The development of a lifestyle instrument for measuring health-related behaviours of Chinese in Hong Kong.

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Abstract This study focuses on development of a lifestyle instrument as an assessment tool designed to measure health-related behaviours of Chinese in Hong Kong. The instrument which consisted of 66 items was developed from the responses of 450 subjects obtained from two major hospitals, a University health clinic, three community centres and interviews conducted in parks. The psychometric properties of the instrument were evaluated by validity assessment, reliability measures and factor analysis. The content validity was judged adequate by a panel of five international and local experts. The test-retest reliability of the subscales were satisfactory (r=0.68-0.99) while factor analysis produced 17 factors which explained 61.9% of the variance. These factors were classified under the domains of dietary habit, leisure activity, smoking, drug use, alcohol consumption, health awareness, health maintenance, ritual and belief, and readiness for lifestyle change. Five subscales achieved a high internal consistency reliability (Cronbach alpha = 0.77-0.98), but it was low in three subscales (Cronbach alpha = 0.38-0.48) and moderate in the rest of the subscales (Cronbach alpha = 0.5-0.67). Continuous refinement, reliability testing and validation of the instrument are necessary in the future, yet the instrument shows promise as a tool for increasing understanding of lifestyle and health-related behaviours in Hong Kong and for use by health care professionals to facilitate comprehensive assessment and health education.

INTRODUCTION

Over past decades, there has been a strong reliance on medical advance and technologies for providing cure of diseases. The curative approach, however, is not the best way to improve people's health. Disease prevention and health promotion have emerged as global priorities with the potential to foster high-level health previously overlooked by curative interventions (Pender, 1990). To align with the health promotion movement, a growing interest has centred around individual health-related behaviour. This arises from the recognition and research that certain unhealthy behaviours, such as, excessive drinking and smoking, overeating, physical inactivity and drug abuse have profound adverse effects on human health, and substantial impact on the use of hospital services (Breslow, 1996; WHO Health Education Unit, 1986; Haapanen-Niemi *et al.*, 1999). Poor health practices have been shown to contribute to different health problems including cardiovascular disorders, various types of cancers, adult-onset diabetes, cirrhosis of the liver, arthritis and psychological disorders (Wynder, 1996; WHO Health Education Unit, 1986; Jonston, 1999). Therefore, individuals can shoulder a major responsibility in reducing their personal risk factors by engaging in positive lifestyle behaviours and exercising positive lifestyle changes.

A lifestyle assessment tool can provide people with the knowledge of their lifestyle pattern and aid in the early detection of people's unfavourable health practices. Similarly such a tool can be used by health care professionals to facilitate

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comprehensive assessment and health education. Developing an appropriate lifestyle instrument that is valid and reliable can be a very useful adjunct to identifying high risk behaviours and facilitating early interventions. This paper describes the development and psychometric analysis of a lifestyle instrument designed for measuring health-related behaviours in Hong Kong in the Chinese language.

BACKGROUND

Lifestyle has been a key factor influencing people's health. The longevity and general good health in Hong Kong have been contributed to by a healthy lifestyle that is inherited from traditional Chinese culture (Wan, 1995). A review of the recent literature, however, highlighted unfavourable changes in people's lifestyle pattern. Problem drinking, drug abuse and cigarette smoking are rising among young people (Green, 1991; Fraser, 1993; Hong Kong Narcotics Report, 1995 & 2002; Concepcion, 1996; Luk, 1993). With Hong Kong's increased westernization, many people are turning away from the traditional 'healthy' Asian diet (rice-based regimen strong on vegetables and low on meat) to the 'less healthy' western-style high fat, high protein and low fibre diet (Jones, 1994). Lack of exercise or physical activity and the existence of high stress levels further compromise the present lifestyle problems (Chow, 1995; Lo, 1994; Wisniewski, 1994). The lifestyle changes in the Chinese have contributed to a rising prevalence of diabetes and cardiovascular diseases which give particular cause for concern (Woo *et al.*, 1999; Cockram, 2000).

In medical research, lifestyle is used to identify individual characteristics, habits and attitudes that increase the risk of individual to diseases. In health promotion research and literature, lifestyle concept is linked with individual health behaviours (Anderson, 1984; Green & Kreuter, 1991; Grol *et al.*, 1997). Common health-related behaviours can include smoking, alcohol consumption, drug use, eating habits, exercise, stress management and physical checks. These are the major constructs used in studying people's lifestyle behaviour. Despite the fact that an unhealthy lifestyle is becoming increasingly adopted by a growing number of people in Hong Kong, many are unaware of their problem. The provision of a valid and reliable instrument can effectively and efficiently assess people's health-related traits, characteristics and behaviours and help improve their knowledge of unfavourable lifestyle patterns (Mahoney *et al.*, 1995). A review conducted from 1966 to 2001 failed to reveal such an instrument in Hong Kong. The most recent studies in Hong Kong have been reported using overseas instruments developed to study people's health-related behaviours (Twinn and Kan, 1994; Day *et al.*, 1996; Callaghan, 1997). These instruments, however, were not tested rigorously for reliability and validity in the local language. There are other internationally well-known instruments, such as, the "Health Risk Appraisal" instruments and the " Health-promoting Lifestyle Profile" (Meeker, 1988; Walker *et al.*, 1987) and some comprehensive lifestyle instruments have been developed recently for national or cross-national studies (Cox *et al.*, 1993; Dengler *et al.*, 1994; Wold & Aaro, 1994). These instruments were all developed in English and did not demonstrate strong evidence for their psychometric properties.

For the above reasons, it was decided to develop a valid, reliable and culturally sensitive instrument for use in Hong Kong, to help in the study of lifestyle in this unique city.

AIMS AND OBJECTIVES

The aim of this study is to develop a lifestyle instrument in Chinese congruent with Hong Kong lifestyle and to test the applicability of this instrument with selected community and hospital samples. Further, such an instrument should enhance health care professional practice and offer uses for the population of Hong Kong to assess lifestyle and health-related behaviours.

The objectives of this study are to:

a) Develop a multidimensional lifestyle instrument in Chinese, for use in Hong Kong, which covers the areas of dietary habit, alcohol consumption, cigarette smoking, drug use, stress management, physical activity and health responsibility.

b) Test the reliability and validity of the instrument, and collect some preliminary data on health-related behaviour of the population in Hong Kong.

METHOD

Construction of the instrument

The lifestyle instrument was developed through a series of steps including planning, constructing, validating and reliability testing (Benson & Clark, 1982). Items were constructed based on an extensive literature search, review of overseas instruments, experts' opinion and three focus group interviews. The first focus group consisted of participants from an elderly centre (n=7, aged over 65) and the other two groups were from a youth community centre (n=13, aged 19-25). Each focus group interview lasted for about an hour. The participants were invited to talk about their understanding of lifestyle and to explain their own lifestyle. All interviews were tape recorded with the prior consent obtained from the participants. After each session, the tape recording was reviewed to identify important information essential for the construction of the items. At the end of the review process and focus group interviews, a preliminary version of the lifestyle instrument was formulated.

The lifestyle instrument was initially developed in English then translated into Chinese. A back translation was undertaken by a professional translator from Chinese to English, and no obvious difference was found helping to confirm the face validity and equivalence of the two versions. The Chinese version of the lifestyle instrument was pretested on 15 subjects in a youth community centre including housewives (n=6), secondary school students (n=4) and working adults (n=5). The English version of the instrument was administered to a small convenience sample (n=3) of English speaking people. The pretest helped to check the clarity and relevancy of the items, the adequacy of response options, the readability of the instrument and the time spent for completion of the instrument. As a result of the pretest, some items were reworded and some response options were changed.

Description of the instrument

The whole instrument consisted of 17 demographic questions (17 items) relating to demographical information, 15 questions (34 items) about dietary habit, 4 questions (4 items) concerning physical activity, 4 questions (6 items) about smoking, 10 questions (10 items) relating to stress management, 13 questions (20 items) about alcohol consumption, 7 questions (19 items) asking about drug use, 8 questions (8 items) relating to health responsibility, and 3 general questions (3 items). The general questions are mainly concerned about an individual's need for lifestyle change, difficulty with the change and perceived support in making the change successful. There were a total of 64 lifestyle questions (104 items). Ninety two items were constructed. Two items were taken from the "Health Promoting Lifestyle Profile" to examine people's stress management and health responsibility. Another 10 items were adopted from the Alcohol Use Disorder Identification Test (AUDIT) Core Questionnaire in assessing the dimension of alcohol consumption. The AUDIT is a well validated and reliable instrument, which was devised by World Health Organisation in early 1980s as a brief screening method to measure alcohol consumption, dependence symptoms and alcohol-associated harm (Bohn *et al.*, 1995). It was incorporated into the present lifestyle instrument to give it the strength to provide effective assessment for people with harmful or hazardous drinking.

Sample

The number of subjects required in the study was calculated by the number of items entered into the factor analytic procedure. As a general rule of thumb, 5-10 subjects are necessary for each variable in factor analysis (Floyd & Widaman, 1995; Hair *et al.*, 1995; Coakes & Steed, 1996; Stevens, 1996). Of the total 104 items, 83 items were included in the factor analysis. Twenty one items were excluded because certain lifestyle behaviours described by the items were not common among the respondents, for example, use of cigars, pipes and illicit drugs. These items were not considered important to the whole instrument. To reduce the item pool, it was decided to exclude these items in the factor analytic procedure.

A total of 450 subjects were targeted for the study. Due to time limitations and human resources, a convenience sample was used. All 450 subjects were selected from 2 major acute hospitals, a University health centre, 3 community centres and subjects interviewed in parks. The hospital sample involved patients from different units but excluding those from ICU, Accident and Emergency Department, Maternal and the Paediatric units. This was to minimise

disturbance caused to the nursing staff and the more ill patients. Since a large proportion of patients in the local hospitals were elderly and illiterate, interviews were conducted for clients who were not able to complete the self-administered instrument.

Reliability

Internal consistency was estimated by using Cronbach's alpha coefficient with the whole data set of 450 subjects, to determine correlation coefficients of all items within the instrument, and item with item total correlation. Since the lifestyle instrument was designed to measure several health-related dimensions, alpha was determined for each dimension or subset of homogenous items (Waltz *et al.*, 1991).

As well as the usual ethical considerations, all subjects involved in the study received a healthy lifestyle pamphlet developed specifically for the project in Chinese and English aimed at healthy eating, safe alcohol consumption, smoking, drug use, health responsibility, physical activity, and stress management. Sources of help were also provided which could be useful for individuals considering lifestyle change or desiring counselling or consultation.

RESULTS

Demographic findings

The 450 subjects consisted of 203 patients from two acute hospitals, 117 attendants in a University health clinic, and 110 respondents from three community centres and 20 subjects interviewed in parks. The self-administered lifestyle instrument was completed by 173 respondents whereas 277 were interviewed. There were 224 female and 226 male. The respondents' age ranged from 10 years old to 87 years old with a mean age of 38. Over 99% of the respondents were Chinese and 69% ethnically Cantonese.

Content validity

Two consecutive reviews were conducted on the content validity of the initial instrument by involving five international and local experts who were well-known for their expertise in health-related areas, lifestyle assessment and human behaviours. The instrument achieved an acceptable content validity index (CVI) of 0.93.

Test-retest reliability

Of the 20 subjects involved in the test-retest procedure at a 2-week interval, a significant correlation was identified between the scores obtained during the initial test and retest in all seven hypothetical dimensions. The reliability coefficients were generally high and increased from the dimension of physical activity (r=0.68) to stress management (r=0.81), drug use (r=0.86), dietary habit (r=0.88), health responsibility (r=0.91), smoking (r=0.99) and alcohol consumption (r=0.99).

Factor analysis

Construct validity is regarded as the extent to which an instrument measures a hypothetical construct or concept it is assumed to measure (Dunn, 1989; Portney *et al.*, 1993). In the proposed instrument, lifestyle was conceptualised as containing seven attributes or dimensions: dietary habit, alcohol consumption, cigarette smoking, drug use, stress management, physical activity and health responsibility based on the literature review. Factor analysis as a construct validity technique, was used in this study to offer support for the hypothesised multidimensional constructs which comprise the instrument. Maximum likelihood factor analysis with varimax rotation was performed. A total of 17 factors were extracted with eigenvalues over 1.0 and these factors explain 61.9% of the variance. The Kaiser-Mayer-Olkin measure of sampling adequacy was 0.85504 and the Bartlett Test of Sphericity was significant ($p < .0001$) in the analysis which showed that the data was suitable for factor analysis (Coakes *et al.*, 1996).

The original lifestyle instrument was constructed with items in seven different dimensions. Following the factor analytic procedure, support was found for the initial intended sub-scale structure of the instrument, and based on loadings greater than 0.3 more latent factors were identified and named (Table 1). As a rule of thumb, factor loadings greater than 0.3 are considered significant (Hair *et al.*, 1995). Items with factor loadings below 0.3 were removed from individual factor (Table 2).

Table 1: Identified factors, loadings and internal consistency measures

	Name	No. of items	Range of factor loadings	Cronbach's alpha coeficient
Factor 1	Alcohol consumption	18	0.69-0.94	0.98
Factor 2	Drug use	5	0.80-0.96	0.96
Factor 3	Consumption of fast food	4	0.38-0.83	0.77
Factor 4	Readiness for lifestyle change	3	0.51-0.89	0.78
Factor 5	Smoking and stress	3	0.72-0.87	0.85
Factor 6	Health awareness	7	0.30-0.62	0.67
Factor 7	Consumption of snacks	4	0.34-0.73	0.66
Factor 8	Health maintenance	4	0.36-0.60	0.53
Factor 9	Consumption of energising foods	3	0.32-0.58	0.38
Factor 10	Consumption of fruit and vegetables	2	0.53-0.61	0.59
Factor 11	Dinning and tea drinking behavior	3	0.34-0.73	0.48
Factor 12	Leisure activity	2	0.62-0.69	0.59
Factor 13	Consumption of carcinogenic food	3	0.33-0.62	0.50
Factor 14	Rituals and beleifs	2	0.39-0.52	0.48

Factor 1 'alcohol consumption' contained all 18 items relating to alcohol consumption with loadings between 0.69 to 0.94. Factor 2, 'drug use' contained five items with loadings between 0.8 to 0.96. The items relating to diet formed 10 factors in the instrument and were able to be defined as distinct dimensions in factors 3,4,6,7,9,10,11,13,16 and 17 (Table 2). Factor 3 was named the "consumption of fast food" which consisted of 4 items concerning the intake of pizzas, French fries, hamburgers or hot dogs and soft drink. The loading values of these items were between 0.38 to 0.83. Five items loaded on factor 4 and this was named "readiness for lifestyle change". Three items were selected with factor loadings 0.51 to 0.89 (Table 2). Factor 5 was named "smoking & stress" which contained 3 items about smoking and its association with stress management (Table 2).

In the original instrument, health responsibility was hypothesised as one of the lifestyle dimensions. It separated into two factors, Factor 6 and 8, in the factor analytic procedure. Factor 6 was named "health awareness". It consisted of 3 items (use of protective equipment, use of seat belt, seek professional help and take precaution against HIV) concerning health protection and 4 different items about the consumption of grain product, use of salt, use of MSG and spiritual support. Factor 8 contained the rest of the 4 items (dental check, health check-ups, monthly inspection and reading health articles) from the initial health responsibility dimension with factor loadings of 0.36 to 0.60. Factor 8 was named "health maintenance". Factor 7 was formed by 4 items with loading values between 0.34 to 0.73. It was named the "consumption of snacks" with its items relating to the habits of taking sweets, biscuits, ice cream and cakes. Factor 9 was formed by 3 items with factor loadings between 0.32 to 0.58. The factor was named "consumption of energising food" which mainly assessed the consumption of coffee, milk or other dairy product and health tonics. Two items with factor loadings between 0.53 to 0.61 formed into Factor 10 about individual' s consumption of vegetables and fruit. The factor was named the "consumption of fruit and vegetables". Factor 11 had drawn 4 items from the dimension of dietary habit (taking of breakfast, dining out habit and tea drinking) and 1 item related to stress management. The first 3 items with the loading value over 0.3 were retained in the factor which were named "breakfast and tea drinking behaviour". The item related to stress management was excluded. Factor 12 was loaded by 3 of the 4 items from physical activity dimension. The factor was reduced to 2 items and called "leisure activity" as 1 item did not reach a satisfactory loading value over 0.3. Factor 13 consisted of 3 items at loading values over 0.33-0.62. This factor was named "consumption of carcinogenic food". It assessed an individual's intake of smoked meat, salted vegetables and preserved/ salted seafood which were associated with cancer risk.

Stress management was a dimension initially constructed of 10 items. However, most items failed to form a stable factor in the factor analytic procedure. Many of the items had loaded with various Factors, such as, Factors 5,6,8,14 &17 (Table 2) with low factor loadings. Only two items (seek help from fortune tellers and burning incense) from this dimension had formed Factor 14 which was named "ritual and belief". Although a food item (consumption of meat, poultry, fish and egg) and a stress response item (eat excessively/ skip meal) also loaded on the same factor, they were finally excluded due to low factor loadings (Table 2). The item on work activity level had combined

with the item on consumption of herbal tea to form Factor 15 (Table 2). These two items did not seem to have any close relationship. The item on herbal tea drinking was removed from the factor since the factor loading was below the cutoff value. Factor 16 and Factor 17 were loaded with one to two food items (Table 2). Of the two items in Factor 17, only 1 item (type of tea usually taken) had a factor loading exceed 0.3. Through the analytic procedure, the lifestyle instrument was reduced to a 66 item instrument with 14 subscales.

Internal consistency

The 14 subscales which emerged from the exploratory factor analysis contained internal consistency measures which ranged from 0.38 to 0.98 (Table 1). Seven of the 14 sub-scales had internal consistency measures greater than 0.66 and were considered acceptable while the three below 0.50 were questionable.

DISCUSSION

The results of the present study demonstrated that the lifestyle instrument had adequate content validity and satisfactory test-retest reliability in initial testing. The expert panel review provided the support that most relevant and representative items were included in the instrument, and items were selected appropriately to tap the different lifestyle dimensions. Of the seven lifestyle dimensions hypothesised in the original instrument, six dimensions achieved high reliability coefficients of 0.81 to 0.99 in the test-retest procedure. The dimension of "physical activity" had a lower reliability coefficient of 0.68 which could be due to both error variance and true change of individual's activity level over time. A test-retest could be repeated in a stable and larger sample with the assessment of physical activity. Based on the significant findings of the Pearson r correlations ($P<0.05$) in all the lifestyle dimensions during the test-retest procedure, it was confirmed that the instrument was stable over time.

Exploration of construct validity of the instrument was undertaken by factor analysis. Factor analysis produced a total 17 interpretable factors which explained the constructs of lifestyle behaviours (Table 2). Alcohol consumption and drug use were the two constructs supported by the analytic findings. The factor of "alcohol consumption" had the highest eigenvalue of 15.36 and an adequate number of items which share 47% to 87% (factor loadings 0.69-0.94) of their variance with the factor. This could indicate that "alcohol consumption" was a key factor related to lifestyle health behaviour. Factor 2 on "drug use" was the second most important factor with an eigenvalue of 5.82. The items in the factor shared considerably high percentage (64%-91%) of their variance with the factor. This reflected that the items were tapping a single construct on drug use. Factor 5 on "smoking" had a lower eigenvalue of 2.60. Items in this factor accounted for 51% to 75% (factor loadings 0.72-0.87) of their variance with the factor indicating the items were able to represent the construct adequately. All these three factors had a high internal consistency coefficients ranged from 0.98 for "alcohol consumption" to 0.96 for "drug use" and 0.85 for "smoking" (Table 1). This suggested that the factor analysis produced coherent clusters that can be used as meaningful subscales.

The domain of dietary habit was reorganised to form a number of factors (Factors 3, 4, 6, 7, 9, 10, 11, 13, 16 & 17) in factor analysis. This suggested that dietary habit was a multidimensional health-related behaviour instead of a unidimensional construct. The breaking down of the factor structure in the dietary habit could arise from problems related to the different scales used to assess individual's dietary habit in the original instrument. Items scored on similar scales tended to correlate more highly with one another than with items scored on a different scale. This was reflected from the factor structure of factors 3,7,10 and 13. It could also relate to the difficulty level of individual items. Easy items will tend to form factors that are distinguished from the difficult items although they belong to the same underlying construct (Nunnally & Berstein, 1994).

Regarding the internal consistency of these dietary factors, they were mostly low to moderate (0.38 to 0.59) except the factor of "consumption of fast food" (0.77). This is because most items of individual factors did not correlate highly with each other and there were too few items in each factor.

The dimension of stress management initially consisted of 10 items in the instrument. The items did not form into a meaningful factor in the factor analytic

procedure. The major reason may be due to the heterogeneity of the items which had low correlations with one other, or may be caused by problems in item construction. Gathering feedback from the respondents on these items is necessary to define the problems.

The dimension of "health responsibility" was separated into two different factors, Factor 6 on "health awareness" and Factor 8 on "health maintenance". The result suggested that an individual's health responsibility was a combination of entities which derived from health protective (use protective equipment, wear seat belts & take precaution against HIV) or health preventive (health check-ups, dental checks, reading health articles & regular body inspection) or other health-related measures.

Factor analysis acted as a powerful tool in establishing 17 constructs in the present lifestyle instrument. It worked effectively by extracting information from a large database and changed it into meaningful interrelated factors. The result of this study, however, should be viewed as a preliminary finding which helped to provide better understanding about the lifestyle concept. It is recommended to repeat the factor analytic procedure with a different sample to examine any changes in the factor structure of the lifestyle measurement. To improve the psychometric properties of this instrument, further testing, refinement and validation are essential. Item analysis and discriminant analysis could also be considered.

The lifestyle instrument was constructed according to a number of objectives outlined earlier in this study. These objectives were mostly achieved. The main problem encountered was in formulating suitable and adequate items to assess the dimension of stress management. The study was limited in several different aspects. The data were collected from a convenience sample selected from hospitals and the community, therefore the findings could only be applied to these groups of subjects and could not be generalized to the population in Hong Kong. The instrument was developed as a general global measurement for assessing people's lifestyle and health-related behaviour. Modification of the instrument is deemed necessary when used in young children or the old aged people or any specific age group in view of their distinctive lifestyle characteristics.

A number of recommendations can be drawn from the present study. To develop a comprehensive model of lifestyle measurement, the present instrument can incorporate extra items to examine the impact of socio-structural conditions on individual lifestyle. Future areas for research can include the study of factors governing the continuity of health-related behaviours and the changes in these behaviours. The applicability of the instrument can be enhanced by further testing the instrument in a large population sample or multiple settings, including hospitals, out-patient departments, clinics, health organizations or agents, community centres, schools, workplace and people's home.

CONCLUSION

Lifestyle has emerged as an important health-related concept. The development of a valid and reliable lifestyle measurement is deemed essential in Hong Kong's unique culture. This study described the effort of developing such an instrument. Statistical analysis has demonstrated some sound psychometric properties of the instrument. Although the instrument is essentially in the developmental stage, it shows promise as a useful assessment tool to increase understanding of health-related behaviours.

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量度与健康相关行为的生活方式评估工具开发

本研究聚焦于开发一项设计用于量度在香港中国人与健康相关行为的生活方式评估工具。本工具有66项。它们是从两所主要医院、三个社区中心、一所大学保健处及公园里的450位对象的访谈回应而开发出来。本工具的心理测量特性通过了效度评估、信度测量及因子分析。内容效度通过了五位国际及本地专家组成的专家小组评审。次测量表的重测信度为理想 (r=0.68-0.99)，当中透过因子分析产生了17项因子，其变异数为61.9%。这些因子被分类为饮食习惯、休闲活动、吸烟、药物使用、饮酒、健康察觉性、健康维护、习惯及信念和生活方式改变的准备程度。5个次量表皆达致高内部一致性信度(Cronbach alpha = 0.77-0.98)，但有三个次量表则为低(Cronbach alpha = 0.38-0.48) ，而其余的次量表为中等(Cronbach alpha = 0.5-0.67)。故本工具必需在将来作延续微调、信度及效度测试。然而本工具仍能作为一项可以增加了解香港人与健康相关行为及生活方式的工具，并使得健康专业人员能用作全面评估及健康教育。

摘要

Table 2: Rotated factor matrix of lifestyle items. Using Maximum likelihood analysis with varimax rotation (N=450).

	Factors				
Items	1	2	3	4	5
34 Alcohol	0.936				
38 Unable to stop	0.935				
41 Feeling of guilt	0.933				
39 Failed to do	0.924				
42 Not remember	0.904				
40 Morning drinking	0.895				
43 Injured	0.892				
44 Cut down	0.863				
34f Chinese liquor	0.863				
34e C.tonic wine	0.860				
37 Six drinks	0.858				
34a Beer	0.849				
46 Difficult	0.842				
45 Drinking problem	0.815				
34b Western wine	0.776				
34d Chinese wine	0.770				
34c Western brandy	0.754				
36 Standard drink	0.689				
7 Eat visible fat	*0.221				
49 Trouble with law		0.956			
50 Finance & occupation		0.939			
51 Being criticized		0.935			
52 Concerned/ Cut down		0.916			
53 Problem with drug use		0.798			
5f French fries			0.829		
5d Hamburgers/ hot dog			0.827		
5e Pizzas			0.522		
5b Soft drink			0.375		
62 Lifestyle changes				0.885	
63 Difficulty with the changes				0.801	
15 Overall comment on diet				0.511	
6 Whether eat regularly				*0.299	
2c Dinner out				*0.283	
20 Smoke					0.865
21a Cigarette					0.770
30 Smoke to reduce stress					0.715
29 Use medication to reduce stress				*0.258	
Eigenvalue	15.36	5.82	4.72	3.21	2.60
% of variance	18.5	7.0	5.7	3.9	3.1
Cumulative %	18.5	25.5	31.2	35.1	38.2

* Item removed from the factor

Table 2 : Rotated factor matrix of lifestyle items. Using Maximum likelihood analysis with varimax rotation (N=450) (cont.)

	Factors						
Items	6	7	8	9	10	11	12
61 Protective equip.	0.617						
60 precautions against HIV	0.541						
54 Wear seat belts	0.475						
3a Grain product consumption	0.420						
8 Add salt at the table	0.336						
58 Seek professional help	0.331						
9 Use of MSG	0.301						
25 Spiritual support	*0.251						
5g Sweets		0.730					
5j Biscuits		0.516					
5h Ice cream		0.487					
5i Cakes		0.338					
56 Health checkups			0.597				
59 Reading health articles			0.466				
55 Dental checks			0.378				
57 Inspect body			0.355				
24 Supportive family/ friends			*0.246				
28 Relax			*0.242				
3b Milk,yogurt or cheese				0.576			
10 Health tonics				0.384			
5a Coffee				0.318			
3e Vegetables					0.608		
3d Fruit					0.528		
14 Glasses of fluid/day					*0.293		
5c Soya drink or soya food products					*0.198		
2a Breakfast out						0.727	
13 Drink western/ Chinese tea						0.408	
2b Lunch out						0.342	
26 Accept things in life						*0.262	
1 Breakfast: day/ week						*0.261	
18 Exercise: day/ week							0.686
17 Leisure activity							0.620
19 More or less time							*0.256
Eigenvalue	2.31	2.13	1.93	1.77	1.68	1.58	1.52
% of variance	2.8	2.6	2.3	2.1	2.0	1.9	1.8
Cumulative %	41	43.5	45.8	48.0	50.0	51.9	53.7

* Item removed from the factor

Table 2 : Rotated factor matrix of lifestyle items. Using Maximum likelihood analysis with varimax rotation (N=450) (cont.)

	Factors				
Items	13	14	15	16	17
4b Smoked/cured meat	0.618				
4a Salted seafood	0.576				
4c Salted vegetables	0.330				
33 Burning incense		0.523			
32 Fortune tellers		0.391			
31 Eat excessively/ skip meal		*0.212			
3b Meat, poultry, fish & egg		*0.210			
16 Physical activity in work			0.573		
12 Drinking herbal tea			*0.256		
4d Preserved bean curd				0.408	
13b Type of tea usually have					0.391
11 Soup at home: times/ week					*0.235
27 Enough satisfying sleep					*0.046
Eigenvalue	1.51	1.38	1.37	1.31	1.20
% of variance	1.8	1.7	1.7	1.6	1.4
Cumulative %	55.5	57.2	58.9	60.4	61.9

* Item removed from the factor