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Original Research Article

Factors influencing the utilization of breast cancer screening services in Korean women using Andersen's behavioral model

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ABSTRACT

Background: Breast cancer is a major health concern worldwide, and timely screening plays an important role in early detection and improved treatment outcomes. In this study, factors influencing the utilization of breast cancer screening services were examined using Andersen's behavioral model, which is widely known as a framework for research on health services utilization.
Methods: In this cross-sectional study, data from 2,602 women aged 35 and older were analysed.
Results: The results of this study shown that the utilization of breast cancer screening was significantly related to predisposing factors, including age and marital status. Moreover, enabling factors, such as income, were also found to be related to screening utilization. However, need factors, such as perceived health status and limitation of activity, did not show a significant association with the utilization of breast cancer screening services.
Conclusions: This study identified factors significantly associated with the utilization of breast cancer screening among Korean women. The findings of this study will contribute to better understand the factors influencing the utilization of breast cancer screening and the development of policies for breast cancer prevention.

Keywords: Anderson's behavioral model, Breast cancer screening, Enabling factor, KNHANES, Need factor, Predisposing factor

INTRODUCTION

Breast cancer is a common cancer with approximately 2.26 million cases worldwide in 2020, accounting for 11.7% of all cancers.[1] Breast cancer is the leading cause of death in most countries, but mortality rates from breast cancer vary across regions.[2] Notably, some Asian countries including Japan and China have lower breast cancer mortality rates compared to the United States and Europe.[3] However, in Korea, breast cancer is the most commonly diagnosed malignancy among women, and the incidence of breast cancer is continuously increasing.[4] Screening and early diagnosis play an important role in reducing mortality from breast cancer. Previous studies have shown that participation in breast cancer screening varies significantly depending on individual characteristics. Studies have consistently shown that individuals with lower socioeconomic status, including factors such as income, economic status, education, and occupation, as well as those residing in less favorable regional circumstances, tend to have lower participation rates in breast cancer screening programs.[5-7]

The health services utilization (HSU) is influenced by many complex and interacting factors. The decision of an individual to use healthcare services depends on a number of interrelated factors, including health status, self-reported health, and the accessibility of health services.[8] Numerous studies have been conducted to investigate the reasons behind the diverse patterns of HSU among

individuals. Various theoretical models have been developed and utilized to investigate and understand specific factors related to HSU, encompassing economic, psychological, behavioral and epidemiological perspectives.[9]

Andersen's behavioral model of HSU has been used extensively to identify key factors for intervention in order to enhance the utilization of cancer screening. This model defines the utilization of services as a function of three main factors: predisposing, enabling, and need factors. Predisposing factors consist of sociodemographic characteristics associated with conditions that increase the probability of HSU. At the individual level, these factors include age, gender, marital status, ethnicity, attitudes, and beliefs. Enabling factors are considered factors that may hinder or facilitate HSU, including factors such as personal income and access to regular health care services. Lastly, need factors include self-perceived health status, restricted activity, and activities of daily living.[10,11]

Based on this theoretical framework, the aim of this study was to explore the factors associated with breast cancer screening in Korean women, utilizing data from the 2012 Korea National Health and Nutrition Examination Survey (KNHANES), a nationwide survey conducted in the Republic of Korea.

METHODS

This cross-sectional study utilized data from the 2012 Korea National Health and Nutrition Examination Survey (KNHANES), a nationwide survey conducted by the Korea Centers for Disease Control and Prevention. The KNHANES sample was selected using a stratified, multistage-sampling design with proportional allocation, based on the National Census Registry.

Participant selection criteria included being female, aged 35 years or older, and completing the questionnaire with no missing data. A total of 2602 women met these criteria.

The study period was from March 1, 2022, to Dec 20, 2023. The study protocol was approved by the Ministry of Health and Welfare of Korea and complied with the ethical principles for medical research involving human subjects as defined in the declaration of Helsinki. All study participants provided written informed consent prior to participation.

The KNHANES includes established questionnaires to assess the demographic and socioeconomic characteristics of the participants. The questionnaire contains a variety of questions including age, education level, marital status, income, place of residence and perceived health status. Education was divided into four categories: less than middle school graduate, middle school graduate, high school graduate, and college graduate or higher. Income was determined using the square root of household size divided by monthly household income according to the method set by the Organization for Economic Co-operation and Development.[12] Then, income was stratified into quartiles according to participants' age groups. In addition, information regarding breast cancer screening was obtained through a self-administered questionnaire.

Descriptive statistics, including frequencies and percentages, were employed to characterize the sample population based on demographic characteristics and determinants of breast cancer screening. Logistic regression models were utilized to estimate the odds ratio (OR) and corresponding 95% confidence intervals (CIs) for breast cancer screening among study participants with varying predisposing, enabling, and need factors. All statistical analyses were performed using SAS statistical software (version 9.4; SAS Institute, Cary, NC, USA). The statistical analysis in this study was conducted with consideration of the survey design. Appropriate SAS procedures, including Surveyfreq and Surveylogistic, were utilized to analyze the weighted data.

RESULTS

A total of 2,602 women aged 35-80 years were included in this study, and the prevalence of predisposing, enabling, and need factors among the study participants is presented in Table 1. The mean age of the participants was 56.7 years, and 1,961 (75.4%) of them underwent breast cancer screening.

Table 2 shows the ORs for the association between predisposing, enabling, and need factors and the utilization of breast cancer screening. Compared with participants aged 35-49, the ORs were 4.37 (95% CI 3.11-6.16) among those aged 50-64, 1.63 (95% CI 1.10-2.43) among those aged ≥65. In terms of marital status as another predisposing factor, "other than married" status was found to significantly decrease OR for breast cancer screening compared to married status (OR 0.45, 95% CI 0.24-0.84). However, education level did not have a significant effect on the OR for breast cancer screening. Among the enabling factors, an increase in income was found to significantly raise the OR for breast cancer screening (p for trend <0.001), while the place of residence did not demonstrate a statistically significant difference in breast cancer screening. Besides, the need factors such as general perceived health and limitation of activity had no significant effect on receiving breast cancer screening.

Table 1: Prevalence of breast cancer screening according to predisposing, enabling, and need factors among study population.

Factors	Total	Breast cancer examination	
		Yes, n (%)	No, n (%)
Predisposing factors			
Age (years)			
35-49	861	553 (64.2)	308 (35.8)
50-64	926	815 (88.0)	111 (12.0)
≥65	815	593 (72.8)	222 (27.2)
Education			
<Middle school	1014	771 (76.0)	243 (24.0)
Middle school	328	270 (82.3)	58 (17.7)
High school	751	560 (74.6)	191 (25.4)
>High school	509	360 (70.7)	149 (29.3)
Marital status			
Married	2551	1935 (75.9)	616 (24.2)
Other	51	26 (51.0)	25 (49.0)
Enabling factors			
Personal income			
1 quartile (lowest)	628	452 (72.0)	176 (28.0)
2 quartile	660	470 (71.2)	190 (28.8)
3 quartile	655	509 (77.7)	146 (22.3)
4 quartile (highest)	659	530 (80.4)	129 (19.6)
Place of residence			
Urban	2025	1519 (75.0)	506 (25.0)
Rural	577	442 (76.6)	135 (23.4)
Need factors			
General perceived health			
Bad	610	455 (74.6)	155 (25.4)
Good	1342	1019 (75.9)	323 (24.1)
Excellent	650	487 (74.9)	163 (25.1)
Limitation of activity within 2 weeks			
No	1925	1449 (75.3)	476 (24.7)
Yes	677	512 (75.6)	165 (24.4)

Table 2: Odds ratios and 95% confidence intervals for breast cancer screening by predisposing, enabling, and need factors.

Characteristics	OR (95% CI)	p for trend
Predisposing factors		
Age (years)		0.004
35-49	1.00 (reference)	
50-64	4.37 (3.11-6.16)	
≥65	1.63 (1.10-2.43)	
Education		0.738
<Middle school	1.00 (reference)	
Middle school	1.43 (0.94-2.20)	
High school	1.33 (0.95-1.86)	
>High school	1.20 (0.80-1.80)	
Marital status		0.001
Married	1.00 (reference)	
Other	0.45 (0.24-0.84)	
Enabling factors		
Personal income		<0.001
1 quartile (lowest)	1.00 (reference)	
2 quartile	0.99 (0.73-1.33)	

Continued.

Characteristics	OR (95% CI)	p for trend
3 quartile	1.46 (1.09-1.95)	
4 quartile (highest)	1.61 (1.15-2.26)	
Place of residence		0.528
Urban	1.00 (reference)	
Rural	1.08 (0.78-1.50)	
Need factors		
General perceived health		0.862
Bad	0.97 (0.69-1.37)	
Good	0.97 (0.70-1.35)	
Excellent	1.00 (reference)	
Limitation of activity within 2 weeks		0.767
No	1.00 (reference)	
Yes	0.96 (0.74-1.26)	

DISCUSSION

In this study, factors influencing the utilization of breast cancer screening in Korean women were investigated, using Andersen's behavioral model of HSU. Utilizing data from a nationwide population-based survey, several predisposing and enabling factors associated with the utilization of breast cancer screening were identified. Among the predisposing factors, age and marital status exhibited the strongest associations with utilization. While it is expected that older individuals (aged ≥65) undergo cancer screening more frequently than younger people aged 35-49, it is noteworthy that middle-aged women (aged 50-64) appear to have the highest frequency of breast cancer screenings. Most previous studies also found that middle-aged and older respondents were the most likely to use health services.[13-15] In addition, a recent study among women in the United States also reported that marital status was significantly associated with breast cancer screening service use.[16] On the other hand, education level was not an important determinant in the utilization of breast cancer screening services. These findings suggest that Korean women possess a substantial awareness of the importance of cancer screening irrespective of their educational level.

Regarding the enabling factors influencing breast cancer screening, income demonstrated a statistically significant effect, whereas place of residence did not exhibit a significant association. Similarly, a recent study reported a significant positive correlation between income and prostate cancer screening engagement among African American men.[17] In Korea, due to the good accessibility of transportation and medical facilities, the significance of place of residence as a determinant of breast cancer screening is believed to be diminished. Previous studies have consistently reported an association between need factors and the utilization of health services. This indicates that individuals who perceive their health as poor or experience limitations in daily activities tend to seek medical care more frequently.[18-20] However, no clear relationship was found between need factors, such as general perceived health or activity limitations, and the utilization of breast cancer screening in Korean women. It is worth noting that the majority of Koreans are insured by the national health insurance system, which may diminish the influence of need factors as determinants of utilization.

This study has several limitations. The use of self-reported questionnaires may introduce information bias, and there may be important factors related to the utilization of breast cancer screening that were not included in this study. While this study primarily focused on predisposing, enabling, and reinforcing factors that influence participation in breast cancer screening, it is important to note that numerous other factors have been reported to mediate or contribute to this effect. Research has indicated that participation in breast cancer screening programs is influenced by various factors, including time constraints, previous experiences with mammography, awareness and fear of breast cancer, and fatalistic attitudes toward the disease.[21,22]

CONCLUSION

This study identified specific predisposing, enabling, and need factors significantly influencing breast cancer screening utilization among Korean women, offering valuable insights for tailored interventions and policy development. Although the Korean healthcare system covers most of the costs associated with breast cancer screening, additional socioeconomic factors such as limited healthcare access, competing priorities, and cultural beliefs may also impact the participation of certain women in breast cancer screening programs. Further studies are needed to explore causation and provide additional evidence to support the results obtained in this study.

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