



# Enrollment in Private Medical Insurance and Utilization of Medical Services Among Children and Adolescents: Data From the 2009-2012 Korea Health Panel Surveys

Dong Hee Ryu<sup>1</sup>, Sin Kam<sup>1</sup>, Young-Taek Doo<sup>2</sup>

<sup>1</sup>Department of Preventive Medicine, Kyungpook National University School of Medicine, Daegu; <sup>2</sup>Department of Physical Therapy, Kwangju Women's University, Gwangju, Korea

**Objectives:** The purposes of this study were to examine the status of children and adolescents with regard to enrollment in private medical insurance (PMI) and to investigate its influence on their utilization of medical services.

**Methods:** The present study assessed 2973 subjects younger than 19 years of age who participated in five consecutive Korea Health Panel surveys from 2009 to 2012.

**Results:** At the initial assessment, less than 20% of the study population had not enrolled in any PMI program, but this proportion decreased over time. Additionally, the number of subjects with more than two policies increased, the proportions of holders of indemnity-type only ('I'-only) and of fixed amount+indemnity-type ('F+I') increased, whereas the proportion of holders with fixed amount-type only ('F'-only) decreased. Compared with subjects without private insurance, PMI policyholders were more likely to use outpatient and emergency services, and the number of policies was proportionately related to inpatient service utilization. Regarding outpatient care, subjects with 'F'-only PMI used these services more often than did uninsured subjects (odds ratio [OR], 1.69), whereas subjects with 'I'-only PMI or 'F+I' PMI utilized a broad range of inpatient, outpatient, and emergency services relative to uninsured subjects (ORs for 'I'-only: 1.39, 1.63, and 1.38, respectively; ORs for 'F+I': 1.67, 2.09, and 1.37, respectively).

**Conclusions:** The findings suggest public policy approaches to standardizing PMI contracts, reform in calculation of premiums in PMI, re-examination regarding indemnity insurance products, and mutual control mechanisms to mediate between national health insurance services and private insurers are required.

**Key words:** Insurance, Health services, Child, Adolescent

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**Corresponding author:** Sin Kam, MD, PhD  
680 Gukchaebosang-ro, Jung-gu, Daegu 41944, Korea  
Tel: +82-53-420-4865, Fax: +82-53-425-2447  
E-mail: kamshin@knu.ac.kr

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## INTRODUCTION

The utilization of medical services is increasing in Korea. From 1990 to 2010, the number of visits per day to ambulatory care or outpatient departments increased from 0.17 million to 2.69 million [1]. Healthcare utilization by children and adolescents is also increasing. In 2002, 63 866 children and adolescents were discharged from hospitals, and this increased two-fold, to 111 417, in 2012 [2].

In 2006, 64.5% of individual health expenditure was covered

by national health insurance, but only 62% was in 2013, which is lower than the Organization for Economic Cooperation and Development average of 72% [3]. In contrast, out-of-pocket medical expenses increased from 13.4% in 2006 to 18.0% in 2013; thus, the low rate of coverage is a major financial burden [3]. Therefore, many individuals tend to purchase private medical insurance (PMI) [4].

In 1996, the Korean market for PMI was 1.3 trillion Korean won (KRW), but it reached 17 trillion KRW in 2009 [5]. Data collected from 36 PMI companies from 2004 to 2006 revealed that, of 105 791 individuals younger than 19 years of age, 59.5% were PMI policyholders [6], and the 2011 Korea Health Panel found that the PMI enrollment rate of children younger than age 15 was 85% [7]. In 2013, 240 395 new contracts were created for children and adolescents, and there were 570 722 in-force contracts for members of this age group [8].

The first amendment to regulation of standard terms and conditions for indemnity insurance applied since 2009 allowed property insurance and life insurance companies to provide indemnity products [9]. Following this amendment, the number of indemnity insurance policyholders increased from 7.96 million in 2006 to 30.81 million in 2014 [10]. Children and adolescents are more susceptible to fractures, burns, and injuries; thus, parents are more likely to obtain indemnity insurance for their children. Recently, many newborns have been enrolled in a new PMI, 'fetus insurance,' which is applied during pregnancy and automatically changes to the indemnity type after birth [11]. Accordingly, the number of policyholders with indemnity PMI is expected to constantly increase.

The effects of PMI on public health insurance have been assessed in Western countries. In the US, most studies have focused on a Medigap policy providing supplementary insurance designed to reduce the out-of-pocket expenses of Medicare applicants; these revealed that people with Medigap coverage are more likely to use medical services [12,13]. The 1993-1994 National Health Interview Survey estimated that uninsured children in the US are less likely to access primary care [14]. Furthermore, a French study reported that PMI holders used outpatient services twice as often as the uninsured [15].

Previous studies evaluating PMI in Korea have focused on adults who make their own decisions about PMI. However, because PMI is accessible to children due to their relatively low premiums, studies investigating the relationship between PMI and healthcare utilization by children and adolescents are needed. Additionally, even if parents make final decisions re-

garding the PMI enrollment, most children maintain this insurance for 20 to 30 years to secure the guarantee periods. Thus, it is critical to examine the variables associated with PMI in this age group to predict future market trends and propose any amendments to related government policies.

The purposes of this study were to assess the recent PMI status of children and adolescents and to determine the utilization of medical services according to PMI status.

## METHODS

### Materials and Study Subjects

Beginning in April 2008, the Korea Institute for Health and Social Affairs, in collaboration with the National Health Insurance Corporation, initiated data collection for the Korea Health Panel. Of the 2008-2012 annual Korea Health Panel datasets (version 1.1), the 2009-2012 data were used in the present study; the data from 2008 were excluded due to the amendment for indemnity PMI in 2009.

The Korea Health Panel provides databases as annual sets basically. For 2010, two surveys were conducted for the first and second halves of the year. Due to variability in the insurance status of individuals in each survey, the PMI data for 2010 was provided as datasets for the first and second halves of the year; thus, a total of five datasets were assessed. The subjects were limited to individuals who were younger than 19 years of age in 2012 and participated in five consecutive surveys ( $n = 2973$ ).

### Study Variables

The dependent variable was the presence or absence of any use of health services since the last visit of the interviewers. The use of outpatient services was further classified by the median number or the upper 30% of visits. The upper 30% represented the top 30% of subjects in terms of number of visits. The individual-specific independent variables were selected based on Andersen's behavioral model for health services uses [16]: the predisposing components for health services utilization were sex and age, the enabling component was household income, and the need component was chronic disease. Frequently identified chronic diseases included asthma, atopic dermatitis, teeth cavities, chronic otitis media, allergic rhinitis, and disorders of refraction and accommodation; these diseases constituted more than 60% of the identified diseases. Age (years) was further categorized as 0-6, 7-12, 13-

15, and 16-18, and household income was categorized into quintiles (lowest, lower, middle, higher, and highest 20%). Chronic disease was classified as presence or absence because the number of subjects with severe diseases affecting health-care utilization to a great extent was very small and the PMI purchase status did not differ among the diseased.

The PMI-related independent variables included whether respondents held PMI and the number and types of PMI they held; subjects without PMI and with PMI were considered to be 'the uninsured' and 'the insured', respectively. The insured were further classified according to PMI type: fixed amount-type only ('F'-only), indemnity-type only ('I'-only), and fixed amount+indemnity-type ('F+I'). The fixed amount type of insurance indicates an insurance policy which guarantees fixed payouts, while indemnity insurance reimburses the patient as expenses are incurred. The number of PMI policies was categorized as 0, 1, 2, and  $\geq 3$ .

### Data Analysis

First, the PMI status according to individual-specific variables for the 2009 and 2012 datasets and differences in healthcare utilization among the groups in each survey were examined using the chi-square test. The Cochran-Mantel-Haenszel chi-square test was used to analyze trend. Generalized estimating equations (GEE) were used to examine the effects of PMI on healthcare utilization considering intra-individual correlations. From the correlation matrix and the quasi-likelihood under the independence model criterion, an autoregressive structure seemed most appropriate [17] and the models were adjusted for the individual-specific variables. All statistical analyses were performed with SAS version 9.4 (SAS Institute Inc., Cary, NC, USA), and a  $p$ -value  $< 0.05$  was considered to indicate statistical significance.

## RESULTS

### Private Medical Insurance Status of Children and Adolescents

The proportion of insured subjects increased from 80.1% to 84.0% over four years, and most subjects had 'F'-only PMI throughout the study period; however, this decreased over time. In 2009, 14.1% of policyholders had 'I'-only PMI, but this increased to 26.3% in 2012; subjects with 'F+I' PMI exhibited a similar trend. In 2009, most insured subjects held only one insurance policy, but this proportion decreased over the four

years; 26.9% of the subjects had two policies, and this increased by 3.6% points over the four years; and 6.5% of the subjects had more than three policies, and this increased to 12.6% over the four years. Of the policyholders with one insurance policy, most had 'F'-only PMI, and the proportion of those with 'I'-only PMI increased from 18.9% in 2009 to 38.3% in 2012. In 2009, 57.3% of the subjects with two policies had 'F'-only PMI, 36.9% had 'F+I' PMI, and 5.8% had 'I'-only PMI; by 2011, these proportions had changed to 46.0%, 47.6%, and 6.3%, respectively, and most had 'F+I' PMI. Of the subjects with more than three policies, most had 'F+I' PMI, whereas the proportion of those with 'I'-only PMI remained in the 1% range until 2012, when it increased to 5.4% (Table 1).

Table 2 displays the 2009 and 2012 PMI enrollment statuses. There were no significant differences with regard to sex. In contrast, PMI status significantly differed according to age, household income, and chronic disease. Compared with 2009, the proportion of uninsured subjects had decreased in every age group, the proportion of subjects with 'F'-only PMI decreased, and the proportions of subjects with 'I'-only and 'F+I' PMI increased in 2012. A similar pattern was observed for household income, except in the lowest income group; in this group, most subjects had 'F'-only PMI in 2009, but most were uninsured in 2012. For both of these datasets, most subjects had 'F'-only PMI regardless of their physical condition. Pediatric patients with chronic diseases were more likely to have 'F+I' PMI than were those without a disease.

### Utilization of Medical Services by Children and Adolescents According to Private Medical Insurance Status

The subjects with PMI were significantly more likely to use outpatient services than the uninsured in each survey. The uses of outpatient services significantly differed according to PMI in each survey ( $p < 0.01$ ). Except for 2011, the uses of inpatient and emergency services exhibited similar patterns with  $p < 0.05$ . The use of inpatient services significantly differed according to the number of insurance policies in 2009, the second half of 2010, and 2012 ( $p < 0.05$ ). The use of outpatient care differed significantly according to the number of insurance policies held in each survey ( $p < 0.01$ ). The use of emergency care significantly differed according to the number of insurance policies in 2009 and the first and second halves of 2010 ( $p < 0.05$ ). The purchase status of PMI changed over time with statistical significance ( $p < 0.05$ , data not shown). Statisti-

**Table 1.** Private medical insurance (PMI) enrollment status by year

	2009	1st half of 2010	2nd half of 2010	2011	2012
PMI enrollment					
Uninsured	591 (19.9)	507 (17.0)	489 (16.4)	481 (16.2)	475 (16.0)
Insured	2382 (80.1)	2466 (82.9)	2484 (83.5)	2492 (83.8)	2498 (84.0)
PMI types					
Fixed amount only	1725 (72.4)	1603 (65.0)	1552 (62.5)	1482 (59.5)	1208 (48.4)
Indemnity only	336 (14.1)	405 (16.4)	417 (16.8)	437 (17.5)	656 (26.3)
Fixed amount+indemnity	321 (13.5)	458 (18.6)	515 (20.7)	573 (23.0)	634 (25.4)
No. of PMI policies					
1					
Fixed amount only	1278 (81.1)	1180 (77.0)	1116 (75.6)	1054 (73.2)	882 (61.7)
Indemnity only	297 (18.9)	353 (23.0)	361 (24.4)	385 (26.7)	548 (38.3)
Subtotal	1575 (66.1)	1533 (62.2)	1477 (59.5)	1439 (57.7)	1430 (57.2)
2					
Fixed amount only	368 (57.3)	342 (49.0)	347 (47.2)	343 (46.0)	255 (33.8)
Indemnity only	37 (5.8)	47 (6.7)	51 (6.9)	47 (6.3)	91 (12.1)
Fixed amount+indemnity	237 (36.9)	309 (44.3)	337 (45.8)	355 (47.6)	408 (54.1)
Subtotal	642 (26.9)	698 (28.3)	735 (29.6)	745 (29.9)	754 (30.5)
≥3					
Fixed amount only	79 (47.9)	81 (34.5)	89 (32.7)	85 (27.6)	71 (22.6)
Indemnity only	2 (1.2)	5 (2.1)	5 (1.8)	5 (1.6)	17 (5.4)
Fixed amount+indemnity	84 (50.9)	149 (63.4)	178 (65.4)	218 (70.8)	226 (72.0)
Subtotal	165 (6.5)	235 (9.5)	272 (10.9)	308 (12.4)	314 (12.6)

Values are presented as number (%). The fixed amount type of insurance indicates an insurance policy which guarantees fixed payouts, while indemnity type of insurance reimburses the patient as expenses are incurred.

cally significant associations between the independent and dependent variables over time were exhibited when Cochran-Mantel-Haenszel chi-square tests were performed (Table 3).

### Effects of Private Medical Insurance on Utilization of Medical Services by Children and Adolescents

The main effect variables for the GEE models were insurance status (insured vs. uninsured) (model 1), number of insurance policies (model 2), and type of insurance (model 3). Additional analyses were performed using models 2 and 3 without the uninsured (models 2A and 3A). Each model was adjusted for sex, age, household income, and chronic disease. The dependent variable was the presence or absence of healthcare utilization.

The insured were more likely to use outpatient and emergency services than were the uninsured (odds ratio [OR], 1.73 and 1.24, respectively), but this was not the case for inpatient services. Additionally, the ORs increased as the number of insurance policies increased. In terms of outpatient care, the results were significant regardless of the number of insurance policies (ORs: 1.64, 1.85, and 2.19, respectively). Compared

with the uninsured, the insured with more than two policies were more likely to use inpatient and emergency services (ORs: 1.40 and 1.57, respectively; ORs: 1.34 and 1.39, respectively). For model 2A, the number of PMI policies was significantly related to the use of inpatient but not of outpatient and emergency services (ORs: 1.32, 1.48, and 1.98, respectively). The insured with 'F'-only PMI used outpatient services significantly more often than did the uninsured (OR: 1.69), and holders of 'I'-only and 'F+I' PMI used outpatient, emergency, and inpatient services significantly more often than did the uninsured. When subjects with 'I'-only and 'F+I' PMI were compared with subjects with 'F'-only PMI (model 3A), holders of 'I'-only PMI used inpatient services more often (ORs: 1.44; 95% confidence interval [CI], 1.13 and 1.82), and those with 'F+I' PMI used inpatient and emergency services more often (ORs: 1.71 and 1.20, respectively; 95% CI, 1.37 to 2.14 and 1.01 to 1.43, respectively) (Table 4).

Table 5 represents the effects of PMI on utilization of outpatient services defined by the median number or the upper 30% of number of visits. For models 1-3, the results were similar. In contrast to the initial analysis, the number of PMI policies was significantly related to the use of outpatient services

**Table 2.** Private medical insurance enrollment status according to general characteristics of study subjects

	2009				2012			
	Uninsured	Insured			Uninsured	Insured		
		Fixed amount	Indemnity	Fixed amount+indemnity		Fixed amount	Indemnity	Fixed amount+indemnity
Sex								
Male	294 (19.2)	836 (57.8)	174 (11.3)	180 (11.7)	231 (15.1)	633 (41.3)	336 (21.9)	334 (21.8)
Female	297 (20.6)	839 (58.3)	162 (11.3)	141(9.8)	244 (17.0)	575 (40.0)	320 (22.2)	300 (20.8)
<i>p</i> -value <sup>1</sup>		0.33				0.11		
Age (y)								
0-6 <sup>2</sup>	168 (17.3)	534 (55.0)	139 (14.3)	129 (13.3)	50 (11.1)	153 (33.9)	141 (31.3)	107 (23.7)
7-12	256 (19.3)	796 (60.0)	138 (10.4)	136 (10.3)	145 (12.5)	491 (42.2)	247 (21.3)	279 (24.0)
13-15	167 (24.7)	395 (58.3)	59 (8.7)	56 (8.3)	144 (21.1)	291 (42.6)	129 (18.9)	119 (17.4)
16-18	-	-	-	-	136 (20.1)	273 (40.3)	139 (20.5)	129 (19.0)
<i>p</i> -value <sup>1</sup>		<0.001				<0.001		
Household income (quintile)								
1st (lowest)	110 (42.3)	114 (43.8)	27 (10.4)	9 (3.5)	88 (44.0)	70 (35.0)	29 (14.5)	13 (6.5)
2nd (lower)	158 (25.9)	339 (55.5)	83 (13.6)	31 (5.1)	125 (21.6)	225 (38.9)	139 (24.0)	89 (15.4)
3rd (middle)	136 (18.1)	426 (56.7)	94 (12.5)	95 (12.6)	98 (13.5)	305 (41.9)	179 (24.6)	145 (19.9)
4th (higher)	104 (13.7)	463 (60.9)	87 (11.4)	106 (13.9)	90 (11.0)	318 (38.8)	192 (23.4)	220 (26.8)
5th (highest)	77 (13.4)	337 (65.7)	43 (12.9)	77 (13.4)	74 (11.4)	290 (44.7)	117 (18.1)	167 (25.8)
<i>p</i> -value <sup>1</sup>		<0.001				<0.001		
Chronic disease								
Yes	136 (17.3)	475 (60.5)	78 (9.9)	96 (12.2)	136 (13.9)	375 (38.3)	210 (21.4)	258 (26.3)
No	455 (20.8)	1250 (57.1)	258 (11.8)	225 (10.3)	339 (17.0)	833 (41.8)	446 (22.4)	376 (18.9)
<i>p</i> -value <sup>1</sup>		<0.001				<0.001		

Values are presented as number (%).

<sup>1</sup>Chi-square tests were performed.

<sup>2</sup>Results of ages 3-6 are presented for the year 2012.

among the insured, and holders of 'I'-only and 'F+I' PMI used outpatient services more often than those with 'F'-only PMI.

## DISCUSSION

The present study found that the number of PMI policyholders younger than 19 years of age increased over four years, whereas the proportion of subjects with 'F'-only PMI decreased and the proportions with 'I'-only and 'F+I' PMI increased. Additionally, the proportion of subjects with one insurance policy decreased, whereas the proportion with multiple insurance policies increased. An analysis of data from the Korea Longitudinal Study of Aging determined that young, female, and highly educated individuals are more likely to hold multiple policies [18]. Although it is usually impossible to be the beneficiary of more than one type of indemnity insurance, the number of people with multiple policies is increasing.

Thus, it is important to thoroughly examine this phenomenon and develop ways to predict its characteristics.

The present findings indicate that age, household income, and physical conditions may be determining factors of PMI enrollment for children and adolescents. PMI status significantly differed according to age. Students are more limited regarding their utilization of healthcare than are preschoolers [19]; thus, studies that specifically target preschoolers are necessary. The present study found that, in 2012, most uninsured individuals were in the lowest quintile of household income and that the number of insured individuals in this quintile slightly decreased regardless of the number of insurance policies, implying an important relationship between the PMI enrollment of children and the economic status of their parents, especially in low-income groups. The PMI enrollment of children is determined by the socioeconomic status of their parents [7], and a study in the US [20] found that PMI enrollment

**Table 3.** Use of medical services according to private medical insurance (PMI) enrollment status

		Inpatient			Outpatient			Emergency			
		Yes	No	p-value <sup>1</sup>	Yes	No	p-value <sup>1</sup>	Yes	No	p-value <sup>1</sup>	
PMI enrollment											
2009	Uninsured	30 (5.1)	561 (94.9)	0.41	530 (89.7)	61 (10.3)	<0.001	66 (11.2)	525 (88.8)	0.23	
	Insured	142 (6.0)	2240 (94.0)		2280 (95.7)	102 (4.2)		310 (13.0)	2072 (87.0)		
1st half of 2010	Uninsured	23 (4.5)	484 (95.5)	0.17	456 (89.9)	51 (10.1)	<0.001	36 (7.1)	471 (92.9)	0.004	
	Insured	151 (6.1)	2315 (93.9)		2336 (94.7)	130 (5.3)		283 (11.5)	2183 (88.5)		
2nd half of 2010	Uninsured	16 (3.3)	473 (96.7)	0.008	439 (89.8)	50 (10.2)	<0.001	32 (6.5)	457 (93.5)	0.001	
	Insured	158 (6.4)	2326 (93.6)		2353 (94.7)	131 (5.3)		287 (11.5)	2197 (88.4)		
2011	Uninsured	24 (5.0)	457 (95.0)	0.81	423 (87.9)	58 (12.1)	0.001	31 (6.4)	450 (93.6)	0.16	
	Insured	131 (5.3)	2361 (94.7)		2309 (92.7)	183 (7.3)		208 (8.3)	2284 (91.6)		
2012	Uninsured	18 (3.8)	457 (96.2)	0.15	384 (80.8)	91 (19.2)	<0.001	27 (5.7)	448 (94.3)	0.031	
	Insured	134 (5.4)	2364 (94.6)		2302 (92.1)	196 (7.8)		215 (8.6)	2283 (91.4)		
Overall p-value <sup>2</sup>				0.004				<0.001	<0.001		
PMI types											
2009	Uninsured	30 (5.1)	561 (94.9)	0.001	530 (89.7)	61 (10.3)	<0.001	66 (11.2)	525 (88.8)	0.001	
	Fixed amount only	81 (4.7)	1644 (95.3)		1638 (95.0)	87 (5.0)		204 (11.8)	1521 (88.2)		
	Indemnity only	29 (16.9)	307 (91.4)		328 (97.6)	8 (2.4)		42 (12.5)	294 (87.5)		
	Fixed+indemnity	32 (10.0)	289 (9.7)		314 (97.8)	7 (2.2)		64 (19.9)	257 (80.1)		
1st half of 2010	Uninsured	23 (4.5)	484 (95.5)	<0.001	456 (89.9)	51 (10.1)	0.001	36 (7.1)	471 (92.9)	<0.001	
	Fixed amount only	71 (4.4)	1532 (95.6)		1510 (94.2)	93 (5.8)		159 (9.9)	1444 (90.1)		
	Indemnity only	37 (9.1)	368 (90.9)		384 (94.8)	21 (5.2)		63 (15.6)	342 (84.4)		
	Fixed+indemnity	43 (9.4)	415 (90.6)		442 (96.5)	16 (3.5)		61 (13.3)	397 (86.7)		
2nd half of 2010	Uninsured	16 (3.3)	473 (96.7)	<0.001	439 (89.8)	50 (10.2)	<0.001	32 (6.5)	457 (93.5)	<0.001	
	Fixed amount only	72 (4.6)	1480 (95.4)		1462 (94.2)	90 (5.8)		152 (9.8)	1400 (90.2)		
	Indemnity only	35 (8.4)	382 (91.6)		394 (94.5)	23 (5.5)		62 (14.9)	355 (85.1)		
	Fixed+indemnity	51 (9.9)	464 (90.1)		497 (96.5)	18 (3.5)		73 (14.2)	442 (85.8)		
2011	Uninsured	24 (5.0)	457 (95.0)	0.74	423 (87.9)	58 (12.1)	0.003	31 (6.4)	450 (93.6)	0.15	
	Fixed amount only	72 (4.9)	1410 (95.1)		1364 (92.0)	118 (8.0)		112 (7.6)	1370 (92.4)		
	Indemnity only	26 (5.9)	411 (94.0)		407 (93.1)	30 (6.9)		44 (10.1)	393 (89.9)		
	Fixed+indemnity	33 (5.8)	540 (94.2)		538 (93.9)	35 (6.1)		52 (9.1)	521 (90.9)		
2012	Uninsured	18 (3.8)	457 (96.2)	<0.001	384 (80.8)	91 (19.2)	<0.001	27 (5.7)	448 (94.3)	0.04	
	Fixed amount only	44 (3.6)	1164 (96.4)		1109 (91.8)	99 (8.2)		91 (7.5)	1117 (92.5)		
	Indemnity only	35 (5.3)	621 (94.7)		597 (91.0)	59 (9.0)		62 (9.4)	594 (90.5)		
	Fixed+indemnity	55 (8.7)	579 (91.3)		596 (94.0)	38 (6.0)		62 (9.8)	572 (90.2)		
Overall p-value <sup>2</sup>				<0.001				<0.001	<0.001		
No. of PMI policies											
2009	0	30 (5.1)	561 (94.9)	0.03	530 (89.7)	61 (10.3)	<0.001	66 (11.2)	525 (88.8)	0.004	
	1	82 (5.2)	1493 (94.8)		1500 (95.2)	75 (4.8)		182 (11.6)	1393 (88.4)		
	2	43 (6.7)	599 (93.3)		618 (96.3)	24 (3.7)		95 (14.8)	547 (85.2)		
	≥3	17 (10.3)	148 (89.7)		162 (98.2)	3 (1.8)		33 (20.0)	132 (80.0)		
1st half of 2010	0	23 (4.5)	484 (95.5)	0.11	456 (89.9)	51 (10.1)	0.001	36 (7.1)	471 (92.9)	0.008	
	1	83 (5.4)	1450 (94.6)		1442 (94.1)	91 (5.9)		164 (10.7)	1369 (89.3)		
	2	49 (7.0)	649 (93.0)		667 (95.6)	31 (4.4)		85 (12.2)	613 (87.8)		
	≥3	19 (8.1)	216 (91.9)		227 (96.6)	8 (3.4)		34 (14.5)	201 (85.5)		

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Table 3. Continued from the previous page

		Inpatient			Outpatient			Emergency			
		Yes	No	<i>p</i> -value <sup>1</sup>	Yes	No	<i>p</i> -value <sup>1</sup>	Yes	No	<i>p</i> -value <sup>1</sup>	
2nd half of 2010	0	16 (3.3)	473 (96.7)	0.009	439 (89.8)	50 (10.2)	<0.001	32 (6.5)	457 (93.5)	0.001	
	1	82 (5.5)	1395 (94.4)		1388 (94.0)	89 (6.0)		154 (10.4)	1323 (89.6)		
	2	54 (7.3)	681 (92.6)		704 (95.8)	31 (4.2)		94 (12.8)	641 (87.2)		
	≥3	22 (8.1)	250 (91.9)		261 (96.0)	11 (4.0)		39 (14.3)	233 (85.7)		
2011	0	24 (5.0)	457 (95.0)	0.53	423 (87.9)	58 (12.1)	0.003	31 (6.4)	450 (93.6)	0.31	
	1	68 (4.7)	1371 (95.3)		1325 (92.1)	114 (7.9)		113 (7.8)	1326 (92.1)		
	2	46 (6.2)	699 (93.8)		698 (93.7)	47 (6.3)		70 (9.4)	675 (90.6)		
	≥3	17 (5.5)	291 (94.5)		286 (92.9)	22 (7.1)		25 (8.1)	283 (91.9)		
2012	0	18 (3.8)	457 (96.2)	0.002	384 (80.8)	91 (19.2)	<0.001	27 (5.7)	448 (94.3)	0.14	
	1	57 (4.0)	1373 (96.0)		1310 (91.6)	120 (8.4)		117 (8.2)	1313 (91.8)		
	2	54 (7.2)	700 (92.8)		700 (92.8)	54 (7.2)		70 (9.3)	684 (90.7)		
	≥3	23 (7.3)	291 (92.7)		292 (93.0)	22 (7.0)		28 (8.9)	286 (91.1)		
Overall <i>p</i> -value <sup>2</sup>				<0.001				<0.001	<0.001		

Values are presented as number (%).

<sup>1</sup>Chi-square tests were performed.

<sup>2</sup>Cochran-Mantel-Haenszel chi-square tests of trend, 2009-2012.

rates were lower for children whose parents were less educated, and who came from a family with a low income. It was also found that the proportion of pediatric patients with 'F+I' PMI increased in 2012, which implies a need for future studies investigating the association between chronic disease and PMI enrollment in this population.

It was also determined that PMI significantly affected utilization of outpatient and emergency services. An analysis of 759 children (mean age: 4.8 years) admitted to a hospital found that medical services are more accessible to PMI policyholders than to uninsured individuals [21], and three consecutive Korea Health Panel surveys indicated that PMI affects the use of outpatient services more than it does the use of inpatient services [22]. Additionally, PMI enrollment influences the number of outpatient visits and medical costs but not the number of admission days or inpatient expenditures [23]. These findings might be due to the lower out-of-pocket expenses and greater accessibility of outpatient services in Korea; in other words, people sensitive to certain risks are probably more likely to obtain PMI to reduce their anxiety and facilitate a rapid recovery from physical symptoms. This would lead to their use of medical services whenever they experience an uncomfortable condition. Furthermore, PMI may not significantly influence inpatient care because individuals with chronic diseases would be excluded at the time when contracts are completed [23].

In this study, the number of policies held was proportion-

ately related to the healthcare utilization, which is consistent with previous findings regarding adults [24]. In contrast, no significant relationship between these variables was found in another study [21]; however, this inconsistency was likely due to differences in the conditions of the subjects.

The present study found that the uninsured were less likely to use outpatient services than were subjects with 'F'-only PMI and that subjects with 'I'-only and 'F+I' PMI were more likely to use outpatient services as well as inpatient and emergency services. These findings imply that a broad utilization of medical services is possible for individuals with indemnity insurance. Additionally, subjects with 'I'-only and 'F+I' PMI were more likely to use inpatient services than were subjects with 'F'-only PMI, and subjects with 'F+I' PMI were more likely to use emergency care than were subjects with 'F'-only PMI. Subjects with 'I'-only and 'F+I' PMI were more likely to visit outpatient department or ambulatory care than those with 'F'-only PMI; this implies that the types of PMI policies affect the number of outpatient visits among the insured. Taken together, these findings highlight the effects of indemnity insurance. However, the results are inconsistent with those of a previous study investigating adults that found no differences between 'F' and 'I' policyholders [4]. Moreover, enrollment in 'I'-only PMI did not influence the number of outpatient visits or admission days among adults [25]. These inconsistencies are probably due to differences in the targeted populations. In contrast to

**Table 4.** Effects of private medical insurance (PMI) enrollment on utilization of medical services

		Inpatient	Outpatient <sup>1</sup>	Emergency	Inpatient	Outpatient <sup>1</sup>	Emergency
<b>Model 1</b>							
	Uninsured	1.00 (reference)	1.00 (reference)	1.00 (reference)			
	Insured	1.19 (0.93, 1.53)	1.73 (1.40, 2.13)	1.24 (1.02, 1.50)			
Sex	Male	1.42 (1.18, 1.72)	0.98 (0.81, 1.18)	1.51 (1.31, 1.73)			
	Female	1.00 (reference)	1.00 (reference)	1.00 (reference)			
Age (y)	0-6	1.94 (1.40, 2.68)	31.76 (19.99, 50.44)	3.14 (2.37, 4.15)			
	7-12	0.81 (0.58, 1.12)	3.64 (2.91, 4.57)	1.48 (1.12, 1.96)			
	13-15	0.84 (0.60, 1.19)	1.38 (1.14, 1.69)	1.15 (0.85, 1.55)			
	16-18	1.00 (reference)	1.00 (reference)	1.00 (reference)			
Household income (quantile)	1st (lowest)	1.23 (0.83, 1.82)	0.56 (0.40, 0.78)	0.82 (0.62, 1.10)			
	2nd (lower)	1.18 (0.87, 1.60)	0.67 (0.51, 0.89)	0.79 (0.64, 0.98)			
	3rd (middle)	1.29 (0.97, 1.71)	0.68 (0.52, 0.90)	0.93 (0.77, 1.13)			
	4th (higher)	1.49 (1.14, 1.95)	0.79 (0.61, 1.03)	1.03 (0.86, 1.25)			
	5th (highest)	Ref (reference)	1.00 (reference)	1.00 (reference)			
Chronic disease	Yes	1.59 (1.31, 1.92)	2.72 (2.16, 3.41)	1.17 (1.01, 1.35)			
	No	1.00 (reference)	1.00 (reference)	1.00 (reference)			
<b>Model 2</b>				<b>Model 2A</b>			
	0	1.00 (reference)	1.00 (reference)	1.00 (reference)			
	1	1.05 (0.81, 1.37)	1.64 (1.32, 2.04)	1.17 (0.96, 1.43)	1.00 (reference)	1.00 (reference)	1.00 (reference)
	2	1.40 (1.04, 1.88)	1.85 (1.42, 2.42)	1.34 (1.07, 1.67)	1.32 (1.06, 1.63)	1.11 (0.89, 1.40)	1.15 (0.98, 1.33)
	≥3	1.57 (1.11, 2.23)	2.19 (1.49, 3.21)	1.39 (1.04, 1.85)	1.48 (1.11, 1.98)	1.34 (0.93, 1.91)	1.19 (0.94, 1.51)
	Male	1.40 (1.16, 1.70)	0.98 (0.81, 1.18)	1.50 (1.30, 1.72)	1.41 (1.15, 1.73)	0.96 (0.78, 1.20)	1.50 (1.29, 1.74)
	0-6	1.97 (1.42, 2.72)	32.00 (20.14, 50.86)	3.16 (2.38, 4.18)	2.02 (1.41, 2.90)	45.34 (25.53, 80.54)	3.43 (2.50, 4.71)
	7-12	0.81 (0.58, 1.13)	3.66 (2.92, 4.59)	1.49 (1.13, 1.97)	0.85 (0.59, 1.21)	4.39 (3.38, 5.71)	1.57 (1.14, 2.15)
	13-15	0.85 (0.60, 1.20)	1.39 (1.14, 1.70)	1.15 (0.85, 1.56)	0.96 (0.66, 1.39)	1.50 (1.19, 1.89)	1.30 (0.92, 1.82)
	1st (lowest)	1.28 (0.86, 1.91)	0.58 (0.41, 0.81)	0.84 (0.63, 1.12)	1.19 (0.75, 1.89)	0.54 (0.35, 0.84)	0.73 (0.51, 1.03)
	2nd (lower)	1.23 (0.91, 1.67)	0.69 (0.52, 0.91)	0.80 (0.65, 1.00)	1.22 (0.88, 1.67)	0.76 (0.54, 1.06)	0.83 (0.66, 1.05)
	3rd (middle)	1.32 (0.99, 1.76)	0.70 (0.53, 0.92)	0.94 (0.78, 1.15)	1.33 (0.99, 1.79)	0.66 (0.49, 0.90)	1.00 (0.81, 1.23)
	4th (higher)	1.51 (1.15, 1.98)	0.80 (0.61, 1.05)	1.04 (0.86, 1.25)	1.58 (1.19, 2.09)	0.84 (0.62, 1.13)	1.08 (0.89, 1.32)
	Yes	1.56 (1.29, 1.89)	2.70 (2.15, 3.39)	1.16 (1.01, 1.34)	1.60 (1.03, 1.95)	2.65 (2.05, 3.44)	1.13 (0.97, 1.31)
<b>Model 3</b>				<b>Model 3A</b>			
	Uninsured	1.00 (reference)	1.00 (reference)	1.00 (reference)			
	Fixed amount only	0.98 (0.75, 1.28)	1.69 (1.35, 2.10)	1.14 (0.93, 1.40)	1.00 (reference)	1.00 (reference)	1.00 (reference)
	Indemnity only	1.39 (1.02, 1.88)	1.63 (1.24, 2.13)	1.38 (1.09, 1.74)	1.44 (1.13, 1.82)	0.97 (0.77, 1.23)	1.20 (1.00, 1.44)
	Fixed+Indemnity	1.67 (1.23, 2.25)	2.09 (1.56, 2.80)	1.37 (1.09, 1.74)	1.71 (1.37, 2.14)	1.24 (0.96, 1.60)	1.20 (1.01, 1.43)
	Male	1.41 (1.17, 1.70)	0.98 (0.81, 1.18)	1.50 (1.31, 1.73)	1.42 (1.19, 1.74)	0.97 (0.78, 1.20)	1.50 (1.29, 1.74)
	0-6	1.97 (1.42, 2.72)	31.86 (20.05, 50.64)	3.14 (2.37, 4.16)	2.02 (1.41, 2.90)	45.13 (25.39, 80.20)	3.41 (2.49, 4.69)
	7-12	0.83 (0.60, 1.15)	3.64 (2.91, 4.57)	1.50 (1.13, 1.98)	0.87 (0.60, 1.25)	4.37 (3.36, 5.68)	1.58 (1.15, 2.17)
	13-15	0.88 (0.62, 1.24)	1.39 (1.14, 1.69)	1.16 (0.86, 1.57)	1.00 (0.68, 1.45)	1.50 (1.18, 1.89)	1.31 (0.93, 1.84)
	1st (lowest)	1.27 (0.85, 1.89)	0.57 (0.40, 0.80)	0.83 (0.62, 1.10)	1.18 (0.75, 1.87)	0.53 (0.34, 0.82)	0.71 (0.50, 1.01)
	2nd (lower)	1.20 (0.89, 1.63)	0.68 (0.51, 0.90)	0.79 (0.64, 0.98)	1.19 (0.86, 1.64)	0.75 (0.54, 1.04)	0.82 (0.65, 1.03)
	3rd (middle)	1.30 (0.98, 1.73)	0.69 (0.52, 0.90)	0.93 (0.76, 1.13)	1.31 (0.97, 1.76)	0.65 (0.48, 0.88)	0.98 (0.80, 1.21)
	4th (higher)	1.48 (1.13, 1.94)	0.79 (0.61, 1.04)	1.02 (0.85, 1.24)	1.54 (1.16, 2.05)	0.83 (0.62, 1.11)	1.07 (0.87, 1.31)
	Yes	1.56 (1.29, 1.89)	2.70 (2.15, 3.39)	1.17 (1.01, 1.35)	1.59 (1.30, 1.94)	2.65 (2.05, 3.44)	1.13 (0.97, 1.32)

Values are presented as odds ratio (95% confidence interval).

Each model shown above is adjusted for sex, age, household income, and chronic disease.

The main effect variables: Model 1, insurance status; Model 2, number of insurance policies; Model 2A, number of insurance policies without the uninsured; Model 3, type of insurance; Model 3A, type of insurance without the uninsured.

The dependent variable: <sup>1</sup>The presence or absence of utilization of outpatient services.



**Table 5.** Effects of private medical insurance (PMI) enrollment on utilization of outpatient services (number of visits)

		Outpatient <sup>1</sup>	Outpatient <sup>2</sup>	Outpatient <sup>1</sup>	Outpatient <sup>2</sup>
<b>Model 1</b>					
	Uninsured	1.00 (reference)	1.00 (reference)		
	Insured	1.40 (1.23, 1.58)	1.50 (1.30, 1.74)		
Sex	Male	0.99 (0.90, 1.10)	1.00 (0.89, 1.12)		
	Female	1.00 (reference)	1.00 (reference)		
Age (y)	0-6	7.21 (6.05, 8.58)	8.45 (7.01, 10.18)		
	7-12	1.84 (1.59, 2.13)	1.87 (1.57, 2.22)		
	13-15	0.93 (0.81, 1.07)	0.86 (0.73, 1.02)		
	16-18	1.00 (reference)	1.00 (reference)		
Household income (quantile)	1st (lowest)	0.82 (0.68, 0.99)	0.82 (0.67, 1.01)		
	2nd (lower)	0.86 (0.75, 0.99)	0.89 (0.76, 1.04)		
	3rd (middle)	0.94 (0.82, 1.08)	0.94 (0.82, 1.08)		
	4th (higher)	0.99 (0.87, 1.12)	0.99 (0.86, 1.13)		
	5th (highest)	1.00 (reference)	1.00 (reference)		
Chronic disease	Yes	2.17 (1.94, 2.43)	2.11 (1.88, 2.37)		
	No	1.00 (reference)	1.00 (reference)		
<b>Model 2</b>			<b>Model 2A</b>		
	0	1.00 (reference)	1.00 (reference)		
	1	1.32 (1.15, 1.50)	1.38 (1.19, 1.60)	1.00 (reference)	1.00 (reference)
	2	1.52 (1.31, 1.76)	1.68 (1.42, 1.98)	1.15 (1.04, 1.28)	1.21 (1.08, 1.36)
	≥3	1.73 (1.42, 2.10)	2.04 (1.66, 2.52)	1.32 (1.11, 1.57)	1.47 (1.24, 1.75)
	Male	0.99 (0.89, 1.10)	0.99 (0.88, 1.11)	0.98 (0.88, 1.10)	0.99 (0.87, 1.12)
	0-6	7.34 (6.16, 8.74)	8.66 (7.18, 10.43)	8.52 (7.02, 10.34)	8.79 (7.18, 10.77)
	7-12	1.85 (1.60, 2.14)	1.88 (1.58, 2.24)	2.05 (1.74, 2.41)	1.94 (1.60, 2.34)
	13-15	0.93 (0.81, 1.08)	0.87 (0.74, 1.03)	1.00 (0.85, 1.16)	0.91 (0.75, 1.09)
	1st (lowest)	0.84 (0.69, 1.01)	0.85 (0.69, 1.04)	0.81 (0.65, 1.02)	0.79 (0.63, 1.00)
	2nd (lower)	0.88 (0.76, 1.01)	0.91 (0.78, 1.07)	0.84 (0.72, 0.98)	0.88 (0.75, 1.04)
	3rd (middle)	0.96 (0.84, 1.10)	0.96 (0.84, 1.10)	0.94 (0.82, 1.09)	0.94 (0.82, 1.09)
	4th (higher)	1.00 (0.88, 1.13)	1.00 (0.87, 1.14)	0.99 (0.86, 1.13)	0.97 (0.85, 1.12)
	Yes	2.16 (1.94, 2.42)	2.10 (1.86, 2.36)	2.10 (1.86, 2.37)	2.01 (1.77, 2.29)
<b>Model 3</b>			<b>Model 3A</b>		
	Uninsured	1.00 (reference)	1.00 (reference)		
	Fixed amount only	1.31 (1.14, 1.49)	1.36 (1.17, 1.58)	1.00 (reference)	1.00 (reference)
	Indemnity only	1.56 (1.33, 1.82)	1.65 (1.39, 1.96)	1.20 (1.06, 1.36)	1.38 (1.22, 1.56)
	Fixed+indemnity	1.54 (1.32, 1.80)	1.87 (1.57, 2.23)	1.18 (1.05, 1.33)	1.22 (1.07, 1.39)
	Male	0.99 (0.89, 1.10)	0.99 (0.889, 1.11)	0.99 (0.88, 1.11)	0.99 (0.88, 1.12)
	0-6	7.26 (6.10, 8.65)	8.58 (7.11, 10.36)	8.41 (6.93, 10.20)	8.69 (7.09, 10.67)
	7-12	1.86 (1.60, 2.15)	1.90 (1.59, 2.26)	2.06 (1.74, 2.42)	1.95 (1.62, 2.36)
	13-15	0.94 (0.82, 1.08)	0.88 (0.74, 1.04)	1.00 (0.86, 1.17)	0.91 (0.76, 1.10)
	1st (lowest)	0.82 (0.68, 0.99)	0.83 (0.68, 1.02)	0.79 (0.63, 1.00)	0.78 (0.62, 0.98)
	2nd (lower)	0.86 (0.75, 0.99)	0.90 (0.77, 1.05)	0.82 (0.70, 0.96)	0.86 (0.73, 1.02)
	3rd (middle)	0.94 (0.82, 1.08)	0.94 (0.82, 1.08)	0.92 (0.80, 1.07)	0.93 (0.80, 1.07)
	4th (higher)	0.98 (0.87, 1.12)	0.99 (0.86, 1.13)	0.97 (0.85, 1.11)	0.96 (0.83, 1.10)
	Yes	2.17 (1.94, 2.42)	2.10 (1.86, 2.36)	2.11 (1.87, 2.38)	2.01 (1.77, 2.29)

Values are presented as odds ratio (95% confidence interval).

Each model shown above is adjusted for sex, age, household income, and chronic disease.

The main effect variables: Model 1, insurance status; Model 2, number of insurance policies, Model 2A, number of insurance policies without the uninsured; Model 3, type of insurance; Model 3A, type of insurance without the uninsured.

The dependent variables: <sup>1</sup>Utilization of outpatient services defined by the median number of visits; <sup>2</sup>Utilization of outpatient services defined by the upper 30% of visits (the upper 30% represented the top 30% of subjects in terms of number of visits).

adults, children and adolescents, especially preschoolers, depend on their parents to determine what kind of medical services they were to use and when. Based on the study results, indemnity PMI is thought to play a significant role in their healthcare utilization by affecting parents' or suppliers' decisions; thus, further studies are needed.

The present study has several limitations. First, the PMI enrollment status of the parents and the number of family members were not considered. Second, the fact that medical service utilization varies according to age was not considered. Third, even though chronic disease types were not considered in this study due to low prevalence of severe diseases, considering disease types is needed in future studies. Fourth, the relationship between PMI and medical expenditures, admission days, and such were not investigated in this study; thus further studies are needed. Despite these limitations, the major strengths of this study include its examination of PMI status and the effects of PMI on healthcare utilization in 2973 children and adolescents using repetitively collected secondary data. Few studies have investigated the purchase status of PMI and its relationship to the utilization of medical services in children and adolescents, which is essential for predicting future trends in this market.

The Dutch government introduced a fundamental reform of the health insurance system to provide more transparency for consumers in 2006 [26]. The present findings suggest such efforts, including standardization of PMI contracts, progressive reform in calculation of premiums in PMI, thorough re-examination of insurance products, and mutual control mechanisms in between national health insurance services and private insurers are required in Korea. These measures would result in the improved management of medical expenditures and the resolution of issues associated with healthcare utilization.

## CONFLICT OF INTEREST

The authors have no conflicts of interest associated with the material presented in this paper.

## ORCID

Dong Hee Ryu <http://orcid.org/0000-0002-2860-8849>

Sin Kam <http://orcid.org/0000-0002-5424-3820>

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