

# Socioeconomic Inequalities in Intention to Quit Smoking Plan Among Korean Adults, 2016–2021

Tobacco Use Insights

Volume 18: 1–9

© The Author(s) 2025

Article reuse guidelines:

[sagepub.com/journals-permissions](https://sagepub.com/journals-permissions)

DOI: 10.1177/1179173X251340519

[journals.sagepub.com/home/tui](https://journals.sagepub.com/home/tui)

Sunhee Park<sup>1,2</sup> , Jeoung A Kwon<sup>1</sup> , Byungmi Kim<sup>1,3,4</sup> , Naeun Kim<sup>1</sup>, Yejin Ha<sup>1</sup>, Mark Parascandola<sup>5</sup> and Yoonjoo Choi<sup>1</sup>

## Abstract

**Objective:** Smoking is the largest preventable cause of cancer morbidity and mortality; however, the smoking prevalence in Korea remains high. Several studies have shown that health behaviors vary by socioeconomic status, indicating that similar inequalities would be found in smoking behavior. Therefore, the aim of this study was to investigate the disparities in smoking cessation intention according to socioeconomic status.

**Methods:** Data from the Korean National Health and Nutrition Examination Survey VII-VIII (2016–2021). We analyzed the answers of 4596 smokers who were asked “Do you have a plan to quit smoking within 6 months?” Regarding their socioeconomic status; education, income, and occupation level. We performed logistic regression and measured health inequality using the slope index of inequality (SII) and the relative index of inequality (RII).

**Results:** In this sample, the prevalence of having a plan to quit smoking was 30.5%, whereas 69.5% had no plan. After adjusting for covariates, the odds ratio for intending to quit smoking within 6 months was higher among those living with a cohabitant compared to those living alone. Intention to quit did not differ significantly by income level; however, education level and occupation level were significantly associated with having a plan to quit smoking. To analyze the disparities, we observed the index SII and RII values. In the SII and RII values, which represent the absolute and relative inequalities, there was a significant difference in the level of education and occupation, but not in the level of income. **Conclusion:** There were inequalities in the intention to quit smoking plan depending on socioeconomic status, including education, household income, and occupational levels.

## Keywords

intention to quit, quit smoking, socioeconomic inequality, disparity, smoking awareness

Received: 10 December 2024; accepted: 22 April 2025

## Introduction

Smoking is the leading preventable cause of cancer incidence and mortality.<sup>1</sup> The World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC), adopted in 2005, aims to protect present and future generations from the health, social, environmental, and economic consequences of tobacco consumption and exposure to tobacco smoke.<sup>2</sup> In Korea, tobacco control programs have been implemented in line with FCTC recommendations, including price and tax policy, tobacco packaging and labeling regulations, restricted smoking advertising, smoking bans indoors and in the workplace, and education and health promotion policies to reduce tobacco use and exposure.<sup>3</sup> Consequently, these policies have led to a decrease in smoking from 23.9% to 19.3% between 2016 and 2021.<sup>4</sup> However, the percentage of people planning to quit smoking also declined from 74.9% to 66.4% between 2005 and 2020.<sup>5,6</sup>

<sup>1</sup>Division of Cancer Prevention, National Cancer Control Institute, National Cancer Center, Goyang, Republic of Korea

<sup>2</sup>Department of Public Health, The Catholic University of Korea College of Medicine, Seoul, Republic of Korea

<sup>3</sup>Center of Tobacco Control, National Cancer Center, Goyang, Republic of Korea

<sup>4</sup>National Cancer Center Graduate School of Cancer Science and Policy, Goyang, Republic of Korea

<sup>5</sup>Center for Global Health, National Cancer Institute, Rockville, MD, USA

## Corresponding authors:

Mark Parascandola, Center for Global Health, National Cancer Institute, Medical Center Dr, Rockville, Maryland 20850, USA.

Email: [paramark@mail.nih.gov](mailto:paramark@mail.nih.gov)

Yoonjoo Choi, National Cancer Center, 323 Ilsan-ro Madu I-dong Ilsandong-gu Goyang, Gyeonggi-do 10408, Republic of Korea.

Email: [yjchoi@ncc.re.kr](mailto:yjchoi@ncc.re.kr)



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons

Attribution-NonCommercial 4.0 License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE

and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

A previous Korean study showed that 95.5% of the population recognized the importance of quitting smoking and avoiding secondhand smoke to prevent cancer<sup>7</sup>; however, awareness does not necessarily translate into action to quit smoking. A previous survey suggested that although 66.4% of Korean smokers reported intentions to quit, less than half of them planned to quit within the next 6 months.<sup>5</sup> This gap between intending to quit and taking action to quit underscores the need for a clearer understanding of the theoretical background linking the awareness stage to the action stage.

Successful smoking cessation can be explained by the Theory of Planned Behavior (TPB),<sup>8</sup> a widely recognized theory that predicts behaviors based on intention. According to this theory, behavior is influenced by the intention to perform that behavior.<sup>9,10</sup> A previous study showed that the intention to quit smoking or past attempts to quit had a positive effect on smoking cessation.<sup>11</sup> People who planned to quit or attempted quitting in the past were more likely to succeed in the long term.<sup>6,12-14</sup>

We considered the intention to quit smoking as an indicator of health behavior and hypothesized that the intention to quit would eventually lead to success.

Socioeconomic status (SES) disparity plays an important role in smoking cessation-related awareness and behavior. SES is typically evaluated using indicators such as education, income, and occupation. An individual's education is related to their level of knowledge and influences their health behaviors.<sup>15</sup> Income can affect access to health services as well as the ability to purchase healthy foods or participate in sports and leisure activities. Occupation may also reflect the environment in which an individual lives.<sup>15</sup> For example, managers and other industry professionals may have workplaces with strict indoor air regulations, making it more difficult to smoke, or they may offer smoking cessation programs.<sup>16</sup> In contrast, individuals of lower SES may not be able to access health screenings or smoking cessation counseling as easily and may find it harder to make healthy lifestyle choices.<sup>15</sup> People with high SES are also likely to associate with health-conscious peers, build social support networks, and engage in behaviors that promote health, all of which contribute to widening SES-related disparities.<sup>15,17</sup>

Despite the importance of occupation, previous studies on health disparities have mainly focused on education or income levels, often overlooking occupation.<sup>6,18,19</sup> Some studies have focused on the role of occupation in smoking status<sup>20,21</sup> or prevalence,<sup>22,23</sup> but have not examined its impact on intentions to quit or health disparities.

A Korean study found that higher education and income levels were associated with greater intentions to quit smoking,<sup>6</sup> although it did not find any inequalities based on SES. However, given that SES affects smoking cessation-related behavior, additional research is necessary. Therefore, this study analyzed all three SES indicators (education, income, and occupation) using a nationally representative cross-sectional survey in Korea. The primary aim was to examine disparities in the intention to quit smoking, an indicator of health behavior, based on the aforementioned SES indicators (education, income, and occupation level), using absolute and relative indices of inequality.

## Methods

### Data Source and Study Population

This study used data collected from the Korean National Health and Nutrition Examination Survey (KNHANES) VII-VIII (2016-2021).<sup>24</sup> KNHANES is a cross-sectional survey conducted by the Korea Disease Control and Prevention Agency and the Ministry of Health and Welfare since 1998. It includes three components: a health interview survey, a health examination survey, and a nutrition survey.

A stratified, multistage, clustered probability sampling design, based on region size and demographic characteristics was used to collect the preliminary data. Survey sample weights were applied in all analyses to produce estimates representative of the Korean population.<sup>25,26</sup> Trained interviewers administered questionnaires on various health-related topics, with respondents self-reporting their smoking habits and intentions to quit in face-to-face interviews. All participants provided informed written consent before participating in the study.

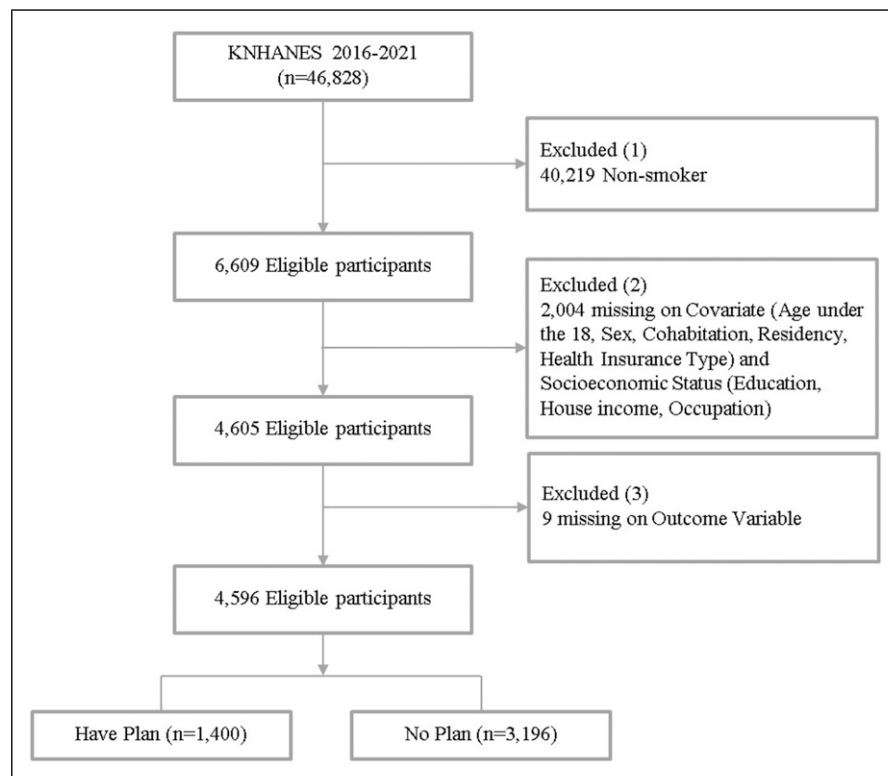
Among the 46 828 respondents that participated in KNHANES (2016-2021), the following exclusion criteria were applied: (1) non-smokers ( $n = 40\,219$ ), (2) missing covariates and SES variables (age under 18, sex, cohabitation, education, income, occupation) ( $n = 2004$ ), and (3) missing outcome variables ( $n = 9$ ). The final study sample included 4596 participants: 1400 with intention to quit smoking, and 3196 with no intention to quit (Figure 1).

### Outcome Variable

The outcome variable was the intention to quit smoking within the next 6 months, as defined by KNHANES. We determined the outcome variable using the question: "Do you plan to quit smoking within 6 months?" The possible responses were: (1) "I plan to quit smoking within 1 month"; (2) "I plan to quit smoking within 6 months"; (3) "I plan to quit smoking someday, but not within the next 6 months"; and (4) "I have no intention to quit smoking at the moment." We categorized responses as "Have plan" only for those who reported plans to quit smoking within either 1 month or 6 months.

### Socioeconomic Indicators

Education was divided into three levels: low (less than middle school graduate, education period < 9 years), middle (less than high school graduate, education period 9-12 years), and high (college or university education, education period  $\geq 13$  years). Income was divided into four levels (lowest, low-middle, middle-high, and highest), which were partially adjusted according to average monthly personal income. Occupation was classified into three categories: highest level (eg, managers, professionals, and related workers), middle level (eg, clerks), and lowest level (eg, service workers; sales workers; skilled agricultural, forestry, and fishery workers; craft and related trades workers; equipment, machine operating, and assembling



**Figure 1.** Flow Diagram of the Study Population.

workers; elementary workers; armed forces and groups with no income). Occupation levels followed the Korean Standard Classification of Occupations (KSCO).<sup>27</sup>

### Measures of Inequality of Health Outcomes

We used three inequality indices: the slope index of inequality (SII), relative index of Inequality (RII), and odds ratio (OR). The OR is a relative measure of health inequality, commonly used in studies on health behaviors; however, OR may not be a good approximation of the prevalence ratio when the outcome prevalence is quite high (such as intention to quit smoking), as it can sometimes overstate or understate the relative inequality.<sup>28</sup> Thus, the SII and RII were used to compare and estimate the magnitude of health inequalities.<sup>29,30</sup>

Theoretically, the SII represents the prevalence difference, while the RII represents the prevalence ratio of health status between the lowest-ranking and highest-ranking groups.<sup>31,32</sup> An SII of 0 and an RII of 1 indicate no inequality, with higher values indicating greater inequality. Furthermore, the SII and RII can only be used for naturally ordered variables, such as income, education, or occupation level, that are ranked from lowest to highest.<sup>33,34</sup> These indices are not applicable for unranked categorical variables like race or sex. Typically, these variables are analyzed by dividing the hierarchy into three or four levels. The advantage of dividing into three levels that it is mainly used for data with a small sample size and applied to simply interpret differences between levels. The advantage of dividing into four levels that it is beneficial when the sample size is reasonably large, as it allows for more detailed comparisons between levels.

### Statistical Analysis

The sample size for this study was calculated using the G\*Power 3.1 program. For the chi-squared test performed on demographic characteristics (Effect size  $w$ : 0.3;  $\alpha$ -error: 0.05; Power: 0.80), 160 participants were required. For the logistic regression analysis (two-tailed, OR: 1.31  $\Pr(Y = 1 | X = 1)$   $H_0$ : 0.2;  $\alpha$ -error: 0.05; Power: 0.80;  $R^2$  other  $X$ : 0.1;  $X$  distribution: Normal;  $X$  param  $\mu$ : 0;  $X$  Param  $\sigma$ : 1), 801 participants were required. The sample size of our study was 4,596, which met the minimum sample size requirement for the analysis.

We examined differences in the following characteristics between both groups (intention to follow a plan to quit smoking within 6 months: have plan vs no-plan): sex, age (19-29, 30-39, 40-49, 50-59, 60-69, 70-80 years; those aged  $\leq 18$  years were excluded), cohabitation (living alone vs living with cohabitant), residence (rural vs urban), health insurance type (employee, self-employed, or medical aid by the Korean National Health Insurance system),<sup>35</sup> education level, income level, and occupation level. Chi-squared tests were performed to compare the differences between the groups.

Socioeconomic inequalities (for education, income, and occupation) in intention to quit smoking within 6 months were measured using the following indices: (1) adjusted odds ratio (aOR) between both groups using multivariable logistic regression; (2) the SII using PROC GENMOD in SAS version 9.4 (SAS Institute, Inc., Cary, NC, USA) with the LINK IDENTITY function, and (3) RII using SURVEYLOGISTIC in SAS.

All statistical analyses accounted for the complex sampling design and were assessed using two-sided tests

**Table 1.** Sample Characteristics According to Intention to Quit Smoking of KNHANES (2016-2021) (n = 4596).

		Total	Yes (have intention) n (%)	No (No intention) n (%)	P-value <sup>a</sup>
Sex	Male	4596	1400 (30.5)	3196 (69.5)	.269
	Female	4008	1213 (86.6)	2795 (87.5)	
Age	19-29	588	187 (13.4)	401 (12.6)	.044
	30-39	637	208 (14.9)	429 (13.4)	
	40-49	1020	310 (22.1)	710 (22.2)	
	50-59	1253	381 (27.2)	872 (27.3)	
	60-69	991	314 (22.4)	677 (21.2)	
	70-79	517	137 (9.8)	380 (11.9)	
	80-89	178	50 (3.6)	128 (4.0)	
Number of Households members	1 person	619	153 (10.9)	466 (14.6)	.004
	2+ persons	3977	1247 (89.1)	2730 (85.4)	
Residency	Urban	3672	1141 (81.5)	2531 (79.2)	.356
	Rural	924	259 (18.5)	665 (20.8)	
Type of Health Insurance	Self-Employed	1435	432 (30.9)	1003 (31.4)	.993
	Employee	3092	947 (67.6)	2145 (67.1)	
	Medical Aid	69	21 (1.5)	48 (1.5)	
Education Level <sup>b</sup>	Lowest	766	200 (14.3)	566 (17.7)	<.0001
	Middle	1891	526 (37.6)	1365 (42.7)	
	Highest	1939	674 (48.1)	1265 (39.6)	
Income Level	Lowest	387	116 (8.3)	271 (8.5)	.454
	Low-Middle	1144	331 (23.6)	813 (25.4)	
	Middle-High	1526	438 (31.3)	1088 (34.0)	
	Highest	1539	515 (36.8)	1024 (32.0)	
Occupational Level <sup>c</sup>	Lowest	2956	813 (58.1)	2143 (67.1)	<.0001
	Middle	780	271 (19.4)	509 (15.9)	
	Highest	860	316 (22.6)	544 (17.0)	

Note. Bold indicates statistical significance ( $P < .05$ ).

KNHANES, Korea National Health and Nutrition Examination Survey.

<sup>a</sup>P-value from Chi-square test.

<sup>b</sup>Education Level: Lowest (Less than middle school graduate, education period of less than 9 years), Middle (Less than high school graduate, education period of 9~12 years), Highest (some college or university graduation above, education period of 13 years and above).

<sup>c</sup>Occupation Level: Lowest (service workers; sales workers; skilled agricultural, forestry and fishery workers; craft and related trades workers; equipment, machine operating, and assembling workers; and elementary workers. the armed forces and groups with no income (housewives and students), Middle (clerks), Highest (managers, professionals and related workers).

with the significance level set at  $P < .05$ . Data analysis was conducted using SAS, version 9.4.

This study analyzed secondary data approved by the Institutional Review Board of the Korea Centers for Disease Control and Prevention (IRB No. 2018-01-03-P-A, 2018-01-03-C-A, 2018-01-03-2C-A, 2018-01-03-5C-A). The KNHANES, conducted from 2015 to 2017, did not undergo review by the Research Ethics Review Committee, as it was state-conducted research for public welfare in accordance with Article 2, Paragraph 1 of the Bioethics Act and Article 2, Paragraph 2, Subparagraph 1 of the Enforcement Decree of the same Act. It was approved by the Research Ethics Review Committee again in 2018.

## Results

Of the 46 828 respondents who participated in KNHANES (2016-2021), 4596 were eventually included in this study after applying the exclusion criteria in total (1400 had plans to quit smoking and 3196 had no plans, Figure 1).

Table 1 summarizes the characteristics of the study population. The total population included a higher proportion of male respondents, consistent with overall smoking prevalence patterns in Korea. Among the total of

4605 total respondents, 30.5% had a plan to quit smoking within 6 months, while 69.5% had no plan.

Table 2 shows the aOR for the intention to quit smoking for each variable. No significant differences were observed based on sex, residency, or type of health insurance. However, significant differences were found for age group and cohabitation. Among the age groups, those aged 40-49 and 60-69 years were less likely to have intentions to quit than those aged 19-29 years (aOR = 0.76; 0.60-0.97, aOR = 0.69; 0.50-0.96). The number of household members was also associated with the intention to quit, with single-person households showing less intention than households with two or more people (aOR = 1.48; 1.16-1.88). The highest educational level group had a greater intention to quit than the lowest educational level group (aOR = 1.41; 1.07-1.87). Income level showed no significant association.

The higher occupational level group was significantly associated with intention to quit smoking (middle vs lowest aOR = 1.32; 1.03-1.69, highest vs lowest aOR = 1.33; 1.03-1.71).

Table 3 presents the absolute and relative socioeconomic inequality indices for the intention to quit smoking. We observed three socioeconomic indicators: education, income, and occupation. Statistically significant absolute differences in education levels related to the intention to

**Table 2.** Multivariable Logistic Regression Analysis of Intention to Quit Smoking Within 6 Months by Socio-Demographic Factors (KNHANES 2016-2021).

		aOR	95% CI
Sex	Male	1.00	
	Female	1.14	(0.91-1.43)
Age	19-29	1.00	—
	30-39	0.78	(0.61-1.00)
	40-49	<b>0.76</b>	<b>(0.60-0.97)</b>
	50-59	0.91	(0.71-1.16)
	60-69	<b>0.69</b>	<b>(0.50-0.96)</b>
	70-80	0.95	(0.59-1.54)
Number of Households members	1 person	1.00	
	2+ persons	<b>1.48</b>	<b>(1.16-1.88)</b>
Residency	Urban	1.00	
	Rural	1.01	(0.82-1.22)
Type of health insurance	Employee	1.00	
	Self-Employed	1.13	(0.95-1.35)
	Medical Aid	1.07	(0.49-2.31)
Educational Level <sup>a</sup>	Lowest	1.00	
	Middle	1.11	(0.86-1.42)
	Highest	<b>1.41</b>	<b>(1.07-1.87)</b>
Income Level	Lowest	1.00	
	Low-middle	0.94	(0.68-1.28)
	Middle-high	0.89	(0.65-1.22)
	Highest	0.92	(0.68-1.25)
Occupational Level <sup>b</sup>	Lowest	1.00	
	Middle	<b>1.28</b>	<b>(1.04-1.58)</b>
	Highest	<b>1.35</b>	<b>(1.10-1.66)</b>

Note: Bold indicates statistical significance ( $P < .05$ ). All covariates were adjusted in this analysis (sex, age, number of household members, residency, type of insurance, education, income, occupational level). The crude values and the model that only adjusted for age and sex are attached as a [supplemental file](#). KNHANES, Korea National Health and Nutrition Examination Survey; aOR, Adjusted Odds Ratio; CI, Confidence interval.

<sup>a</sup>Education Level: Lowest (Less than middle school graduate, education period of less than 9 years), Middle (Less than high school graduate, education period of 9~12 years), Highest (some college or university graduation above, education period of 13 years and above).

<sup>b</sup>Occupation Level: Lowest (service workers; sales workers; skilled agricultural, forestry and fishery workers; craft and related trades workers; equipment, machine operating, and assembling workers; and elementary workers. the armed forces and groups with no income (housewives and students), Middle (clerks), Highest (managers, professionals and related workers).

**Table 3.** Slope and Relative Indices of Inequality for Smoking Cessation Intentions Within 6 months by Education, Income, and Occupational Level in Korea (KNHANES 2016-2021).

	Estimate	95% CI
Educational level <sup>a</sup>		
SII (Lowest to Highest)	<b>0.041</b>	<b>(0.018-0.065)</b>
RII (Lowest to Highest)	<b>1.41</b>	<b>(1.07-1.87)</b>
Income Level		
SII (Lowest to Highest)	-0.004	(-0.019-0.011)
RII (Lowest to Highest)	0.92	(0.68 -1.25)
Occupational Level <sup>b</sup>		
SII (Lowest to Highest)	<b>0.036</b>	<b>(0.018-0.055)</b>
RII (Lowest to Highest)	<b>1.35</b>	<b>(1.10 -1.66)</b>

Note. Bold indicates statistical significance ( $P < .05$ ).

KNHANES, Korea National Health and Nutrition Examination Survey; SII, Slope index of inequality; RII, Relative index of inequality.

<sup>a</sup>Education Level: Lowest (Less than middle school graduate, education period of less than 9 years), Middle (Less than high school graduate, education period of 9~12 years), Highest (some college or university graduation above, education period of 13 years and above).

<sup>b</sup>Occupation Level: Lowest (service workers; sales workers; skilled agricultural, forestry and fishery workers; craft and related trades workers; equipment, machine operating, and assembling workers; and elementary workers. the armed forces and groups with no income (housewives and students), Middle (clerks), Highest (managers, professionals and related workers).

quit smoking were measured by the SII (SII = 0.041; 0.018-0.065), and relative inequality was measured by the RII (RII = 1.41; 1.07-1.87). Similarly, there was a statistically significant difference in quit intentions between the lowest and highest occupational levels, both in terms of absolute inequalities (SII = 0.036; 0.018-0.055) and relative inequalities (RII = 1.35; 1.10-1.66).

## Discussion

In this nationally representative cross-sectional study of Korea, we observed significant socioeconomic inequality with the intention to quit smoking within 6 months, using data from KNHANES VII-VIII (2016-2021). We used the intention to quit smoking within 6 months as the health behavior outcome, rather than within 1 month, because Korea provides Outreach smoking cessation services and smoking cessation camp programs lasting 6 months. We considered this period an appropriate timeframe for fostering smoking cessation intentions and behaviors through policy intervention. We analyzed three socioeconomic indicators by OR. Income-related inequalities were not statistically significant, whereas education-related and occupation-related inequalities were statistically significant. Although statistical differences in intention to quit



smoking within 6 months were observed, they were not statistically significant across all cases, suggesting that there are meaningful socioeconomic disparities in quit intentions.

In multivariable logistic regression, sex, residency, and health insurance type were not significant factors. However, age and number of household members were statistically significant. Previous studies have shown that the intention to quit smoking decreases with age, particularly among individuals aged 65 and older compared to those under 45,<sup>36</sup> which was consistent with our study findings. Additionally, some studies indicate that smoking cessation is more successful when there is support from the household or family.<sup>37</sup> Our study also found that the intention to quit smoking was greater for individuals living in households with two or more people.

We observed significant disparities in the intention to quit smoking based on education level, both in absolute inequality (measured by SII) and relative inequality (measured by aOR and RII). Previous studies have also reported a link between lower education levels and higher smoking prevalence.<sup>23,38</sup> Individuals with a lower level of education may have less access to information about smoking and health,<sup>15,23</sup> and greater exposure to tobacco advertising.<sup>15</sup> However, one study found no association between education level and intention to quit smoking by relative inequality,<sup>39</sup> although it did note that subjective norms and self-efficacy related to smoking cessation are influenced by education level.<sup>39</sup> Furthermore, a person's peer group can impact their smoking behavior, and individuals with higher SES tend to share healthy behaviors with those around them, including relatives, colleagues, and neighbors.<sup>15,40</sup>

Disparities in the intention to quit smoking were also observed based on occupation level, as shown in the aOR, SII, and RII analyses. We found that individuals in the middle and highest occupation groups had a significantly higher intention to quit smoking than those in the lowest group. Absolute inequality, as measured by SII, was also shown to be significant. Manual laborers are sometimes considered to be "disadvantaged," and may face environments with greater risk of exposure to tobacco.<sup>19</sup>

Manual workers also face higher health risks, including physical danger, exposure to hazardous materials, sleep disorders, and lower overall health status compared to non-manual workers.<sup>15,22,41-43</sup> Differences in both health status and health behavior based on socioeconomic levels have been reported. Populations in lower occupation levels tend to have higher smoking prevalence,<sup>44,45</sup> more hazardous alcohol consumption,<sup>46</sup> lower physical activity levels,<sup>47</sup> and higher obesity rates<sup>48</sup> compared to those in higher occupation levels. Occupation reflects the environment in which a person lives, and smoking restrictions differ between manual and non-manual workers. In Korea, smoking is prohibited in all indoor areas, and non-manual workers typically work indoors. In contrast, manual workers in fields like agriculture, fisheries, or crafts often work outdoors and are more likely to be exposed to smoking environments.<sup>49</sup> Additionally, the occupational level is believed to lead to similar health outcomes among colleagues as they all share the same working environment.<sup>40</sup> Although this classification of occupations in this analysis

may be specific to Korea, similar disparities may exist in other settings. Studies in different contexts have shown relationships between occupational status, work environment, and tobacco use patterns.<sup>50</sup>

Our findings regarding inequality in household income levels conflict with previous studies. Even though we analyzed the OR by dividing income into four levels, the results were not statistically significant. Neither the absolute inequality (SII) nor the relative inequality (RII) were significant. Previous studies on annual income suggest that the intention to quit smoking does not differ significantly between the highest and lowest income levels.<sup>6,51,52</sup> Generally, income level does not always reflect the social or environmental background to which a person belongs. For instance, individuals with lower education levels may still earn high incomes as professional technicians or self-employed workers. However, lower-income populations may have limited access to healthcare, social programs, or other health resources.

There is considerable evidence showing that smoking status is linked to lower incomes, but this relationship may vary across countries with differing economic conditions.<sup>50</sup> Therefore, health disparities in low-income populations need to be considered.<sup>53,54</sup>

The reason we focused on intention is supported by previous research. Studies show that behavior is influenced by the intention to perform that behavior,<sup>9,14</sup> with the intention being the strongest predictor of behavior (the TPB).<sup>8</sup> More positive attitudes toward smoking cessation were significantly associated with the intention to quit.<sup>10</sup> Consequently, our study found that higher education and occupation levels were significantly associated with intention to quit smoking. As noted earlier, studies in other contexts have shown that education, income, and occupation influence patterns of tobacco use. Thus, it is reasonable to predict that higher educational and occupational levels will lead to greater smoking cessation behavior.

This study had several limitations. First, we combined 6 years of data because the sample sizes for each year were small. Second, we could not analyze trends in disparities over those 6 years. Further study is therefore necessary to analyze these trends.

Despite these limitations, the strength of this study lies in being the first, to the best of our knowledge, to identify an association between three SES indicators and the intention to quit smoking within 6 months, a key health behavior outcome, using national-level cross-sectional data. We analyzed the three major SES indicators of education, income, and occupation levels. We found that education and occupational levels were significantly related to the intention to quit smoking. We also measured absolute and relative inequality simultaneously, which allowed us to compare the prevalence difference and prevalence ratio.

Our findings suggest potential policy interventions based on the results of the inequalities in the intention to quit smoking within 6 months. The Korean government provides several free smoking cessation programs to small businesses (with 300 employees or less), people with disabilities, out-of-school adolescents, and heavy smokers, through the Regional Tobacco Control Center. In particular, the smoking cessation environment for adolescents and

small business workers, who are the main targets of Korea's smoking cessation policy, are the most closely related to the results of our study. These groups have fewer opportunities to access such programs and are often located far from environments where community education or awareness can be accessed. Additionally, many people in Korea remain unaware of these support services and do not realize that they are entitled to governments benefits with free of charge. Therefore, further efforts are needed to support these specific groups, including increasing public awareness of national smoking cessation programs and expanding relevant national policies.

## Conclusion

This study demonstrated socioeconomic factors that affect the intention to quit smoking within 6 months, and in particular, identified the gap in the intention to quit smoking according to socioeconomic disparities. Age, number of household members, education level, and occupational level affected the intention to quit smoking, and it was found that there was a inequalities between the intention and the education level and occupational level.

## ORCID iDs

Sunhee Park  <https://orcid.org/0000-0002-1736-2556>  
 Jeoung A Kwon  <https://orcid.org/0000-0003-3469-0583>  
 Byungmi Kim  <https://orcid.org/0000-0001-8621-9190>  
 YoonJoo Choi  <https://orcid.org/0000-0001-7903-8324>

## Ethical Statement

### Ethics Approval

This study analyzed secondary data and was approved by the Institutional Review Board of the Korea Centers for Disease Control and Prevention (IRB No. 2018-01-03-P-A, 2018-01-03-C-A, 2018-01-03-2C-A, 2018-01-03-5C-A). This study meets the Helsinki Declaration based ethical principles for medical research involving human subjects. (The National Health and Nutrition Survey was conducted from 2015 to 2017 without review by the Research Ethics Review Committee as a research conducted directly by the state for public welfare in accordance with Article 2, Paragraph 1 of the Bioethics Act and Article 2, Paragraph 2, Subparagraph 1 of the Enforcement Decree of the same Act. It was approved by the Research Ethics Review Committee again in 2018).

## Consent to Participate

All participants provided informed written consent before participating in the study.

## Author Contributions

Conceptualization: Sunhee Park; Data curation: Sunhee Park., Naeun Kim; Formal analysis: Sunhee Park., Naeun Kim; Investigation: Sunhee Park., Jeoung A Kwon; Methodology: Sunhee Park., Yejin Ha., Naeun Kim; Validation: Jeoung A Kwon., YoonJoo Choi., Naeun Kim; Writing-original draft preparation: Sunhee Park; Writing-review and editing: Sunhee Park., Jeoung A Kwon., YoonJoo Choi., Mark Parascandola; Supervision: YoonJoo Choi., Byungmi Kim., Mark Parascandola; Project administration: YoonJoo Choi., Mark Parascandola.

## Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by a National Cancer Center grant funded by the Korean government, the Republic of Korea (NCC-24H1052-2, 2025).

## Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Data Availability Statement

Publicly available datasets were analyzed in this study. These data can be found at <https://knhanes.kdca.go.kr/knhanes/>

## Supplemental Material

Supplemental material for this article is available online.

## References

1. Park S, Jee SH, Shin H-R, et al. Attributable fraction of tobacco smoking on cancer using population-based nationwide cancer incidence and mortality data in Korea. *BMC Cancer*. 2014;14:1-12.
2. (WHO) WHO. *Framework Convention on Tobacco Control (FCTC)*. World Health Organization (WHO); 2024. <https://fctc.who.int/>. Accessed April 30, 2024.
3. Institute KLR. National health promotion act. In: *Institute KLR*, editor. Ministry of health and welfare: Ministry of health and welfare; 2006.
4. Current smoker of Korea (2016-2021).
5. Han M, Seo D, Kim Y, et al. Factors associated with quit intentions among adult smokers in South Korea: findings from the 2020 ITC Korea Survey. *Int J Environ Res Public Health*. 2022;19(17):10839.
6. Myung S-K, Seo HG, Cheong Y-S, Park S, Lee WB, Fong GT. Association of sociodemographic factors, smoking-related beliefs, and smoking restrictions with intention to quit smoking in Korean adults: findings from the ITC Korea Survey. *J Epidemiol*. 2012;22(1):21-27.
7. Oh J-K, Park E, Kim B, et al. Awareness of and practice toward cancer prevention recommendations: results of the Korean national cancer prevention awareness and practice survey in 2021. *Epidemiol Health*. 2022;44:e2022068.
8. Moan IS, Rise J. Quitting smoking: applying an extended version of the theory of PlannedBehavior to predict intention and behavior 1. *J Appl Biobehav Res*. 2005;10(1):39-68.
9. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process*. 1991;50(2):179-211.
10. Droomers M, Schrijvers CT, Mackenbach JP. Educational differences in the intention to stop smoking: explanations based on the theory of planned behaviour. *Eur J Public Health*. 2004;14(2):194-198.
11. Norman P, Conner M, Bell R. The theory of planned behavior and smoking cessation. *Health Psychol*. 1999;18(1):89-94.
12. Hoie M, Moan IS, Rise J. An extended version of the theory of planned behaviour: prediction of intentions to quit smoking using past behaviour as moderator. *Addiction Res Theor*. 2010;18(5):572-585.

13. Rise J, Kovac V, Kraft P, Moan IS. Predicting the intention to quit smoking and quitting behaviour: extending the theory of planned behaviour. *Br J Health Psychol*. 2008;13(2):291-310.
14. Tseng Y-F, Wang K-L, Lin C-Y, Lin Y-T, Pan H-C, Chang C-J. Predictors of smoking cessation in Taiwan: using the theory of planned behavior. *Psychol Health Med*. 2018;23(3):270-276.
15. Pampel FC, Krueger PM, Denney JT. Socioeconomic disparities in health behaviors. *Annu Rev Sociol*. 2010;36:349-370.
16. Bauer JE, Hyland A, Li Q, Steger C, Cummings KM. A longitudinal assessment of the impact of smoke-free worksite policies on tobacco use. *Am J Public Health*. 2005;95(6):1024-1029.
17. Freese J, Lutfey K. Fundamental causality: challenges of an animating concept for medical sociology. In: *Handbook of the Sociology of Health, Illness, and Healing: A Blueprint for the 21st Century*. Springer; 2010:67-81.
18. Siahpush M, McNeill A, Borland R, Fong G. Socioeconomic variations in nicotine dependence, self-efficacy, and intention to quit across four countries: findings from the International Tobacco Control (ITC) four country survey. *Tob Control*. 2006;15(suppl 3):iii71-iii75.
19. Hiscock R, Bauld L, Amos A, Fidler JA, Munafò M. Socioeconomic status and smoking: a review. *Ann NY Acad Sci*. 2012;1248(1):107-123.
20. Sorensen G, Barbeau E, Hunt MK, Emmons K. Reducing social disparities in tobacco use: a social-contextual model for reducing tobacco use among blue-collar workers. *Am J Public Health*. 2004;94(2):230-239.
21. Mathur S, Singh N. Characteristics of smokers with intentions to quit, with a focus on occupational status, race/ethnicity, and cognitive behavior. *Moment*. 2015;6:12-13.
22. Wang Q, Shen JJ, Sotero M, Li CA, Hou Z. Income, occupation and education: are they related to smoking behaviors in China? *PLoS One*. 2018;13(2):e0192571.
23. Tomioka K, Kurumatani N, Saeki K. The association between education and smoking prevalence, independent of occupation: a nationally representative survey in Japan. *J Epidemiol*. 2020;30(3):136-142.
24. Oh K, Kim Y, Kweon S, et al. Korea national health and nutrition examination survey, 20th anniversary: accomplishments and future directions. *Epidemiol Health*. 2021;43:e2021025.
25. Kweon S, Kim Y, Jang M-J, et al. Data resource profile: the Korea National Health and Nutrition Examination Survey (KNHANES). *Int J Epidemiol*. 2014;43(1):69-77.
26. Yun S, Oh K. The Korea national health and nutrition examination survey data linked cause of death data. *Epidemiol Health*. 2022;44:e2022021.
27. Korea S. The Korean Standard Classification of Occupations(KSCO) 2018.
28. Khang Y-H, Yun S-C, Lynch JW. Monitoring trends in socioeconomic health inequalities: it matters how you measure. *BMC Public Health*. 2008;8:1-6.
29. Kakwani N, Wagstaff A, Van Doorslaer E. Socioeconomic inequalities in health: measurement, computation, and statistical inference. *J Econom*. 1997;77(1):87-103.
30. Salinas-Rodríguez A, Manrique-Espinoza B, Cruz-Góngora VDL, Rivera-Almaraz A. Socioeconomic inequalities in health and nutrition among older adults in Mexico. *salud pública de méxico*. 2021;61:898-906.
31. Harper S, Lynch J. Health inequalities: measurement and decomposition. In: *Methods in Social Epidemiology*. 2nd ed. Jossey-Bass; 2017.
32. Mackenbach JP, Kunst AE. Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. *Soc Sci Med*. 1997;44(6):757-771.
33. Harper S, Lynch J. Methods for measuring cancer disparities: using data relevant to healthy people 2010 cancer-related objectives. 2005.
34. Kino S, Jang S-N, Takahashi S, Ebner DK, Kawachi I. Socioeconomic disparities in self-rated health in two East Asian countries: comparative study between Japan and Korea. *Soc Sci Med*. 2020;253:112945.
35. Kwon S. Thirty years of national health insurance in South Korea: lessons for achieving universal health care coverage. *Health Policy Plan*. 2009;24(1):63-71.
36. Marques-Vidal P, Melich-Cerveira J, Paccaud F, Waeber G, Vollenweider P, Cornuz J. Prevalence and factors associated with difficulty and intention to quit smoking in Switzerland. *BMC Public Health*. 2011;11:1-9.
37. Johnston V, Thomas DP. Smoking behaviours in a remote Australian Indigenous community: the influence of family and other factors. *Soc Sci Med*. 2008;67(11):1708-1716.
38. Khang Y-H, Cho H-J. Socioeconomic inequality in cigarette smoking: trends by gender, age, and socioeconomic position in South Korea, 1989–2003. *Prev Med*. 2006;42(6):415-422.
39. Droomers M, Huang X, Fu W, Yang Y, Li H, Zheng P. Educational disparities in the intention to quit smoking among male smokers in China: a cross-sectional survey on the explanations provided by the theory of planned behaviour. *BMJ Open*. 2016;6(10):e011058.
40. Kawachi I, Subramanian SV, Kim D. *Social Capital and Health: A Decade of Progress and beyond*. Springer; 2008.
41. Burgard SA, Lin KY. Bad jobs, bad health? How work and working conditions contribute to health disparities. *Am Behav Sci*. 2013;57(8):1105-1127.
42. Donoghue AM. Occupational health hazards in mining: an overview. *Occup Med*. 2004;54(5):283-289.
43. Kawachi I. Globalization and workers' health. *Ind Health*. 2008;46(5):421-423.
44. Hassoy H, Ergin I, Yazarbas G. Trends in socioeconomic inequalities in smoking in Turkey from 2008 to 2016. *BMC Public Health*. 2021;21:1-11.
45. Chang Y, Kang H-Y, Lim D, Cho H-J, Khang Y-H. Long-term trends in smoking prevalence and its socioeconomic inequalities in Korea, 1992–2016. *Int J Equity Health*. 2019;18:1-10.
46. Sandoval JL, Leão T, Theler J-M, et al. Alcohol control policies and socioeconomic inequalities in hazardous alcohol consumption: a 22-year cross-sectional study in a Swiss urban population. *BMJ Open*. 2019;9(5):e028971.
47. Vandelandotte C, Short C, Rockloff M, et al. How do different occupational factors influence total, occupational, and leisure-time physical activity? *J Phys Act Health*. 2015;12(2):200-207.
48. Luckhaupt SE, Cohen MA, Li J, Calvert GM. Prevalence of obesity among US workers and associations with occupational factors. *Am J Prev Med*. 2014;46(3):237-248.



49. Brownson RC, Hopkins DP, Wakefield MA. Effects of smoking restrictions in the workplace. *Annu Rev Public Health*. 2002;23(1):333-348.
50. Institute UNC. *A Socioecological Approach to Addressing Tobacco-Related Health Disparities*. US Department of Health and Human Services, National Institutes of Health; 2017.
51. Lund M. Social inequality in cigarette consumption, cigarette dependence, and intention to quit among Norwegian smokers. *BioMed Res Int*. 2015;2015(1):835080.
52. Schoretsaniti S, Filippidis FT, Vardavas CI, et al. 5-Year trends in the intention to quit smoking amidst the economic crisis and after recently implemented tobacco control measures in Greece. *Addict Behav*. 2014;39(1):140-145.
53. Lazar M, Davenport L. Barriers to health care access for low income families: a review of literature. *J Community Health Nurs*. 2018;35(1):28-37.
54. Fairbrother G, Kenney G, Hanson K, Dubay L. How do stressful family environments relate to reported access and use of health care by low-income children? *Med Care Res Rev*. 2005;62(2):205-230.