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Lifestyle Health Behaviors of Hong Kong Chinese: Results of a Cluster Analysis

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Abstract

Sociodemographics affect health through pathways of lifestyle choices. Using data from a survey of 467 Hong Kong Chinese, this study aims to examine the prevalence of their lifestyle behaviors, identify profiles based on their sociodemographic and lifestyle variables, and compare differences among the profile groups. Two-step cluster analysis was used to identify natural profile groups within the data set: only 37% of the participants engaged in regular physical exercises, and less than 50% monitored their dietary intake carefully. The analysis yields 2 clusters, representing a "healthy" and a "less-healthy" lifestyle group. The "less-healthy" group was predominantly male, younger, employed, and had high-to-middle levels of education. The findings reveal the lifestyle behavior patterns and sociodemographic characteristics of a high-risk group, which are essential to provide knowledge for the planning of health promotion activities.

Keywords

cluster analysis, health risks, Hong Kong Chinese, lifestyle health behaviors, sociodemographic factors

Introduction

Individual sociodemographic factors influence health status through pathways of lifestyle choices.[1,2] Poor dietary habits, physical inactivity, cigarette smoking, and excessive alcohol drinking are the major behavioral health risks for morbidity and mortality[3] and have been considered in most comparative studies.[4-6]

Previous studies have shown associations between individual sociodemographic factors and lifestyle behaviors. Lower levels of income and education, male sex, and younger age are associated with a greater likelihood of smoking; similar patterns are found for excessive alcohol drinking and less-regular physical exercise; however, older age is associated with a greater likelihood of excessive drinking, but age differences are not associated with regular physical exercise in Canada.[7] Another study using cluster analysis (n = 2002; age = 50-70 years) from Germany identifies different homogeneous health behavior clusters[8] and shows that more women (60.4%) and middle/upper socioeconomic categories (71%) are clustered in the "no risk behaviors" profile. Men and those with low socioeconomic status are significantly more likely to be smokers

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with risk behaviors; and fruit and vegetable avoiders and drinkers with risk behaviors are significantly more likely to be men. Investigating cluster patterns of health behaviors in the Australian population, French et al[9] found that most women (≥40 years) belonging to high-income groups have safe health behaviors; cigarette smokers are generally young and include an equal proportion of men and women, whereas unsafe drinkers are mostly men (≥40 years), with the greatest proportion in the high-income category. Cornaz et al[11] studied the health risk behaviors of young-old adults (65-70 years) in Switzerland and reported that (1) men are more likely than women to smoke and drink alcohol, (2) those with low incomes tend to be physically inactive, and (3) those with low levels of education have bad diets and high alcohol consumption.

Several studies address the relationships between sociodemographic factors and lifestyle behaviors among Chinese people. Chan et al[10] used cluster analysis to identify 2 health profiles among Hong Kong Chinese (n = 702) and found that there are gender differences in dietary behavior, cigarette smoking/substance use, and participation in physical activities. Men are more likely to have poor dietary habits, smoke, and engage in physical exercise than women. Contrary to other studies,[7-9,11] age and socioeconomic status in terms of income does not differ significantly between profile groups. In a sample (n = 2537) of older Chinese living in New York, Parikh et al[2] provide evidence that (1) younger Chinese adults of both sexes consume less alcohol, (2) older, more highly educated Chinese women are significantly less likely to become smokers, and (3) higher education and better physical health are associated with greater participation in physical activities. However, the study found no gender differences in terms of physical activities, and income was inversely related to physical activity.

A cross-cultural study shows that in China (a developing country), higher socioeconomic status is associated with a less-healthy lifestyle, in contrast to the United States (a developed country), where higher socioeconomic status is associated with a healthier lifestyle.[1] The relationship between socioeconomic status and lifestyles in China is confounded by gender; smoking and alcohol drinking are practiced almost exclusively by men with higher levels of education.[1]

Many aspects of the relationships between sociodemographics and lifestyle behaviors are inconclusive, and our basic knowledge of their effect on Hong Kong Chinese is inadequate. Health policy makers in Hong Kong need to understand how best to encourage, support, and maintain positive health behaviors within a sociodemographically diverse population. Cluster analysis investigates lifestyle health behavior profiles and determines natural structures of sociodemographic factors and lifestyle behaviors within a sample.[12,13] As an exploratory method, it is used to categorize the sample into profile groups and is appropriate when the sample is non-homogeneous.[14,15] This article proposes that data on sociodemographic factors and lifestyle behaviors serve as criterion variables to validate and profile the resulting clusters. The 3 research objectives are as follows:

1. to identify the prevalence of lifestyle health behaviors in a sample of Hong Kong Chinese;
2. to identify profiles of Hong Kong Chinese based on sociodemographic factors and lifestyle behavior variables; and
3. to explore the differences in these variables among the profile groups of Hong Kong Chinese.

Methods

Design, Sample, and Data Collection Procedures

This study involves the secondary analysis of data from a descriptive cross-sectional survey on knowledge, perception, and risk behavior control efficacy for chronic disease prevention and health promotion. Participants were sampled by convenience and snowball methods. Previous

investigators[16] asserted that primordial, primary, and secondary preventive measures are important approaches to disease prevention and health promotion. Therefore, the target population of this study was heterogeneous, including people recruited from the public domain (eg, universities, churches, and neighborhoods) and those with chronic morbidities (eg, coronary diseases, hypertension, and diabetes) recruited from hospital clinical settings. Data were collected through a structured self-reported questionnaire and included statistics on sociodemographics and health behavior items that relate to cigarette smoking, physical activity, dietary habits, and alcohol consumption. Prior approval of the study was granted by the hospital ethics committee and by participating organizations. Written consent was obtained from each participant, who personally completed and returned the questionnaire. Participants were also given the option to complete the questionnaire with a researcher's assistance, in which case each of the questions was read aloud and the participants replied verbally. All completed questionnaires were collected by researchers.

Measures

Sociodemographic Variables. The sociodemographic variables used in this study included age, sex, health status, and socioeconomic status. Health status was assessed by self-reports of lifestyle-related chronic morbidity: coronary heart disease, diabetes, and hypertension. Socioeconomic status was measured by education and employment. Options for educational levels were based on a list of 7 preset responses, ranging from primary education to doctorate. Responses for educational level were categorized as follows: low (less than secondary education), middle (secondary and postsecondary education), and high (university degree or above). Employment status was categorized into (1) employed, including self-employment, and (2) unemployed, including retirees, homemakers, and students.

Lifestyle Behavior Variables. Diet was assessed by whether respondents were careful in monitoring the fat, cholesterol, calorie, and salt content of their daily food intake and by their attitudes toward dietary habits. Their degree of monitoring was rated on a 3-point scale (1 = *carefully monitor*, 2 = *somewhat monitor*, and 3 = *do not monitor*) for fat, cholesterol, calories, and salt content. With respect to attitude toward dietary habits, respondents were asked to choose 1 of 4 statements (as shown in Table 1 under "Attitude about dietary habits") that most closely described their attitude toward the food they eat.

Physical activity was assessed based on responses to: How often do you perform 30-minute exercises that make you perspire? Participants were asked to choose 1 of 8 preset responses: 7 = *at least once a day*, 6 = *a few times a week*, 5 = *at least once a week*, 4 = *a few times a month*, 3 = *at least once a month*, 2 = *a few times a year*, 1 = *at least once a year*, and 0 = *never*. For smoking status, respondents were categorized into *current smokers* = 1 and *noncurrent smokers* = 0. Alcohol consumption was based on responses to: How often do you take alcoholic drinks? Participants chose 1 of 5 preset responses: 4 = *daily/most days* (4-7 days a week), 3 = 1-3 days a week; 2 = 1-3 days a month, and 1 = *less than once a month* (eg, on special occasions, such as Christmas, New Year, and social gatherings), and 0 = *no alcohol at all*.

Data Analysis

Data collected from the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistical analysis was performed. A 2-step cluster analysis was used to identify natural profile groups within the sample data set.[12,13] This method of analysis is appropriate when dealing with mixed continuous and categorical data. Data on sociodemographic factors and lifestyle behaviors served as criteria to validate and profile the resulting clusters. The choice of a similarity measure and the determination of the number of clusters were based on the

Table 1. Sample Sociodemographics and the Prevalence of Lifestyle Health Behaviors.

Characteristics	Percentages (n = 459)
Male	56.6
Female	43.4
Low education level	32.9
Middle education level	53.4
High education level	13.7
Unemployed	56.0
Employed	44.0
Respondent without CHD, DM, HT	38.1
Respondents with 1 disease[a]	29.0
Respondents with 2 diseases[a]	20.9
Respondents with 3 diseases[a]	12.0
Current nonsmokers	90.6
Current smokers	9.4
How often exercise 30 min/d	
Never	23.7
At least once a year	0.4
A few times a year	4.6
At least once a month	3.1
A few times a month	3.5
At least once a week	7.4
A few times a week	20.3
At least once a day	37.0
Monitor fat content carefully	41.4
Monitor fat content somewhat	44.0
Do not monitor fat content	14.6
Monitor cholesterol content carefully	36.6
Monitor cholesterol content somewhat	45.3
Do not monitor cholesterol content	18.1
Monitor calories carefully	27.2
Monitor calories somewhat	47.9
Do not monitor content	24.8
Monitor salt content carefully	33.6
Monitor salt content somewhat	44.9
Do not monitor salt content	21.6
Attitude about dietary habits	
I am very concerned about my diet. I only eat foods that are good for me and always avoid items high in fat and calories	6.8
I am fairly concerned about my diet. I try to eat foods that are good for me whenever possible but indulge myself every once in a while	36.6
I am somewhat concerned about my diet but do not pay as much attention to it as I probably should. I eat healthily when I can, but my food choices tend to be based on taste preferences, rather than health and nutrition considerations	39.7
I am not really concerned about my diet. I eat what I like, regardless of health or nutritional value	17.0
Alcohol consumption frequency	
Do not drink alcohol	78.6
Less than once a month (on special occasions)	8.3
1 To 3 days a month	4.6
1 To 3 days a week	4.8
Daily/Most days (4 to 7 days a week)	3.7

Abbreviations: CHD, coronary heart disease; DM, diabetes mellitus; HT, hypertension.
[a]Any of the 3 diseases, including CHD, DM, and HT.

log-likelihood distance and Akaike's information criterion (AIC), respectively. Differences among the cluster groups were delineated descriptively. The Mann-Whitney *U* test and crosstabs χ^2 were used to compare data between clusters because of categorical and/or ordinal data in most of the outcomes. The independent *t* test was used to compare differences in terms of age, which were continuous variables. A $P < .05$ level of significance was used.

Results

Sample Characteristics and Prevalence of Lifestyle Behaviors

A total of 467 respondents participated in the study; 8 that were missing data on age (n = 4) and employment (n = 4) were deleted, leaving 459 (98%) for data analysis. The mean sample age was 54.8 (standard deviation = 17.3; range = 18-91) years. Most participants had middle educational levels (53.4%). More than half of the sample (56.0%) was unemployed because most of them were retirees (38.6%) and homemakers (11.8%), whereas some of them were students (4.1%) and had no employment status (1.5%). Most were current nonsmokers (90.6%) and non–alcohol drinkers (78.6%). Only 37% engaged in regular daily physical exercises. Less than 50% monitored their dietary content carefully, and many (39.7%) were somewhat concerned about their diet and tended to choose food based on taste, rather than health considerations. Table 1 summarizes the sociodemographic factors and lifestyle health behaviors of the participants.

Cluster Analysis

The 2-step cluster analysis yielded 2 clusters based on AIC (AIC = 9522.5) and highest log-likelihood distance measures (ratio of distance measures = 2.19); 271 participants (59%) formed cluster 1, and 188 participants (41%) formed cluster 2. The clusters are discussed below.

Clusters of Lifestyle Health Behaviors

In Table 2, we compare data on lifestyle health behaviors between the 2 cluster profiles. Compared with cluster 1, cluster 2 was characterized by relatively positive lifestyle health behaviors. Cluster 2 was labeled as the "healthy" group, whereas cluster 1 was labeled as the "less healthy" group. More participants in cluster 1 were cigarette smokers and alcohol drinkers; they were more likely to be classed as physically sedentary and were less likely to exercise daily. Fewer participants in this cluster monitored their food intake, and their food choices tended to be based on taste preferences, regardless of health or nutritional value. Significant differences ($P < .001$) were found between the participants in the 2 clusters across all lifestyle health behaviors (Table 2).

Sociodemographic Characteristics of the Clusters

Table 3 compares the sociodemographic data between clusters. Participants in cluster 1, the "less healthy" group, were predominantly men, with younger mean age and high-to-middle educational levels, and more likely to be employed. Significant differences were found between participants in the 2 clusters across all sociodemographic factors, except for health status ($P = .32$). Despite the insignificant difference in health status between the 2 clusters, participants in cluster 2 appeared healthier than those in cluster 1 in terms of the number of diseases they reported.

Discussion

The results of the study show that sociodemographic factors influence lifestyle behaviors. Among the Hong Kong Chinese surveyed, risky lifestyle behaviors are found in combinations (eg, poor

Table 2. Comparison of Data on Lifestyle Health Behaviors Between Clusters.

Characteristics	Cluster, Count (%)		*P* Value[a]
	1 (n = 271, 59%)	2 (n = 188, 41%)	
Smoking			<.001
Current nonsmokers	233 (86.0)	183 (97.3)	
Current smokers	38 (14.0)	5 (2.7)	
How often exercise 30 min/d			<.001
Never	87 (32.1)	22 (11.7)	
At least once a year	2 (0.7)	0 (0.0)	
A few times a year	17 (6.3)	4 (2.1)	
At least once a month	10 (3.7)	4 (2.1)	
A few times a month	14 (5.2)	2 (1.1)	
At least once a week	15 (5.5)	19 (10.1)	
A few times a week	53 (19.6)	40 (21.3)	
At least once a day	73 (26.9)	97 (51.6)	
Fat monitoring			<.001
Monitor fat content carefully	12 (4.4)	178 (94.7)	
Monitor fat content somewhat	193 (71.2)	9 (4.8)	
Do not monitor fat content	66 (24.4)	1 (0.5)	
Cholesterol monitoring			<.001
Monitor cholesterol content carefully	10 (3.7)	158 (84.0)	
Monitor cholesterol content somewhat	183 (67.5)	25 (13.3)	
Do not monitor cholesterol content	78 (28.8)	5 (2.7)	
Calories monitoring			<.001
Monitor calories carefully	7 (2.6)	118 (62.8)	
Monitor calories somewhat	161 (59.4)	59 (31.4)	
Do not monitor content	103 (38.0)	11 (5.8)	
Salt monitoring			<.001
Monitor salt content carefully	7 (2.6)	147 (78.2)	
Monitor salt content somewhat	170 (62.7)	36 (19.1)	
Do not monitor salt content	94 (34.7)	5 (2.7)	
Attitude about dietary habits:			<.001
I am very concerned about my diet. I only eat foods that are good for me and always avoid items high in fat and calories	0 (0.0)	31 (16.4)	
I am fairly concerned about my diet. I try to eat foods that are good for me whenever possible but indulge myself every once in a while	44 (16.2)	124 (66.0)	
I am somewhat concerned about my diet but do not pay as much attention to it as I probably should. I eat healthily when I can, but my food choices tend to be based on taste preferences, rather than health and nutrition considerations	152 (56.1)	30 (16.0)	
I am not really concerned about my diet. I eat what I like, regardless of health or nutritional value	75 (27.7)	3 (1.6)	
Alcohol consumption frequency:			<.001
Not drink alcohol	194 (71.6)	167 (88.8)	
Less than once a month (on special occasions)	27 (10.0)	11 (5.9)	
1 to 3 days a month	16 (5.9)	5 (2.7)	
1 to 3 days a week	18 (6.6)	4 (2.1)	
Daily/Most days (4 to 7 days a week)	16 (5.9)	1 (0.5)	

[a]Significant at .05.

Table 3. Comparison of Sociodemographic Data Between Clusters.

Characteristics	Cluster Count (%)		*P* Value
	1 (n = 271)	2 (n = 188)	
Mean age ± SD	52.3 ± 17.0	58.4 ± 17.2	<.001[a]
Gender			<.001[a]
Male	177 (65.3)	83 (44.1)	
Female	94 (34.7)	105 (55.9)	
Education			<.001[a]
Low education level	72 (26.6)	79 (42.0)	
Middle education level	154 (56.8)	91 (48.4)	
High education level	45 (16.6)	18 (9.6)	
Employment			.001[a]
Unemployed	132 (48.7)	122 (64.9)	
Employed	139 (51.3)	66 (35.1)	
Health status			.562 (NS)
Respondent without CHD, DM, HT	101 (37.3)	74 (39.4)	
Respondents with 1 disease[b]	74 (27.3)	59 (31.4)	
Respondents with 2 diseases[b]	61 (22.5)	35 (18.6)	
Respondents with 3 diseases[b]	35 (12.9)	20 (10.6)	

Abbreviations: SD, standard deviation; NS, not significant at .05; CHD, coronary heart disease; DM, diabetes mellitus; HT, hypertension.
[a]Significant at .05.
[b]Any of the 3 diseases, including CHD, DM, HT.

dietary habits/attitudes and physical inactivity). This should be taken into careful consideration when developing effective and efficient prevention and intervention measures. More important, multiple risk behaviors should be modified simultaneously.

Cigarette smoking shows a low prevalence rate, which is consistent with previous studies conducted in Hong Kong,[17-19] but deviates from findings in some Western countries.[20,21] In recent decades, public health initiatives have highlighted cigarette hazard awareness, and the dangers of smoking have been emphasized in major health campaigns in Hong Kong. A decreased prevalence rate of cigarette smoking in this Hong Kong sample reflects the successful implementation of a well-developed anti-smoking policy. However, highly focused health promotion campaigns among the Hong Kong Chinese population could still be possible for single risky health behaviors, in isolation from other health behaviors.

In terms of alcohol consumption, previous studies indicate that drinking rates and patterns in Hong Kong tend to be lower than in other areas, including Mainland China and the United Kingdom.[22,23] In Hong Kong, the cultural norms encourage light drinking as beneficial to health, and excessive unsafe drinking is less socially accepted.[22,24,25] Furthermore, several studies report that approximately one-third to one-half of the Chinese people have a protective genetic factor that decelerates the removal of acetaldehyde during alcohol metabolism,[26-28] which makes them susceptible to flushing when drinking alcohol and prevents them from imbibing large amounts because they feel ill.[29] The low prevalence of smoking and unsafe alcohol consumption provides important information on the local setting. More important, mobilization of resources and strategies to promote healthy lifestyles can effectively target the needs of a given population.

Regular exercise and positive dietary habits/attitudes are more likely among women, older age groups, and those with lower socioeconomic status. These are consistent with previous studies showing that women are more likely to engage in healthy lifestyle practices[8,9] and have positive

dietary habits[8,10] but inconsistent with other studies showing that women are more likely to have sedentary lifestyles[10,30] or that no gender differences exist in terms of physical activity.[2] Older women with lower educational status who work as homemakers may have time to engage in regular physical activities and to pay attention to dietary issues for themselves and for their family members. Therefore, when planning health promotion programs, resources should be mobilized to encourage female homemakers to promote healthy diets to their family members. In addition, encouraging leisure time physical activities and providing knowledge on healthy food choices to the male working class would also be highly recommended for the Hong Kong setting.

The results of the cluster analysis also highlight concerns over the suboptimal physical activities and dietary habits/attitudes prevalent among men with higher socioeconomic status. Cultural, social, and historical expectations as well as economic changes in China affect the relationship between socioeconomic status and lifestyle behaviors[1,31] because men are in an advantageous position to attain higher educational levels, and the culture encourages smoking and drinking among men. Westernization has popularized sedentary lifestyles and has introduced costly processed foods that are commonly high in fat, cholesterol, salt, and refined sugar. Affected by economic changes and exposed to the Western lifestyle that is usually viewed as a privilege of the elite, men of higher socioeconomic status readily adopt these unhealthy lifestyles. In addition, lifestyle health risks among Asian/developing countries have been reported to be related to gender, cultural, and economic development of the populations,[1,30-32] suggesting that there are variations and differences in lifestyle risks between Asian/developing countries and Western developed countries.[1] For instance, a lifestyle health problem such as obesity/overweight was associated with gender and socioeconomic status in developing countries, in which men[32] and/or those with higher socioeconomic status[30] had an increased prevalence of obesity/overweight. Therefore, the aforementioned changes involving economic development, Westernization, and people's adoption of unhealthy lifestyles in developing countries may have led to the present status in Hong Kong, a Special Administrative Region of China. If this is the case, educating the Hong Kong public on how to adopt healthy lifestyles and develop more intense public health programs is essential, especially because more than half of the participants (59%) belonged to the "less-healthy" group—that is, they engage in less physical activity, have poor dietary monitoring habits, and report having suffered from more illnesses with significant effects on health status and increased levels of morbidity compared with the "healthy" lifestyle group.

Limitations of the Study

Data were collected from self-reports; hence, the possibility of over- and under-reporting biases of desirable and less-acceptable behaviors, respectively, should be considered. The study might have inadvertently excluded some groups of respondents, and the limitations of convenience and snowball sampling should be noted. Cross-sectional studies also lack causal inference; hence, longitudinal studies are recommended to help strengthen policy initiatives on the promotion of healthy lifestyle behaviors.

Conclusion

Profiles related to individual sociodemographic factors and lifestyle behaviors vary. Health policy makers in Hong Kong and any other region need clear information on lifestyle health patterns in relation to a sociodemographically diverse and emergent population to understand how best to encourage, support, and maintain positive lifestyle health behaviors among the populace. Using cluster analysis, this study examines natural data and highlights the lifestyle behavior patterns of Hong Kong Chinese in a recent local setting, providing useful knowledge for the promotion of a

healthy lifestyle. Hong Kong men of high socioeconomic status are more likely to exhibit a combination of risky lifestyle behaviors such as physical inactivity and poor dietary habits. The findings have potential implications for health education and health planning strategies to modify the multiple risk behaviors exhibited by the population.

Declaration of Conflicting Interests

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References

1. Kim S, Symons M, Popkin BM. Contrasting socioeconomic profiles related to healthier lifestyles in China and the United States. *Am J Epidemiol*. 2004;159:184-191.
2. Parikh NS, Fahs MC, Shelley D, Yerneni R. Health behaviors of older Chinese adults living in New York city. *J Community Health*. 2009;34:6-15.
3. Lopez AD, Mathers CD, Ezzati M, et al. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet*. 2006;367:1747-1757.
4. Chiolero A, Wietlisbach V, Ruffieux C, et al. Clustering of risk behaviors with cigarette consumption: a population-based survey. *Prev Med*. 2006;42:348-353.
5. Ma J, Betts NM, Hampl JS. Clustering of lifestyle behaviors: the relationship between cigarette smoking, alcohol consumption, and dietary intake. *Am J Health Promot*. 2000;15:107-117.
6. Poortinga W. The prevalence and clustering of four major lifestyle risk factors in an English adult population. *Prev Med*. 2007;44:124-128.
7. Qi V, Phillips SP, Hopman WM. Determinants of a healthy lifestyle and use of preventive screening in Canada. *BMC Public Health*. 2006;6:275-282.
8. Schneider S, Huy C, Schuessler M, Diehl K, Schwarz S. Optimising lifestyle interventions: identification of health behaviour patterns by cluster analysis in a German 50+ survey. *Eur J Public Health*. 2009;19:271-277.
9. French S, Rosenberg M, Knuiman M. The clustering of health risk behaviours in a Western Australian adult population. *Health Promot J Austr*. 2008;19:203-209.
10. Chan MF, Mok E, Wong TKS, Lee RLT, Fok MSM. Investigating the health profiles of Hong Kong Chinese: results of a cluster analysis. *J Clin Nurs*. 2008;17:911-920.
11. Cornaz S, Taffe P, Santos-Eggimann B. Life-course socioeconomic environment and health risk behaviours: a multilevel small-area analysis of young-old persons in an urban neighbourhood in Lausanne, Switzerland. *Health Place*. 2009;15:273-283.
12. Blashfield RK. Propositions regarding the use of cluster analysis in clinical research. *J Consult Clin Psychol*. 1980;48:456-459.
13. Hair JF, Anderson RE, Tatham RL, Black WL. *Multivariate Analysis With Readings*. New York, NY: MacMillan; 1992.
14. Chan MF, Day MC, Suen LKP, Tse SHM, Tong TF. Attitudes and skills of Hong Kong Chinese medicine practitioners towards computerization in practice: a cluster analysis. *Med Inform Internet Med*. 2005;30:55-68.
15. Chan MF, Chung LYM, Lee ASC, et al. Investigating spiritual care perceptions and practice patterns in Hong Kong nurses: results of a cluster analysis. *Nurse Educ Today*. 2006;26:139-150.
16. Benjamin EJ, Smith SC, Cooper RS, Hill MN, Luepker RV. Task force #1: magnitude of the prevention problem: opportunities and challenges. *J Am Coll Cardiol*. 2002;40:588-603.
17. Abdullah ASM, Fielding R, Hedley AJ. Patterns of cigarette smoking, alcohol use and other substance use among Chinese university students in Hong Kong. *Am J Addict*. 2002;11:235-246.
18. Chou KL. The prevalence and clustering of four major lifestyle risk factors in Hong Kong Chinese older adults. *J Aging Health*. 2008;20:788-803.

19. Lau EMC, Lee P, Lynn H, Sham A, Woo J. The epidemiology of cigarette smoking in Hong Kong Chinese women. *Prev Med*. 2003;37:383-388.
20. Centers for Disease Control and Prevention. Cigarette smoking among adults: United States. *MMWR*. 1995;46:1217-1220.
21. Smith DR, Leggat PA. Tobacco smoking by occupation in Australia: results from the 2004 to 2005 National Health Survey. *J Occup Environ Med*. 2007;49:437-445.
22. Griffiths S, Lau JTF, Chow JKW, Lee SS, Kan PYM, Lee S. Alcohol use among entrants to a Hong Kong University. *Alcohol Alcohol*. 2006;41:560-565.
23. Janghorbani M, Ho SY, Lam TH, Janus ED. Prevalence and correlates of alcohol use: a population-based study in Hong Kong. *Addiction*. 2003;98:215-224.
24. Trinidad DR, Chou CP, Unger JB, Anderson JC, Li Y. Family harmony as a protective factor against adolescent tobacco and alcohol use in Wuhan, China. *Subst Use Misuse*. 2003;38:1159-1171.
25. Wei H, Derson Y, Xiao S, Li L, Zhang Y. Alcohol consumption and alcohol-related problems: Chinese experience from six area samples. *Addiction*. 1999;94:1467-1476.
26. Chen CC, Lu RB, Chen YC, et al. Interaction between the functional polymorphisms of the alcohol-metabolism genes in protection against alcoholism. *Am J Hum Genet*. 1999;65:795-807.
27. Goedde HW, Agarwal DP, Fritz G, et al. Distribution of ADH2 and ALDH2 genotypes in different populations. *Hum Genet*. 1992;88:344-346.
28. Luezak SE, Wall TL, Cook TAR, Shea SH, Carr LG. ALDH2 status and conduct disorder mediate the relationship between ethnicity and alcohol dependence in Chinese, Korean, and White American college students. *J Abnorm Psychol*. 2004;113:271-278.
29. Wall TL, Ehlers CL. Genetic influences affecting alcohol use among Asians. *Alcohol Res Health*. 1995;19:184-190.
30. Razzaque A, Nahar L, Mustafa AHMG, Ahsan KZ, Islam MS, Yunus M. Sociodemographic differentials of selected noncommunicable diseases risk factors among adults in Matlab, Bangladesh: findings from a WHO STEPS survey. *Asia Pac J Public Health*. 2011;23:183-191.
31. Mao Z, Wu B. Urban-rural, age and gender differences in health behaviours in the Chinese population: findings from a survey in Hubei, China. *Public Health*. 2007;121:761-764.
32. Sabanayagam C, Shankar A, Saw SM, Tai ES, Wong TY. The association between socioeconomic status and overweight/obesity in a Malay population in Singapore. *Asia Pac J Public Health*. 2009;21:487-496.