

Original

The association between subjective socioeconomic status and health inequity in victims of occupational accidents in Korea

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Abstract: Objectives: We aimed to investigate the health inequity of victims of occupational accidents through the association between socioeconomic status and unmet healthcare need. **Methods:** Data from the first and second Panel Study of Workers' Compensation Insurance were used, which included 1,803 participants. The odds ratio and 95% confidence intervals for the unmet healthcare needs of participants with a lower socioeconomic status and other socioeconomic statuses were investigated using multivariate regression analysis. **Results:** Among all participants, 103 had unmet healthcare needs, whereas 1,700 did not. After adjusting for sex, age, smoking, alcohol, chronic disease, recuperation duration, accident type, disability, and economic participation, the odds ratio of unmet healthcare needs in participants with a lower socioeconomic status was 2.04 (95% confidence interval 1.32-3.15) compared to participants with other socioeconomic statuses. **Conclusions:** The victims of occupational accidents who have a lower socioeconomic status are more likely to have unmet healthcare needs in comparison to those with other socioeconomic statuses.

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I. Introduction

As Korean society develops further, people are more interested in their quality of life. In other words, they go beyond simply focusing on staying alive to pursuing something more important, such as physical, mental, and social well-being¹⁾. As health affects the body and mind, it is regarded as one of the most important factors for quality of life, which is a reason that many advanced countries consider health to be an important value. In particular, they put a lot of effort into ensuring health equity in order to guarantee everyone's rights to health²⁾. While Korean society has made remarkable strides in many aspects, these social advances do not necessarily always ensure health equity. Furthermore, it is often observed that people with a low socioeconomic status (SES), who have been marginalized during the development process, are more likely to have poorer health status³⁾.

The SES is known to create health inequity⁴⁾. To be specific, smoking habits differ according to SES⁵⁾, low SES is associated with more alcohol consumption⁶⁾, and SES affects nutrition inequity⁷⁾. Moreover, access to healthcare resources are known to be affected by the SES⁸⁾. The subjective SES in particular is known to be closely associated with health inequity⁹⁾. According to previous research, there is a vicious cycle in which a lower SES leads to a poor health status, and the poorer health status, in turn, leads to a much lower SES¹⁰⁾. As discussed above, the effect of SES has on health inequity is widely known, and the subjective SES in particular is known to be closely associated with health inequity¹¹⁾.

There are many indicators of health inequity, such as mortality, level of self-esteem, and the result of medical tests, including blood pressure, blood sugar, and hemo-

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globin¹²). Among these, unmet healthcare needs are the indicators used to evaluate the effect on health and these are commonly used to identify health inequity in particular¹³. Unmet healthcare needs are defined as the situations where a person does not receive appropriate treatment even though he or she needs a medical examination or treatment. Unmet healthcare needs are divided into clinical and subjective; clinical unmet healthcare needs are evaluated in terms of medical need, whereas subjective unmet healthcare needs are evaluated in terms of personal need^{13,14}. Many previous studies have used subjective unmet healthcare needs as an indicator to restore health equity¹³⁻¹⁵.

A previous study examined the correlation between employment status and unmet healthcare needs and investigated the causes of such unmet healthcare needs, focusing on the association between the SES and health equity¹⁶. When unemployed caused by a disease or injury, economic burden was associated more with stay-at-home mothers than ordinary workers when it came to unmet healthcare needs. Meanwhile, ordinary workers had unmet healthcare needs due to a lack of available time to visit a hospital rather than economic burden¹⁶. It is also known that those with low SES have more unmet healthcare needs^{14,17}. However, there are no studies of the subjective SES and health inequity. Moreover, no study has examined the association between the subjective SES and unmet healthcare needs.

Korea runs a workers' compensation insurance scheme¹⁸, which provides occupationally injured workers with all of the applicable treatments¹⁹. Therefore, health equity should be ensured for the occupational victims regardless of the SES. Among the occupational victims, however, there is a possibility that health inequity could occur. Therefore, we intended to examine the effect that the SES has on the health inequity of the occupational victims. We investigated the subjective SES's association with unmet healthcare needs as an indicator of health equity, and what causes unmet healthcare needs according to the SES.

II. Materials and Methods

1. Study design and participants

This study conducted a secondary analysis based on data from the first and second Panel Study of Workers' Compensation Insurance (PSWCI). The PSWCI set a target population of 89,921 workers who finished receiving workers' compensation care from January to December 2012 and used a sample of 2,000. The first round of the PSWCI was conducted with 2,000 participants from August to October 2013. The second round was conducted from August to October 2014. Of the 2,000 participants in the first round, 197 were not able to participate in the second round, leaving 1,803 participants. We selected the

1,803 people who were part of both the first and second rounds as the participants. The details of the PSWCI can be found in our previous study²⁰. The institutional review board of Yonsei University Graduate School of Public Health approved this study (No. 2-1040939-AB-N-01-2016-154).

2. Subjective SES

We classified the subjective SES into four classes: upper, upper-middle, lower-middle, and lower. In order to identify the subjective SES, we used a question about health, everyday life, and quality of life from the questionnaire for health and quality of life in the first PSWCI. More specifically, we used the question, "Considering your income, occupation, education level, and wealth, which one of the following categories do you think your SES belongs to?" When the participant answered "1. Upper," we defined his or her subjective SES as upper. In the same manner, when the participant answered "2. Upper-middle," "3. Lower-middle," or "4. Lower," we defined his or her subjective SES as upper-middle, lower-middle, or lower respectively.

3. Unmet healthcare needs

For unmet healthcare needs, we used the questions about health, everyday life, and quality of life from the questionnaire for health and quality of life in the second PSWCI. The question we used for health inequity was "Over the past one year, have you ever, even once, not been able to receive a check-up or treatment in a healthcare institution although it was needed?" The answers to the question were: "1. No, I have not at least once."; "2. Yes, I have been able to receive them all the time."; and "3. I have never needed them." When the answer was number 1, the participant was defined as having unmet healthcare needs, while the other answers were defined as having no unmet healthcare needs.

The question we used to identify the reason for unmet healthcare needs was "Over the past one year, what was the most important reason for not being able to receive a check-up or treatment in a healthcare institution?" The answers included: "1. Due to economic burden (because the treatment cost was too high)"; "2. Because a healthcare center was too far away (too long to go hospital)"; "3. Because I was not able to move very well or it was difficult to visit for health reasons (using transportation was difficult)"; "4. Because there was no one to take care of my child/children"; "5. Because the symptoms were mild (bearable symptoms)"; "6. Because I did not know where to go (lack of information)"; "7. Because I had no time to visit (lack of time)"; "8. Because I could not make a reservation as early as possible"; "9. Because there was no family doctor who knew my health status well (or family members)"; and "10. Others."

4. Covariates

The data from the first PSWCI were used for all of the following different covariates. Sex was divided into men and women. Age was divided into under 29, 30 to 39, 40 to 49, 50 to 59, and above 60 years. Smoking status was categorized as three groups: current smoker, past smoker, and non-smoker. In the meantime, drinking was divided into three groups: current alcohol use, past alcohol use, and non-alcohol use. Based on the questionnaires, chronic disease status was divided into those who had a chronic disease and those who did not. The recuperation duration was divided into three groups: less than 6 months, between 6 months and 1 year, and more than 1 year. Industrial accident was categorized based on the type of accident and disease, while disability was divided into those with disabilities and those without disabilities. Depending on whether the participant had a job or not, they were considered in terms of economic activities and divided into employed and unemployed.

5. Statistical analysis

As the outcomes were whether having unmet healthcare needs and the cause of unmet healthcare needs occurred over the past year, we used data from the first PSWCI for all variables except for the dependent variables. Using the data from the first PSWCI, we performed a chi-squared test on the general characteristics of the participants depending on their subjective SES. We also conducted a chi-squared test on the general characteristics from the first PSWCI depending on whether there were unmet healthcare needs in the second PSWCI.

By using multivariate logistic analysis, we calculated with a 95% confidence interval (95% CI) the odds ratio (OR) of occupational victims in the lower subjective SES class compared to those in other classes depending on whether there were unmet healthcare needs or not. In addition, based on the multivariate logistic analysis, which was adjusted for the following lifestyle and demographic characteristics as potential confounding variables: sex, age, smoking, alcohol, chronic disease, recuperation duration, accident type, disability, and economic participation, we calculated the OR (95% CI) of occupational victims in the lower subjective SES class compared to those in other classes depending on whether there were unmet healthcare needs.

We also examined the reason behind unmet healthcare needs depending on the subjective SES. We used multivariate logistic analysis and calculated the OR (95% CI) of occupational victims in the lower subjective SES class compared to those in other classes depending on whether there were unmet healthcare needs due to economic burden. Furthermore, this was also calculated using multivariate logistic analysis that was adjusted for the following lifestyle and demographic characteristics as potential confounding variables: sex, age, smoking, alcohol,

chronic disease, recuperation duration, accident type, disability, and economic participation. We used the SAS 9.2 software (SAS Institute, Cary, NC, USA) for statistical analysis and considered it statistically significant when the p -value was less than 0.05.

III. Results

1. Subjective SES

According to the classification of the participants in the first PSWCI based on the subjective SES, there were no people in the upper class while there were 4.9% in the upper-middle class, 51.3% in the lower-middle class, and 43.8% in the lower class (Table 1). In addition, while there was no difference in sex among the different classes, the largest age group across all the classes comprised participants in their fifties. As the class went higher, the smoking rate decreased ($p < 0.001$), but there was no difference for alcohol consumption. The higher the class, the lower the rate of those with a chronic disease, and the lower the rate of those whose recuperation duration for the industrial accident lasted more than a year. On the other hand, as the class became higher, the industrial accident type was more likely to be a disease and less likely to be a disability. The employment rate was higher in the higher classes.

2. Unmet healthcare needs

Among those in the second PSWCI, 5.7% belonged to a group with unmet healthcare needs while 94.3% belonged to a group without unmet healthcare needs (Table 2). Unmet healthcare needs occurred more among women than men. While there was no difference in unmet healthcare needs depending on smoking status, those who drank alcohol had fewer unmet healthcare needs than those who did not drink. As the recuperation duration became longer, there were more unmet healthcare needs ($p < 0.001$), but there was no difference according to accident type or disability. Unmet healthcare needs occurred more often among those who were unemployed, and the lower the subjective SES class, the more likely to have unmet healthcare needs.

3. Unmet healthcare needs according to subjective SES

The OR (95% CI) of unmet healthcare needs according to the subjective SES was 3.405 (1.590-3.637) in the lower class, which was high enough to be statistically significant ($p < 0.001$) (Table 3). In Model I, which was adjusted for sex, age, smoking, alcohol, chronic disease, recuperation duration, accident type, disability, and economic participation, the lower class had an OR of 1.995 (1.287-3.092), which was fairly high.

Table 1. Overview of subjective socioeconomic status

		Subjective SES N (%)			p-value
		Upper middle	Lower middle	Lower	
Sex	Men	72 (81.8)	777 (84.0)	665 (84.2)	0.849
	Women	16 (18.1)	148 (16.0)	125 (15.8)	
Age	~ 29	10 (11.4)	63 (6.8)	33 (4.2)	<.001
	30 ~ 39	20 (22.7)	163 (17.6)	76 (9.6)	
	40 ~ 49	23 (26.1)	228 (24.6)	208 (26.3)	
	50 ~ 59	29 (33.0)	328 (35.5)	291 (36.8)	
	60 ~	6 (6.8)	143 (15.5)	182 (23.1)	
Smoking	Current smoker	31 (35.2)	417 (45.1)	416 (52.6)	<.001
	Past smoker	18 (20.5)	200 (21.6)	164 (20.8)	
	Non smoker	39 (44.3)	308 (33.3)	210 (26.6)	
Drinking alcohol	Current alcohol use	62 (70.5)	660 (71.4)	571 (72.3)	0.629
	Past alcohol use	7 (7.9)	77 (8.3)	77 (9.7)	
	Non alcohol use	19 (21.6)	188 (20.3)	142 (18.0)	
Chronic disease	Yes	7 (7.9)	138 (14.9)	151 (19.1)	0.006
	No	81 (92.1)	787 (85.1)	639 (80.9)	
Recuperation duration	~ 6months	58 (65.9)	545 (58.9)	429 (54.3)	0.055
	6months ~ 1year	26 (29.5)	289 (31.3)	264 (33.4)	
	1year ~	4 (4.6)	91 (9.8)	97 (12.3)	
Accident type	Accident	73 (83.0)	840 (90.8)	732 (92.7)	0.008
	Disease	15 (17.0)	85 (9.2)	58 (7.3)	
Disability	Yes	66 (75.0)	764 (82.6)	661 (83.7)	0.124
	No	22 (25.0)	161 (17.4)	129 (16.3)	
Economic participation	Employed	77 (87.5)	714 (77.2)	477 (60.4)	<.001
	Unemployed	11 (12.5)	211 (22.8)	313 (39.6)	
Total		88 (4.9)	925 (51.3)	790 (43.8)	

SES, socioeconomic status

4. Causes of unmet healthcare needs according to subjective SES

Regarding the upper-middle subjective SES class in the second PSWCI, unmet healthcare needs occurred caused by a lack of time in all cases (Table 4). In the lower-middle class, unmet healthcare needs occurred to 42.8% of the participants due to economic burden and to 37.1% due to a lack of time. Meanwhile, in the lower class, 71.2% had unmet healthcare needs due to economic burden.

5. Economic burden as a cause of unmet healthcare needs according to subjective SES

The OR (95% CI) of unmet healthcare needs caused by economic burden as categorized by the subjective SES was 3.628 (1.558-8.449) in the lower class, which was high enough to be statistically significant ($p = 0.002$) (Table 5). In Model I, which was adjusted for sex, age, smoking, alcohol, chronic disease, recuperation duration, accident type, disability, and economic participation, the lower class had an OR of 3.138 (1.081-9.110), which was

fairly high.

IV. Discussion

This study examined the subjective SES of occupational victims by dividing the SES into four classes: upper, upper-middle, lower-middle, and lower. No person belonged to the upper class while 4.9% belong to the upper-middle class, 51.3% to the lower-middle class, and 43.8% to the lower class. It was found that industrial accidents occurred more among socioeconomically vulnerable groups. It is believed that a vicious cycle exists whereby people with jobs that have low wages and poor working conditions are more vulnerable to industrial accidents, which in turn cause less economic participation and result in economic vulnerability²¹.

The second PSWCI also surveyed the question for subjective SES. According to the classification of the participants in the second PSWCI based on the subjective SES, there were 0.2% in the upper class while there were 6.9% in the upper-middle class, 53.5% in the lower-middle

Table 2. Overview of unmet healthcare needs

		Unmet healthcare need N (%)		
		Yes	No	p-value
Sex	Men	75 (5.0)	1439 (95.0)	0.002
	Women	28 (9.7)	261 (90.3)	
Age	~ 29	3 (2.8)	76 (97.2)	0.270
	30 ~ 39	14 (5.4)	230 (94.6)	
	40 ~ 49	20 (4.4)	424 (95.6)	
	50 ~ 59	44 (6.8)	646 (93.2)	
	60 ~	22 (6.6)	324 (93.4)	
Smoking	Current smoker	48 (5.6)	816 (94.4)	0.764
	Past smoker	20 (5.2)	362 (94.8)	
	Non smoker	35 (6.3)	522 (93.7)	
Drinking alcohol	Current alcohol use	59 (4.6)	1234 (95.4)	0.004
	Past alcohol use	14 (8.7)	147 (91.3)	
	Non alcohol use	30 (8.6)	319 (91.4)	
Chronic disease	Yes	22 (7.4)	274 (92.6)	0.209
	No	81 (5.4)	1426 (94.6)	
Recuperation duration	~ 6months	36 (3.5)	996 (96.5)	<.001
	6months ~ 1year	44 (7.6)	535 (92.4)	
	1year ~	23 (12.0)	169 (88.0)	
Accident type	Accident	90 (5.5)	1555 (94.5)	0.154
	Disease	13 (8.2)	145 (91.8)	
Disability	Yes	90 (6.0)	1401 (94.0)	0.196
	No	13 (4.2)	299 (95.8)	
Economic participation	Employed	51 (4.0)	1217 (96.0)	<.001
	Unemployed	52 (9.7)	483 (90.3)	
Subjective SES	Upper middle	2 (2.3)	86 (97.7)	<.001
	Lower middle	35 (3.8)	890 (96.2)	
	Lower	66 (8.4)	724 (91.6)	
Total		103 (5.7)	1700 (94.3)	

SES, socioeconomic status

Table 3. Odds ratio and 95% confidence intervals for unmet healthcare needs according to subjective socioeconomic status

	Crude		Model I*	
	OR	95% CI	OR	95% CI
Subjective SES				
Upper middle and lower middle	1.00		1.00	
Lower	2.41	(1.59 ~ 3.64)	2.04	(1.32 ~ 3.15)

SES, socioeconomic status

OR, odds ratio

95% CI, 95% confidence intervals

* Model I: Adjusted for sex, age, smoking, alcohol, chronic disease, recuperation duration, accident type, disability, and economic participation.

class, and 39.4% in the lower class. In the alterations of subjective SES between first and second PSWCI, there were 67.7% in the same subjective SES while there were

19.4% in the risen subjective SES and 12.9% in the fallen subjective SES. For longitudinal study, we examined the association between subjective SES in the first PSWCI

Table 4. Causes of unmet healthcare needs according to subjective socioeconomic status

	Subjective SES N (%)		
	Upper middle	Lower middle	Lower
Economic burden	0 (0)	15 (42.8)	47 (71.2)
Too long to go hospital	0 (0)	0 (0)	1 (1.5)
Using transportation was hard	0 (0)	3 (8.6)	0 (0)
Bearable symptoms	0 (0)	0 (0)	4 (6.1)
Lack of time	2 (100.0)	13 (37.1)	10 (15.1)
I didn't have a family doctor	0 (0)	1 (2.9)	0 (0)
Others	0 (0)	3 (8.6)	4 (6.1)
Total	2 (100.0)	35 (100.0)	66 (100.0)

SES, socioeconomic status

Table 5. Odds ratio and 95% confidence intervals for economic burden as a cause of unmet healthcare needs according to subjective socioeconomic status

	Crude		Model I*	
	OR	95% CI	OR	95% CI
Subjective SES				
Upper middle and lower middle	1.00		1.00	
Lower	3.63	(1.56 ~ 8.45)	3.16	(1.11 ~ 9.00)

SES, socioeconomic status

OR, odds ratio

95% CI, 95% confidence intervals

* Model I: Adjusted for sex, age, smoking, alcohol, chronic disease, recuperation duration, accident type, disability, and economic participation.

and unmet healthcare need in the second PSWCI.

When factors contributing to unmet healthcare needs were examined, it was found that in terms of sex, women had more unmet healthcare needs than men, which is consistent with the preceding studies²²⁾. Regarding drinking alcohol, the group who did not drink had more unmet healthcare needs. It is possible that the results could be distorted because men are much more likely to drink than women in Korea²³⁾, or that the healthy group drank a lot more and brought down the occurrence of unmet healthcare needs²⁴⁾.

As the rehabilitation duration lasted longer, unmet healthcare needs occurred more frequently. In other words, longer rehabilitation duration means poorer health and makes the need for healthcare more likely. With reference to economic participation, those who were unemployed were more likely to have unmet healthcare needs than those who were employed. It has been observed that the unemployed used healthcare more often and had more unmet healthcare needs than the employed because their health was poorer than that of their counterparts²⁵⁾.

About the subjective SES and unmet healthcare needs, it was found that there were more unmet healthcare needs

as the class went down from upper to lower. It was also discovered that the lower the subjective SES, the poorer the participant's health; therefore, the more he or she was likely to need healthcare. In addition, it was found that the participants did not receive sufficient treatment, as access to healthcare was limited due to socioeconomic reasons, including economic burden. These findings confirm that occupational victims with a lower subjective SES face health inequity.

The OR of the lower subjective SES class in comparison to the other classes in terms of unmet healthcare needs was statistically significant. In addition, when it was adjusted for sex, age, smoking, alcohol, chronic disease, recuperation duration, accident type, disability, and economic participation, it was also statistically significant. It was found from these outcomes that the lower subjective SES class had more limited access to needed healthcare than others, which made health inequity in the lower class much worse. The upper-middle and lower-middle subjective SES classes were separated to examine whether the occurrence of unmet healthcare needs had a dose-response relationship. However, the upper-middle class had very few participants, which rendered it statisti-

cally insignificant.

When the reasons for unmet healthcare needs according to the subjective SES were examined, it was found that all participants in the upper-middle class reported that they had unmet healthcare need due to lacked time, while only 37.1% in the lower-middle class and 15.1% in the lower class cited this as their reason. On the other hand, no person in the upper-middle class reported economic burden as the reason for their unmet healthcare needs while 42.8% in the lower-middle class and 71.2% in the lower class did. Based on these results, we can confirm that in terms of healthcare, the lower subjective SES class had unmet healthcare needs mainly due to economic burden. These results are also consistent with a previous study that examined a general population group¹⁶⁾.

The OR of the lower subjective SES class compared to the other classes with regard to unmet healthcare needs caused by economic burden was statistically significant. In addition, when it was adjusted for sex, age, smoking, alcohol, chronic disease, recuperation duration, accident type, disability, and economic participation, statistically significant outcomes were found. From these findings, we can confirm that the lower subjective SES class had economic burden as the main reason for their limited use of healthcare. The upper-middle and lower-middle subjective SES classes were separated in order to examine whether unmet healthcare needs caused by economic burden had a dose-response relationship, but there were very few participants in the upper-middle class, which led to it being statistically insignificant.

This study has some strengths in many aspects. First, it was a large-scale epidemiological study conducted with 1,803 industrial accident patients and it was based on panel studies. Second, there was consistency between the participants because the same participants were used in the two panel studies²⁰⁾. Third, the study is particularly meaningful because the lower subjective SES class was separated from other classes and compared with the other classes, through this method, it was demonstrated that the lower class was more vulnerable to health inequity than the others.

At the same time, however, this study has several limitations. First, the SES was categorized by relying on a single questionnaire; we used subjective SES, which was individual recognitions of socioeconomic status²⁶⁾; the real income or education background and other objective indicators were not used. However, in our defense, many previous studies have used this method to classify the SES^{12,20)}. Furthermore, many previous studies have considered subjective SES as a health indicator in public health^{27,28)}. Moreover, after adjustment of objective SES such as income and education, subjective SES had causal relationship as health indicator²⁶⁾. Second, data about unmet healthcare needs were collected based on a questionnaire rather than objective indicators. Yet, data about un-

met healthcare needs are mostly collected by questionnaires similar to the one used in this study. Moreover, we based unmet healthcare needs not on how they happened in medical terms but on how each individual felt about them, which we believe reflects healthcare needs more accurately from the health sciences perspective^{14,29)}. Finally, we adjusted all of potential confounder including smoking status and alcohol consumption. In this analytic approach, there was a potential bias caused by over-adjustments. However, there was no significant difference in the results whether those confounding factors were adjusted or not.

In this study, we confirmed that the subjective SES of occupational victims and health inequity were associated with one another. It was observed that the lower subjective SES class in particular had more unmet healthcare needs and their access to healthcare was limited due to economic burden. As one of the most important goals for becoming a more advanced society is to ensure health equity, Korea needs to pay more attention to the lower SES classes. Moreover, supplementary actions should be taken, such as expanding welfare or providing healthcare services, in order to ensure that the occupational victims in the lower SES class do not have unmet healthcare needs for economic reasons.

Conflicts of interest: The authors have no competing interests

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