Health Literacy, English Language Proficiency and Mammogram: An Analysis of Largest State Health Survey in the United States

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Abstract

Objective: We utilized the largest state health survey in the United States, California Health Interview Survey to evaluate if low English language proficiency with a combination of low health literacy impacted mammogram screening among women.

Methods: We conducted survey weighted descriptive, bivariate, and multivariable regression analyses. All analyses were conducted with alpha less than .05 to denote significance.

Results: A total of 25,958 women aged 40 or older were included in our study. Low English language proficiency was found in 8% of the population, while nearly 13% had low health literacy, and another 7% had both. Not having a mammogram was highest among those with both low English language proficiency and low health literacy. Results of regression analysis show that women with both low English language proficiency and low health literacy were 42% less likely to have a mammogram.

Conclusion: Mammogram screening remains one of the most common methods of preventing breast cancer. Our study shows that targeted health education and preventive care is needed for women who do not speak English and have low health literacy.

Introduction

Women in the United States have more than one in three lifetime risk of developing cancer at certain points in their lives [1]. Among these cancers, breast cancer has one of the highest incidences among women, primarily because of late detection. Thus, breast cancer is currently the second leading cause of cancer-related death among women in the United States. To note, breast cancer can be treated and the risk of dying is lessened when the mutant cells are detected and removed early on. This can only happen when screening becomes part of women's health programs [1].

In response to this phenomenon, public health programs have been promoting early detection through mammography as a primary strategy for reducing breast cancer-related mortality in the country [2]. This is primarily because increase in mammogram screening reduces breast cancer mortality considering that the number of women diagnosed with late-stage breast cancer is also reduced [3]. At the other end of the spectrum, studies show that women diagnosed with late-stage breast cancer are less likely to have had mammograms prior to their diagnosis in comparison with women diagnosed with early-stage cancer [3], thus demonstrating the importance of preventive screening.

However, it cannot be emphasized enough that even though the use of mammogram has significantly increased over the past three decades, 30% of women in the United States remain inadequately screened [2]. This is because both patient level and system barriers stand in the way of timely breast cancer screening. Among these barriers are poor knowledge about screening, fear of being diagnosed with cancer, lack of motivation, embarrassment, lack of health insurance coverage, and lack of access to screening facilities [2].

One of the most pressing barriers to mammograms is poor health literacy. Here, health literacy is defined as "the ability to obtain, process, and understand basic health information and services to make appropriate health decisions". Low health literacy has been linked with a weak health vocabulary that limits how individuals understand key concepts, such as, screening and its benefits. Evidence exists that women with low

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literacy are more likely to have negative attitudes towards, and negative perceptions of, mammography [4]. Hence, it is common for such women to hold the misconception about mammograms being embarrassing, harmful, painful, and troublesome. A person with limited health literacy tends to not fully understand oral and written information regarding breast cancer screening recommendations and processes.

There are also written materials regarding the significance of early cancer screening which requires 10th to 11th grade reading level so that they are clearly understood [4]. As such, poor literacy makes it difficult for an individual to navigate through the fragmented health care system of the United States, fill up health forms, understand appointment slips, comprehend medication instructions accurately, and communicate effectively with their physician [4]. In light of these, limited health literacy and low English literacy can serve as barriers to the use of mammogram as prevention for breast cancer. As such, there is an imperative need to address if such low health literacy and language proficiency can lower mammogram screening and by utilizing a population-based survey; our study can be generalized to the larger population due to increased external validity.

Methods

Data source and measures

We utilized the public access adult portion of the 2007 California Health Interview Survey (CHIS). CHIS, considered the largest state health survey, uses random-digit-dial sample to assess the health and behaviors of Californians and the survey is offered in several languages. The primary exposure variable in our study was low health literacy and/or low English language proficiency (LEP): *"When you get written information at a doctor's office, would you say that it is very easy, somewhat easy, somewhat difficult, or very difficult to understand?"* and *"When you read the instructions on a prescription bottle, would you say that it is very easy, somewhat easy, somewhat difficult, or very difficult to understand?"* Those responding as *"somewhat difficult"* or *"very difficult"* to at least one of these, as well as any participants responding *"yes"* to the question *"The last time you saw a doctor, did you have a hard time understanding the doctor?"* were termed low health literacy in our study.

We further defined LEP as participants who responded *"not well"* or *"not at all"* to the question *"Since you speak a language other than English at home, we are interested in your own opinion of how well you speak English. Would you say you speak English (well, very well, not well, not at all)."* As a result, we created a low health literacy and LEP variable: low health literacy only, LEP only, both, or none.

Our primary outcome variable was having mammogram, defined as response of *"yes"* to ever having a mammogram. The question was only asked to those aged 30 or older, while in our study we primarily focused on those aged 40 or older, as often when such a screening is recommended. Control variables were included: marital status, race/ethnicity, education, poverty, insurance status, and general health status.

Data Analysis

All analyses employed survey weights and were conducted using SAS 9.4 (SAS Institute, Inc., Cary, NC). Descriptive statistics

was utilized to obtain study population characteristics, followed by chi-square test for association using design based F values to evaluate the association between mammogram screening and categorical variables, while survey-weighted unadjusted linear regression was utilized for continuous variable of age. Next, survey-weighted multivariable logistic regression analysis was conducted to evaluate the association between low health literacy/LEP and mammogram screening.

Results

A total of 25,958 women aged 40 or older were included in our study, resulting in an annual population estimate of 10,046,838. Approximately, 8% of the population reported LEP, while 12.47% had low health literacy and another 7.19% had both LEP and low health literacy.

Table 1 provides the prevalence of mammogram screening, by each population characteristics. Results highlight that higher prevalence of not having a mammogram was present among those with both LEP and low health literacy (37.94%), followed by those with LEP (28.47%), and those with low health literacy (23.59%), with the lowest prevalence of not having a mammogram being present among those with adequate health literacy and English language proficiency (20.58%).

Table 2 displays the results of survey-weighted multivariable regression analysis. We noted that women with both LEP and low health literacy had 43% lower odds of having a mammogram, as compared to those with adequate health literacy and English language proficiency. In addition, Asian/Pacific Islander women also had lower odds of mammogram (adjusted odds ratio [aOR] = 0.74), compared to White, with similar trend noted for those lacking health insurance in the past 12 months (aOR = 0.69).

Discussion

Patient compliance is a critical component of healthcare outcomes, however, many patients may face a variety of challenges including health literacy. Although, the United States Department of Health & Human Services [5] announced the strategy of a 'National Action Plan' to improve health literacy, overall the literature continues to suggest low health literacy remains in the forefront and continues to impacts healthcare outcomes. Despite the enormous implications of low health literacy, there remains a significant amount of confusion surrounding the concept and its connection with healthcare outcomes [6]. The aim of this study was to learn more about and evaluate prevalence of LEP, low health literacy, or both LEP and low health literacy and the relationship to mammogram screening. In this study, the data showed that a significant portion of the participants reported LEP, low health literacy or both LEP and low health literacy. In addition, the findings showed those female participants with both LEP and low health literacy had lesser odds of having a mammogram. The study also found participants who lacked insurance and were Asian/Pacific Islander had a much lower likelihood of having a mammogram.

The findings establish significance and demonstrate a prevalence of LEP, low health literacy, or both LEP and low health literacy and how such a factor is associated with lower preventive care utilization. The findings echo results such as in a recent study, where Komenaka, et al. [7] concluded of all

	Had mammogram n (%)	Did not have mammogram n (%)	P value
Health literacy and English language proficiency level			**<.0001**
Neither	17,919 (79.42)	2,699 (20.58)	
Low English Proficiency Only	791 (71.53)	275 (28.47)	
Low Health Literacy Only	2,820 (76.41)	511 (23.59)	
Both low	650 (62.06)	293 (37.94)	
Marital status			**0.0864**
Not currently married	12,396 (77.87)	1,812 (22.13)	
Currently married	11,325 (76.19)	2,397 (23.81)	
Race/Ethnicity			**<.0001**
Asian/Pacific Islander	1,759 (72.73)	537 (27.27)	
Latino	1,912 (64.87)	849 (35.13)	
African American	1,240 (82.67)	190 (17.33)	
White	17,255 (82.62)	2,172 (17.38)	
Other	1,555 (69.38)	461 (30.62)	
Education Level			**0.0008**
High School or less	7,458 (77.07)	1,412 (22.93)	
Some college	7,242 (79.54)	1,069 (20.46)	
Bachelors or higher	9,021 (74.65)	1,728 (25.35)	
Insurance status			**<.0001**
Insured all past 12 months	21,835 (79.79)	3,223 (20.21)	
Not insured all past 12 months	1,886 (59.94)	986 (40.06)	
General health status			**<.0001**
Fair or poor general health	5,022 (82.92)	643 (17.08)	
Excellent, very good, good general health	18,699 (75.15)	3,566 (24.85)	
Food security level			**<.0001**
Food secure and at or above 200% federal poverty level	17,845 (79.17)	2,729 (20.83)	
Food secure and below 200% federal poverty level	4,037 (72.47)	907 (27.53)	
Food insecure and below 200% federal poverty level	1,839 (69.75)	573 (30.25)	

Table 1: Association between population characteristics and mammogram screening status

Variables	Odds ratio (95% CI)
Health literacy/English language proficiency level	
Both low vs Neither	0.57 (0.38, 0.86)*
Low English Proficiency Only vs Neither	1.02 (0.69, 1.53)
Low Health Literacy Only vs Neither	1.05 (0.80, 1.38)
Marital status	
Not currently married vs Currently married	0.93 (0.79, 1.10)
Race/ethnicity	
African American vs White	1.42 (0.93, 2.18)
Asian/Pacific Islander vs White	0.74 (0.59, 0.95)*
Latino vs White	1.01 (0.80, 1.27)
Other vs White	0.91 (0.66, 1.25)
Education level	
High School or less vs Bachelors or higher	0.93 (0.76, 1.14)
Some cllege vs Bachelors or higher	1.01 (0.85, 1.19)
Insurance status	
Not insured all past 12 months vs Insured all past 12 months	0.69 (0.51, 0.93)*
General health status	
Fair or poor general health vs Excellent, very good, good general health	1.28 (0.99, 1.66)
Food security status	
Food insecure and 200% below federal poverty level vs at or above 200% federal poverty level	0.90 (0.65, 1.23)
Food secure vs at or above 200% federal poverty level	0.88 (0.68, 1.15)

* P <. 05

Table 2: Results of multivariable regression analyses, adjusted for age.

the sociodemographic variables examined, health literacy had a strong relationship with use of screening mammography. Based on these findings, it is reasonable to express the continued concerns and need to improve health literacy aimed at healthy outcomes for a vulnerable population, especially those with LEP and/ or low health literacy. While it is encouraging that a

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large amount of women participated in the research; however, these findings did not come as a surprise since there is a considerable amount of attention in the news media regarding breast cancer awareness [8]. As shown in our results, a key area of needed public health efforts is also the Asian/Pacific Islander population. Due to the model minority myth, often this population is overlooked for health education programs, but our results show that targeted interventions are needed in this population to improve preventive care utilizations.

The results, however, should be taken in the context of some limitations. The cross-sectional nature of the study limits causality. In addition, the survey responses are susceptible to recall bias and self-reporting bias. Nonetheless, CHIS is survey-weighted and thus generalizable to the larger California population. In addition, the survey questions have been used previously in the literature and thus holds validation [9,10]. Furthermore, results emphasize the need for further research and must focus on increasing the comprehension of mammography in women with low health literacy and those who do not speak English well. Approaches to increase health literacy can lead to an increase in mammography adherence. Simplifying health literacy can improve health education and have the potential of improving women's health while addressing the existing health disparities and aid in a better understanding of this quandary can help in the strategy of a suitable means to improve comprehension of the appropriate literacy.

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