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Patterns of Alcohol and Tobacco Use in Cambodia

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Abstract

Few studies have considered whether the habitual use of tobacco in Southeast Asia is part of an established pattern of addiction that includes regular alcohol use. As part of a national survey of adult tobacco use in Cambodia (n = 13 988), we found that men who smoked were 2 times more likely to have drunk alcohol in the past week (odds ratio = 2.53, 95% confidence interval = 2.10–3.03). By age 18 to 25 years, 47% of male smokers drank alcohol, and this pattern of alcohol and tobacco use increased to >55% through the fifth decade. Women using smokeless tobacco with betel quid were more likely to be alcohol drinkers (odds ratio = 1.49, 95% confidence interval = 1.12–1.98). Past week's drinking declined by late middle age and was associated with lower education and being currently married; the behavior was lower in some ethnic groups (ie, Cham). Our findings indicate an important association between alcohol and tobacco use, and raise the possibility that reducing alcohol consumption can be an important component of tobacco control.

Keywords

abstinence; adult; alcohol; Cambodia; smoking; smokeless tobacco; tobacco

Introduction

Increasing alcohol consumption and tobacco use are associated with numerous public health challenges, including the increasing prevalence of chronic disease in the Asia-Pacific Region. In addition to cancer and chronic obstructive pulmonary disease, the high prevalence of smoking and heavy drinking contributes to the diabetes epidemic in Asia,¹ and heavy drinking contributes to higher stroke risk and mortality,² and other health conditions, such as hip fractures.³ Cancer risk is dose dependent and alcohol and tobacco use have synergistic effects, particularly with an increased risk of oral cancer.⁴ Furthermore, Asian heavy drinkers with a genetic deficiency for detoxifying acetaldehyde (an alcohol metabolite) have a particularly high for upper digestive tract cancers.⁵

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In addition to the well-established association directly linking binge drinking to death, heavy alcohol use can also lead to more risk-taking behavior. Recent data link alcohol use to falls, road accidents, fights and violence, coercive sexual activity and unprotected sex, and domestic violence.^{6,7} In 2004, alcohol use disorders were the second leading cause of burden, as defined by morbidity (years lost due to disability) among men around the world, and the fourth leading cause for everyone living in low- and middle-income countries.⁸ Alcohol consumption is an established risk factor for cancers of the mouth, throat, esophagus, liver, colon, and breast; liver diseases; cardiovascular problems, including hypertension; and psychiatric problems.⁶

There are long-held ethnic, sociocultural, and gender-related factors associated with alcohol and tobacco use. Surveys in the United States generally find that married men and women are less likely to engage in heavy episodic drinking.⁷ In Asia, there are complex relationships of alcohol use, tobacco, marriage, and mental health, as revealed by a study of married rural women in India, which reported that husband's alcohol use and the wife's own tobacco use were both independently associated with mental disorders in women.⁹ There are additional rural and urban differences. For example, it has been noted that drinking in rural areas is usually “binge drinking” and centered on pay-day or special occasions, such as marriages and festivals.¹⁰ Further study may reveal regional differences in alcohol consumption. For example, a survey in rural northern Vietnam found that 61% of adult men had current at-risk drinking (several standard drinks a day),¹¹ whereas a contemporary survey covering rural south Vietnam found that approximately 40% of men were being heavy/frequent drinkers.¹²

In the Western Pacific Region, alcohol, tobacco abuse, and road traffic accidents are among the top 6 leading causes of burden of disease.^{13,14} For this region, there is a paucity of data to (a) assess national prevalence of alcohol use and (b) examine the patterns of alcohol use that also include other important public health exposures (ie, tobacco, illicit drug use, road traffic accidents). Within the region, the estimated per capita annual consumption of pure alcohol is 6.3 liters—an amount that is less than Western nations.¹⁵ In Cambodia, the estimated per capita consumption during 2003–2005 among adults (15+ years old) was 4.8 liters of pure alcohol. During 2000–2005, there was a large increase in the per capita consumption of beer, from approximately 0.25 liters of pure alcohol from beer in 2000 to 0.75 liters in 2005.¹⁵ It is noteworthy, however, that the public health impact of alcohol depends on both total volume consumed and the pattern of drinking.¹³ Further study of the daily pattern of alcohol and tobacco use in the Western Pacific Region is needed to inform preventive public health and policy measures.

In the present study, we have focused on Cambodia—a nation with one of the highest rates of tobacco use in the region—with an overall aim to investigate the relation between tobacco use and alcohol consumption. We analyzed data from the first national prevalence survey (n = 13 988; 18 years and older) of adult tobacco use (2006 Tobacco Control Leadership Training Survey). This survey also included detailed items on other lifestyle variables such as alcohol consumption (beer, wine, liquor) that was included in a dietary assessment section of the survey. Our specific aims were to (a) examine the prevalence of regular alcohol use (daily, weekly) among Cambodian men and women, (b) identify demographic variables that

are associated with alcohol use among Cambodian men and women, and (c) examine the association between alcohol use and tobacco use among Cambodian men and women.

Methods

Study Design and Participants

The Tobacco Control Leadership Training Survey of 2005–2006 consisted of 13 988 adults (18 years and greater), who were selected through a stratified 3-stage cluster sampling of the population using the 1998 Cambodia General Population Census as the sampling frame. Details of the survey are presented elsewhere.¹⁴ In brief, the country was stratified into 17 sampling domains consisting of 12 individual provinces and 5 groups of similar provinces. Survey teams consisted of 4 or 5 interviewers and enumerators from the National Institute of Statistics, Ministry of Planning, Phnom Penh, Cambodia, who worked in each of the 17 census-derived regions. Survey teams visited all private households, including single-member households. The survey did not cover institutional households such as military barracks, prisons, hospitals, or the residents of temples (monks). Less than 3% of adults declined to complete the survey. Surveys were conducted in the local language (Khmer). Questions were designed with input from focus groups and literature review. The written survey items were translated and back-translated to verify content, criteria, and semantic equivalence by bilingual and monolingual experts. Written informed consent was obtained from each subject and the protocol was approved by the Institutional Review Board of Loma Linda University and the National Ethics Committee on Health (Ministry of Health, Cambodia). An incentive of about US 50 cents was provided to each participant.¹⁴ There were 6130 completed surveys for men and 7858 completed surveys for women.

Survey Items and Statistical Analysis

Although most items related to tobacco use, data were also obtained regarding demographics, anthropometrics, diet, current health, women's health, and media exposure. Sociodemographics in this study were presented similarly to previous reports,¹⁴ though some variables were presented with fewer categories. For example, occupational categories were retained only if they occurred in at least 1% of surveys. Within the diet component of the survey, subjects were asked how many times in the past week they had consumed alcohol. Responses ranged from 0 to 35. Past week's use was defined as one or more times of consuming alcohol during the past week and daily use as 7 or more times during the past week.

Descriptive statistics regarding alcohol use were generated stratified by gender and tobacco use. The vast majority (97.5%) of the 1.25 million men who consumed tobacco did so by smoking, whereas the vast majority (81.3%) of the 0.7 million women who consumed tobacco did so via smokeless methods, such as chewing tobacco with betel quid (BQ). Of women who used tobacco, 17.2% smoked and 1.5% used a pipe; but this study focused on BQ since there are different cultural and public health implications between these different forms of tobacco use. This finding is consistent with the Asian Betel-Quid Consortium study, which found that alcohol and tobacco use were associated with BQ chewing.¹⁶ They also found that in countries primarily to the north (Mainland China, Nepal, Taiwan, and Sri

Lanka), men were more likely than women to use BQ. However, in countries south of Cambodia (Malaysia and Indonesia), women were more likely than men to chew BQ.¹⁶

Data analysis for this study accounted for the stratified, multistage cluster sampling protocol described above. The 95% confidence intervals for prevalence of alcohol use and odds ratios for tobacco use and sociodemographic variables were calculated using a Taylor series linearized approach (with replacement) to compute between-cluster variance estimators that accounted for the intracluster correlation among subjects within the same village. Point estimates for prevalence and odds ratios were further adjusted by sample weights to account for different sampling fractions within each of the 17 domains described above. Odds ratios were derived from gender-specific logistic regression models where alcohol usage in the past week (yes/no) was the dependent variable, and tobacco use (smoking or chewing) and selected sociodemographics (age, ethnicity, religion, marital status, education, income, urbanicity, and occupation) were the independent variables. These statistical analyses were performed using SUDAAN software release 10.0.1 (RTI International, Research Triangle Park, NC).

Results

As previously reported,¹⁴ this sample of adults were predominately of Khmer ethnicity (95%), Buddhist religion (96%), had completed 6 years or less of school (74%), and earned US\$2 per day or less (87%).

In Table 1, we found that 64.6% (95% confidence interval = 61.3% to 67.8%) of men and 92.5% (95% confidence interval = 91.3% to 93.5%) of women abstained from drinking alcohol in the past week. In all, 48% of adult men smoked cigarettes and 17% of women chewed tobacco in the form of a betel quid. Tobacco use was positively associated with increased levels of alcohol use for both men and women; but the effect was much stronger among men. For example, among men who smoked, 12.3% drank 7 or times in the past week compared with 3.8% of men who did not smoke. Among women using BQ, 3.1% drank alcohol 7 or more times in the past week, compared with 2.3% among women not using BQ.

In Table 2, we examine the prevalence of past week's drinking among men who are current smokers and nonsmokers. These data indicate that in all categories of demographic variables smokers had a greater frequency of past week's alcohol drinking as compared with nonsmokers. Some specific trends include (a) at entry into adulthood (18–25 years); about half of all male smokers are drinking alcohol and the trend persists through the fifth decade; (b) there is a lower rate of alcohol use in the ethnic and religious minorities (ie, non-Khmer, non-Buddhist) who tend to be of the Cham ethnicity and of the Islamic faith, (c) in all domains of education, income, and urban dwelling, 40% to 50% of male smokers drink alcohol; and (d) unmarried, nonsmoking males had a particularly low rate of alcohol use (8.7%).

In Table 3, we examine the prevalence of past week's drinking among women who are currently using BQ and not using BQ. Among women, the contrast in alcohol drinking

between tobacco use categories was not as evident. Among BQ chewing women, higher rates (>10%) of alcohol use emerged between ages 26 to 48 years and those who were rural dwelling. Overall, alcohol use was substantially lower in ethnic and religious minorities (0.3% to 3.6%) as compared with the Khmer–Buddhists who were in the majority (7% to 10%).

In Table 4, we present the findings from gender-specific multivariable models that related past week's alcohol drinking to tobacco use and all demographic variables. Among men, we found a significant 2-fold increase in odds of drinking among current smokers. After the age of 18 to 25 years, men were more likely to drink during ages 26 to 48 years, and less likely to drink after age 48 years. Men who were non-Buddhists, unmarried, or had completed postsecondary education were significantly less likely to drink. Among women, BQ use was associated with a significant 49% increase in odds of drinking. Similar to men, the tendency seemed to be to drink during middle age but not after the fifth decade. The groups that showed significantly lower odds of past week's drinking included ethnic/religious minorities (ie, non-Khmer, non-Buddhist), unmarried women, and women with primary or secondary education.

Discussion

We examined the frequency of alcohol use in a national sample of Cambodian adults and found that the behavior was significantly associated with tobacco use, age, gender, marital status, education, and ethnic/religious subgroups.

Alcohol and Smoking in Cambodian Men

Among Cambodian men we found that cigarette smokers (*a*) were 2 times more likely to be alcohol drinkers (odds ratio = 2.53, 95% confidence interval = 2.10–3.03) and (*b*) had 3 times the prevalence of drinking 7 or more times in the past week as compared with nonsmokers (12.3% vs 3.8%). When considering how the apparent link between these 2 behaviors affects initiation of habitual tobacco use, it is noteworthy that by the age of 18 to 25 years, 47% of the young men who smoke are drinking alcohol, and the prevalence increases to beyond 50% through the fifth decade. We have previously reported that cigarette smoking in men of this sample is about 22% at ages 18 to 25 years and after that increases to 50% to 60% through the remainder of the life span.¹⁴ Taken together, these data raise the possibility that a pattern of smoking and drinking in young adulthood serves as a gateway for habitual tobacco use among males throughout the life span. Further studies are needed to examine how patterns of alcohol and tobacco use among adolescent and young adult males in Cambodia affect the initiation of a lifelong habit.

Interestingly, whereas the tobacco habit remains throughout the life span, alcohol use declines after the fifth decade. This may reflect a survivor effect, where many of the men who are heavy drinkers and smokers are dying after the fifth decade.

The co-aggregation of smoking and drinking behaviors in Cambodian men is also noteworthy when considering that virtually all men older than 30 years in this sample were survivors of the genocide and mass violence events that occurred in Cambodia during 1975–

1979. A link between posttraumatic stress disorder (PTSD) and alcoholism has been suggested in qualitative and quantitative studies of psychiatric morbidities in Cambodia.¹⁷ A 2001 population survey in one rural Cambodian province found that more than half of adults met the criteria for at least one mental disorder, mostly depression, anxiety, and PTSD. These mental disorders, associated with exposure to violence and poverty, contributed to high levels of social impairment,¹⁷ which could lead to alcohol abuse. In studies of Cambodian refugees in the United States, problem drinking is often identified, although links to PTSD and tobacco use are less clear. One such study reported that fathers who abuse their children are most likely to be using alcohol,¹⁸ though alcohol use in general and binge drinking in particular (26% and 2%, respectively, in past 30 days) was not related to PTSD.¹⁹

Alcohol and Use of Smokeless Tobacco in Cambodian Women

Among Cambodian women, we found that BQ users were also more likely to drink alcohol. The prevalence of the alcohol drinking was much lower in women. Among female BQ users, alcohol use was primarily occurring between the second and the fifth decade. A number of possible factors may explain this trend. Similar to the men, many of the women in this group are survivors of the genocide and some of this may be linked to PTSD.

We have previously reported that BQ use among women of Cambodia tends to be a habit that is initiated at an average of about 29 years and occurs at a time when the women are in their childbearing years. During this time, strong familial and social ties occur among the older women in Cambodia and smokeless tobacco use habits are initiated under the influence of older female relatives and traditional midwives. We have found evidence that BQ is being promoted as part of traditional medicine remedies (ie, morning sickness, fatigue, dental health, infectious disease). Our findings in this report also raise the possibility that for about 10% of the female tobacco users, alcohol use may also be initiated at the same time. Further study of the cultural, familial, and traditional medicine basis for these patterns is needed.

Demographics of Alcohol Use in Cambodia

Our findings among all adults in Cambodia indicate that alcohol use is highest among men and middle-aged adults. Alcohol drinking was lowest among ethnic and religious minorities (non-Khmer, non-Buddhist), among young unmarried adults, and among those who completed more years of education.

Religion/ethnicity—The significantly lower rate of drinking in non-Buddhist men is largely attributable to low rates among those of the Cham ethnicity who are Muslim by faith. The role of faith in their higher tendency toward abstinence is a possibility, though this has not been studied. In previous studies of Cambodia, we have found that this group is less likely to use tobacco. The fifth precept of Buddhism proscribes addictive behaviors such as alcohol, gambling, and drug use. Other analysis of this same survey data revealed that most Cambodian are knowledgeable of this precept and those who did not use tobacco were more likely to cite a Buddhist principle as part of their personal beliefs and practice.²⁰ An analysis of alcohol drinking among men in neighboring Thailand (also 95% Buddhist), found limited

associations between religious practice and alcohol use, but it did find that those placing more emphasis on the fifth precept were less likely to have an alcohol use disorder.²¹

Marriage—The lower rate of alcohol use among young, unmarried adults is also noteworthy and identifies a period of life that may provide some target for interventions. In Cambodia, the young occupy a much lower social status in relation to parents, older relatives, and elders, and this power differential affects both willingness to state dissension to elders and reveal embarrassing facts to the outside world.²² We note that our findings are in contrast to the data from Cambodian refugee populations. Indeed, among Cambodians living in the United States, alcohol use is common among youth and is a leisure and social activity known to relieve stress and aid in sleep.²³ Some of this difference may be attributable to acculturation.

In contrast to what other researchers have found,⁷ this study finds that married men and women in Cambodia are more likely to drink. Furthermore, among men who do not smoke there is an even greater contrast in prevalence of alcohol drinking between the married and unmarried (31.4% vs 8.7%). The strong association between alcohol and marriage can potentially indicate that contextual, cultural, and familial issues may underlie alcohol use in young to middle-age men. There is limited research on alcohol use within Cambodian families.¹⁵

Urbanization—In looking only at alcohol consumption (yes/no), we did not find significant differences in past week's drinking (yes/no) between those living in rural versus urban areas. Additional research could also examine the context of different urban and rural areas within Cambodia to see how measures such as general levels of education and wealth influence individual drinking patterns.²⁴

Education—Higher education was significantly associated with less drinking among both men and women, with the effect being strongest among those not using tobacco. The prevalence of higher rates of drinking among those with less than primary education needs further investigation. Much of the older population in this category may have had education and development interrupted during war—possibility that links the higher alcohol use to PTSD symptoms. Overall, this finding of increased alcohol use among the least educated adults is consistent with findings from the rural Health and Demographic Surveillance System, which found lower education to be a risk factor in neighboring Vietnam but not in other Asian countries (Bangladesh, India, Indonesia, and Thailand).²⁵ A survey of Cambodia in 2001 found that 60.6% of adults were illiterate.¹⁷

The indication in our data from Cambodia that 10% of middle-aged women are using smokeless tobacco and drinking is also noteworthy, given data indicating a strong synergistic effect of the combination of alcohol and tobacco in producing an increased risk of oral cancer.⁴

Limitations

An important limitation of our cross-sectional analyses is that we are not able to identify how much of the alcohol use is part of temporal trends in the Cambodian population. The

shift from agrarian to modern societies in urban areas of the nation has led to people changing emotionally, culturally, and socially. The impact of globalization, industrialization, migration, and increasing media presence has led many to embrace new lifestyles, cultures and practices, such as increasing use and abuse of alcohol, more drinking among women, more “binge” drinking, and greater acceptability of drinking as an accepted social norm.¹⁰ Additional burden from alcohol is costly in a country having a per capita gross domestic product of US\$776 and with approximately 28% of the total population in 2009 living below the official rural and urban poverty levels.²⁶

Another limitation of the analysis is that although we have validated tobacco use items, we do not know the validity of the items on alcohol use. We only asked for the alcohol use in the past week, not frequency during the past month or year. Alcohol use may carry some social stigma among young adults and women in Cambodia and this raises the issue of social desirability bias in the responses and nonresponses.

Finally, we do know that the age at initiation of tobacco was 18 years in men and 29 years in women. Our survey did not measure age at initiation of alcohol use and this should be considered in future efforts to investigate the potential for one substance serving as a gateway for the other.

Conclusions

Our findings from Cambodia indicate that alcohol drinking is linked to cigarette smoking in men and smokeless tobacco use in women. In men, the alcohol drinking is highly prevalent during ages 18 to 25 years—period when smoking is beginning to increase by 2- to 3-fold in prevalence to the point that half of all men smoke cigarettes. In women, alcohol drinking is far less prevalent and the occurrence tends to be associated with BQ chewing during middle age. Overall associations between alcohol use and marriage, ethnicity, and religion raise the possibility of cultural, familial, and contextual influences that relate to alcohol being an accepted practice during adulthood. Taken together, the data indicate that preventive health education and control policies should target adolescents and young adults.

To reduce alcohol and tobacco use, the World Health Organization acknowledges that governments can implement a variety of regulations and policies, such as taxation, package labeling, and the creation of smoke-free areas.¹³ Taxation with price elasticity applied to both alcohol and smoking could prove especially useful in reducing use among younger adults with lower levels of income. Also, a focus on making bars and restaurants smoke-free areas has the added advantage of curtailing venues where males congregate to smoke and drink²⁷—a behavior that may be the gateway to lifelong addictive habits. In a country that is predominately Buddhist, principles regarding the Buddhist faith have been used in previous efforts to decrease the use of tobacco.^{20,28} This approach may also be useful in efforts to reduce problematic alcohol consumption.

Emphasizing negative health outcomes of alcohol and smoking, such as incontinence, impotence, chronic obstructive pulmonary disease, and other concerns affecting the identity of men and their virility, may prove effective,² especially for younger male cohorts and for

urban populations more exposed to Western culture. Given the high morbidity and mortality from traffic accidents, more efforts should be placed on reducing drinking and driving. For example, a cohort study in Thailand found that 56.1% of adult males reported driving during the past year after consuming 3 or more glasses of alcohol.²⁹

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Table 1

Prevalence of Intensity of Alcohol Consumption Among Cambodian Adults (18+ Years Old) by Gender and Category Tobacco Use

	Men; Proportion (95% Confidence Interval)			Women; Proportion (95% Confidence Interval)		
	Total	No Smoking	Smoking	Total	NoBQ ^a	BQ ^a
Effective population size ^b	N = 2 538 734	N = 1 321 659	N = 1 217 075	N = 3 292 562	N = 2 732 752	N = 559 810
Alcoholic beverages consumed in the past week						
0	64.6 (61.3–67.8)	76.4 (72.8–79.7)	51.9 (48.8–55.0)	92.5 (91.3–93.5)	92.9 (91.3–92.5)	90.5 (88.3–92.3)
1–3	18.2 (16.2–20.3)	14.6 (12.2–17.4)	22.0 (19.9–24.4)	3.3 (2.8–4.0)	3.1 (2.6–3.8)	4.4 (3.2–5.9)
4–6	9.3 (7.7–11.2)	5.2 (3.9–6.8)	13.8 (11.5–16.3)	1.7 (1.2–2.5)	1.6 (1.0–2.5)	2.1 (1.3–3.2)
7+	7.9 (6.8–9.2)	3.8 (2.9–5.0)	12.3 (10.8–14.1)	2.5 (2.0–3.0)	2.3 (1.9–2.9)	3.1 (2.2–4.4)

^aBQ indicates smokeless tobacco in the form of a betel quid (betel leaf, betel nut, tobacco leaves formed into a packet and inserted into the gingival pocket).

^bEstimate of the size of the group in the population of adults derived from the sample weights.

Table 2

Prevalence of Weekly Alcohol Drinking Among Cambodian Men by Smoking Status and Demographic Variables

Demographics	n	Not Currently Smoking; % (95% Confidence Interval)	Currently Smoking; % (95% Confidence Interval)
Age (years)			
18–25	1701	14.2 (11.0–18.2)	47.0 (40.1–54.0)
26–36	1425	33.9 (27.5–40.9)	57.8 (53.0–62.4)
37–48	1567	33.3 (26.4–41.0)	57.9 (52.9–62.7)
>48	1437	21.3 (16.5–27.0)	31.3 (27.7–35.3)
Ethnicity			
Khmer	5611	23.5 (20.1–27.2)	49.3 (46.3–52.4)
Non-Khmer	519	27.1 (17.5–39.7)	31.4 (20.0–45.6)
Religion			
Buddhist	5700	23.5 (20.1–27.2)	49.4 (46.4–52.4)
Non-Buddhist	430	26.4 (16.6–39.3)	26.3 (15.4–41.0)
Marital status			
Married	4814	31.4 (27.2–36.0)	48.6 (45.4–51.8)
Not married	1316	8.7 (6.3–12.0)	44.1 (36.3–52.1)
Years of education			
0–6	4235	26.7 (23.5–30.2)	49.0 (45.8–52.1)
7–12	1690	20.5 (16.2–25.6)	46.0 (39.4–52.8)
>12	179	16.0 (10.7–23.2)	42.6 (24.6–62.8)
Income per day (US\$)			
<1	3827	19.4 (16.3–22.8)	44.7 (41.0–48.5)
1–2	1198	29.7 (24.1–36.0)	55.2 (49.9–60.3)
2.01–3	472	30.4 (22.4–39.8)	49.8 (39.6–60.1)
>3	633	29.2 (21.0–39.0)	52.1 (44.3–59.8)
Urbanicity			
Urban	724	23.3 (16.4–32.1)	42.2 (33.9–50.9)
Rural	5406	23.6 (19.9–27.8)	49.0 (45.7–52.3)
Occupation			
None	441	12.6 (5.8–25.0)	14.5 (9.1–22.2)
Professional (nonhealth)	123	31.1 (20.8–43.5)	44.5 (31.1–58.7)
Technical	149	22.1 (14.0–33.2)	37.3 (21.6–56.3)
Sales	311	19.0 (11.3–30.2)	31.1 (20.1–44.8)
Farming or livestock	4036	25.5 (22.9–28.3)	50.4 (47.6–53.3)
Labor	697	29.6 (22.8–37.3)	54.8 (45.6–63.6)
Trades or crafts	86	26.1 (13.1–45.2)	49.7 (24.5–75.1)
All other	287	21.0 (11.7–34.9)	55.4 (43.0–67.2)

Table 3

Prevalence of Weekly Alcohol Drinking Among Cambodian Women by Smokeless Tobacco Use and Demographic Variables

	n	Not Currently Using BQ ^a ; % (95% Confidence Interval)	Currently Using BQ ^a ; % (95% Confidence Interval)
Age (years)			
18–25	2099	5.0 (3.5–7.1)	9.1 (2.2–31.2)
26–36	1765	9.3 (7.1–12.0)	17.5 (11.4–26.1)
37–48	2006	7.8 (6.3–9.6)	15.2 (11.3–20.1)
>48	1988	6.5 (4.6–9.2)	6.3 (4.7–8.4)
Ethnicity			
Khmer	7249	7.3 (6.1–8.6)	10.1 (8.2–12.4)
Non-Khmer	609	3.6 (2.1–6.2)	0.3 (0.0–2.5)
Religion			
Buddhist	7354	7.3 (6.1–8.6)	10.0 (8.1–12.3)
Non-Buddhist	504	3.2 (1.7–6.0)	1.4 (0.3–7.1)
Marital status			
Married	5471	8.3 (7.2–9.7)	12.3 (9.8–15.3)
Not married	2387	4.2 (2.8–6.4)	5.0 (3.4–7.5)
Years of education			
0–6	6695	8.1 (6.9–9.4)	9.5 (7.7–11.7)
7–12	1073	3.8 (2.4–5.9)	10.8 (3.6–27.9)
>12	84	1.0 (0.2–4.5)	ND
Income per day (US\$)			
<1	6764	7.2 (6.0–8.6)	8.9 (7.1–11.2)
1–2	585	9.9 (6.9–14.1)	18.5 (10.7–30.0)
2.01–3	202	2.6 (1.1–6.0)	7.2 (2.0–22.9)
>3	307	4.7 (2.6–8.4)	17.1 (6.6–37.7)
Urbanicity			
Urban	939	7.3 (4.4–11.8)	2.6 (0.8–7.6)
Rural	6919	7.1 (5.9–8.4)	10.0 (8.1–12.3)
Occupation			
None	1458	5.8 (3.8–8.7)	5.1 (3.1–8.2)
Professional (nonhealth)	24	3.8 (0.8–15.9)	ND
Technical	80	4.0 (1.3–11.7)	ND
Sales	1016	5.8 (4.0–8.3)	12.1 (5.8–23.5)
Farming or livestock	4790	8.2 (6.9–9.6)	10.8 (8.5–13.7)
Labor	220	10.0 (3.6–24.8)	25.4 (6.2–63.4)
Trades or crafts	173	5.6 (2.6–11.3)	7.2 (1.7–26.5)
All other	97	2.2 (0.6–8.6)	ND

Abbreviations: ND, not determined due to insufficient events.

^aBQ indicates smokeless tobacco in the form of a betel quid (betel leaf, betel nut, tobacco leaves formed into a packet and inserted into the gingival pocket).

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Table 4

Multivariable Logistic Regression Models Relating Weekly Alcohol Drinking to Tobacco Use and Demographic Variables in Cambodian Men and Women

	Odds Ratio (95% Confidence Interval)	
	Men	Women
Tobacco use		
No tobacco use (ref.)	—	—
Currently smoking	2.53 (2.10–3.03)	
Currently using smokeless BQ ^a		1.49 (1.12–1.98)
Age (years)		
18–25 (ref.)	—	—
26–36	1.61 (1.25–2.06)	1.58 (1.12–2.23)
37–48	1.48 (1.15–1.90)	1.30 (0.86–1.95)
>48	0.63 (0.46–0.85)	0.94 (0.59–1.49)
Ethnicity		
Khmer (ref.)	—	—
Non-Khmer	1.06 (0.64–1.76)	0.57 (0.24–1.37)
Religion		
Buddhist (ref.)	—	—
Non-Buddhist	0.45 (0.23–0.90)	0.51 (0.19–1.38)
Marital status		
Married (ref.)	—	—
Not married	0.49 (0.39–0.61)	0.54 (0.39–0.76)
Years of education		
0–6 (ref.)	—	—
7–12	0.80 (0.65–0.98)	0.51 (0.36–0.73)
>12	0.57 (0.39–0.85)	0.14 (0.03–0.71)
Income per day (US\$)		
<1 (ref.)	—	—
1–2	1.26 (1.03–1.53)	1.66 (1.09–2.54)
2.01–3	1.08 (0.81–1.43)	0.40 (0.17–0.96)
>3	1.26 (0.94–1.69)	0.90 (0.52–1.58)
Urbanicity		
Rural (ref.)	—	—
Urban	1.03 (0.66–1.59)	1.28 (0.75–2.18)
Occupation		
None (ref.)	—	—
Professional (nonhealth)	2.18 (0.96–4.99)	1.07 (0.18–6.27)
Technical	1.41 (0.62–3.22)	1.09 (0.38–3.08)
Sales	1.03 (0.48–2.20)	1.06 (0.59–1.90)
Farming or livestock	1.89 (1.03–3.48)	1.37 (0.96–1.94)
Labor	1.99 (0.99–4.01)	2.01 (0.82–4.93)

	<u>Odds Ratio (95% Confidence Interval)</u>	
	Men	Women
Trades or crafts	1.66 (0.68–4.06)	0.96 (0.42–2.20)
All other	1.59 (0.72–3.54)	0.38 (0.09–1.71)

^aBQ indicated smokeless tobacco in the form of a betel quid (betel leaf, betel nut, tobacco leaves formed into a packet and inserted into the gingival pocket)