Patterns of adolescent chewing betel nut and later drug use in adults

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Introduction

The chewing of betel nut, a combination of areca nut, betel leaf, slaked lime, and region dependent flavoring ingredients is a uniquely Asian, culturally derived lifestyle habit. Bred from ancient tradition, its use is socially accepted in all groups, including women and young children, although other substance use such as tobacco smoking is deemed objectionable.1,2 The Asian Betel-quid Consortium study showed the chewing prevalence rates in Asian men were during 9.8% - 43.6%, which higher than women during 1.8% - 46.8% in 2009.3 By raising epinephrine and norepinephrine plus modulation of cholinergic and monoamine transmission, areca nut exerts neurobiological effects on the sympathetic and parasympathetic nervous systems.4-6 Tolerance and withdrawal symptoms have been detected in regular betel nut chewers.7-9 Such a pharmacological profile is comparable with nicotine, a well-known substance that leads to abuse and dependence. This suggests that betel nut chewing may be like cigarette or alcohol has 'gateway effect'. But, its gateway pattern between betel nuts chewing and illegal drug use had not been examined clearly in previous studies.

Objectives: Our studies **tried to address the timeline of gateway effect among betel nuts and illicit drug use.**

Study Design

Data Source and Study Subjects

Secondary Data are from the 2005 and 2009 National Health Interview Survey and the claims data in the National Health Insurance Research Database in Taiwan. We used the data containing personal socioeconomic status and addictive materials information including history of smoking, drinking, chewing betel nuts and material use behaviors. There were 14958 and 16563 adult subjects who completed the 2005 and 2009 substance abuse surveys.. We measure these adults' substances usage patterns. For understanding which kind of substances usage pattern inducing their drug abuse risk in adult, we compared different substances use situation among drug user and non-users in 2005 and 2009 surveys.

Statistical Analysis

We used SAS (version 9.2 for windows; SAS Institute Inc., Cary, NC, U.S.A.) for all statistical analyses. Differences in demographic characteristics between subjects in 2005 and in 2009 were observed by chi-square test for categorical variables and Wilcoxon two-sample test for continuous variables. Differences of the proportion of substance abuse between 2005 and 2009 were examined by chi-square test. Brown-Mood test was used to examine the differences of age at onset for substance use between drug abusers and non-drug abusers. Logistic regression models were used to measure odds ratios with 95% confidence intervals (CIs). Demographic characteristics that were associated with illicit drug abuse in the univariate analysis were included in the multivariate regression model for adjustment.

Betel nuts consumption in Taiwan

The decreasing trend of betel nuts consumption in Taiwan during 1991-2010

The main agricultural products in Taiwan are rice, sugar cane, betel nuts and corn. According to the latest statistics published by the Taiwan Directorate General of Budget, the Taiwanese betel nuts consumption was decreasing from 10.4 kg/year in 1995 to 7.2 kg/year in 2010 which almost down the similar level in the year 1991.
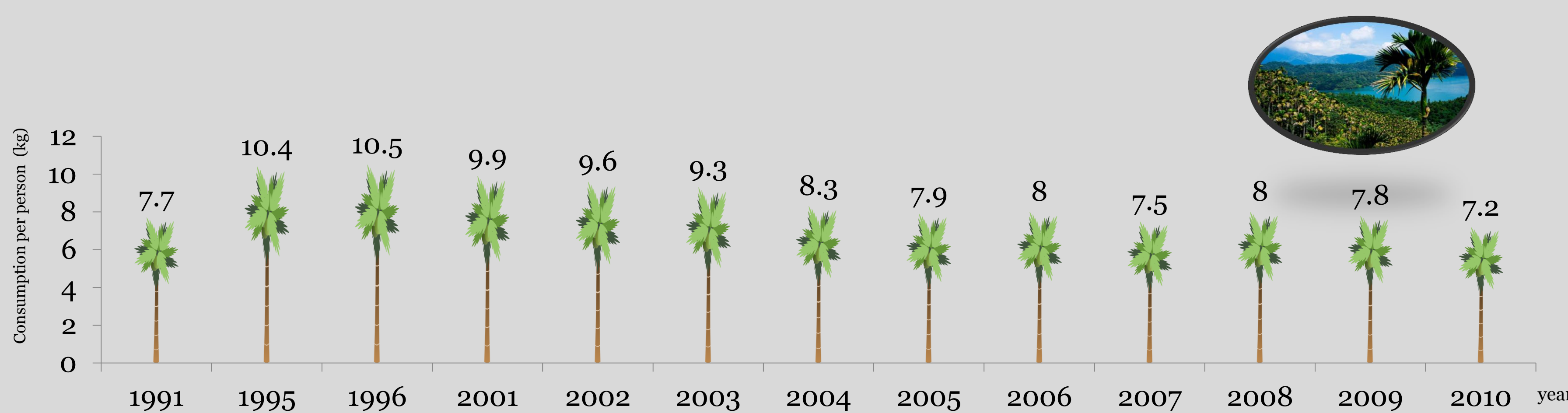
Baseline Results

Table 1. Demographic data for random samples of people aged 18~64 years from 2005 and 2009, frequency (%)

| Variable		2005 N=14598	2009 N=16563	P-value
Age	Mean (SD)	38.9 (12.5)	39.1 (12.7)	0.1771
Gender	Male	7713 (51.6%)	7859 (47.4%)	<0.0001
	Female	7245 (48.4%)	8704 (52.6%)	
Living Area	North	3536 (23.6%)	4180 (25.2%)	<0.0001
	Centre	712 (4.8%)	1081 (6.5%)	
	South	6110 (40.9%)	5809 (35.1%)	
	East	4594 (30.7%)	5491 (33.2%)	
Marital status	Married	5945 (39.8%)	7099 (42.9%)	<0.0001
	Single	9000 (60.2%)	9462 (57.1%)	
Academic degree	None	150 (1%)	296 (2%)	<0.0001
	Elementary school	2061 (13.9%)	0 (0%)	
	High school	7365 (49.7%)	7713 (52.5%)	
	College or above	5253 (35.4%)	6687 (45.5%)	
Academic degree of father	None	628 (5.1%)	3466 (32.7%)	<0.0001
	Elementary school	6112 (49.6%)	0 (0%)	
	High school	4362 (35.4%)	5373 (50.7%)	
	College or above	1230 (10%)	1766 (16.7%)	
Academic degree of mother	None	495 (5.1%)	5943 (54%)	<0.0001
	Elementary school	5568 (57.8%)	0 (0%)	
	High school	3131 (32.5%)	4238 (38.5%)	
	College or above	440 (4.6%)	819 (7.4%)	
Occupation	None	3094 (21%)	4324 (26.2%)	<0.0001
	Military	308 (2.1%)	203 (1.2%)	
	White collar	6605 (44.7%)	8378 (50.7%)	
	Agriculture/Fishery/Forestry/Animal husbandry	465 (3.1%)	579 (3.5%)	
	Blue collar	3160 (21.4%)	2005 (12.1%)	
	Student	1134 (7.7%)	1033 (6.3%)	
Income (NT Dollars)	<10000	4314 (29.1%)	4803 (29.5%)	<0.0001
	10000~20000	2379 (16.1%)	3084 (18.9%)	
	20000~40000	4664 (31.5%)	4846 (29.8%)	
	40000~59999	2158 (14.6%)	2167 (13.3%)	
	≥60000	1307 (8.8%)	1384 (8.5%)	

p-values were all calculated from Chi-square tests except for that of the variable "age".
For variable "age", p-value was from Wilcoxon two sample test.

Table 2. The proportion of substance abuse for random samples of people aged 18~64 years from 2005 and 2009, frequency (%)

Variable	2005 N=14598	2009 N=16563	P-value
Cigarettes	5657 (38.6%)	5886 (35.5%)	<0.0001
Alcohol	7289 (50.4%)	9995 (60.4%)	<0.0001
Betel nuts	3150 (21.4%)	3681 (22.2%)	0.0786
Slimming drug	501 (3.4%)	551 (3.3%)	0.7060
Cold medicine	4036 (27.6%)	4066 (24.6%)	<0.0001
Sedatives	425 (2.9%)	180 (1.1%)	<0.0001
Illicit drug	191 (1.3%)	245 (1.5%)	0.2197

All p-values were calculated from Chi-square tests.

Figure 2 Recent use of any illicit drug : proportion of the same age group among people aged 18~64 years from 2005 and 2009 Taiwan national survey
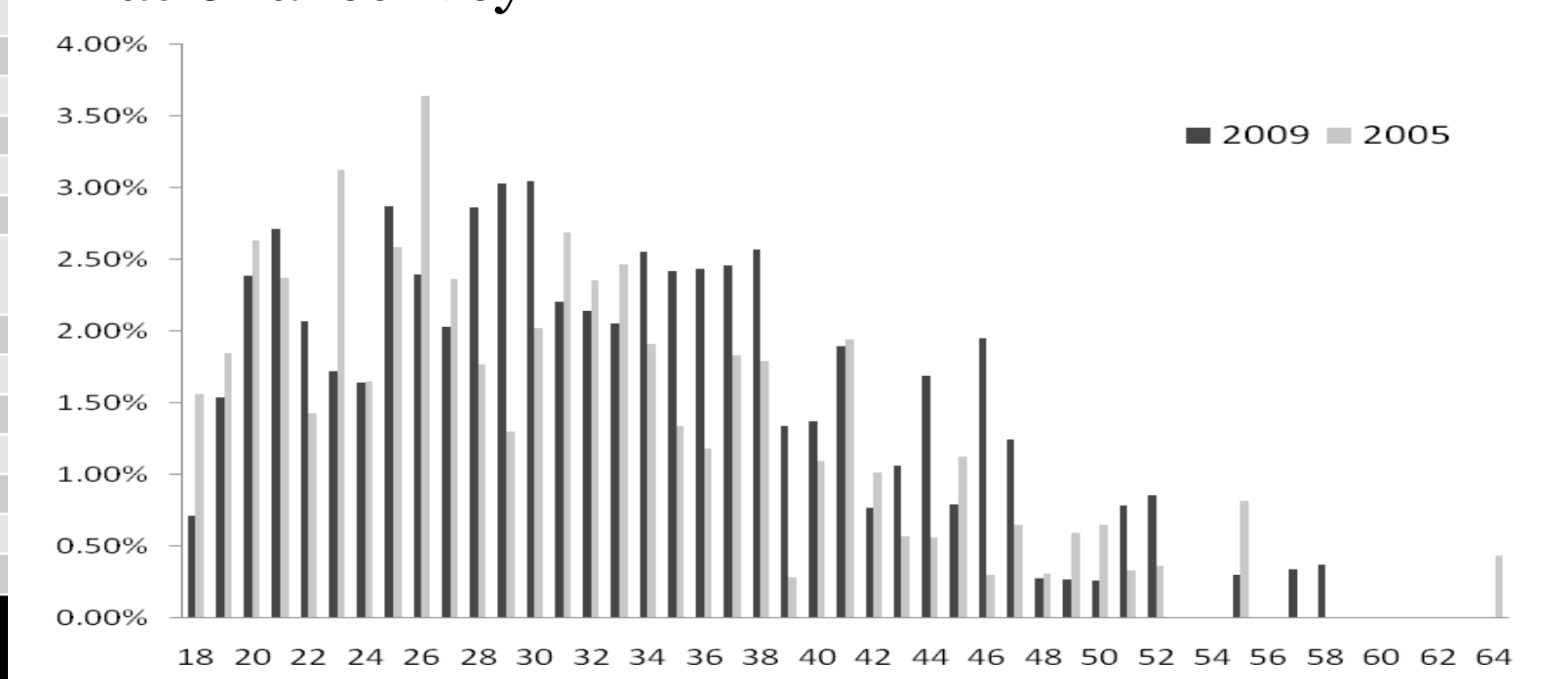
Betel Nuts Gateway pattern

Table 3 The onset age of substance use in 2005 and 2009

| Median age (Q1,Q3)	2005			2009		
	non illicit drug use	illicit drug use	P	non illicit drug use	illicit drug use	P
cigarette	18 (17,21)	16 (15,18)	<0.0001	18 (16,21)	16 (15,18)	<0.0001
alcohol	20 (18,21)	17 (15,18)	<0.0001	19 (17,22)	16 (14,18)	<0.0001
Betel nuts	20 (18,25)	18 (16,20)	<0.0001	20 (18,25)	18 (15,20)	<0.0001

Q1: 25% quantile Q3: 75% quantile

Table 4 The relationship between the onset age of substance use and illicit drug abuse for people aged 18~64 years in Taiwan 2005 and 2009.

Variable	2005		2009	
	Crude OR (95% CI)	*Adjusted OR (95% CI)	Crude OR (95% CI)	**Adjusted OR (95% CI)
Cigarettes	0.84 (0.81, 0.88)	0.88 (0.84, 0.92)	0.85 (0.82, 0.88)	0.87 (0.84, 0.91)
Alcohol	0.86 (0.83, 0.89)	0.88 (0.84, 0.91)	0.86 (0.84, 0.89)	0.88 (0.85, 0.91)
Betel nuts	0.89 (0.86, 0.93)	0.92 (0.88, 0.96)	0.92 (0.9, 0.95)	0.95 (0.92, 0.98)
Sedatives			0.93 (0.91, 0.95)	0.95 (0.92, 0.98)

*Odds ratio adjusted for age, sex, marital status, academic degree and academic degree of parents
**Odds ratio adjusted for age, sex, marital status, academic degree of parents, occupation and income

Figure 2 The onset age of different addictive material usage among Taiwan drug users in 2009 national survey :

(a) Smoke

(b) Alcohol
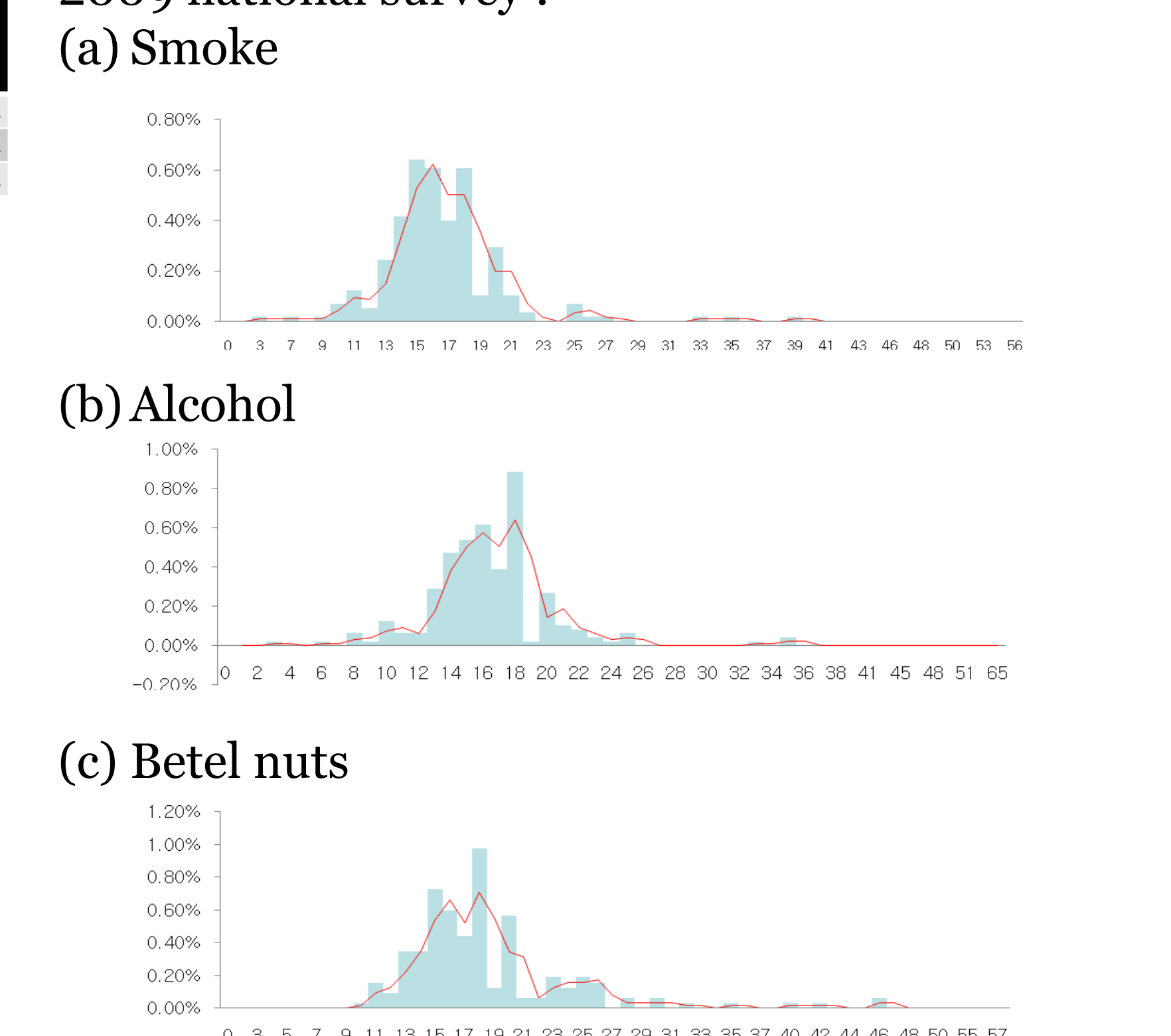
(c) Betel nuts

This study examined the onset age of betel nuts chewing and considered the possible association between betel nuts using and becoming illicit drug use later in adult. Similar with cigarette and alcohol, the onset age of 18 among illicit drug users was younger than non-illicit drug users in the age 20 (p<0.001). Later the teenager use the betel nuts, smaller risk they would develop illicit drug using later in adult (OR 0.92(0.88,0.96) in 2005; 0.95(0.92, 0.98) in 2009). Furthermore, the one year increasing in betel nuts use duration, there was 1.11(1.09, 1.13 ;95%CI) odds becoming illicit drug users later in adult.

Conclusion

For adolescents who become daily betel nuts chewer, **quitting for 18 years old** or **decreasing the chewing duration** should be the aim of betel nuts and other addict substance control and intervention.

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