

The Influence of Maternal Educational Level on the Oral Health Behavior of Korean Adults

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Background: Parental attention is crucial for preventing childhood oral diseases. Mothers play a significant role in maintaining their families' oral health, and their educational level influences their children's oral health behaviors. This study investigates the impact of mothers' educational levels on adult oral health behaviors using data from a national survey.

Methods: This study employed a cross-sectional analysis of secondary data. The data used were obtained from the 8th Korea National Health and Nutrition Examination Survey. Descriptive statistics were calculated to identify participant characteristics. Next, t-tests and one-way analysis of variance were conducted to examine the effects of the explanatory variables on the distribution of the dependent variable. Finally, logistic regression analysis was used to investigate the influence of the explanatory variable on the dependent variable, using "no education" as the reference value, and calculate the odds ratios.

Results: Children of mothers with a college education or higher had a 1.13 times higher likelihood of receiving oral examinations than those whose mothers had no education. Children whose mothers graduated from college or higher had a 2.23 times higher probability of receiving preventative dental treatment than those whose mothers had no education. Children whose mothers graduated from college or higher had a 1.92 times higher probability of receiving scaling than those whose mothers had no education. Children whose mothers graduated from high school had a 1.35 times higher probability of receiving scaling than those whose mothers had no education.

Conclusion: Developing oral health programs is important for low-educated and low-income parents to change theirs and their children's oral health behaviors/attitudes. This will help reduce oral health disparities among adults raised by parents of higher and lower socioeconomic statuses. Therefore, a comprehensive approach is essential for adults to maintain good oral health, regardless of variations in their parental educational levels during childhood.

Key Words: Educational status, Health behavior, Mother-child relations, Oral health, Social class

Introduction

1. Background

The structure of healthcare has shifted from disease treatment to disease prevention, and awareness of the importance of quality of life and daily health has increased, thereby increasing the importance of a healthy body. One representative means of preventing chronic diseases is insurance coverage guaranteed by the government. Korea is currently implementing policies to prevent

dental caries and periodontal diseases.

Dental sealants are the most common insurance coverage items for the prevention of dental caries. Dental sealants, which fill the pits and fissures of teeth, can effectively prevent dental caries¹⁾. In Korea, as part of the National Oral Health Program, dental sealant programs have been implemented for the first molars of children aged 6 to 14 years since 2009. Since then, coverage has been expanded to include the second molars, and the age limit has increased to 18 years²⁾. In addition, individual

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co-payment has been reduced by 10%³⁾, and the government is making efforts to prevent dental caries among its citizens. Although topical fluoride application in children is currently not covered by insurance, fluoride is a representative substance that can inhibit the demineralization of enamel, promote remineralization, and prevent dental caries through its antibacterial effect⁴⁾. Professional fluoride application in dental clinics is known to be highly effective in preventing dental caries and is suitable for children who are at a high risk of dental caries^{5,6)}.

Scaling is used to prevent periodontal diseases. Scaling significantly reduces the number of oral microbial colonies⁷⁾ and the risk of transient bacteremia⁸⁾. Since 2013, health insurance in Korea has been applied to scaling for adults over the age of 20⁹⁾.

Although national efforts to promote oral health among citizens are important, internal efforts within households are also crucial. Untreated oral diseases in childhood can lead to tooth loss in adulthood¹⁰⁾. Therefore, careful attention is required to prevent oral diseases in children. Even if the government conducts oral health examinations for children and adolescents and implements insurance coverage for oral health, a lack of interest or poor understanding of health information by parents can lead to health inequalities¹¹⁾.

Self-management is especially important because chronic diseases require long-term management. Specifically, parents play an important role in maintaining and promoting oral health¹²⁾. Parents should pay attention to their children's oral health to ensure that it is maintained; however, if their socioeconomic status or attention to oral health is not sufficiently high, oral health can deteriorate significantly¹²⁾. It has been reported that oral health behavior and knowledge of mothers, who play the most important role in maintaining and improving their children's oral health, are related to their children's dental caries^{13,14)}. In addition, mothers' socioeconomic status, health beliefs^{15,16)}, occupation¹⁷⁾, and age can affect their children's oral health¹⁸⁾.

2. Objectives

This study aims to investigate the differences in adult oral-health-preventive behaviors according to the educa-

tional level of the mothers during their childhood. We used educational level as a representative indicator of socioeconomic status. Educational level reflects other socioeconomic indicators, such as income level and occupational status, and better reflects socioeconomic differences than other indicators¹⁹⁻²¹⁾. In addition, only maternal educational level was used as an independent variable because, although the perception of mothers as the main caregivers has been decreasing in contemporary times, mothers were the main caregivers in the past.

Materials and Methods

1. Study design

This study employed a cross-sectional analysis using secondary data. The data used for analysis were obtained from the first year (2019) of the 8th Korea National Health and Nutrition Examination Survey conducted annually by the Korea Centers for Disease Control and Prevention. The Korea Centers for Disease Control and Prevention obtained ethical approval from the Institutional Review Board to comply with the ethical guidelines for data use (Institutional Review Board approval number: 2018-01-03-C-A).

Data were downloaded from the Korea National Health and Nutrition Examination Survey website and processed according to the instructions provided in the Data Use Manual.

2. Subjects

In this study, we selected 3,712 participants from 7,359 survey participants of the first year of the 2019 Korean National Health and Nutrition Examination Survey (KNHANES), aged between 20 and 60 years.

The study population used for the analysis consists of 3,712 participants as of 2019. These individuals, currently adults, were examined for their oral health-related behaviors in adulthood, based on their mothers' educational levels during their childhood.

3. Variables

The dependent variables in the study were as follows: 1) dental examination rate (OR1_2), 2) dental caries preven-

tion and treatment experience rate (MO4_17_1), and 3) scaling experience rate (MO4_17_1).

The rate of oral examinations was calculated as the percentage of respondents who answered “yes” to the question “Have you had an oral examination within the past year?” The rate of experience with dental caries prevention and treatment was calculated as the percentage of respondents who answered “yes” to the question “Have you ever received a dental sealant or fluoride application?” The rate of experience with scaling was calculated as the percentage of respondents who answered “yes” to the question “Have you ever received scaling for all teeth?”

The independent variable in this study is the educational level of mothers during the participants’ childhood (EC_pedu_2), representing childhood environmental factors. Mothers’ highest level of education was categorized into five groups by combining eight categories: 1) no education, 2) elementary school graduation, 3) middle school graduation, 4) high school graduation, and 5) college graduation or higher.

Confounding variables affecting healthcare utilization, such as sex, age, income level, educational level, and father’s educational level, were adjusted for.

4. Statistical analysis

A complex sample analysis was conducted according to the data analysis guidelines of the KNHANES. First, descriptive statistics were calculated to identify participant characteristics. Next, t-tests and one-way analysis of variance were conducted to examine the effects of the explanatory variables on the distribution of the dependent variable. Finally, logistic regression analysis was used to investigate the influence of the explanatory variable on the dependent variable, using “no education” as the reference value, and calculate the odds ratio (OR) values. Confounding variables such as sex, age, income level, educational level, and father’s educational level were adjusted for in the analysis, and precision was evaluated using a 95% confidence interval (CI). Statistical analyses were performed using PASW Statistics ver. 23.0 (SPSS Inc., Chicago, IL, USA), and the significance level for type I errors was set at 0.05.

Results

Study participants were slightly more female than male. The age group with the highest representation was the 50s, followed by the 40s. Most participants had a college degree or higher, with high school graduation being the second most common level of education. Income levels were evenly distributed across the entire sample. The most common occupations were managers, professionals, and related workers, followed by service and sales workers. The most common level of maternal education was elementary school, followed by high school ($p < 0.05$) (Table 1).

Table 1. General Characteristics

Variable	n (%)
Sex	
Male	10,801,454 (46.2)
Female	12,599,689 (53.8)
Age	
20s	4,830,534 (20.6)
30s	5,018,535 (21.4)
40s	6,679,523 (28.5)
50s	6,872,551 (29.4)
Education level	
No education, Elementary school	377,729 (1.8)
Middle school	933,793 (4.4)
High school	8,596,356 (40.4)
College or higher	11,361,601 (53.4)
Income level	
Lower	5,691,132 (24.4)
Lower-middle	5,897,793 (25.3)
Upper-middle	5,892,405 (25.2)
Upper	5,868,694 (25.1)
Occupational status	
Managers, professional, and related workers	4,428,467 (29.9)
Clerks	3,266,936 (22.1)
Service/sales workers	3,429,860 (23.2)
Craft workers, equipment and machine operation and assembling workers	2,124,893 (14.4)
Agricultural, forestry, and fishery workers	222,329 (1.5)
Elementary workers	1,269,551 (8.6)
Soldier	61,926 (0.5)
Maternal education level	
No education	1,776,942 (8.9)
Elementary school	6,437,929 (32.1)
Middle school	3,229,627 (16.1)
High school	5,950,151 (29.7)
College or higher	2,636,948 (13.2)

1. Experience of oral examination according to maternal educational level in childhood

When oral examination rates by maternal educational level in childhood were expressed as OR, the odds of receiving an examination among children of mothers with

college education or higher were 1.13 times higher (OR: 1.13, CI: 1.12~1.14) than those of children whose mothers had no education (Table 2, Fig. 1).

Table 2. Oral Health Behavior according to Maternal Educational Level during Childhood

	B	S.E.	Exp(B)	CI		p-value
				Lower limit	Upper limit	
Oral examination						
No education						< 0.001
Elementary school	0.102	0.002	1.11	1.10	1.11	
Middle school	0.101	0.003	1.11	1.10	1.11	
High school	0.013	0.003	1.01	1.01	1.02	
College or higher	0.123	0.003	1.13	1.12	1.14	
Dental caries prevention and treatment experience						
No education						< 0.001
Elementary school	0.250	0.005	1.28	1.27	1.30	
Middle school	0.333	0.006	1.40	1.38	1.41	
High school	0.602	0.006	1.83	1.80	1.85	
College or higher	0.803	0.007	2.23	2.20	2.27	
Scaling						
No education						< 0.001
Elementary school	0.201	0.003	1.22	1.22	1.23	
Middle school	0.088	0.004	1.09	1.08	1.10	
High school	0.297	0.004	1.35	1.34	1.36	
College or higher	0.651	0.004	1.92	1.90	1.93	

S.E.: standard error, CI: 95% confidence interval.

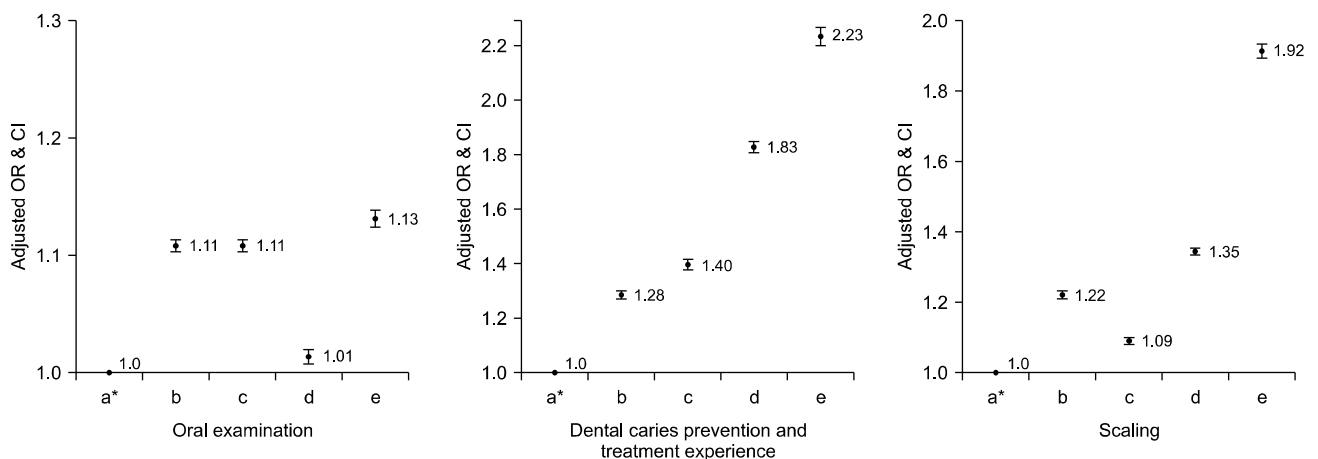


Fig. 1. Oral health behavior according to maternal educational level during childhood. Adjusted OR: unweighted, adjusted odds ratio (sex, age, income, education, and occupation), CI: 95% confidence interval. a: no education, reference group, b: elementary school graduate, c: middle school graduate, d: high school graduate, e: college graduate or higher. Statistically significant by multiple regression analysis.

2. Experience of preventative dental treatment according to maternal educational level in childhood

When the experience of preventative dental treatment according to maternal educational level during childhood was expressed as OR, the children of mothers who graduated from college or higher had a 2.23 times higher probability (OR: 2.23, CI: 2.20~2.27) of receiving preventative dental treatment compared to those whose mothers had no education. Additionally, the children of mothers who graduated from high school had a 1.83 times higher probability (OR: 1.83, CI: 1.80~1.85) of receiving preventative dental treatment compared to those whose mothers had no education (Table 2, Fig. 1).

3. Experience of dental scaling according to maternal educational level in childhood

When the experience of scaling according to maternal educational level during childhood was expressed as OR, the children whose mothers graduated from college or higher had a 1.92 times higher probability (OR: 1.92, CI: 1.90~1.93) of receiving scaling compared to those whose mothers had no education. Additionally, the children of mothers who graduated from high school had a 1.35 times higher probability (OR: 1.35, CI: 1.34~1.36) of receiving scaling compared to those whose mothers had no education (Table 2, Fig. 1).

Discussion

1. Interpretation

According to the analysis, even after controlling for individual demographic factors and paternal educational levels, adult children of mothers with higher education were more likely to engage in oral-health-related behaviors. This difference was observed not only in oral examinations but also in proactive disease prevention behaviors, such as “preventive treatment” or “scaling.”

2. Key results and comparison

Why do adults’ individual oral health behaviors differ depending on their mothers’ levels of education during childhood?

This is believed to be due to additional factors associated with maternal educational level, which leads to changes in the oral-health-related behavior of adult children. Health levels differ according to socioeconomic status, and people with higher educational levels are more likely to maintain healthy habits and take healthy actions²²⁾. In addition, the inequality of healthy habits is more clearly seen based on educational level than other socioeconomic indicators²²⁾. Therefore, it is suggested that the mother’s knowledge of dental health influences the child’s dental health behavior. For example, a mother’s oral-health-related behaviors, such as brushing habits and frequency of sugary food consumption, can affect the child’s oral health behavior²³⁾. Furthermore, mothers’ knowledge of and attitude toward oral health are associated with the maintenance of their children’s healthy teeth²⁴⁾, and a positive attitude toward oral health affects their children’s daily tooth brushing frequency and healthy teeth²⁴⁾. Parents can influence their children’s oral health behavior and attitude through teaching and can also make decisions and take action regarding factors that can affect their child’s oral health²⁵⁾. Therefore, it is suggested that the maternal educational level impacts adult children’s oral health behavior.

Mothers with higher educational levels may have higher levels of health literacy²⁶⁾, which can lead to a greater understanding of the benefits of preventive oral health behaviors and better adherence to recommended oral health practices. It is also possible that mothers with higher education have a greater influence on their children’s health behaviors²⁷⁾, including oral health behaviors, through their roles as primary caregivers and models for behavior.

3. Suggestion

Maternal educational level affects various aspects of a child’s life, including oral health. Although it is important to develop measures to alleviate oral health inequalities that may arise from socioeconomic status, it is difficult to change individual socioeconomic indicators such as income, education, and occupation through programs or policies that have already been established.

However, social factors can influence lifestyle habits,

leading to disparities in health outcomes²⁸). Therefore, programs that can mitigate differences based on socioeconomic status indicators should be developed²⁹, and oral health inequalities should be addressed through improvements in daily living conditions¹¹). Such programs should be based on equity rather than equality. In other words, programs should be designed based on “proportional universalism” so that populations with lower socioeconomic status have more exposure to health promotion services. The development of oral health programs is crucial for low-educated parents to alter their own and their children’s oral health behaviors and attitudes. This will help reduce oral health disparities among adults raised by parents of higher and lower socioeconomic statuses. The implementation of these programs should consider the diversity of socioeconomic levels. It is important to recognize the varied economic backgrounds and needs of the target population. Collaborative efforts among healthcare professionals, educators, and community leaders are essential to ensure the success and sustainability of oral health initiatives.

Providing accessible resources, such as workshops and educational materials, can empower parents to prioritize oral health within their families. Although oral health programs are required for specific groups, universal programs are also needed. For example, a universal program for all community members, such as the sealant health insurance project currently provided in Korea, is necessary. This comprehensive approach will help all children achieve good oral health, even if their parents have different levels of education.

4. Limitations

This study had several limitations. First, as respondents were asked to recall their experiences over a one-year period, there might have been respondent bias. Second, we could not examine the effects of childhood economic conditions or access to oral healthcare in the area where respondents grew up in addition to their mothers’ educational levels. However, there is significant value in using systematically collected data to analyze nationwide trends. Moreover, by controlling for the father’s educational level, which was accessible from personal socio-

ecological factors and childhood data, this study identified the impact of the maternal educational level as a crucial determinant of children’s oral-health-related behavior and a potential mediator of oral health inequality.

Future studies should investigate the mediating effects of maternal educational level, oral health status, and oral-health-related behaviors on children’s oral health.

Notes

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Ethical approval

The requirement for ethical approval was waived due to use of publicly available data from the Korea National Health and Nutrition Examination Survey website. The data were processed according to instructions in the Data Use Manual (Institutional Review Board approval number: 2018-01-03-C-A).

Author contributions

Conceptualization: Young-Eun Jang and Su-Kyung Park. Data acquisition: Young-Eun Jang. Formal analysis: Young-Eun Jang. Writing-original draft: Young-Eun Jang and Su-Kyung Park. Writing-review & editing: Young-Eun Jang and Su-Kyung Park.

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Data availability

Raw data is provided at the request of the corresponding author for reasonable reason.

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