Demographic and Socioeconomic Determinants of the Use of Periodic Health Examinations: Public vs. Private Sector

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Periodic health examinations (PHEs) are prevalent in Korea. While some people frequently use public PHEs, others use private PHEs with high fees. This study examined the determinants of the use of public and private PHEs using a multinomial logit model. We used the data from the Korean Longitudinal Study of Aging (KLoSA) Wave I conducted in 2006. The KLoSA was a national longitudinal study of a representative sample of individuals ($n = 10,253$) aged 45 years or older. The mean age of the sample was 61.6 years; 77.8% of subjects were married and 37.5% had at least a high school education. The most frequent type of PHE usage was public PHEs only (38.9%), followed by private PHEs only (7.3%) and both public and private PHEs (6.5%). This study found that subjects who lived in rural areas or who were employed were significantly more likely to use public PHEs because of many public health facilities in rural area and mandatory public PHEs for employees. Those who used private PHEs only were educated, wealthy, or unhealthy, because private PHEs required out-of-pocket payments and provided higher quality services. Those who used both types of PHE had a high socio-economic status or a bad health status. The authors suggest that policy makers pay attention to the use of public PHEs among populations with lower socio-economic status. As for the group of subjects who use both types of PHE, their overutilization of PHEs must be reduced through cooperation between the public and private PHEs. ——— periodic health examinations; multiphasic screening; preventive health services; utilization; Korea.

Tohoku J. Exp. Med., 2009, **219** (3), 223-230. © 2009 Tohoku University Medical Press

Periodic health examinations (PHEs) became prevalent in the 1960s in the USA because of the economic concerns of the life insurance industry. These examinations helped corporations to assess the financial risk associated with life insurance applicants and also to improve the productivity of their employees (Han 1997). PHEs are administered by medical professionals, and their objectives are to detect disorders and diseases early and to promote good health (Han 1997). However, since the 1980s, disease-specific screening has come into widespread use, and it has supplanted PHEs because it has proven to be a more cost-effective way to reduce mortality and morbidity (Spitzer 1984; Frame 1986; Lawrence and Mickalide 1987).

In Korea and Japan, social health insurance (SHI) has provided universal PHEs to the public since the 1970s. The objectives of universal PHEs are to contain the cost of healthcare as well as to reduce overall mortality and morbidity. In Korea, the National Health Insurance Corporation (NHIC, the sole social health insurer) covers public PHEs for patients who are older than 40 years on at least a

bi-annual basis. The NHIC provided public PHEs for 60% of the eligible enrollees (8.6 million persons) in 2007 (NHIC, 2008). Public PHEs focus on the screening of major chronic diseases such as hypertension, diabetes and liver diseases. The PHE consists of 25 examination components (i.e., height, weight, eyesight, hearing, chest X-ray, blood pressure, urine, blood test, oral hygiene, history taking, etc.). The examination also provides screening for the five most frequent cancers (stomach, breast, cervix, liver, and colon). The public PHEs in Japan are similar to those in Korea, but public PHEs in Japan are offered by each SHI union.

Although public PHEs cover these various components at no charge or with a small out-of-pocket payment, some people in Korea choose to use private PHEs at their own expense. Private PHEs vary widely in services and price. In general, private PHEs are more comprehensive than public PHEs in terms of the components covered. Moreover, many medical institutes provide private PHEs as one of their profit-seeking strategies. A study has shown that about 10% of all Korean people used private PHEs in 2006 (Kang

Received August 3, 2009; revision accepted for publication September 5, 2009. doi:10.1620/tjem.219.223

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et al. 2009). In addition, medical institutes are marketing PHEs to demanding customers who are even willing to travel overseas.

Although both public and private PHEs are prevalent, to our knowledge, there has been no study examining public and private PHEs simultaneously. Some studies focus on only one of the two types of PHE (Kang et al. 2009; Park et al. 2009). Kang et al. (2009) examined the determinants of utilization of private PHEs only, while Park et al. (2009) studied the factors associated with the use of public PHEs only. In the context of Korea, where both public and private PHEs are widely used, it is worthwhile to consider the determinants of use of the two types of PHE simultaneously.

The objectives of this study were to discover the distinguishing characteristics of public versus private PHE users. Understanding why individuals choose private PHEs over public ones can lead to policies that increase the usage of public PHEs and promote the efficient allocation of public and private health resources.

Methods

Data

We used data from the Korean Longitudinal Study of Ageing (KLoSA) Wave I, which was conducted by the Korea Labor Institute in 2006. The KLoSA is a national longitudinal study of Korean individuals and their family units that focuses on health, economic status, and life satisfaction.

The KLoSA study sample consisted of 10,253 individuals 45 years of age or older. The survey used 45 as the minimum age because Koreans are increasingly retiring in their mid-forties. The KLoSA used a stratified multistage probability sampling design according to region and residence to select subjects nationwide from the Korean population. Using face-to-face interviews, the survey collected a wide variety of information both on economic factors such as employment status, income level, household assets and overall financial satisfaction, and on typical demographic characteristics such as age, sex, marital status, education and health.

The main advantage of these data is that the use of public as well as private PHEs was investigated as part of the study. In addition, The KLoSA includes information on subjective health status and history of diseases including hypertension, diabetes and cancer. Using these data, we investigated the determinants of PHE use, controlling for demographic, socioeconomic and health-related variables.

Variables used

The primary dependent variable was type of PHE. Some subjects used only public PHEs, others used only private PHEs, still others used both types of PHEs or none at all within the previous two years.

We used demographic factors, socioeconomic status and health-related variables as independent variables. The demographic variables used in this study included age, sex, marital status, education, religion, employment and residency. We used total household assets, which consisted of the sum of the real estate and financial assets of the household. Based on their total household assets, subjects were classified into quartiles (fourth quartile, third quartile, second quartile, top quartile). Binary variables were used to distinguish public and private health insurance.

This study employed several health-related variables: self-assessed health status measured by a five-grade scale, prevalence of chronic disease (hypertension, diabetes, or cancer), accidents (traffic accidents or falls) and disability. The prevalence of chronic diseases was considered only when doctors diagnosed hypertension, diabetes or cancer.

Variables reflecting current smoking and drinking habits were generated from the interview data. The variable for regular exercise behaviors refers to whether or not the respondents spend a half hour or more on moderate or vigorous physical activity at least three times per week. Lastly, we included the respondents' confidence in public policies ensuring coverage for their golden years.

Statistical Analysis

We used simple frequencies to describe the characteristics of the respondents based on the type of PHE that they received, and we used Chi-square and ANOVA tests to determine the differences in socio-demographic characteristics and health-related variables between the PHE groups.

Next, we used a multinomial logit (MNL) model to examine the determinants of the choice between public PHEs only, private PHEs only, both types of PHE and non-usage of PHEs. We employed the MNL model to analyze respondents' choice of PHE type. We calculated the incidence rate ratios (IRRs) and confidence intervals (CIs) at the 95% confidence level. We obtained simple frequencies, the results of Chi-square and ANOVA tests and estimates of the MNL for the determinants of PHE use using STATA 9.1.

Results

Characteristics of respondents

Table 1 presents the characteristics of the entire sample according to the type of PHE used within the two years prior to the time of the survey conducted in 2006. About 38.9% ($n = 3,994$) of the 10,253 samples received public PHEs only, 7.3% ($n = 743$) received private PHEs only and 6.5% ($n = 666$) received both types, while 47.3% ($n = 4,850$) did not receive any PHE at all. There was no significant difference between males (43.5%) and females (56.5%) in terms of type of PHE use. The mean age of all respondents was 61.6 years and there was a significant difference in age between the four groups. About 77.8% of all respondents were married and around 37.5% had at least a high school education. A little more than half of the respondents had a religion and individuals receiving any type of PHE were more likely to have a religion compared to those who did not use any kind of PHE. 77.3% of all respondents resided in an urban area, and city dwellers were more likely to use PHE programs. Individuals receiving private PHEs only were more likely to reside in cities than respondents in any other group. The proportion of individuals living in cities was 85.3% in private PHEs only, 73.3% in public PHEs only, 83.8% in both types of PHEs, and 78.6% in no PHEs respectively. The average household assets was 20,255 USD (U.S. dollar); individuals receiving private PHEs only had much higher average household assets (36,833 USD) than individuals using both types of PHE (30,558 USD), public PHEs only (18,457 USD) or no PHE at all (17,644

USD).

With regard to health insurance status, all of the respondents were enrolled in either SHI (93.7%) or Medicaid (6.3%). 32.2% of all respondents purchased private health insurance to supplement the social health insurance. There was a greater proportion of privately insured respondents among users of both types of PHE than among those who did not use PHEs at all (44.2% versus 26.4%); a similar trend was observed for religion. In other words, the use of private health insurance led to a higher use of PHE program services.

Nearly one-third (31.0%) of respondents evaluated their health status as 'fair' or 'poor'. Respondents who self-assessed their health as 'fair' or 'poor' were more frequent in the private PHE only and both PHE groups than in the no PHE user group. The prevalence of chronic diseases among the total sample population was 34.6%, and that of accidents was 12.8%. The prevalence of diseases among users of private PHEs only and users of both types of PHEs was higher than in the public PHE only and no PHE groups. With regard to health-related behaviors (i.e., smoking, drinking and regular exercise), 19.3% of all respondents were current smokers and 38.3% exercised regularly. The proportions of current smokers or respondents who do not exercise regularly were highest in the no PHE group, followed by the public PHE group; they were lowest in the both PHE group. The more concerned respondents were with their own health status, the higher their use of PHE programs. Trends in drinking habits were opposite. 74.2% of respondents held negative views in terms of their confidence in public policies for seniors.

Determinants of use of periodic health examinations

The MNL model examined the determinants of utilization of PHEs. The results are presented in Table 2. The model found that respondents aged 65 to 74 years were 1.41 times more likely to receive public PHEs compared to a reference group (≥ 75). However, there was no significant difference in age between those who used private PHEs and the reference group. We found that married individuals were more likely to use public PHEs and both types of PHE compared to their counterparts. Our study also showed that respondents with a higher level of education may use private PHEs or both types of PHE more frequently than illiterate individuals. Furthermore, religious individuals were more likely to receive public PHEs or both types of PHE. And finally, individuals who lived in an urban area were less likely to receive public PHEs compared to those who lived in rural areas.

Occupation was not a predictor of the use of either private PHEs or both types of PHE, but respondents who were employed were more likely to use public PHEs than unemployed respondents. We found that the richer an individual was, the more they used PHEs. We found that those who were in the top quartile of total household assets were 2.95 times more likely to use private PHEs, 2.34 times more

likely to use both types of PHE and 1.23 times more likely to use public PHEs compared to those who were in the bottom quartile of total household assets. Private health insurance was also a predictor of receiving PHEs. Respondents who were privately insured were 1.85 times more likely to use both types of PHE and 1.61 times more likely to use private PHEs compared to uninsured respondents.

Regarding the health status of respondents, self-assessed health status was related to the use of private PHEs and both types of PHE. In contrast, these factors showed little association with the use of public PHEs. Individuals who self-assessed their health status as 'poor' were 3.16 times more likely to use private PHEs compared to those who rated their health as 'excellent'. Both chronic diseases and accidents were predictors of using private PHEs or both types of PHE. Individuals with chronic diseases were 1.55 times more likely to use private PHEs compared to respondents with no chronic disease. In terms of health-related behaviors, smoking was related to both the use of public PHEs only and the use of both types of PHE. Regular exercise was also related to all three types of PHE use, but drinking was not.

Discussion

This study examined the main characteristics of individuals who used PHEs and the determinants of PHE use among Korean people. We found that there were significant differences in the demographic and socioeconomic characteristics of the three groups of PHE users (public PHEs only, private PHEs only and both types of PHE).

We found that about 38.9% of all respondents used public PHEs only. Those who were married, religious, or resided in rural areas were more likely to use public PHEs than their counterparts. The positive relationship between public PHE use and religious belief is consistent with previous findings (Benjamins 2007). This fact might be due to religious doctrines that emphasize physical as well as spiritual health. One of interesting findings was that residents of rural areas were more likely to use public PHEs than those living in urban areas; this was not consistent with the results of previous studies, which reported a negative relationship between the use of preventive services and residence in rural areas (Hueston et al. 2000; Casey et al. 2001). It is assumed that this occurs because there are many public health facilities (public health centers) providing public PHEs in rural areas in Korea, which increases the uptake of public PHEs among rural populations. The public health facilities in rural areas have promoted public PHEs for their residents more than those in urban areas have.

The current study found that those who were employed in the corporate sector were more likely to use public PHEs than the unemployed because most employees receive mandatory public PHEs which employers have to give to their all employees by law on at least a bi-annual basis. Those who have a higher degree of confidence in public policies were more likely to use public PHEs than their counterparts.

Table 1. Characteristics of respondents (N, %).

	Total ^{*3}	No PHE ^{*1}	PHEs			<i>P</i>
			Public PHEs only	Private PHEs only	Both PHEs ^{*2}	
Subjects	10,253 (100.0)	4,850 (47.3)	3,994 (38.9)	743 (7.3)	666 (6.5)	
Sex ^{*4}					<.121	
Male	4,465 (43.5)	2,062 (42.5)	1,783 (44.6)	315 (42.4)	305 (45.8)	
Female	5,788 (56.5)	2,788 (57.5)	2,211 (55.4)	428 (57.6)	362 (54.2)	
Age (Mean $\pm$ s.d. ^{*5})	61.6 $\pm$ 11.1	62.3 $\pm$ 11.9	61.3 $\pm$ 10.3	60.2 $\pm$ 10.6	60.5 $\pm$ 10.1	<.001
Age group						<.001
45 - 54	3,308 (32.3)	1,578 (32.5)	1,239 (31.0)	271 (36.5)	220 (33.1)	
55 - 64	2,790 (27.2)	1,187 (24.5)	1,170 (29.3)	223 (30.0)	210 (31.5)	
65 - 74	2,676 (26.1)	1,207 (24.9)	1,121 (28.1)	172 (23.1)	176 (26.4)	
$\geq$ 75	1,479 (14.4)	878 (18.1)	464 (11.6)	77 (10.4)	60 (9.0)	
Marital status						<.001
Married	7,970 (77.8)	3,524 (72.7)	3,269 (81.9)	606 (81.6)	571 (85.7)	
Unmarried	2,281 (22.2)	1,325 (27.3)	724 (18.1)	137 (18.4)	95 (14.3)	
Education						<.001
Illiterate	1,835 (17.9)	1,066 (21.9)	641 (16.0)	142 (19.2)	122 (18.4)	
Less than primary school	2,814 (27.5)	1,293 (26.8)	1,190 (29.8)	224 (30.2)	205 (30.9)	
Middle school	1,749 (17.1)	801 (16.5)	695 (17.4)	139 (18.8)	114 (17.2)	
High school	2,703 (26.4)	1,225 (25.3)	1,049 (26.3)	165 (22.3)	166 (25.0)	
College and university	1,114 (11.1)	462 (9.5)	418 (10.5)	71 (9.5)	57 (8.5)	
Religion						<.001
Religious	5,679 (55.4)	2,529 (52.1)	2,299 (57.6)	443 (59.6)	408 (61.3)	
Not religious	4,574 (44.6)	2,321 (47.9)	1,695 (42.4)	300 (40.4)	258 (38.7)	
Region						<.001
Urban	7,929 (77.3)	3,810 (78.6)	2,927 (73.3)	634 (85.3)	558 (83.8)	
Rural	2,324 (22.7)	1,040 (21.4)	1,067 (26.7)	109 (14.7)	108 (16.2)	
Occupation						<.001
Employed	1,875 (18.3)	820 (16.9)	814 (20.4)	114 (15.3)	127 (19.1)	
Self-employed	2,013 (19.6)	955 (20.0)	782 (19.6)	148 (19.9)	128 (19.2)	
Unemployed	6,365 (62.1)	3,075 (63.4)	2,398 (60.0)	481 (64.7)	411 (61.7)	
Total household assets (Mean $\pm$ s.d. ^{*5} /USD ^{*6})	20,255 $\pm$ 35,519	17,644 $\pm$ 31,859	18,457 $\pm$ 30,033	36,833 $\pm$ 59,944	30,558 $\pm$ 45,151	<.001
Total household assets						<.00
1 st Quartile	2,382 (23.2)	936 (19.3)	878 (22.0)	307 (41.3)	261 (39.2)	
2 nd Quartile	2,546 (24.8)	1,110 (22.9)	1,077 (27.0)	187 (25.2)	172 (25.8)	
3 rd Quartile	2,272 (22.2)	1,110 (22.9)	957 (24.0)	110 (14.8)	95 (14.3)	
4 th Quartile	2,053 (29.8)	1,694 (34.9)	1,082 (27.0)	139 (18.7)	138 (20.7)	
SHI ^{*7} type						<.001
SHI	9,588 (93.7)	4,490 (92.9)	3,744 (94.0)	719 (96.8)	635 (95.4)	
Medicaid	640 (6.3)	345 (7.1)	240 (6.0)	24 (3.2)	31 (4.6)	
Private health Insurance						<.001
Insured	3,294 (32.2)	1,280 (26.4)	1,408 (35.3)	313 (42.2)	293 (44.2)	
Uninsured	6,937 (67.8)	3,561 (73.6)	2,577 (64.7)	429 (57.8)	370 (55.8)	
Health status						<.001
Excellent	357 (3.5)	172 (3.6)	135 (3.4)	24 (3.2)	26 (3.9)	
Very good	3,052 (34.2)	1,683 (34.7)	1,352 (33.8)	251 (33.8)	216 (32.4)	
Good	3,208 (31.3)	1,386 (28.5)	1,401 (35.1)	221 (29.7)	200 (30.0)	
Fair	2,486 (24.2)	1,217 (25.1)	900 (22.5)	183 (24.7)	186 (27.9)	
Poor	700 (6.8)	392 (8.1)	206 (5.2)	64 (8.6)	38 (5.8)	

Table 1. Continued

	Total ^{*3}	No PHE ^{*1}	PHEs			<i>P</i>
			Public PHEs only	Private PHEs only	Both PHEs ^{*2}	
Disability						.786
Yes	668 (6.5)	328 (6.8)	249 (6.2)	49 (6.6)	42 (6.3)	
No	9,585 (93.5)	4,522 (93.2)	3,745 (93.8)	694 (93.4)	624 (93.7)	
Chronic disease						<.001
Yes	3,545 (34.6)	1,604 (33.1)	1,353 (33.9)	322 (43.3)	266 (39.9)	
No	6,708 (65.4)	3,246 (66.9)	2,641 (66.1)	421 (56.7)	400 (60.1)	
Accidents						<.001
Yes	1,311 (12.8)	618 (12.7)	469 (11.7)	109 (14.7)	115 (17.3)	
No	8,942 (87.3)	4,232 (87.3)	3,525 (88.3)	634 (85.3)	551 (82.7)	
Smoking						<.001
Non-smoker/Ex-smoker	8274 (80.7)	3,771 (77.8)	3,302 (82.7)	611 (82.2)	590 (88.6)	
Current smoker	1979 (19.3)	1,079 (22.2)	692 (17.3)	132 (17.8)	76 (11.4)	
Drinking						.02
Yes	5,676 (55.4)	2,099 (43.3)	1,820 (45.6)	403 (54.2)	348 (52.3)	
No	4,577 (44.6)	2,751 (56.7)	2,174 (54.4)	340 (45.8)	318 (47.7)	
Regular exercise						<.001
Yes	3,931 (38.3)	1,490 (30.7)	1,640 (41.1)	404 (54.4)	397 (59.6)	
No	6,322 (61.7)	3,360 (69.3)	2,354 (58.9)	339 (45.6)	269 (40.4)	
Confidence in public policies						<.001
5 - 10 points (Positive)	2,645 (25.8)	1,147 (23.6)	1,135 (28.4)	194 (26.1)	169 (25.4)	
0 - 4 points (Negative)	7,608 (74.2)	3,703 (76.4)	2,859 (71.6)	549 (73.9)	497 (74.6)	

^{*1}Subjects who did not use any kind of periodic health examinations (PHEs). ^{*2}Subjects who used both public and private examinations.

^{*3}Total = No PHE + PHEs = No PHE + Public PHEs + Private PHEs + Both PHEs.

^{*4}In each variables, the sum of vertical proportion rates is 100%.

^{*5}S.D., Standard Deviation. ^{*6}USD, U.S. dollar. ^{*7}SHI, Social Health Insurance.

This means that they might be in sympathy with other public programs like public PHEs.

We found that about 7.3% of all respondents received private PHEs only. They tended to be more educated, wealthier and less healthy than respondents who used no PHE at all. Education has been assumed to be associated with the use of preventive services (Kenkel 2000). We found that the level of education was associated with the use of private PHEs but not with that of public PHEs, which contrasts with previous studies (Farrell and Fuchs 1982; Kenkel 2000). The level of education is thought to be an indicator of individuals' socioeconomic status (Seidel et al. 2008). Indeed, inequalities in income and health status according to education level are larger in Korea than in developed countries (Khang et al. 2004; Son 2004; Lee and Jeon 2005). Moreover, the finding that education level was related to the use of private PHEs might be due to the fact that education level is associated with income, which itself is a factor in the use of private PHEs, which require high fees.

This study's finding that health status is associated with the use of private PHEs but not public PHEs can be partly explained by untruthfulness about public PHEs among Korean people (Shin et al. 2006). Most public PHEs

are provided by small-size hospitals or clinics that are able to receive reimbursements by reporting to NHIC, while private PHEs are provided by large hospitals such as university hospitals. In addition, private PHEs provide for sufficient consultations about the users' health status, whereas with public PHEs, patients are informed of the results of the examinations without a direct consultation with a physician (Lee et al. 2004; NHIC 2007). Hence, those who have chronic diseases or consider themselves unhealthy will opt for private PHEs instead of public PHEs. Given the brief diagnosis and treatment and the long waiting time for outpatient and physician visits in Korea, individuals might be more drawn to medical consultations provided by private PHE programs.

The current study showed that 6.5% of all subjects used both public and private PHEs. They had a high socioeconomic status and a low health status with regard to chronic diseases and accidents. The main finding was that these respondents were unhealthy but eager to promote their health by not smoking and getting regular exercise. In addition, they reduced their financial risk by using private health insurance.

It is expected that there are three pathways leading to the use of both types of PHE. Firstly, some people who

Table 2. Multinomial logistic regression for periodic health examinations (PHEs).

	Public PHEs only (IRR, 95% CI; N = 3,994)	Private PHEs only (IRR, 95% CI; N = 743)	Both PHEs (IRR, 95% CI; N = 666)
Sex			
Male	1.06 (0.94 - 1.21)	0.83 (0.66 - 1.06)	1.08 (0.85 - 1.38)
Female	1	1	1
Age group			
45 - 54	0.93 (0.77 - 1.16)	1.16 (0.81 - 1.66)	0.93 (0.63 - 1.37)
55 - 64	1.26 (1.07 - 1.49)	1.31 (0.95 - 1.81)	1.34 (0.94 - 1.90)
65 - 74	1.41 (1.21 - 1.64)	1.25 (0.93 - 1.70)	1.50 (1.08 - 2.08)
≥ 75	1	1	1
Marital status			
Married	1.42 (1.26 - 1.61)	1.05 (0.83 - 1.32)	1.46 (1.12 - 1.90)
Unmarried	1	1	1
Education			
College and university	1.03 (0.84 - 1.28)	2.89 (1.97 - 4.25)	2.56 (1.69 - 3.87)
High school	1.07 (0.90 - 1.27)	1.98 (1.40 - 2.80)	2.05 (1.42 - 2.98)
Middle school	1.07 (0.90 - 1.27)	1.94 (1.37 - 2.73)	1.78 (1.23 - 2.59)
Primary school	1.21 (1.05 - 1.39)	1.52 (1.12 - 2.07)	1.75 (1.25 - 2.44)
Illiterate	1	1	1
Religion			
Religious	1.20 (1.10 - 1.32)	1.15 (0.97 - 1.36)	1.21 (1.02 - 1.45)
Non-religious	1	1	1
Region			
Urban	0.63 (0.56 - 0.70)	0.95 (0.76 - 1.20)	0.84 (0.66 - 1.07)
Rural	1	1	1
Occupation			
Employed	1.27 (1.11 - 1.45)	0.79 (0.61 - 1.03)	1.13 (0.87 - 1.46)
Self-employed	0.92 (0.81 - 1.05)	0.94 (0.74 - 1.18)	0.97 (0.76 - 1.24)
Unemployed	1	1	1
Total household asset			
1 st Quartile	1.23 (1.07 - 1.40)	2.95 (2.31 - 3.75)	2.34 (1.82 - 3.01)
2 nd Quartile	1.28 (1.13 - 1.45)	1.68 (1.31 - 2.16)	1.45 (1.12 - 1.87)
3 rd Quartile	1.15 (1.02 - 1.31)	1.14 (0.87 - 1.50)	0.95 (0.71 - 1.26)
4 th Quartile	1	1	1
Social health insurance type			
Social health insurance	0.87 (0.72 - 1.05)	1.69 (1.08 - 2.63)	0.99 (0.66 - 1.49)
Medicaid	1	1	1
Private health insurance			
Insured	1.49 (1.34 - 1.67)	1.61 (1.33 - 1.96)	1.85 (1.51 - 2.27)
Uninsured	1	1	1
Health status			
Excellent	1	1	1
Very good	1.08 (0.85 - 1.38)	1.24 (0.78 - 1.96)	1.02 (0.65 - 1.61)
Good	1.49 (1.16 - 1.91)	1.74 (1.09 - 2.79)	1.53 (0.97 - 2.43)
Fair	1.20 (0.93 - 1.56)	2.17 (1.33 - 3.53)	2.16 (1.34 - 3.49)
Poor	0.95 (0.70 - 1.30)	3.16 (1.81 - 5.49)	1.85 (1.02 - 3.30)
Disability			
Yes	1.00 (0.83 - 1.20)	1.01 (0.72 - 1.42)	0.91 (0.63 - 1.30)
No	1	1	1

Table 2. Continued.

	Public PHEs only (IRR, 95% CI; N = 3,994)	Private PHEs only (IRR, 95% CI; N = 743)	Both PHEs (IRR, 95% CI; N = 666)
Chronic disease			
Yes	1.05 (0.95 - 1.16)	1.55 (1.29 - 1.85)	1.24 (1.03 - 1.50)
No	1	1	1
Accidents			
Yes	0.93 (0.81 - 1.06)	1.15 (0.91 - 1.45)	1.37 (1.09 - 1.73)
No	1	1	1
Smoking			
Non-smoker or ex-smoker	1.44 (1.27 - 1.64)	1.09 (0.86 - 1.39)	2.24 (1.70 - 2.95)
Current smoker	1	1	1
Drinking			
Yes	1.09 (0.98 - 1.21)	1.08 (0.89 - 1.31)	1.12 (0.91 - 1.37)
No	1	1	1
Regular exercise			
Yes	1.46 (1.32 - 1.61)	1.92 (1.62 - 2.28)	2.35 (1.95 - 2.82)
No	1	1	1
Confidence in public policies			
5 - 10 points (Positive)	1.22 (1.11 - 1.35)	1.09 (0.91 - 1.31)	1.04 (0.85 - 1.25)
0 - 4 points (Negative)	1	1	1
Number of observations		10,205	
LR Chi-square		1,239.39	
Pseudo R ²		0.0557	

PHEs, periodic health examinations; IRR, Incidence Rate Ratio; CI, Confidence Interval.

used public PHEs and were not satisfied with them might then use private PHEs. Previous studies (Lee et al. 2004; Shin et al. 2006; NHIC 2007) demonstrated that Korean people are more satisfied with private PHEs than with public PHEs because private PHE programs report results to the patients promptly and also give them sufficient explanations about the results and follow-up procedures. Secondly, those who are found to have an abnormality during a public PHE might prefer to use a private PHE instead of a second public PHE to examine the abnormality more closely. The NHIC reported that, among those who have abnormalities detected in the public PHE program, return for a second public PHE decreased from 49.7% in 2004 to 43.0% in 2007 (NHIC 2005; NHIC 2008). The third pathway is the use of private PHE programs offered by medical institutions that provide both public and private PHEs because private PHEs are not covered by Korean social health insurance and are more profitable for the institutions than public PHEs.

Based on the findings of this study, we found that respondents who were not married and lived in urban areas were less likely to use public PHEs. Although public PHEs are provided almost for free for all participants, those who were not employed or self-employed and those who were in the lower asset bracket were also less likely to participate in the public PHE program. The Korean government has made efforts to increase participation in public PHEs by including new components into the PHE. In this context, it

is suggested that policy makers pay attention to the target population (i.e., lower socioeconomic group) rather than to the content of the examination in order to increase the utilization of public PHEs. On the other hand, the government should consider increasing participants' satisfaction through speedy and kindly explanations, and follow-up of abnormalities. Also, policy makers should take measures to increase large-size hospitals delivering public PHEs and should control quality of small-size medical institutes providing the examination for increasing the public's confidence in the public PHE program.

Although private PHEs are thought to be less cost-effective than public PHEs from a social perspective (Frame 1986), the former provide more benefits to specific populations (educated, wealthy, or unhealthy group) than do the latter when viewed from a personal perspective, because the private PHE is a customer-suited service that will meet the requirements of individual users. Therefore, even though the NHIC fully covers public PHEs, there has been a demand for private PHEs among some segments of the population.

As noted above, there were problems of PHE underutilization among those who were disadvantaged with regard to socio-economic status. On the other hand, participation in both public and private PHEs may indicate overutilization problems because the components of private PHEs include those of public PHEs, such as mammography and

cholesterol screening. It is therefore necessary for policy makers to reduce the overutilization of PHEs through cooperation between public and private PHE programs; for example, in such a way that individuals who have used a private PHE are excluded from the public PHE program.

This study has some limitations. Firstly, the private PHEs used by respondents of this study were not uniform in terms of the examination's components. However, this fact might not be critical because our main objective was to make comparisons between private and public PHE users rather than between users of different private PHEs. Secondly, there is a difference in the components of the PHEs given to women and men. Hence, the samples used in most previous studies (Diamant et al. 2000; Taylor et al. 2004; Larsen et al. 2006; Blomberg et al. 2008) were limited to only women or only men. The current study did not group the respondents according to their sex because the PHEs in this study included comprehensive examination components and the proportion of sex-specific components in the PHEs was minimal. Our study examined sex-specific subgroups but did not report the results because there was little difference between the results of the subgroups and the pooled data. Finally, the current study was based on self-reports, which might result in 'recall bias'. Care should be taken in interpreting the results of this study.

Regardless of the limitations, this study has important implications in that determinants of the choice between a public PHE, a private PHE or both types of PHE were examined. The findings from this study can be used to guide policy decision-making, especially by countries that provide both public and private PHEs. Our results suggest that those who are socioeconomically disadvantaged should be given social attention with a public PHE, and that cooperation between public and private PHE programs should be implemented to improve healthcare resource utilization.

References

- Benjamins, M.R. (2007) Predictors of preventive health care use among middle-aged and older adults in Mexico: the role of religion. *J. Cross Cult. Gerontol.*, **22**, 221-234.
- Blomberg, K., Ternstedt, B.M., Tömborg, S. & Tishelman, C. (2008) How do women who choose not to participate in population-based cervical cancer screening reason about their decision? *Psychooncology*, **17**, 561-569.
- Casey, M.M., Call, K.T. & Klingner, J.M. (2001) Are rural residents less likely to obtain recommended preventive healthcare services? *Am. J. Prev. Med.*, **21**, 182-188.
- Diamant, A.L., Schuster, M.A. & Lever, J. (2000) Receipt of preventive health care services by lesbians. *Am. J. Prev. Med.*, **19**, 141-148.
- Farrell, P. & Fuchs, V.R. (1982) Schooling and health: the cigarette connection. *J. Health Econ.*, **1**, 217-230.
- Frame, P.S. (1986) A critical review of adult health maintenance. part 1: prevention of atherosclerotic diseases. *J. Fam. Pract.*, **22**, 341-346.
- Han, P.K.J. (1997) Historical changes in the objectives of the periodic health examination. *Ann. Intern. Med.*, **127**, 910-917.
- Hueston, W.J. & Hubbard, E.T. (2000) Preventive services for rural and urban African American adults. *Arch. Fam. Med.*, **9**, 263-266.
- Kang, S.W., You, C.H. & Kwon, Y.D. (2009) The determinants of the use of an opportunistic screening program in Korea. *J. Prev. Med. Public Health*, **42**, 177-182.
- Kenkel, D.S. (2000) Prevention. In *Handbook of health economics, Volume I*, edited by A.J. Culyer & J.P. Newhouse. Elsevier, New York, 1675-1720.
- Khang, Y.H., Lynch, J.W., Yun, S. & Lee, S.I. (2004) Trends in socioeconomic health inequalities in Korea: use of mortality and morbidity measures. *J. Epidemiol. Community Health*, **58**, 308-314.
- Lawrence, R.S. & Mickalide, A.D. (1987) Preventive services in clinical practice: designing the periodic health examination. *JAMA*, **257**, 2205-2207.
- Larsen, I.K., Grotmol, T., Almendingen, K. & Hoff, G. (2006) Lifestyle characteristics among participants in a Norwegian colorectal cancer screening trial. *Eur. J. Cancer Prev.*, **15**, 10-19.
- Lee, S.A., Choi, K.S., Hwang, S.Y., Lee, J.Y., Park, E.C. & Lee, K.J. (2004) The effect of socioeconomic factors on health screening in Korea. *J. Korean Assoc. Cancer Prev.*, **9**, 188-198.
- Lee, S.G. & Jeon, S.Y. (2005) The relations of socioeconomic status to health status, health behaviors in the elderly. *J. Prev. Med. Public Health*, **38**, 154-162.
- National Health Insurance Corporation (NHIC). (2005) *Press reports on 2004 periodic health examination*, NHIC, Seoul.
- National Health Insurance Corporation (NHIC). (2007) *Satisfaction investigation of health screening participants*, NHIC, Seoul.
- National Health Insurance Corporation (NHIC). (2008) *Press reports on 2007 periodic health examination*, NHIC, Seoul.
- Park, J.H., Lee, J.S., Lee, J.Y., Gwack, J., Park, J.H., Kim, Y.I. & Kim, Y. (2009) Disparities between persons with and without disabilities in their participation rates in mass screening. *Eur. J. Public Health*, **19**, 85-90.
- Seidel, D., Becker, N., Rohrmann, S., Nimptsch, K. & Linseisen, J. (2008) Socio-demographic characteristics of participation in the opportunistic German cervical cancer screening programme: results from the EPIC-Heidelberg cohort. *J. Cancer Res. Clin. Oncol.*, **135**, 533-541.
- Shin, Y.S., Park, C.Y., Jung, S.H., Jung, Y.J. & Kang, H.Y. (2006) Comparison of customer satisfaction with health examination programs provided by the Korea National Health Insurance and private healthcare organizations in Korea. *J. Korean Soc. Qual. Assur. Health Care*, **12**, 40-51.
- Son, M. (2004) Commentary: Why the educational effect is so strong in differentials of mortality in Korea? *Int. J. Epidemiol.*, **33**, 308-310.
- Spitzer, W.O. (1984) The periodic health examination: 1. Introduction. *Can. Med. Assoc. J.*, **130**, 1276-1278.
- Taylor, R., Morrell, S., Estoesta, J. & Brassil, A. (2004) Mammography screening and breast cancer mortality in New South Wales, Australia. *Cancer Causes Control*, **15**, 543-550.