

# BMJ Open Employment status and unmet dental care needs in South Korea: a population-based panel study

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## ABSTRACT

**Objectives** This study was designed to evaluate whether employment status is associated with the experience of unmet dental care needs.

**Methods** A total of 4620 workers were retrieved from Korea Health Panel data (2010–2013), and potential relationships were explored among their income levels, changes in employment and unmet dental care needs.

**Results** Among the 4620 workers, 17.3% said they had failed at least once to get dental treatment or check-up, despite their needs. Precarious workers and those not in employment were more likely to experience unmet dental care needs due to economic burden compared with permanent workers (OR 1.36, 1.40, respectively). In addition, people in low-income group were 4.46 times more likely to experience unmet dental care needs caused by economic burden, compared with those with the highest income.

**Conclusion** This disparity means that precarious workers and those not in employment are more likely to face barriers in obtaining needed health services. Given the insecure employment status of low income people, meeting their healthcare needs is an important consideration.

## INTRODUCTION

South Korea achieved universal health insurance coverage just 12 years after its national health insurance system was implemented.<sup>1</sup> However, people with national health insurance are still paying rather high amount of out-of-pocket (OOP) payments. The proportion of total medical spending financed by the public sector in South Korea is only 56% of the country's population, which is lower than the Organization for Economic Cooperation and Development (OECD) average (73%). Furthermore, South Korea had the fourth lowest level of spending out of OECD nations after Chile (46%), the USA (48%) and Mexico (51%).<sup>2</sup> Relatively low coverage by health insurance may result in unmet needs, and this phenomenon is more likely to occur in dental care which often requires higher OOP payments than those for regular

## Strengths and limitations of this study

- This was the first study to examine the association between economic status and unmet dental care needs among adults in South Korea using longitudinal panel data.
- We used self-reported questionnaires to identify subjects' experience of unmet dental care needs.
- We did not control severity of dental care in our research.

healthcare. In South Korea, the coverage benefit of dental care services is low due to the relatively high medical expenses incurred by non-insured payment. Although the South Korean government has expanded coverage expansion policy for dental service, the level of OOP payments is very high compared with those of other countries.

The rate of unmet dental care needs is very high in South Korea. A previous study on unmet dental care needs in South Korea showed that response rate of unmet dental care needs was 24.5% of the entire population,<sup>3</sup> whereas results from another study performed in the US state of Wisconsin indicated that about 20.6% of the total population experienced unmet dental care needs.<sup>4</sup> In addition, a Canadian study on immigrants living more than 10 years in Canada showed that the experience rate of unmet dental care needs was 17.5%, and the rate of 28 European Union (EU) countries, including Spain, was 7.2%.<sup>5–7</sup>

The factors related to unmet healthcare needs among adults in previous studies were socioeconomic factors, such as income or education levels, and health status, including self-related health or mental health.<sup>8–12</sup> In other words, low-income or education groups were more likely to experience unmet healthcare needs than those with higher-income or education status. Although there has been some studies that reported on the association



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between employment status and unmet needs, most of them examined unmet healthcare needs, rather than dental care.

The current study aimed to examine the impact of employment status on the experience of unmet dental care needs, using nationally representative panel data collected from 2010 to 2013.

## METHODS

### Study model

This study used the Anderson social behavioural model to analyse factors that affect unmet dental care needs. This model is widely used as a model for analysing factors that affect unmet medical care. In the Anderson model, the factors that determine an individual's behaviour related to the use of medical services are largely categorised as predisposing factors, enabling factors and need factors, and their relevance to medical use is analysed through regression analysis. Predisposing factors consist of social structure variables (sex, age, marital status), social structural variables (education level, occupation) and health beliefs and attitudes. Enabling factors are the resources of individuals and communities that enable the use of medical care, and these include variables such as income, number of household members, type of health insurance and existence of private health insurance. Need factors are directly related to the use of health services, and disease factors are related to the level of individual disability or illness. It mainly includes variables such as subjective health status, presence of chronic disease, and disability. In this study, the predisposing factors were sex, age, education level, marital status and employment status. Enabling factors were income level, type of health insurance and private insurance. Needs factors were self-rated health, depression and stress.

### Data

We utilised data from the Korea Health Panel (KHP) third to sixth (2010–2013 year), which was conducted by the Korea Institute for Health & Social Affairs and National Health Insurance Corporation. KHP is a nationally representative sample of South Korean individuals and their families, and it includes data on subjects' demographic and socioeconomic characteristics, health status, access to healthcare and private health insurance status. KHP uses a stratified multistage probability sampling design according to region and residence, in order to select nationwide subjects from the 2005 Korea Census.<sup>13</sup>

### Study sample and design

We excluded the first to second data of KHP (2008–2009 year), since the variable of unmet dental care needs was not included in the survey. This study included data from the fourth wave in 2011. In the fourth wave (2011), a total of 17 035 subjects completed the survey questionnaire. The study subjects consisted of waged workers  $\geq 19$  years of age, and excluded those who did experience

unmet dental care needs. Subjects aged  $\geq 62$  years in 2011 were also excluded to ensure that all subjects in this study were  $< 65$  years old during the 3 year follow-up. After excluding subjects without follow-up or those with any missing values, a total of 4620 workers remained in this study. We examined the effect employment status on the experience of unmet dental care needs from 2011 to 2013.

### Dependent variable

Dependent variable of this study was whether the respondents had an unmet dental care. Therefore, they were asked, "Did you ever fail to receive dental care services over the past year, even when there was a need for treatment or check-up?" Also, economic burden, no time to spare and others were added as result variables for those who had experienced unmet healthcare needs.

### Independent variable

Employment status was classified into four categories: full-time permanent, precarious, self-employed or those not in employment. KHP classified individuals as full-time permanent workers if all four of the following conditions were satisfied: (1) they were directly hired by their employers (not subcontracted or dispatched workers, or self-employed workers without employees); (2) they were full-time workers (not part-time workers); (3) there was no fixed term in their employment contract (not temporary workers) and (4) there was a high probability of maintaining their current job (having relatively little job insecurity, and not a day labourer). Other than full-time permanent workers, waged workers hired by their employers were classified as precarious workers. Self-employed were defined as workers who managed their own business regardless of scale, or carried out professional matter under their own responsibility. For the purpose of comparability with previous East Asian studies and consideration of different classification of employment status between countries, self-employed were treated as having a different employment status. Those not in employment were defined as those who stopped working in 2011 out of workers in 2010.

### Covariates

In this study, we used several covariates to control for demographic and socioeconomic characteristics, as well as health status. Demographic characteristics included sex, age, marital status and socioeconomic factors, including education and income. The age groups were divided in 10 year intervals for measurement. Marital status was categorised into married, single and divorced or separated. Educational levels were categorised into below elementary school, middle or high school and above college. Weighted total household income was divided into five levels: highest, high, middle, low and lowest. As a proxy for health status, we utilised self-rated health, stress, depression, disability and chronic disease to control for the participant's health condition and health behaviour

**Table 1** General characteristics at first follow-up (2011) of waged workers

Variables	Total	Unmet dental care needs		Rao-Scott $\chi^2$ (p value)
		Yes, n (%)	No, n (%)	
Total	4620	801 (17.3)	3819 (82.7)	
Sex				0.35 (0.555)
Men	2845	488 (17.2)	2357 (82.8)	
Women	1775	313 (17.6)	1462 (82.4)	
Age (years)				4.00 (0.261)
20–29	292	43 (14.7)	249 (85.3)	
30–39	1034	167 (16.2)	867 (83.8)	
40–49	1686	285 (16.9)	1401 (83.1)	
≥50	1608	306 (19.0)	1302 (81.0)	
Education				14.67 (<0.001)
Below elementary school	346	84 (24.3)	262 (75.7)	
Middle or high school	2231	408 (18.3)	1823 (81.7)	
Above college	2043	309 (15.1)	1734 (84.9)	
Marital status				9.24 (0.009)
Married	3611	631 (17.5)	2980 (82.5)	
Single	730	102 (14.0)	628 (86.0)	
Divorced or separated	279	68 (24.4)	211 (75.6)	
Income				27.92 (<0.001)
Q1 (Lowest)	204	51 (25.0)	153 (75.0)	
Q2	694	145 (20.9)	549 (79.1)	
Q3	1093	207 (18.9)	886 (81.1)	
Q4	1311	226 (17.2)	1085 (82.8)	
Q5 (Highest)	1316	172 (13.1)	1144 (86.9)	
Self-rated health				64.09 (<0.001)
Good	2140	294 (13.7)	1846 (86.3)	
Normal	1815	380 (20.9)	1435 (79.1)	
Bad	326	97 (29.8)	229 (70.2)	
Depression				58.40 (<0.001)
Yes	251	88 (35.1)	163 (64.9)	
No	4030	683 (16.9)	3347 (83.1)	
Stress				73.09 (<0.001)
Always	363	118 (32.5)	245 (67.5)	
Often	2246	434 (19.3)	1812 (80.7)	
No	1667	218 (13.1)	1449 (86.9)	
Type of health insurance				3.25 (0.072)
National health insurance	4531	778 (17.2)	3753 (82.8)	
Medical aid	89	23 (25.8)	66 (74.2)	
Private insurance				4.04 (0.044)
Yes	3953	659 (16.7)	3294 (83.3)	
No	657	132 (20.1)	525 (79.9)	
Employment status				14.00 (0.002)
Permanent	1902	278 (14.6)	1624 (85.4)	

Continued

Table 1 Continued

Variables	Total	Unmet dental care needs		Rao-Scott $\chi^2$ (p value)
		Yes, n (%)	No, n (%)	
Precarious	1221	237 (19.4)	984 (80.6)	
Self-employed	1116	218 (19.5)	898 (80.5)	
Those not in employment	381	68 (17.8)	313 (82.2)	

that can affect healthcare utilisation. Finally, we used type of health insurance (national health insurance, medical aid) and existence of private insurance.

### Statistical analysis

The overall frequency of situations where unmet dental care needs incurred, after accounting for demographic, socioeconomic and health status, was determined by Rao-Scott  $\chi^2$  test. To identify factors associated with unmet dental care needs and, in particular, to examine the relationship between employment status and unmet dental care needs, we used the Generalized Linear Mixed Models since subjects in our study were measured repeatedly over time. OR was calculated using the regression coefficient gained through the Generalized Linear Mixed Models, and presented with a 95% CI. SAS V.9.3 statistical package was used for data analysis.

### Patient and public involvement statement

Patients or the public were not involved in this study.

## RESULTS

This study utilised longitudinal data that were repeatedly measured and constructed for 24616 people in 2008. First-year (2010) response rate of data utilised in this study was 80.6%, and the main reasons for decreasing response rate were death, response refusal and so on. Table 1 shows general characteristics at first follow-up (2011) of waged workers. Out of 4620 respondents aged between 20 and 61 years, 17.3% said they had failed at least once to have dental treatment or check-up, despite their needs. People who had low

education, as well as the low-income group, people who were divorced, people with negative self-related health and those with depression or stress who joined private insurance scheme, precarious workers and self-employed were more likely to experience unmet dental care needs. However, no significant relationship was observed between unmet dental care needs and sex, age, disability, chronic disease and type of health insurance.

Table 2 shows self-reported reasons for unmet dental care needs according to employment status. Precarious workers and those not in employment were more likely to experience unmet dental care needs caused by economic burden. On the other hand, permanent workers and self-employed were more likely to experience unmet dental care needs due to having no time to spare.

After applying multivariate models adjusted for several covariates, the results for factors associated with unmet dental care needs are shown in table 3. People who did not graduate elementary school had a higher risk of unmet dental care needs compared with those who graduated from college (OR: 1.35, 95% CI 1.11 to 1.64). Low-income group was 1.77 times more likely to experience unmet dental care needs than those with higher income. People with negative self-rated health were 2.19 times more likely to experience unmet dental care needs than those with positive self-related health, and people with stress or depression were more likely to experience unmet dental care needs than those who did not have such conditions (OR: 1.90, 1.69, respectively). People who joined private insurance scheme were 1.15 times more likely to experience unmet dental care needs than

Table 2 Self-reported reasons for unmet dental care needs according to employment status

Variable	Reason for unmet need			
	Total	Economic burden, n (%)	No time to spare, n (%)	Others, n (%)*
Total	4620	415 (9.0)	209 (4.5)	177 (3.8)
Permanent	1902	98 (5.2)	106 (5.6)	74 (3.9)
Precarious	1221	158 (12.9)	42 (3.4)	37 (3.0)
Self-employed	1116	109 (9.8)	56 (5.0)	53 (4.7)
Those not in employment	381	50 (13.1)	5 (1.3)	13 (3.4)

\*Others: Trivial symptoms, great distance from healthcare facility, reduced mobility (difficult to visit for physical reasons), no one to babysit, lack of information as to where to go, no timely appointment, absence of a primary care physician and so on.

**Table 3** Factors associated with unmet dental care needs

Variables	Unmet dental care needs	
	Adjusted OR	95% CI
<b>Sex</b>		
Men	1.00	
Women	0.95	0.86 to 1.06
<b>Age (years)</b>		
≥50	1.00	
40–49	1.03	0.92 to 1.16
30–39	1.11	0.95 to 1.29
20–29	1.10	0.82 to 1.48
<b>Education</b>		
Above college	1.00	
Middle or high school	1.07	0.96 to 1.19
Below elementary school	1.35	1.11 to 1.64
<b>Marital status</b>		
Married	1.00	
Single	1.17	0.98 to 1.41
Divorced or separated	0.79	0.67 to 1.03
<b>Self-rated health</b>		
Good	1.00	
Normal	1.76	1.59 to 1.94
Bad	2.19	1.86 to 2.59
<b>Depression</b>		
No	1.00	
Yes	1.69	1.42 to 2.01
<b>Stress</b>		
No	1.00	
Often	1.39	1.26 to 1.55
Always	1.90	1.61 to 2.24
<b>Income</b>		
Q5 (Highest)	1.00	
Q4	1.20	1.05 to 1.38
Q3	1.33	1.16 to 1.52
Q2	1.51	1.29 to 1.76
Q1 (Lowest)	1.77	1.41 to 2.22
<b>Type of health insurance</b>		
National health insurance	1.00	
Medical aid	1.17	0.86 to 1.60
<b>Private insurance</b>		
No	1.00	
Yes	1.15	1.01 to 1.32
<b>Employment status</b>		
Permanent	1.00	
Precarious	1.11	0.98 to 1.26
Self-employed	1.18	1.04 to 1.34
Those not in employment	1.09	0.92 to 1.30

those who did not join private insurance. Self-employed workers were 1.18 times more likely to experience unmet dental care needs than full-time permanent workers.

Table 4 shows the factors associated with reason for unmet dental care needs according to employment status or income. In employment status, precarious workers and those not in employment were more likely to experience unmet dental care needs caused by economic burden, compared with permanent workers (OR: 1.36, 1.40, respectively). On the other hand, precarious workers were 0.73 times more likely to experience unmet dental care needs due to having no time to spare, compared with permanent workers. In terms of income level, low-income group were 4.46 times more likely to experience unmet dental care needs caused by economic burden than those with the highest income. Meanwhile, middle-income group was 0.74 times more likely to experience unmet dental care needs caused by having no time to spare, compared with the highest-income class.

## DISCUSSION

This study showed that 17.3% of the South Korean population experienced unmet dental care needs. This rate is about 3–4 times higher than those of European countries, meaning people in South Korea have relatively low access to dental care. The high rate results from very low health insurance coverage in dental care services. Non-insured payments, which includes costs that the government does not support such as dental care services, is higher than payments for general healthcare services. In 2010, the national health insurance coverage rate was about 62.7% in South Korea (pharmacy 71.6%, clinic 65.6%, hospital 60.5%), whereas coverage rates of dental clinics and hospitals were about 35.5% and 25.5%, respectively.<sup>14</sup> In addition, the proportion of non-insured payment (numerator) in OOP (denominator) was about 43.2% and 64.6%, respectively, which was a much higher rate compared with other treatment services.<sup>3</sup> Fortunately, the South Korean government has implemented a policy to insure dental implant treatments, which were previously not insured among senior citizens, and plans to expand coverage rate for younger people as well. Based on such improvement of benefits, we suggest consistent coverage expansion in dental care by considering the characteristics of treatment criteria.

We identified the factors affecting unmet dental care needs as following: education, income, self-rated health, depression, stress, private insurance and employment status. In particular, we found no interaction between employment status and income. In other words, income and employment status independently affect unmet dental needs. The significant results linking socioeconomic status, including education and income levels, to health status indicators, such as self-rated health, depression, and stress, were not confined to dental care outcomes. These results were similar to those of previous studies using various designs or study periods.<sup>15–23</sup>

Our research showed that people who joined private insurance scheme were 1.15 times more likely to experience unmet dental care needs than those who did not join private insurance. People who had higher levels of

**Table 4** Factors associated with reason for unmet dental care needs according to employment status or income

Variables	Reason for unmet need					
	Economic burden		No time to spare		Others	
	OR*	95% CI	OR*	95% CI	OR*	95% CI
Employment status						
Permanent	1.00		1.00		1.00	
Precarious	1.36	1.14 to 1.61	0.83	0.67 to 1.04	1.03	0.79 to 1.34
Self-employed	1.18	0.99 to 1.41	1.12	0.91 to 1.37	1.44	0.13 to 1.83
Those not in employment	1.40	1.16 to 1.76	0.42	0.28 to 0.64	1.55	1.12 to 2.15
Income						
Q5 (Highest)	1.00		1.00		1.00	
Q4	2.06	1.65 to 2.57	0.92	0.75 to 1.12	0.96	0.75 to 1.22
Q3	2.93	2.35 to 3.64	0.74	0.59 to 0.94	0.85	0.65 to 1.10
Q2	3.44	2.73 to 4.34	0.74	0.56 to 0.98	0.89	0.65 to 1.21
Q1 (Lowest)	4.46	3.33 to 5.99	0.67	0.40 to 1.14	0.58	0.32 to 1.04

\*Adjusted for age, sex, education, marital status, disability, chronic disease, depression, stress, self-rated health, type of health insurance, private insurance.

income or education were more likely to join private insurance, and this phenomenon was similar to other countries that operate public healthcare systems with supportive private insurance.<sup>24</sup> Although medical utilisation of people joining private insurance was not higher compared with those not insured by private insurance, it is possible to increase unmet needs by relatively high desire for healthcare. Unmet needs related to private insurance must be examined further in future research.

We examined the difference of unmet dental care needs by employment status. Self-employed workers were 1.18 times more likely to experience unmet dental care needs than full-time permanent workers, and this phenomenon may have resulted from characteristics of self-employed workers in South Korea. A few people who failed to get a regular job opted to start their own business rather than looking for a non-regular position. Self-employed people comprise more than 30% of the entire labour market in South Korea. A substantial number of self-employed people belong to low-income class, and they are exposed to the danger of working in poverty.<sup>25</sup>

We examined the factors associated with reason for unmet dental care needs according to employment status or income. Precarious workers and those not in employment were more likely to experience unmet dental care needs caused by economic burden than permanent workers, and this result was similar compared with previous studies.<sup>26, 27</sup> Such phenomenon is related to the fact that the monthly wages of precarious workers were about 52.2% of wages earned by full-time permanent workers. In 2015, the average monthly wage of permanent workers was about US\$2300 in South Korea, whereas the monthly wage of precarious workers was about US\$1200. It is a crucial issue is that the average wage of precarious workers is lower than minimum cost of living,

and this disparity may have the effect of reducing access to dental care for precarious workers and those not in employment. A similar issue is that low-income group was 4.46 times more likely to experience unmet dental care needs due to economic burden than those with the highest income. Meanwhile, unmet dental care needs caused by other reasons were also significant, but in the opposite direction. For example, precarious workers and those not in employment were less likely to experience unmet dental care needs caused by having no time to spare than permanent workers. This phenomenon may be due to the longer working hours of full-time permanent workers compared with precarious workers. In fact, the average working hours of precarious workers in 2013 were about 75.5% of those of permanent workers.

This study is significant in that it was the first study to examine the association of economic status on unmet dental care needs among adults in South Korea using longitudinal panel data. Although similar studies on this topic have been conducted, all of them used cross-sectional design, and the possible inverse causality between employment status and unmet dental care needs were not reflected. This study's longitudinal design allowed us to assess the stability and continuity of several attributes of a sample group by repeatedly observing the same participants. Another major strength of this study's longitudinal design was that cohort effects can be avoided since we examined one group of individuals over time, rather than comparing several different groups that represent different ages and generations.

Our study also had some limitations. First, we used self-reported questionnaires to identify subjects' experience of unmet dental care needs. Nevertheless, some studies using subjective and objective methods tended to give reasonably

consistent results.<sup>28</sup> In addition, the follow-up period in the current study was relatively short compared with other studies. Second, we did not control severity of patient's dental status in our research. Although severity of dental status may affect the subject's access to medical care, we did not consider this factor in our model. Third, temporal bias could exist in our study results.

## CONCLUSIONS

Our research showed that precarious workers and those not in employment were more likely to experience unmet dental care needs due to economic burden than full-time permanent workers. In addition, low-income group were more likely to experience unmet dental care needs caused by economic burden than those with the highest income. This disparity indicates that certain people are more likely to face barriers in obtaining the health services they need. Given the insecure employment status of low-income people, meeting their needs for healthcare may be an important thing to consider.

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