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Determinants of Alcohol, Khat, and Bhang Use in Rural Kenya

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Abstract

The study investigated local determinants of substance use in rural Kenya. Over the years, there has been a growing concern over increased use of substances across ages, gender, religious persuasions, and social class in Kenya. It is still unclear what psychosocial individual and/or community factors might be that offer some explanation for the high levels of alcohol and drug use. The study investigated community members' social status in areas of gender, education, employment, self-esteem, and availability of substances. The sample was comprised of Kenyan rural participants, and included 153 men and 64 women with a mean age of 34.2 years. The participants completed a survey measuring possible psychosocial determinants of alcohol, khat and bhang (i.e., marijuana) use patterns. The sample evidenced high levels of substance use particularly involving the locally available substances (i.e., bottled beer, local brews, chewing khat, smoking bhang). Males in comparison to females were more likely to drink alcohol, chew khat, and smoke bhang. Women compared to men reported higher education and employment status, which were associated with less substance use. Females had higher self-esteem when they did not use bottled beer whereas males had higher self-esteem when they use bottled beer. The implications of these findings are discussed.

Keywords

psychosocial determinants; substance use; rural; age; gender; social class

Research suggests that patterns of substance abuse are found in both developed and developing countries. For example, Saunders, Aasland, Amundsen, and Grant (1993) evaluated substance use in Australia, Bulgaria, Kenya, Mexico, Norway, and USA. Among the participants, 48% were classified as "drinking patients" and 16% were termed alcoholics. Among the drinking patients, 62% were men and 38% women. The alcoholic category was male dominated as 72% were men and 28% were women. These findings suggest that alcohol dependence occurs across culturally diverse areas (Hall, Saunders, Babor, Aasland, Amundsen, Hodgson, & Grant, 1993).

A number of studies indicate that alcoholic substances are the most used intoxicant in Kenya. A majority of these studies that report substance and substance related prevalence are from hospital and school settings. For example, Ndeti (1984) found that among first time admissions of patients aged 18–65 in Kenyatta national hospital, only two of 83 participants had been diagnosed and treated for alcoholism. However, 50% of the sample was classified as alcoholics, and among this group, 80% felt guilty about their drinking, 73% of patients' families objected to their drinking patterns, and 69% were unable to stop drinking even when they wanted.

Studies by NACADA (2002) in school settings and Adelekan (2006) in rural village settings concur that the most commonly used substances among the rural and urban communities in Kenya are traditional alcohol brews. Local brewing occurs extensively in poor families, and the availability of these brews is enhanced by the easy availability of ingredients needed, such as, maize, sorghum, and sugar. Although most traditional brews are illegal by the laws of Kenya, some locally brewed beer is sold by individuals after obtaining the licenses to do so. In addition to local brews, alcohol use includes western style types of alcoholic beverages produced and marketed through breweries and distillers such as branded spirits, gins, and wines.

Besides western style alcohol and locally brewed alcohol, there are a number of other common substances used in Kenya. They include khat and bang, two substances grown by local farmers in Kenyan families. Khat is a perennial shrub, indigenous to east and southern African and Arabia whose fresh leaves and soft twigs are chewed to release a juice that has pharmacological effects induced by cathinone and *cathine*, the active chemicals that alters the mood of the user. Khat is clinically known to induce a state of mild euphoria and excitement (Kalix, 1994), but long-term use causes serious problems to the user's body. There is considerable debate in Kenya surrounding the ever-expanded use and trade of khat. Carrier (2008) argues that as khat is legal in Kenya, it is a commodity of great value to the country's economy, particularly among the growing population and through its international trade. Carrier (2008) further indicates that khat is also associated with gender differences where men are more likely to chew it compared to women.

Another substance frequently used by the rural population in Kenya is the plant cannabis sativa, which is the source of marijuana or bhang. Bhang is prepared from the leaves and flowers (buds) of the female cannabis plant that is consumed either as a smoked powder or as a beverage. A study by NACADA (2007) noted that bhang is locally grown on around the Mount Kenya region, and is easily available to the local population. A NACADA (2007) study indicated that use of these substance Kenya were high among children both in rural and urban settings.

Ndetei (2009) studied 1,328 students from 17 high schools in 49 registered public schools in Nairobi and found that 33.9% of the sample had used substances in varying forms. The abuse of a wide range of psychoactive substances in the African continent today is a public health concern, and the government has regarded the pattern of substance use as a "growing epidemic". Many poorer neighborhoods have liquor-brewing households, and they sell local brews as a means of supplementing their income. Additionally, individual, community, and psychosocial factors may also contribute to engaging in risky sexual practices, drug use, and alcoholism. Substance abuse might contribute to a breakdown of the community, which could affect both the sense of community and collective self-esteem. It certainly is also possible that the cultural, political, economic, social, and religious transitions in Kenya from a traditional system to a modern life style might have contribute to lower self-esteem and vulnerability to drug and alcohol use.

NACAD (2010) recently explored the risk factors that can account for the alcohol use across Kenyan districts. The study found that alcohol use was due to idleness in 76.4 % of individuals, peer pressure in 64.8% of participants, unemployment in 61.2% of their sample, and work related stress for 56.3% of respondents. In addition, NACADA (2010) found that marital problems and poverty each explained 49% of the alcohol related reasons for alcohol use. Finally, parental problems were identified as a reason 28.2 % of adults use alcohol, and 14.3% use alcohol because of media influence. While this study is important in helping understanding problems Kenya is facing due to substance abuse, it does not address the social psychological factors that may lead individuals to be more predisposed to substance

abuse. The current study intends to bridge that gap by examining relationships between psychosocial and structural factors and increased substance use.

In addition to the paucity of studies on the psychological processes at the individual and community level, few investigations have looked at rural community substances abuse trends and the relationship of gender; employment and education variables. Moreover, relationships such as substance use and self-esteem in males and females have not received attention in studies in rural African samples. The aim of this cross-sectional study was to explore the psychosocial and structure factors behind patterns of alcohol, khat, and bhang use in a predominantly Kenya rural population. We hypothesized that males would have higher use of alcohol, khat and bhang than females. We also hypothesized that participants with higher education and employment status would have lower use of substances. Lastly, we explored whether use of substances by males and females would have any differential effects on self-esteem.

Method

Participants

We conducted this study in a rural residential setting, among the Meru of Eastern Province of Kenya. The Meru tribe is comprised of seven sub-tribes; Igembe, Tigania, Imenti, Chuka, Mwimbi, Tharaka, and Muthambi. The entire tribe speaks Kimeru as their native language, with each tribe having a different dialect. However, all the tribes understand and speak Kiswahili. In addition, the majority of the Meru people can understand English although they do not necessarily speak English. The sample ($n = 217$) included 153 men (71%) and 64 women (29%). Participants' ages ranged from 18 to 73 years old, with a mean age of 34.2 years ($SD = 12.9$).

Procedures

Data collection occurred from December 2009 until January 2010. Participants were approached through snowball or chain sampling in which the researcher approached village cluster settings across this rural area including schools, shopping centers, car washes, religious center environments, and families. From these settings, individuals who were using and not using substances were approached. These individuals were asked to bring in other participants to be interviewed. All the participants who were approached to do the survey indicated they were willing to take part in the study. Participants were given copies of the informed consent in both English and Kiswahili. Upon completing consent forms, individuals were provided a paper and pencil survey that was in English or Kiswahili as per participant's preference. The first author guided all the participants through the survey clarifying each question and was available to translate or explain unfamiliar terms and phrases to the participants. Finally, the first author was available to read items aloud if any of the participants were unable to read. The survey took approximately fifty minutes to complete. All participants approached completed the survey.

Measures

All measures were translated into Kiswahili. In addition, the English version was back translated into Kenya-familiar English by an independent Kenyan bilingual researcher. Corrections were made to align the back-translated version to the original instrument.

Demographic Questionnaire—The demographics questionnaire assessed age, gender, relationship status (married, divorced, widowed, single), number of children, highest level of education attained, employment status, and tribal affiliation. Participants' employment rates were assessed by an employment status question that had seven possible responses (i.e.,

permanent, temporary, student, disabled, not employed, self-employed, do not want to disclose). Employment status was placed into one of two categories: one involving being employed (i.e., self-employed, or temporarily employed) and a second category of not employed (i.e., not employed or student). Questions assessed use of local brewed alcohol, western style bottled alcohol, khat and bhang.

Collective self-esteem scales (CSES)—The cultural orientation of rural Kenya is considered collectivistic (Vaunne me et al 1997), so we used a collective self-esteem scale in this study and evaluated its association with drug and alcohol use. The CSES is a 16-item self-report measure that assesses one's thoughts and feelings regarding the self and social group (Luhtanen & Crocker, 1992). With a 7-seven point scale (anchored by 1 = strongly disagree and 7 = strongly agree), participants responded to several statements about their collective self-esteem. The CSES has four subscales. The membership subscale items assess how "good or worthy" one feels about being in a particular social group. For example, "I am a worthy member of the social groups I belong to". The CSES private subscale assesses how well one views one's own social group, for example: "I feel good about the social group I belong to." The CSES public scale assesses how one believes others outside the social group judges one's own group. For example: "In general, others respect the social groups I am a member of". Finally, the CSES Identity subscale assesses how important one's social group is to one's self concept. For example: "The social groups I belong to are an important reflection of who I am". Luhtanen and Crocker (1992) report CSES' internal consistencies of .71 to .88 for all four subscales over a series of three studies consisting of college students. Kim and Omizo (2005) reported alpha levels of .72 to .86 with a sample of Asian American college students. Downie, Mageau, Koestner, and Liodeden (2006) reported alpha levels of .78 to .92 with a sample of multiple ethnic Canadians.

The original scale was designed to capture a global assessment regarding one's social group. Moreover, research by Fischer and Holz (2007) demonstrated rewording items for a specific group does not compromise its psychometric properties. In this study, items were worded to indicate that the rural Meru Kenyan community is the social group of interest. The entire scale was used, with higher scores indicating more collective self-esteem.

Results

Table 1 provides data from our sample compared to a national Kenyan sample (NACADA, 2010), so that we can examine how representative our sample was to the national norms of substance use in Kenya. It is clear from the findings that rates of substance use, particularly for bottled beer and khat, were higher in our sample than the more representative NACADA sample. NACADA'S (2010) sample examined age and gender for general alcohol use (See Figure 1). Males indicated much higher alcohol use compared to females across all ages

Gender Effects

We predicted there would be a difference between males and females in levels of substance use behavior with males reporting higher use. Table 2 provides data concerning the association between gender and substance use behavior related to alcohol (bottled beer, local brews) and drugs (khat and bhang). Males used significantly more substances than females for the substance use variables. Chi-square analysis indicated a significant relationship between gender and drinking bottled beer [$\chi^2(1, N = 203) = 42.21, p < .01$]. Males (83.3%) were significantly more likely to use bottled beer than females (37.3%). A Kendall's tau-b value of .46 indicated that there was a strong positive relationship between gender and the consumption of bottled beer. There was also a significant relationship between consuming local brew and gender [$\chi^2(1, N = 193) = 43.54, p < .01$]. Males were significantly more

likely to use local brew (62.5%) than females (10.5%). Kendall's tau-b value of .48 indicated a strong positive relationship between gender and the consumption of local brew. There was also a significant relationship between gender and khat chewing such that males were more likely to use khat (62.6%) than females (7.0%) [$\chi^2(1, N = 196) = 50.20, p < .01$], and Kendall's tau b value of .51 indicated it was a strong positive relationship. Finally, gender was significantly related to smoking bhang [$\chi^2(1, N = 187) = 9.23, p < .01$], Males were more likely to use bhang (21.4%) compared to females (3.6%) but a Kendall's tau-b value of .22 indicated that this relationship was weak.

Gender and Education level

To analyze the relationship between education level and gender, education levels were recoded into lower education level (no school, primary, or high school) versus higher education level (i.e. technical, college, and university level) (See Table 3). Women were more likely obtain a higher education level than men, with 48.4% of females having a higher education as compared to 32.9% of males. Although the relationship was statistically significant [$\chi^2(1, N=211) = 4.50, p = .03$], Kendall's tau-b value of $-.15$ indicates it was a weak negative relationship.

Gender and Employment

The analysis revealed that employment status was significantly associated with gender such that women were more likely to be employed (84.8%) compared to men (56.0%) [$\chi^2(1, N = 200) = 14.98, p < .01$] (See Table 4). Further examination of Kendall's tau-b value $-.27$ indicated a negative weak association between employment status and gender.

Association Between Substance Use and Education

In Table 5, summary information indicates that there was no statistical significant relationship between education levels and use of bottled beer [$\chi^2(1, N= 197) = .01, p = .95$]. There was a statistically significant relationship between education level and local brew beer use [$\chi^2(1, N= 187) = 4.31, p < .05$] such that those with lower education levels were more likely to use local brew (53.4%) than those with high education levels (37.7%). However, Kendall's tau-b value of $-.15$ signified a weak negative relationship. There was a borderline statistically significant relationship between education level and khat use [$\chi^2(1, N = 190) = 3.44, p = .06$]. Those who reported lower levels of education were more likely to use khat (52.5%) than those who reported higher levels of education (38.6%). A Kendall's tau-b test of $-.14$ indicated a weak association between education levels and khat use. There was a statistical significant relationship between level of education and bhang use [$\chi^2(1, N= 181) = 8.32, p < .01$], such that those who reported low levels of education are more likely to use bhang (22.1%) compared to those who have higher levels of education (5.9%). The direction and magnitude of the relationship as indicated by Kendall's tau-b test of $-.21$ showed it to be a weak negative relationship.

Association between Substance Use and Employment

Table 6 presents summary data information on the relationship of bottled beer use with employment status. Those not employed were more likely to be using bottled beer (79.1%) compared to those employed (65.0%) [$\chi^2(1, N= 187) = 4.08, p < .05$]. Although the relationship between employment and beer use was significant, the direction of the relationship as suggested by a Kendall's tau-b value $-.15$ was of a weak negative relationship. There was a significant relationship between employment and use of local brew, $\chi^2(1, N= 178) = 6.88, P < .01$. Those unemployed were more likely to use local brew (58.7%) compared to those employed (38.3%). A $-.20$ Kendall's tau- b value indicates a weak negative relationship between employment status and use of local brew. There was a

statistically significant association between employment status and chewing khat [$\chi^2(1, N=181) = 19.13, p < .01$]. Those who are unemployed were more likely to be using khat (66.7%) than those employed (33.0%). The direction of the relationship as indicated in a Kendall's tau-b test value of $-.33$ was moderately negative. There was a statistically significant association between employment status and bhong smoking [$\chi^2(1, N=172) = 11.44, p < .01$]. Those unemployed were more likely to smoke bhong (27.4%) compared to (8.1%) of those employed. A Kendall's tau-b test value $-.26$ indicated that employment status and bhong smoking had a weak negative relationship.

Self-Esteem

We evaluated whether collective self-esteem would be negatively associated with substance use behavior, alcohol (local brew and bottled beer) and drug abuse (bhong and khat). For each ANOVA, we entered dichotomized substance use and gender as between-subjects factors and collective self-esteem as the dependent variable. There was not a significant main effect of either gender [$F(1, 189) = .20, p = .66, \text{partial } \eta^2 < .01$] or use of bottled beer on collective self-esteem [$F(1, 189) = .68, p = .41, \text{partial } \eta^2 < .01$]. However, there was a significant interaction between the gender and use of bottled beer on collective self-esteem [$F(1, 189) = 6.59, p = .01, \text{partial } \eta^2 = .03$] (see Figure 2). Females had a higher self-esteem when they did not use bottled beer and males had a higher self-esteem when they used bottled beer. For the other substances, no significant effects were found.

To test for any unique and / or combined effect of gender, education, employment status and the level of collective self-esteem on substance abuse, we performed a standard logistic regression in which substance use; alcohol use, local brew and miraa were entered as the dependent variables with gender, education, employment and collective self-esteem as predictor variables, respectively.

Table 7 provides odds ratios, beta weight, confidence intervals and Wald for the gender variable logistic regression. 219 cases were analyzed, the full model significantly predicted gender $X^2 = 44.63, df = 1, p < .005$. The model accounted for between 22.5% and 31.9 % of the variance for the gender, 66.0 % of ether gender being non-alcohol use predicted; however, 85.2% of gender predictions on alcohol use are accurate. Overall 79.4 % of predictions were accurate. This shows that gender is a reliable predictor of bottled beer use.

Table 8 provides odds ratios, beta weight, confidence intervals and Wald for the local brew use logistic regression, 219 cases were analyzed and the full model significantly predicted bottled beer use $X^2 = 43.20, df = 1, p < .005$. The model accounted for between 22.9% and 30.6% of the variance in local brew status, with 51.1% of non-local brew users successfully predicted. However, majority 93.4% of predictions for the local brew use group were accurate. Overall 70.5% of predictions were accurate. This indicates that gender is a reliable predictor of local brew use. In addition, a marginally significant model predicting local brew use $X^2 = 3.0, df = 2, p = .084$. The model accounted for between 24.3% and 32.5 % of variance in local brew use, with 51.1% of the non-local brew users successfully predicted. Additionally, 93.4% of the predictions for the local brew users group were accurate. Overall 70.5% of predictions were accurate. This indicates that level of education is a reliable predictor of local brew use.

Table 9 provides odds ratios, beta weight, confidence intervals and Wald for the local khat/ miraa logistic regression. A total of 219 cases were analyzed and the full model was significantly predicting use of khat/ miraa, $X^2 = 54.90, df = 1, p < .005$. The model accounted for 27.6% and 36.9 % of the variance in khat use, with 52.2% of non-khat users successfully predicted. In addition, 96.2 % of the predictions for the khat use group were accurate.

Overall 72.4% of predictions were accurate. This indicates that gender is a reliable predictor of khat use.

Likewise, a full model logistic regression for khat / miraa use and employment was conducted with 219 cases analyzed. The full model significantly predict use of khat, $X^2 = 5.54$, $df = 1$, $p < .005$. The model accounted for 30.4% and 40.6% of the variance in khat use, with 65.2% of non-khat users successfully predicted. Moreover, 83.3% of the predictions for khat use group were accurate. Overall 73.5 % of predictions were accurate. This shows that employment is a reliable predictor of khat use.

Discussion

Our study found high levels of substance use particularly involving bottled beer, local brews, khat, and bhang. We used Snowball or chain-sampling method of data collection, which in some sense can be argued to have had an influence on participants' responses. However, with this limitation in our method of collecting data, we did find that males compared to females were more likely to drink alcohol, chew khat, and smoke bhang. In addition, women in comparison to men had more education and higher levels of employment. Higher education and employment were generally associated with less substance use. We also found that females had a higher self-esteem when they did not use bottled beer and males had a high self-esteem when they use bottled beer. These are complex findings, and suggest some important gender effects of employment, education, and ultimately alcohol use and self-esteem.

Our study found gender differences in alcohol consumption, with males reporting more substance use than females. Combining alcohol abuse and dependence, the gender difference widened with males being three times more likely to be diagnosed with alcohol abuse or dependence than women, (Grant, Harford, Dawson, Chou, et al., 1994). A number of societal factors explain this difference between genders in substance abuse. One such major factor is the social response to women with alcoholism and drug problems. Although there is a general stigmatization that comes with alcoholism and drug problem disorders, women using alcohol and other drugs are more stigmatized than males (Blume, 1986).

Additionally, an interaction of gender alcohol and occupation is an important direction in gender differences in alcoholism and drug problems. With modernization, equal rights and equal pay for days work have accorded women places in the workplace that were previously male dominated. In addition, the changing roles of men and women are contributing to differential patterns of substance (Wilsnack, Vogeltanz, Wilsnack, & Harris, 2000). These changes has also afforded women opportunities to drink away from home, thus increasing the likelihood of drinking among females. We found higher education and employment of women, which point to growing use of alcohol by women although not as prevalent compared to males.

Certainly, there is a biological cause of some of these sex difference. There is a natural difference of the body metabolism and amount of water in men's body as compared to that of women, which contribute to differences in the amount and frequency of alcohol intake for men and women. Numerous studies have shown a gender difference in alcohol effects because of physiological factors. Frezza, di Padova, and Pazzato (1990) point out that woman have a lesser gastric alcohol dehydrogenase than males. The biological function of this enzyme is metabolism of a substantial amount of alcohol before entry into the body's circulation. This contributes to higher blood-alcohol concentrations and a possible link to psychological and medical consequences in women. Women become intoxicated quickly after smaller quantities of alcohol as compared to males who get intoxicated after larger

amounts of alcohol intake. Similarly, Marshall, Kingstone, and Boss (1983) demonstrated that there is a relationship between the biological fact that females have less total body water than males of similar size, which means females bodies achieve higher blood-alcohol concentrations than males after ingesting equivalent amount of alcohol.

Moreover, females had higher self-esteem when they did not use bottled beer alcohol and males had high self-esteem when they used bottled beer alcohol. First, it is important to understand that drinking bottled beer is different from drinking local brew in Kenya. Alcohol consumption behavior was formerly a reserve of the colonial master's experience. After independence for Kenya, alcohol use involving bottled beer, wines, and spirits was considered as modern and superior. Different attitudes towards internally and externally produced alcohol is evident in legal frameworks in which two distinct systems of licensing of Western bottled alcohol and traditional brews still exists. Kenya sought largely to ban traditional liquor favoring bottled beer and branded spirits. The expressions of this western lifestyle appear in behaviors such as drinking imported wines, spirits, and beers. Beer drinking became a way of celebrating achievements in politics and businesses that fit in with a Western or modern lifestyle of clothing, cars, and other imported goods (Haugerud, 1995).

The male versus female differences on self-esteem for bottled beer may be partially explained by social cultural socialization that drinking Western bottled beers is a male way of celebrating power and success. Additionally, the changing social gender roles, men are losing the status and prestige that defined them as having privileges such as power, prestige, and ownership of property. In today's rural Kenya society, there is an equalizing of gender status, so that women are gaining access to property ownership, power, and status. This resource gain possibly provides them with more self-esteem. On the other hand, males psychologically experience equity as a reduction of their traditional bases of self-esteem. The use of bottled beer possibly becomes a means for males to acquire a false sense of self-esteem.

Africa is in social, cultural, political, and economic transition. The circumstances of such transitions rarely prepare populations for the cultural shocks inherent in the change. There is little preparation for either males or females to acquire the self-understanding for the new equalized gender roles. These transitional experiences comprise stressors for males who have lost status and have had to adopt equal or even subordinate status with women. It is possible that male self-esteem has been reduced, whereas, for women who had previously been subjected to male domination, have now gained status and power. Increasing use of substances by men might be a result of these changes.

Another way of understanding these gender differences involves exploring contrasts between individualistic and collectivistic styles (Bontempo, Lobel, & Traindis, 2001). Allocetrics enjoy doing what the in-group expects of them, and their self-esteem is more based on 'getting along' as in traditional collectivistic culture. In contrast, in a more individualistic culture, success involves trying to get a head. Serbin (1993) explains that men have self-esteem that is anchored to their social role as defined by the collectivistic society. Because self-esteem is built upon what is validated by the in-group, getting along as an attribute it is often lost in the transition from collective traditional culture to individualistic culture. For those with a collectivistic self-esteem, such as an African male self-esteem, which was embedded with more meaning in the hierarchical gender differentiated culture structure, the stressors of the new individualistic culture might be contributing to increasing substance use.

There were several limitations in the present study. First, the original version of the questionnaires was developed in English. Different language versions might be literally

equivalent but not exactly meaningfully equivalent. Even upon translation into local language Swahili and back translation to common English, the sample from a population with majority who had no or very little reading and writing skills may have compromised the accuracy of participants' responses. In addition, many of the participants in this study were diverse, as they were recruited through convenient samples in different rural community in Kenya. In other words, using snow ball recruiting at five rural village settings (i.e., family, shopping center, primary school, church, and a car wash) does not represent a randomized sample. Therefore, the sampling method might have identified more substance users (as individuals were requested to identify others that they knew as to be users) than if a completely random sample had been utilized. The sample therefore might not have been representative of the rural Kenya substance abuse experiences. Future studies in rural Kenya should try to recruit larger, random samples that are more representative of the population.

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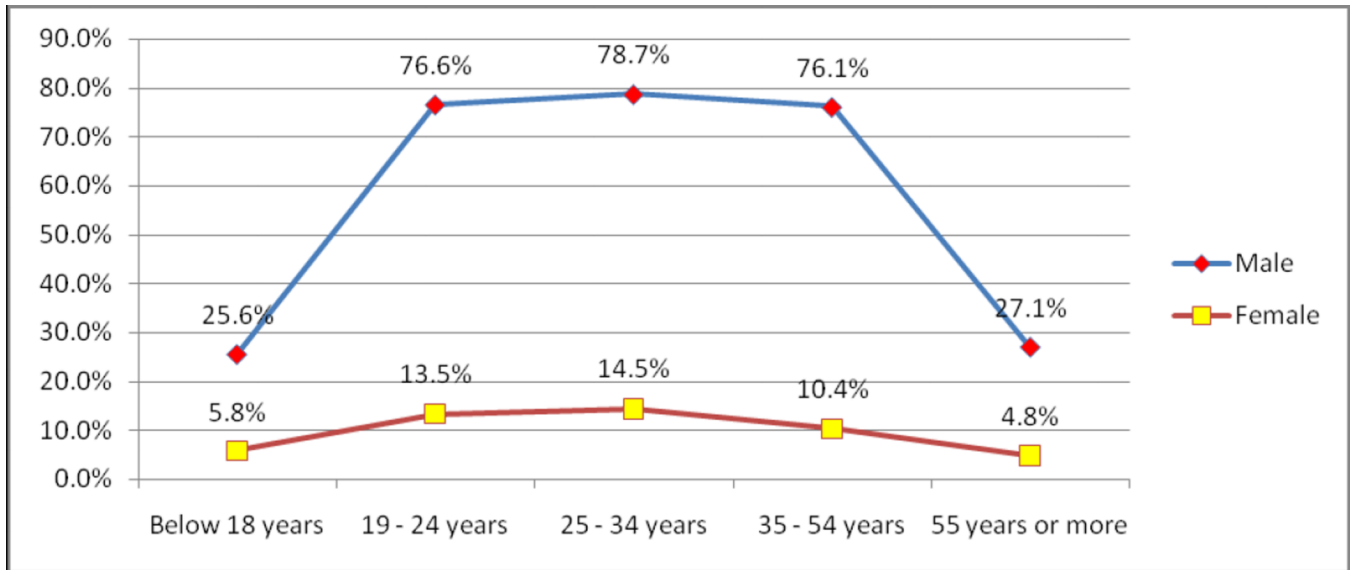


Figure 1.
Alcohol use across age and gender (NACADA 2010)

Estimated Marginal Means of avg_cses

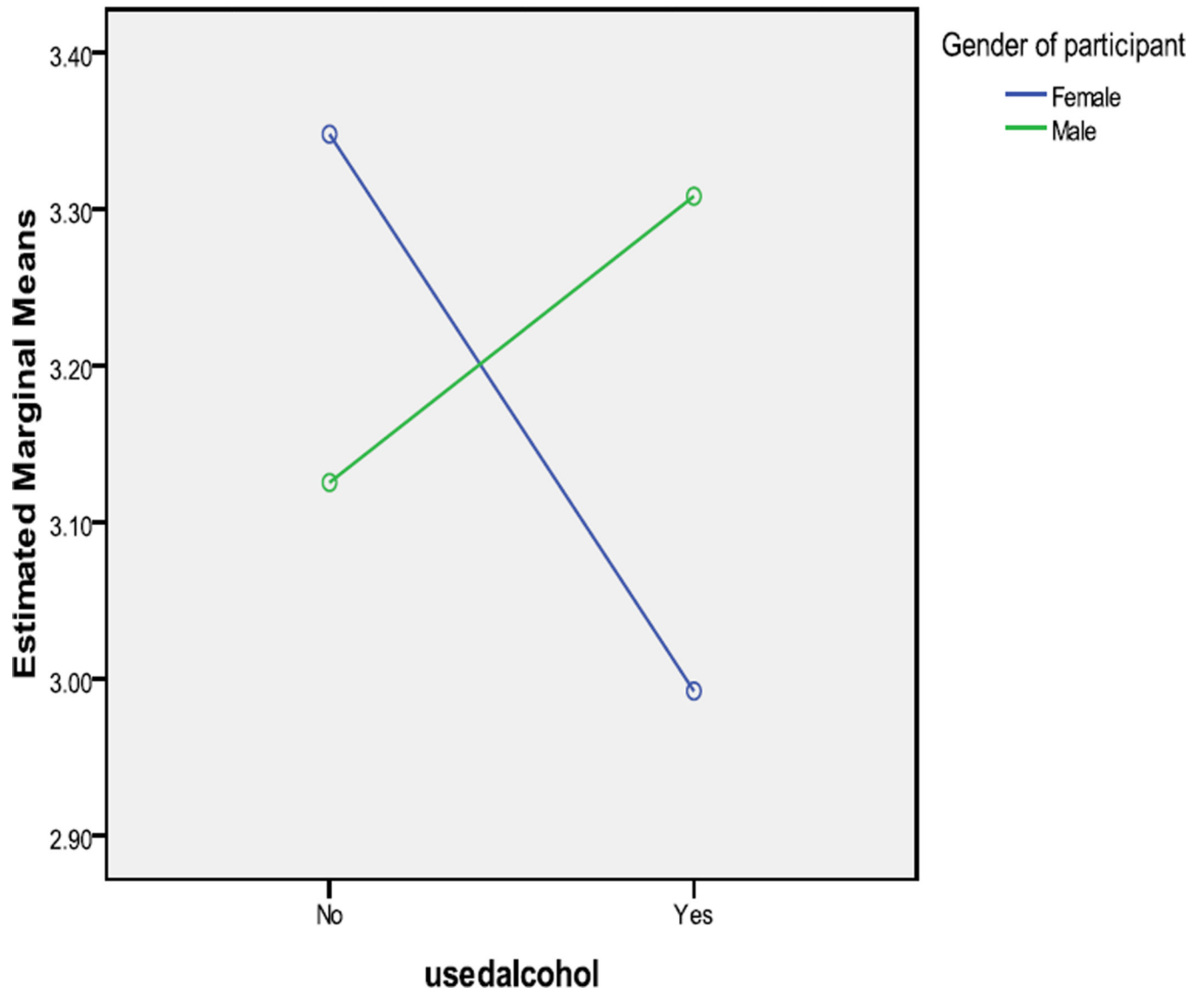


Figure 2.
Gender and bottled beer use on collective self esteem

Table 1

Analysis examining substance use (alcohol, khat, and bhang) in our sample and National NACADA Sample.

Substances	Kenya National sample (N= 3,356)		Our sample (N= 217)
	Rural %	Urban %	Rural %
bottled beer	21.6	31.6	64.8
local brew	39.9	29.6	41.6
Khat	9.9	9.9	41.6
bhang	5.7	8.9	13.7

Table 2

Analysis examining participant's gender and substance use of bottled beer, local brew, khat, and bhang.

Substances	Gender		χ^2	df	Sig	K's tau-b
	Men	Women				
	% (Users/Total)	% (Users/Total)				
bottle beer	83.3 (120/144)	37.3 (22/59)	42.21	1	.000	.46
local brew	62.5 (85/136)	10.5 (6/57)	43.54	1	.000	.48
khat	62.6 (87/139)	7.0 (4/57)	50.20	1	.000	.51
bhang	21.4 (28/131)	3.6 (2/56)	9.23	1	.002	.22

Table 3

Education and gender analysis summary.

Gender	Education		χ^2	df	Sig	K's Value
	Low Education (Lower/Total)	High Education (Lower/total)				
Men	67.1 (100/149)	32.9 (49/149)	4.40	1	.03	-.15
Women	51.6 (32/62)	48.4 (30/62)				

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Table 4

Employment and gender analysis summary.

Gender	Employment		χ^2 Value	df	Sig	K's t-b
	(Employed/total)	(Unemployed/total)				
Men	56.0 (79/141)	44.0 (62/141)	14.98	1	.00	-.27
Women	84.8 (50/59)	15.25 (9/59)				

Table 5

Relationship between Education Level and Substance Use summary table

Variable	Lower Education Level		Higher Education Level		χ^2	df	Sig	Ks tau-b
	%	(Lower/Total)	%	(Higher/Total)				
bottled beer	70.7	(87/123)	70.3	(52/74)	.01	1	.95	-.01
local brew	53.4	(63/118)	37.7	(26/69)	4.31	1	.038	-.15
Khat	52.5	(63/120)	38.6	(27/70)	3.44	1	.064	-.14
Bhang	22.1	(25/113)	5.9	(4/68)	8.32	1	.004	-.21

Table 6

Relationship between Substance Use and Employment Status

Substance	Employment		χ^2	df	Sig	Kl's
	% (Unemployed/total)	% (Employed /total)				
bottled beer	79.1 (53/67)	65.0 (78/120)	4.08	1	.04	-.15
local brew	58.7 (37/63)	38.3 (44/115)	6.88	1	.00	-.20
Khat	66.7 (44/66)	33.0 (38/115)	19.13	1	.00	-.33
bhang	27.4 (17/62)	8.1 (9/110)	11.44	1	.00	-.26

Table 7

Logistic regression Analysis of 219 rural Kenyan adults Bottle beer alcohol use

Predictor	β	OR / e β	CI	SE	Wald's X ²	df
STEP 1						
Gender	2.42~	11.24	5.27, 23.96	.386	39.19	1
STEP 2						
Gender	2.44	11.42	5.10, 25.54	.411	35.10	1
Education	-.212	.81	.364, 1.799	.407	.270	1
Employment	.074	1.08	.46, 2.540	.438	.029	1
Collective Self-esteem	.030	1.030	.543, 1.954	.327	.008	1

Note. N=219,

~ < .10

* < .05.

Table 8

Logistic regression Analysis of 219 rural Kenyan adults Local brew alcohol use

Predictor	β	OR / e β	CI	SE	Wald's X ²	df
STEP 1						
Gender	2.70~	14.85	5.48, 40.22	.508	28.15	1
STEP 2						
Gender	2.65	14.10	5.18, 38.40	.511	26.80	1
Education	.64	1.90	.903, 4.01	.380	2.86	1
Employment	.83	1.086	.516, 2.30	.380	.048	1
Collective Self-esteem	.49	1.63	.838, 3.175	.340	2.08	1

Note. N=219,

~ < .10

* < .05.

Table 9

Logistic regression Analysis of 219 rural Kenyan adults Khat use

Predictor	β	OR / e β	CI	SE	Wald's χ^2	df
STEP 1						
Gender	3.306~	27.27	2.02, 92.78	.625	28.01	1
STEP 2						
Gender	3.263~	26.13	7.66, 89.11	.626	27.19	1
Education	.351*	1.42	.656, 3.071	.394	.793	1
Employment	.854	2.350	1.104, 5.004	.386	4.908	1
Collective Self-esteem	.339	1.404	.719, 1.740	.341	.987	1

Note. N=219,

~ < .10

* < .05.