

# Impact of changes in economic status on catastrophic health expenditures among households with people with a disability in South Korea

Jae-Woo Choi, Tae-Hyun Kim, Jae-Hyun Kim, Sang-Gyu Lee,  
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## ABSTRACT

**Aims:** Although people with a disability need comprehensive and consistent healthcare services because they often have both common and disability-related health problems, their economic status may restrict healthcare service use. This study investigated the impact of economic status changes on catastrophic health expenditures (CHE) among people with a disability in South Korea. **Methods:** We retrieved 4,065 household records from the Panel Survey of Employment for the Disabled (2010–2012) and explored potential relationships among disability status, economic change, and CHE. **Results:** Households in which people with a disability recently lost a job or had been unemployed [(Odds ratios (OR): 2.30, 1.68, respectively)] were more likely to incur CHE compared with those with a consistent job. In addition, households with

people with a mild disability who either lost or gained a job or who was already unemployed (OR: 3.12, 2.10, 1.73, respectively) were more likely to incur CHE than households with people with a severe disability who had been supported by medical aid. **Conclusions:** Households with people with a disability who experiences a change in job status are more likely to face barriers to needed healthcare services than those with no such change, indicating that job status may be a more significant factor for CHE than level of disability.

**Keywords:** Catastrophic health expenditure, Disability, Economic Status

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## INTRODUCTION

People with a disability need comprehensive and consistent healthcare services because they often experience disability-related health problems in addition to common health conditions not associated with their disability [1–3]. Although they may have highly subjective

clinical needs, their medical expenditure is consistently higher than that for people without a disability [4, 5]. In a questionnaire related to outpatient treatment and hospitalization service, 45% (outpatient treatment) and 20% (hospitalization service) of people with a disability indicated they use healthcare services, but only 27% (outpatient treatment) and 9% (hospitalization service) of people without a disability had been using healthcare services. Households with people with a disability dedicate 20% of their income to medical expenses, although people without a disability only spend 3.4% of their income on these expenses, thus highlighting the burden of medical expenses on people with a disability [6]. In addition, these individuals may not be using available healthcare services due to disability-related limitations in educational, economic, social activities, or other direct or indirect barriers of access to hospitals [7–12].

Economic activities of people with a disability are significant because their quality of life may be improved by increased income and by demonstrating their abilities through such activities. However, consistent employment for people with a disability can present many challenges. The employment rate of people with a disability from a 2011 survey in South Korea was only 35.5%, whereas the employment rate of people without a disability was nearly double at 60.3%. The major employment types of workers with a disability include jobs related to simple labor (30.1%), a craft (12.5%), or agriculture, forestry, or fisheries (12.2%), many of which provide a low income. In addition, 47.5% of all employees with disabilities worked in a place with four or fewer workers [13]. The results of this survey indicate that it is difficult for people with a disability to gain a high-income job, and they often cannot escape poverty-level conditions, even after employment.

Previous studies have focused on employment of people with a disability, especially on gaining employment [14–16], and many studies have been expanded to include various types of disabilities [17–19] or gender-related differences [20–22]. However, these studies often do not consider that the average work period of people with a disability is 67 months, and 44.8% of unemployed individuals with disabilities work for less than one year [23]. Although factors affecting catastrophic health expenditure (CHE) among elderly people with a disability have been investigated, no study has explored the impact of economic status changes on CHE among households with people with a disability in Korea. Therefore, we examined how the burden of medical expenses in these households varies according to changes in economic status. We also determined if a relationship exists between CHE and disability severity.

## MATERIALS AND METHODS

**Data:** This project utilized the panel survey of employment for the disabled (PSED) from 2010–2012.

The PSED includes panel data from repeatedly measured households living with people with a disability and provides useful data for studying the economic activities of people with a disability related to their employment. The main data of the survey consists of demographic data (gender, age, education, disability status, disability grade), economic participation factors which utilize the questions and standards of the Korean National Statistical Office, and employed, unemployed, and non-economically active population factors. In addition the individual and environmental factors which influence economic activity are included. The PSED conducted 1:1 interview surveys with people with a disability directly. Since structure and contents of this data are more complex compared to cross-sectional data, this survey used CAPI (computer-assisted personal interviewing) method to minimize the problem. Interviewers input the response of interviewees in the computer installed CAPI and investigators were able to check logically wrong response using the method. The PSED only allowed the head of household or nearest guardian to reply if a direct response was impossible due to an intellectual disability or mental disorder. The substitute response rate was 7.2%.

**Study Sample:** We used a stratified cluster systematic method to select the sample of households used for this study. The survey was stratified by 15 metropolitan cities and provinces in South Korea, age (15~60, 61~75), and type of disability. The survey divided age to examine people under 60 years old because they are major target related to disability policy in South Korea. The sample size was calculated by proportional distribution using area and type of disability according to two age groups. The selected records included data from the 3rd wave (2010), 4th wave (2011), and 5th wave (2012) during the three-year research period, respectively. We excluded households that were dropped or added during this period and subsequently queried records from 4,065 households.

**Dependent Variable:** The dependent variable was CHE as defined by the World Health Organization (WHO). According to the WHO, CHE occurs when out-of-pocket (OOP) spending exceeds 40% of a household's capacity to pay, and this standard should be altered appropriately for each country [24]. We defined a household's capacity to pay as the amount of money spent per month, excluding food expenses [25]. An OOP expenditure is a payment made by a household when receiving a health service. Medical and drug costs resulting from emergency and outpatient care, as well as from hospitalizations, were included as OOP payments, whereas transportation and nursing costs were excluded. Thus, CHE was defined as health expenditures that were 40% greater than the ability of the household to pay.

**Independent Variable:** The main independent variable for this study was economic status change of people with a disability. We stratified households into four categories with respect to job status: employed-no

change, employed-then-unemployed, unemployed-then-employed, or unemployed-no change.

**Explanatory Variables:** We used several covariates to analyze demographic and socioeconomic characteristics and health status. Demographic characteristics included sex, age, marital status, and socioeconomic factors such as education and income level. Income level was measured by summing the total family income, including the income from employment, assets, pensions, financial support from the government, and other sources. Household income was adjusted by taking the square root of the number of household members. As a proxy for health status, we used self-rated health, severity of disability, and chronic diseases to control for the participant's health condition and health behavior, which can affect health care utilization. In addition, we examined household characteristics, such as the number of senior citizens, total number of family members, and the number of employed individuals.

**Statistical Analysis:** The frequency with which CHE occurred overall after accounting for demographic, socioeconomic, and health status was determined by performing a chi-square test. To identify factors associated with CHE and, in particular, to examine the relationship between changes in economic status and CHE, we used the GLIMMIX procedure under the marginal model (population average model). The odds ratio (OR) was calculated through the regression coefficient gained through GLIMMIX procedure and presented with the 95% confidence interval (95% CI). We used the SAS 9.3 statistical package (Cary, NC, USA) for data analysis.

## RESULTS

General characteristics of households analyzed in this study are given in Table 1. Among the 4,065 households with at least one person with a disability, 174 (4.3%) experienced CHE. At the individual level, elderly people had a higher proportion of CHE than younger individuals or those with a lower educational level. People with a disability with negative self-rated health or those with chronic diseases also experienced a higher frequency of CHE. We also observed a significant difference in the proportion of economic status changes and CHE. At the household level, households living with senior citizens were associated with a higher frequency of CHE, whereas households living with an employed, people with a disability experienced a lower frequency of CHE. We observed a significant difference between the number of family members in a household and the frequency of CHE. Interestingly, we observed no significant relationship between CHE and sex, marital status, severity of disability, or income level.

Table 2 presents the results for factors associated with CHE in South Korean households. People with a disability living alone had a higher risk of catastrophic medical

costs than those living with a spouse. Households living with people with a disability who experienced changes in job status from employed to unemployed or who were unemployed with no change were more likely to incur CHE compared with households in which people with a disability continuously held a job. Households with more than two family members were also more likely to incur CHE.

Table 3 presents results for changes of economic status associated with CHE in households according to severity of disability. After adjusting for all variables used in Table 1, we saw no significant difference in CHE associated with changes in economic status for individuals with a highly severe disability. However, households with people with a disability who experienced changes in job status, either from employed to unemployed or from unemployed to employed, or were unemployed with no change were more likely to incur CHE compared with households in which people with a disability continuously held a job, even if he or she experienced a low-severity disability.

## DISCUSSION

We identified the factors affecting catastrophic health expenditure as marital status, self-rated health, chronic diseases, and the number of senior citizens and total number of household members. The relationship between marital status and CHE has been differentially identified by several studies. For example, although some studies showed that people with a disability living with spouse had a higher risk of CHE than those living alone [26], research that examined CHE of low-income households yielded opposite results [27]. In our study, people with a disability living alone had a higher risk of CHE than those living with a spouse, which may imply that the ratio of medical expenses to total expenditure is higher in unmarried participants. In addition, households living with senior citizens or with more than two members were more likely to incur CHE, which supports similar previous studies involving people without a disability [28, 29]. Thus, we need to consistently examine vulnerable groups, such as low-income households or people with a disability living alone, with respect to increased CHE.

Health-related factors affecting CHE in our study included self-rated health and chronic diseases, which is similar to the results of previous studies related to people without a disability [30, 31] and people with a disability with chronic diseases [32–34]. If households include a person with chronic diseases, they would likely continually incur medical expenses that may be increased by payments not covered by health insurance.

Households in which people with a disability recently lost a job or were previously unemployed are more likely to incur CHE than households with people with a disability who had been consistently employed. Although no previous research linking CHE to changes in economic

Table 1: General characteristics of households

Variables	Catastrophic health expenditure (CHE)					p-value
	Total	with CHE	%	Without CHE	%	
Total	4,065	174	4.3	3,891	95.7	
Individual level						
Sex						0.0879
Male	2,516	97	3.9	2,419	96.1	
Female	1,549	77	5.0	1,472	95.0	
Age						<0.0001
20–39	502	14	2.8	488	97.2	
40–59	2,499	83	3.3	2,416	96.7	
≥60	1,031	76	7.4	955	92.6	
Education						0.0066
Below elementary school	1,738	94	5.4	1,644	94.6	
Middle or high school	2,020	72	3.6	1,948	96.4	
Above college	307	8	2.6	299	97.4	
Marital status						0.0501
Married	2,377	117	4.9	2,260	95.1	
Single	711	26	3.7	685	96.3	
Divorced or separated	977	31	3.2	946	96.8	
Self-rated health						<0.0001
Good	1,508	28	1.9	1,480	98.1	
Bad	2,557	146	5.7	2,411	94.3	
Chronic diseases						<0.0001
Yes	2,242	132	5.9	2,110	94.1	
No	1,822	42	2.3	1,780	97.7	
Severity of disability						0.9434
Low	1,905	82	4.3	1,823	95.7	
High	2,160	92	4.3	2,068	95.7	
Economic status						0.0402
Employed -> employed	1,478	48	3.2	1,430	96.8	
Unemployed -> employed	184	5	2.7	179	97.3	
Employed -> unemployed	164	8	4.9	156	95.1	
Unemployed -> unemployed	2,239	113	5.0	2,126	95.0	
Income						0.1886
High	1,290	45	3.5	1,245	96.5	
Middle	1,367	60	4.4	1,307	95.6	
Low	1,408	69	4.9	1,339	95.1	
Number of employed individuals						0.0434
0	1,999	100	5.0	1,899	95.0	
1	621	27	4.3	594	95.7	
≥2	1,445	47	3.3	1,398	96.7	
Number of senior citizens						<0.0001
0	3,377	117	3.5	3,260	96.5	
≥1	688	57	8.3	631	91.7	
Number of household members						<0.0001
1	664	14	2.1	650	97.9	
2	1,296	79	6.1	1,217	93.9	
≥3	2,105	81	3.8	2,024	96.2	

Table 2: Factors associated with catastrophic health expenditure

Variables	Catastrophic health expenditure		
	OR	95% CI	CI
<b>Individual level</b>			
Sex			
Male	1.00		
Female	1.13	0.93	1.37
Age			
20–39	1.00		
40–59	0.81	0.55	1.20
≥60	1.21	0.77	1.90
Education			
Above college	1.00		
Middle or high school	0.82	0.55	1.22
Below elementary school	1.02	0.68	1.54
Marital status			
Married	1.00		
Single	1.51*	1.08	2.11
Divorced or separated	0.82	0.63	1.07
Self-rated health			
Good	1.00		
Bad	2.45***	1.87	3.22
Chronic diseases			
No	1.00		
Yes	2.12***	1.67	2.70
Severity of disability			
Low	1.00		
High	1.04	0.86	1.26
Economic status			
Employed -> employed	1.00		
Unemployed -> employed	1.44	0.86	2.41
Employed -> unemployed	2.30**	1.34	3.94
Unemployed -> unemployed	1.68**	1.15	2.44
<b>Household level</b>			
Income			
High	1.00		
Middle	1.05	0.83	1.32
Low	0.91	0.70	1.18
Number of employed individuals			
0	1.00		
1	1.35	0.75	2.30
≥2	0.93	0.66	1.30
Number of senior citizens			
0	1.00		
≥1	1.91***	1.54	2.36
Number of household members			
1	1.00		
2	2.66***	1.86	3.80
≥3	2.76***	1.84	4.14

Abbreviations: CHE, catastrophic health expenditure; OR, odds ratio; 95% CI, 95% confidence interval.  
\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 3: Changes of economic status associated with catastrophic health expenditure in households according to severity of disability

Economic status	Severity of disability					
	High		Low			
	Odds	95% CI	Odds	95% CI	CI	
Employed -> employed	1.00		1.00			
Unemployed -> employed	0.59	0.18	1.96	2.10*	1.17	3.76
Employed -> unemployed	1.53	0.63	3.74	3.12**	1.55	6.30
Unemployed -> unemployed	1.59	0.91	2.75	1.73*	1.01	2.95

Abbreviations: CHE catastrophic health expenditure, OR odds ratio, 95% CI, 95% confidence interval.

Adjusted odds ratio from multiple regression analysis with sex, age, education, marital status, self-rated health, chronic diseases, economic status, income, number of employed individuals, number of senior citizens, number of household members.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

status of people with a disability has been performed, our results are similar to those of one study that investigated unmet healthcare needs following changes in economic status in people without a disability [35]. Further studies should explore this same relationship in people with a disability because CHE is commonly positively associated with unmet healthcare needs due to economic reasons [36].

We also examined if changes in economic status were associated with CHE in households according to severity of disability. Although economic status changes of people with a severe disability did not significantly affect CHE incidence, we found that households with people with a mild disability could still incur CHE. This phenomenon reflects the medical assistance policy for people with a disability in South Korea, which provides low-cost medical benefits to people with a severe disability. As a result, decreased income in this population due to economic status changes did not significantly relate to CHE. However, households with people with a mild disability not receiving these medical benefits did experience increased CHE, even after gaining employment. These results imply that we should consider healthcare access of people with a mild disability as a potential contributing factor to CHE.

This study has a few limitations. Firstly, it was difficult to determine levels of CHE for people without a disability because we analyzed households with people with a disability only. However, we did compare our results with those from previous studies related to people without

a disability. Secondly, comparing our CHE results with previous studies is difficult because various criteria (10–40%) have been used as the threshold of CHE. Thus, we referred to previous studies that used a 40% threshold as recommended by the WHO. Thirdly, the actual prevalence of chronic conditions is likely higher than that reported in the PSED because some conditions may not have been diagnosed.

Despite these limitations, this project is significant because it is the first study to examine the impact of economic status changes on CHE among households with people with a disability in South Korea. We believe this study could be used as important evidence for expanding support for people with a mild disability because the Korean government has consistently increased medical support programs for people with a disability [37]. Second, this study's longitudinal design allows us to assess the stability and continuity of several attributes of a sample group by repeatedly observing the same participants. Another major strength of its longitudinal design is that cohort effects can be avoided because we examined one group of individuals over time, rather than comparing several different groups that represent different ages and generations.

## CONCLUSION

Households with people with a disability who experienced changes in job status from employed to unemployed or were unemployed with no status change were more likely to incur catastrophic health expenditures (CHE) compared with households in which people with a disability was continuously employed. In addition, households with people with a mild disability were more likely to experience CHE than those with people with a severe disability who were supported by government-sponsored medical aid. Given the insecure employment status of people with a disability, people with a mild disability who have not received this medical aid are more likely to face barriers in obtaining needed health services. Our results indicate that change in economic status may be a more significant contributing factor to CHE than level of disability, thus highlighting the need to expand medical to people with a mild disability.

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## Author Contributions

Jae-Woo Choi – Substantial contributions to conception and design, Drafting the article, Final approval of the version to be published

Tae-Hyun Kim – Substantial contributions to conception and design, Revising it critically for important intellectual content, Final approval of the version to be published

Jae-Hyun Kim – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Sang-Kyu Lee – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Eun-Cheol Park – Substantial contributions to conception and design, Revising it critically for important intellectual content, Final approval of the version to be published

## Guarantor

The corresponding author is the guarantor of submission.

## Conflict of Interest

Authors declare no conflict of interest.

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