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Relationship Between Catastrophic Health Expenditures and Income Quintile Decline



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ABSTRACT

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Objectives: The aims of this study were to investigate the proportion of households facing catastrophic health expenditures based on household income quintiles, and to analyze the relationship between expenditures and household income quintile decline.

Methods: Study data were obtained from an annually conducted survey of the 2012–2013 Korean health panel. There were 12,909 subjects aged 20–64 years from economically active households, whose income quintile remained unchanged or declined by more than one quintile from 2012 to 2013. Logistic regression analysis was performed to determine whether catastrophic health expenditures in 2012 were related to more than one quintile income decline in 2013.

Results: Households facing catastrophic health expenditures of $\geq 40\%$, $\geq 30\%$, and $\geq 10\%$ of a household's capacity to pay, were 1.58 times ($p < 0.003$), 1.75 times ($p < 0.000$), and 1.23 times ($p < 0.001$) more likely to face a decline in income quintile, respectively.

Conclusion: Over a 1 year period, the proportion of households facing more than one quintile income decline was 16.4%, while 2.1% to 2.5% of households in Korea faced catastrophic health expenditures. Catastrophic health expenditure experienced in 2012 was significantly associated with income quintile decline 1 year later. Therefore, lowering the proportion of households with catastrophic health expenditure may reduce the proportion of households with income quintiles decline.

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Introduction

The incidence of income inequality has recently increased, resulting in the decline of household income quintiles. Income quintile groups are determined by calculating the equally distributed, disposable income for each household member. According to the “Household Financial and Welfare Survey Dynamic Change Analysis Report,” 21.8% of households faced an income quintile decline between 2011 and 2014 [1].

Several factors affect household income decline. Previous studies have shown that gender, age, educational level, employment status of the household head, number of

members of the household employed, initial income, and the vocational training and social insurance benefits of the household head are factors that affect income quintiles [2–5]. When household heads were paid employees (including regular and non-regular workers) and self-employed workers, 20.8% and 28.4% of those households faced a decline in income quintile in 2014 compared with 2011, respectively. In addition, the rate of age-dependent income decline in 2014 was 20.2% lower for those aged ≤ 39 years, 23.1% for those aged between 40 years and 59 years, and 20.9% for those aged ≥ 60 years, compared with income in 2011 [1].

Household members with health complications that could

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negatively affect their capacity to work, resulting in a decrease in their income [6]. If those households were well-equipped with social insurance schemes, such as sickness insurance or sickness allowance, compensation for reduced income may be provided, and this may not lead to a decline in household income quintile.

Although the National Health Insurance system, a social insurance system that lowers the burden of out-of-pocket health payments is in operation in Korea, the burden of out-of-pocket payments borne by individuals and their family members continues to be high. The proportion of household out-of-pocket spending based on the total national health expenditures in Korea was 35.2% in 2011, approximately 1.8 times higher than the Organization for Economic Co-operation and Development (OECD) average of 19.6% [7].

The World Health Organization define catastrophic health expenditure as a household's health expenditure that exceeds 40% of the household's capacity to pay. An analysis of household catastrophic health expenditure in 59 countries showed that the proportion of households facing catastrophic health expenditures in Korea was 1.73% which is higher than the proportion in all OECD countries, except Portugal (2.71%) and Greece (2.17%) [8].

Households facing excessive health expenditures may be forced to reduce spending on other subsistence costs [9-10]. Under these adverse health conditions, low income households with a high risk of catastrophic health expenditures are more likely to spend their household income on health services [11]. This may lead to a lower quality of life, economic risks [12], and an increased probability of poverty [13-16].

In the past 3 years, 20% of households have experienced a decline in income quintile. It has been speculated that the incidence of catastrophic health expenditures without sick allowance in Korea, may have had a significant impact on the decline in income quintile of middle-class households. However, there have been no studies to investigate the effects of catastrophic health expenditures on income quintile decline.

In the present study, we analyzed the proportion of households facing catastrophic health expenditures by considering households with and without income quintile decline.

Materials and Methods

1. Participants

The present study used data from the Korea Health Panel (KHP), 2012-2013 collected by the National Health Insurance Cooperation, and the Korea Institute for Health and Social Affairs. The KHP survey was conducted in 2008 on 7,866

households and 24,616 individuals. Due to loss of households for reasons such as death or survey refusal, the sample size was reduced to 5,850 households and 17,417 individuals in 2012. In 2013, 2,500 households nationwide were additionally sampled, resulting in a sample size of 7,743 households and 22,701 individuals. In the present study, there were 12,909 subjects aged 20 years to 64 years from economically active households, whose income quintile remained unchanged or declined by more than one quintile from 2012 to 2013. There were 3,489 households whose income quintile increased by one or more quintiles and were excluded from the analysis.

2. Variables

The dependent variable was income quintile decline, which was defined as income quintile that declined by more than one quintile between 2012 and 2013, and which was then compared to the households whose income quintiles remained unchanged. Income was entered in the questionnaire with the total annual income of household members, and the survey period was from January to December of the previous year. Total annual household income was calculated as follows:

$$\text{Total annual household income} = \frac{\text{Total annual household income}}{\sqrt{\text{Total number of household members}}}$$

Total annual household income is composed of earned income, financial income, rental income etc. The income quintiles used in this study are divided into 5 quintiles based on the total annual household income. The 1st quintile is the lowest 20% income bracket, and the 5th quintile is the top 20% and the highest-income bracket.

The independent variables were determined using data from the 2012 Korea Health Panel. The independent variables included gender, age, educational level, health status (EQ-5D), presence or absence of chronic diseases, number of outpatient visits, private health insurance coverage, catastrophic health expenditures, and employment status.

The catastrophic health expenditure was divided into percentages of household out-of-pocket health expenditure of the household's capacity to pay, or the thresholds of catastrophic health expenditures of $\geq 40\%$, $\geq 30\%$, $\geq 20\%$, and $\geq 10\%$. The households' capacity to pay was calculated after excluding the average food expenses from the monthly living expense and was converted into the annual unit. The household out-of-pocket health expenditure was calculated by summing up direct spending on emergency medical service, outpatient medical service, and prescription drug expenditure (emergency, and inpatient and outpatient care) per household.

The employment status was divided into regular workers and

non-regular workers (temporary, day workers), self-employed workers (including unpaid family workers), and economically inactive individuals. The educational level was divided into college graduates or above, and high school graduates or below. The private health insurance coverage was divided into fixed benefit type, indemnity type, and mixed type (fixed type and indemnity type).

3. Data analysis

Logistic regression analysis was conducted to determine whether catastrophic health expenditures in 2012 were related to more than one quintile income decline in 2013. The threshold levels of catastrophic health expenditures were divided into 40%, 30%, 20%, and 10% of a household's capacity to pay and this was analyzed.

4. Analysis model

Logit (income quintile decline) = $\alpha + \beta_1 \text{Gender}_i + \beta_2 \text{Age}_i + \beta_3 \text{Education}_i + \beta_4 \text{Employ}_i + \beta_5 \text{Chronic Disease}_i + \beta_6 \text{EQ-5D}_i + \beta_7 \text{Outpatient Visit}_i + \beta_8 \text{Private Health Insurance}_i + \beta_9 \text{Catastrophic Health Expenditure}_i$

The proportion of households whose income declined by more than the first quintile was estimated by gender, age, education, employment status, chronic disease, EQ-5D (health status), number of outpatient visits, health insurance, and catastrophic health expenditure. The intercept of the regression equation was calculated as the median of the number of outpatient visits for all household members. Gender (Male = 0, Female = 1), Education (Less than High School = 0, Graduate more = 1), Employment status (Regular worker = 0, Non-regular worker = 1, Self-employ = 2, Non economically = 3), Chronic disease (No = 0 Yes = 1), Private Health Insurance (Fixed benefic type = 0, Indemnity type = 1, Mixed type = 2), Catastrophic health expenditure (Less than Threshold level = 0, Threshold level more = 1) is binary variables.

Results

1. Distribution of households facing catastrophic health expenditures by year and income quintile

In the present study, the proportion of households facing catastrophic health expenditures did not significantly differ between 2012 and 2013. It was rather different depending on the threshold level of catastrophic health expenditures. When the threshold levels of catastrophic health expenditures were 40%, 30%, 20%, and 10%, the proportions of households facing catastrophic health expenditures were 2.5%, 4.1%, 8.8%, and 24.3%, respectively in 2012 and 2.1%, 3.7%, 7.8%, and 20.4%, respectively in 2013 (Table 1).

Table 1. Distribution of the proportion of households facing catastrophic health expenditures: 2012-2013.

	2012		2013	
	<i>n</i>	%	<i>n</i>	%
CHE ≥ 40%	443	2.5	344	2.1
CHE ≥ 30%	733	4.1	597	3.7
CHE ≥ 20%	1,557	8.8	1,271	7.8
CHE ≥ 10%	4,295	24.3	3,303	20.4

CHE = catastrophic health expenditures
Total households: 18,017.

The proportion of households facing catastrophic health expenditures significantly differed based on their income quintile and according to the threshold level of the catastrophic health expenditure. The proportion of households facing catastrophic health expenditures was 11.7% in the 1st quintile and 1.1% in the 5th quintile when the threshold of catastrophic health expenditure was ≥ 40%, whereas it was 42.8% in the 1st quintile and 13.6% in the 5th quintile when the threshold of the catastrophic health expenditure was ≥ 10% (Table 2).

Table 2. Distribution of the proportion of households facing catastrophic health expenditures based on their income quintile.

Income Quintile	CHE ≥ 40%		CHE ≥ 30%		CHE ≥ 20%		CHE ≥ 10%	
	2012	2013	2012	2013	2012	2013	2012	2013
5	41 (0.8)	55 (1.1)	111 (2.1)	91 (1.8)	294 (5.5)	261 (5.1)	983 (18.5)	692 (13.6)
4	76 (1.6)	58 (1.3)	133 (2.8)	112 (2.5)	265 (5.6)	234 (5.3)	999 (21.1)	677 (15.4)
3	153 (3.9)	65 (1.8)	201 (5.1)	115 (3.2)	419 (10.7)	279 (7.9)	1094 (28.0)	892 (25.1)
2	86 (3.1)	78 (3.3)	161 (5.7)	133 (5.6)	354 (12.6)	292 (12.2)	804 (28.7)	716 (30.0)
1	87 (9.5)	88 (11.7)	127 (13.9)	145 (19.3)	222 (24.3)	204 (27.1)	405 (44.4)	322 (42.8)

CHE = catastrophic health expenditures.
Values expressed as *n* (%).

2. Distribution of the rate of income quintile decline by explanatory variable: univariate analysis

The rate of more than one quintile income decline was higher in high school graduates or below (22.53%) in comparison to college graduates or above (19.1%) ($p < 0.001$).

The rate of more than one quintile income decline according to employment status was the highest with 24.54% being economically inactive individuals, followed by non-regular

workers at 21.67%, self-employed workers at 20.93%, and regular workers at 16.02% ($p < 0.001$).

The threshold levels of catastrophic health expenditures were 40%, 30%, 20%, and 10%. The rate of more than one quintile income decline was higher in households experiencing above the threshold catastrophic health expenditures in comparison to those experiencing below the threshold catastrophic health expenditures ($p < 0.001$) (Table 3).

Table 3. Distribution of income quintile decline by explanatory variable ($n = 12,909$).

		No change	Decline Income Quintile				Total	<i>p</i>
			1 Quintile Decline	2 Quintile Decline	3 Quintile Decline	4 Quintile Decline		
Gender								< 0.398
Male		4,932 (79.29)	1,078 (17.33)	171 (2.75)	38 (0.61)	1 (0.02)	6,220	
Female		5,284 (79.00)	1,147 (17.15)	215 (3.21)	39 (0.58)	4 (0.06)	6,689	
Education Level								< 0.001
Graduate or higher		4,959 (80.99)	953 (15.56)	187 (3.05)	24 (0.39)	0 (0.00)	6,123	
Less than high school		5,257 (77.47)	1,272 (18.74)	199 (2.93)	53 (0.78)	5 (0.07)	6,786	
Employment status								< 0.001
Regular worker		3,072 (83.98)	514 (14.05)	64 (1.75)	8 (0.22)	0 (0.00)	3,658	
Non-regular worker		1,959 (78.33)	438 (17.51)	83 (3.32)	19 (0.76)	2 (0.08)	2,501	
Self-employed		2,002 (79.07)	456 (18.01)	64 (2.53)	10 (0.39)	0 (0.00)	2,532	
Not economically active		3,183 (75.46)	817 (19.37)	175 (4.15)	40 (0.95)	3 (0.07)	4,218	
Chronic disease								< 0.218
Yes		5,142 (78.94)	1,116 (17.13)	205 (3.15)	48 (0.74)	3 (0.05)	6,514	
No		5,074 (79.34)	1,109 (17.34)	181 (2.83)	29 (0.45)	2 (0.03)	6,395	
Private health insurance								< 0.007
Fixed benefic type		6,909 (78.52)	1,566 (17.80)	269 (3.06)	53 (0.60)	2 (0.02)	8,799	
Indemnity type		891 (84.06)	147 (13.87)	21 (1.98)	1 (0.09)	0 (0.00)	1,060	
Mixed type		1,386 (78.79)	310 (17.62)	52 (2.96)	11 (0.63)	0 (0.00)	1,759	
Catastrophic health expenditure								
40%	≥	190 (70.90)	58 (21.64)	10 (3.73)	10 (3.73)	- (0.00)	268	< 0.001
	<	9,867 (79.22)	2,151 (17.27)	372 (2.99)	62 (0.50)	3 (0.02)	12,455	
30%	≥	319 (70.26)	92 (20.26)	32 (7.05)	10 (2.20)	1 (0.22)	454	< 0.001
	<	9,738 (79.37)	2,117 (17.25)	350 (2.85)	62 (0.51)	2 (0.02)	12,269	
20%	≥	787 (76.86)	169 (16.50)	45 (4.39)	22 (2.15)	1 (0.10)	1,024	< 0.001
	<	9,270 (79.24)	2,040 (17.44)	337 (2.88)	50 (0.43)	2 (0.02)	11,699	
10%	≥	2,248 (77.30)	526 (18.09)	103 (3.54)	29 (1.00)	2 (0.07)	2,908	< 0.001
	<	7,809 (79.63)	1,674 (17.07)	279 (2.85)	43 (0.44)	1 (0.01)	9,806	

3. Relationship between catastrophic health expenditures and income quintile decline

Households facing catastrophic health expenditures of $\geq 40\%$ were 1.58 times more likely to face a decline in their income quintile in comparison to households facing catastrophic health expenditures of $< 40\%$ ($p < 0.003$). In addition, households with a threshold of catastrophic health expenditures of $\geq 30\%$ and $\geq 10\%$ were 1.75 times ($p < 0.001$) and 1.23 times ($p < 0.001$) more likely to have a decline in income quintile, respectively. Non-regular workers, self-employed, and economically inactive

individuals were 1.44 times, 1.46 times, and 1.42 times more likely to experience a decline in income quintile, respectively, in comparison to regular workers ($p < 0.001$). High school graduates or below were 1.27 times more likely to have a decline in income quintile in comparison to college graduates or above ($p < 0.001$). The indemnity-type private health insurance subscribers were 0.73 times less likely to have an income quintile decline in comparison to fixed-type private health insurance subscribers ($p < 0.002$) (Table 4).

Table 4. Relationship between catastrophic health expenditures and income quintile decline.

	<i>p</i>	ORs	95% CI	<i>p</i>	ORs	95% CI	<i>p</i>	ORs	95% CI	<i>p</i>	ORs	95% CI
Gender (ref. Male)												
Female	0.374	0.95	0.85-1.06	0.299	0.94	0.84-1.05	0.330	0.95	0.84-1.06	0.316	0.94	0.84-1.06
Age												
	0.206	1.00	0.99-1.00	0.107	1.00	0.99-1.00	0.090	1.00	0.99-1.00	0.095	1.00	0.99-1.00
Education level (ref. Graduate or higher)												
Less than High school	< 0.001	1.24	1.10-1.39	< 0.001	1.27	1.13-1.43	< 0.001	1.27	1.13-1.42	< 0.001	1.27	1.13-1.43
Employment status (ref. Regular worker)												
Non-regular worker	< 0.001	1.46	1.25-1.70	< 0.001	1.45	1.24-1.69	< 0.001	1.44	1.23-1.67	< 0.001	1.44	1.23-1.67
Self-employed	< 0.001	1.48	1.27-1.71	< 0.001	1.46	1.26-1.70	< 0.001	1.47	1.26-1.71	< 0.001	1.46	1.26-1.70
Not economically active	< 0.001	1.44	1.24-1.67	< 0.001	1.43	1.24-1.66	< 0.001	1.42	1.22-1.64	< 0.001	1.42	1.23-1.65
Chronic disease (ref. No)												
Yes	0.442	0.96	0.85-1.07	0.345	0.95	0.85-1.06	0.384	0.95	0.85-1.06	0.381	0.95	0.85-1.06
EQ-5D (Health Survey Questionnaire)												
	0.443	1.00	1.00-1.00	0.490	1.00	1.00-1.00	0.444	1.00	1.00-1.00	0.465	1.00	1.00-1.00
Number of outpatient visits												
	0.011	1.00	1.00-1.01	0.001	1.00	1.00-1.01	0.004	1.00	1.00-1.01	0.001	1.00	1.00-1.01
Private health insurance (ref. fixed benefic type)												
Indemnity type	0.002	0.73	0.60-0.89	0.002	0.73	0.60-0.89	0.002	0.74	0.61-0.90	0.002	0.73	0.60-0.89
Mixed type	0.965	1.00	0.87-1.16	0.961	1.00	0.87-1.16	0.870	1.01	0.88-1.17	0.916	1.01	0.87-1.16
Catastrophic health expenditure												
$\geq 10\%$ (ref. $< 10\%$)	0.001	1.23	1.09-1.39									
$\geq 20\%$ (ref. $< 20\%$)				0.187	1.13	0.94-1.35						
$\geq 30\%$ (ref. $< 30\%$)							< 0.001	1.75	1.37-2.22			
$\geq 40\%$ (ref. $< 40\%$)										0.003	1.58	1.17-2.15

CI = confidence interval; EQ-5D = EuroQol-5D ; OR = odds ratio; ref. = Gender (Male = 0, Female = 1), Education (Less than High School = 0, Graduate more = 1), Employment status (Regular worker = 0, Non-regular worker = 1, Self-employ = 2, Non economically = 3), Chronic disease (No = 0 Yes = 1), Private Health Insurance (Fixed benefic type = 0, Indemnity type = 1, Mixed type = 2), Catastrophic health expenditure (Less than Threshold level = 0, Threshold level more = 1).

Discussion

The results in this study, together with those from recent studies, indicate that 1 out of 6 to 10 households in Korea experiences a decline in household income in a 1 year period. In the present study, 16.4% of households experienced more than one quintile income decline from 2012 to 2013. In addition, when income quintile decline was classified in terms of the number of quintiles declined, the rate of 1, 2, 3, or 4 income quintile declines were 13.6%, 2.35%, 0.47%, and 0.03%, respectively. In addition, in another study analyzing income mobility for 3 income levels (low-income, middle-income, and high-income levels), the rate of income level decline for 1 year (between 2011 and 2012) was 10.4% [17].

When the observation period was extended to 3 to 4 years, the rate of income quintile decline was higher, with 1 out of 5 to 7 households experiencing a decline in income [1]. According to the "Household Financial and Welfare Survey Dynamic Change Analysis Report," 21.8% of households experienced a decline in income quintile from 2011 to 2014 [1]. In a study where the income bracket was divided into 3 income brackets (low-income, middle-income, and high-income), the rate of income bracket decline over 4 years (from 2008 to 2012) was 14.8%. The middle-income bracket moved down by 5.6% into the low-income bracket, the high-income bracket moved down to the middle-income bracket by 7.9%, and the high-income bracket moved down to the low-income bracket by 1.5% [17]. In another study, in which the income bracket was divided into 4 categories based on the median income, the proportion of households with urban workers whose income bracket declined by more than two quintiles was 10.8% between 2003 and 2008 [2].

The rates of income quintile decline within 1 year in Korea were reported to be lower than that of Argentina and China. In Argentina, the income quintile decline rate was 9.1% to 22.7% between 2001 and 2002. In China, the rates of income quintile decline were 24.2% to 27.7% between 1990 and 1995 [18].

It has been reported that the rates of income quintile decline over 10 years in 6 countries were 47%–60% [19], which was higher than the rate of 1-year income quintile decline of 16.4% in Korea. Comparison of income levels between 1992 and 2002 showed that the rates of income quintile decline from the highest or fifth income quintile, to 1 to 3 lower quintiles were 47% in Sweden, 48% in Denmark, 50% in Norway and Finland, 55% in the United States of America (US), and 60% in the UK. In addition, the rates of income quintile decline from the highest or fifth income quintile to the lowest or first income quintile were 10% in the US, 11% in the UK, 25% in Denmark, 26% in Sweden, and 28% in Norway and Finland [19]. The reasons for the difference between the results of the aforementioned study and the results of studies in Korea are as follows. First,

the former study had a longer observation period of 10 years, and secondly, the income quintile decline was based on assessments starting at the richest income quintile.

It is catastrophic if more than 40% of a household's capacity to pay is spent on health. From the results of the present study, 2.5% to 2.1% of Korean households faced catastrophic health expenditures in 2012 or 2013. A previous study also reported that the proportion of households facing catastrophic health expenditures in Korea was 4.5% in 2015, which was the highest among the OECD countries [20]. The reason for this is that the national health insurance coverage rate, is lower than the average health insurance coverage rate in other OECD countries. In particular, Korea's health insurance system has low coverage, with high out-of-pocket costs and many items not covered [21-23]. According to the OECD Health Data, the proportion of household direct out-of-pocket payments based on the current health expenditures was 36.9% in Korea, and this was amongst the highest of the OECD countries, after Mexico (44.7%). On the other hand, the proportion of households' direct out-of-pocket payments based on the current health expenditures was low in European countries, such as Sweden (14.8%), Norway (14.6%), the UK (9.9%), and France (6.7%) [7].

The results of the present study found that households facing catastrophic health expenditures in Korea were 1.58 times more likely to face income decline, when catastrophic health expenditures were $\geq 40\%$ of a household's ability to pay. The probability of household income quintile decline differed according to the definition of catastrophic health expenditure. More specifically, households facing catastrophic health expenditures of $\geq 10\%$ and $\geq 30\%$, they had a 1.23 times and 1.75 times higher chance of income quintile decline, respectively.

To date, there is no domestic study that analyzes the relationship between catastrophic health expenditures and income quintile decline. However, 2 domestic studies have analyzed the relationship between catastrophic health expenditures and the incidence of poor households, and have shown that households facing catastrophic health expenditures that spent $\geq 10\%$ of their capacity to pay, were 1.42 or 1.88 times more likely to fall into poverty. Poverty, is an independent variable, defined as $< 50\%$ of the median income, based on disposable income [13-14].

If the proportion of households facing catastrophic health expenditures can be lowered, the probability of a decline in income quintile can be reduced. Various policies, such as increasing the national insurance coverage rate, are required to reduce the burden of the rate of household out-of-pocket payments. If the level of national health insurance coverage is low, people with low incomes may not be able to receive the required medical services, or may face economic risks due to the heavy burden of health expenditure, even if they used medical services [24]. In other words, to lower catastrophic

medical expenditures, various policies that reduce the number of non-covered items are needed, along with lower out-of-pocket costs.

Another factor related to income quintile decline was economic activity. Maintaining a stable form of employment, such as regular work, could lower the likelihood of income quintile decline. In the present study, the rate of more than one quintile income decline was highest among economically inactive individuals, followed by non-regular workers, such as daily workers, temporary workers, self-employed, and regular workers (Table 3). A previous study also found that the rate of transition from non-poverty to poverty was highest when household heads were economically inactive, followed by non-wage workers, wage workers, and unemployed workers [25].

Furthermore, even after adjusting for catastrophic health expenditures, self-employed workers faced the highest probability of decline in income quintile in comparison to regular workers, followed by non-regular workers and economically inactive workers (Table 4). A previous study reported that the income quintiles of regular workers were less likely to move down to lower income quintiles [3], and the household heads of urban laborers who were temporary or day workers faced a higher probability of decline in income quintile in comparison to regular workers [2].

In the present study, the reasons why regular workers were less likely to face a decline in income quintile were not analyzed. However, it is judged that maintaining a stable form of employment, such as regular work, can prevent poor households moving toward income quintile decline. In addition, it is considered necessary to introduce more active social security systems to prevent such a decline in the income quintiles of non-regular and self-employed workers. That is to say, a sickness allowance system, which ensures income even if one becomes unemployed due to an illness, is needed. European countries, which feature relatively low household out-of-pocket costs, guarantee a certain amount of income through a sickness allowance system even when individuals cannot work due to an illness [26].

Unlike advanced welfare countries which are well-equipped with a social security system, such as sickness insurance, the sickness allowance system in Korea is not adequate.

A decline in income quintile caused by disease and medical care costs may lead to a reduction in national economic activity. The independent variable of this study, the 2012 catastrophic health expenditure experience, was significantly associated with the dependent variable, income quintile decline. However, the limitation of the present study is that the observation period of catastrophic health expenditures and income quintile decline was short. Continued spending on catastrophic health expenditures may lead to poverty due to declines in household income. Further studies are required to determine whether

continuous catastrophic health expenditures may lead to income quintile decline and poverty. In addition, in the current situation where various types of social security systems, such as child allowance, basic old-aged pension reinforcement, and minimum wage increase are introduced, studies are required to investigate the effects of such policies on income quintile decline. Furthermore, although income quintile decline is a rank-type of variable, we could not apply an ordered logit model due to the rate of income quintile decline across income quintiles. Additional studies are needed to analyze income quintile decline across income quintiles using an ordered logit model.

Conflicts of Interest

All authors have no conflicts of interest to declare.

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