International Journal of Mental Health Promotion
DOI: 10.32604/IJMHP.2020.010995

Tech Science Press

Article

Association between Economic Activity and Cognitive Health: A Population-Based Observational Study

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Abstract: This study investigates whether restricted participation in productive activity is associated with cognitive health in Korea. Furthermore, given the enormous socioeconomic disparities between aging and gender differences in employment, we also examine whether these associations vary by gender and age. Data from the Korean Longitudinal Study of Ageing (KLoSA) from 2006 to 2016 was used and 9,942 subjects were included at baseline in 2006. To analyze the association between restricted economic activity due to health condition and cognitive function, generalized estimating equation (GEE) model and chi-square test were used. Of the 9,942 individuals at baseline in 2006, the odds ratio (OR) of cognitive decline in those in the "very probable" of restricted economic activity was 2.58 times higher (p-value: < 0.0001) compared with "not at all" of restricted economic activity. In a subgroup analysis, $\leqslant$ 64 years and $\geqslant$ 65 years groups presented similar results. OR of cognitive decline in "very probable" of restricted economic activity was 2.50 times higher (p-value: < 0.0001) compared with "not at all" of restricted economic activity in both groups, respectively. For male and female, OR of cognitive decline in "very probable" of restricted economic activity was 2.77 times higher (p-value: < 0.0001) and 2.40 times higher (p-value: < 0.0001) compared with "not at all" of restricted economic activity, respectively. Our findings highlight association between restriction in economic activity and cognitive function among middle aged and elderly population in Korea. Given the benefits of economic activity, efforts should be made to improve health condition and reduce barriers to participate in economic activity.

Keywords: Activity; economic; elderly; health; restriction

1 Introduction

With a rapid aging population, cognitive impairment is becoming a severe health problem in Korea. Dementia, which could be a result of significant cognitive impairment, is considered as one of the leading causes of increased disability in late life. Furthermore, the prevalence of dementia around the world is expected to increase due to global aging. Notably, a study conducted in 2014 put forth the possibility of a 15.3% reduction in dementia prevalence by 2050 when the key exposures were reduced by 20% [1]. Accordingly, the risk factors associated with dementia should be identified and managed better to reduce its prevalence.

Prior evidence indicates that the cognitive functions related to the frontal lobe are affected the most by aging [2]. The frontal lobe is often related to fluid abilities, such as memory, processing speed and spatial ability, and these abilities tend to decline faster than crystalized functions (e.g., vocabulary, information, and comprehension) [3,4]. Furthermore, although most cognitive functions decline naturally with aging,

because cognitive decline could be a predictor of dementia [5], it is important to identify and understand the mechanisms involved in cognitive decline.

Social factors, such as socioeconomic status (e.g., unemployment and income), often have a profound impact on cognitive function [6]. According to recent research, participation in productive activity (e.g., paid work, volunteering, and family caregiving) has shown to benefit overall well-being as well as health outcomes such as mortality, morbidity, and cognitive impairment [7,8]. Participation in such activities could lead to social contributions that benefit others, and enable better integration to social networks and a sense of gratification [8]. Also, previous studies indicated a negative association of social integration and social engagement with cognitive function, mental health and mortality [9–11].

In a 20-year follow-up study from the Suffolk Country Mental Health Project cohort, Strassnig et al. [12] showed the predictive effect of health limitations in terms of unemployment, independent of other previously established correlates, including cognition and symptoms. Their results indicated that negative symptoms and physical limitations attributed to about 30% of the variance in terms of predicting unemployment. In addition, poor health status [12] including cognition and symptoms [12] was associated with residential region and, particularly, employment. The importance of poor health status for predicting outcome was confirmed in a more impaired group [12]. Therefore, the positive effect of productive activity on cognition may be robust to alternative empirical specifications [13]. Yet, it is still unclear whether participation or restriction in economic activity will have a protective effect on cognitive function or accelerate cognitive decline in Korea. Besides, a number of studies have explained the impact of participation in productive activity on mental health with the role theory, but there has not been a study focusing on the impact of restricted economic activity on cognitive decline for the Korean population. Therefore, we contribute to the current research by focusing on whether restricted participation in productive economic activity is associated with cognitive health in Korea. Furthermore, we extended our research to consider the longitudinal association between productive activities and cognitive function by focusing on the impact of restricted participation in productive economic activity on cognitive decline over time. Lastly, given the enormous socioeconomic disparities between aging and gender differences in employment, we also examined whether these associations vary by gender and aging.

2 Methods

2.1 Data Soruce

The data used for the following analyses were derived from the Korean Longitudinal Study of Ageing (KLoSA) from 2006 to 2016. As a type of study that possesses both the strengths of cross-sectional data and time series data, KLoSA was constructed by repeatedly surveying the identical content for the same respondents. Thus, all variables were repeatedly measured from the 1st wave to the 6th wave 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 a multistage, stratified probability sampling designed to create a nationally representative sample of community-dwelling Koreans 45 years of age and older. Participant selection was performed by the Korea Labor Institute for these rapidly growing populations, including individuals from both urban and rural areas. In case of refusal to participate, another subject was selected from an additional, similar sample from the same district.

In the first baseline survey in 2006, 10,254 individuals in 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 subjects, who represented 86.6% of the original panel. The third survey, in 2010, followed up with 8,229 subjects, who represented 81.7% of the original panel, the fourth survey, in 2012, followed up with 7,813 subjects, who represented 80.1% of the original panel and the fifth survey, in 2014, followed up with 8,387 subjects (including 920 new subjects), who represented 80.4% of the original panel. The sixth survey, in 2016, followed up with 9,913 subjects (including 878 new subjects), who represented 79.6% of the original panel.

In this study, we excluded individuals for whom we had incomplete data: 33 individuals who lacked information on socioeconomic factors and 216 individuals who lacked information on health status and risk

factors in 2006. Finally, 9,942 subjects were included. This study does not need ethical approval because it is not a study using human derivatives, and all subjects are encrypted and cannot be identified (Fig. 1).

2.2 Independent Variables

Restriction on economic activity due to health condition was assessed by self-reported response to the question: "Do you have a problem with your work because of your health condition?". The responses were assigned to 1 of 4 subcategories: "very probable", "probable", "probably not" and "not at all".

2.3 Dependent Variables

2.3.1 Korean Mini-Mental State Examination (K-MMSE)

The study considered a twofold dependent variable, which was measured by using the Korean Mini-Mental State Examination (K-MMSE) as cognitive function. K-MMSE included 11 items in 7 categories of cognitive functions, including orientation for time and place, registration, attention & calculation, recall, language, and visual construction [14,15]. In a previous study, Kang et al. [16] showed that of the cognitive components included in the K-MMSE, Orientation, Attention and Calculaton, Recall, and Visual Construction are impaired in dementia patients. The sensitivities of the K-MMSE in detecting dementia were 70–83. Factor analysis indicated that the multiple cognitive components of the K-MMSE can he explained by one or two factors. The K-MMSE was also highly correlated with another brief measure of cognitive functioning, the Blessed Orientation Memory-Information ($r = 0.78$). The result, however, further suggested that the K-MMSE is relatively insensitive to detect the early stage of dementia, causing an increase in false negatives.

The total score of the measure ranges from 0 to 30; higher the score, better the cognitive function. The validity of K-MMSE was reported elsewhere [14]. We followed the conventional classification criteria for cognitive function, categorizing K-MMSE scores as cognitive decline (K-MMSE $\leq$ 23), and normal cognitive function (K-MMSE $\geq$ 24) [14,15].

2.4 Control Variables

2.4.1 Socioeconomic and Demographic Factors

Age groups were divided into three categories: 45–54, 55–64 and $\geq$ 65 years of age. Education level was categorized into four groups: elementary school or lower, middle school, high school, and college or higher. Gender was categorized as male and female. Marital status was divided into three groups: married, separated or divorced, and single. Residential regions were categorized as Metropolitan (Seoul), urban (Daejeon, Daegu, Busan, Incheon, Kwangju or Ulsan) or rural (not classified as a city). Health insurance was categorized into national health insurance and medical aid.

2.4.2 Health Status and Behavioral Factors

Self-rated health was categorized into five groups: very good, good, normal, bad, and worst, and depressive symptom a week was divided into two groups: yes or no. Smoking status was categorized into three groups: current smoker, former smoker, and never smoker. Alcohol use also was divided into three groups: current drinker, former drinker, and never drinker. Depressive symptoms from responses to the question: "How many days in a week do you have a depressed mood?" were included in the model because 2-week symptoms of depression could not be assessed due to data collection limitations. The response "less than a day" indicated "No" and "a day or two", "three or four days" and "five days or more" indicated "Yes". Finally, the number of chronic diseases (consisting of hypertension, diabetes, osteoarthritis, rheumatoid arthritis, cancer, chronic pulmonary disease, liver disease, cardiovascular disease, and cerebrovascular disease) and year dummies during 12 years were included as covariates in our analyses.

2.5 Analytical Approach and Statistics

Chi-square test and a generalized estimating equation (GEE) for logistic regression in binary outcome

were used to handle the association between restriction on economic activity due to health condition and cognitive function. The use of a GEE model was required in order to handle the unbalanced data with correlated outcomes over time. To determine whether the probability of cognitive function changed over time, we included time (year) in the model as a categorical covariate; the regression coefficient was used to estimate both the change in probability of cognitive function and independent variables, annually [17]. For all analyses, statistical significance was set to $p \leq 0.05$, two-tailed. All analyses were conducted using the SAS statistical software package, version 9.4 (SAS Institute Inc., Cary, NC, USA).

3 Results

3.1 Prevalence of Cognitive Function

Tab. 1 displays the descriptive statistics of all variables from 2006 to 2016. At baseline 2006, of the 9,942 research subjects included in our study, the prevalence of those with cognitive decline was 24.4% (2,454 participants) and mean of cognitive function was 25.46 (SD: 5.3). Of the total sample population, the number of participants with "very probable" of restriction on economic activity due to health condition was 1,037 (10.4%) and cognitive function was 20.46 (SD: 7.7). Of them, 579 participants (55.8%) had cognitive decline. The number of participants with "probable" of restriction on economic activity due to health condition was 2,290 (23.0%) and cognitive function was 23.92 (SD: 5.6). Of them, 854 participants (37.3%) had cognitive decline (Tab. 1).

3.2 Association between Restriction on Economic Activity and Cognitive Function

Tab. 2 shows the relationship between restriction on economic activity due to health condition and cognitive function adjusted for socioeconomic status, health risk/status behavior and behavioral factors. After adjusting for all of these confounders, the odds ratio (OR) of cognitive decline in those with "very probable" of restriction on economic activity due to health condition was 2.58 times higher (95% Confidence Interval [CI]: 2.26–2.94 *p*-value: < 0.0001) compared with those with "not at all" of restriction on economic activity due to health condition and the estimate of cognitive function in those with "very probable" of restriction on economic activity due to health condition was -0.12 (95% CI: -0.13–-0.11 *p*-value: < 0.0001) compared with those with "not at all" of restriction on economic activity due to health condition.

OR of cognitive decline in those with "probable" of restriction on economic activity due to health condition was 1.43 times higher (95% CI: 1.29–1.59 *p*-value: < 0.0001) compared with those with "not at all" of restriction on economic activity due to health condition and the estimate of cognitive function in those with "probable" of restriction on economic activity due to health condition was -0.01 (95% CI: -0.01–0.00 *p*-value: 0.007) compared with those with "not at all" of restriction on economic activity due to health condition. In addition, OR of cognitive decline in those 65 years or older was 4.10 times higher (95% CI: 3.70–4.55 *p*-value: < 0.0001) compared with those with 54 years or less and OR of cognitive decline in "never smoker" was 1.16 times higher (95% CI: 1.01–1.21 *p*-value: 0.024) compared with those with "smoker".

3.3 Association between Restriction on Economic Activity and Cognitive Function by Age and Gender

Tab. 3 shows subgroup analysis according to age (≤ 64 years or ≥ 65 years) and gender (male and female). In both age groups, OR of cognitive decline in those with "very probable" of restriction on economic activity due to health condition was 2.50 times higher compared with those with "not at all" of restriction on economic activity due to health condition. In the male group, OR of cognitive decline in those with "very probable" of restriction on economic activity due to health condition was 2.77 times higher (95% CI: 2.25–3.42 *p*-value: < 0.0001) and in the female group, OR of cognitive decline in those with "very probable" of restriction on economic activity due to health condition was 2.40 times higher (95% CI: 2.02–2.85 *p*-value: < 0.0001) compared with those with "not at all" of restriction on economic activity due to health condition.

4 Discussion

In this population-based prospective study of 9,942 middle aged and older adults at baseline, our

primary purpose was to examine the association between the restriction on economic activity due to health condition, and cognitive decline and cognitive function measured by the Korean Mini-Mental State Examination (K-MMSE) after adjusting for covariates (i.e., socioeconomic status, health risk, and behavioral factors), using a nationally representative database in South Korea. Bi-directional association between economic activity status and impaired physical, mental and/or cognitive health is well recognized [18–20]. Bjelajac et al.'s study [21] showed that the protective factors for good mental health and cognitive functioning in older Croatian workers are being employed, having more education, living with a partner in the household, and being healthier.

In the present study, we found that restriction on economic activity due to health condition was associated with an increased risk of cognitive decline. The most notable result was stronger in men than women. This result could be explained by the role theory and gender expectation in Korea. The role theory provides important perspective in regards to productive aging, and is made of three stages: role loss, role strain, and role enhancement [22]. Role loss postulates that when individuals enter their older age period, the sudden role loss could be experienced. This could be especially so when the individuals are not able to access a new role as they become older. Role loss is often used to explain the psychological loss, brought forth by retirement [8]. In addition, despite the changing family structure in Korea, the traditional high expectation put upon males to provide for the family still exists [23]. Therefore, the results of the present research could be attributed to the specific culture in Korea. In addition, according to the 'use it or lose it' hypothesis, the cognitive function of an individual could either be maintained or declined more quickly, depending on how cognitively active an individual stay. Failure to stay cognitively active could accelerate cognitive decline and further increase the risk of dementia [24]. Accordingly, many studies have suggested that restriction in productive activities may potentially trigger cognitive decline and be associated with lower cognitive function [25,26].

This study has various strengths, particularly with its use of a population-based representative sample and the 10-year follow-up database. Also, it advances the knowledge on restricted economic activity or productive activities in Korea. We also used a large nationally representative longitudinal survey data of a well-defined and comprehensively studied sample of middle aged and older adults. This data was analyzed to study the association between restricted economic activity and cognitive function, in an effort to better the generalizability of our results. Therefore, with the rapidly aging population in Korea, restricted economic activity may be a reasonably good predictor of cognitive function.

There are several limitations to this study that should be taken into consideration. First, data was gathered from self-reports of socioeconomic factors as well as health status and risk factors. Although MMSE is a widely used and well validated measure in older adults, respondents' reports are subjective and are potentially affected by false consciousness and adaptation of resources, because cognition was determined using a cut-off on a self-reported measure of MMSE and not by clinical evaluation. Therefore, self-reported data may be an imperfect indicator of actual behavior. Second, information regarding health status and risk behavior factors was not sufficient. Especially, our analysis of the length and intensity of economic activity participation may not be thorough due to data availability and small number of participants in some economic activity. Furthermore, there might have been unobserved confounders. Therefore, the lack of such information might have resulted in an underestimation of our results in the present study. Finally, although we conducted longitudinal analysis through GEE model, associations between economic activity and cognitive health are subject to reverse-causation problems."

Nevertheless, despite the underestimation, we found a significant association between restricted economic activity and cognitive function. Finally, although this analysis covered a 12-year period, it might still be too short to see large cognitive declines. As new waves are being added in the future, it is important to reexamine these relationships between restricted economic activity and cognitive function. In the meantime, with longer periods, sample attrition due to mortality and dropout must be carefully evaluated and adjusted as the association may be less apparent due to the fact that those who are less engaged and who have poor cognitive function are more likely to die or dropout.

In conclusion, our findings highlight the association between restriction in economic activity and

cognitive declines among middle aged and elderly population in Korea. This study has implications for policy-makers, health care practitioners, and community advocates. Given the benefits of economic activity, efforts should be made to improve health condition and reduce barriers to participate in economic activity among middle aged and elderly population.

Table 1: General characteristics of subjects included for analysis

	CD	CF	CD	CF	CD	CF	CD	CF	CD	CF	CD	CF
	2006		2008		2010		2012		2014		2016	
	Yes	M	Yes	M	Yes	M	Yes	M	Yes	M	Yes	M
Restriction on economic activity due to health condition	*	*	*	*	*	*	*	*	*	*	*	*
Very probable	579	20	458	20	380	18	363	18	316	18	343	18
Probable	854	24	793	24	843	22	782	23	744	24	710	24
Probably not	787	26	830	26	1,208	24	794	26	715	26	635	26
Not at all	207	28	133	28	166	26	79	27	78	28	88	27
Education level	*	*	*	*	*	*	*	*	*	*	*	*
≤ Elementary school	2,037	23	1,837	23	1,889	22	1,535	22	1,371	23	1,305	23
Middle school	195	27	182	27	313	25	214	26	234	26	223	26
High school	161	28	160	28	313	26	213	27	201	27	202	27
≥ College	34	28	35	28	82	26	56	27	47	28	46	28
Gender	*	*	*	*	*	*	*	*	*	*	*	*
Male	654	27	608	26	832	25	611	26	555	26	522	26
Female	1,773	25	1,606	24	1,765	23	1,407	24	1,298	24	1,254	24
Age	*	*	*	*	*	*	*	*	*	*	*	*
≤ 54	179	28	113	28	186	26	74	27	22	28	0	0
55–64	437	27	326	27	439	25	281	27	235	27	148	28
≥ 65	1,811	23	1,775	23	1,972	22	1,663	23	1,596	23	1,628	24
Marital status	*	*	*	*	*	*	*	*	*	*	*	*
Married	1,398	26	1,277	26	1,617	25	1,201	25	1,050	26	1,005	26
Separated, divorced	1,020	22	926	22	962	21	808	22	788	22	762	22
Single	9	27	11	26	18	24	9	25	15	24	9	25
Residential region	*	*	*	*	*	*	*		*	*	*	*
Metropolitan	308	27	298	26	374	24	243	25	205	26	193	26
Urban	652	26	528	26	669	24	537	25	492	25	473	25
Rural	1,467	25	1,388	25	1,554	23	1,238	24	1,156	25	1,110	25
Health insurance	*	*	*		*	*	*		*	*	*	
National health insurance	2,141	26	1,985	25	2,303	24	1,813	25	1,673	25	1,621	25
Medical aid	286	22	229	22	294	21	205	22	180	22	155	23
Self-rated Health	*	*	*	*	*	*	*	*	*	*	*	*
Very Good	39	27	17	28	42	25	17	26	13	27	2	29
Good	317	28	215	28	380	26	205	27	193	27	175	27
Normal	665	26	811	25	914	24	724	25	628	26	619	26
Bad	1,046	23	927	23	1,003	21	812	22	784	22	719	22
Worst	360	20	244	19	258	18	260	17	235	17	261	17
Number of chronic disease*	*	*	*	*	*		*	*	*		*	
0	893	26	670	26	732	25	502	26	397	27	326	27
1	827	25	755	25	853	24	634	25	560	25	516	25
≥ 2	707	23	789	23	1,012	22	882	23	896	23	934	23
Smoking status	*		*	*	*		*		*		*	*
Never	1,944	25	1,761	25	1,948	23	1,544	24	1,394	25	1,340	25
Former smoker	168	26	192	26	301	24	248	25	291	26	319	25
Smoker	315	27	261	26	348	25	226	26	168	26	117	27
Alcohol use	*		*		*	*	*	*	*	*	*	*
Drinker	2,227	26	1,971	25	2,235	24	1,693	25	1,146	24	1,418	25
Former Drinker	200	24	243	24	362	23	325	24	342	24	358	24
Never	0	0	0	0	0	0	0	0	365	27	0	0
Depressive symptom	*	*	*	*	*	*	*	*	*	*	*	*
Yes	1,055	23	1,347	23	1,382	22	1,130	23	1,043	23	981	23
No	1,372	26	867	27	1,215	25	888	26	810	26	795	26
Total	2,427	25	2,214	25	2,597	24	2,544	25	1,853	25	1,776	25

*$p < 0.05$; CD: cognitive decline, CF: cognitive function, M: Mean

Table 2: Adjusted effect between economic activity and cognitive health

	Cognitive decline				Cognitive function			
	OR	**95% CI**		***P*-value**	**Estimate**	**95% CI**		***P*-value**
Restriction on economic activity due to health condition								
Very probable	2.58	2.26	2.94	< 0.0001	-0.12	-0.13	-0.11	< 0.0001
Probable	1.43	1.29	1.59	< 0.0001	-0.01	-0.01	0.00	0.007
Probably not	1.24	1.13	1.36	< 0.0001	0.00	0.00	0.01	0.032
Not at all	1.00				ref			
Education level								
≤ Elementary school	4.33	3.80	4.94	< 0.0001	-0.09	-0.10	-0.09	< 0.0001
Middle school	2.02	1.76	2.32	< 0.0001	-0.02	-0.02	-0.01	< 0.0001
High school	1.45	1.27	1.67	< 0.0001	-0.01	-0.02	-0.01	< 0.0001
≥ College	1.00				ref			
Gender								
Male	0.73	0.68	0.79	< 0.0001	0.02	0.01	0.02	< 0.0001
Female	1.00				ref			
Age								
≤ 54	1.00				ref			
55–64	1.47	1.32	1.63	< 0.0001	-0.01	-0.01	-0.01	< 0.0001
≥ 65	4.10	3.70	4.55	< 0.0001	-0.08	-0.09	-0.08	< 0.0001
Marital status								
Married	0.88	0.65	1.19	0.409	0.01	-0.01	0.03	0.342
Separated, divorced	1.40	1.03	1.91	0.033	-0.06	-0.07	-0.04	< 0.0001
Single	1.00				ref			
Residential region								
Metropolitan	1.00				ref			
Urban	1.17	1.08	1.27	0.000	-0.02	-0.02	-0.01	< 0.0001
Rural	1.44	1.34	1.55	< 0.0001	-0.03	-0.03	-0.03	< 0.0001
Health insurance								
National health insurance	1.00				ref			
Medical aid	1.31	1.19	1.45	< 0.0001	-0.01	-0.02	0.00	0.008
Self-rated Health								
Very Good	1.00				ref			
Good	0.60	0.48	0.74	< 0.0001	0.01	0.00	0.02	0.015
Normal	0.86	0.69	1.06	0.162	0.00	-0.01	0.01	0.982
Bad	1.37	1.10	1.70	0.005	-0.05	-0.06	-0.04	< 0.0001
Worst	1.94	1.52	2.48	< 0.0001	-0.16	-0.18	-0.15	< 0.0001
Number of chronic disease*								
0	1.00				ref			
1	1.09	1.02	1.16	0.012	-0.01	-0.02	-0.01	< 0.0001
≥ 2	1.00	0.94	1.06	0.900	0.00	0.00	0.00	0.910
Smoking status								
Never	1.11	1.01	1.21	0.024	-0.01	-0.01	0.00	0.006
Former smoker	1.05	0.96	1.16	0.281	-0.01	-0.01	0.00	0.075
Smoker	1.00				ref			
Alcohol use								
Drinker	0.97	0.85	1.11	0.630	-0.01	-0.02	0.00	0.119
Former Drinker	0.97	0.90	1.05	0.485	0.00	0.00	0.01	0.718
Never	1.00				ref			
Depressive symptom								
Yes	1.57	1.49	1.65	< 0.0001	-0.04	-0.04	-0.04	< 0.0001
No	1.00				ref			
Year								
2006	1.10	1.01	1.20	0.031	-0.01	-0.02	-0.01	< 0.0001
2008	1.11	1.02	1.22	0.016	-0.01	-0.02	-0.01	< 0.0001
2010	1.88	1.72	2.05	< 0.0001	-0.07	-0.08	-0.07	< 0.0001
2012	1.16	1.06	1.26	0.001	-0.03	-0.04	-0.03	< 0.0001
2014	1.05	0.93	1.19	0.403	0.00	-0.01	0.00	0.287
2016	1.00				ref			

Table 3: Adjusted effect between economic activity and cognitive health by gender and age

	Cognitive decline				Cognitive function			
	OR	**95% CI**		***P*-value**	**Estimate**	**95% CI**		***P*-value**
Restriction on economic activity due to health condition				**≤ 64**				
Very probable	2.50	1.96	3.19	< 0.0001	-0.06	-0.07	-0.05	< 0.0001
Probable	1.41	1.19	1.67	< 0.0001	0.00	-0.01	0.00	0.050
Probably not	1.32	1.15	1.52	< 0.0001	0.00	0.00	0.00	0.361
Not at all	1.00				1.00			
Restriction on economic activity due to health condition				**≥ 65**				
Very probable	2.50	2.12	2.95	< 0.0001	-0.15	-0.16	-0.13	< 0.0001
Probable	1.41	1.23	1.61	< 0.0001	-0.02	-0.03	-0.01	0.005
Probably not	1.20	1.05	1.36	0.01	0.00	-0.01	0.01	0.610
Not at all	1.00				1.00			
Restriction on economic activity due to health condition				**Male**				
Very probable	2.77	2.25	3.42	< 0.0001	-0.11	-0.12	-0.10	< 0.0001
Probable	1.49	1.26	1.75	< 0.0001	-0.01	-0.01	0.00	0.131
Probably not	1.17	1.01	1.36	0.033	0.01	0.00	0.01	0.027
Not at all	1.00				1.00			
Restriction on economic activity due to health condition				**Female**				
Very probable	2.40	2.02	2.85	< 0.0001	-0.13	-0.15	-0.12	< 0.0001
Probable	1.40	1.23	1.59	< 0.0001	-0.01	-0.02	0.00	0.014
Probably not	1.28	1.13	1.44	< 0.0001	0.00	0.00	0.01	0.552
Not at all	1.00				1.00			
***adjusted for all variables**								

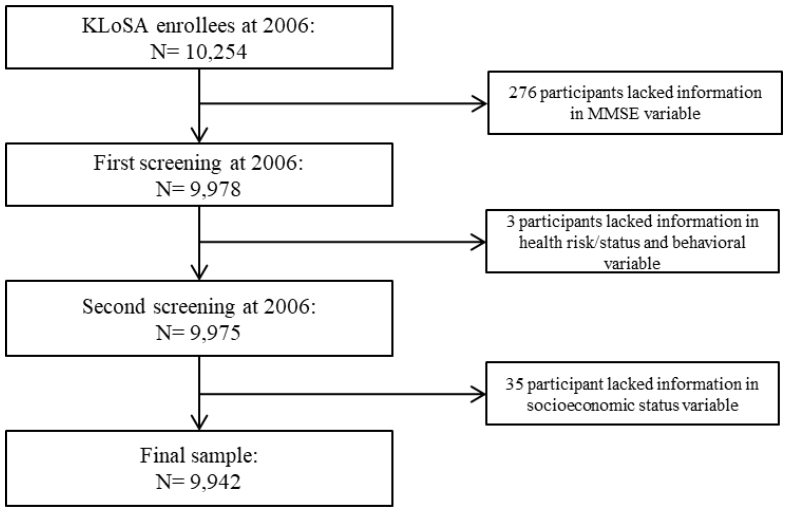

Figure 1: Flow chart for sample selection

Funding Statement: The author(s) received no specific funding for this study.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

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