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Research Article

Women's Willingness to Pay for Mammography Screening under Two Medical Information Scenarios

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Objective. Secondary prevention of breast cancer (BC) helps diagnose the disease in the early stages and prevent disease progression. World Health Organization and the American Cancer Society consider early diagnosis as the best way to control BC. Mammography screening is the most sensitive and specific test that can be conducted along with the clinical examination for the early diagnosis of BC. However, like other tests, mammography is not a perfect test. The purpose of the present study is to measure willingness to pay (WTP) for mammography among a sample of women by providing each of them one of two scenarios describing medical information on the test. *Methods*. 450 women aged 35–55 years were assigned randomly into two groups of equal numbers in a quasi-experimental study conducted in Tabriz city, Iran. Each group was presented with one of the two designed scenarios. First scenario described the basic medical information on mammography as a good test of BC screening. The alternative scenario described some information on potential diagnostic errors of the mammography result alongside basic medical information about this test. The double bounded dichotomous choice method was used to extract women's WTP for mammography under each scenario. *Results*. Based on the official currency exchange rate of 37000 IRR/USD, the mean WTP for BC screening with mammography was estimated as 30.5$ in the group receiving basic medical information and 26.8$ in the other group. However, the result of regression analysis revealed receiving information on potential diagnostic errors of mammography result did not lead to significant higher WTP for the test. The WTP for mammography raised significantly among older women, employed women, and those with higher level of education. *Conclusion*. The result of our study suggests that providing women with information about the potential diagnostic errors of mammography may not be correlated to economic value they give to this test. However, women with different individual status may reveal different economic value on mammography.

1. Introduction

Breast cancer (BC) is the most common and fatal malignancy in women worldwide and is considered as one of the major concerns on women's health [1]. According to the statistics released by the Ministry of Health and Medical Education (MoHME), BC has been reported as the most common cancer among Iranian women, accounting for up to 18.9% of cancer cases diagnosed among women in this country [2]. The highest incidence of breast cancer in Iran belongs to women aged 35–55 [3].

World Health Organization (WHO) and the American Cancer Society (ACS) consider early diagnosis as the best way to control BC [4], because secondary prevention of BC helps diagnose the disease in the early stages and prevent disease progression [5]. According to the recommendation of the American Breast Cancer Society (ABCS), breast self-examination, mammography, and clinical breast examinations are three effective methods for secondary prevention of BC [6]. In Iran, the BC screening is not offered in health care centers and if mammography is needed, this service is mostly done in private health centers with a private tariff. Between

the years of 2007 to 2009, Iranian Ministry of Health and Medical Education' had piloted a BC screening programs in a low socioeconomic group of Iranian women who had been older than 35 years old in 11 metropolis cities of the country covering 30% of Iranian Population. The result of conducted studies confirms the cost-effectiveness of program [7]. However, the pilot program have not implemented as full scale national program.

According to existing evidence, mammography screening is the most sensitive and specific test that can be conducted along with the clinical examination for the early diagnosis of BC [8]. However, like other medical tests, mammography screening is not a perfect test and suffers from some limitations [9].

Thus, it is essential to provide adequate information about all positive and negative aspects of screening programs to individuals being asked about willingness to pay (WTP) for BC screening. The information should include the limitations and risks of each screening program along with its advantages. It would help obtain the real and valid value of the screening program. Accordingly, given mammography screening is an individual decision and women require out of pocket payment for the screening, the purpose of the present study is to measure and compare women's WTP for mammography screening under to separate scenarios providing women with medical information about mammography. In the present study, it is hypothesized that women's WTP for mammography screening varies in regard to medical information scenarios presented to them. The result can help the policymakers obtain a better understanding of women preference in order to implementation of the mammography screening program in local or even national level.

2. Methods

2.1. Data Collection. The present quasi-experimental study was conducted in Tabriz city, Iran in fall 2017. Study participants were chosen through the multistage (cluster) sampling: The municipality of Tabriz was classified in three regions including south, north, and center regions. Within each region, a health complex center, given full registration of the target population, was randomly selected. A total of 450 women aged between 35 and 55 years old were randomly selected from a registered individual and were further divided randomly into two groups of 225 individuals. Each group received a separate scenario describing medical information about mammography. One of the authors (SHR) presented the designed scenario to women via structured interviews inside the health complex centers. The other author (SN) evaluated the interviews. Participation in the interviews was voluntary. Before the interview, each woman was informed and assured that their privacy would be preserved in all stages of the research, and she was requested to provide verbal informed consent. Each interview lasted approximately 10 to 15 minutes. The study was approved by the ethics board of Tabriz University of Medical sciences (The ethical code: IR.TBZMED.REC.REC.1395.1067).

2.2. Questionnaire. We used the contingent valuation method (CV) to obtain women's WTP for mammography screening. The questionnaire for this study was designed according to the guideline of the CV framework. The validity and reliability of the CV questionnaire have been confirmed repeatedly [10, 11].

The questionnaire consisted of four modules. Module 1 introduced the purpose of our study. Module 2 described study scenarios. We designed two scenarios. The first one described basic medical information about BC epidemiology, global risky age of getting BC, the average age of BC incidence among women in Iran, and the advantages of mammography as a good test for BC screening. The alternative scenario additionally described some information on limitations mammography test, mainly false positive and false negative errors of the result alongside aforementioned basic medical information about this test. An additional Word file shows this in more detail (see Supplementary file 1). The scenarios were followed by bids submitted to respondents. The starting bids valuing of 18.9$, 29.7$, 43.2$, 54.1$, and 70.3$ were submitted randomly to respondents regardless of whether respondents assigned to the first or second study group. To avoid starting point bias, lower and upper bids were determined by open-ended questions performed on the pilot sample of 30 women. Module 3 and Module 4 focused correspondingly on women's health status and socio-demographic information.

2.3. Data Analyses. The double bounded dichotomous choice methods was used to separately elicit the WTP for mammography screening among two group of women. We reported value of WTP based on official currency exchange rate of 37000 IRR/USD in the year 2017. The ratio of WTP compared to average annual household expenditure (gross) in nominal price was reported as well. The interval regression analysis was used to examine the correlation of explanatory variables with the women's WTP for mammography screening. Three interval regression models were conducted for all 450 women. Dependent variable in all four models was defined as respondents' answers to first and second bids. The first model included complete information and demographic status of respondents as explanatory variables. The second model added two other explanatory variables controlling for health status of respondents, as a self-reported variable, and history of cancer in respondents' family. The third model included all the explanatory variables plus prior experience of mammography.

3. Results

The main characteristics of the participants are presented in Table 1. The average age of the participants was 42 years. They were mostly living in middle or low-income households. All women reported to have a basic health insurance enrollment, but just 20% had complementary health insurance. One-fourth of respondent women reported past-hospitalization, and more than 90% reported they had good or average health status. One tenth reported familial BC

TABLE 1: Sample's descriptive statistics.

Variable name	Mean/percentage (all participants)	Mean/percentage (group receiving basic medical information)	Mean/percentage (group receiving complete medical information)
Monthly household income			
Low	57%	57%	57%
Medium	34.75%	35%	35%
High	8.4%	8%	8%
Age of woman	42	42	41.8
Education			
Illiterate	8%	8%	8%
Up to nine years of schooling	54%	55%	54%
High school degree	23%	23%	24%
College degree	15%	14%	14%
Employment status			
Employed	10%	11%	10%
Housewife	90%	89%	90%
Family size	3.60	3.6	3.6
Marital status			
Currently married	92%	92%	91%
Single	8%	8%	9%
Having supplementary insurance	21%	20%	21%
Past-hospitalization experience	26%	26%	25%
Past-mammography experience	15.3%	16%	15%
Health status (as self-report)			
Good	50%	50%	50%
Average	43%	43%	43%
Bad	7%	7%	7%
Familial history of breast cancer	9.3%	9%	10%

history. We compared the characteristics of participants receiving two medical information scenarios. As the results presented in Table 1, two groups are very similar in all characteristics, and we can confirm that participants were randomly assigned between two groups.

The average amount of WTP for mammography screening was estimated to be 30.5 $ in the group receiving basic medical information about mammography and 26.8 $ in the other group.

As illustrated in Table 2, the WTP for mammography screening in the group of women receiving medical information about false positive and false negative errors of mammography result was less compared to that of the group receiving only the basic medical information about test. The p-values of WTPs indicated the estimated values in both groups are significant different from zero.

The results of interval regression analysis of WTP for mammography screening are presented in Table 3. Age of woman at the time of the interview, her occupation status, her education status, and whether or not she obtained complementary health insurance were correlates for mammography screening. In more detail, younger, employed, and more educated women and women having complementary insurance were more likely to pay for mammography screening. The interesting finding of regression analysis was insignificancy of intervention. To more detail, the regression analysis showed no significant difference in WTP between women receiving information on possible errors of mammography and those receiving just basic information.

4. Discussion

In the present study, applying the DBDC technique, it was tried to measure women's WTP for mammography screening contingent to the medical information they receive about this test.

Based on the results obtained from regression analysis, we found no significant difference in WTPs of two groups receiving different information about mammography test. It seems that women can balance positive and negative aspect of this screening test. As a result, awareness about possible diagnostic errors of the test does not significantly reduce economic value of the test from women's viewpoint.

In the present study, it was revealed that WTP for mammography was raised with the age of women. This finding is consistent with some previous evidence [12–14]. However, there is existing literature reporting the reverse [15, 16]. Women sample in this study aged 35–55 years old. In this specific age range, older women are potentially at higher risk of BC. Therefore, they show more preference for mammography.

We found that employed women reveal significantly more WTP for mammography screening. It seems that some women do not take any action to receive mammography services due to economic shortages or/and not being economically independent. According to the results of the other

Table 2: Calculated WTPs.

Scenario	WTP	CI (95%)	The ratio of WTP
Complete medical information	26.8**	7.8–45.7	0.002
Basic medical information	30.5**	11.6–49.2	0.003

** $p < 0.05$.

Table 3: Correlates of WTP for mammography screening ($N = 450$).

Variables	Model 1	Model 2	Model 3
Complete medical information	0.73	0.70	0.75
Age of woman	−0.26**	−0.25***	−0.28**
Married	−0.52	−0.45	−0.69
Employed	8.39***	8.40**	8.36***
Education			
Less than diploma	Reference	Reference	Reference
Diploma	4.27**	4.83**	4.1**
University degree	4.99*	4.15***	5.3*
Complementary insurance	4.38**	4.34***	3.98**
Health status			
Bad/medium health	—	Reference	Reference
Good health		−0.20	0.29
Familial history of cancer	—	1.35	0.75
Prior experience of mammography	—	—	2.66

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

study, 78.3% of women declared the high cost of mammography as the main reason for not undergoing it [17]. It was also found that women obtaining complementary health insurance express significantly higher value for mammography screening. This result supports the role of insurance coverage on affordability of mammography screening. These two special findings might convey that promoting ability to pay can convince women for undergoing mammography screening.

As expected, education level of women was significantly associated with more reported WTP for mammography screening. Existing literature supports this finding [13, 14, 16]. It might address the fact that more educated women assess more awareness and better information of the role of diagnosis services, mainly mammography screening in early detection of BC.

This study raises a concern; the data sample contains women with good variation in respect to demographic, economic, and health status condition. Still, since a couple of population women were not willing to participate in the study, we did not access a completely random sample of population women. Therefore, this limitation must be considered when interpreting the results.

5. Conclusions

The result of our study suggests that providing women with information about the potential diagnostic errors of mammography may not be correlated to economic value they give to this test. However, women with different individual status may reveal different economic value on mammography.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Disclosure

The authors confirm that all listed authors have made a significant scientific contribution to the research in the manuscript, approved its claims, and agreed to be an author. The authors ensure that anyone who has not contributed to the manuscript does not qualify for authorship. The authors did not use any copyediting or translation services for the preparation of our manuscript. The authors followed the guidelines of the International Committee of Medical Journal Editors. It also should be noted that an earlier version has been presented as preprint according to https://www.researchsquare.com/article/rs-663415/v1 [18] and an earlier version of conference has been presented as preprint according to https://assets.researchsquare.com/files/rs-663415/v2/eb7de9ac-67c3-4608-84a5-c021f7598375.pdf?c=1638869359.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

Supplementary file 1: Includes two alternative medical information scenarios presented to participants. (*Supplementary Materials*)

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