Food Insufficiency, Substance Use, and Sexual Risks for HIV/AIDS in Informal Drinking Establishments, Cape Town, South Africa

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ABSTRACT *HIV/AIDS is concentrated in impoverished communities. Two critical aspects of poverty are food insufficiency and substance abuse, and both are associated with sexual risks for HIV/AIDS in southern Africa. The current study is the first to examine both hunger and substance use in relation to sexual risks for HIV infection in South African alcohol serving establishments. Anonymous venue-based intercept surveys were completed by men (n=388) and women (n=407) patrons of six informal drinking places (e.g., shebeens) in Cape Town, South Africa. Food insufficiency and its more extreme form hunger were common in the sample, with 24 % of men and 53 % of women experiencing hunger in the previous 4 months. Multiple regression analyses showed that quantity of alcohol use was related to higher rates of unprotected sex for men and women. Trading sex to meet survival needs was related to food insufficiency and methamphetamine use among men but not women. Food insufficiency and substance use may both contribute to HIV risks in South African shebeens. However, the influence of hunger and substance use on sexual risks varies for men and women. Interventions to reduce HIV transmission risks may be bolstered by reducing both food insufficiency and substance use.*

KEYWORDS *HIV prevention, South Africa, Food insufficiency, Alcohol risks*

INTRODUCTION

The AIDS pandemic is concentrated among the world's poor. Even in the most resource limited countries, the most disenfranchised carry the greatest burden of AIDS.¹ Among conditions of poverty, food insufficiency is consistently associated with high risk for HIV infection. Trading sex to meet survival needs, such as sex for money or food, is the most obvious connection between hunger and risks for HIV infection.^{2,3} Because food insufficiency is more prevalent among impoverished women than men, lack of adequate food may contribute to gender differences in HIV infections in southern Africa.^{4,5} For example, a study conducted in Botswana and Swaziland found that 32 % of women and 22 % of men lack adequate food and women who experience insufficient food have a greater than 70 % increased

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likelihood of inconsistent condom use with non-primary sex partners and are more than twice as likely to exchange sex to meet survival needs.⁶ A study in Uganda found that for many HIV-positive women, hunger was a driving force behind their engaging in sex work. Food insufficiency therefore impacts women's ability to control condom use and limits their options for escaping abusive relationships.⁵

Within a context of poverty and hunger, alcohol use and other drug use are also closely connected to HIV risk behaviors in southern Africa.⁷⁻⁹ Beyond the cognitive influences that are apparent with substance use, such as impaired judgment and distorted outcome expectancies, social facets of alcohol use also influence sexual risks for HIV infection.¹⁰ Of particular importance are the social environments where alcohol is served.^{11,12} In a study of informal drinking establishments in South Africa, commonly known as shebeens, Weir et al.¹¹ found that 94 % of all places where people meet new sex partners also serve alcohol. These drinking venues exist in a broader context of poverty, where as many as 43 % of South African households lack sufficient food.¹³ Shebeens are often male-dominated environments that encompass sexual expectations for female patrons.¹⁴ As many as one in four men and women in shebeens report meeting sex partners at these venues, and those who do meet sex partners at shebeens demonstrate significantly more partners and higher rates of unprotected sex than other shebeen patrons.¹⁰ In addition to alcohol use, less frequently used drugs contribute to sexual risks in South African townships. Cannabis (i.e., dagga), the most prevalent non-alcoholic drug in South Africa, is associated with risks for sexually transmitted infections (STI).^{15,16} Although less common, methamphetamine (i.e., Meth, Tik) has quickly become prevalent in Cape Town, South Africa and is closely tied to risks for STI due to sexual enhancing and addictive properties.^{17,18}

Substance abuse and food insufficiency co-occur in poverty, and both are related to HIV/AIDS. However, no study has simultaneously examined these two important risks for HIV infection. Alcoholism and drug addiction may facilitate circumstances where individuals have to choose between food and substances, or barter sex to meet survival needs.^{14,16} Based on previous research,^{6,8,19} we hypothesized that both food insufficiency and substance use would be associated with sexual risks for HIV infection, specifically frequency of unprotected sex and trading sex to meet survival needs, among men and women who drink in shebeens. We examined the influence of food insufficiency and substance use on HIV risks separately for men and women to determine gender-specific patterns.

METHODS

Participants and Setting

Participants were 388 men and 407 women residing in a peri-urban township in Cape Town, South Africa. The township is located within 20 km of Cape Town's central business district and is home to a significant racial minority group that mainly consists of people who are of mixed race or aboriginal in origin (e.g., Coloreds). A relatively new township, the community, was established in 1990 and is among the first townships in South Africa to racially integrate. The township sampled for this study offers the opportunity to survey men and women who identified as Black or Colored residing within one South African community.

Measures

Measures were adapted from previous research conducted in South Africa and were administered in the three languages spoken throughout the township: English, Xhosa, and Afrikaans. Measures were collected in drinking venues using self-administered surveys.

Demographic and HIV Risk History Characteristics. Participants reported their age, gender, race, years of formal education, whether they were employed, their marital status, and whether they have children. We also asked if their home has electricity and indoor plumbing. Participants were also asked whether they had been diagnosed with an STI, if they had ever been tested for HIV, and the results of their most recent HIV test.

Food Insufficiency and Hunger. To measure food insufficiency and hunger, we obtained items from the Household Food Insecurity Access Scale.²⁰ We used six items that focus on food insufficiency defined by food anxiety, meal quality, and lack of consistent access to food in the previous 4 months. We also used two items to assess hunger as a more extreme form of food insufficiency during that same time period. The exact items are shown in the “Results” section. A 4-month retrospective time frame was chosen to line up with the period assessed by our other behavioral and substance use measures. We therefore created two indexes: food insufficiency (scores ranged 0–6) and hunger (scores ranged 0–2).

Substance Use. To assess alcohol use, participants completed the first two items of the Alcohol Use Disorder Identification Test (AUDIT), a self-report instrument designed to identify individuals for whom the use of alcohol places them at risk for developing alcohol-related problems. The first two items of the AUDIT are commonly used as an index of frequency and quantity of current alcohol use. To assess drinking frequency, participants responded to the item “How often do you have a drink containing alcohol?” with options ranging from “never” to “greater than four times per week.” Quantity of alcohol consumption was assessed using the item “How many drinks containing alcohol do you have on a typical day when you are drinking?” with responses ranging from “0” for non-drinkers to “greater than 10.” Participants self-defined the meaning of alcoholic “drinks,” and the items were framed to assess current alcohol use.²¹ The AUDIT quantity and frequency items have been demonstrated reliable and valid.²²

In addition, participants reported how often they drank at the shebeen, whether they were at the shebeen to meet sex partners, and whether they were able to access food at the shebeen. To measure current non-alcohol drug use, we focused on cannabis and methamphetamine (meth). Specifically, participants indicated whether they had used cannabis, referred to as dagga, and whether they had used meth, or Tik, in the previous 4 months. No use was coded 0 and use was coded 1.

Sexual Behaviors. Participants reported their number of male and female sex partners and frequency of sexual behaviors, specifically vaginal and anal intercourse with and without condoms in the previous 4 months. The instructions asked participants to think back over the past 4 months and estimate the number of male and female sex partners they had and the number of occasions in which they practiced vaginal and anal intercourse with and without condoms. Unprotected intercourse was computed by summing the number of unprotected anal and vaginal

intercourse occasions in the previous 4 months. To assess trading sex, participants indicated whether they had either given or received money, food, or a place to stay in exchange for sex in the previous 4 months. Measures were developed from instruments that have been shown reliable and valid and were asked on a 4-month time frame to increase reliability.²³

Procedures

Field workers used “street intercept” survey methods to sample men and women from drinking establishments located within the township. A total of six shebeens were purposefully selected for the study. We used community mapping procedures described by Weir et al.¹² to identify, locate, and approach alcohol serving establishments in the township. Key informants and street outreach workers identified potential venues that served alcohol on-premises and were geographically dispersed across Black and Colored sections of the township. With permission of the shebeen owners, anonymous surveys were collected between October 2009 and February 2010. Field workers obtained verbal consent and allowed participants to complete the survey on their own, offering assistance with reading and understanding survey items when needed. Only 7 % of participants required field staff assistance to complete the nine-page survey. Participants were given a small token of appreciation for completing surveys, such as a keychain or coffee mug. All study procedures were approved by US and South African institutional review boards.

Data Analyses

We conducted initial descriptive analyses of demographic characteristics and food insufficiency/hunger separately for men and women. Bivariate logistic regressions were performed with participant gender as the dichotomous dependent variable and demographic characteristics and food insufficiency/hunger entered as independent variables. For food insufficiency, we first examined each indicator separately, followed by a simultaneous regression that included all food insufficiency/hunger indicators, and we report both unadjusted bivariate and adjusted multivariate odds ratios. Next, we examined substance use and sexual risk behaviors in relation to the more extreme food insufficiency of hunger among men and women. For these analyses, we partitioned men and women into groups based on their hunger experiences. Analyses were conducted within genders and used bivariate logistic regressions, entering hunger as the dichotomous dependent variable and substance use and sexual behaviors as independent variables. We controlled for participant age and race in multivariable analyses because the shebeens varied on these characteristics. Finally, to test our main study hypothesis that food insufficiency/hunger and substance use would be associated with sexual risks, we performed multiple regression analyses to test food insufficiency/hunger and substance use in relation to (a) having engaged in sexual exchange in the past 4 months and (b) continuous frequency of unprotected intercourse in the past 4 months. Because the frequency distribution of unprotected intercourse was skewed (skewness=6.07, Se=0.091; kurtosis=51.35, Se=0.183) and therefore diverged from assumptions for linear regression, we used a $\log_{10}(X+1)$ transformation to reduce skew. The resulting distribution had a skewness statistic of 1.24 (Se=0.091) and kurtosis 0.75 (Se=0.183). There were less than 5 % missing data for any given variable. Because of the small number of missing values, we used a within group mean substitution

procedure in the multiple regression analyses. For all analyses, we used $p<0.05$ to define statistical significance.

RESULTS

Eight hundred participants were asked to complete surveys with 98 % agreement; a total of 795 completed surveys were available for analysis. Age ranged from 18 to 73 (median=30, inter-quartile range (IQR)=15.5). The characteristics of the sample are shown in Table 1.

Food Insufficiency and Hunger

Food insufficiency and hunger were prevalent in the sample, with a majority of both men and women lacking adequate food in the previous 4 months and 29 % of men and 53 % of women experiencing hunger (see Table 2). Logistic regression models showed that women were significantly more likely to experience every indicator of food insufficiency and hunger compared to men. Overall, 81 % of women and 61 % of men did not have enough food for themselves and their families in the previous 4 months. In an adjusted logistic regression model, entering all food insufficiency and hunger items simultaneously, women were significantly more likely than men to have worried about having enough food, had to limit their variety of food, and went an entire day without eating because they lacked food. Men were significantly more likely to have eaten food they did not want because of lack of resources.

Substance Use and Sexual Risks

As expected, alcohol use was common in this sample, with more than half of men and one in three women drinking at least two to three times per week and drinking

TABLE 1 Demographic and health characteristics of men and women in township shebeens

Characteristic	Men		Women		OR	95 % CI
	N	%	N	%		
Age (median, IQR)	30	15	35	21	1.0	0.9–1.0
Race						
Black	234	60	163	40	Reference	
Colored	154	40	244	60	2.2**	1.7–3.0
Married	94	24	114	28	0.8	0.6–1.1
Unemployed	146	38	303	75	1.6**	3.7–6.8
Has children	260	67	303	75	0.6	0.5–0.9
Home has electricity	358	93	382	94	0.8	0.4–1.4
Home has indoor water	346	90	363	89	1.0	0.6–1.6
Visits shebeen at least weekly	255	64	215	52	1.6**	1.2–2.2
Came to shebeen to meet sex partner	54	14	24	6	2.5**	1.5–4.2
Lifetime history of STI	72	18	47	12	1.7**	1.1–2.6
Has been tested for HIV	236	62	302	75	0.5**	0.3–0.7
Most recent HIV test result						
Positive	20	5	32	8	Reference	
Negative	232	62	275	70	2.6**	1.1–5.8
Does not know	88	23	66	17	1.9*	1.0–3.5
Declined response	31	8	19	5	1.2	0.6–2.3

* $p<0.05$; ** $p<0.01$

TABLE 2 Food insufficiency and hunger among men and women shebeen patrons

	Men		Women		Unadjusted		Adjusted	
	N	%	N	%	OR	95 % CI	OR	95 % CI
Food insufficiency indicators								
Worried that your household would not have enough food	156	41	256	64	1.7**	1.5–2.0	1.2*	1.0–1.5
You or any household member was not able to eat the kinds of foods you preferred because of a lack of resources	140	37	232	58	1.6**	1.4–1.9	0.9	0.7–1.2
You or any household member had to eat a limited variety of foods due to a lack of resources	151	40	256	64	1.8**	1.6–2.2	1.4**	1.1–1.8
You or any household member had to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food	155	42	236	60	1.5**	1.3–1.8	0.7*	0.5–0.9
You or any household member had to eat a smaller meal than you felt you needed because there was not enough food	149	40	257	65	1.8**	1.5–2.1	1.1	0.9–1.5
You or any household member had to eat fewer meals in a day because there was not enough food	128	35	244	62	1.8**	1.6–2.2	1.2	0.9–1.5
There was no food to eat of any kind in your household because of lack of resources to get food	128	35	238	60	1.8**	1.6–2.2	1.2	0.9–1.6
Endorsed at least one food insufficiency indicator	230	61	326	81	2.7**	2.0–3.8		
Hunger indicators								
You or any household member went to sleep at night hungry because there was not enough food	99	26	197	50	1.7**	1.4–2.0	1.0	0.8–1.4
You or any household member went a whole day and night without eating anything because there was not enough food	90	24	182	46	1.7**	1.4–2.0	0.9	0.7–1.3
Endorsed at least one hunger indicator	110	29	212	53	2.7**	2.0–3.6		

* $p < 0.05$; ** $p < 0.01$

significant quantities of alcohol. Other drug use was less common, with 80 (21 %) of men and 61 (15 %) of women reporting any other drug use. The associations between substance use and hunger were tested in logistic regression models separately for men and women that controlled for race and age (see Table 3). For both men and women, experiencing hunger was not systematically associated with frequency or quantity of alcohol use or with frequency of visiting the shebeen. Men

TABLE 3 Substance use among hunger experienced and non-experienced men and women shebeen patrons

	Men						Women					
	No hunger			Hunger			No hunger			Hunger		
	N	%		N	%		N	%		N	%	
Frequency of alcohol use												
Never	16	6	5	5		Reference	26	14		34	16	Reference
<Monthly	54	20	20	22		0.5	45	24		47	22	0.6
2-4 times/month	68	23	19	21		0.7	51	27		46	22	0.5
2-3 times/week	86	33	32	35		0.6	51	27		56	26	0.4*
4+ times/week	49	19	24	26		0.7	14	8		29	14	0.5
Amount alcohol use per drinking day												
None	13	5	5	5		Reference	28	15		30	14	Reference
1-2	54	21	21	23		0.7	49	26		50	24	0.9
3-4	71	27	25	27		0.8	49	26		54	26	0.8
5-6	48	18	19	21		0.7	29	16		35	16	0.9
7-9	19	7	5	6		0.9	9	5		17	8	1.0
10+	58	22	26	28		0.6	22	12		26	12	1.5
Frequency of visiting shebeens												
<Weekly	93	35	32	36		Reference	86	46		103	48	Reference
Weekly	104	40	37	40		0.7	69	36		80	38	1.4
Daily	64	25	30	33		0.7	33	18		28	13	1.3
Get food at the shebeen	76	29	46	51		1.4**	49	27		71	33	1.1
Cannabis (Dagga)	38	14	33	37		2.9**	19	10		27	12	1.2
Methamphetamine (Tik)	9	3	8	9		2.4	8	5		22	10	2.3*

*p<0.05; **p<0.01

who experienced hunger were significantly more likely to report accessing food from the shebeen. In terms of other drugs, hunger was associated with cannabis use among men and hunger was associated with meth use among women.

Table 4 shows the associations between experiencing hunger and sexual behaviors for men and women. More than 30 % of men and 20 % of women reported two or more sex partners in the previous 4 months. Unprotected intercourse exceeded condom protected intercourse, and alcohol was frequently used in sexual contexts. Analyses showed that men who experienced hunger were significantly more likely to have been diagnosed with an STI and to have exchanged money or materials for sex in that time period. For women, hunger was only associated with exchanging sex to meet survival needs. For both men and women, there were no associations between experiencing hunger and number of sex partners or frequencies of sexual behaviors.

Food Insufficiency and Substance Use in Relation to Sexual Risks

We conducted multiple regression analyses to test our main study hypothesis that substance use and food insufficiency would both be related to engaging in sexual exchange and frequency of unprotected sex. For men, results indicated that Black race and greater quantity of alcohol use were related to higher rates of unprotected intercourse, $F(7,377)=5.7$, $p<0.001$. In a separate model for exchanging sex, higher rates of sexual exchange among men were related to younger age, meth use, and food insufficiency, overall model $X^2=25.88$, $p<0.001$. For women, regression analysis indicated that quantity of alcohol use and food insufficiency were associated with higher rates of unprotected intercourse, $F(7,401)=4.39$, $p<0.001$. With respect to higher rates of sexual exchange among women, only food insufficiency was significant, overall model $X^2=20.79$, $p<0.01$ (see Table 5).

DISCUSSION

The current study found that food insufficiency/hunger and substance use were associated with unprotected sex and engaging in sexual exchange among shebeen patrons, confirming our main hypothesis. However, patterns of association differed for men and women. The intersections between alcohol use and sexual risks for HIV infection are well established in southern Africa,⁸ and informal drinking places play critical roles in these associations.¹¹ The current study found substantial quantities and frequencies of alcohol use among men and women in township shebeens, with drinking patterns that far exceeded those observed in other high-risk populations.^{24,25} Men and women who drink in shebeens also reported drug use at higher rates than observed in other segments in South Africa.²⁶ Of particular importance was meth use, which has been increasingly prevalent in South Africa and linked to sexual risks for HIV/AIDS.¹⁸ Our results suggest that while alcohol use is associated with engaging in more unprotected sex, and use of other drugs in addition to alcohol is associated with exchanging sex to meet survival needs. Addictive drugs may therefore play an increasingly important role in the spread of HIV, especially in new sub-epidemics in southern Africa, such as among Colored persons in Cape Town.

Food insufficiency and hunger were prevalent among shebeen patrons and women reported significantly greater food insufficiency than men. The overall rates of food insufficiency and hunger were alarming but not surprising, with 61 % of men and 81 % of women indicating food insufficiency and 29 % of men and 53 % of women endorsing at least one indicator of hunger. The rates of food insufficiency

TABLE 4 Sexual behaviors among hunger experienced and non-experienced men and women shebeen patrons

	Men				Women			
	No hunger		Hunger		No hunger		Hunger	
	N	%	N	%	N	%	N	%
Number of sex partners								
0	45	17	22	20	43	23	42	20
1	131	50	44	40	107	57	135	64
2	38	14	19	17	26	14	21	10
3	12	5	8	7	4	2	3	1
4+	37	14	17	16	7	3	11	5
STI	9	3	11	10	8	4	10	5
Tested for HIV	170	64	61	55	135	73	165	78
HIV positive	10	4	9	9	11	6	18	9
Exchanged money/sex	25	9	22	20	6	3	24	11
	M	SD	M	SD	M	SD	M	SD
Sex partners	1.9	2.9	2.1	3.4	1.2	2.0	1.1	1.1
Unprotected intercourse	6.2	14.1	10.0	24.5	4.0	15.1	6.3	19.7
Protected intercourse	4.1	11.3	4.6	13.2	3.1	10.3	3.2	9.5
Alcohol use before sex	4.5	9.2	3.9	11.4	2.5	11.3	2.8	9.3

*p<0.05; **p<0.01

TABLE 5 Regression models predicting unprotected intercourse and sexual exchange for men and women

	Linear regressions predicting transformed values of unprotected intercourse				Logistic regressions predicting having exchanged money/sex	
	<i>B</i>	SE	β	<i>t</i>	Adjusted OR	95 % CI
Men						
Race	0.194	0.06	0.172	3.1*	1.08	0.50–2.31
Age	−0.002	0.003	−0.036	0.6	0.92	0.88–0.96
Alcohol frequency	0.200	0.025	0.042	0.8	1.16	0.83–1.63
Alcohol quantity	0.060	0.019	0.175	3.2**	1.12	0.88–1.42
Cannabis use	0.060	0.040	0.084	1.6	0.37	0.13–1.06
Meth use	−0.050	0.077	−0.031	0.6	6.53**	1.81–23.5
Food insufficiency	0.005	0.005	0.051	1.0	1.29**	1.05–1.59
Women						
Race	0.043	0.053	0.043	0.8	0.40	0.14–1.14
Age	−0.001	0.002	−0.209	0.5	0.99	0.95–1.04
Alcohol frequency	0.037	0.023	0.094	1.6	1.24	0.77–1.99
Alcohol quantity	0.043	0.019	0.136	2.2**	0.94	0.65–1.36
Cannabis use	0.018	0.046	0.021	0.4	2.75	0.83–9.14
Meth use	0.065	0.052	0.065	1.2	2.44	0.62–1.48
Food insufficiency	0.008	0.004	0.112	2.2**	1.28**	1.12–1.48

* $p < 0.05$; ** $p < 0.01$

and hunger in the shebeens exceeded those reported in studies of other impoverished communities of southern Africa.² Food insufficiency and hunger among women and men in shebeens may shed light on the economics of drinking and sex in these environments. Women in poverty who are alcohol dependent and hungry may barter sex to meet basic survival and addiction needs. Men were also more likely to report obtaining food at the shebeens than were women, again suggesting that men in shebeens have more resources than women. In multivariate analyses, we found that greater quantities of alcohol consumption were associated with higher rates of engaging in unprotected intercourse. Exchanging sex to meet survival needs was related to younger age, meth use, and food insufficiency. The multivariate analyses for women showed that quantity of alcohol use and food insufficiency were associated with unprotected sex. However, sexual exchange among women was not significantly associated with any of the factors included in the multivariate model. Because the variables included in the models were inter-correlated, associations between participant characteristics and sexual risks may have been obscured in the multivariate model. Thus, the pattern of women's risks runs parallel to men's, where quantity of alcohol use, other drug use, and food insufficiency are associated with high-risk sexual behaviors.

It is important to interpret the current study findings in the context of their methodological limitations. Our study, like others in the field of HIV/AIDS risk and prevention, relied on self-report behavioral instruments. The sensitivity and private nature of sexual behavior may have biased responses by social desirability, privacy concerns, and potential embarrassment. These social influences may have led to under-reporting of substance use and risk behaviors. Our measures of alcohol and other drug use were also constrained by the brevity of our survey, suggesting the

need for more comprehensive assessments of food insufficiency and substance use in relation to HIV risk in future South African research. The study is also based on a convenience sample, limiting generalizability of results. The study results also require replication as we conducted multiple planned comparisons without further adjusting statistical significance levels. We sampled participants from one peri-urban township in Cape Town, cautioning against generalizing the results to other settings and cultural groups. Finally, substance use may have complex relationships with food insufficiency, including use of drugs to ease the physical experience of hunger. Future research is needed to examine these relationships and their role in HIV risks. Despite these limitations, the current findings offer new information regarding the implications of alcohol use, poverty, and HIV prevention.

HIV prevention interventions have been developed and tested to address alcohol use in relation to sexual risks in South Africa.^{27,28} Unfortunately, interventions have thus far largely ignored the influences of poverty on both substance use and sexual risks. Interventions that reduce poverty, especially alleviating hunger, may have direct effects on both substance use and sexual health. For example, microfinance and other economic empowerment programs are being tested for broad-based effects on poverty including HIV prevention.^{29,30} Alcohol serving establishments also offer opportunities for delivering HIV prevention interventions.^{7,31} Fragmented approaches to interventions that address one of many inter-related outcomes at a time are less efficient and potentially less effective than integrated multi-targeted interventions that could simultaneously address hunger, substance use, and HIV transmission risks. Research is urgently needed to design and test interventions that can optimally impact these complex inter-related problems in drinking establishments.

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