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Prevalence and correlates of alcohol use and subsequent sexual activity among adult males in a rural community of ethnic minorities in Yunnan Province, China

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Summary **This community-based cross-sectional study examined alcohol use and HIV risks among a sample of predominantly ethnic males in Yunnan Province, China. Information about alcohol use, sexual behavior, sex after drinking, and HIV infection was collected using face-to-face interviews and blood testing. Out of 497 potential male participants, 382 males agreed to participate in this study. Of these males, 70% were ethnic minorities, 74.1% were currently married, 95.5% were sexually experienced, 27.5% had used drugs, and 6% were HIV-infected. Over 81% were current drinkers and 55.7% started drinking before the age of 18. Among current drinkers, 44.5% drank daily and 31.9% had drunk heavily in the past 30 days. Baijiu (a Chinese liquor distilled from sorghum with an ethanol content of at least 40%) was the preferred drink of choice. Excessive alcohol use was associated with being an ethnic Jingpo (OR = 1.96), being a smoker (OR = 2.09) and having multiple lifetime sex partners (OR = 1.55). Over 21% reported having ever engaged in sex after drinking. Those who were aged 26 to 35 (OR = 3.80), started drinking before age 18 (OR = 2.14), who were heavy drinkers (OR = 1.99), or who had ever used drugs (OR = 2.00) were more likely to have ever engaged in sex after drinking. Health education programs for alcohol abuse and unwanted outcomes, particularly the risk of HIV, are urgently needed for ethnic males in Yunnan.**

Keywords: Alcohol use, sex, drug use, HIV, minority

1. Introduction

Alcohol consumption has become the world's third largest risk factor for disease and disability (*1*). An estimated 3.8% of all global deaths and 4.6% of global disability-adjusted life-years are attributable to alcohol, more than those caused by HIV/AIDS, violence, or tuberculosis (*2-4*). Sexual risk practices due to alcohol use and/or abuse have been studied extensively in many countries but not in China (*5-9*). The limited body of research investigating the association between alcohol use and sexual risk practices in China has mainly focused on specific populations such as drug users, migrants, female sex workers, and men having sex with men (MSM) in metropolitan and coastal areas (*10-18*). Little is known about alcohol use and its association with sexual risk practices and HIV infection among Chinese ethnic minorities, many of which have been disproportionately affected by the HIV epidemic (*19*).

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This is particularly true in Yunnan Province, a major epicenter of the drug and HIV epidemics in China (*20-22*). To address this significant gap, a pilot, cross-sectional study of adult males belonging to ethnic minorities in rural Yunnan Province was conducted in order to examine the prevalence and correlates of alcohol use and subsequent sexual activity as well as HIV status.

2. Methods

2.1. *Study site and participants*

This study was conducted in Dehong Dai and Jingpo Autonomous Prefecture (which borders Myanmar) in the west of Yunnan Province, where the first HIV outbreak in China was reported (*23*). Half of the 1.2 million permanent residents in this prefecture are ethnic minorities, the two largest groups of which are the Dai and Jingpo. The present study was conducted in 2011 in a rural community with 10 villages and ethnic minorities. A roster of registered male residents in these 10 villages was obtained from local authorities as a sampling frame. All permanent male residents aged 16 to 55 years who were able to provide informed consent were recruited for the study. In the Dai and Jingpo cultures, 16 is the age of consent. The upper age limit was set at 55 because life expectancy in this region is lower than the national average.

2.2. *Data collection*

A paper-pencil interview was conducted face-to-face by trained local public health workers in private settings – mostly participants' homes – using a four-part structured questionnaire covering (*i*) demographic characteristics, (*ii*) alcohol use, (*iii*) smoking and other drug use, and (*iv*) sexual behavior. Participants received a small incentive equivalent to US$5 as compensation for their time. All participants were assured of the confidentiality of their information on the informed consent form and throughout the interview. This study was approved by the Institutional Review Board (IRB) of Fudan University, Shanghai, China.

2.3. *Measurements*

2.3.1. *Demographic characteristics*

Due to the profile of the study population (rural ethnic minorities with low rates of literacy) data were collected on just four demographic characteristics – (*i*) age, (*ii*) education, (*iii*) ethnicity and (*iv*) marital status – in order to minimize stigma.

2.3.2. *Alcohol use*

A drinker was defined as an individual who had drunk at least once a month for more than one year. Two questions in the questionnaire were used to measure the prevalence of drinking: (*i*) "Have you ever drunk alcohol in your life?" and (*ii*) "Did you drink alcohol in the past 30 days?" If a respondent answered "yes" to the first question, then this person was defined as an ever drinker. If a respondent answered "yes" to both questions, then this person was defined as a current drinker.

Participants were asked about the types and quantities of beer and baijiu (a Chinese liquor distilled from sorghum) or other spirits consumed during a typical occasion such as lunch or dinner in order to measure alcohol (ethanol) consumption. To calculate the absolute amount of alcohol consumed during a typical occasion, an ethanol content of 4% was assumed for beer and 40% was assumed for baijiu or other spirits. The quantity of alcohol consumed was then calculated by multiplying the number of milliliters consumed by the percentage of ethanol contained in each type of beverage. If a drinker consumed both types of beverages during the same occasion, their absolute alcohol consumption was added together. Using guidelines from the World Health Organization, a low level of alcohol (ethanol) consumption was defined as drinking one to 40 grams per typical occasion, a medium level as 41 to 60 grams per typical occasion, a high level as 61 to 100 grams per typical occasion, and a very high level as 100+ grams per typical occasion (*24*).

2.3.3. *Smoking and other drug use*

A current smoker was defined as an individual who had smoked at least 100 cigarettes over his lifetime (*25*) and who had smoked during the past month. Lifetime illicit drug use including opium, heroin, ephedrine, ketamine, or ecstasy, and drug injection behaviors such as needle sharing were also assessed.

2.3.4. *Sexual behavior*

Lifetime sexual experience including the number of one's sexual partners was assessed. For alcohol users, lifetime sexual activity after drinking was assessed by specific type of sexual behavior (such as commercial sex or casual sex) as well as the rate of condom use. "Sexual activity after drinking" was defined as any sexual intercourse occurring subsequent to drinking.

2.3.5. *HIV testing*

All participants except those who were already confirmed as HIV-infected before this study were invited to and agreed to undergo HIV testing. Venous blood was collected by professional nurses using disposable sterile needles and tubes, stored in a cold box, and transported to the laboratory within four hours. Blood specimens were screened for HIV

Table 1. Characteristics of study participants

Variables	Jingpo (n = 225) No. (%)	Other (n = 157) No. (%)	Total (n = 382) No. (%)
Current age (years) (χ^2 = 6.85, p = 0.07)			
16-25	47 (20.9)	46 (29.3)	93 (24.3)
26-35	66 (29.3)	35 (22.3)	101 (26.4)
36-45	61 (27.1)	50 (31.8)	111 (29.1)
46-55	51 (22.7)	26 (16.6)	77 (20.2)
Education (years) (χ^2 = 10.31, p = 0.02)			
0 (Illiterate)	25 (11.1)	5 (3.2)	30 (7.9)
1-6	99 (44.0)	72 (45.9)	171 (44.8)
7-9	79 (35.1)	55 (35.0)	134 (35.1)
≥ 10	22 (9.8)	25 (15.9)	47 (12.3)
Marital status (χ^2 = 3.84, p = 0.14)			
Never married	47 (20.9)	40 (25.5)	87 (22.8)
Currently married	168 (74.7)	115 (73.2)	283 (74.1)
Divorced or widowed	10 (4.4)	2 (1.3)	12 (3.1)
Current smoker (χ^2 = 6.45, p = 0.01)			
Yes	184 (81.8)	111 (70.7)	295 (77.2)
No	41 (18.2)	46 (29.3)	87 (22.8)
Smoking in the past 30 days (cigarettes per day) (χ^2 = 2.05, p = 0.15)			
1-19	75 (40.8)	36 (32.4)	111 (37.6)
≥ 20	109 (59.2)	75 (67.6)	184 (62.4)
Ever used drugs (χ^2 = 26.63, p < 0.001)			
Yes	84 (37.3)	21 (13.4)	105 (27.5)
No	141 (62.7)	136 (86.5)	277 (72.5)
Ever injected drugs (p = 0.02[a])			
Yes	18 (21.4)	0 (0)	18 (17.1)
No	66 (78.6)	21 (100)	87 (82.9)
Ever shared needles to inject drugs			
Yes	15 (83.3)	0 (0)	15 (83.3)
No	3 (16.7)	0 (0)	3 (16.7)
Sexually experienced (χ^2 = 1.03, p = 0.31)			
Yes	217 (96.4)	148 (94.3)	365 (95.5)
No	8 (3.6)	9 (5.7)	17 (4.5)
Number of lifetime sexual partners (χ^2 = 9.88, p = 0.007)			
0-1	62 (27.6)	67 (42.7)	129 (33.8)
2-4	87 (38.7)	52 (33.1)	139 (36.4)
≥ 5	76 (33.8)	38 (24.2)	114 (29.8)
HIV-infected (χ^2 = 10.62, p = 0.001)			
Yes	21 (9.3)	2 (1.3)	23 (6.0)
No	204 (90.7)	155 (98.7)	359 (94.0)

[a] Fisher's exact test.

infection using an enzyme-linked immunosorbent assay (ELISA) (Kehua Biotech, China). Any samples that screened positive for HIV were confirmed by a Western blot assay (HIV BLOT 2.2; Genelabs Diagnostics, Singapore). All tests were performed according to the manufacturer's instructions. Participants were informed that they could obtain their test results by calling a designated telephone number and providing their identification number and name. If a participant tested positive for HIV, the participant would be counseled and registered with the national HIV/AIDS case reporting and surveillance system. The individual would also undergo routine follow-up CD4+ T-cells counts and, if appropriate, free antiretroviral treatment following national guidelines.

2.4. *Statistical analysis*

Data were analyzed using SPSS 17.0 for Windows (SPSS Inc., Chicago, IL, USA). In addition to descriptive analyses, tests of associations between two categorical variables were based on the chi-square test or Fisher's exact test, where appropriate. A multivariate ordinal logistic regression analysis adjusting for potential confounding variables was performed to examine correlates of a high risk of ethanol consumption during a typical occasion. Univariate and multivariate logistic regression analyses were also performed to explore correlates of subsequent sex after drinking among drinkers who had drunk in the past 30 days (*i.e.*, current drinkers). Respective odds ratios (ORs) and 95% confidence intervals (95% CI) were calculated. A significance level of 0.05 was used for all tests.

3. Results

3.1. *Socio-demographic characteristics*

A total of 497 male residents were eligible for this study, of whom 115 (23.1%) declined to participate. Reasons for non-participation were relocation elsewhere (73.0% or 84/115) and incarceration for drug use (26.1% or 30/115) or other crimes (0.9% or 1/115). Among the 382 participants, 113 (29.6%) were Han (China's predominant ethnic group), 225 (58.9%) were Jingpo, 29 (7.6%) were Dai, and 15 (3.9%) belonged

to another ethnic minority. Of the participants, 7.9% were illiterate and 44.8% had only a primary school education, and 22.8% were never married. The mean age of participants was 35.3 years (S.D. = 10.9). Ethnic Jingpo participants did not significantly differ from other participants in terms of age and marital status but were significantly less educated (Table 1).

3.2. *Alcohol use: Lifetime and in the past 30 days*

Table 2 presents detailed information about alcohol use among participants. Over 90% were defined as ever drinkers, of whom 192 (55.7%) started drinking before age 18 and 310 (89.8%) were current drinkers (*i.e.*, drank in the past 30 days). Among current drinkers, 44.5% drank daily, 13.5% often drank in the morning, 48.4% drank only baijiu, 19.0% drank only beer, and 32.6% drank both baijiu and beer. Compared to other participants, Jingpo participants were more likely to be ever drinkers, to be current drinkers, to have drunk daily in the past 30 days, and to often drink in the morning. Surprisingly, Jingpo participants were less likely to start drinking at an earlier age than other participants.

3.3. *Prevalence and correlates of high or very high levels of alcohol consumption during a typical occasion in the past 30 days*

Nearly 50% of participants had consumed low or medium levels of alcohol during a typical occasion in the past 30 days, while approximately 32% consumed high or very high levels. Bivariate chi-square analysis showed that Jingpo participants were more likely to have consumed high or very high levels of alcohol in the past 30 days. After controlling for potential confounding variables, multivariate ordinal logistic regression analysis indicated that the level of alcohol consumption in the past 30 days was positively associated with being Jingpo (OR = 1.96, 95% CI: 1.29-2.97) and a current smoker (OR = 2.09, 95% CI:

Table 2. Alcohol use among study participants

Variables	Jingpo (n = 225) No. (%)	Other (n = 157) No. (%)	Total (n = 382) No. (%)
Ever drinker (χ^2 = 11.86, p = 0.001)			
Yes	213 (94.7)	132 (84.1)	345 (90.3)
No	12 (5.3)	25 (15.9)	37 (9.7)
Age (years) of drinking initiation among ever drinkers (χ^2 = 15.29, p < 0.001)			
≤ 18	111 (47.4)	91 (68.9)	192 (55.7)
≥ 19	112 (52.6)	41 (31.1)	153 (44.3)
Current drinker (*i.e.*, had drunk in the past 30 days) among ever drinkers (χ^2 = 0.35, p = 0.55)			
Yes	193 (90.6)	117 (88.6)	310 (89.8)
No	20 (9.4)	15 (11.4)	35 (10.2)
Frequency of drinking in the past 30 days among current drinkers (χ^2 = 15.84, p < 0.001)			
Daily or nearly daily	94 (48.7)	44 (37.6)	138 (44.5)
Often	50 (25.9)	18 (15.4)	68 (21.9)
Occasionally	49 (25.8)	55 (47.0)	104 (35.5)
Often drinking in the morning in the past 30 days (χ^2 = 11.38, p = 0.001)			
Yes	36 (18.7)	6 (5.1)	42 (13.5)
No	157 (81.3)	111 (94.9)	268 (86.5)
Type of alcoholic beverage consumed in the past 30 days (χ^2 = 3.64, p = 0.06)			
Baijiu only	100 (51.8)	50 (42.7)	150 (48.4)
Beer only	31 (16.1)	28 (23.9)	59 (19.0)
Both	62 (32.1)	39 (33.3)	101 (32.6)
Level of ethanol consumption during a typical occasion in the past 30 days (χ^2 = 15.76, p < 0.001)			
None	32 (14.2)	40 (25.5)	72 (18.8)
Low or medium	105 (46.7)	83 (52.9)	188 (49.2)
High or very high	88 (39.1)	34 (21.7)	122 (31.9)
Attended clinic due to drinking in the past year (χ^2 = 0.44, p = 0.51)			
Yes	30 (15.5)	15 (12.8)	45 (14.5)
No	163 (84.5)	102 (87.2)	265 (85.5)
Lifetime experience of sex after drinking (χ^2 = 2.27, p = 0.13)			
Yes	47 (24.4)	20 (17.1)	67 (21.6)
No	146 (75.6)	97 (82.9)	243 (78.4)
Lifetime experience of commercial sex after drinking (p = 0.035[a])			
Yes	9 (19.1)	0 (0)	9 (13.4)
No	38 (80.9)	20 (100)	58 (86.6)
Lifetime experience of casual sex after drinking (χ^2 = 6.74, p = 0.009)			
Yes	20 (42.6)	2 (10.0)	22 (32.8)
No	27 (57.4)	18 (90.0)	45 (67.2)
Condom use during sex after drinking (χ^2 = 2.26, p = 0.32)			
Never	32 (68.1)	10 (50.0)	42 (62.7)
Sometimes	9 (19.1)	7 (35.0)	16 (23.9)
Always	6 (12.8)	3 (15.0)	9 (13.4)

[a] Fisher's exact test.

Table 3. Prevalence and correlates of alcohol consumption level during a typical occasion in the past 30 days among study participants (*n* = 382)

Variables	None (*n* = 72), No. (%)*	Low or medium (*n* = 188), No. (%)*	High or very High (*n* = 122), No. (%)*	OR (95% CI)[a,b]	*p*[b]
Current age (years)					
16-25	17 (18.3)	59 (63.4)	17 (18.3)	1.00	
26-35	13 (12.9)	52 (51.5)	36 (35.6)	1.47 (0.80-2.70)	0.220
36-45	27 (24.3)	48 (43.2)	36 (32.4)	1.17 (0.61-2.25)	0.636
46-55	15 (19.5)	29 (37.7)	33 (42.9)	1.92 (0.93-3.96)	0.077
Ethnicity					
Jingpo	32 (14.2)	105 (46.7)	88 (39.1)	1.96 (1.29-2.97)	0.002
Other	40 (25.5)	83 (52.9)	34 (21.7)	1.00	
Education (years)					
≤ 6	43 (21.4)	90 (44.8)	68 (33.8)	0.83 (0.55-1.24)	0.365
≥ 7	29 (16.0)	98 (54.1)	54 (29.8)	1.00	
Marital status					
Never married	18 (20.7)	47 (54.0)	22 (25.3)	1.00	
Ever married	54 (18.3)	141 (47.8)	100 (33.9)	0.96 (0.55-1.70)	0.900
Current smoker					
Yes	40 (13.6)	154 (52.2)	101 (34.2)	2.09 (1.28-3.40)	0.003
No	32 (36.8)	34 (39.1)	21 (24.1)	1.00	
Ever used drugs					
Yes	15 (14.3)	51 (48.6)	39 (37.1)	0.97 (0.59-1.60)	0.907
No	57 (20.6)	137 (49.5)	83 (30.0)	1.00	
Multiple lifetime sex partners					
Yes	34 (26.4)	61 (47.3)	34 (26.4)	1.55 (0.99-2.42)	0.055
No	18 (12.9)	77 (55.4)	44 (31.7)	1.00	
HIV-infected					
Yes	5 (21.7)	9 (39.1)	9 (39.1)	0.71 (0.30-1.70)	0.443
No	67 (18.7)	179 (49.9)	113 (31.5)	1.00	

[a] OR, odds ratio; CI, confidence interval. [b] Obtained from multivariate ordinal logistic regression analysis adjusting for potential confounding variables listed in the table. * Proportions were calculated in the row.

1.28-3.40) but was not significantly associated with age, education level, marital status, drug use, multiple lifetime sex partners, or HIV infection status (Table 3).

3.4. *Smoking and other drug use*

As shown in Table 1, 77.2% of study participants were current smokers, and the proportion of current smokers was significantly higher among Jingpo than among other ethnic groups (81.8% *vs*. 70.7%, $\chi^2 = 6.45$, $p = 0.01$). Among current smokers, a majority (62.4%) smoked more than 20 cigarettes per day (CPD) during the past 30 days, including 59.2% of Jingpo and 67.6% of other ethnic groups, though there was no statistical difference.

More than one-quarter (27.5%) of participants were drug users, of whom 17.1% had injected drugs. Drug use was much more common among Jingpo than other ethnic groups (37.3% *vs*. 13.4%, $\chi^2 = 26.63$, $p < 0.001$). Roughly one-fifth (21.4%) of Jingpo drug users had ever injected drugs, 83.3% of whom had ever shared a needle when doing so. None of the drug users from other ethnic groups had ever used injection drugs (Table 1).

3.5. *Sexual behavior and HIV infection*

Among the study participants, 95.5% were sexually experienced and 66.2% had had two or more sexual partners in their lifetime (*i.e.*, multiple lifetime sex partners). Of the Jingpo participants, 72.4% had had multiple lifetime sex partners, which was significantly higher than the proportion in other ethnic groups (57.3%). The prevalence of HIV infection was 6% overall, 9.3% among Jingpo, and 1.3% among other ethnic groups. HIV prevalence was significantly higher among the Jingpo than among other ethnic groups (Table 1).

3.6. *Sexual activity after drinking*

Among the 310 current drinkers, 67 (21.6%) had ever engaged in sex after drinking. Of those, 13.4% (9/67) had engaged in commercial sex after drinking, 32.8% (22/67) had engaged in casual sex after drinking, and 62.7% (42/67) had never used condoms during sex after drinking. Both commercial sex and casual sex after drinking were more common among Jingpo than among other ethnic groups (Table 2).

Univariate logistic regression analyses showed that lifetime sexual activity after drinking was significantly correlated with age, age of alcohol initiation, alcohol consumption, drug use, and HIV infection status. After controlling for potential confounding variables, multivariate logistic regression analysis indicated that those who were age 26 to 35 (OR = 3.80, 95% CI: 1.38-10.52, $p = 0.01$), started drinking before age 18 (OR = 2.14, 95% CI: 1.08-4.22, $p = 0.03$), consumed high or very high levels of alcohol during a typical occasion in the past 30 days (OR = 1.99, 95% CI: 1.05-3.76, $p = 0.04$), or had ever used drugs (OR = 2.00, 95% CI: 1.00-4.01, $p = 0.05$) were more likely to have ever engaged in

Table 4. Prevalence and correlates of lifetime sexual activity after drinking among current drinkers (*n* = 310)

Variables	Prevalence of subsequent sex after drinking (%)	OR (95%CI)[a,b]	p^b	OR (95% CI)[c]	p^c
Current age (years)					
16-25	19.7	1.93 (0.73-5.09)	0.183	3.29 (0.97-11.13)	0.055
26-35	34.1	4.06 (1.65-10.01)	0.002	3.80 (1.38-10.52)	0.01
36-45	17.9	1.71 (0.65-4.48)	0.277	1.77 (0.63-4.96)	0.280
46-55	11.3	1.00		1.00	
Ethnicity					
Jingpo	24.4	1.56 (0.87-2.80)	0.134	1.12 (0.57-2.21)	0.738
Other	17.1	1.00		1.00	
Education (years)					
≤ 6	22.2	1.07 (0.62-1.83)	0.814	0.97 (0.52-1.81)	0.931
≥ 7	21.1	1.00		1.00	
Marital status					
Never married	21.7	1.00		1.00	
Ever married	21.6	0.99 (0.52-1.90)	0.977	1.65 (0.74-3.67)	0.219
Current smoker					
Yes	23.1	1.77 (0.79-3.95)	0.165	1.50 (0.62-3.63)	0.368
No	14.5	1.00		1.00	
Frequency of drinking in the past 30 days					
Daily or nearly daily	24.6	1.94 (0.99-3.79)	0.053	1.45 (0.66-3.19)	0.352
Often	26.5	2.14 (0.99-4.60)	0.053	1.81 (0.77-4.30)	0.176
Occasionally	14.4	1.00		1.00	
Age (years) of drinking initiation					
≤ 18	27.4	2.31 (1.28-4.15)	0.005	2.14 (1.08-4.22)	0.03
≥ 19	14.1	1.00		1.00	
Level of ethanol consumption during a typical occasion in the past 30 days				1.00	
Low or medium	17.0	1.00		1.99 (1.05-3.76)	0.035
High or very high	28.7	1.96 (1.14-3.39)	0.02		
Ever used drugs				2.00 (1.00-4.01)	0.05
Yes	35.6	2.92 (1.66-5.12)	< 0.001	1.00	
No	15.9	1.00			
HIV-infected				2.44 (0.78-7.63)	0.124
Yes	50.0	4.03 (1.53-10.62)	0.005	1.00	
No	19.9	1.00			

[a] OR, odds ratio; CI, confidence interval. [b] Obtained from univariate logistic regression analyses. [c] Obtained from multivariate logistic regression analysis adjusting for potential confounding variables listed in the table.

sex after drinking. According to the multivariate logistic regression analysis, the demographic characteristics of ethnicity, education level, marital status, smoking status, frequency of drinking in the past month, and HIV infection status were all not significantly associated with sex after drinking (Table 4).

4. Discussion

To the extent known, this is the first community-based study examining alcohol use, sex after alcohol use, and their association with HIV infection among ethnic minorities in China. Findings revealed a high prevalence of lifetime alcohol use (90.3%), alcohol use in the past 30 days (89.8% among ever drinkers), and lifetime sexual activity after drinking (21.6%) among male residents of villages with mixed ethnic populations in rural Yunnan, China. The prevalence of alcohol use noted in this study is similar to that in males who are ethnic Li in Hainan Province (*26*) but is much higher than that in the general male Han population in China (though regional and local variations do exist). Hao *et al*. found that 63.8% of Chinese men had at least one drink in the past three months (*27*). The prevalence of alcohol use over 12 months among men was 54.4% in Beijing, the national capital (*28*), but nearly 90% in Wuhan, the capital of Hubei Province (*29*). The prevalence of alcohol use noted in the current study is higher than that in a study by Nehl *et al*. of a sample of MSM in Shanghai, 90% of whom reported ever drinking and 73.5% of whom reported moderate or high levels of alcohol consumption in the past three months (*15*). Furthermore, high levels of alcohol consumption in the past 30 days were noted in 31.9% of the current study participants, and this figure is higher than the prevalence of episodic heavy drinking over 12 months (24.6%) among men in Beijing (*28*). Based on the number of drinks per day in the past three months, Nehl *et al*. categorized 10.6% of MSM participants as heavy drinkers (two or more drinks per day) (*15*). Thus, the present study provides important information on the prevalence of alcohol use in a community with ethnic minorities that are severely affected by alcohol use, drug use, and HIV and that yet rarely receive public health attention.

Compared to other ethnic groups, Jingpo participants described significantly higher levels of heavy alcohol consumption. Li *et al*. argue that ethnic minorities in China (including Jingpo in Yunnan province) have a strong tradition of drinking, especially

during specific festivals, and tend to exhibit a higher prevalence of alcohol abuse and disorders than the Han majority (*30*).

In contrast to other studies in China (*15,27,31*), the present study indicates that homemade baijiu, rather than beer, is the most commonly consumed drink among ethnic communities in rural Yunnan. Such homemade baijiu has a very high ethanol content (usually over 40%) and is likely to be associated with an increased risk of harm due to unknown and potentially dangerous impurities or contaminants in these beverages (*4*). In fact, 14.5% of current drinkers in the current study reported having visited a clinic for an alcohol-related problem in the past year. These findings, along with the high percentages of daily drinking (44.5%) and morning drinking (13.5%) found among participants (especially among Jingpo participants), suggest that alcohol consumption could be a major social and public health problem, particularly for ethnic Jingpo males in rural Yunnan.

The global literature, including the limited number of studies in China, suggests that alcohol use and abuse are positively associated with a number of risky sexual behaviors and outcomes such as unwanted pregnancy and sexually transmitted infections (STIs) including HIV and syphilis (*10-18,32-35*). However, these studies often examine global instead of temporal (*i.e.*, sex after drinking) associations. In the present study, the lifetime prevalence of sexual activity after drinking was 21.6% among participants, and this figure was significantly higher among those who started drinking at an early age, who were heavy drinkers, and who were drug users. Moreover, condom use during sex after drinking was very rare, which is probably due to impaired judgment after alcohol use (*36,37*).

This study has several limitations. First, this was a cross-sectional study, so causal inferences cannot be made. Second, alcohol use and sexual behaviors are sensitive personal topics, so any self-reported measures are subject to recall bias, including deliberate concealment. Finally, participants were only tested for HIV infection but not for other STIs such as syphilis and herpes simplex virus-2 that have been found to be prevalent among Chinese men (*38*). Future studies should be extended to examine these STIs as outcomes of sex after alcohol use.

Nonetheless, findings from this study have important implications for future harm reduction programs targeting alcohol use and abuse in rural Yunnan, and particularly among ethnic Jingpo males. According to a 2003 Cochrane review on alcohol use in China (*39*), many high school students, especially boys, experience early alcohol initiation. Specifically, 55.7% of ever drinkers started drinking at the age of 18 or younger, suggesting that there is an urgent need to implement health education and intervention programs to prevent early use and misuse of alcohol among adolescents in rural Yunnan. Second, use of substances such as tobacco, alcohol, and illicit drugs has become a severe social and public health challenge that requires tremendous and integrated efforts in terms of research and control. Finally, given that Yunnan is one of China's HIV epicenters, the high prevalence of sex after alcohol use and the low rate of condom use during sex underscore the importance of enhanced condom promotion programs and empowerment programs for women to encourage condom use.

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