

Prevalence of Tobacco Smoking, Drinking and Betel Nut Chewing Among Taiwanese Workers in 1999

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Objective. In this study we determined the prevalence of and relevant factors associated with tobacco smoking, alcohol drinking and betel nut chewing among Taiwanese workers in 1999.

Methods. We selected 1726 workers from the databank of Taiwan's Labor Insurance Bureau (7,597,386 workers) by proportional probability and interviewed them with a structured questionnaire.

Results. The prevalence of tobacco smoking, alcohol drinking and betel nut chewing was 47.7%, 31.2% and 10.4% among males, and 5.9%, 3.4% and 1.9% among females, respectively. The results of the multivariate logistic regression analysis showed that the prevalence of smoking was higher among males, youth, mainland Chinese workers, workers with lower levels of education, and workers who reported experiencing both stress and anxiety in the workplace. In general, prevalence rates for drinking and betel nut chewing were similar to those of smoking, although prevalence rates were higher among slightly older workers. Drinking and betel nut chewing prevalence rates were highest among aborigines.

Conclusions. The prevalence of consumption of all three substances was highly inter-correlated. Furthermore, ethnicity, health education and government policies play an important role in affecting the prevalence of these three lifestyle habits. (*Mid Taiwan J Med* 2002;7:146-54)

Key words

betel nut chewing, drinking, prevalence rates, relevant factors, Taiwanese workers, tobacco smoking

INTRODUCTION

It is widely accepted that a lifestyle which includes regular consumption of tobacco, alcohol and betel nut chewing is unhealthy, especially when workers are exposed to other harmful chemicals. In addition, there may be a greater risk of injury due to accidents related to tobacco and alcohol [1-3]. In 1997, the Department of Health (DOH) in Taiwan announced a ban on smoking in designated public areas, but this

did not include the workplace. Because of the lack of adequate safety and health regulations in the workplace, a large number of workers smoke while working. This poses a health risk to individual workers as well as a risk of fire and/or explosions. As such, there is an urgent need to ban smoking in the workplace.

Drinking at the workplace during working hours is banned in most factories and offices in Taiwan and as such, drinking usually takes place after work, which results in absenteeism and loss of productivity. The incidence of cirrhosis and liver cancer is very high in Taiwan which is due, in part, to the high prevalence of hepatitis B antigen among Taiwanese [4]. It has been shown that alcohol

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consumption plays an important role in the development of these diseases [5]. In Taiwan, two million people habitually chew betel nut [6] and approximately 80% of all oral cancer deaths are associated with this habit [7]. Tobacco, alcohol and betel nut consumption have been shown to be harmful to health and present a hazard in the workplace. Because there is no reference data with regard to worker consumption of alcohol, tobacco and betel nut chewing in Taiwan, the authors wish to use the results of the current study to establish a reference for further studies. Therefore, the objective of this study was to determine the prevalence of, and factors influencing tobacco smoking, alcohol drinking and betel nut chewing among Taiwanese workers.

MATERIALS AND METHODS

We selected 1884 workers from the databank of Taiwan's Labor Insurance Bureau using a mixed sampling design (7,597,386 workers in 1999). Occupations were divided into 11 categories, and workers were selected on a proportional probability basis. The number of subjects selected from each company was dependent on the number of workers in each company. Generally, three workers were selected from each company (3 workers = 1 unit), but for companies with large numbers of workers, more than one unit might be selected based on probability sampling. The proportions of the subjects' occupations, ages, genders and geographic locations were very similar to those of each occupation in the general work population. Of the 1884 workers, 1726 (91.6%) were interviewed.

A structured questionnaire was designed to include workers' demographic information, health status, medical services/medicine utilization, quality of life and lifestyle habits. The focus of the current study was on lifestyle habits with a particular emphasis on tobacco, alcohol, and betel nut consumption. Tobacco smoking was defined as one pack or more per month. Alcohol consumption was

defined as consumption of at least one alcoholic beverage (equivalent to 125 mL of normal strength beer) per week. Betel nut chewing was defined as consumption of at least 10 betel nuts per week [8]. The stress level in the workplace was rated on a scale of 1 to 3 which represented no stress, stress but no anxiety, and general stress and anxiety. Prior to the interviews, companies/factories were contacted to arrange time for the workers to be interviewed privately in order to minimize any potential worker stress. Before the study, the questionnaire was pre-tested to check the wording, sequencing and ease of comprehension and was modified accordingly. A content validity test was conducted using five experts, including public health, statistics, environmental health and occupational hygiene. Twenty subjects were used to test the reliability of the questionnaire. Questionnaire items were coded and double keying was used to ensure that the data were reliably recorded.

All data were analyzed by SAS 6.12 software (1992). Prevalence of lifestyle habits according to gender was analyzed by frequency. Factors that affected lifestyle habits were analyzed by multivariate logistic regression. All analyses were based on the maximum valid sample [9].

RESULTS

The prevalence of smoking, drinking and betel nut chewing was higher among males (47.7%, 31.2% and 10.4%, respectively) than females (5.9%, 3.4% and 1.9%, respectively). There was a significant difference between geographic location and prevalence of betel nut and alcohol consumption among males. There was a significant difference between geographic location and smoking among females. The highest prevalence of alcohol consumption (45.8%) and betel nut chewing (18.8%) was in eastern Taiwan among males, and the highest prevalence of smoking (8.8%) among women was in northern Taiwan. The highest prevalence of smoking (51.1%), alcohol

consumption (36.3%) and betel nut chewing (13.8%) was in the 31 to 44 year age group for males. Aboriginal Taiwanese males had the highest prevalence of smoking (66.7%), drinking (86.7%) and betel nut chewing (60.0%), whereas the prevalence for all three lifestyle habits for the 5 aboriginal female subjects was 0%. Prevalence of all three lifestyle habits was highest among males with junior high school level educations and lowest among males with college level educations. Subjects who reported high levels of stress and general anxiety at work had a higher prevalence of all three lifestyle habits, but this was only significant among female workers who consumed alcohol. Prevalence of smoking was highest among skilled labor workers (male = 55.7%, female = 10.8%), and prevalence of betel nut chewing was highest among unskilled/semi-skilled workers (male = 16.7%, female = 3.5%). The prevalence of betel nut consumption was highest among male construction workers (24.1%), and prevalence of smoking was highest among male mine workers (68.2%). The highest prevalence of alcohol consumption was among male public administrators (44.4%), followed by male social service workers (42.2%). For females, construction workers had the highest prevalence of smoking (13.0%), and the highest prevalence of drinking and betel nut chewing was among social service workers (7.5% and 4.5%, respectively) (Table 1).

Because of the high inter-correlation between education and occupation levels, the latter data were excluded from the multivariate analysis. The odds ratio for males was 15.9, 13.7 and 5.6 times higher for smoking, drinking, and betel nut chewing, respectively, than females. There was no difference in prevalence according to location of workers for the three lifestyle habits. The odds ratio for workers below 30 years was five times higher than for workers over 60 years for smoking (OR = 0.2). There was a significantly higher prevalence of drinking among workers aged 31 to 44 years compared to workers below 30 years (OR = 1.7). Prevalence of smoking among

workers descended from mainlanders (post-1949) was significantly higher than workers descended from Fujianese (early immigrants). Prevalence of drinking (OR = 7.8) and betel nut chewing (OR = 5.9) was highest among aboriginal Taiwanese. Prevalence of all three lifestyle habits was significantly lower among workers who had graduated from college or university compared with workers who had a junior high school level (or below) education. Workers who reported feeling both stress and anxiety in the workplace had a higher prevalence of all three lifestyle habits, although only smoking and drinking were significant (OR = 1.7 and OR = 1.5, respectively). There was no significant difference between the eleven kinds of occupations. However, prevalence of smoking was highest among mine/stone workers, and the highest prevalence of drinking and betel nut chewing was found among social service workers (Table 2).

The prevalence of consumption of all three substances was 6.2% for males and 1.0% for females. For workers who only consumed alcohol and tobacco, the prevalence was 15.4% for males and 0.5% for females. For workers who only smoked, the prevalence was 23.1% for males and 3.8% for females, and for workers who only consumed alcohol, prevalence was 8.8% for males and 1.7% for females. For workers who consumed none of the three substances, prevalence was 42.4% for males and 92.2% for females (Figs. A, B).

DISCUSSION

Over the past twenty years, there has been considerable economic development in Taiwan which has led to a variety of socio-economic changes, including lifestyle habits, such as smoking, drinking and betel nut chewing. Recent data have shown that the increase in cardiovascular disease and oral malignancies may be associated with these lifestyle habits [4]. As such, mortality rates related to smoking, drinking and betel nut chewing have all significantly increased [5-7]. In 1993, Wu [10] investigated the health status

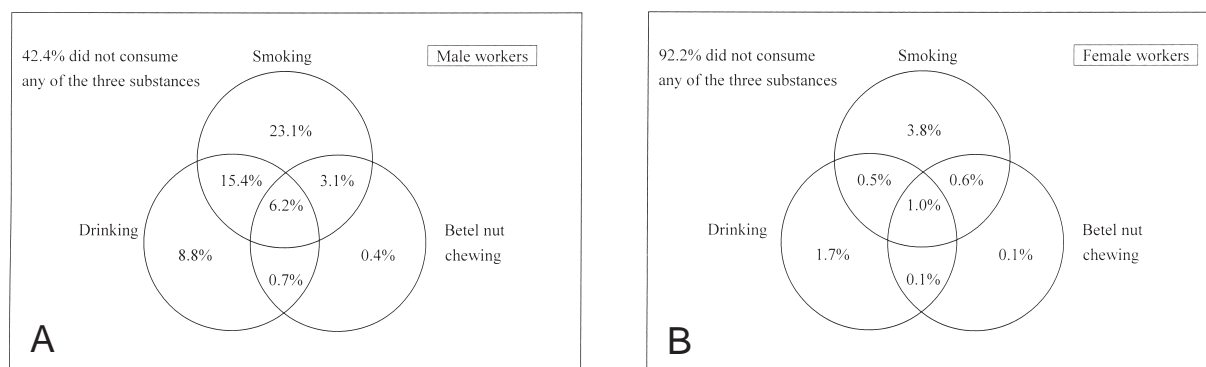


Figure. A: Prevalence rates of smoking, drinking and betel nut chewing among male Taiwanese workers. B: Prevalence rates of smoking, drinking and betel nut chewing among female Taiwanese workers.

of 8446 Taiwanese adults (over 15 years old) and the prevalence of smoking, drinking and betel nut chewing. Prevalence among males was 55.2%, 29.2% and 18.5%, respectively. Prevalence among females was 4.7%, 7.8% and 0.7%, respectively. Wu's results showed that prevalence of all three lifestyle habits was significantly correlated with gender, occupation, ethnicity and education level. The prevalence of daily drinking and daily betel nut chewing was highest among aboriginal Taiwanese (20.0% and 20.6%), a finding consistent with the results of this study. However, our results indicate that the prevalence of smoking among male workers in 1999 (47.7%) was lower than Wu's results for male adults in 1993, but higher for females. An increasing number of women have started working in recent years which may have indirectly influenced the number of female smokers. The prevalence of smoking among males and females varies in different countries [11]. These data were collected from studies conducted at different times. The highest prevalence of smoking among males in 1991 was in Laos (80.0%), followed by China (66.9%) and Hong Kong in 1996 (66.0%). Overall, the prevalence of smoking among males was lower in western countries. Smoking among females was highest in New Zealand in 1996 (26.0%), followed by Australia (25.0%). In western countries, there was no significant difference between males and females regarding the prevalence of smoking, but in

Asian countries males smoked significantly more than females.

In 1987, the Taiwan government eased restrictions on the importation of tobacco and alcohol. The market percentage of imported cigarettes increased from 17.7% in 1987 to 29.1% in 1996. In addition, the total number of cigarettes sold in Taiwan increased from 34,584 million cigarettes to 37,819 million cigarettes in the same period of time. Average alcohol consumption per person per year in Taiwan was 33.14 liters in 1987, and 36.3 liters in 1996 [12]. Wu [10] reported that the prevalence among male adults was 29.2% and 7.8% among female adults in 1993. The results of the current study reveal that the prevalence of drinking was 31.2% among male workers and 3.4% among female workers in 1999. The different prevalence rates reported by previous studies may be due, in part, to methodological considerations. For example, the definition of drinking varied among the studies. Wu [8] defined frequency of alcohol consumption as having 1–3 drinks per month. In the current study, alcohol consumption was defined as consumption of at least 125 mL of normal strength beer (or its equivalent) once a week. Therefore, it is difficult to obtain a meaningful comparison between the studies. Alcohol dependence and/or abuse in Taiwan is low (5% to 9%) [13]. Lifetime prevalence rates of alcohol abuse and/or dependence are 23% for Mexican-Americans in the US, 19% in New Zealand and 18% in Canada [14]. Because of

Table 1. Prevalence rates of smoking, drinking and betel nut chewing among Taiwanese workers based on demographic factors (unit: %, total sample = 1,726)

	Male				Female			
	N	Smoking	Drinking	Betel nut chewing	N	Smoking	Drinking	Betel nut chewing
Gender	859	47.7	31.2	10.4	867	5.9	3.4	1.9
Residential location								
North	450	45.2	26.8	7.8	476	8.8	5.3	3.4
West	152	47.4	33.6	11.2	143	2.1	0.7	0
South	204	51.0	34.8	13.4	190	2.1	1.6	0
East	48	54.2	45.8	18.8	58	3.5	0	0
<i>p</i>		0.427	0.015	0.030		< 0.001	-†	-
Age (years)								
Below 30	197	44.7	22.5	5.6	292	6.5	3.4	2.1
31-44	406	51.1	36.3	13.8	409	5.4	3.4	1.7
45-59	235	45.9	31.0	9.0	149	6.7	3.4	2.0
Above 60	21	28.6	14.3	4.8	17	0	0	0
<i>p</i>		0.112	0.002	0.011		-	-	-
Ethnic group								
Fujian	661	47.1	30.9	10.5	653	5.5	3.5	2.3
Hakka	90	47.2	32.6	5.6	103	2.9	1.0	0
Mainland	79	51.3	23.1	6.3	90	12.2	5.6	1.1
Aboriginal	15	66.7	86.7	60.0	5	0	0	0
Others	13	30.8	15.4	0	14	7.1	0	0
<i>p</i>		0.385	< 0.001	< 0.001		-	-	-
Education level								
Junior high or below	254	58.5	34.8	17.8	250	6.8	3.6	3.2
Senior high	331	49.7	33.9	9.4	342	7.3	5.0	2.1
Above college	274	35.2	24.4	4.7	274	3.3	1.1	0.4
<i>p</i>		< 0.001	0.014	< 0.001	0.083	0.028	0.052	
Stress and anxiety								
none	228	50.0	31.4	10.6	236	5.5	2.1	1.3
Stress only	507	44.9	30.5	9.9	493	5.3	3.3	1.8
Stress & anxiety	116	56.0	33.9	11.2	109	11.0	7.3	3.7
<i>p</i>		0.069	0.773	0.891		0.070	0.045	0.313
Occupational level								
Un/semi-skilled	216	48.1	32.4	16.7	257	9.0	3.9	3.5
Skilled	223	55.7	33.0	12.2	130	10.8	6.2	2.3
Semi-professional	145	42.1	29.7	6.2	226	4.4	3.5	1.8
General adminis.	201	42.3	28.1	5.5	160	1.9	0.6	0.0
Specialist	22	54.6	27.3	9.1	27	3.7	3.7	0.0
<i>p</i>		0.037	0.800	0.002		0.007	0.150	0.141
Occupation categ.								
Agricultural	20	50.0	30.0	15.0	32	6.3	0.0	0.0
Mine, stone	44	68.2	40.9	15.9	31	0.0	0.0	0.0
Manufacture	283	44.0	24.6	7.1	281	4.3	2.5	1.4
Water, electricity	98	44.3	32.7	7.1	21	0.0	4.8	0.0
Construction	58	44.8	31.0	24.1	47	13.0	2.2	4.4
Business	103	46.1	32.4	10.7	124	9.7	4.0	1.6
Traffic, storage	52	61.5	32.7	13.5	17	11.8	0.0	0.0
Finance, insurance	37	37.8	21.6	5.4	53	5.7	3.8	1.9
Service business	39	50.0	34.2	10.3	46	2.2	0.0	0.0
Social service	64	50.0	42.2	10.9	134	8.2	7.5	4.5
Public adminis.	55	53.7	44.4	13.0	70	2.9	4.3	1.4
<i>p</i>		0.095	0.061	0.030		0.086	0.248	0.456

Data based on the largest valid sample, all tests are based on chi-squared tests;†chi-squared test may be invalid due to small counts in cells.

Table 2. Factors that affect prevalence rates of smoking, drinking and betel nut chewing among Taiwanese workers using multivariate logistic regression

	Smoking OR (95% CI)	Drinking OR (95% CI)	Betel nut chewing OR (95% CI)
Gender			
Female	1	1	1
Male	15.9 (11.4-22.2)***	13.7 (9.0-20.7)***	5.6 (3.2-10.0)***
Residential location			
North	1	1	1
West	0.7 (0.5-1.1)	1.1 (0.8-1.7)	0.8 (0.5-1.6)
South	0.9 (0.6-1.2)	1.2 (0.8-1.7)	1.0 (0.6-1.7)
East	0.8 (0.5-1.5)	1.2 (0.7-2.3)	1.1 (0.4-2.7)
Age (years)			
Below 30	1	1	1
31-44	0.9 (0.7-1.3)	1.7 (1.1-2.4)**	1.4 (0.8-2.6)
45-59	0.7 (0.5-1.0)	1.3 (0.8-2.0)	0.7 (0.3-1.5)
Above 60	0.2 (0.1-0.6)**	0.4 (0.1-1.5)	0.2 (0.0-2.0)
Ethnic			
Fujian	1	1	1
Hakka	1.0 (0.7-1.6)	1.0 (0.6-1.6)	0.5 (0.2-1.3)
Mainland	1.8 (1.2-2.7)**	0.8 (0.5-1.3)	0.7 (0.3-1.8)
Aboriginal	1.1 (0.4-3.3)	7.8 (2.4-25.6)***	5.9 (1.9-18.3)**
Others	0.9 (0.3-2.8)	0.6 (0.1-2.6)	0.0 (0-999)
Education level			
Junior high or below	1	1	1
Senior high	0.6 (0.5-0.9)**	1.1 (0.8-1.6)	0.4 (0.3-0.7)**
Above college	0.3 (0.2-0.4)***	0.6 (0.4-0.9)*	0.2 (0.1-0.4)***
Stress and anxiety			
None	1	1	1
Stress only	0.9 (0.7-1.2)	1.1 (0.8-1.6)	1.3 (0.7-2.1)
Both	1.7 (1.1-2.6)*	1.5 (1.0-2.5)*	1.7 (0.8-3.4)
Occupation category			
Agricultural	1	1	1
Mine, stone	1.7 (0.6-4.5)	1.6 (0.5-4.9)	1.2 (0.3-5.6)
Manufacture	0.8 (0.3-1.8)	1.0 (0.4-2.7)	0.6 (0.2-2.3)
Water, electricity	1.0 (0.4-2.5)	1.5 (0.5-4.2)	0.9 (0.2-4.1)
Construction	1.0 (0.8-1.2)	1.0 (0.8-1.3)	1.2 (0.9-1.6)
Business	1.0 (0.9-1.2)	1.1 (0.9-1.3)	1.0 (0.8-1.3)
Traffic, storage	1.5 (0.6-4.0)	1.0 (0.3-3.2)	1.0 (0.2-4.5)
Finance, insurance	0.9 (0.3-2.4)	1.1 (0.3-3.7)	0.9 (0.2-5.3)
Service business	1.1 (0.4-2.9)	1.5 (0.5-4.9)	1.0 (0.2-5.1)
Social service	1.2 (0.5-2.9)	2.7 (1.0-7.6)	1.5 (0.4-5.9)
Public adminis.	0.9 (0.4-2.3)	2.2 (0.8-6.3)	1.2 (0.3-5.0)

Data based on the largest valid sample, all tests are based on Wald's tests. OR = odds ratio; 95% CI = 95% confidence interval. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

changing socio-economic trends in Taiwan, the prevalence of alcohol consumption is increasing. The greater availability of imported brands, the greater social acceptability of social drinking and the ease with which minors are able to purchase alcohol have all contributed to the ever-increasing prevalence of drinking in Taiwan. The estimated prevalence of regular or occasional drinking is

20.6% for adolescents and 38.4% for adults [15,16].

In Taiwan, betel nut chewing is most prevalent among adults. In 1990, the prevalence of chewing betel nut among adults was estimated to be 14.9%, but decreased to 10.9% in 1996 [15,16]. For adolescents, the prevalence was 7.3% in 1995 and 2.3% in 1996 [17]. Chiu [18] reported that for the entire

Taiwan population, the average prevalence of betel nut chewing was 8.8% (1.8 million people) and that betel nut chewing was more popular among males and aboriginal Taiwanese, which is consistent with the current study. In addition, the current study found that betel nut chewing was more prevalent among males, aboriginal groups and workers with a low level of education (below junior high school level). Ko [19] reported that there was a synergistic effect between betel nut chewing and both alcohol and tobacco consumption for oral cancer. Ko [6] reported that 86% of Taiwanese betel nut chewers were smokers and 75% of them drank alcohol. About 10% of adults (over 15 years old) were found to have combined betel nut chewing with either smoking or drinking at least once in their lives. The current study also showed that 89% of both male and female workers who chewed betel nuts also smoked, and that 66% of male and 61% of female betel nut chewers also drank alcohol.

In the current study, 6.2% of males and 1.0% of females smoke, drink and chew betel nut, which is consistent with Wu [8] who reported that 4.4% of Taiwanese consume all three substances. Our results showed that among male smokers, 51.7% drink and/or chew betel nuts (35.6% among female smokers). Among male drinkers, 71.7% smoke and/or chew betel nuts (35.6% among female drinkers). Among male betel nut chewers, 96.2% smoke and/or drink (94.4% among female betel nut chewers). It has been shown that less than half of male workers (42.4%) never smoke, drink or chew betel nut, although 92.1% of female workers never smoke, drink or chew betel nut. The prevalence of these lifestyle habits seem to be increasing due to various factors, such as greater economic independence, and changes in social concepts. In 2001, the National Health Insurance Act earmarked tax of tobacco and alcohol for health insurance expenditures. Lee [13] suggested that earmarked taxes for tobacco, alcohol and betel nut could reduce demand for these substances by 12%, 5% and

5%, and save 5%, 0.6% and 0.2% of health care expenditure, and increase health care revenue by 3%, 4%, and 16%, respectively. It is clear, therefore, that in addition to greater health education, there is an urgent need to increase revenue for health care expenditures by earmarking taxes on these substances.

In conclusion, the prevalence of smoking, drinking and betel nut chewing among male workers in Taiwan in 1999 was 47.7%, 31.2% and 10.4%, and 5.9%, 3.4% and 1.9% among female workers in Taiwan, respectively. There was a high degree of inter-correlation between prevalence of consumption of the three substances. Age, gender, ethnicity, educational level and stress in the workplace affected the prevalence rates of these lifestyle habits among Taiwanese workers. Culture, health education and government policies also play an important role in affecting the trend of smoking, drinking and betel nut chewing.

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台灣地區1999年勞工抽煙、喝酒及嚼檳榔之盛行率調查

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背景 本研究在調查台灣勞工1999年抽煙、喝酒及嚼檳榔之盛行率及其影響之相關因素。

方法 利用勞保局資料庫(共7,597,386名),以等比例機率抽樣方式抽樣,並以結構式問卷訪視,共得1,726名勞工當作研究對象。

結果 台灣勞工抽煙、喝酒及嚼檳榔之盛行率,在男性勞工為47.7%,31.2%及10.4%;在女性勞工為5.9%,3.4%及1.9%。邏輯斯複迴歸分析結果顯示男性,年紀較年輕,外省籍,教育程度較低及工作上較有壓力及困擾者有較高之抽煙盛行率,喝酒及嚼檳榔盛行率影響因素與抽煙類似,然盛行率最高族群為31至44歲這一組,且不同籍貫中以原住民喝酒及嚼檳榔盛行率為最高。

結論 主要影響勞工抽煙、喝酒及嚼檳榔之因素包括性別、年齡、籍貫、教育程度及工作場所之壓力程度等變項,與其居住地區地理分佈及職業別並無明顯之相關性。三種習慣彼此之間有很強的相關性,此外,文化、衛生教育及政府政策對影響抽煙,喝酒及嚼檳榔盛行率之趨勢扮演者很重要的角色。(中台灣醫誌 2002;7:146-54)

關鍵詞

嚼檳榔, 喝酒, 盛行率, 相關因素, 台灣勞工, 抽煙

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