International Journal of Gerontology

journal homepage: http://www.sgecm.org.tw/ijge/
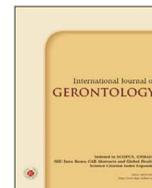
Original Article

Association between Restriction on Economic Activity Due to Health Condition and All-Cause Mortality: Results from Korean Longitudinal Study of Ageing

Jeong Min Yang [a,c], Jae Hyun Kim [b,c] *

[a] Department of Public Health, General Graduate School of Dankook University, Cheonan, Republic of Korea, [b] Department of Health Administration, College of Health Science, Dankook University, Cheonan, Republic of Korea, [c] Institute for Digital Life Convergence, Dankook University, Cheonan, Republic of Korea

A R T I C L E I N F O

S U M M A R Y

Background: According to the Organization for Economic Co-operation and Development, the unemployment rate of the middle-aged and elderly population is increasing worldwide. Moreover, 15.7% of middle-aged and elderly people in Korea are unable to engage in economic activities despite their desire for economic activities. Under these circumstances, various studies have been conducted to determine the relationship between unemployment and unhealthy status.
Purpose: The purpose of this study was to identify the association between restrictions on economic activities due to health conditions and all-cause mortality rates in those aged 45 and older in Korea and to lower the mortality rates of these groups.
Results: The study found that the mortality rate of those who responded "very probable" to experience of economic activity restrictions due to health conditions was 2.376 times (hazard ratio [HR] 2.376, 95% confidence interval [CI]: 1.933–2.920, p-value < .0001) higher than those who responded "not at all". Moreover, in a group with current non-economic activity, the mortality rate of those who responded "very probable" to experience of economic activity restrictions due to health conditions was 2.345 times (HR: 2.345, 95% CI: 1.856–2.963, p-value < .0001) higher than those who responded "not at all."
Conclusion: This study found that the death rate of groups with economic activity restrictions due to health conditions was higher than that of other groups, particularly those with current non-economic activities due to restrictions on economic activities. Thus, if a policy related to social participation, such as economic activities, is provided to a group of individuals with non-economic activities, the mortality rate for these groups is expected to be lower.

1. Introduction

The implications of economic activity are not only economic satisfaction but also involve daily work and decisions, sharing experiences with others, setting goals, and achieving activities.[1] This results in the preservation of an individual's cognitive function,[2] recognition of positive subjective health,[3] and prevention of individuals' mental health.[4]

According to the Organization for Economic Co-operation and Development (OECD) statistics, the unemployment rate for the middle-aged and elderly population has declined from 5.8% to 4.5% over the past 5 years. However, the unemployment rate in Korea exceeded to 3.0% in 2019 and exceeded to 3.6% in 2021.[5] Over the past 3 years, the unemployment rate for the middle-aged and elderly population has increased from 2.9% in 2019 to 3.3% and 3.7% in 2020 and 2021, respectively.[6]

Amidst restrictions on the economic activities of middle-aged and elderly groups in our society, the impact of non-economic activities on individuals is increasing. Holmes and Rahe's social adaptation measures listed the factors that caused changes in individual daily lives; non-economic activities ranked sixth after spousal death, divorce, imprison-ment, marital separation, and death of non-spouse family members.[7]

In fact, non-economic activities have caused a decrease in income, resulting in financial pressure and mental stress,[8] leading to death from drinking-related diseases, circulatory machinery diseases, malignant tumors, and suicide.[9,10] In addition, non-economic activities of middle-aged and older people cause deterioration of health, which is a limiting factor in starting economic activities. Jusot et al. found that based on the participant's health status, women groups with a smoking habit and was obese experienced 1.7 times more difficulty in starting economic activities than the healthy groups, and men groups who smoked experienced 1.8 times more difficulty in starting economic activities than the healthy groups.[11]

Therefore, based on prior studies suggesting that poor health increases economic activity restrictions[11] and the negative impact of economic activity restrictions on individuals,[12,13] this study aimed to identify the association between restrictions on economic activity due to health conditions in middle-aged and older populations and mortality.

2. Materials and methods

2.1. Data source

The data used for the analyses were derived from the Korean

* Corresponding author. 119, Dandae-ro, Dongnam-gu, Cheonan-si, Chungnam 330-714, Korea.
  E-mail address: jaehyun@dankook.ac.kr (J. H. Kim)

Longitudinal Study of Aging (KLoSA) from 2006 to 2016. As a study that possesses both the strengths of cross-sectional and time-series data, the KloSA was conducted by repeatedly surveying identical content for the same respondents every year. Thus, all variables surveyed by the KloSA were repeatedly measured from the first to the fourth waves to collect observation cases at multiple points in time. This biennial survey involves multistage stratified sampling based on geographical areas and housing types across Korea. Participants were selected randomly using multistage stratified probability sampling to create a nationally representative sample, excluding Jeju Island, of community-dwelling Koreans aged 45 and older.

Participant selection was performed by the Korea Labor Institute, including individuals from both urban and rural areas. In case of refusal to participate, another participant was selected from an additional, similar sample from the same district.

In the first baseline survey in 2006, 10,254 individuals from 6,171 households (1.7 per household) were interviewed. There were 292 individuals with cancer. The second survey, in 2008, followed up with 8,675 participants, who represented 86.6% of the original panel. The third survey, in 2010, followed up with 8,229 participants, who represented 81.7% of the original panel. The fourth survey, in 2012, followed up with 7,813 participants, who represented 80.1% of the original panel. The fifth survey, in 2014, followed up with 8,387 participants (including 920 new participants), who represented 80.4% of the original panel. The sixth survey, in 2016, followed up with 9,913 participants (including 878 new participants), who represented 79.6% of the original panel.

To investigate the association between restrictions on economic activity due to health conditions and mortality, among 10,254 individuals who were registered in the KLoSA, we excluded 35 respondents who did not respond. Finally, we included 10,219 participants at the baseline.

2.2. Independent variables

Restriction on economic activity due to health conditions was assessed by the response to the following question at baseline (1st KLoSA) by a yes/no response to the question: "Do you have difficulties with your current economic activities because of health conditions?"

2.3. Dependent variables

Death (all-cause mortality) over a maximum follow-up period of 10 years was determined by death certificates and a coroner's report.

2.4. Control variables

2.4.1. Socioeconomic and demographic factors
The age group was divided into four categories: 45–54, 55–64, 65–74, and ≥ 75 years. Educational level was categorized into four groups: elementary school or lower, middle school, high school, and college or higher. Gender was categorized as either male or female. Residential regions were categorized as urban (Seoul, Daejeon, Daegu, Busan, Incheon, Kwangju or Ulsan) and rural (not classified as a city). Marital status was divided into two groups: married or single (including separated, divorced). Current economic activity was categorized into yes or no, and health insurance was categorized into national health insurance and medical aid.

2.4.2. Health status and behavioral factors
Smoking status was categorized into three groups: never, for-

mer smoker and smoker. Alcohol use was also divided into three groups: never, former drinker and drinker. Finally, the number of chronic diseases (hypertension, diabetes, osteoarthritis, rheumatoid arthritis, cancer, chronic pulmonary disease, liver disease, cardiovascular disease, and cerebrovascular disease) was included as a covariate in our analyses.

2.5. Analytical approach and statistics

Chi-square and log rank tests for the Kaplan Meier curve as well as Cox proportional hazards models, were used to analyze the association between restriction on economic activity due to health conditions and mortality. Using Cox proportional hazards models, adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) were calculated to assess the association between economic restriction due to health conditions and mortality. Survival time, measured as the time interval between the date of enrollment and the date of death or censoring (up to eight years), was the outcome variable. For all analyses, the criterion for statistical significance was $p \leq 0.05$, two-tailed. All analyses were conducted using the SAS statistical software package, version 9.4 (SAS Institute Inc., Cary, NC, USA).

2.6. Ethics approval

Approval from an ethics committee is not required to analyze encrypted claim data.

The study protocol was reviewed and approved by the KOSTAT (Statistics Korea), approval number 33602.

The survey of the Korean Longitudinal Study of Aging (KLoSA) was approved by the Institutional Review Board of the Korea Centers for Disease Control and Prevention. In addition, as the KLoSA database is released to the public for scientific use, ethical approval was not needed for this study.

3. Results

Table 1 shows the general characteristics of the participants in identifying the relevance between the restrictions of economic activity due to health conditions and mortality. The mortality rate of the 10,219 subjects was 14.6% (1,488 individuals). Regarding the restriction on economic activities due to health conditions, 24.7% (2,521 individuals) answered "Not at all," and the resulting death rate was 6% (152 individuals). The number of respondents who answered "Probably not" stood at 41.1% (4,199 individuals), and their death rate was 10.8% (453 individuals). The number of respondents who answered "Probable" stood at 23% (2,347 individuals), and their death rate was 19% (445 individuals). The number of respondents who answered "Very probable" stood at 11.3% (1,152 individuals), and their mortality rate was 38% (438 individuals). At present, 38.7% (3,950 individuals) are economically active, and the death rate in this group is 6.5% (256 individuals). The number of economically inactive groups was 61.4% (6,269 individuals), and their mortality rate was 19.7% (1,232 individuals).

Figure 1 shows the Kaplan-Meier curve. Results of log-rank test represented a significant difference in survival probability of the fourth groups for restriction on economic activity due to health conditions (p < .0001).

Table 2 shows the results of the correction of other control variables to determine the relevance of restrictions on economic activity due to health conditions and mortality. Compared to those who responded "Not at all" to restricted economic activities due to health conditions, those who answered "Very probable" had a high mortal-

Table 1

General characteristics of subjects included for analysis.

	Total		Mortality				p-value
	N	%	No	%	Yes	%	
Restriction on economic activity due to health condition							< .0001
Very probable	1,152	11.3	714	62.0	438	38.0	
Probable	2,347	23.0	1,902	81.0	445	19.0	
Probably not	4,199	41.1	3,746	89.2	453	10.8	
Not at all	2,521	24.7	2,369	94.0	152	6.0	
Age							< .0001
45–54	3,288	32.2	3,187	96.9	101	3.1	
55–64	2,789	27.3	2,580	92.5	209	7.5	
65–74	2,672	26.2	2,171	81.3	501	18.8	
≥ 75	1,470	14.4	793	54.0	677	46.1	
Education							< .0001
≤ elementary school	4,801	47.0	3,753	78.2	1,048	21.8	
Middle school	1,656	16.2	1,500	90.6	156	9.4	
High school	2,705	26.5	2,504	92.6	201	7.4	
≥ college	1,057	10.3	974	92.2	83	7.9	
Gender							< .0001
Male	4,452	43.6	3,657	82.1	795	17.9	
Female	5,767	56.4	5,074	88.0	693	12.0	
Residential region							< .0001
Urban	6,648	65.1	5,791	87.1	857	12.9	
Rural	3,571	34.9	2,940	82.3	631	17.7	
Marital status							< .0001
Married	7,937	77.7	7,014	88.4	923	11.6	
Single (including separated, divorced)	2,282	22.3	1,717	75.2	565	24.8	
Current economic activity							< .0001
Yes	3,950	38.7	3,694	93.5	256	6.5	
No	6,269	61.4	5,037	80.4	1,232	19.7	
Health insurance							< .0001
National health insurance	9,579	93.7	8,252	86.2	1,327	13.9	
Medical aid	640	6.3	479	74.8	161	25.2	
Smoking status							< .0001
Never	7,275	71.2	6,353	87.3	922	12.7	
Former smoker	976	9.6	750	76.8	226	23.2	
Smoker	1,968	19.3	1,628	82.7	340	17.3	
Alcohol use							< .0001
Never	3,872	37.9	3,397	87.7	475	12.3	
Former drinker	687	6.7	496	72.2	191	27.8	
Drinker	5,660	55.4	4,838	85.5	822	14.5	
Number of chronic disease*							< .0001
0	5,362	52.5	4,824	90.0	538	10.0	
1	2,967	29.0	2,476	83.5	491	16.6	
2	1,309	12.8	1,010	77.2	299	22.8	
≥ 3	581	5.7	421	72.5	160	27.5	
Total	10,219	100.0	8,731	85.4	1,488	14.6	

* Hypertension, diabetes, cancer, chronic obstructive pulmonary disease, liver disease, cardiovascular disease, cerebrovascular disease and arthritis.
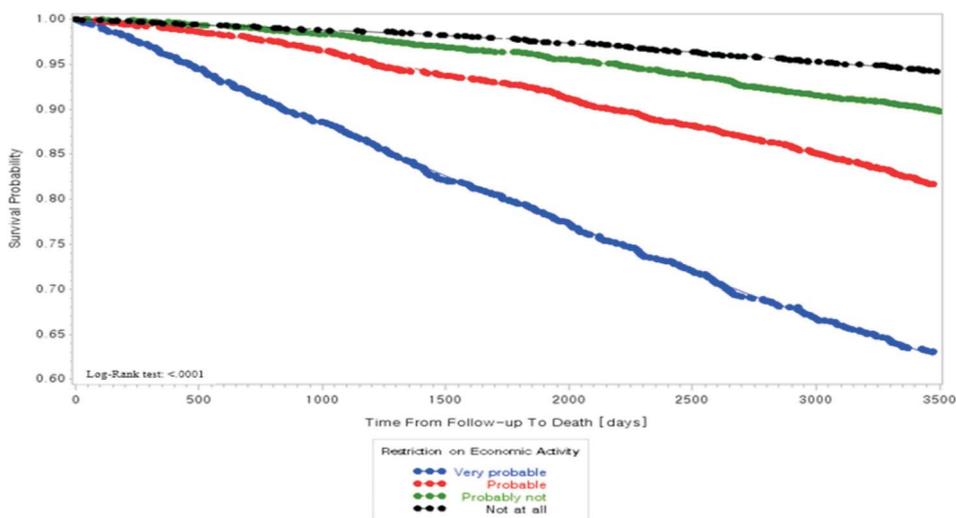

Figure 1. Kaplan Meier curve for death.

Table 2
Adjusted effect between restriction on economic activity and risk of mortality.

	Mortality		
	HR	95% CI	p-value
Restriction on economic activity due to health condition			
Very probable	2.376	1.933	2.920	< .0001
Probable	1.408	1.154	1.718	0.001
Probably not	1.087	0.899	1.313	0.390
Not at all	1.000		
Age			
45–54	1.000		
55–64	1.812	1.417	2.318	< .0001
65–74	3.702	2.924	4.687	< .0001
≥ 75	9.053	7.088	11.563	< .0001
Education			
≤ elementary school	1.421	1.118	1.806	0.004
Middle school	1.128	0.861	1.477	0.382
High school	1.055	0.816	1.365	0.681
≥ college	1.000		
Gender			
Male	2.404	2.063	2.802	< .0001
Female	1.000		
Residential region			
Urban	1.000		
Rural	1.258	1.132	1.398	< .0001
Marital status			
Married	1.000		
Single (including separated, divorced)	1.430	1.258	1.625	< .0001
Current economic activity			
Yes	0.614	0.526	0.716	< .0001
No	1.000		
Health insurance			
National health insurance	1.037	0.875	1.228	0.676
Medical aid	1.000		
Smoking status			
Never	1.291	1.087	1.533	0.004
Former smoker	1.416	1.219	1.644	< .0001
Smoker	1.000		
Alcohol use			
Never	1.000		
Former drinker	1.091	0.916	1.300	0.331
Drinker	1.122	0.978	1.287	0.100
Number of chronic disease*			
0	1.000		
1	0.991	0.873	1.125	0.884
2	1.186	1.021	1.378	0.026
≥ 3	1.204	0.996	1.455	0.055

Controlled variables: Age, Education, Gender, Residential region, Marital status, Current economic activity, Health insurance, Smoking status, Alcohol use, Number of chronic diseases.
* Hypertension, diabetes, cancer, chronic obstructive pulmonary disease, liver disease, cardiovascular disease, cerebrovascular disease and arthritis.

ity rate of 2.376 times (HR: 2.376, 95% CI: 1.933–2.920, p-value < .0001). Those who answered "Probable" had a high mortality rate of 1.408 times (HR: 1.408, 95% CI: 1.154–1.718, p-value: 0.0001) than "Not at all" group. Those who answered "Probably not" had a high mortality rate of 1.087 times. However, the difference was not statistically significant. According to the current economic activity status, the activity group's mortality rate was 0.614 times (HR: 0.614, 95% CI: 0.526–0.716, p-value < .0001) lower than the inactivity group's mortality.

Table 3 shows the results of a correction analysis to analyze the relevance of economic activity restrictions due to health conditions and mortality rates based on current economic activity. In the group with current economic activity, the death rate of the group that responded "Very probable" was 1.586 times higher (HR: 1.586, 95% CI: 0.872–2.883, p-value 0.131) than that of the group that responded "Not at all" to restricting economic activities due to health conditions; however, the difference was not statistically significant. In the group with non-economic activity, the death rate of the group that

responded "Very probable" was 2.345 times higher (HR: 2.345, 95% CI: 1.856–2.963, p-value < .0001) than that of the group who responded "Not at all to restricting economic activities due to health conditions, which was statistically significant.

4. Discussion

According to OECD, the unemployment rate of middle-aged and older adults aged 45 years or older is increasing worldwide.[5] Moreover, 15.7% of middle-aged and older people in Korea are unable to engage in economic activities despite their desire for economic activities.[6]

Under these circumstances, various studies[8,10] have been conducted on the relationship between unemployment and unhealthy status. Therefore, this study analyzed the link between economic activity restrictions and mortality rates due to the health conditions of middle-aged and elderly people in Korea.

To summarize the results of this study, the mortality rate of

Table 3
Adjusted effect between restriction on economic activity and risk of mortality by current economic activity.

	Mortality					
	Group with current economic activity			Group with non-economic activity		
	HR	95% CI	p-value	HR	95% CI	p-value
Restriction on economic activity due to health condition						
Very probable	1.586	0.872　2.883	0.131	2.345	1.856　2.963	< .0001
Probable	1.366	0.907　2.057	0.135	1.357	1.077　1.710	0.010
Probably not	1.263	0.901　1.770	0.176	0.999	0.796　1.254	0.996
Not at all	1.000			1.000		
Age						
45–54	1.000			1.000		
55–64	1.652	1.128　2.419	0.010	1.743	1.251　2.429	0.001
65–74	3.740	2.528　5.531	< .0001	3.356	2.458　4.583	< .0001
≥ 75	9.214	5.646　15.037	< .0001	8.426	6.163　11.520	< .0001
Education						
≤ elementary school	2.480	1.409　4.365	0.002	1.204	0.925　1.567	0.167
Middle school	1.380	0.746　2.553	0.305	1.034	0.766　1.397	0.827
High school	1.689	0.972　2.938	0.063	0.893	0.666　1.198	0.450
≥ college	1.000			1.000		
Gender						
Male	3.306	2.180　5.014	< .0001	2.269	1.921　2.679	< .0001
Female	1.000			1.000		
Residential region						
Urban	1.000			1.000		
Rural	1.381	1.063　1.796	0.016	1.231	1.095　1.383	0.001
Marital status						
Married	1.000			1.000		
Single (including separated, divorced)	1.722	1.178　2.516	0.005	1.398	1.221　1.602	< .0001
Health insurance						
National health insurance	1.005	0.513　1.972	0.988	1.045	0.877　1.246	0.619
Medical aid	1.000			1.000		
Smoking status						
Never	1.139	0.775　1.675	0.508	1.327	1.095　1.610	0.004
Former smoker	1.180	0.862　1.615	0.302	1.479	1.249　1.753	< .0001
Smoker	1.000			1.000		
Alcohol use						
Never	1.000			1.000		
Former drinker	1.356	0.902　2.038	0.143	1.057	0.870　1.284	0.577
Drinker	1.067	0.786　1.447	0.679	1.128	0.966　1.316	0.127
Number of chronic disease*						
0	1.000			1.000		
1	1.072	0.803　1.430	0.638	0.972	0.844　1.119	0.688
2	1.133	0.734　1.750	0.573	1.184	1.008　1.391	0.040
≥ 3	1.274	0.670　2.420	0.460	1.184	0.969　1.447	0.099

Controlled variables: Age, Education, Gender, Residential region, Marital status, Health insurance, Smoking status, Alcohol use, Number of chronic diseases.
* Hypertension, diabetes, cancer, chronic obstructive pulmonary disease, liver disease, cardiovascular disease, cerebrovascular disease and arthritis.

groups with restricted economic activity due to health conditions was higher than that of the other groups, particularly those with non-economic activities.

The results of this study were consistent with those of previous studies,[9,14,15] and groups with limited economic activity had a higher mortality rate than those with chronic diseases, accidents, and increased violence.[16]

Factors that contributed to the high death rates of middle-aged and elderly people who are not economically active due to restrictions on economic activities were decreased incomes,[17] lack of collective activities,[18] chronic diseases caused by restricted social activities,[15] and poor health due to environmental factors at work.[19] In addition, the increase in depression and frustration caused by the inability to perform economic activities despite the desire for economic activities led to death in some cases.[20]

According to previous studies, the current Korean middle-aged and elderly population was found to have a higher mortality rate due to chronic diseases, suicide, and pneumoconiosis, similar to previous studies[15,19,20] compared to other age groups.[21] The reason for the high death rate was the high retirement rate of middle-aged and elderly Koreans compared to other countries,[22] and the reemploy-

ment rate was significantly lower than that in other countries.[23] In addition, statistical data[6] showed that the employment rate of middle-aged and old-aged Korean companies continued to decrease. At the same time, a high percentage of "voluntary unemployment" among middle and high-aged groups in Korea who fail to engage in economic activities despite their high desire for economic activities, and eventually an increase in suicides and the occurrence of chronic diseases contributed to the increase in mortality rate.[21]

It has been shown, however, that the health status of economically inactive middle-aged and older groups is improved if they are provided with opportunities for social participation, such as economic activities, due to restrictions on economic activities.[24] Caplan et al. found that interventions for reemployment among the unemployed had positive effects on mental health, such as overcoming anxiety and depression, and increased self-esteem and quality of life by generating high-quality reemployment in terms of income and job satisfaction.[25] Therefore, this study suggests that restrictions on economic activity will reduce the mortality rate of economically inactive groups by providing them with opportunities such as social activities.

Unlike previous studies focusing on economic activity restrictions and their associations with suicide rates or health problems,

this study examined the association between economic activity restrictions and mortality due to health problems and an in-depth analysis of economic activity restrictions and non-economic groups. In addition, the survey can be generalized to Korean adults aged 45 years or older using the KLoSA, which has the advantage of representing the entire population of survey participants.

Nevertheless, this study has several limitations that should be considered. First, this study has a subjective bias due to the KLoSA used in the analysis, mixed with the opinions of the respondents. Therefore, the research results should be understood while acknowledging the limitations of the objectivity of self-reported data. Second, individual response characteristics may be associated with restrictions on economic activity. Not including them in our statistical model can exaggerate the association of interest. Third, we analyzed longitudinal data, but the results may reflect an inverse causal relationship between the constraints of economic activity and all-cause mortality.

5. Conclusion

Based on the 1st to 6th Basic Survey of the KLoSA conducted on middle-aged people aged 45 or older, this study aimed to determine the association between restrictions on economic activity due to health conditions and mortality. This study found that the mortality rate of groups with economic activity restrictions due to health conditions was higher than that of other groups, particularly those with current non-economic activities due to restrictions on economic activities. Thus, if a policy related to social participation, such as economic activities, is provided to a group of individuals with non-economic activities, the mortality rate for these groups is expected to be lower.

Author contributions

Jae Hyun Kim designed the study, researched the data, and performed the statistical analyses.

Jeong Min Yang contributed to performing the statistical analyses and writing the manuscript.

Jae Hyun Kim is the guarantor.

Availability of data and material

The data that support the findings of this study are openly available at https://survey.keis.or.kr/eng/klosa/klosa01.jsp.

References

1. Jahoda M. Reflections on marienthal and after. *J Occup Organ Psychol*. 1992;65(4):355–358.
2. Glei DA, Landau DA, Goldman N, et al. Participating in social activities helps preserve cognitive function: an analysis of a longitudinal, population-based study of the elderly. *Int J Epidemiol*. 2005;34(4):864–871.
3. Chung SD, Kim YH, Choi HJ. Relationship between social-economic re-
sources and health: A comparison of elderly with different age groups. *Health Soc Welf Rev*. 2013;33(2):63–90. [In Korean, English abstract]
4. Oh CS. The effects of the elderly's subjective health perceptions and quality of life on their depression and suicide ideation. *Korean J Health Serv Manag*. 2012; 6(2):179–191. [In Korean, English abstract]
5. OECD Data. *Unemployment rate by age group*. Paris, France: Organisation for Economic Co-operation and Development; 2021. Available at https://data.oecd.org/unemp/unemployment-rate-by-age-group.htm. Accessed September 15, 2021.
6. Statistics Korea. *Economically Active Population Survey in December 2021*. Daejeon, Korea: Statistics Korea; 2022. Available at http://kostat.go.kr/portal/eng/pressReleases/5/2/index.board?bmode=read&bSeq=&aSeq=416351&pageNo=1&rowNum=10&navCount=10&currPg=&searchInfo=&sTarget=title&sTxt=. Accessed January 15, 2022.
7. Holmes TH, Rahe RH. The social readjustment rating scale. *J Psychosom Res*. 1967;11(2):213–218.
8. Michaud PC, Crimmins E, Hurd M. The effect of job loss on health: Evidence from biomarkers. *Labour Econ*. 2016;41:194–203.
9. Pongiglione B, De Stavola BL, Kuper H, et al. Disability and all-cause mortality in the older population: evidence from the English Longitudinal Study of Ageing. *Eur J Epidemiol*. 2016;31(8):735–746.
10. Bloemen H, Hochguertel S, Zweerink J, et al. Job loss, firm-level heterogeneity and mortality: Evidence from administrative data. *J Health Econ*. 2018;59:78–90.
11. Jusot F, Khlat M, Rochereau T, et al. Job loss from poor health, smoking and obesity: a national prospective survey in France. *J Epidemiol Community Health*. 2008;62(4):332–337.
12. Strassnig M, Cornacchio D, Harvey PD, et al. Health status and mobility limitations are associated with residential and employment status in schizophrenia and bipolar disorder. *J Psychiatr Res*. 2017;94:180–185.
13. Luo Y, Pan X, Zhang Z. Productive activities and cognitive decline among older adults in China: Evidence from the China Health and Retirement Longitudinal Study. *Soc Sci Med*. 2019;229:96–105.
14. Clemens T, Popham F, Boyle P. What is the effect of unemployment on all-cause mortality? A cohort study using propensity score matching. *Eur J Public Health*. 2015;25(1):115–121.
15. Lundin A, Lundberg I, Hallsten L, et al. Unemployment and mortality--a longitudinal prospective study on selection and causation in 49321 Swedish middle-aged men. *J Epidemiol Community Health*. 2010;64(1):22–28.
16. Mustard CA, Bielecky A, Etches J, et al. Mortality following unemployment in Canada, 1991-2001. *BMC Public Health*. 2013;13:441.
17. Yamasaki A, Sakai R, Shirakawa T. Low income, unemployment, and suicide mortality rates for middle-age persons in Japan. *Psychol Rep*. 2005; 96(2):337–348.
18. Dunlavy AC, Juárez S, Rostila M. Employment status and risk of all-cause mortality among native- and foreign-origin persons in Sweden. *Eur J Public Health*. 2018;28(5):891–897.
19. DeBono N, Richardson D, Keil A, et al. Employment characteristics and cause-specific mortality at automotive electronics manufacturing plants in Huntsville, Alabama. *Am J Ind Med*. 2019;62(4):296–308.
20. Buffat J. Unemployment and health. *Rev Med Suisse Romande*. 2000; 120(4):379–383.
21. Statistics Korea. *Causes of Death Statistics in 2019*. Daejeon, Korea: Statistics Korea; 2020. Available at https://kostat.go.kr/portal/eng/pressReleases/1/index.board?bmode=read&aSeq=385629. Accessed September 15, 2021.
22. Kwon HJ. The status and characteristics of the elderly pension in Korea. *Pension Forum*. 2017;66(2):23–34. Available at https://kiss.kstudy.com/public/public2-article.asp?key=50928928. Accessed September 15, 2021. [In Korean]
23. Kwon HJ, Jang JH. *Loss of jobs and reemployment of middle and high-aged people*. Chungcheongbuk-do, Korea: Korea Employment Information Service; 2015. Available at https://keis.or.kr/user/extra/main/3874/publication/publicationList/jsp/LayOutPage.do?categoryIdx=131&pubIdx=1972&onlyList=N. Accessed September 15, 2021. [In Korean]
24. Schuring M, Robroek SJ, Otten FW, et al. The effect of ill health and socioeconomic status on labor force exit and re-employment: a prospective study with ten years follow-up in the Netherlands. *Scand J Work Environ Health*. 2013;39(2):134–143.
25. Caplan RD, Vinokur AD, Price RH, et al. Job seeking, reemployment, and mental health: a randomized field experiment in coping with job loss. *J Appl Psychol*. 1989;74(5):759–769.