate risk to women at high risk. Women who were 31–48 years of age, currently smoking, receiving public assistance, and who had caused injury to self or others as a result of drinking were significantly more likely to be in the high/moderate risk group. Comparing women in the high and moderate risk groups revealed that older women, 31–48 years, were significantly more likely to be in the high risk group as compared to younger women. Women who reported currently smoking [OR=4.63, 95% CI: 1.82, 12.27], having caused injury to self or others as a result of drinking [OR=6.08, 95% CI: 1.90, 20.23] or having received treatment for alcohol problems [OR=7.29, 95% CI: 1.81, 34.52] were more likely to be in the high risk group.

The alcohol questions were extremely useful in differentiating the low risk drinkers from women whose alcohol consumption put them at moderate to high risk, with odds ratios ranging from 2.4 to 4.3 (Table 5). The questions that were useful in differentiating moderate from high risk were friends and relative worried or complained about drinking [OR=4.0, 95% CI=1.5, 10.6], drinking upon rising [OR=6.7, 95% CI=1.8, 26.9], feeling a need to reduce drinking [OR=3.2, 95% CI=1.3, 8.1], and that drinking prevented the woman from doing something [OR=2.9, 95% CI=1.1, 7.7]. Being injured in a fight or assault in the past 5 years was also associated with an odds ratio of 2.7 [95% CI=1.3, 5.6] for being in the high/moderate risk group compared to the low risk group. Fractures in the past 5 years or injury in a traffic accident in past five years were significantly more likely among the women with high risk alcohol consumption compared to women with moderate risk consumption [OR=4.2, 95% CI=1.0, 17.8; OR=3.4, 95% CI=1.0, 12.2, respectively].

Women who had previously been pregnant were more likely to be in the moderate/high risk group compared to women who had no previous pregnancies. Women with two or more previous pregnancies were 2.5 [95% CI=1.3, 4.7] times more likely to be in the high/moderate risk group as compared to women with no prior pregnancies. Among the women with prior pregnancies, those with at least one live birth were almost twice as likely to be in the high/moderate risk group as compared to women with no live births. Wantedness of pregnancy was strongly associated with risk drinking and women who reported not wanting to be pregnant at all were 1.9 times as likely to be in the moderate/high risk group as compared to the women who reported wanting to be pregnant sooner or at that time. Women who had at least one previous preterm infant were more than four [95% CI=1.4, 12.9] times as likely to be in the high risk alcohol consumption group compared to the moderate risk consumption group. Wantedness of this pregnancy did not differentiate between moderate and high risk drinkers.

DISCUSSION

This study validated the usefulness of our questionnaire (questions from both the TWEAK and AUDIT with additional questions added) in identifying women who were at risk for alcohol consumption during pregnancy across a range of consumption levels. The definition of “risk” drinking during pregnancy in previous studies is a consumption level of an average minimum of one ounce of absolute alcohol per day, which is the equivalent of 2 standard drinks per day.^{17–21} However, through the use of the specific quantity/frequency questions,

our screening tool revealed that 27% of current/recent drinkers who drank less than one ounce of absolute alcohol per day also acknowledged binge drinking once or twice during their pregnancy. Some studies have suggested that binge drinking behavior is potentially worse in causing detrimental effects to the fetus, than is the behavior of drinking one or two drinks. Animal models³⁵ suggest that the peak dose of the maternal blood alcohol may be a greater determinant of potential damage, than the chronicity of alcohol. It is important to identify these women as early as possible because they may not realize that this pattern of episodic drinking is potentially harmful or even that they are pregnant when they are consuming alcohol in this manner.

A surprisingly high proportion (56%) of women in our sample consumed alcohol in the three months prior to or into their pregnancy. Early in a woman's pregnancy, many women do not realize that they are pregnant. It is likely that many do not know that alcohol readily crosses the placenta and that it is during organogenesis that major damage may be done to the developing nervous system of the fetus.³⁶ We found that 23.5% of pregnant women drank after they knew they were pregnant, much higher than the 10% reported for African American populations based on the Behavioral Risk Factor Surveillance System surveys.³⁷ During the consent process, women were informed that their answers would be anonymous. Knowing this may have convinced some women to be more forthcoming in reporting their drinking habits than if they knew that their health provider would be given the information. In addition to the private environment that the ACASI methodology provides, the alcohol quantity-frequency questions required very specific responses. How forthcoming women would be if their answers were to be shared with their provider is unknown; as is a particular physician's level of comfort in asking about alcohol use.²⁴ This study revealed that there is a considerable subset of pregnant women who drink at a moderate risk level. Although these women are not consuming at high risk levels, it is unclear at what alcohol level, if any, is safe to consume during pregnancy. Certain questions helped to identify heavy drinkers and flag them for potentially intervention. Heavy drinkers were more likely to binge drink and more often reported a history of injuries, including bone fractures and traffic accident injuries within the past five years. Women who consumed alcohol at high compared to at moderate risk level were significantly more likely to report a history of at least one preterm birth. Because we were screening women anonymously, we do not know if these women were drinking during the pregnancy that ended in a preterm birth.

Over half of the current drinkers in this study were more likely to have initiated drinking before age 18, before the time when most women desire to start a family. Therefore, preventative and educational programs should target adolescents well before age 18 on the dangers of drinking during pregnancy.

The ACASI method has proven to be superior to other interview methods because of its ability to elicit sensitive information that offers the patient privacy and less confrontation than direct interviewing.³¹⁻³⁸ Our questions were carefully arranged in order to gradually build up from less intrusive questions to the most direct ones. In addition, the options offered for the quantity-frequency questions were reverse-ordered, placing the highest consumption option first. This arrangement was intended to facilitate the woman to be more forthcoming with answers to sensitive questions. This approach to screening facilitates the assignment of a woman to a risk category to assist in the determination of a patient's risk level. This in turn suggests the need for appropriate intervention(s) and treatment plan(s) for the patient. Furthermore, women consuming alcohol at lower levels of risk are often not easily identifiable by the more commonly used screening approaches. The ACASI approach to screening may provide a low cost method to identify these women and target them for simple intervention approaches.

This approach may be useful in other countries where women's consumption of alcohol is a social norm. There is evidence of alcohol consumption during pregnancy from many countries around the world.^{39–43} In addition, use of the ACASI screening tool has been successfully used in a numerous countries for issues that would also be considered sensitive.^{44–46} Measurement of quantities would need to be adjusted to conform to the usual amounts consumed in the country. As with any research, piloting the questionnaire and the data collection tool are recommended prior to actual use.

We can conclude that it is worthwhile to use the ACASI screening tool, to ask specific questions about drinking habits of women during pregnancy. ACASI enabled us to identify women who are at high, moderate and low risk levels. Other risk factors such as age, injuries, parity, unwanted pregnancy and smoking may also identify risk of unsafe drinking habits. Further research is needed to determine if women would provide similar answers in a setting that was not anonymous.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Definitions of Risk Drinking During Pregnancy

TABLE 1

Sociodemographic characteristics by Current Drinkers and Former Drinkers/Abstainers

Characteristic	Current Drinkers % (n=285)	Former Drinkers/Abstainers % (n=221)
<u>Maternal Age</u>		
18–25 years	48.1 (137)	52.9 (117)
26–30 years	22.5 (64)	15.8 (35)
31–35 years	18.9 (54)	17.7 (39)
36+ years	10.5 (30)	13.6 (30)
<u>Race</u>		
Black	95.8 (272)	93.2 (206)
Other	4.2 (12)	6.8 (15)
<u>Ethnicity</u>		
Hispanic	5.3 (15)	6.3 (14)
Non-Hispanic	94.7 (270)	93.7 (207)
<u>Marital status</u>		
Currently Married	12.3 (35)	19.9 (44)
Divorced/Widowed/Separated	23 (8.1)	8.6 (19)
Never Married	79.6 (227)	71.5 (158)
<u>Level of Education</u>		
Less than HS graduation	24.9 (71)	22.2 (49)
HS graduation or above	75.1 (214)	77.8 (172)
<u>Employment</u>		
Not employed	41.9 (119)	45.0 (99)
Employed	58.1 (165)	55.0 (121)
<u>Public Assistance</u>		
Yes	30.5 (87)	29.9 (66)
No	69.5 (198)	70.1(155)
<u>Ever told/felt need for help for depression</u>		
Yes	31.9 (91)*	22.6 (50)
Never	68.1 (194)	77.4 (171)
<u>Treated for Depression</u> (those who felt/told that they needed help for depression)		
Yes	37.4 (34)	34.0 (17)
Never	62.6 (57)	66.0 (33)
<u>Smoking</u>		
Current Smoker	29.8 (85)*	14.5 (32)
Former Smoker/Never Smoked	70.2 (200)	85.5 (189)

Characteristic	Current Drinkers % (n=285)	Former Drinkers/Abstainers % (n=221)
<u>Family Member With Alcohol Problem</u>		
Yes	41.4 (118)	34.4 (76)
No	58.6 (167)	65.6 (145)
<u>Partner with alcohol problem</u>		
Yes	15.8 (45) *	8.6 (19)
No	84.2 (240)	91.4 (202)

*
 $p \leq 0.05$

TABLE 2

Binge drinking among a Sample of Women in Washington, D.C.

Episodes of drinking 3 or more drinks	Drinking 3 months before pregnancy (n=285) n (%)	Drinking during pregnancy (n=119) n (%)
Every Day	15 (5.3)	3 (2.5)
3–4 times a week	11 (3.9)	2 (1.7)
1–2 times per week	38 (13.3)	7 (5.8)
1–3 times per month	32 (11.2)	8 (6.7)
Once/twice	72 (25.3)	32 (26.9)
Consumed alcohol, but did not binge	117 (41.1)	67 (56.3)

TABLE 3

Binge Drinking among Women that Continued to Consume Alcohol during Pregnancy

Episodes of 3 or more drinks at one time	Moderate Risk (N=85) n (%)	High Risk (N=34) n (%)
Every Day	0 (0)	3 (8.8)
3–4 times/week	0 (0)	2 (5.9)
1–2 times/week	0 (0)	7 (20.6)
1–3 times/month	0 (0)	8 (23.5)
Once/twice	23 (27.1)	9 (26.5)
Consumed alcohol, but did not binge	62 (72.9)	5 (14.7)

TABLE 4
Sociodemographic Characteristics for the Current/Recent Drinkers by Risk Groups

Characteristic	Comparison 1			Comparison 2		
	Low Risk (n=166) % (n)	High/moderate Risk (n=119) % (n)	Odds ratio of being in the high/moderate risk group OR [95% CI]	Moderate Risk (n=85) % (n)	High Risk (n=34) % (n)	Odds ratio of being in the high risk group OR [95% CI]
Maternal age						
18–25 years	57.8 (96)	34.5 (41)	0.37 [0.15,0.91]	40.0 (34)	20.5 (7)	0.16[0.04,0.69]
26–30 years	21.7 (36)	23.5 (28)	0.68 [0.26,1.78]	22.4 (19)	26.5 (9)	0.36 [0.09,1.56]
31–35 years	12.1 (20)	28.6 (34)	1.49 [0.54,4.04]	29.4 (25)	26.5 (9)	0.28 [0.09,1.63]
36+ years	8.4 (14)	13.4 (16)	Referent	8.2 (7)	26.5 (9)	Referent
Marital Status						
Currently Married	11.5 (19)	13.5 (16)	1.28 [0.58,2.79]	16.5 (14)	5.9 (2)	0.33 [0.03,1.63]
Divorced/Widowed/Separated	6.0 (10)	10.9 (13)	1.98 [0.76,5.26]	9.4 (8)	14.7 (5)	1.46 [0.34,5.59]
Never Married	82.5 (137)	75.6 (90)	Referent	74.1 (63)	79.4 (27)	Referent
Education Level						
Below HS	21.1 (35)	30.2 (36)	1.62 [0.91,2.89]	28.2 (24)	35.3 (12)	1.39 [0.54,3.48]
HS or above	78.9 (131)	69.8 (83)	Referent	71.8 (61)	64.7 (22)	Referent
Employment						
Employed	57.6 (95)	58.8 (70)	Referent	64.7 (55)	44.1 (15)	Referent
Not employed	42.4 (70)	41.2 (49)	0.95 [0.57,1.58]	35.3 (30)	55.9 (19)	2.32 [0.96,5.67]
Received Public Assistance						
Yes	23.5 (39)	40.3 (48)	2.20 [1.28,3.80]	36.5 (31)	50.0 (17)	1.74 [0.72,4.20]
No	76.5 (127)	59.7 (71)	Referent	63.5 (54)	50.0 (17)	Referent
Ever told or felt needed help for depression	27.1 (45)	38.7 (46)	Referent	37.7 (32)	41.2 (14)	Referent
Not told or felt needed help	72.9 (121)	61.3 (73)	0.59 [0.35,1.01]	62.4 (53)	58.8 (20)	0.86 [0.36,2.13]
(For those reported depression)						
Ever been treated for depression	40.0 (18)	34.8 (16)	Referent	12.9 (11)	14.7 (5)	Referent
Not treated for depression	60.0 (27)	65.2 (30)	1.25 [0.49,3.19]	87.1 (74)	85.3 (29)	0.86 [0.25,3.45]
Current Smoker	19.3 (32)	44.5 (53)	3.36 [1.92,5.92]	34.1 (29)	70.6 (24)	4.63 [1.82,12.27]
Former Smoker/Never Smoked	80.7 (134)	55.4 (66)	Referent	65.9 (56)	29.4 (10)	Referent
Injury to self/other as result of drinking	6.6 (11)	16.0 (19)	2.68 [1.15,6.49]	8.2 (7)	35.3 (12)	6.08 [1.90,20.23]

Characteristic	Comparison 1				Comparison 2		
	Low Risk (n=166) % (n)	High/moderate Risk (n=119) % (n)	Odds ratio of being in the high/moderate risk group OR [95% CI]		Moderate Risk (n=85) % (n)	High Risk (n=34) % (n)	Odds ratio of being in the high risk group OR [95% CI]
No injury to self/other	93.4 (155)	84.0 (100)	Referent		91.8 (78)	64.7 (22)	Referent
Got treatment for alcohol problems	4.8 (8)	10.9 (13)	2.42 [0.89,6.97]		4.7 (4)	26.5 (9)	7.29 [1.81,34.52]
No treatment/no need for treatment for alcohol problems	95.2 (158)	89.1 (106)	Referent		95.3 (81)	73.5 (25)	Referent

Note: Highlighted portions indicate significant association at the 0.05 level of significance.

TABLE 5

Prevalence of Risk Factors for the Current Drinkers by Risk Groups

Characteristic	Low vs. Moderate/high Risk			Moderate vs. High Risk		
	Low Risk (n=166) % (n)	Moderate/high Risk (n=119) % (n)	Odds ratio of being in the moderate/high risk group [95% CI]	Moderate Risk (n=85) % (n)	High Risk (n=34) % (n)	Odds ratio of being in the high risk group [95% CI]
Alcohol						
Family Member With Alcohol Problem	39.8 (66)	43.7 (52)	1.18 [0.71,1.95]	41.2 (35)	50.0 (17)	1.43 [0.59,3.43]
Partner with alcohol problem	10.8 (18)	22.7 (27)	2.41 [1.20,4.92]	17.7 (15)	35.3 (12)	2.55 [0.93,6.81]
Number of drinks can hold (6+ drinks)	18.1 (30)	34.5 (41)	2.38 [1.33,4.28]	30.6 (26)	44.1 (15)	1.79 [0.72,4.38]
Number of drinks to feel high (4+ drinks)	15.8 (26)	33.6 (40)	2.71 [1.48,4.98]	28.2 (24)	47.1 (16)	2.26 [0.91,5.55]
Friends/Relatives worry or complain about drinking	10.2 (17)	24.4 (29)	2.82 [1.41,5.79]	16.5 (14)	44.1 (15)	4.00 [1.50,10.64]
Sometimes Drink when get up (eyeopener)	4.8 (8)	12.6 (15)	2.85 [1.08,8.02]	5.9 (5)	29.4 (10)	6.67 [1.83,26.86]
Not recall things done while drinking (amnesia)	22.3 (37)	42.9 (51)	2.62 [1.51,4.53]	37.7 (32)	55.9 (19)	2.10 [0.87,5.10]
Feel need to cut down on drinking	20.0 (33)	38.7 (46)	2.52 [1.43,4.44]	30.6 (26)	58.8 (20)	3.24 [1.32,8.05]
Drinking prevented from doing something	6.6 (11)	23.5 (28)	4.34 [1.97,10.08]	17.7 (15)	38.2 (13)	2.89 [1.07,7.66]
Injury						
Fractures/dislocations to bones/joints (past 5 years)	9.6 (16)	10.1 (12)	1.05 [0.44,2.48]	5.9 (5)	20.6 (7)	4.15 [1.02,17.80]
Injured in traffic accident (past 5 years)	14.5 (24)	12.6 (15)	0.85 [0.40,1.79]	8.2 (7)	23.5 (8)	3.43 [0.97,12.17][§]
Injured head (past 5 years)	7.2 (12)	10.1 (12)	1.44 [0.57,3.65]	8.2 (7)	14.7 (5)	1.92 [0.44,7.64]
Injured in fight or assault (past 5 years)	10.2 (17)	23.5 (28)	2.70 [1.34,5.55]	21.2 (18)	29.4 (10)	1.55 [0.56,4.14]
Characteristic	Low vs. Moderate/high Risk			Moderate vs. High Risk		
	Low Risk (n=166) % (n)	High/moderate Risk (n=119) % (n)	Odds ratio of being in the moderate/high risk group [95% CI]	Moderate Risk (n=85) % (n)	High Risk (n=34) % (n)	Odds ratio of being in the high risk group [95% CI]
Pregnancy History						
<u>Number of Pregnancies</u>						
0	25.9 (43)	11.8 (14)	Referent	12.9 (11)	8.8 (3)	Referent
1	26.5 (44)	15.1 (18)	1.35 [0.62,2.95]	17.7 (15)	8.8 (3)	0.73 [0.12,4.35]

Characteristic	Low vs. Moderate/high Risk			Moderate vs. High Risk		
	Low Risk (n=166) % (n)	Moderate/high Risk (n=119) % (n)	Odds ratio of being in the moderate/high risk group [95% CI]	Moderate Risk (n=85) % (n)	High Risk (n=34) % (n)	Odds ratio of being in the high risk group [95% CI]
2+	47.6 (79)	73.1 (87)	2.50 [1.33,4.72]	69.4 (59)	82.4 (28)	1.74 [0.45,6.74]
At least one live birth (among those with prior pregnancies)	69.9 (86)	81.9 (86)	1.95 [1.00,3.88][§]	78.4 (58)	90.3 (28)	2.58 [0.65,14.80]
At least one preterm birth (among those with live births)	18.6 (16)	29.1 (25)	1.79 [0.83,3.94]	19.0 (11)	50.0 (14)	4.27 [1.42,12.91]
At least one birth defect (among those with live births)	3.5 (3)	4.7 (4)	1.35 [0.22,9.48]	1.7 (1)	10.7 (3)	6.84 [0.51,365.19]
<u>Wantedness of pregnancy</u>						
Sooner/at that time	39.8 (66)	35.3 (42)	Referent	37.7 (32)	29.4 (10)	Referent
Later	39.8 (66)	23.5 (28)	0.77 [0.44,1.33]	25.9 (22)	17.7 (6)	0.87 [0.28,2.75]
Not at all	20.5 (34)	41.2 (49)	1.94 [1.17,3.23]	36.5 (31)	52.9 (18)	1.86 [0.74,4.65]

Note:

Highlighted portions indicate significant association at the 0.05 level of significance based on Fisher's Exact Test.

[§] indicates that the association is significant based on Fisher's exact test (p<0.05) but the confidence interval includes 1 which is an artifact of the computational algorithm.