

BMJ Open Catastrophic health expenditure according to employment status in South Korea: a population-based panel study

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ABSTRACT

Objectives: Catastrophic health expenditure (CHE) means that the medical spending of a household exceeds a certain level of capacity to pay. Previous studies of CHE have focused on benefits supported by the public sector or high medical cost incurred by treating diseases in South Korea. This study examines variance of CHE in these households according to changes in employment status. We also determine whether a relationship exists according to income level.

Design: A longitudinal study.

Setting: We used the Korean Welfare Panel Study (KOWEPS) conducted by the Korea Institute.

Participants: The data came from 5335 households during 2009–2012.

Outcome measure: CHE, defined as health expenditures that were 40% greater than the ability of the household to pay.

Results: Households with people who experienced changes in job status from employed to unemployed (OR 2.79, 95% CI 2.06 to 3.78) or were unemployed with no status change (OR 1.57, 95% CI 1.28 to 1.92) were more likely to incur CHE than those containing people who were consistently employed. In addition, low-income families with members who had either lost a job (OR 3.52, 95% CI 2.44 to 5.10) or were already unemployed (OR 1.67, 95% CI 1.29 to 2.16) were more likely to incur CHE than those with family members with a consistent job.

Conclusions: Given the insecure employment status of people with low income, they are more likely to face barriers in obtaining needed health services. Meeting their healthcare needs is an important consideration.

INTRODUCTION

Catastrophic health expenditure (CHE) means that medical spending of a household exceeds a certain level of capacity to pay. Various elements affect the financial burden of medical expenditure, one of which is the nature of the healthcare system. In 2012, the ratio of total medical expenses financed by

Strengths and limitations of this study

- This study is meaningful because it is the first to examine the impact of employment status changes on catastrophic health expenditure (CHE) in low-income people as well as the general population of South Korea.
- The longitudinal design of this research allows us to assess the continuity and stability of a few attributes of a sample group by repeatedly examining the same people.
- Comprehensive medical expenses, including expenses for health functional food and check ups etc, were used, even though the WHO defined CHE as inevitable and involuntary spending; therefore, CHE may be overestimated.
- Because diverse criteria (10–40%) have been used as the threshold of CHE, comparing our results with those of previous research is difficult.
- Since a few conditions may not have been diagnosed, the actual prevalence of chronic diseases is probably higher than that reported in the Korean Welfare Panel Study (KOWEPS).

the public sector was only 55% in South Korea, which is lower than the Organization for Economic Cooperation and Development (OECD) average (72%), and the fourth lowest OECD level of expenditure after the USA (48%), Chile (49%) and Mexico (51%).¹ The moderate impact of insurance cover on financial protection shows that people with health insurance are still paying fairly high out-of-pocket (OOP) payments.² Since the system that provides low benefit accounts for high OOP payment, households requiring a lot of medical utilisation have a much greater financial burden from medical spending. Another requisite affecting CHE is excessive OOP payment. In South Korea, medical expenses of households consist of 35.2% (2011) in total expenditure, a far

higher level than the OECD average of 19.6% (2011), which may pose serious issues for low-income families.³ Households with high spending on medical costs due to diseases or accident have to reduce their consumption and may have substantial financial problems.^{4 5} The final element is the ability of the household to pay. CHE is a relative concept that has to consider ability to pay as well as level of medical cost because the same level of medical spending gives greater burden to low-income households than to the rich.⁶ Previous studies of CHE have focused on benefits supported by the public sector or high medical costs incurred by treating diseases in South Korea.^{7–11} However, few studies on ability to pay, which constitutes the denominator of CHE, have been reported.

The ability to pay generally explains disposable income of households, and income mainly consists of earned income, business income and property income. Reduction in income may be affected by changes in economic status. A previous study showed that households in which people with a disability had recently lost a job (OR 2.30, 95% CI 1.34 to 3.94) or had been unemployed (OR 1.68, 95% CI 1.15 to 2.44) were more likely to incur CHE than households of people with consistent jobs.¹² However, there is no clear evidence for a relationship between changes in employment status and CHE in the general population.

Therefore, this study examined how the burden of medical expenses in these households varies according to changes in economic status. This research also examined the association by dividing the population by income level: low-income, middle-income and high-income. Low-income populations normally have greater financial burden of medical expenses because their ability to pay is relatively low and the amount of medical utilisation due to bad health is regressive for income.^{13–15} In addition, medical costs are regressive for income in a limited health benefit system for low-income groups.^{16–18}

METHODS

Data

This study used the 2009–2012 Korean Welfare Panel Study (KOWEPS), representative of national households, conducted by the Korean Institute for Health and Social Affairs along with the Seoul National University Social Welfare Research Center. KOWEPS data were collected using an interview research method where the interviewer questioned and recorded the answers of the interviewees. A stratified cluster systematic method was used to select the sample of households for the research. This survey was conducted with the goal of understanding the living conditions and welfare demands of the population group, and to evaluate the effectiveness of policies in utilising information on policies. These data are appropriate for analysis of the characteristics of people with low income, such as Medical Aid beneficiaries, because more than half of the sample consists of low-

income households (below 60% of median income), and the data come from various questionnaires that can be used for in-depth examination of utilisation of health-care. In addition, the results of the analysis can be easily generalised because KOWEPS has conducted a survey of all people including those in rural areas. The panel consists of 18 856 individuals from a national probability sample of 7072 households in South Korea who have been surveyed annually since 2006. The sample was selected using systematic two-stage stratified cluster sampling on 2005 census data. KOWEPS also used post-stratification weights based on 2005 census data, and data were weighted by (1) a primary sampling unit and (2) intentionally oversampling low-income households. Further details of the sample design, methods and datasets can be found elsewhere (<http://www.koweps.re.kr/>). This study received ethics approval from the institutional review board of Yonsei University Graduate School of Public Health.

Study sample

A stratified cluster systematic method was used to select the sample of households used for this study. The selected records included data from the 4th wave (2009), 5th wave (2010), 6th wave (2011) and 7th wave (2012) during the 4-year research period. Households that were dropped or added during this period were excluded and, subsequently, records from 5335 households were queried.

Dependent variable

The dependent variable was CHE as defined by the WHO. According to the WHO, CHE occurs when OOP spending exceeds 40% of a household's capacity to pay, and this standard should be altered appropriately for each country.^{19 20} A household's capacity to pay was defined as the amount of money spent per month, excluding food expenses.²¹ 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 hospitalisations, 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 change in employment status of an individual. Each change in employment for each year was measured between consecutive years. Households were stratified according to four categories with respect to job status: employed-no change; employed-then-unemployed; unemployed-then-employed; unemployed-no change.

Covariates

Several covariates were used to analyse 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, self-rated health, depression and chronic diseases were used to control for the participant's health condition and health behaviour, which can affect healthcare utilisation. In addition, this study examined the following household characteristics: type of health insurance; number of people over 65 years; total number of family members; number of people with a disability.

Statistical analysis

The frequency with which CHE was incurred overall after demographic, socioeconomic and health status had been accounted for was determined by the χ^2 test. To identify factors associated with CHE and, in particular, to examine the relationship between changes in economic status and CHE, this study used the GLIMMIX procedure under the marginal model (population-average model). OR was calculated through the regression coefficient gained using the generalised linear mixed model (GLMM) and is presented with 95% CI. SAS V.9.3 was used for data analysis.

RESULTS

General characteristics of households analysed in this study are shown in [table 1](#). Of the 5335 households, 220 (4.1%) experienced CHE. At the individual level, people over 65 years had a higher proportion of CHE than younger individuals or those with a lower educational level. People with negative self-rated health or those having chronic diseases or depression also experienced a higher frequency of CHE. A significant difference in the proportion of employment status changes and CHE was also observed. At the household level, low-income households had a higher proportion of CHE than higher-income households. Households containing people over 65 years or people with a disability were associated with a higher frequency of CHE. A significant difference was observed between the number of family members in a household and the frequency of CHE. However, no significant relationship was observed between CHE and sex or type of health insurance.

The results for factors associated with CHE in South Korean households are shown in [table 2](#). Female householders were more likely to experience CHE than male householders (OR 1.42, 95% CI 1.05 to 1.93). People living with a spouse had a higher risk of CHE than those who were divorced or separated. People with negative self-rated health were more likely to experience CHE, and those having chronic diseases or depression were more likely to experience CHE than those no having

such diseases. Households with family members who had experienced changes in job status from employed to unemployed or who were unemployed with no change were more likely to incur CHE than those with family members with a consistent job. Households that benefited from the Medical Aid programme were less likely to experience CHE than those with national health insurance. Households that included an older person or a person with a disability were more likely to experience CHE than households that did not. Households with two family members were also more likely to incur CHE than households with only one person.

Results for changes of economic status associated with CHE in households according to income level are shown in [table 3](#). After adjustment for all variables used in [table 1](#), there was no significant difference in CHE associated with changes in middle-income (except unemployed with no change) and high-income households. However, low-income households that experienced changes in job status, either from employed to unemployed (OR 3.52, 95% CI 2.44 to 5.10) or were unemployed with no change (OR 1.67, 95% CI 1.29 to 2.16), were more likely to incur CHE than those with a consistent job.

DISCUSSION

Our results indicate that changes from employed to unemployed or those who were unemployed with no change were associated with CHE among the general population in South Korea. In particular, unemployed households were 2.8 times more likely to experience CHE, and this may be because of interruption of household income. A recent study showed that unemployed households were 2.3 times more likely to experience unmet need for economic reasons.²² These households will have a burden of spending on medical costs because of disruption of economic activities. The financial burden of medical expenses results in poor health if treatment for diseases is not received at appropriate times and the illness can represent loss of working ability. In other words, such conditions may lead to a vicious cycle of poverty.^{23 24}

In addition, in the subpopulation analyses, the association between change in employment status and CHE was affected by income level. This study found that, in low-income households, job status, either changes from employed to unemployed or unemployed with no change, is associated with CHE compared with continuous employment. A previous study on low-income levels showed a rate of occurrence of CHE of 7.8% in the poor, whereas only 2.2% of the general population (including the rich) experienced CHE.⁸ The reason that low-income people are more affected by changes in employment status may be their relatively low purchasing power.²⁵ Most of their ability to pay is accounted for by earned income, whereas the general population has higher business and/or property income in addition to

Table 1 General characteristics of households analysed

Variable	Catastrophic health expenditure (CHE)				p Value
	Total	With CHE	Per cent	Without CHE	
Total	5335	220	4.1	5115	95.9
<i>Householder level</i>					
Sex					0.5801
Male	3841	162	73.6	3679	71.9
Female	1494	58	26.4	1436	28.1
Age (years)					<0.0001
≤39	719	8	3.6	711	13.9
40–59	1977	28	12.7	1949	38.1
≥60	2638	184	83.6	2454	48.0
Education					<0.0001
Below elementary school	1859	120	54.5	1739	34.0
Middle or high school	2226	68	30.9	2158	42.2
Above college	1250	32	14.5	1218	23.8
Marital status					0.0082
Married	3436	161	73.2	3275	64.0
Single	281	5	2.3	276	5.4
Divorced or separated	1617	53	24.1	1564	30.6
Self-rated health					<0.0001
Good	2739	53	24.1	2686	52.5
Normal	1204	49	22.3	1155	22.6
Bad	1392	118	53.6	1274	24.9
Chronic disease					<0.0001
Yes	3074	182	82.7	2892	56.5
No	2261	38	17.3	2223	43.5
Depression					<0.0001
Yes	1670	95	43.2	1575	30.8
No	3508	113	51.4	3395	66.4
Economic status					<0.0001
Employed→employed	3246	85	38.6	3161	61.8
Unemployed→employed	233	5	2.3	228	4.5
Employed→unemployed	274	19	8.6	255	5.0
Unemployed→unemployed	1582	111	50.5	1471	28.8
<i>Household level</i>					
Income					<0.0001
High	1225	15	6.8	1210	23.7
Middle	1525	67	30.5	1458	28.5
Low	2585	138	62.7	2447	47.8
Type of health insurance					0.9188
National health insurance	4716	194	88.2	4522	88.4
Medical-aid	619	26	11.8	593	11.6
Number of people with a disability					<0.0001
0	4213	145	65.9	4068	79.5
≥1	1122	75	34.1	1047	20.5
Number of people over 65 years					<0.0001
0	2710	40	18.2	2670	52.2
1	1672	68	30.9	1604	31.4
≥2	953	112	50.9	841	16.4
Number of household members					<0.0001
1	1283	40	18.2	1243	24.3
2	1612	121	55.0	1491	29.1
≥3	2440	59	26.8	2381	46.5

Without CHE, households without CHE; With CHE, households with CHE.

earned income than the poor. This indicates that, when there is a need for medical services in a low-income household, low purchasing power does not stop that household from paying for healthcare. This causes high

healthcare expenses relative to purchasing ability, which can lead to low-income families experiencing CHE.²⁶

Regarding householder level, households headed by women or having negative self-related health, chronic

Table 2 Factors associated with catastrophic health expenditure (CHE)

Variable	CHE	
	Adjusted OR	95% CI
<i>Householder level</i>		
Sex		
Male	1.00	
Female	1.42	1.05 to 1.93
Age (years)		
≤39	1.00	
40–59	1.33	0.74 to 2.38
≥60	1.54	0.80 to 2.97
Education		
Above college	1.00	
Middle or high school	1.00	0.75 to 1.34
Below elementary school	1.29	0.96 to 1.75
Marital status		
Married	1.00	
Single	1.00	0.53 to 1.91
Divorced or separated	0.58	0.40 to 0.84
Self-rated health		
Good	1.00	
Normal	1.23	0.96 to 1.59
Bad	1.97	1.54 to 2.51
Chronic disease		
No	1.00	
Yes	1.72	1.31 to 2.27
Depression		
No	1.00	
Yes	1.47	1.23 to 1.76
Economic status		
Employed→employed	1.00	
Unemployed→employed	0.95	0.59 to 1.53
Employed→unemployed	2.79	2.06 to 3.78
Unemployed→unemployed	1.57	1.28 to 1.92
<i>Household level</i>		
Income		
High	1.00	
Middle	1.55	1.11 to 2.18
Low	1.09	0.75 to 1.57
Health insurance type		
Health insurance	1.00	
Medical Aid	0.61	0.46 to 0.81
Number of people with a disability		
0	1.00	
≥1	1.26	1.05 to 1.51
Number of people over 65 years		
0	1.00	
1	1.43	1.01 to 2.00
≥2	3.69	2.57 to 5.28
Number of household members		
1	1.00	
2	1.42	1.01 to 1.99
≥3	1.27	0.86 to 1.87

diseases or depression were more likely to experience CHE. Households headed by a woman have increased from 18.5% (2000) to 25.9% (2010), and this reflects problems as well as structural changes in South Korea.²⁷

Whereas in the past female householders generally resulted from the loss of a spouse, single households have recently increased because of changes in family values.²⁸ Labour market discrimination against women limits their economic activities, and career discontinuity occurs because of a patriarchal society that makes them wholly responsible for housework. Income reduction or insecure status of the labour market may result in CHE if a woman loses her husband.²⁹ Health-related factors affecting CHE in our study included self-rated health, chronic diseases and depression, similar to the results of previous studies.^{2 30–32}

Regarding household level, households that joined the national health insurance system were more likely to experience CHE. The healthcare system in Korea has two elements, national health insurance and Medical Aid. The national health insurance system, which is comprehensively managed in the form of social insurance, is financed by contributions from beneficiaries and provides benefits to them. The other element, Medical Aid, was started in 1977 as a form of public assistance to guarantee the minimum standard of living to low-income families by providing almost free medical services, and is financed by general revenue.³³ Our results indicated that people supported by Korea's Medical Aid programme had significantly lower CHE, which is probably due to the fact that Medical Aid beneficiaries have very low OOP payments. At least for low-income households, it appears that Medical Aid contributes more financial protection than alternative insurance programmes.³⁴ In contrast, households with elderly people and those containing individuals with a disability had significantly higher odds of experiencing CHE, similar to previous studies.^{35 36}

This study has a few limitations. First, comprehensive medical expenses, including expenses for health functional food and check ups etc, were used, even though the WHO defined CHE as inevitable and involuntary spending; therefore, CHE may be overestimated. However, according to statistics from the 2012 Korean Health Panel (KHP), similar to KOWEPS, necessary medical costs including inpatient, outpatient and emergency treatment and drugs account for 88.8% of comprehensive medical expenses. This rate indicates that the effect of CHE by voluntary spending may be modest. Second, because diverse criteria (10–40%) were used as the threshold of CHE, comparing our results with those of previous research is difficult. Thus, this study referred to previous studies which used a 40% threshold as recommended by the WHO. In addition, the CHE index does not take account of households that did not receive medical treatment because of their inability to pay and indirect costs such as loss in wages. Third, because a few conditions may not have been diagnosed, the actual prevalence of chronic diseases is probably higher than that reported in the KOWEPS. Fourth, because this research analysed data from a higher proportion of low-income people, these study findings cannot be easily generalised.

Table 3 Changes in economic status associated with catastrophic health expenditure in households according to income level

Variable	Low-income population		Middle-income population		High-income population	
	OR*	95% CI	OR*	95% CI	OR*	95% CI
Employed→employed	1.00		1.00		1.00	
Unemployed→employed	1.06	0.58 to 1.95	0.63	0.24 to 1.62	1.16	0.26 to 5.07
Employed→unemployed	3.52	2.44 to 5.10	1.49	0.75 to 2.97	2.10	0.60 to 7.37
Unemployed→unemployed	1.67	1.29 to 2.16	1.53	1.03 to 2.28	1.29	0.58 to 2.87

*Adjusted for age, sex, education, marital status, disability, chronic disease, depression, household income, type of health insurance, number of people with a disability/people over 65 years/number of household members.

Despite these limitations, this study is meaningful because it is the first to examine the impact of employment status changes on CHE in low-income people as well as the general population of South Korea. Because the Korean government has continuously increased medical support programmes for low-income people, we believe this research could provide significant evidence for expanding this assistance. Second, the longitudinal design of this research allows us to assess the continuity and stability of a few attributes of a sample group by repeatedly examining the same people. Another important strength of the longitudinal design is that cohort effects can be avoided because this study analysed one group of individuals over time, rather than comparing several groups that include different generations.

CONCLUSIONS

Households containing people who experienced changes in job status from employed to unemployed or who were unemployed with no status change were more likely to incur CHE than households with people who were continuously employed. In addition, low-income families with members who had either lost a job or were already unemployed were more likely to incur CHE than low-income households of people continuously holding a job. Given the insecure employment status of low-income people, they are more likely to face barriers in obtaining needed health services. Meeting their healthcare needs is an important consideration.

Contributors JWC conceived the study. THK and SIJ helped to draft the manuscript and provided a variety of comments. SYJ and W-RK performed the statistical analysis. ECP participated in its design and coordination. All authors read and approved the final manuscript.

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