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Alcohol consumption among HIV-positive pregnant women in KwaZulu-Natal, South Africa: prevalence and correlates

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Abstract

Background—HIV-positive pregnant women who drink put their children at risk of both HIV and fetal alcohol spectrum disorders. The province of KwaZulu-Natal (KZN) has the highest prevalence of HIV in South Africa, but has not before been considered an area of high alcohol consumption among women. This paper analyzes a large sample of HIV+ pregnant women in KZN to examine alcohol consumption in that population.

Methods—Data came from assessments of women enrolled in Prevention of Mother-To-Child Transmission programs at 8 clinics in KZN. Descriptive statistics and logistic regressions were used to examine the prevalence and correlates of alcohol consumption and binge drinking.

Results—Of 1201 women assessed, 18% reported drinking during pregnancy, and 67% of drinkers usually binged when drinking (had 3+ drinks in one sitting). Over one-third of drinkers binged twice a month or more. Women living in urban and peri-urban locations were more likely to drink, as were those with indicators of higher economic status and greater social engagement. Married women were less likely to drink, while women who had poorer mental health, used tobacco, or had a greater history of sexual risk-taking were more likely to drink.

Conclusion—Health care workers in KZN should be aware that pregnant women who drink are likely to do so at a level that is dangerous for their babies. Some factors associated with drinking indicate social/environmental influences that need to be counteracted by greater dissemination of information about the dangers of drinking, and greater support for abstinence or moderation.

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AUTHOR DISCLOSURES

Contributors.
Study design: LR, MT, MJRB. Implementation and data collection: LR, MT, AvH, HvR. Analysis and interpretation of data: KD, EG, WSC. Drafting of paper: KD, NM, MT. Critical review of manuscript: LR, EG, AvH, HvR, WSC, MJRB.

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No conflict declared.

Keywords

Alcohol; HIV; pregnancy; South Africa

1. Introduction

South Africa is suffering a persistent high-intensity generalized HIV/AIDS epidemic and, at the same time, has one of the highest levels of alcohol consumption in the world. The association between these two problems has been well-established overall, and in the context of sub-Saharan Africa. Those who drink more alcohol are also likely to be greater sexual risk takers, and are therefore at greater risk of HIV infection (Morojele et al., 2006; Fisher et al., 2007; Kalichman et al., 2007; Baliunas et al., 2010; Parry et al., 2009; Shuper et al., 2010; Hahn et al., 2011). Because of this association, we hypothesize that HIV-positive pregnant women may drink more than pregnant women in general. This has health implications for the mother, but most importantly it puts her baby at risk of both HIV infection and fetal alcohol spectrum disorders (FASD). FASD encompasses a range of outcomes including facial dysmorphology, growth restriction, decreased cognitive functioning, attention deficits, emotional and behavioral problems, and decreased motor and visual-spatial abilities, among others (Sokol et al., 2003; Centers for Disease Prevention and Control, 2005).

It is estimated that South Africa is home to the world's largest population of people living with HIV, 5.6 million in 2009 (UNAIDS, 2010). Of all the provinces in South Africa, KwaZulu-Natal (KZN) has the highest prevalence of HIV among pregnant women, 38.7%, as assessed by regular public antenatal clinic surveillance (South Africa Department of Health, 2009). KZN is also home to two of the four districts in South Africa with the highest prevalence of HIV: uMgungundlovu (45.7% of pregnant women) and eThekwini (40.3%).

In addition to HIV, South Africa also has one of the highest levels of alcohol consumption per drinker anywhere in the world (Parry et al., 2005; Peltzer and Ramlagan, 2009). A substantial amount of research has been conducted regarding drinking and fetal alcohol spectrum disorders in the Western Cape Province (WCP) of South Africa, as this is a wine-growing region with a history of alcohol compensation for seasonal work and associated problem drinking (Croxford and Viljoen, 1999; May et al., 2000; Viljoen et al., 2002; Viljoen et al., 2003; May et al., 2005; Viljoen et al., 2005; May et al., 2007; May et al., 2008). It has been estimated that 34% of urban and 46–51% of rural women in that province drink during pregnancy (May et al., 2005). Croxford and Viljoen (1999) found that 43% of pregnant women consumed alcohol during the current pregnancy, and more than half of these drinkers, or 24% of the total sample, were significant drinkers – defined as moderate to heavy consumption occurring in episodes of binging. Nationwide, 13% of pregnant women reported using alcohol in the past month (Peltzer and Ramlagan, 2009). Given the association between alcohol use and HIV, one might expect these rates to be even higher among pregnant women who are HIV-positive.

Studies of FASD in WCP have shown that a major risk factor is heavy episodic (binge) drinking. In a comprehensive review of the literature, May et al. (2009) identified the following predictors of binging and FASD: being of lower socioeconomic status (measured by income, education, and occupation status); being unmarried; high gravidity; poor nutrition; being smaller in height and weight; being less regular in the practice of religion; being more depressed; being in a relationship with men who drink; and using cannabis or tobacco. Recent research conducted in the townships surrounding Cape Town in the WCP identified having a higher number of lifetime sexual partners and partner violence as factors

associated with post-conception alcohol use (O'Connor et al., 2011). Alcohol use among pregnant women has been associated with use of traditional medicines in Africa (Banda et al., 2007). Large drinking-supportive social networks have also been associated with greater alcohol-related problems (Homish and Leonard, 2008).

Evidence regarding different patterns of drinking by urban vs. rural location is mixed. Studies by May, Viljoen and colleagues have consistently shown a greater risk of FASD among children of women living in rural farming areas, compared to women living in more urbanized locations (May et al., 2000; May et al., 2005; Viljoen et al., 2005; May et al., 2007; May et al., 2008). Morojele et al. (2010) also found that rural women of child-bearing age were much likelier than urban women to drink, as well as to engage in hazardous drinking. In contrast, Parry et al. (2005) reported results from a national health survey showing higher rates of lifetime and current drinking in urban areas; the same survey showed higher rates of risky (i.e., binge) drinking among current drinkers in nonurban areas.

Rural-urban comparisons are affected by the larger context of economic and socio-cultural background factors. Due to the very different demographic profiles of WCP and KZN (Statistics South Africa, 2005), findings from studies conducted in the WCP regarding personal or environmental characteristics associated with drinking during pregnancy and FASD might not necessarily apply in KZN. Although there is less alcohol consumption than WCP in KZN as a whole (Peltzer et al., 2011), more drinking may be found in the HIV+ subpopulation. Circumstances in KZN could result in an elevated risk for fetal alcohol spectrum disorders among HIV+ women in that province. Among drinkers in KZN, surveys have shown a pattern of binging, a major risk factor for FASD (Parry et al., 2005; Peltzer and Ramlagan, 2009). Being of low socioeconomic status has also been identified as a risk factor, and women in KZN have less education, employment, income, and fewer housing assets than the well-studied WCP population (Statistics South Africa, 2005). Yet little research has been conducted on alcohol consumption among HIV+ pregnant women in KZN. This paper analyzes data from a large sample of HIV+ women from multiple sites in KZN, and offers insights on the prevalence of prenatal alcohol consumption and the importance of risk factors identified in the South African context, in an important and relatively unstudied population.

2. Methods

2.1 Participants

Pregnant HIV-positive women enrolled in state-run Prevention of Mother-To-Child Transmission (PMTCT) programs were recruited from 8 health care clinics in the uMgungundlovu and eThekwini districts of KwaZulu-Natal Province, South Africa. Recruitment of the sample took place from July 2008 through April 2010. The context was an evaluation of a mentor mother intervention program aimed at providing clinic-based support to HIV+ mothers and babies during pregnancy and the baby's first year of life (Rotheram-Borus et al., 2011). This paper presents results from baseline assessments, collected prior to the intervention program.

The goals of the intervention were to enhance and support the PMTCT program and to improve the mental and physical health and well-being of mother and child. The name of the program, Masihambisane, means "let's walk together". Research partners for Project Masihambisane were the Child, Youth, Family and Social Development Program of the Human Sciences Research Council (HSRC) in South Africa and the UCLA Center for Community Health. The study sites were selected from urban, peri-urban and rural health facilities to achieve four matched pairs that could be randomized to the intervention and control conditions of the study. The two urban sites were in the vicinity of Pietermaritzburg

(the provincial capital); the four peri-urban sites were in the urban fringes surrounding Pietermaritzburg and Durban (the largest city in the province); and the two rural sites were in small villages outside Pietermaritzburg.

The procedure followed at each clinic was for women presenting at the clinic during pregnancy to undergo voluntary counseling and testing for HIV. All women, regardless of HIV status, were offered a referral to a Masihambisane peer mentor, for additional support during pregnancy. HIV+ women meeting with peer mentors were given material about the study and a consent form to review. If a woman was eligible and provided voluntary informed consent at a second meeting at the antenatal clinic, a 60–90 minute baseline interview was conducted during that visit. Eligibility criteria included being 18 years or older, pregnant and HIV+; being enrolled in the PMTCT program and receiving medical care from the study site clinic; residing in the study area and not planning to relocate after the birth for at least a year; and being mentally competent. Interviews were conducted at the antenatal clinics by trained staff using locally-developed mobile phone-based survey software, designed to run on entry-level handsets. Data collected for the study were kept confidential and not shared with clinic staff. Completed assessments were uploaded immediately to a central online database, and cleared from the mobile phones to prevent data loss and to assure privacy. The assessment was available in English and isiZulu (the most common language in KZN).

2.2 Measures

Alcohol use was assessed using the brief AUDIT-C alcohol screener, which contains questions about frequency of drinking, amount consumed when drinking, and frequency of binge drinking (Bush et al., 1998). The interviewer used a typical local cup and asked about drinking the amount contained in that cup. The questions were repeated for two time periods, referring to “the month before you found out you were pregnant” and “now that you know you are pregnant”. The questions asked were “How often did/do you drink any alcoholic beverage”, “Counting all types of alcohol combined, how many drinks did/do you usually have on days when you drank alcohol”, and “How often did/do you drink three or more drinks in a single day”. We defined drinking during pregnancy as a non-zero response to the questions about frequency of any drinking, before or after recognition of the pregnancy. We defined binging as a non-zero response to the questions about having 3 or more drinks in a single day, pre- or post-recognition (Bradley et al., 2007).

Prior research has identified several factors that are associated with prenatal alcohol consumption by South African women. Data collected for this study included many of these factors: the pregnant woman’s demographics (age, marital status, education, employment); living conditions as indicators of economic status (formal or informal housing, water onsite, ownership of household items); and urban, peri-urban, or rural location. We included an indicator of prior pregnancies, as gravidity has been linked to drinking. In addition, we included measures of weeks pregnant at discovery, whether the pregnancy was planned, and whether there had been an attempt to terminate the pregnancy. Mental health was assessed with the 12-item General Health Questionnaire (GHQ) (Goldberg et al., 1997), an instrument for measuring psychiatric morbidity that has been widely used and extensively translated, including in South Africa (Spangenberg and Pieterse, 1995).

Other measures associated with prenatal alcohol consumption are current use of tobacco or cannabis, which we included, as well as regular use of traditional medicines. We also ascertained the women’s histories of risky sexual behavior: number of partners in the past year and treatment for sexually transmitted infections (STIs). Social support was measured by number of visits received in the past month from friends and relatives, and participation in religious or community meetings. We did not have measures of the women’s nutrition or

physical size, which have been associated with FASD, nor of partner drinking or violence. We did ascertain whether there was conflict at home.

2.3 Statistical methods

Characteristics of women who did and did not report drinking were compared using Chi-square and t-tests for categorical and continuous measures, respectively. Descriptive statistics were provided to illustrate the patterns of consumption among women who reported drinking. Bivariate logistic regressions were run to examine the impact of individual predictors on drinking. Multivariate logistic regressions were run to examine the impacts of all hypothesized predictive measures on drinking, controlling for other factors. For the multivariate regressions, collinearity diagnostics were within acceptable ranges; interactions of urban/rural location with other measures were tested and were not retained in the final models. Analyses were performed using SAS version 9.1 software.

3. Results

3.1 Characteristics of the sample

Recruitment began July 2008 and ended April 2010. Detailed enrollment and uptake data collected between March 2009 and April 2010 indicate that 671/878 (76%) of eligible women, who were identified and invited to participate during that period, provided informed consent and completed baseline assessments. Overall, 1201 women were enrolled in the study. Their characteristics are shown in the right-hand column of Table 1. Participants were on average 26.5 years old, predominantly single, with secondary-level education. Fewer than half were employed; fewer than one fifth owned an expensive household item such as a computer, internet phone, car, or landline. Over half were from peri-urban areas; the remainder were nearly evenly split between rural and urban locations. On average the women were two months post-conception when they became aware of their pregnancies; over three-quarters had been pregnant before, and only one-fifth had planned the pregnancy. Over a third had been treated for STIs at some point in the past; over three quarters were churchgoers.

3.2 Frequency and amount of alcohol consumption

Of the 1201 women assessed, 221 (18%) reported drinking during pregnancy, either during the month prior to recognition or after the woman knew she was pregnant. Table 2 displays the patterns of alcohol consumption. Of the 221 drinkers, 162 (73%) drank prior to pregnancy recognition only, 45 (20%) drank both before and after recognition, and 14 (6%) drank only post-recognition..

Over a quarter of the women who drank (57/221) did so at least on a weekly basis. Two-thirds of women who reported drinking (149/221) usually consumed 3 or more drinks on the days when they drank. Over a third of the drinkers (78/221) binged twice a month or more often. Binging episodes were the normal drinking pattern for these women: of the 147 women who consumed 3 or more drinks at least once, 133 (90%) reported that 3 or more drinks was the usual amount they had on days when they drank (not shown).

3.3 Factors associated with alcohol consumption during pregnancy

We compared drinkers (n=221) to non-drinkers (n=980) on a variety of characteristics identified in prior studies or hypothesized by us to have an association with FASD or prenatal alcohol consumption. Results are shown in Table 1. Fewer drinkers were married to their partners (2% of drinkers vs. 7% of nondrinkers were married, $p<.05$). No significant differences were found in age, education, employment, or use of traditional medicines. Drinkers were more likely to have water on site in their homes (77% vs. 61%, $p<.001$) and

more likely to have one of the more expensive and less commonly owned household items (computer, internet phone, car, or landline; 27% vs. 18%, p<.01). Drinking was more common in urban areas (32% of drinkers were urban vs. 21% of nondrinkers; 10% of drinkers were rural vs. 28% of nondrinkers; p<.001).

Drinkers were more likely to have attempted to terminate the current pregnancy (8% vs. 4%, p<.05), but there were no significant differences in other aspects of pregnancy history. Drinkers had indications of greater mental health problems, with a higher average GHQ score (4.0 vs. 3.4, p<.001). There were no significant differences in use of tobacco or marijuana. Drinkers had had more partners in the past year (1.3 vs. 1.1, p<.01), and were more likely to have been treated for an STI (45% vs. 32%, p<.01).

Women who drank reported more social support, receiving more visits from friends and relatives in the past month (5.6 vs. 3.9, p<.001), and greater involvement in community meetings (42% vs. 29%, p<.001). Drinkers were less likely to attend church (73% vs. 79%, p<.05). There was no difference between the two groups with regard to conflict in the home.

Results of bivariate and multivariate logistic regressions are shown in Table 3. The multivariate models, which include the full set of characteristics as predictors, are discussed here. The bivariate findings are provided for purposes of comparison. We found that women in urban (AOR = 3.81, 95% CI = 2.09–6.95) and peri-urban (AOR = 2.44, 95% CI = 1.40–4.25) locations were significantly more likely to drink than rural women. Married women were less likely to drink than single women (AOR = 0.29, 95% CI = 0.11–0.77). Having water on site (AOR=1.54, 95% CI = 1.01–2.35), having any of the valuable household assets (AOR=1.65, 95% CI = 1.13–2.42), worse mental health (AOR for a 1-point higher GHQ score=1.08, 95% CI = 1.02–1.15), tobacco use (AOR=2.35, 95% CI = 1.35–4.10), an additional sexual partner (AOR=1.57, 95% CI = 1.14–2.15), history of STIs (AOR=1.47, 95% CI = 1.06–2.04), an additional visit with friends and relatives (AOR=1.03, 95% CI = 1.01–1.05), and attending community meetings (AOR=1.67, 95% CI = 1.19–2.34) were each associated with a greater likelihood of drinking. Other variables that had been significantly associated with drinking when evaluated singly were no longer significant in the multivariate model: having tried to terminate the pregnancy, and attending a temple or church.

4. Discussion

Alcohol consumption is a health risk for HIV+ pregnant women in KZN. We found drinking was more prevalent among women in our sample of HIV+ pregnant women than among women in general in KZN: 17% of our sample (207/1201) drank in the month prior to pregnancy awareness, compared to 8% of women in the general population of KZN reporting any alcohol use in the past 30 days (Peltzer et al., 2011). The rate of drinking in our sample was also higher than the nationwide estimate of 13% of pregnant women using alcohol in the past month (Peltzer and Ramlagan, 2009). Both of these comparisons may understate the difference in alcohol use associated with HIV status, since the drinking rate among pregnant women in KZN is likely to be lower than the estimate of 8% calculated among all women in the province (not just pregnant), and lower than the estimate of 13% calculated among pregnant women in the whole country (not just KZN, but including WCP and other provinces where drinking is more generally prevalent).

Binge drinking estimates were also much higher among the women in our sample: again looking at the month prior to awareness only, we found that 69% of drinkers (142/207) reported that they usually had 3 or more drinks on the days they were drinking. This compares to the population estimates, among women in KZN drinking in the past month, of

38% reporting having 3 or more drinks on weekends (Parry et al., 2005), and 19% reporting having 3 or more drinks per day (Peltzer and Ramlagan, 2009). The binge drinking estimate is particularly troubling because of its implications for the development of FASD in the babies of these mothers. Clearly, nurses and other health care workers in KZN should know that if HIV+ women report any drinking during pregnancy, it is likely to have been at a level that could greatly endanger their babies.

Our findings are consistent with those prior South African studies (e.g., Parry et al., 2005) showing that urban and peri-urban HIV+ pregnant women were more likely to drink than their rural counterparts. In a model including urban/peri-urban/rural indicators, education and employment were not significant predictors of any alcohol consumption during pregnancy. Two indicators of economic status, having on-site water and ownership of expensive household items, were associated with a greater likelihood of drinking. Being married was a protective factor, while HIV+ pregnant women who had poorer mental health, used tobacco, or had a greater history of sexual risk-taking were more likely to drink. These findings are for the most part consistent with findings on risk and protective factors for binge drinking and FASD. We did not include some factors, such as measures of physical size of the mother, nutrition, or of partner drinking, which were assessed in previous research in the WCP. In this study, we found that increased social activity, which was not examined in research in the WCP, was a risk factor for alcohol use: HIV+ pregnant women who had more visits with friends and relatives, and those who attended more community meetings, were more likely to drink.

There are some limitations in this investigation. Alcohol consumption may have been under-reported. The clinics where the HIV+ mothers were sampled were selected to provide matched areas for randomization, and are not necessarily representative of all of KZN. The HIV+ mothers in our sample appear to be more educated and more likely to be employed than women in general in KZN (Statistics South Africa, 2005). The external validity of our sample is limited consequently; one should not assume our rates reflect the situation of the entire province of KZN.

Nonetheless, the impact of urban location, tobacco, and social contacts on alcohol consumption implies strong environmental influences. The only statistically significant mitigating variable is being married, and marriage rates are extremely low in the country as a whole and marriage is generally delayed till after the birth of one or two children (Budlender et al., 2004; Hosegood et al., 2009). We could characterize drinkers as more likely to be unmarried urban/peri-urban women, somewhat stressed, socially engaged, with more disposable income, and more likely to smoke and engage in risky sexual behavior. This suggests that there could be a normative environment for alcohol consumption among HIV+ women in KZN that needs to be counteracted by greater dissemination of information about the dangers of drinking, and social as well as environmental supports for abstinence or moderation. Binge drinking is a problem that requires particular attention.

Given that this is one of the first published studies of alcohol consumption among HIV+ pregnant women in South Africa, and in the province with the highest HIV prevalence, the results call urgent attention to the need for specific interventions to reduce alcohol consumption among women who are pregnant or of childbearing age. This will contribute to the reduction of FASD in South Africa and help to reduce the risks to the health and well-being of children already compromised by infection or exposure to HIV during fetal development.

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Table 1

Characteristics of HIV+ pregnant women, comparing drinkers to nondrinkers

	Non-Drinkers (N=980)		Drinkers (N=221)		Total (N=1201)		
	n	%	n	%	n	%	
Mother's social and economic characteristics							
Mean age, (SD)	26.6	(5.5)	26.0	(5.2)	26.5	(5.5)	
Marital status:							*
Single	766	78%	179	81%	944	79%	
Married	71	7%	5	2%	76	6%	
Not married but living together	143	15%	37	17%	180	15%	
Highest education level: (N=1199)							
No schooling / Grade 1–6 (Primary education)	157	16%	32	15%	189	16%	
Grade 7–12 (Secondary education)	777	79%	178	81%	955	80%	
Tertiary education	44	5%	11	5%	55	5%	
Employed	447	46%	90	41%	537	45%	
Uses traditional medicines on a regular basis	169	17%	35	16%	204	17%	
Lives in formal housing	580	59%	138	62%	718	60%	
Has water on site (N=1200)	594	61%	169	77%	763	64%	***
Has computer, internet phone, car, or landline	172	18%	60	27%	232	19%	**
Location of home							***
Urban area	205	21%	70	32%	275	23%	
Peri-urban area	503	51%	130	59%	633	53%	
Rural area	272	28%	21	10%	293	24%	
Pregnancy history							
Mean weeks pregnant at discovery, (SD) (N=1200)	7.9	(5.4)	8.4	(5.9)	8.0	(5.5)	
Had any pregnancies prior to this	754	77%	166	75%	920	77%	
Planned this pregnancy	204	21%	43	20%	247	21%	
Attempted to terminate this pregnancy (N=1199)	39	4%	17	8%	56	5%	*
Mental health							
GHQ score (higher=worse, possible range=0–12)							
Mean, SD	3.4	(2.5)	4.0	(2.7)	3.5	(2.6)	***

	Non-Drinkers (N=980)		Drinkers (N=221)		Total (N=1201)		
	n	%	n	%	n	%	
Substance use							
Uses tobacco	82	8%	26	12%	108	9%	
Used marijuana in past 3 months	7	1%	4	2%	11	1%	
Sexual behavior							
Had previous treatment for an STI (N=1200)	311	32%	100	45%	411	34%	**
Mean number of sexual partners last year, (SD)	1.1	(0.5)	1.3	(0.6)	1.1	(0.5)	**
Social support							
Number of visits with friends and relatives in past month							
Mean, SD	3.9	(6.9)	5.6	(8.5)	4.2	(7.3)	***
Attends temple/church	777	79%	161	73%	938	78%	*
Attends community meetings	283	29%	93	42%	376	31%	***
Any conflict at home (N=1200)	71	7%	19	9%	90	8%	

* p < .05;

** p < .01;

*** p<.001

Table 2

Patterns of alcohol consumption among 221 HIV+ women who drank during pregnancy

	Drank prior to pregnancy awareness, but not currently (stopped) n=162		Drank both prior to pregnancy awareness and currently (continued) n=45				Did not drink prior to awareness, but drinking currently (started) n=14		All drinkers n=221	
	Prior to pregnancy awareness		Prior to pregnancy awareness		Currently		Currently		At either time (pre or post awareness)	
	n	%	n	%	n	%	n	%	n	%
How often drank any alcoholic beverage										
Monthly or less	88	54%	7	16%	23	51%	8	57%		
2–3 times per month	46	28%	17	38%	11	24%	2	14%		
Weekly or more often	28	17%	21	47%	11	24%	4	29%	57	26%
How many drinks usually had on days when drinking										
1–2 drinks	55	34%	10	22%	22	49%	9	64%		
3 drinks or more	107	66%	35	78%	23	51%	5	36%	149	67%
How often had 3 or more drinks in a single day										
At least once	107	66%	36	80%	24	51%	2	14%	147	67%
Monthly or less	59	36%	10	22%	13	29%	1	7%		
Twice a month or more	48	30%	26	58%	11	24%	1	7%	78	35%

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Table 3

Logistic regression results, all HIV+ pregnant women Predictors of any alcohol consumption

	Bivariate analyses			Multivariate analysis		
	Unadjusted odds ratio	95% confidence interval		Adjusted odds ratio	95% Confidence Interval	
Mother's social and economic characteristics						
Age	0.98	(0.95, 1.01)		0.98	(0.94, 1.01)	
Marital status (omitted=single)			*			*
Married	0.30	(0.12, 0.76)	*	0.29	(0.11, 0.77)	*
Not married but living together	1.11	(0.75, 1.65)		1.02	(0.66, 1.58)	
Highest education level (omitted=none/primary)						
Grade 7–12 (Secondary education)	1.12	(0.74, 1.70)		0.91	(0.57, 1.44)	
Tertiary education	1.23	(0.57, 2.63)		0.75	(0.32, 1.75)	
Employed	0.82	(0.61, 1.10)		0.76	(0.54, 1.05)	
Uses traditional medicines on a regular basis	0.90	(0.61, 1.34)		0.83	(0.54, 1.28)	
Lives in formal housing	1.15	(0.85, 1.55)		0.95	(0.66, 1.37)	
Has water on site	2.11	(1.51, 2.95)	***	1.54	(1.01, 2.35)	*
Has computer, internet phone, car, or landline	1.75	(1.25, 2.46)	**	1.65	(1.13, 2.42)	*
Location of home (omitted=rural)			***			***
Urban area	4.42	(2.63, 7.44)	***	3.81	(2.09, 6.95)	***
Peri-urban area	3.35	(2.06, 5.43)	***	2.44	(1.40, 4.25)	**
Pregnancy history						
Weeks pregnant at discovery	1.02	(0.99, 1.04)		1.02	(0.99, 1.05)	
Had any pregnancies prior to this	0.91	(0.64, 1.27)		1.15	(0.76, 1.75)	
Planned this pregnancy	0.92	(0.64, 1.33)		0.99	(0.66, 1.49)	
Attempted to terminate this pregnancy	2.01	(1.11, 3.62)	*	1.41	(0.73, 2.74)	
Mental health						
GHQ score	1.10	(1.04, 1.16)	**	1.08	(1.02, 1.15)	**
Substance use						
Uses tobacco	1.46	(0.92, 2.33)		2.35	(1.35, 4.10)	**
Used marijuana in past 3 months	2.56	(0.74, 8.83)		1.68	(0.39, 7.18)	
Sexual behavior						

	Bivariate analyses			Multivariate analysis		
	Unadjusted odds ratio	95% confidence interval		Adjusted odds ratio	95% Confidence Interval	
Had previous treatment for an STI	1.78	(1.32, 2.39)	***	1.47	(1.06, 2.04)	*
Number of sexual partners last year	1.87	(1.39, 2.51)	***	1.57	(1.14, 2.15)	**
Social support						
Number of visits with friends/relatives in past month	1.03	(1.01, 1.05)	**	1.03	(1.01, 1.05)	**
Attends a temple/church	0.70	(0.50, 0.98)	*	0.74	(0.51, 1.06)	
Attends community meetings	1.79	(1.33, 2.42)	***	1.67	(1.19, 2.34)	**
Any conflict at home	1.20	(0.71, 2.04)		0.84	(0.48, 1.48)	

* p < .05;

** p < .01;

*** p<.001