

# Tobacco, Betel Quid, Alcohol, and Illicit Drug Use Among 13- to 35-Year-Olds in I-Lan, Rural Taiwan: Prevalence and Risk Factors

## ABSTRACT

**Objectives.** This study determined the prevalence of and risk factors for substance use among rural Taiwanese.

**Methods.** We used a survey of a representative sample of 6318 participants aged 13 to 35 years in I-Lan, Taiwan, in 1996 through 1997.

**Results.** Perceived use of illicit drugs by peers, tobacco smoking, betel quid chewing, and male gender were the strongest predictors of illicit drug use. The prevalence of illicit drug use ranged from 0.3% among those who did not use any other substance to 7.1% among those using tobacco, betel quid, and alcohol.

**Conclusions.** Preventive measures should address substance use in general rather than aiming at single substances. (*Am J Public Health.* 2001;91:1130–1134)

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The use of tobacco, alcohol, and other drugs by youths is a topic of current concern.<sup>1,2</sup> Substance use, particularly illicit drug use, results in social problems and is linked with injury and mortality.<sup>1,3,4</sup> Traditionally, substance use among youths has been considered an urban and suburban problem. However, it is also a problem in rural areas.<sup>3,5</sup>

The prevalence of tobacco smoking and illicit drug use among young persons may be increasing in Taiwan,<sup>6</sup> Republic of China, and the government of Taiwan aims to reduce substance use.<sup>7,8</sup> Despite a legal age of 18 years or older for tobacco and alcohol use, the prevalence of illicit drug use in 1997 was 2.0% in male and 0.8% in female adolescent students in urban Taiwan.<sup>9</sup> No report of substance use in rural Taiwan has been published. We report the results from a population-based survey of tobacco, betel quid, alcohol, and illicit drug use among 13- to 35-year-old persons in I-Lan County, a rural area of Taiwan.

## Methods

### Subjects

The population of I-Lan County, an underdeveloped area located about 150 km from Taipei Metropolitan City, consists of 113 000 persons aged 13 to 35 years (54% male, 46% female).<sup>10</sup> In I-Lan County, 93.6% of the residents are of Chinese origin and 6.4% are aborigines, and most are fishermen or farmers.

A list of all residents of the county was obtained, and a sample of 8000 persons aged 13 to 35 years was randomly selected for a home interview, which was conducted by trained public health nurses from July 1996 to December 1996. Each participant or the parents of those younger than 16 years signed a written consent form, and the study was approved by the Regional Medicine Ethical Committee. The participants did not receive any payment. Subjects were asked about their age, sex, marital status, education, occupation, and details of use of cigarettes or cigars, betel quids, alcohol, or illicit drugs. A total of 1682 persons who could not be contacted after 3 approaches to the home were excluded

from the analysis. Complete information was obtained for the remaining 6318 persons.

Study respondents who currently smoked 1 or more cigarettes or cigars per day and had smoked 100 or more cigarettes or cigars in their lifetime were classified as tobacco smokers. Respondents who currently chewed 1 or more betel quids per day and had chewed 100 or more betel quids in their lifetime were defined as betel quid chewers. Respondents who answered yes to the question "Have you ever drunk alcohol (a glass of wine or a can of beer) at least once a week for a period of more than 3 months?" were classified as alcohol drinkers.<sup>2</sup> Respondents who answered yes to the question "Have you ever used any illicit drugs in your lifetime?" were classified as illicit drug users.

### Statistical Analysis

We analyzed associations between categorical variables with  $\chi^2$  tests. Statistical trends in dose-response relationships were assessed in models containing ordinal variables.<sup>11</sup> The Mantel-Haenszel test and backward stepwise logistic regression analysis were used to assess risk factors for substance use. All statistically significant variables in the univariate analysis were included in the multivariate analysis. We included levels of education together in the analyses as 4 dichotomous variables; the referent group was grade 13 or higher. The same procedure was used for occupation, with 5 dichotomous variables; the

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**TABLE 1—Prevalence of Tobacco, Betel Quid, Alcohol, and Illicit Drug Use Among Males (n=3188) and Females (n=3130), by Sociodemographic Characteristics: I-Lan, Taiwan, 1996–1997**

	No.	Prevalence, %							
		Tobacco		Betel Quid		Alcohol		Illicit Drug	
		Male	Female	Male	Female	Male	Female	Male	Female
Total	6318	41.4	5.7	15.5	1.3	18.3	3.9	1.3	0.8
Age, y									
13–15	1146	8.8	3.2	3.0	0.4	3.5	2.2	0.7	0.4
16–18	1076	23.2	4.0	6.8	0.4	7.7	1.5	1.5	0.2
19–22	1069	36.9	7.4	12.1	1.3	11.9	3.1	1.5	0.7
23–35	3027	60.8	6.6	23.9	2.0	29.0	5.9	1.5	1.2
Race/ethnicity									
Aboriginal	408	49.5	25.7	35.3	12.8	46.0	31.4	0.0	3.8
Chinese	5910	40.9	4.3	14.2	0.5	16.5	2.0	1.4	0.5
Education, grade <sup>a</sup>									
≤6	220	57.1	17.3	34.2	10.0	41.4	16.0	0.0	1.3
7–9	1133	74.4	11.6	37.3	3.5	35.3	9.6	2.5	1.8
10–12	1505	62.3	5.5	19.1	0.5	25.7	3.5	1.7	0.6
≥13	1026	30.6	1.1	6.7	0.0	14.1	0.8	0.5	1.1
Occupation <sup>a,b</sup>									
Group I	403	50.6	1.4	14.7	0.0	20.1	0.7	1.9	1.4
Group II	1401	58.5	6.3	20.3	0.7	25.5	3.3	1.7	0.9
Group III	724	53.8	9.7	21.7	3.2	27.4	8.1	1.9	1.3
Group IV	1019	67.0	8.1	31.1	3.9	33.2	9.8	1.6	1.8
Group V	337	16.2	1.8	1.8	0.0	6.0	0.6	0.0	0.0
Other substance use									
Tobacco	1501	...	...	33.9	15.1	37.0	36.9	3.1	6.1
Betel quid	535	90.7	65.8	...	...	57.5	63.4	5.9	9.7
Alcohol	706	83.9	53.7	48.7	21.1	...	...	3.9	6.5
Illicit drug	67	95.3	45.8	67.4	16.7	53.5	33.3	...	...
Perceived peer drug use	705	54.7	13.0	23.9	2.7	23.1	6.9	7.5	5.4

<sup>a</sup>Only for 19- to 35-year-old participants.

<sup>b</sup>Occupation: group I = professionals, supervisors, and officers; group II = clerks, salespersons, businesspersons, shopkeepers, and traders; group III = housewives, retired persons, and unemployed persons; group IV = skilled and unskilled workers; group V = students.

referent group was group I (professionals) (see footnote, Table 1). In the analysis of associations between substance use and occupation and educational level, we performed analyses separately for the participants younger than 19 years and those 19 years or older. The models for those younger than 19 years did not include education and occupation. Statistical analyses were conducted with SPSS, 6.1.3 Version (SPSS Inc, Chicago, Ill).

## Results

Among the 6318 (3188 males and 3130 females) participants, 198 males and 210 females were aborigines. The overall response rate was 79%. There were no significant differences in age, sex, or race/ethnicity between those who responded to the survey and those who did not.

### Tobacco Smoking

Of the males, 41.4% (95% confidence interval [CI]=39.8%, 43.2%) were smokers, compared with 5.7% (95% CI=4.9%, 6.5%) of the females ( $P<.001$ ). Seven percent of

those aged 13 to 18 years (95% CI=5.2%, 8.9%), compared with 27.1% (95% CI=24.8%, 29.2%) of the adults ( $\geq 19$  years), were smokers ( $P<.001$ ) (Table 1). The prevalence of smoking increased with age among males ( $P<.001$ ) but among females was highest in the 19- to 22-year-old group. Smoking prevalence was higher among aborigines (37.2%; 95% CI=32.5%, 41.9%) than among persons of Chinese origin (22.8%; 95% CI=21.7%, 23.9%) ( $P<.001$ ). As level of education increased, the prevalence of tobacco smoking decreased ( $P<.001$ ). Students (group V) were less likely and manual workers (group IV) more likely to be smokers than were professionals (group I) ( $P<.001$ ). Among smokers, the mean age for starting smoking was 18 years (range=6–35 years).

In logistic regression models, male sex, betel quid use, alcohol drinking, and perceived illicit drug use by peers were independently and positively associated with smoking in participants younger than 19 and in those 19 years or older. Lower education level ( $<13$  years) and illicit drug use were positively associated and being a student (group V) was negatively associated with smoking in participants aged 19 years or older (Table 2).

### Betel Quid Chewing

The prevalence of betel quid chewing was 15.5% (95% CI=14.2%, 16.8%) among males, compared with 1.3% (95% CI=0.9%, 1.7%) among females, and was 1.3% (95% CI=0.6%, 2.0%) among those aged 13 to 18 years compared with 8.1% (95% CI=6.8%, 9.4%) among adults. The prevalence of betel quid chewing increased with age ( $P<.001$ ), was higher among aborigines (23.8%; 95% CI=19.7%, 27.9%) than among persons of Chinese origin (7.4%; 95% CI=6.7%, 8.1%) ( $P<.001$ ), and was higher among those with lower levels of education than among those with higher levels ( $P<.001$ ). Students (group V) were less likely and manual workers (group IV) more likely to be betel quid chewers than were professionals (group I) ( $P<.001$ ). Among current betel quid chewers, the mean age for starting chewing was 20 years (range=8–35 years).

In logistic regression models, male sex, tobacco use, alcohol use, and illicit drug use were independently and positively associated with betel quid chewing in participants younger than 19 and in those 19 years or older. Aboriginal ethnicity and lower education level ( $<13$  years) were positively associated with betel

**TABLE 2—Factors Associated With Tobacco, Betel Quid, Alcohol, and Illicit Drug Use in Separate Backward Stepwise Logistic Regression Models: I-Lan, Taiwan, 1996–1997 (N = 6318)**

	Tobacco		Betel Quid		Alcohol		Illicit Drug	
	< 19 y OR (95% CI)	≥ 19 y OR (95% CI)	< 19 y OR (95% CI)	≥ 19 y OR (95% CI)	< 19 y OR (95% CI)	≥ 19 y OR (95% CI)	< 19 y OR (95% CI)	≥ 19 y OR (95% CI)
Sex								
Male	4.3 (2.9, 6.3)**	16.1 (12.6, 20.5)**	4.1 (1.5, 11.5)*	6.4 (3.7, 11.0)**	1.3 (0.7, 2.4)	2.1 (1.5, 2.8)**	1.7 (0.3, 8.6)	3.6 (1.7, 7.7)**
Female	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)
Age, 1-y increment	1.5 (1.2, 1.8)**	1.0 (0.9, 1.0)	1.3 (0.8, 1.8)	1.0 (0.9, 1.1)	1.0 (0.8, 1.4)	1.0 (1.0, 1.1)*	1.2 (1.0, 1.5)	1.0 (0.9, 1.1)
Race/ethnicity								
Aborigine	1.1 (0.8, 1.7)	1.1 (0.9, 1.3)	1.3 (0.6, 2.4)	1.7 (1.2, 2.4)**	2.1 (1.1, 3.9)*	2.1 (1.7, 2.7)**	2.6 (1.0, 6.6)	1.4 (0.9, 2.1)
Chinese	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)	1.0 (referent)
Education, grade								
≤ 6								
7–9		3.2 (1.8, 5.7)**		5.6 (2.5, 13.1)**		2.1 (1.3, 3.8)*		2.7 (0.5, 15.8)
10–12		4.1 (2.8, 6.1)**		4.2 (2.3, 7.8)**		1.1 (0.8, 1.6)		1.0 (0.4, 2.5)
≥ 13		2.6 (1.9, 3.6)**		2.0 (1.1, 3.6)*		1.0 (0.7, 1.4)		1.4 (0.5, 3.5)
Occupation <sup>a</sup>		1.0 (referent)		1.0 (referent)		1.0 (referent)		1.0 (referent)
Group V		0.4 (0.2, 0.6)**		0.3 (0.1, 1.1)		0.6 (0.3, 1.3)		0.0
Group IV		1.0 (0.7, 1.4)		1.6 (1.0, 2.5)		1.3 (0.9, 1.9)		1.4 (0.5, 3.9)
Group III		1.0 (0.6, 1.4)		1.3 (0.7, 2.4)		1.5 (0.9, 2.4)		1.5 (0.5, 5.1)
Group II		1.0 (0.8, 1.4)		1.2 (0.8, 2.0)		1.1 (0.7, 1.6)		1.6 (0.6, 4.3)
Group I		1.0 (referent)		1.0 (referent)		1.0 (referent)		1.0 (referent)
Other substance use								
Tobacco (yes vs no)	...	...	25 (9.8, 61)**	7.0 (4.5, 11)**	23.4 (12, 44)**	4.9 (3.8, 6.4)**	18.3 (1.7, 180.2)*	6.4 (2.8, 15.2)**
Betel quid (yes vs no)	18.1 (7.3, 45)**	5.4 (3.5, 7.8)**	...	...	3.8 (1.9, 7.5)**	4.1 (3.2, 5.2)**	7.0 (1.5, 32.9)*	4.0 (2.0, 7.9)**
Alcohol (yes vs no)	20.3 (10.7, 38.8)*	4.7 (3.6, 6.1)**	4.1 (2.0, 8.2)**	4.0 (2.8, 5.6)**	...	...	2.9 (0.7, 11.8)	1.5 (0.7, 3.0)
Illicit drug (yes vs no)	12.1 (1.3, 106.1)*	5.9 (2.4, 15)**	6.1 (1.3, 28.9)*	3.1 (1.5, 6.5)*	2.8 (0.7, 10.7)	1.6 (0.8, 3.3)	...	...
Perceived peer drug use	2.3 (1.4, 3.7)**	1.5 (1.1, 2.0)**	1.9 (0.8, 4.3)	1.4 (1.0, 2.0)	1.1 (0.5, 2.2)	1.1 (0.8, 1.4)	8.2 (2.5, 26.7)**	15.3 (8.2, 29.1)**

Note. OR = odds ratio; CI = confidence interval.

<sup>a</sup>Occupation: group I = professionals, supervisors, and officers; group II = clerks, salespersons, businesspersons, shopkeepers, and traders; group III = housewives, retired persons, and unemployed persons; group IV = skilled and unskilled workers; group V = students.

\**P* < .05; \*\**P* < .001.

quid chewing in participants aged 19 years or older.

### Alcohol Drinking

The prevalence of alcohol drinking was 18.3% (95% CI = 17.0%, 19.6%) among males, compared with 3.9% (95% CI = 3.2%, 4.6%) among females (*P* < .001), and was 1.9% (95% CI = 1.3%, 2.5%) among those aged 13 to 18 years compared with 9.8% (95% CI = 8.8%, 10.8%) among adults (*P* < .001). The prevalence of alcohol drinking increased with age (*P* < .001), was higher among aborigines (38.5%; 95% CI = 33.8%, 43.2%) than among persons of Chinese origin (9.3%; 95% CI = 8.6%, 10.0%) (*P* < .001), and was higher among those with lower levels of education than among those with higher levels (*P* < .001). Students (group V) were less likely and manual workers (group IV) more likely to be alcohol drinkers than were professionals (group I) (*P* < .001). Among alcohol drinkers, the mean age for starting drinking was 19 years (range = 7–35 years).

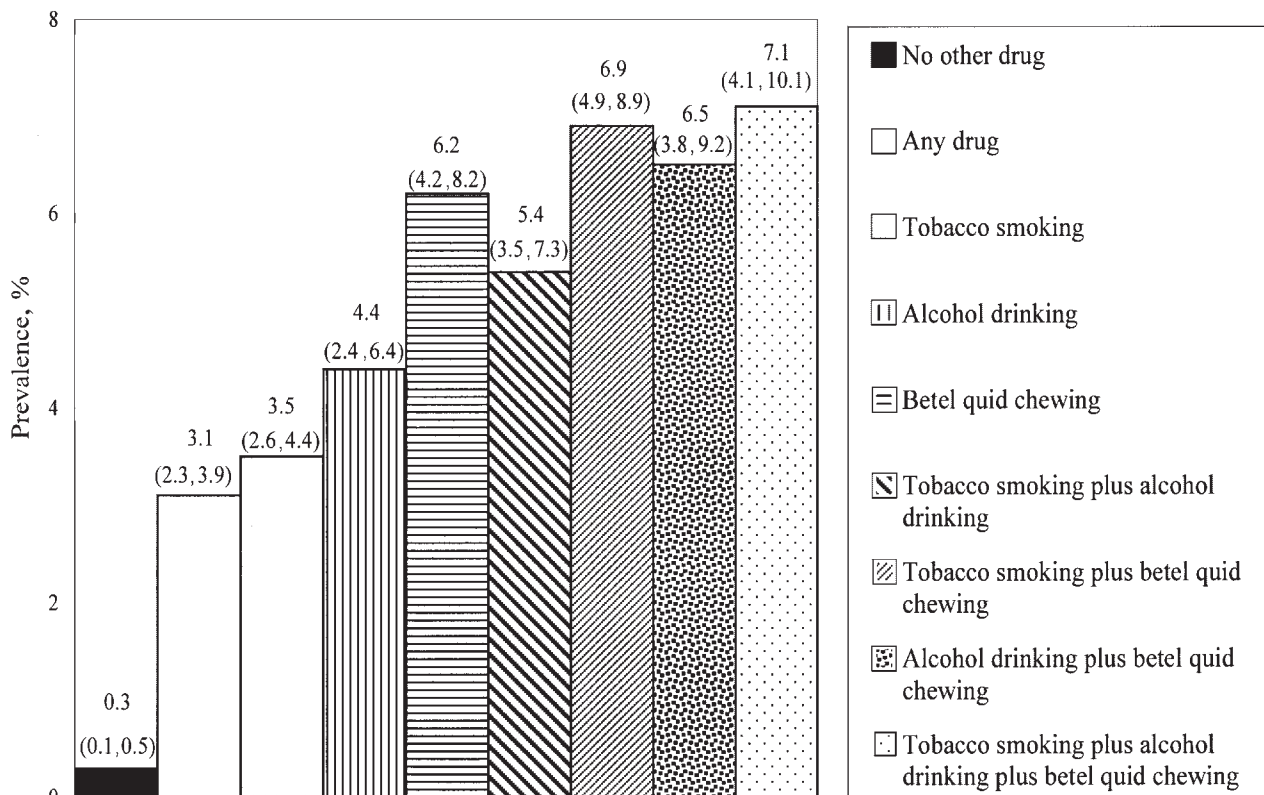
In logistic regression models, aboriginal ethnicity, tobacco use, and betel quid use were independently and positively associated with alcohol drinking in participants younger than 19 and in those aged 19 years or older. Male sex and older age were positively associated with alcohol drinking in participants aged 19 years or older.

### Illicit Drug Use

Males were more likely than females to have used illicit drugs (1.3%; 95% CI = 1.0%, 1.6% vs 0.8%; 95% CI = 0.6%, 1.0%; *P* = .024). Among those aged 13 to 18 years, 0.6% (95% CI = 0.2%, 1.0%) were illicit drug users compared with 1.3% (95% CI = 1.1%, 1.4%) of the adults (*P* = .005). Prevalence of illicit drug use was not significantly associated with race/ethnicity (*P* = .67) and age (*P* = .13). Among illicit drug users, the mean age for initiation was 18 years for males (range = 8–30 years) and 22 years for females (range = 15–32 years).

In logistic regression models, perceived use of illicit drugs by peers, tobacco use, and betel quid use were associated with illicit drug use (*P* < .001) in participants younger than 19 and in those aged 19 years or older. Male sex was positively associated with illicit drug use in participants aged 19 years or older.

The prevalence of illicit drug use ranged from 0.3% among those using no other substance to 7.1% among those using tobacco, betel quid, and alcohol (Figure 1).



Note. Values are percentages (95% confidence interval).

FIGURE 1—Prevalence of illicit drug use according to other substance use among participants aged 13 to 35 years: I-Lan, Taiwan, 1996-1997.

## Discussion

This is the first reported population-based study of the prevalence of and risk factors for substance use among young persons in rural Taiwan. The prevalence rates of tobacco smoking, betel quid chewing, alcohol drinking, and illicit drug use were higher for males than for females. The use of these different substances was found to cluster.

Adolescents (aged 13–18 years) in our study had lower prevalence rates of tobacco smoking (7% vs 13%),<sup>9</sup> alcohol drinking (1.9% vs 2.8%),<sup>9</sup> and illicit drug use (0.6% vs 1.4%)<sup>9</sup> than did adolescents in urban areas of Taiwan. The prevalence of betel quid chewing was similar to that reported for an older population (36.8 ± 13.9 years) in an urban area in southern Taiwan (16% vs 13% for males and 1.3% vs 1.4% for females).<sup>12</sup>

The prevalence of illicit drug use among adolescents in our study (0.6%) was much lower than the prevalence reported in the United Kingdom (5%)<sup>13</sup> and United States (4.8%).<sup>14</sup>

However, the progressive westernization of Taiwan may lead to a secular increase in the prevalence of illicit drug use.

The mean age for initiation of any of the substances was 16 to 18 years,<sup>15,16</sup> a critical period for developing coping behaviors and responses<sup>17,18</sup> and a prime time to actively prevent substance use.<sup>19</sup>

The overall population-attributable fraction of tobacco smoking for illicit drug use was 55%. Bailey<sup>20</sup> found that levels of use of both cigarettes and alcohol were associated with whether subjects later initiated other illicit drug use, with heavier smoking and drinking indicating greater risk of initiation. Thus, preventing tobacco smoking may have a large effect on illicit drug use, as well as on its well-known associated conditions (e.g., cancer, chronic bronchitis).<sup>21</sup>

Betel quid chewing is a popular habit in Asia,<sup>8,22,23</sup> and it is often used on social occasions. Betel quid chewing induces a feeling of well-being; overcomes sensations such as hunger, exhaustion, and irritability<sup>24</sup>; and of-

fers a way of projecting an aura of toughness and strength.<sup>23</sup> We found that illicit drug use was positively associated with betel quid chewing.

Our findings are based on self-reported data involving sensitive questions, which generally have good specificity but poor sensitivity.<sup>25</sup> Our results thus may have underestimated the true prevalence of substance use, despite questionnaire administration by local public health nurses who stressed its anonymity. However, a multitrait-multimethod analysis of independent ratings indicated that self-reported data about sensitive issues (such as drug use) may be valid.<sup>26</sup>

Our study found that tobacco, betel quid, and illicit drug use are important public health problems among young persons in rural Taiwan, especially among those aged 18 to 22 years, aborigines, males, those with lower education levels, and those using another substance.<sup>5,21</sup> Appropriate prevention measures are needed in rural Taiwan to control substance use in general rather than to control use of a single substance. □

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## Contributors

K.-T. Chen planned the study, analyzed the data, and wrote the paper. C.-J. Chen assisted with study design and data analysis. A. Fagot-Campagna and K. M. V. Narayan supervised data analysis and contributed to the writing of the paper.

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## References

1. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. Washington, DC: US Dept of Health and Human Services; 1991. DHHS publication PHS 91-50212.
2. Sutherland I, Willner P. Pattern of alcohol, cigarette and illicit drug use in English adolescents. *Addiction*. 1998;93:1199-1208.
3. Cronk CE, Sarvela PD. Alcohol, tobacco, and other drug use among rural/small town and urban youth: a secondary analysis of the Monitoring the Future data set. *Am J Public Health*. 1997;87:760-764.
4. Frischer M, Goldberg D, Rahman M, Berney L. Mortality and survival among a cohort of drug injectors in Glasgow, 1982-1994. *Addiction*. 1997;92:419-427.
5. Sarvela PD, Pape DJ, Odulana J, Bajracharya SM. Drinking, drug use, and driving among rural midwestern youth. *J Sch Health*. 1990;60:215-219.
6. Yu SK, Jiang DD, Chen KT. Drug abuse in Taiwan—a preliminary investigation. *Epidemiol Bull*. 1996;12:89-96.
7. Dept of Health, Republic of China. Health for the next generation. In: *White Paper for Public Health, R.O.C. Taiwan, Republic of China: Department of Health*; 1997:67-71.
8. Nelson BS, Heischouer B. Betel nut: a common drug used by naturalized citizens from India, Far East Asia, and the South Pacific Islands. *Ann Emerg Med*. 1999;34:238-243.
9. Chou PJ. *The Prevalence and Risk Factors of Drug Abuse by Adolescents*. Taiwan, Republic of China: Dept of Health, Republic of Health; 1987. Publication DOH8601.
10. Lo CH. Pattern of regional development in Taiwan [in Chinese]. *Taiwan Econ*. 1992;190:41-68.
11. Clayton D, Hills M. *Statistical Methods in Epidemiology*. Oxford, England: Oxford University Press; 1993:249-260.
12. Chen JW, Shaw JH. A study on betel quid chewing behavior among Kaohsiung residents aged 15 years and above. *J Oral Pathol Med*. 1996;25:140-143.
13. Bagnall G. Use of alcohol, tobacco and illicit drugs amongst 13-year-olds in three areas of Britain. *Drug Alcohol Depend*. 1988;22:241-251.
14. Vega WA, Zimmerman RS, Warheit GJ, Apospori E, Gil AG. Risk factors for early adolescent drug use in four ethnic and racial groups. *Am J Public Health*. 1993;83:185-189.
15. Raveis VH, Kandel DB. Changes in drug behavior from the middle to the late twenties: initiation, persistence, and cessation of use. *Am J Public Health*. 1987;77:607-611.
16. Chen K, Kandel DB. The natural history of drug use from adolescence to the mid-thirties in a general population sample. *Am J Public Health*. 1995;85:41-47.
17. O'Malley PM, Bachman JG, Johnston LD. Period, age, and cohort effects on substance use among American youth, 1976-82. *Am J Public Health*. 1984;74:682-688.
18. Kandel DB, Logan JA. Patterns of drug use from adolescence to young adulthood, I: periods of risk for initiation, continued use, and discontinuation. *Am J Public Health*. 1984;74:660-666.
19. Bachman JG, O'Malley PM, Johnston LD. Drug use among young adults: the impacts of role status and social environment. *J Pers Soc Psychol*. 1984;47:629-645.
20. Bailey SL. Adolescents' multisubstance use patterns: the role of heavy alcohol and cigarette use. *Am J Public Health*. 1992;82:1220-1224.
21. Liao Y, McGee DL, Cao G, Cooper RS. Alcohol intake and mortality: findings from the National Health Interview Surveys (1988 and 1990). *Am J Epidemiol*. 2000;151:651-659.
22. Awang MN. Betel quid and oral carcinogenesis. *Singapore Med J*. 1988;29:589-593.
23. Yang MS, Su IH, Wen JK, Ko YC. Prevalence and related risk factors of betel quid chewing by adolescent students in southern Taiwan. *J Oral Pathol Med*. 1996;25:69-71.
24. Ko YC, Chiang TA, Chang SJ, Hsieh SF. Prevalence of betel quid chewing habit in Taiwan and related sociodemographic factors. *J Oral Pathol Med*. 1992;21:261-264.
25. Poole WK, Flynn PM, Rao AV, Cooley PC. Estimating prevalence of drug use from self-reports in a cohort for which biologic data are available for a subsample. *Am J Epidemiol*. 1996;144:413-420.
26. Stacy AW, Widaman KF, Hays R, DiMatteo MR. Validity of self-reports of alcohol and other drug use: a multitrait-multimethod assessment. *J Pers Soc Psychol*. 1985;49:219-232.