Impacts of physical, mental, and socioeconomic factors on the outpatient medical care costs of the Chinese elderly : Health survey of the elderly living in Tianjin

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Objective : This paper is aiming at a contribution to the debate on how to make health-care services in China more responsive to the needs of the elderly.

Methods : We performed a health survey of elderly Chinese aged 65 years and above living in Tianjin. A questionnaire concerning physical, mental, socioeconomic factors was distributed to 191 people. Logistic regression analysis was then used to analyze the data in order to evaluate the relationship of outpatient medical care costs to lifestyle and fitness level.

Results : Multivariate analysis suggested that, dietary habits [reference : not, odds ratio=1.96 (paying attention to dietary balance) 95% confidence interval=1.02-3.76], self-perceived health [reference : not, OR=0.30 (fairly healthy) 95% CI=0.12-0.57], level of insurance [reference : uninsured, OR=3.81 (insured), 95% CI=1.22-11.9], and walking speed (OR=1.68, 95% CI=1.18-2.41) were closely related to a reduction in consultation behavior.

Conclusion : This study revealed the complexities of the situation coupled with the impact of class on the participation in medical insurance services. China needs urgent improvement in its legal system, and education strategies, prevention activities, and health delivery methods for the whole population, particularly groups that are hard to reach and stratified health message delivery.

Key words : China, elderly, outpatient medical care cost, life style, disparity

I Introduction

According to the fifth national census conducted in 2000, individuals aged 65 years and above accounted for approximately 7% of the total population of the People's Republic of China (China), the most populous country in the world (National

Bureau of Statistics of China, 2004). The World Population Prospects of the United Nations forecasts that this percentage will increase to 13.4% (190 million) by 2025 and 22.9% (320 million) by 2050 (United Nations, 2003). China is clearly confronting complex problems associated with aging. Demographically, the population is being rapidly

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transformed by the marked and rapid aging of urban populations, those in economically underdeveloped regions, and the baby boom generation (Kawamura, 2004).

Consequently, increasing medical care costs have become a serious concern in China. Besides overall macroeconomic reform of the health-care system, improvements in health measures and health-care microeconomics are recognized as urgent items on the policy agenda (Baogang, 2003). In other words, reasonable medical care costs to reform the health-care system itself are, of course, important. However as elevated health levels local residents are the result of various health activities, it is desirable that proper medical expenses incurred through preventable diseases.

Many studies have analyzed how medical care costs relate to health-care behavior and local characteristics in developed countries (Daniel and Miguel, 2008 ; Maetzel et al., 2004).

Numerous researchers in China have investigated the relationship between lifestyle and chronic disorders in the elderly, as well as looking into topics related to the activities of daily living (ADL) and the health of the elderly (Chen et al., 1995 ; Matsuzaki et al., 2004 ; Woo et al., 2002). Yet the problems weighing on health-care services in China are diverse and complex. The training processes and work circumstances of health professionals in China differ in many respects from those in other developed countries. There are also many cross-cultural differences throughout the country. The great majority of studies conducted to date have taken a sociological or economic approach, while a very few comprehensive investigations into the state of health of the elderly in Chinese cities and analysis of their medical care costs have been completed. This study contributes to the debate on how to make health-care services in China more responsive to the needs of elderly

Chinese.

II Methods

In March 2004 we conducted a health survey of elderly people (aged 65 years and above) living in Tianjin, as part of a joint study with the School of Nursing at Tianjin Medical University. Tianjin is one of the four largest cities in China under the direct control of the national government. The elderly population (≥ 65 years) there is high among Chinese cities, accounting for 8.3% of the total population (National Bureau of Statistics of China, 2004).

A questionnaire concerning lifestyle and health status was jointly prepared by Tianjin Medical University and Waseda University and distributed to 200 people aged 65 years and above (104 males with a mean age of 70.3 ± 4.9 years, 96 females with a mean age of 70.7 ± 5.4 years).

Two hundred subjects were randomly selected from among 9,167 elderly citizens (≥ 65 years) registered with the Community Hospital of Tianjin Nankai District, for questioning in group interviews (effective response rate : 100%) (Koyama et al., 2006). The study was conducted with the approval of the Ethical Review Board of Waseda University. All the subjects gave their advance consent to participate in the study after being informed that their hospital consultation records, questionnaire entries, and health checkup results would be reviewed. The hospital consultation records used in this study comprise records of the outpatient medical care costs of the 200 subjects recorded between November 2003 and May 2004. As the subjects of this study were all, independent elderly people, the inpatient medical care costs for these patients were quite low (three cases only), and therefore were excluded from the study. In the end, we collected 577 individual hospital outpatient consultation records.

The questionnaire data included the following : age, household composition, employment status, drinking habits (never been a drinker/ex-drinker/current drinker), smoking habits (never been a smoker/ex-smoker/current smoker), exercising habits (regular exerciser or not), sleep patterns, dietary habits (three regular meals a day or not ; attention paid to dietary balance or not) (Berkman and Breslow, 1983) identified breakfast-skipping as a factor of poor health, but 89.9% of the subjects in this study ate breakfast regularly), a simple stress check list (SCL-S : 0-5scores=normal/6-10scores=a mildly stressed state/11-20scores=moderate degree/over 21 scores=severe stress) (Murakami et al., 1989), self-perceived health (very healthy/fairly healthy/not very healthy/in poor health), satisfaction with life (very satisfied/fairly satisfied/not very satisfied/unsatisfied), family financial situation (well-to-do/average/tight/very tight), and whether the subject had received health checkups in his/her 50s. The following parameters were assessed in the fitness tests given during the health checkup : grip strength as an index of muscle strength, anterior flexion in the sitting position with the legs extended as an index of flexibility, bar grip reaction time (catching a dropped bar) as an index of agility, length of time standing on one-leg with eyes open as an index of equilibrium, time take to walk 10-m as an index of general mobility, and vital capacity as an index of endurance (Berkman and Breslow, 1983). The body mass index (BMI : body weight (kg)/height (m)²) was also calculated from the body weight and height, and blood pressure was taken three times with a sphygmomanometer.

The disease state of each of the 200 subjects was evaluated based on hospital consultation records. The diseases were classified according to the WHO ICD-10 coding system, and the 6 most prevalent diseases were listed separately for males

and females. Details of medical care costs were calculated according to the items cited in the hospital consultation records at Chinese hospitals and presented separately for males and females. In the typical Chinese health-care system, care providers keep receipts for each person and tally them annually. Therefore, for this study, the receipts were tallied for the participants who agreed to the purpose of this study at the School of Nursing at Tianjin Medical University.

The insurance status of the subjects was examined, the mean and standard deviation of the monthly outpatient medical care costs were calculated, and the differences in the data between the groups were examined using the unpaired t-test. The outpatient medical care cost data were converted to logarithms to normalize their distribution.

Data were analyzed for 98 males (70.1 ± 4.8 years) and 93 females (70.7 ± 5.3 years) who provided complete data for the questionnaire and participated in the fitness tests. The questionnaire answers on household composition, employment status, satisfaction with life, family financial situation, self-perceived health, and seven lifestyle parameters selected from Breslow (Berkman and Breslow, 1983) (drinking habits, smoking habits, exercise habits, sleep duration, diet, perceived stress level, and BMI) were analyzed statistically, and differences between the genders were examined using the χ^2 -test. With regards to the results of blood pressure and fitness tests, the mean and standard deviations were calculated separately for the males and females, and the differences in the mean values were examined using the t-test and Mann-Whitney U-test.

Among the four quartiles for outpatient medical care costs (Q1-Q4), percentage differences in the seven lifestyle parameters and other variables were examined using the χ^2 -test, and differences in the mean were examined using one-way

ANOVA.

The data of all measured items were presented as means and standard deviations, then standardized separately for males and females (Z score) using means and standard deviations. The mean of the Z scores of the seven items was defined as the total fitness score.

Thereafter, a correlation analysis using Pearson's correlation coefficient was performed for age, outpatient medical care cost (logarithms), the results of each fitness test, and the total fitness score.

A univariate analysis and multiple logistic regression analysis were performed to evaluate the relationship between outpatient medical care costs and the lifestyles and fitness levels of the 191 subjects analyzed. The monthly mean of the outpatient medical cost, divided into 2 categories using the yuan value (Q1-Q2/Q3-Q4), as the dependent variable and the seven lifestyle items (Table 6) showing significance differences as independent variables, and the odds ratio (OR) and 95% confidence interval (95% CI) were calculated with.

P-value of less than 0.05 was regarded as significant and p-value of less than 0.1 was regarded as a tendency toward significance in all of the statistical procedures. SPSS for Windows, version 13.0, was used for the statistical analyses.

III Results

1. Disease structure

Table 1 shows the six disease classifications (ICD-10) recorded most frequently in the 577 hospital consultation records. The top three most frequently recorded diseases for the male subjects were diseases of the circulatory system (45.7%), diseases of the respiratory system (23.1%) and endocrine, nutritional and metabolic diseases (11.4%). The top three for the female subjects were the same : diseases of the circulatory system

(47.4%), diseases of the respiratory system (25.5%), and endocrine, nutritional and metabolic diseases (14.9%). Among the diseases of the circulatory system, the most frequently diagnosed in the male subjects were hypertension (35 cases, 33.0%), arteriosclerosis (23 cases, 21.7%), and stroke (12 cases, 11.3%). The top two most frequently diagnosed diseases of the circulatory system in the females subjects were also hypertension (33 cases, 35.1%) and arteriosclerosis (24 cases, 25.5%), and the third most frequently diagnosed was hypercholesterolemia (11 cases, 11.7%).

Table 2 shows the outpatient medical care costs per subject based on all hospital consultation records listed separately for males and females. The three largest cost components were the same for both males and females : Western medicines, ready-made Chinese drugs and treatment (in descending order). The fourth largest cost component for males was general examinations, while for females it was custom-prescribed Chinese drugs.

2. Insurance coverage

Ninety-four subjects (47%) had public health insurance, 20 (10%) had labor insurance, 60 (30%) had health insurance (new system), and 24 (12%) were uninsured.

The mean outpatient medical care cost was 1.57 (log) for insured subjects and 0.94 (log) for uninsured subjects.

Comparisons of the mean values for the two groups (insured/uninsured) using the t-test indicated that, the outpatient medical care costs for the uninsured subjects was significantly lower than the cost of insurance cover for the insured subjects ($p=0.007$).

3. Subject Characteristics

Data on 191 of the 200 subjects (98 males aged 70.1 ± 4.8 years and 58 females aged 70.1 ± 5.3

Table 1 Rank of disease prevalence in subjects by sex

Male (106)		%	Female (94)		%
No. 1	Diseases of the circulatory system	45.7	No. 1	Diseases of the circulatory system	47.4
No. 2	Diseases of the respiratory system	23.1	No. 2	Diseases of the respiratory system	25.5
No. 3	Endocrine, nutritional and metabolic disorders	11.4	No. 3	Endocrine, nutritional and metabolic disorders	14.9
No. 4	Diseases of the digestive system	9.4	No. 4	Diseases of the digestive system	7.4
No. 5	Diseases of urinary system	6.6		Diseases of the musculoskeletal system and connective tissue	7.4
No. 6	Diseases of the musculoskeletal system and connective tissue	4.7	No. 6	Diseases of urinary system	3.2

The 6 most prevalent diseases according to the clinic consultation records are shown separately for the males and females.

The classification of diseases was based on the International Statistical Classification of Diseases-10 of the WHO.

Table 2 Details of the outpatient medical care costs per subject by sex

Male		(Yuan*)	Female		(Yuan*)
No. 1	Western drug	626.8	Western drug		471.0
No. 2	Chinese Herbal remedy (ready-made drug)	166.0	Chinese Herbal remedy (ready-made drug)		209.4
No. 3	Treatment cost	69.9	Treatment cost		51.3
No. 4	General inspection cost	23.4	Chinese Herbal medicine (prescribed drug)		37.6
No. 5	Biochemical examination	18.7	Biochemical examination		5.0
No. 6	Chinese Herbal medicine (prescribed drug)	10.8	General inspection cost		17.0

The items of the outpatient medical care costs per subject during the 6 months in which the clinic consultation records

could be collected are shown in decreasing order of the amount of money in Chinese Yuan.

*yuan=Chinese yuan (renmkinbi) 1yuan.=13.4 Japanese Yen

years) were analyzed after those subjects who answered the questionnaire incompletely or inappropriately were excluded. Table 3 shows the results of male-female comparisons for lifestyles, psychological states, fitness test results, and outpatient medical care costs together with the basic attributes of the subjects.

The percentage of subjects with spouses was significantly lower for the female cohorts (61.3%)

than for the male cohorts (83.7%) ($p < 0.0001$).

Concerning lifestyle, the rates of drinking and smoking were significantly lower among the female subjects than among the male subjects ($p < 0.0001$). With regards to diet, the percentage of those who ate three regular meals daily and paid attention to dietary balance was significantly higher for the females (43.0%) than for the males ($p < 0.05$).

Table 3 Characteristics of subjects

Variable	category	Male (N=98)	Female (N=93)	P-value	
Basic Attribute					
age	Mean±SD (years)	70.1±4.8	70.7±5.3	ns	
household composition	with spouses	82 (83.7)	57 (61.3)	<0.0001	
employed	enter the work-force (%)	8 (8.2)	3 (3.2)	ns	
family financial situation	well-to-do/average (%)	89 (91.0)	86 (92.5)	ns	
Life Style					
alcohol drinking	past/current (%)	61 (62.2)	21 (22.6)	<0.0001	
cigarette smoking	past/current (%)	73 (74.5)	34 (36.6)	<0.0001	
physical Exercise	regularly exercising (%)	64 (65.3)	56 (60.2)	ns	
sleep time	7≤hours<9	64 (65.3)	55 (59.1)	ns	
dietary habits (balance/regulation)	both a combination (%)	26 (26.5)	40 (43.0)	0.014	
Mental State					
self-perceived health	very/fairly healthy (%)	41 (41.8)	40 (43.0)	ns	
life satisfaction level	very/fairly satisfied (%)	82 (83.7)	85 (91.4)	0.027	
stress check list (SCL)	6≤ (%)	50 (51.0)	29 (31.2)	0.004	
Physical Exercise					
grip strength	Mean±SD, Kg	32.2±13.5	13.0±6.8	<0.0001	
One leg standing with open eyes	Median, second	17.2	11.9	ns	
bar grip reaction time	Mean±SD, cm	25.3±7.9	30.3±8.2	<0.0001	
Anterior flexion	Mean±SD, cm	28.6±9.1	31.9±8.1	0.008	
time take to walk 10-m	Mean±SD, m/second	11.9±3.4	11.9±3.5	ns	
vital capacity	Mean±SD, ml	2162.8±638.9	1399.5±512.7	<0.0001	
BMI (body mass index)	Mean±SD	25.1±3.6	25.0±3.7	ns	
Blood pressure	systolic pressure	Mean±SD, mmHg	137.6±17.5	133.6±17.1	ns
	diastolic pressure	Mean±SD, mmHg	85.4±12.3	84.4±11.7	ns
outpatient medical care costs	Mean±SD (yuan [※])	145.90±225.1	164.44±239.8	ns	
	Mean±SD (logarithm)	1.40±1.1	1.59±0.1	ns	

ns : not significant

Basic attributes (age, household composition, state of employment, state of the family budget), lifestyle, psychological state (self-perceived health, stress checklist), results of fitness tests, history of falling, and monthly outpatient medical cost were compared by the Chi-square test (differences in percentage) or t-test and Mann-Whitney U-test (differences in the mean).

*yuan=Chinese yuan (renminbi) 1yuan.=13.4 Japanese Yen

Concerning satisfaction with life and the family financial situation, 83.7% of the male subjects and 91.4% of the female subjects were very satisfied or fairly satisfied with life, and 91.0% of the male subjects and 92.5% of the female subjects were well-to-do or average in terms of their financial situation. These rates were not surprising, as the high rate of insurance coverage among the subjects suggested that many belonged to the privileged class. These high rates of satisfaction can presumably be credited, at least in part, to the high

percentage of subjects who were financially secure.

With regards to self-perceived health, 41.8% of the male cohorts and 43.0% of the female cohorts rated themselves as “very healthy” or “fairly healthy”.

Concerning perceived stress level, 51.0% of the males and 31.2% of the females rated themselves as 6 or higher, a score believed to indicate a mildly stressed state. The difference between the genders was significant ($p<0.01$).

Table 4 Correlation analysis between the outpatient medical care costs and results of fitness tests

	Male		Female	
	medical care costs		medical care costs	
	r	p-value	r	p-value
Age	-0.07	0.321	0.04	0.228
Grip strength (GS)	0.07	0.244	-0.30	0.044
One leg standing with eyes open	0.10	0.335	-0.16	0.113
Bar grip reaction time (BRT)	-0.07	0.481	0.09	0.255
Anterior flexion (AF)	-0.14	0.350	-0.11	0.402
time take to walk 10-m (WT)	0.19	0.044	0.08	0.098
Vital capacity (VC)	-0.11	0.325	-0.30	0.048
Total fitness score (TFS)	-0.13	0.142	-0.27	0.046

The relationships of the outpatient medical care costs with, results of various fitness tests, total fitness score, and age are shown as Pearson's correlation coefficients.

4. Physical state and medical care costs

The outpatient medical care costs showed a significant positive correlation with the walking time ($r=0.189$) in the male subjects and a significant negative correlation with grip strength ($r=-0.292$), vital capacity ($r=-0.258$) and total fitness score ($r=-0.266$) in the female subjects.

5. Physical, mental and socioeconomic factors as relating to outpatient medical care costs

For the four quartiles for outpatient medical care costs, the differences in the proportion of uninsurance, household composition, lifestyle items, self-perceived health status, and medical screening conducted in the 50s were examined using the χ^2 -test, and differences in the mean age, body mass index and blood pressure were examined using one-way ANOVA (Table 5).

As a result, significant differences were observed in the percentage of uninsured subjects ($p<0.05$), subjects with good dietary habits (eating three regular meals a day, paying attention to

dietary balance) ($p<0.05$), subjects under stress ($p<0.0001$) and subjects with a good self-perceived state of health ($p<0.01$).

6. Multivariate analysis

Table 6 shows the results of the univariate and multivariate logistic regression analysis to evaluate the relationship between outpatient medical care costs and lifestyle and fitness level.

The outpatient medical care costs were divided into two categories with a mean yuan value (0=Q1-Q2, 1=Q3-Q4) taken as the dependent variable. The lifestyle items and variables that showed significant differences on the χ^2 -test, one-way ANOVA, and correlation analysis were taken as independent variables.

In the univariate analysis, the outpatient medical care costs correlated significantly with a current smoking habit (OR=0.67; 95% CI=0.47-0.95), good diet (OR=1.93; 95% CI=1.05-3.55), good self-perceived health (OR=0.34; 95% CI=0.18-0.61; $p<0.0001$), insurance status (OR=3.87; 95% CI=1.36-11.1; $p<0.05$), and walking time (OR=1.13; 95% CI=1.03-124; $p<0.01$).

Next, when the relationships with outpatient medical care costs were adjusted for age, marital status, satisfaction with life, family financial situation, health screening in the 50s, and blood pressure (systolic pressure 140 mmHg and/or diastolic pressure 90 mmHg) by putting all the variables into a multivariate model, significant correlations were observed for good dietary habits (OR=1.96; 95% CI=1.02-3.76; $p<0.05$), good self-perceived health (OR=0.30; 95% CI=0.12-0.57, $p<0.0001$), insurance status (OR=3.81; 95% CI=1.22-11.9, $p<0.05$), and walking time (OR=1.68; 95% CI=1.18-2.41; $p<0.01$).

IV Discussion

As a result of the population control policy (one

Table 5 Lifestyle according to the medical cost.

	outpatient medical care costs (yuan)				P-value
	Q1 (0yuan※)	Q2 (1.0-66.2yuan)	Q3 (66.3-210.9yuan)	Q4 (211.0yuan+)	
No. of subjects (%)	49	46	48	48	
male	30 (61.2)	23 (50.0)	20 (41.7)	25 (52.1)	ns
female	19 (38.8)	23 (50.0)	28 (58.3)	23 (47.9)	ns
Mean age (years)	70.1±4.8	70.5±5.0	70.3±5.6	70.8±4.9	ns
Uninsurance (%)	16.3	19.6	6.3	2.1	0.019
marital state, have a partner (%)	77.6	65.2	75	72.9	0.570
Lifestyle					
alcohol drinking habit (%)					
non-drinker	55.1	54.3	60.4	58.3	0.130
past	6.1	26.1	14.6	14.6	
current drinker	38.8	19.6	25.0	27.1	
cigarette smoking habit (%)					
non-smoker	38.8	41.3	41.7	54.3	0.102
past	22.4	30.4	29.2	35.4	
current smoker	38.8	28.3	29.2	10.4	
physical Exercise (%)					
regularly	63.3	58.7	70.8	58.3	0.831
sleeping time (%)					
7≤Hours<9	65.3	58.7	56.3	68.8	0.510
dietary habits (balance/regulation) (%)	36.7	17.4	37.5	45.8	0.029
stress check list (SCL) (%)					
6≤scores	38.8	67.4	79.2	50	<0.0001
Self-perceived health very/fairly (%)	61.2	45.7	29.2	33.3	0.003
Medical screening in the 50s (%)	44.9	60.9	72.9	75.0	0.232
Body mass index (kg/m ²)	25.0±3.9	25.4±3.1	25.0±3.9	24.9±3.7	0.897
Systolic blood pressure (mmHg)	132.8±16.5	135.0±19.3	135.7±15.0	139.2±18.5	0.332
Diastolic blood pressure (mmHg)	81.4±11.2	85.7±14.9	85.2±9.0	87.5±11.9	0.082

Basic attributes (marital state, have a partner), lifestyle, psychological state (self-perceived health), medical screening in the 50s were compared by the chi-square test. And age body mass index, blood pressure were compared by the one-way layout ANOVA, ns : not significant ※yuan=Chinese yuan (renmkinbi) 1yuan.=13.4 Japanese Yen

child per family policy) enforced since 1978, the population in China is aging progressively, particularly in urban areas¹. The Tianjin area surveyed in this study is one of the cities aging remarkably much in China ; living standards have risen along with the area's economic growth, and many men and women are experiencing cardiovascular disease, a disease which this shows the same transition to chronic diseases in developed countries. Access to medical services is expected to increase in the future, but as it does, skyrocketing increase of medical care costs are likely to become a seri-

ous problem.

Against the background of such problems with health-care services, the optimal functioning of the complex medical system in China is a key influencing factor.

China's medical insurance system is mainly publicly funded, but there are also workers' health insurance systems and three different forms of rural cooperative medical care.

Traditionally, state enterprises must bear all medical expenses for the health-care of employees and retirees through public health insurance.

Table 6 Univariate and multivariate odds ratio (ORs) and their 95% confidence intervals (CIs) for factors associated with healthcare cost with the lifestyle and fitness level

Variable		outpatient medical care costs						
		Univariate				Multivariate [‡]		
		N	Crude	OR (95% CI)	p-value	Adjusted	OR (95% CI)	p-value
sex	male	98	1.00	(reference)		1.00	(reference)	
	Female	93	1.43	(0.81–2.54)	0.215	3.97	(0.92–17.2)	0.165
drinking habit	Never	109	1.00	(reference)		1.00	(reference)	
	past	29	0.94	(0.42–2.14)	0.887	0.83	(0.35–2.33)	0.827
smoking habit	current drinking	53	0.89	(0.64–1.23)	0.886	0.91	(0.62–1.34)	0.644
	Never	84	1.00	(reference)		1.00	(reference)	
	past	56	0.93	(0.47–1.84)	0.835	1.11	(0.52–2.38)	0.797
	current smoking	51	0.67	(0.47–0.95)	0.026	0.88	(0.59–1.32)	0.533
diet	not	125	1.00	(reference)		1.00	(reference)	
	eating 3 meals regularly	66	1.93	(1.05–3.55)	0.035	1.96	(1.02–3.76)	0.043
sleeping time	paying attention to dietary balance							
	≤6, 9Hours≤	72	1.00	(reference)		1.00	(reference)	
	7≤hours<9	119	0.95	(0.52–1.72)	0.859	1.06	(0.56–1.20)	0.864
exercise	Never	71	1.00	(reference)		1.00	(reference)	
	regularly exercising	120	0.90	(0.49–1.68)	0.749	0.95	(0.53–1.98)	0.953
subjective stress (SCL score)	<6	112	1.00	(reference)		1.00	(reference)	
	6≤	79	1.77	(0.99–3.16)	0.056	1.69	(0.90–3.15)	0.102
BMI	18.5–25	94	1.00	(reference)		1.00	(reference)	
	<18.5, 25<	96	1.14	(0.61–2.13)	0.998	0.91	(0.49–1.68)	0.755
self-perceived health	not very/not	24	1.00	(reference)		1.00	(reference)	
	very/fairly healthy	167	0.34	(0.18–0.61)	<0.0001	0.30	(0.12–0.57)	<0.0001
Medical screening in the 50s	not	55	1.00	(reference)		1.00	(reference)	
	participation	169	1.65	(0.86–3.15)	0.130	1.63	(0.82–3.24)	0.164
state of insurance	uninsured	21	1.00	(reference)		1.00	(reference)	
	insured	168	3.87	(1.36–11.1)	0.011	3.81	(1.22–11.9)	0.022
grip strength			1.00	(reference)		1.00	(reference)	
			0.99	(0.97–1.01)	0.301	0.95	(0.69–1.32)	0.765
time take to walk 10-m			1.00	(reference)		1.00	(reference)	
			1.13	(1.03–1.24)	0.010	1.68	(1.18–2.41)	0.004
vital capacity			1.00	(reference)		1.00	(reference)	
			0.85	(0.64–1.14)	0.280	0.82	(0.60–1.11)	0.201
total fitness score			1.00	(reference)		1.00	(reference)	
			0.64	(0.39–1.05)	0.078	0.58	(0.32–1.06)	0.078

[‡] : Multiple logistic regression analysis, adjusted for age, household composition, degree of satisfaction with living, state of the family budget, blood pressure.

The monthly mean of the outpatient medical care costs, divided into 2 categories using the yuan value (Q1~Q2/Q3~Q4) as the dependent variable, and the 7 lifestyle items and the variables that showed significant differences in Tables 6 and 7 were used as independent variables.

However, rapidly increasing health-care spending in recent years has become a significant burden for these companies (Gao et al., 2001).

The number of health-care beneficiaries of public expenditure (those currently working combined with retirees) rose from 15,300 million in 1988 to

17,800 million in 1997 (16.4% increase). Over the same period, medical expenses rose from 183 billion yuan to 797 billion yuan (3.3-fold increase) (National Bureau of China Statistics Press, 2003).

According to the report, "China 2020—Financing Health Care", published by the World Bank in 1997, (The World Bank, 1997) only 21% of the Chinese population has some form of health insurance cover: rural insurance (cooperative health system) (7%), labor insurance (12%) and public health insurance (2%).

In the 1990s, China instituted social security reforms in earnest to begin alleviating its serious economic and social disparities. The new system, the conventional system (health insurance) (Feiyue and Marui, 2000), and mixed-type reforms are all gradually progressing.

Twelve per cent of the subjects of this study were uninsured. They still remains vulnerable, therefore primary and secondary prevention will be of foremost importance for disease management.

The Q1 subjects in our study were not necessarily a health-conscious quartile. These subjects had a higher incidence of both smoking and drinking. However, in their lifestyle without oppression, it is hard to accumulate stress. Self-perceived health seems to be associated with increased outpatient medical care costs. There are significant differences in health-care behavior and in the kinds and quality of medical services that people can access in China. The links between outpatient medical care costs and lifestyle are not comparable to those in Western countries and Japan. However, in China the demand for health-care will increase if the health-care services (supply) are free, or decrease if the services are expensive.

Recipients of free, publicly insured medical services enjoy the advantages these provide, and the impact of class is likely to lead them to select health education to choose a better lifestyle.

As a result, the subjects in Q4 had low smoking rates (10.4%) and ate regular balanced meals, with very few skipping meals (45.8%).

On the other hand, the percentage of subjects with self-perceived poor health does not necessarily suggest that they lack confidence in their health. (Q4 subjects had a high percentage (33.3%) of self-perceived good health).

Similar results were reported from the Q4 smoking group in the past, but many had quit or were in treatment for various diseases during the current study period, suggesting that this may have influenced the results reported.

This raises the question as to whether the Q1 and Q2 subjects, or the subjects with low access to medical care were truly more healthy? These groups demonstrate the highest smoking rate (38.8%) and drinking rate (38.8%), suggesting they were not necessarily truly healthy.

These hierarchies are still present, and it is suggested that an undesirable lifestyle has not appeared to impact on medical care costs so far.

According to reports on smoking, it has been shown that the decreases in overall smoking rates is due to the integration of the low socio-economic status (SES) class (Lopez et al., 1994.)

Health-conscious people (=high SES) make more healthy lifestyle choices. But people who lack interest in health and people with poor access to information and services are left behind, so the gap continues to widen (Nelson et al., 2002). This is a vicious cycle with the potential to expand health inequities in China.

High smoking rates have been reported in association with rising outpatient medical care costs in previous studies from Japan and other developed countries (Kaplan and Camacho, 1983). In China, on the other hand, the results are impacted by the complexities of the society and the level of participation in medical insurance services.

This study is not designed to elucidate the details of medical causation. Rather, it is an exploratory investigation designed to cross the boundaries of a small number of factors in a small survey population. However, in the special context of China, we find it particularly meaningful to report on related socio-economic factors, outpatient medical care costs, and physical and mental factors. Our results may also inform efforts to build a new type of medical service in China.

In the future we will also need to closely consider tools, such as mental support services, to help the elderly thrive by enhancing their self-perceived health and the health-care environment.

Incidentally, our data on health maintenance and overall findings suggest a relationship between outpatient medical care costs and walking ability. Earlier reports have shown an association between lower medical care costs and good walking ability (Pratt et al., 2000 ; Purser et al., 2005). Apart from policies for improved QOL, home-grown Chinese policies to actively maintain the health of older people will be essential to the promotion of longer and healthier lives (similar policies have been instituted in many countries, such as Healthy People 2000 (USA), Healthy People 2010 (USA), The Health of the Nation (England), Kenko-Nippon21 (Japan), etc.).

According to a survey of retirees by the Ministry of Labor and Social Security of China in 2000, the foremost concern for laid-off workers in 10 cities nationwide was "the safety of the social security system" (81.2%) (National Bureau of China Lobar Press, 2000). As the social gap widens in modern China, the social security safety net is expected to grow. Meanwhile, many other important issues are also expected to emerge, such as the need for an improved legal system, health promotion and education strategies, primary and secondary prevention activities, health delivery meth-

ods for the whole population, particularly groups that are hard to reach (=population approach) (Rose, 1992) and stratified health message delivery (=health communication).

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