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Knowledge of Breast Cancer Risk Factors and Willingness To Undergo Screening among Female Faculty, Staff, and Graduate Students of Illinois State University

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KNOWLEDGE OF BREAST CANCER RISK FACTORS AND WILLINGNESS TO UNDERGO SCREENING AMONG FEMALE FACULTY, STAFF, AND GRADUATE STUDENTS OF ILLINOIS STATE UNIVERSITY

ESTHER OSHAJI

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Breast Cancer (BC) is a leading cause of cancer deaths in women worldwide. Early detection is key to combating the disease. Despite the U.S. having one of the highest BC rates globally, there is limited research on awareness of BC risk factors and willingness to undergo screening among university students, faculty, and staff. Drawing on the constructs of the Health Belief Model, this study assesses the knowledge and predictors of BC screening behaviors among female graduate students, faculty, and staff at a U.S. Midwestern University. This group is particularly important as BC risks increase with age. Understanding their perceptions of BC susceptibility, benefits, and risks is essential for identifying health behavior determinants and developing interventions to reduce BC risks as this younger population ages and to decrease mortality through early detection. This study used a quantitative approach to draw a convenience sample size of 422 respondents. An online survey collected data using a structured questionnaire covering knowledge of risk factors, screening barriers, and willingness to undergo screening. Data analysis employed descriptive and multivariate statistics. The findings showed that higher educational attainment is linked to greater BC knowledge. Faculty and staff demonstrated higher knowledge levels than graduate students, even when accounting for other sociodemographic factors. Surprisingly, the analysis found no significant differences in the perception of screening

costs or willingness to undergo mammograms based on income. This suggests that perceived screening barriers may be more universally complex rather than solely influenced by socioeconomic status. Based on these findings, implementing BC education based on the health belief model at different life stages is crucial. Targeting educational disparities, addressing the unique needs of different staff categories, and considering broader sociocultural determinants can help public health interventions develop more equitable and effective strategies to reduce the BC burden within this university population and beyond.

KEYWORDS: Breast Cancer; risk factors; Health Belief Model; Early Detection; Screening

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EO.

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CHAPTER I: INTRODUCTION

Background to the Study

Cancer remains a leading cause of death worldwide, ranking among the top five leading causes in every region of the world (Momenimovahed and Salehiniya 2017). The World Cancer Research Fund International (2020) reported that 18,094,716 million cancer cases were diagnosed globally in 2020. As the burden of cancer is growing in almost every country, effective cancer prevention has become a critical public health challenge.

Breast cancer (BC) is a significant public health issue and the most commonly diagnosed cancer in women globally. In 2017, over 252,700 new instances of invasive breast cancer were detected among American women, with young women under 45 accounting for roughly 9.7% of these cases (CDC Wonder, 2018; Centers for Disease Control and Prevention, 2017). According to the American Cancer Society (2019), breast cancer is the second most frequently diagnosed cancer in women, with about 268,600 diagnoses in 2019. In 2022, the figures rose to approximately 287,850 new cases of invasive breast cancer, 51,400 cases of DCIS[1] were posited to have been diagnosed among US women, and 43,250 deaths from breast cancer. In 2020, an estimated 2.3 million cases of female breast cancer were diagnosed globally, and about 685,000 women died as a result (Arnold et al. 2022).

As of January 1, 2022, approximately 4.1 million women with a history of breast cancer live in the United States (Giaquinto et al. 2022). The American Cancer Society (2019) posited that approximately 1 in 8 women (13%) would be diagnosed with invasive breast cancer in their lifetime, and 1 in 39 women (3%) would die from breast cancer, making it an area worthy of attention.

[1] According to the American Cancer Society, Ductal carcinoma in situ (DCIS) means the cells that line the milk ducts of the breast have become cancer, but they have not spread into surrounding breast tissue.

Ferley et al. (2013) also revealed in their study that breast cancer is the most frequent malignancy among women and one of the leading causes of mortality among them. Breast cancer is a complex disease, and many variables contribute to its incidence (Zendehdel et al. 2018). Although the disease occurs worldwide, its incidence, mortality, and survival rates vary significantly, possibly attributable to various variables such as population structure, lifestyle, genetic factors, and environment (Hortobagyi et al. 2005).

Late presentation of symptoms to treatment facilities at severe stages characterizes most BC problems, leaving little room for intervention that would dramatically minimize disability and death. Recent research has shown that poor knowledge regarding breast cancer symptoms and its numerous early diagnostic tools is one of the critical causes for the late presentation of BC diagnoses in most women (Okobia et al. 2006). However, it has been noted that women who receive their diagnoses earlier have more treatment choices and a better chance of survival than those who do not (Jemal et al. 2006). Additionally, even though the incidence of BC has increased, the death rate has fallen due to early diagnosis and effective treatment (Smith et al. 2018).

Understanding the risk factors for various health issues is essential for assessing an individual's overall health within a community. This understanding largely depends on awareness and a proactive perception of disease and pathological abnormalities in the body. Several studies have identified factors associated with an increased risk of breast cancer, including age, sex, genetic predisposition, family history, use of oral contraceptives, early age at first menstruation (menarche), late age at first full-term pregnancy, late menopause, consumption of a westernized diet, smoking, alcohol consumption, and physical inactivity (Olotu 2006; Agboma 2007; Ajayi 2008; National Cancer Institute 2011; WHO 2011). Consequently, it may

be concluded that women often engage in dangerous lifestyle choices that increase their chance of developing breast cancer in later life.

The most frequent symptoms of breast cancer are a change in the appearance or feel of the breast, a difference in the appearance or feel of the nipple, and nipple discharge. Awareness of these symptoms and performing examinations such as Breast Self-Examination (BSE), Clinical Breast Examination (CBE), and or Mammography regularly aid in detecting any signs or symptoms immediately after a change occurs; examples of such differences include the development of a lump or swelling, skin irritation or dimpling, nipple pain or retraction (turning inward), redness of the nipple or breast skin, or a discharge other than breast milk (American Cancer Society 2011).

Breast cancer risk factors influence the likelihood of developing the disease. Some variables significantly impact risk, whereas others have a small impact. Factors such as a person's age or race cannot be altered. Others are connected to cancer-causing environmental elements, while some others are tied to personal actions that may be modifiable, such as smoking, drinking, and food choices (American Cancer Society 2011). Increased awareness among health practitioners and early detection criteria may not prevent breast cancer. Still, there are things all women can do to minimize the risk and raise expectations that if cancer does arise, it will be discovered at an earlier, more curable stage. Understanding which variables may influence risk might aid in developing a consistent breast health strategy. Even after a breast cancer diagnosis, women must be well-educated and have access to the correct information to make the best choices for their health and well-being (Rosen & Rosen 2011; Komen 2011).

Breast cancer screening to seek early identification of cancer is one potentially helpful technique for lowering breast cancer mortality. As a result, raising awareness, which is a crucial

tactic, implies improved breast cancer screening. Breast cancer early detection tests save thousands of lives each year, and many more lives may be saved if more women and their healthcare professionals use these tests (American Cancer Society 2011). Following breast cancer early detection standards increase the odds of early diagnosis and effective treatment (Rosen & Rosen 2011; Komen 2011; American Cancer Society 2011). Breast self-examination (BSE), physical examination of the breasts by doctors or certified health professionals, clinical breast examination (CBE), and mammography are the major methods of screening (Rosen & Rosen 2011; Komen 2011).

Sensiba and Stewart (1995) emphasized that a lack of knowledge is a significant barrier for individuals considering cancer screening tests. Therefore, providing accurate information about cancer and screening procedures to high-risk populations can help dispel misconceptions and promote informed decision-making.

Access to preventive screening services can play a crucial role in breast cancer prevention and reducing mortality by enabling early detection and treatment. Research has shown that women who undergo regular screenings have a lower risk of developing and dying from advanced breast cancer compared to those who are not screened (Jørgensen et al., 2009).

As a primary cause of mortality among women, especially in the United States of America, understanding breast cancer is critical, as it will allow for early identification and treatment. Against this backdrop, this research investigates knowledge of breast cancer risk factors and willingness to undergo BC screening among female faculty, staff, and Illinois State University graduate students.

Research Questions

1. What is the level of knowledge regarding breast cancer risk factors among female faculty, staff, and graduate students at Illinois State University?
2. How willing are female faculty, staff, and graduate students at Illinois State University to undergo breast cancer screening?
3. What are the social determinant factors that influence the willingness to undergo breast cancer screening among female faculty, staff, and graduate students at Illinois State University?

Significance of the Study

Breast cancer is still the largest cause of cancer-related deaths in women across the globe, and early diagnosis via screening is critical for increasing survival rates (Gehlert, Hudson, and Sacks 2021). Nevertheless, there are significant variations in breast cancer screening rates across demographic groups, including female graduate students, faculty, and university staff.

Breast cancer knowledge and awareness among university students in the United States is an understudied area. Despite the high breast cancer rates in the country, little is known about breast cancer knowledge and awareness among U.S. university students (Odhiambo and Hunter 2023). In a recent study, Odhiambo and Hunter (2023) found a widespread lack of overall breast cancer knowledge and associated risk factors among the students. Despite the well-established benefits of breast cancer screening, there is limited research on the knowledge and willingness to undergo screening among female graduate students, faculty, and staff in a university setting in the USA. Specifically, it is unclear whether this population has adequate knowledge about breast cancer, including risk factors, screening methods, and recommended guidelines, and whether

they are willing to undergo screening. Understanding these factors is crucial for developing effective interventions to promote breast cancer awareness and screening among this population.

Female graduate students, faculty, and staff in the United States represent a diverse group in terms of age, ethnicity, cultural background, and socioeconomic status, and there is a gap in understanding their knowledge and desire to undertake breast cancer screening. The unique demographic characteristics of this population may affect breast cancer screening practices among international graduate students or faculty from diverse backgrounds compared to the general population of university students or faculty. Additionally, these groups face unique challenges in managing academic and employment commitments, financial constraints, and cultural factors, which may create barriers to accessing breast cancer screening programs. Understanding these issues is critical for developing targeted interventions to promote breast cancer screening and improve the overall health of this population.

In addressing these research gaps, this study aims to investigate variables impacting breast cancer awareness and screening behavior among this population and obstacles and facilitators to obtaining screening services. Interventions to increase breast cancer awareness and screening rates among female graduate students, faculty, and university staff might also be designed and evaluated.

Female faculty, staff, and graduate students are an essential target audience because of the long-term implications that lifestyle choices and preventative health behavior practices may have on their health generally. Female graduate students and faculty members are an essential demographic to study regarding their knowledge of breast cancer risk factors and willingness to participate in screening procedures for various reasons. Female graduate students and faculty members have the same high risk of breast cancer as other women. However, long durations of

sitting, a lack of physical exercise, and stress from academic work may all be significant risk factors for breast cancer in this group of women. As a result, these activities may significantly influence their chance of acquiring breast cancer in the future (Wendt, 2005).

Additionally, the health of this population and those of others around them may be significantly impacted by their knowledge, attitudes, and behavior about breast cancer screening and risk factors. As academic community members, they have a more comprehensive network of influence, including students, coworkers, and family members. This group of women may also give valuable insights into the efficiency of breast cancer screening programs and the variables that impact their decision-making about breast cancer screening. This demographic study might help find ways to improve breast cancer awareness and screening programs as well as potential treatment barriers. Female graduate students and faculty members may promote breast cancer screening among their peers and the general public as a form of advocacy. They may use their skills and expertise to encourage early detection and raise breast cancer awareness.

Thus, the underlying premise of this research study is that investigating factors that could potentially impact knowledge, attitudes, and behaviors associated with breast cancer and breast cancer screening behaviors in women could assist health professionals in developing interventions that are better suited specifically for this population, which could ultimately result in altering their actual breast cancer risks. Furthermore, influencing these women in this comprehensive approach may favor their families' health habits, such as using health care services to determine the health of their breasts.

The results of this study would potentially trigger significant initiatives at the University level to safeguard women from dying young from an illness that is preventable if discovered early enough. Furthermore, by offering a sociological perspective, the research would contribute

to the existing literature on breast cancer and screening service utilization nationally and globally. Therefore, examining the knowledge, attitudes, and behavior of female graduate students, faculty, and staff about breast cancer screening and risk factors is crucial to improving breast cancer education, prevention, and treatment.

CHAPTER II: LITERATURE REVIEW

This section offers an overview of knowledge of breast cancer risk factors and willingness to undergo screening exercises among female faculty, staff, and graduate students at Illinois State University. The chapter reviews the findings of scholars, researchers, and authors in breast cancer and healthcare utilization, and it is structured around the Health Beliefs model, which informs this study. First, I explore the knowledge of breast cancer risk factors and symptoms. Second, I review screening guidelines, practices, and attitudes. Lastly, I examine the socio-demographic characteristics (educational attainment, income, race, and employment status) and their influence on willingness to undergo screening.

Knowledge of Breast Cancer Risk Factors

Several studies have highlighted the significant impact of having comprehensive health knowledge, which is positively associated with overall survival and quality of life in various diseases, including breast cancer (Shubhagata Das, 2022). As previous studies have argued, lack of adequate breast cancer knowledge negatively affects whether one will seek breast cancer care, the timing of the care, the development of the disease, and the prognosis (Caplan, 2014; Peek et al., 2008). In addition, a lack of awareness of breast cancer also results in failure to seek medical care or to undergo treatment (Kaiser et al., 2013), thus resulting in a more aggressive cancer (Caplan, 2014).

For breast cancer's primary prevention, understanding risk factors and mitigation strategies is imperative. Inadequate knowledge about breast cancer stands out as a significant contributor to breast cancer mortality (Conway-Phillips, 2009; Faria et al., 2021). Moreover, a lack of comprehensive breast cancer knowledge correlates with failures to undergo screening, whether through mammograms, clinical breast examinations, or breast self-examinations (Faria et al.,

2021). Delay in seeking treatment due to inadequate breast cancer knowledge also leads to unfavorable outcomes. Early-stage breast cancer diagnoses, characterized by smaller tumor size and absence of metastasis, are more amenable to successful treatment (Rahman et al., 2019).

Conversely, delayed medical attention increases the risk of advanced-stage cancer, often untreatable (Akinyemiju et al., 2013). Despite evidence highlighting the pivotal role of breast cancer knowledge in early detection, there persists a general lack of awareness about breast cancer risks among women and, to a lesser extent, among men (Hughes, 2013). Previous research has predominantly focused on women aged 40 and above, partly due to the prevailing notion that breast cancer risks escalate post-40, inadvertently leaving younger individuals, both male and female, underrepresented in breast cancer studies (Elimimian et al., 2021).

A comprehensive understanding of the benefits of a healthy diet and regular exercise, coupled with an awareness of predisposing disease risks, correlates with a healthier lifestyle (Fitgerald et al., 1994; Pirouznia, 2001). Furthermore, knowledge about diseases, their symptoms, associated health risks, and preventive measures empowers individuals to actively engage in decision-making regarding medical care and treatment options, promoting early screening and detection, thus improving clinical outcomes.

The risk factors for breast cancer can be categorized into non-modifiable intrinsic factors, such as age, sex, race, exposure to endogenous steroid hormones, benign proliferative breast lesions, genetic susceptibility, and modifiable external factors. The latter, conditioned by lifestyle choices (e.g., inactivity, alcohol consumption, and smoking), diet, and long-term pharmacological interventions (e.g., oral hormonal contraceptives or hormone replacement therapy), offer avenues for preventive strategies at the primary healthcare level (Kaminska et al., 2015). Identifying modifiable or potentially modifiable risk factors can inform the development

of preventive strategies aimed at reducing breast cancer incidence, to be implemented by researchers and multidisciplinary professionals (Guerrero et al.,2017).

Knowledge of breast cancer, therefore, emerges as a significant motivator for breast cancer screening, as evidenced by studies where individuals who have encountered cancer positively, such as through family members or friends surviving the disease, exhibit increased eagerness to learn about it, leading to favorable shifts in perceptions and behaviors (Mishra et al., 2012).

Screening Guidelines, Practices, and Attitudes

The objective of cancer screening is to identify preclinical stages of the disease in otherwise healthy, asymptomatic individuals, aiming to prevent adverse outcomes, enhance survival rates, and circumvent the necessity for more aggressive treatments. (Loud and Murphy 2017). Screening procedures offer a spectrum of advantages, such as better health outcomes, yet they also entail potential adverse consequences, including financial costs, heightened anxiety levels, and inconvenience (ACOG, 2017).

Breast self-examination (BSE), clinical breast examination (CBE), and mammography are among the screening methods employed either individually or in conjunction to detect breast cancer. Typically, a more intensive screening yields a higher disease detection rate. Intensifying screening protocols can involve the integration of multiple screening modalities, extending screening initiatives across broader age demographics, or augmenting the frequency of screening tests (ACOG, 2017).

According to the guidelines established by the American Cancer Society (2015), women are advised to acquaint themselves with the benefits, limitations, and potential risks associated with breast cancer screening. Additionally, it is recommended that women should be aware of

the normal appearance and texture of their breasts and promptly report any changes to a healthcare professional.

The 2015 guidelines published by the ACS recommend that women with an average risk of breast cancer commence regular screening mammograms at the age of 45. Women aged 40 to 44 should have the option to begin annual screening, while those between 45 and 54 should undergo annual screenings, and women aged 55 and above should either continue annual screenings or transition to biennial screenings. Furthermore, the ACS advises women to continue screening mammography as long as they are in good overall health and have a life expectancy of at least ten years (Oeffinger et al., 2015).

Numerous studies and published guidelines have underscored the crucial role of early detection in combating breast cancer, which can significantly reduce breast cancer-related mortality and complications, ultimately improving clinical outcomes. A study comparing breast cancer-related mortality rates before and after the introduction of screening revealed a potential mortality reduction of up to 49% among women who underwent screening compared to those who did not (Tabar et al., 2003).

Some studies have identified predominantly negative attitudes among women toward breast cancer screening, with common barriers including fear, embarrassment, and a perceived lack of necessity for regular screening (Azami-Aghdash et al., 2015; Donnelly et al., 2013). Cultural beliefs, such as fatalistic perspectives on cancer, also influence women's attitudes and behaviors toward screening (Akhigbe & Omuemu, 2009; Donnelly et al., 2013). Conversely, other studies have found that women hold positive attitudes regarding the potential curability of breast cancer if detected early (Smith et al., 2016; Haji-Mahmoodi et al., 2002). However, these favorable attitudes do not consistently translate into regular screening practices.

Socio-Demographic Characteristics and Willingness to Undergo Screening

It is now commonly acknowledged that social economic characteristics, including race, income, level of educational attainment, marital status, age, and type of employment, are key determinants of health-seeking behavior, including breast cancer screening. Park et al. (2011) stated that several studies have analyzed the relationship between certain demographic characteristics and the willingness of the study participants to undergo screening, many of which show associations between sociodemographic factors of age, marital status, educational level, income, and employment or occupation and screening. Of particular interest is the impact of education level on breast cancer screening rates. In many studies, higher educational attainment has been associated with greater willingness and adherence to screening guidelines (Adebamowo and Ajayi, 2000). However, the influence of education on screening willingness is also mixed. While some studies show a positive relationship between higher education and greater screening uptake (Boxwala et al., 2010; Tavafian et al., 2009), others report no significant association (Secginli & Nahcivan, 2005). In a sample of 160 Asian-Indian women in the United States, Boxwala et al. (2010) found that college-educated women were more likely to participate in mammogram screening compared to those without a college education.

Another key sociodemographic characteristic that has been extensively studied in relation to breast cancer screening is age. The existing literature presents a mixed picture regarding the relationship between age and women's willingness to undergo screening. While some studies have found that older women are more likely to participate in breast cancer screening, others have reported higher screening rates among younger women. For instance, while Tavafian et al. (2009) found a lack of association between age and BSE, Akhigbe and Omuemu (2009) and Park et al. (2011) reported an association between increasing age and BSE. This discrepancy may be

partly explained by the varying screening recommendations and the complex balance of benefits and risks associated with screening at different age groups. For instance, most guidelines recommend annual or biennial mammography screening for women aged 40-74 (Grimm et al., 2022).

Lower socioeconomic status, as indicated by factors like income, occupation, and health insurance coverage, is consistently associated with reduced willingness to undergo breast cancer screening (Akhigbe & Omuemu, 2009; Boxwala et al., 2010; Schueler et al., 2008). While Litaker and Tomolo (2007) and Gregory-Mercado et al. (2007) found women from high-income households more likely to participate in mammogram screening compared to those from low-income families, Park et al. (2011) and Renshaw et al. (2010) reported an association between living in less affluent or economically deprived areas and non-participation in mammogram screening. The literature, on the other hand, shows inconsistent associations between breast cancer screening practices and employment status: full-time versus part-time, employed versus unemployed, or retired (Ahmadian et al., 2012; Boxwala et al., 2010).

Work is vital, particularly when most people get their health insurance through their jobs(Keisler-Starkey and Bunch 2020). Other significant advantages related to the kinds of occupations people may access include paid time off and the flexibility in work schedules to take the time to get screenings or follow treatment regimens. In a sample of 160 Asian-Indian women, Boxwala et al. (2010) reported that almost 75% of the fully employed participants adhered to breast cancer screening practices compared to their part-time counterparts. Litaker and Tomolo (2007) reported similar findings in the United States.

Researchers have, therefore, identified Socioeconomic characteristics as a crucial factor that affects health-seeking behaviors. Thus, the present study uses social and economic

categories of type of employment, income level, level of education, age, and race to assess knowledge of BC risk factors among the study population of female graduate students, faculty, and staff and their willingness to undergo BC screening.

Theoretical Framework

This study essentially focuses on the knowledge of breast cancer risk factors and willingness to undergo screening exercises among female faculty and staff of Illinois State University. The theoretical perspective employed in this study is the Health Belief Model (HBM) and Social Determinant of Health theory (SDH).

The Health Belief Model

The Health Belief Model (HBM) is an example of a health behavior theory that considers an individual's perceived risk of illness as a prelude to positive, preventative action (Janz and Becker 1984; Weinstein and Sandman 2002; Wendt 2005). It is a psychological model that aims to explain and predict health-related behavior. This explanation is accomplished by concentrating on people's attitudes and beliefs. The Health Belief Model was established in the 1950s by social psychologists in the United States Public Health Service to explain the low public engagement in health screening and preventive programs. Since then, the HBM has been modified to investigate a wide range of long and short-term health behaviors, including health and sexual risk behaviors (Rosenstock, Strecher, and Becker 1994).

The core principle of the Health Belief Model (HBM) is that personal beliefs or perceptions about illnesses (for example, breast cancer) and the measures available to reduce their incidence affect health behavior (Hochbaum 1958). Individual perception is influenced by various intrapersonal elements that impact health behavior. Using value-expectancy and

decision-making theories, the HBM explains health-related behavior from a social-psychological perspective using the following four perceptions that serve as the model's core constructs:

- Perceived Susceptibility
- Perceived Severity
- Perceived Benefits
- Perceived Barriers

These perspectives may be used to explain health behavior individually or in combination. Other constructs have been added to the HBM, expanding the model to include cues to action, motivating variables, and self-efficacy.

Perceived Susceptibility

Personal risk or susceptibility is a potent motivator for individuals to adopt healthier practices ("Am I at risk for breast cancer?"). The higher the perceived risk, the greater the possibility of participating in disease-prevention practices. When individuals feel they are in danger of an illness, they are more inclined to take action to avoid it. According to Glanz and Rimer (2008), individuals who feel they are at minimal risk of having a disease are more inclined to participate in unhealthy or risky activities. Thus far, it has been discovered that a sense of higher vulnerability or risk is associated with healthier behaviors and a perception of less susceptibility to unhealthy behaviors.

The premise of this model, which emphasizes the individual's subjective assessment of the health situation, particularly regarding using health services, is that by taking a specific action, an individual's susceptibility/vulnerability would be reduced or, if the disease had already occurred, its severity would be ameliorated. The construct is based on the understanding that a person will perform health-related actions, such as performing breast self-examination and

engaging in other breast cancer screening exercises if they are confident that the action will likely be effective and beneficial.

The HBM proposes that individuals who have experienced a benign breast disorder are more likely to perceive themselves as susceptible to breast cancer and, therefore, more likely to participate in screening. These individuals may have heightened awareness of their breast health and are more likely to recognize the importance of early detection. Additionally, the experience of a benign breast disorder may increase individuals' perceptions of the severity of breast cancer and the benefits of early detection.

Perceived Severity

The concept of perceived severity refers to a person's perception of the severity or significance of a condition. While a person's judgment of severity is always based on medical knowledge or facts, it may also arise from beliefs about the challenges an illness would bring or how it would affect their life. In addition to perceptions about the illness (such as whether it is life-threatening and may result in disability or discomfort), perceived severity also considers the disease's broader effects on functioning in social and occupational contexts (Glanz et al., 2008).

Female faculty, staff, and graduate students who perceive benign breast disorders, such as benign lumps or cysts, as severe enough to warrant concern and action may be more motivated to undergo breast cancer screening. They may view benign breast disorders as a potential precursor or indicator of breast cancer and perceive them as a severe health issue, leading to higher participation in screening behaviors.

For example, suppose a female graduate student discovers a benign lump in her breast and perceives it as a concern and potentially severe health issue. In that case, she may be more likely to seek breast cancer screening to rule out the possibility of breast cancer. This perception

of the high severity of benign breast disorders may result in higher motivation to engage in breast cancer screening behaviors, leading to higher knowledge and desire to undertake breast cancer screening.

Perceived Benefits

According to Glantz et al. (2008), the perceived benefits of acting are another factor that influences health-related behaviors. The concept of perceived benefit is a person's perception of the value or utility of a new activity in lowering the risk of contracting an illness. When people think their new action may reduce their risk of contracting a disease, they are more likely to adopt healthy habits. A person will not act unless they believe the advantages of the treatment or prevention are perceived as outweighing the costs.

Perceived benefits significantly influence the adoption of screenings and other secondary preventive actions. For instance, in the context of the current research, the sooner breast cancer is detected, the better the prognosis. Breast self-examination is one of the screening techniques that, when used frequently, may be a helpful tool for early detection. However, not all women often practice BSE. According to Graham (2002), women must feel a benefit in engaging in this screening, which was shown to be the case among black women: those who felt breast self-examination was advantageous performed it more often.

Older female faculty, staff, and graduate students may perceive the benefits of breast cancer screening, such as early detection and potential for better treatment outcomes, higher, compared to younger female faculty, staff, and graduate students, which may influence their willingness to participate in breast cancer screening exercises.

Perceived Barriers

Given that most individuals resist change, this construct of the HBM addresses the problem of perceived barriers to change. This construct is an individual's assessment of the impediment to adopting a new habit ("I am too busy to perform BSE"). The most crucial component in affecting behavior change is perceived barriers. To adopt a new behavior, a person must feel that the advantages of the new activity exceed the dangers of staying with the old habit. This allows hurdles to be overcome and the new behavior to be adopted.

It would seem logical that the fear of breast cancer would stimulate the adoption of this early detection method to promote breast self-examination practices among women. However, breast cancer is undoubtedly a severe illness, one for which women are at risk and for which there is a strong feeling of threat. Despite the fear of breast cancer, the barriers to engaging in BSE have a higher impact on behavior than does cancer threat (Champion,1999).

Female faculty, staff, and graduate students with demanding work schedules or heavy workloads and lack of adequate financial resources may perceive barriers in terms of time constraints, difficulty taking time off from work, or logistical challenges in scheduling and attending breast cancer screening appointments. This perception of barriers may impact their willingness to participate in breast cancer screening as they may prioritize their work commitments over their health, leading to lower engagement in screening behaviors.

This study uses the Health Belief Model as a theoretical foundation to investigate breast cancer-related knowledge, beliefs, and screening behaviors among female faculty, staff, and graduate students at Illinois State University. The primary constructs of the theory are employed to explain the perceptions of female graduate students, faculty, and staff regarding breast cancer risk factors and screening strategies. This is significant given that the perceptions of women of

reproductive age impact where, when, and how they seek health. According to Jegede (2010), for an individual to act on a "healthy behavior," they must have a specific and focused mindset that prioritizes that behavior over other potential actions or thoughts. Thus, for any woman to use breast cancer screening services such as mammography, clinical breast examination, and breast self-examination, she would weigh the benefits of screening services, the threat of breast cancer, and the severity of breast cancer.

Consedine et al. (2011) applied the HBM to explore factors influencing breast cancer screening behavior among African American women. The authors found that perceived susceptibility, severity, and benefits were significant predictors of breast cancer screening behavior. In contrast, perceived barriers were not significant predictors. Thus, while the Health Belief Model (HBM) has been widely used as a framework for understanding health behaviors, including breast cancer screening, several limitations should be considered (Jones et al., 2015; Champion & Skinner, 2008). Firstly, the HBM primarily focuses on individual beliefs and attitudes while overlooking the broader social and cultural context that may impact health behaviors (Shirzadi et al., 2017; Mohamed et al., 2016). For example, the model does not account for the influence of cultural norms, family values, or social support networks on women's decisions to undergo breast cancer screening.

Additionally, the HBM assumes that people make rational decisions based on accurate information about their health risks. However, this assumption may not hold true for individuals with limited access to information or low health literacy (Miller et al., 2019; Petro-Nustas et al., 2012). In such cases, the HBM may not fully explain why some women are less knowledgeable about breast cancer risk factors and less willing to undergo screening. The HBM also tends to neglect emotional and psychological factors that may impact health behaviors. For instance, fear,

anxiety, and stigma associated with breast cancer and screening may discourage women from seeking screening, even if they are aware of the benefits of early detection (Hajian-Tilaki & Auladi, 2014). Furthermore, the HBM does not fully account for environmental factors that may influence screening behavior, such as the availability and accessibility of screening facilities and the cost of screening tests (World Health Organization, 2020; Miller et al., 2019). Finally, the HBM may oversimplify the relationship between knowledge of breast cancer risk factors and screening behavior, as breast cancer risk factors are complex and multifactorial, involving genetic and environmental components (Shirzadi et al., 2017; WHO, 2020).

Given the limitations of the HBM, this study will apply the Social Determinants of Health Theory to complement the HBM and provide a more comprehensive understanding of the factors influencing women's knowledge of breast cancer risk factors and their willingness to undergo screening.

Social Determinants of Health Theory

The Social Determinants of Health (SDH) theory is a framework that recognizes that a broad range of social, economic, and environmental factors beyond individual behaviors and genetics influence health outcomes. The SDH theory highlights how social inequalities and disparities can impact health outcomes and access to healthcare services. It also emphasizes the importance of addressing the social determinants of health to achieve health equity and improve population health.

Various researchers and organizations have proposed the Social Determinants of Health (SDH) theory. One of this theory's earliest and most influential proponents is the World Health Organization (WHO) (WHO, 2008). In 2008, the WHO released a report titled "Closing the Gap in a Generation: Health Equity Through Action on the Social Determinants of Health,"

emphasizing the importance of addressing the social determinants of health to achieve health equity and improve health outcomes. The report called for action on the social determinants of health, including income, education, social support, and community resources, to reduce health inequities and improve health outcomes. Since then, numerous researchers and organizations have expanded on the SDH theory and developed frameworks and models to explore further the complex relationship between social determinants and health outcomes (Wilkinson and Marmot 2003; Solar and Irwin 2010). These frameworks and models guide research policy and practice to address the root causes of health inequities and improve population health.

Given that SDH theory recognizes that social, economic, and environmental factors, such as income, educational attainment, employment, and social support networks, influence health, these factors can have a significant impact on an individual's ability to access healthcare services, make informed decisions about their health, and adopt healthy behaviors. In the context of breast cancer, SDH may play a crucial role in shaping the knowledge of breast cancer risk factors and willingness to undergo screening among female faculty members, staff, and graduate students.

Educational attainment is a crucial social determinant of health that can influence breast cancer knowledge and screening behavior. Studies have shown that women with higher educational attainment are more likely to be aware of breast cancer risk factors and undergo regular screening (Savoye et al. 2019). In a study of female university faculty members, staff, and graduate students, those with higher levels of educational attainment may have more knowledge about breast cancer and the benefits of screening, which in turn may "increase their willingness to undergo screening compared to those "with lower levels of educational attainment.

Income is another essential social determinant of health that can impact breast cancer screening behavior. In their study of female university faculty members, staff, and graduate students, Wright et al. (2017) found that individuals with lower incomes may be less likely to undergo regular breast cancer screening due to financial constraints. Women with lower incomes may face barriers to screening services, such as a lack of health insurance or limited access to transportation.

Social support networks can also play a role in breast cancer screening behavior. Women who receive support from family, friends, or healthcare providers may be more likely to undergo screening (Jibaja-Weiss et al. 2003). In their study of female university faculty members, staff, and graduate students, Jibaja-Weiss (2003) found that those with social support networks may be more likely to undergo screening and have higher levels of breast cancer knowledge than those without social support networks.

In conclusion, the Social Determinants of Health theory may be used to analyze the factors influencing knowledge of breast cancer risk factors and willingness to undergo screening among female university faculty members, staff, and graduate students. Educational attainment, income, and social support networks are vital social determinants impacting screening behavior and knowledge about breast cancer risk factors. Understanding these factors may help inform targeted interventions to increase breast cancer screening and knowledge among this population.

The specific hypotheses that guided this study include:

1. Women with higher educational attainment are more knowledgeable of breast cancer risk factors than women with lower educational attainment.
2. Faculty and staff are more knowledgeable of BC risk factors than graduate students.

3. Graduate students perceive the cost of services as a barrier to BC screening more than faculty and staff.
4. Women with higher incomes are more willing to undergo mammograms than women with lower incomes.

CHAPTER III: METHODOLOGY

This section focuses on procedural steps used to collect and analyze data in the current study. The chapter includes a description of the study area, the research instruments, the study population, the sample size and sampling techniques, the measures, and the data analysis methods.

Study Population and Sample Size

The target population for this study is all female faculty, staff, and graduate students at Illinois State University. According to data from the Office of Planning, Research, and Policy Analysis (PRPA), in the Fall of 2021, there were 2,095 female faculty and staff, representing 55.7% of the total faculty and staff population at the university (strategicplan.illinoisstate.edu/metrics). Additionally, as of Spring 2023, the total number of female graduate students was 1,582, accounting for 65% of the overall graduate student population. The study sample consisted of 422 female faculty, staff, and graduate students, selected through a convenience sampling approach. This sample size was chosen to ensure a sufficient number of respondents for the planned statistical analyses while also accounting for potential errors or incomplete responses that could affect the representativeness of the final sample. The researcher obtained the list of female faculty, staff, and graduate students, including their email addresses, from the PRPA office to recruit participants.

An online survey was sent to all University women, requesting their voluntary participation and informed consent. Participants were assured of anonymity and their right to withdraw from the study at any stage. The convenience sampling approach was chosen due to the practical constraints of the research, such as limited resources and time. While this sampling method may limit the generalizability of the findings, the large sample size of 422 respondents,

representing a significant proportion of the target population, provided a robust dataset for the planned statistical analysis.

Procedures

Data for this study was gathered through an online survey using Qualtrics. The online survey method is considered appropriate, given that it provides the highest level of convenience for the respondents because they can answer the questionnaire according to their own pace, chosen time, and preferences, and it assures respondents of anonymity. Besides time efficiency, the online survey method is considered over other survey methods because faculty members, staff, and graduate students are tech-savvy, which means they are familiar with the online technology and questionnaires. Online questionnaires also allow many respondents to be reached within a limited time. The questionnaire was sent to each respondent through their email addresses, collected from the Office of Planning, Research, and Policy Analysis (PRPA) and the University's Human Resources Department. To increase the likelihood of obtaining more responses from the survey respondents, a total of four follow-up emails were sent between July and September, with approximately two-week intervals between each email until the desired sample size was achieved.

Measures

The primary outcome variables of interest in this study were knowledge and willingness level regarding breast cancer. Other outcome variables include screening practices, motivating factors, and the constructs of the HBM (perceived barriers, perceived susceptibility, and perceived benefits). The researcher assessed these outcomes using self-reported measures.

To determine the level of knowledge about breast cancer, respondents were asked the following:

- Perceived Likelihood

Respondents rated the perceived likelihood of a typical woman developing breast cancer on a 4-point scale from 1 (slightly likely) to 4 (extremely likely).

- Symptom Awareness

Awareness of early basic breast cancer symptoms was measured on a 4-point scale from 1 (not at all aware) to 4 (very aware).

- Symptom Knowledge

Knowledge of breast cancer symptoms was assessed by indicating a level of agreement with statements about various symptoms (chest pain, nipple position changes, cough, armpit swelling/lump) on a 4-point scale from 1 (strongly disagree) to 4 (strongly agree).

- Symptom Experience

A binary measure (yes=1, no=2) indicated whether respondents had experienced any breast cancer symptoms.

- Recommended Age for Baseline Mammogram

Respondents reported the recommended age for a first baseline mammogram, categorized into age groups (e.g., 30-35, 36-39 years).

- Risk Factor Knowledge

Knowledge of breast cancer risk factors was measured on a 5-point scale from 1 (not at all knowledgeable) to 5 (extremely knowledgeable), recoded into an ordinal scale: 1 (not knowledgeable), 2 (moderately knowledgeable), 3 (knowledgeable).

- Perceived Risk Factors

Agreement with various potential risk factors (age, skin color, family history, abortion, alcohol, benign breast disorder) was rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree).

To determine the participants' BC screening practices, respondents were asked about their frequency of screening methods:

- Mammogram Screening

A binary measure (yes=1, no=2) was used to assess prior mammogram screening. Frequency was reported categorically (e.g., once/twice, yearly).

- Breast Self-Examination

The frequency of breast self-exams was reported on a 9-point scale from 1 (never) to 9 (every day).

- Clinical Breast Examination

The frequency of clinical breast exams was reported categorically (never, once/twice, yearly, etc.) on a 9-point scale from 1 (never) to 10 (every day), with an “others” option.

To determine the participants' willingness to undergo breast cancer screening:

- Mammogram Willingness

Willingness for mammogram screening was measured with a binary response (yes=1, no=2) and an “unsure” option.

- Clinical Exam Willingness

Willingness for clinical breast exams was measured with a binary response (yes=1, no=2) and an “unsure” option.

- Self-Exam Willingness

Willingness for breast self-exams was measured with a binary response (yes=1, no=2) and an "unsure" option.

To investigate the respondents' motivation for BC screening, the following were assessed as potential motivating factors using binary (yes=1, no=2) measures:

- Healthcare provider recommendations
- Perceived health benefits
- Media/public awareness campaigns
- Personal/family cancer history
- Age
- Convenience/accessibility

To determine the perceived barriers, perceived susceptibility, and perceived benefits regarding BC and willingness to screen, this was measured using some constructs of the HBM as follows:

- Perceived Barriers

Perceived barriers to screening were assessed by asking about lack of time, cost, lack of insurance/knowledge, and fear/anxiety, with binary (yes=1, no=2) response options.

- Perceived Susceptibility

Perceived susceptibility was measured by whether reaching certain ages (e.g., 40, 50) would motivate screening.

- Perceived Benefits

Perceived benefits of screening (e.g., early detection and treatment) were measured with a binary (yes=1, no=2) response about motivating regular screening.

The participants' sociodemographic characteristics, such as race, age, education level, staff category (graduate student, faculty, or staff), marital status, income, and religion, were treated as the independent variables that could potentially influence the outcome variables of knowledge and willingness. For analysis's sake, I recoded all sociodemographic variables into categorical formats. Race was recoded as White or non-White. Age was dichotomized into younger (under 35) and older (36 and above) groups. Education level was categorized into two groups: those with a first degree or less (bachelor's, associate degree, and high school diploma) and those with higher educational attainment (master's and doctoral degrees). The staff category was recoded into graduate students, faculty, and staff. Marital status was categorized into married and unmarried. Religion was classified as religious or non-religious. Income was divided into lower (less than $74,000) and higher ($75,000 and above) categories.

Methods of Data Analysis

Statistical analysis was done using the Statistical Package for Social Sciences (SPSS) version 24. Descriptive statistics were conducted to analyze the demographic variables, including race, age, income, education, marital status, religion, and staff category for all participants, as well as each measurement of breast cancer knowledge and risk factors. Cross tabulations were performed to examine the associations between various independent variables (e.g., sociodemographic factors) and the dependent variables of interest (e.g., knowledge, willingness to screen, perceived barriers, and screening practices). To test the hypothesis, multivariate analysis was conducted using ordinal regression to test the effect of an independent variable on a dependent variable while controlling for other socio-demographic characteristics, allowing the

researcher to determine the factors that significantly influenced the level of breast cancer knowledge and willingness to undergo screening. Given that ordinal regression is specifically designed to handle ordinal dependent variables such as “level of breast cancer knowledge and willingness to undergo screening,” suggesting an ordinal dependent variable, where the responses can be ranked (e.g., low, medium, high knowledge/willingness), it was considered more appropriate for this study than linear or logistic regression. This is because the dependent variable has more than two ordered categories, allowing me to determine the key factors that significantly influence breast cancer knowledge and screening willingness. The association between the variables was analyzed using multiple ordinal regression with the significance level set at $p < 0.05$ for all variables used.

CHAPTER IV: RESULTS

Description of Results

This section provides an overview of the statistical analysis conducted on all variables in the study. Descriptive statistics were employed, including percentages, frequencies, and bivariate analyses. Additionally, multivariate analyses were performed. Descriptive analysis was used to describe and summarize data; bivariate analyses were used to examine the relationship between two variables; and multivariate analyses were conducted using ordinal regression to explore the relationship between multiple independent variables and an ordinal dependent variable to test the study's hypotheses.

Descriptive Analysis

Socio-Demographic Characteristics

In this section, results on the socio-demographic characteristics of the respondents are presented and analyzed. This is achieved using frequency distribution and percentages (see Table 1). It is not surprising that a predominant 82.2% identify as White/Caucasian, mirroring the prevailing racial composition of the institution. The sample consisted of two broad age groups. The younger group, aged 22-35 years, comprised 138 respondents, representing 32.6% of the total sample. On the other hand, the older age group, ranging from 36 to 76 years, included 283 respondents, accounting for the larger proportion of 67.2% of the sample population. The educational landscape is marked by a notable prevalence of advanced degrees, with 39.8% holding a master’s degree and 23.9% possessing doctoral or other advanced degrees. Examining employment status reveals a distribution with 29.9% identifying as Graduate students, 31.3% as Faculty Members, and 38.9% as staff. This variation introduces a complex interplay of roles and responsibilities within the academic community, potentially influencing knowledge dissemination and health-related attitudes. The marital status composition, portraying 56.6% as

married, 31.0% as never married, and 12.3% as divorced, widowed, or separated, highlights the university's diverse relational contexts. As a social institution, marital status implicates support structures and decision-making processes, shaping individual health behaviors. Annual income exhibits a wide range distribution, with 38.4% earning less than $49,999, 28.4% earning between $50,000 and $74,999, and 33.2% earning $75,000 and above. Religious affiliation, with 38.6% reporting none, 31.5% identifying as Protestant, 19.0% as Catholic, and 10.9% as Jewish and Others, introduces a realm of cultural and moral considerations shaping health-related decision-making.

Breast Cancer Knowledge Assessment: Symptoms, Risk Factors, Screening Practices, and Willingness

This section describes the knowledge of breast cancer assessed in three main groups: knowledge of BC and its symptoms, knowledge of BC risk factors, BC screening practices, willingness, and motivation.

Knowledge of respondents on breast cancer and its symptoms

From the results (see Table 2), 64.5 percent of the respondents mentioned that the development of breast cancer for a typical woman is moderately likely. In comparison, 1.4 percent and 15.2 percent of the respondents said it is very likely and extremely likely, respectively. On awareness of early basic symptoms of BC, 68.0 percent of the respondents were somewhat aware of the early basic symptoms of breast cancer, while 13.5 percent of the respondents were very aware of the early symptoms of breast cancer. Overall, the awareness level is somehow high. On symptoms of breast cancer, from the results, 9.0 percent and 51.4 percent of the respondents strongly agreed and agreed, respectively, that the main symptom of breast cancer is chest pain. Also, 55.2 percent and 40.0 percent of the respondents strongly

agreed and agreed, respectively, that a changed nipple position is one of the symptoms of breast cancer. This shows that 95.2 percent of the respondents agreed that changed nipple position is one of the symptoms of breast cancer.

Furthermore, 2.6 percent and 21.8 percent of the respondents strongly agreed and agreed, respectively, that cough is one of the symptoms of breast cancer. Also, 79.1 percent and 19.2 percent of the respondents strongly agreed and agreed, respectively, that swelling or a lump in the armpit is one of the symptoms of breast cancer. This shows that 98.3 percent of the respondents agreed that swelling or a lump in the armpit is one of the major symptoms. From the analysis, the most emphasized symptom of breast cancer is swelling, or a lump in the armpit, followed by a changed nipple position, and chest pain came third, while cough is the last symptom. On the respondent's experience of symptoms, the results indicated that 62.8 percent of the respondents did not experience any symptoms, while 37.2 percent had experienced symptoms of breast cancer.

In summary, the respondents demonstrated a moderate to high level of awareness and knowledge regarding the likelihood of breast cancer development and the common symptoms associated with the disease.

Knowledge of Breast Cancer Risk Factors

Table 2 also provides a comprehensive overview of respondents' knowledge of breast cancer risk factors. In terms of overall knowledge, most respondents fall into the categories of slightly knowledgeable (35.8%) and moderately knowledgeable (38.6%), while a smaller proportion claim to be very knowledgeable (15.4%) or extremely knowledgeable (5.2%). Moving to specific risk factors, a substantial portion recognizes age as a risk factor, with 47.5% strongly agreeing and 46.8% agreeing. Skin color as a risk factor sees varied opinions, with 36%

agreeing and 37.4% disagreeing. A family history of breast cancer is widely acknowledged as a risk factor, with 89.8% strongly agreeing. Opinions on abortion as a risk factor are diverse, with 50.7% disagreeing and 24.9% strongly disagreeing. Alcohol consumption and benign breast disorders also elicit mixed responses, with 48.6% agreeing and 51.4 disagreeing that alcohol consumption is a risk factor for breast cancer, while a whopping 74% of the respondents agreed that benign breast disorder is a risk factor.

In sum, the majority of respondents describe themselves as either slightly knowledgeable or moderately knowledgeable. Specific risk factors such as age and family history of breast cancer are widely recognized, while opinions on factors like skin color and abortion vary among respondents. Alcohol consumption and benign breast disorders also evoke mixed responses.

Breast Cancer Screening Practices and Willingness

On age at getting a baseline mammogram, the majority (45.5%) of the respondents noted that the age for the first baseline mammogram was 30-35 years, followed by 40-44 years (30.6%). When asked if they had ever had a mammogram, 166 (39.3%) of the respondents had never; in contrast, 65.4% have a clinical breast examination (CBE) every year, with only 2% monthly. The diverse frequency of breast self-examinations (BSE) ranks lowest, showcasing varying levels of commitment, with only 14% performing BSE annually and 22% monthly. On the factors motivating regular breast cancer screening among respondents. Notably, recommendations from healthcare providers emerged as a predominant motivator, with 97.2% of respondents acknowledging their influence. Health benefits also played a significant role, motivating 96.7% of individuals to undergo regular screening. Personal or family history of breast cancer (94.3%), age (91.9%), and convenience/accessibility (92.7%) were identified as

substantial factors encouraging screening. Interestingly, while media coverage and public awareness campaigns impacted 56.6% of respondents, their influence was comparatively lower.

In brief, the result highlights that the majority of respondents were of the opinion that the first baseline mammogram age is between 30-35, with a significant proportion choosing age 40-44. While a considerable percentage have never had a mammogram, most undergo annual clinical breast examinations (CBEs). Breast self-examinations (BSEs) vary in frequency among respondents. Motivations for regular screening include healthcare provider recommendations, perceived health benefits, personal/family history of breast cancer, age, and convenience. Interestingly, media coverage and public awareness campaigns have less influence on screening behaviors.

Bivariate Analysis

Socio-Demographic Characteristics and Knowledge of Breast Cancer Risk factors

The cross-tabulation table (see Table 3) comprehensively examines the relationship between respondents' socio-demographic characteristics and knowledge of breast cancer risk factors. Significant associations emerge through bivariate categorization and analysis, shedding light on disparities in knowledge levels across various demographic groups. Notably, age is a significant determinant, with younger participants (under 35 years) demonstrating a higher proportion (70%) of being "not knowledgeable" compared to their older counterparts (aged 36 years and above) who exhibit a lower proportion (30%) of being "not knowledgeable" ($\chi^2 = 16.376$, $p < .001$). This represents a substantial percentage difference of 40.0% between the "Not Knowledgeable" category for the "Younger" and "Older" age groups. Moreover, disparities in knowledge levels are evident among racial and ethnic groups, with white participants exhibiting higher knowledge levels (82.2%) than other minority groups (17.8%) in the knowledgeable

category ($\chi^2 = 6.275$, $p = .043$). Similarly, education level emerges as a significant predictor of knowledge levels, with only 14.3% of participants holding higher education degrees in the not knowledgeable category and 85.7% of those with lower education levels demonstrating a poor knowledge of breast cancer ($\chi^2 = 7.286$, $p = .026$). The analysis further reveals significant associations between knowledge levels regarding breast cancer and several demographic variables, including income level, religious affiliation, and staff category (income: $\chi^2 = 13.226$, $p = .001$; religion: $\chi^2 = 12.192$, $p = .002$; staff category: $\chi^2 = 8.837$, $p = .012$). Notably, among respondents with low income, 55.2% demonstrated knowledge about breast cancer, compared to 44.8% of those with higher income. Regarding religious affiliation, 77% of religiously affiliated individuals exhibited knowledge about breast cancer, contrasting with only 23% of non-religious respondents. Additionally, faculty and staff members displayed more knowledge (63.2%) than graduate students (36.8%).

Socio-Demographic Characteristics and Willingness to Undergo Mammogram Screening

The cross-tabulation analysis of willingness to undergo breast cancer screening yields insightful findings regarding the influence of socio-demographic factors and perceived health benefits on screening behavior. When examining education level, respondents with higher education levels demonstrate a notably higher willingness to undergo screening (96.0%) compared to those with a first degree or less education (80.1%). While this association is marginally significant ($\chi^2 = 3.764$, $p = .052$), it suggests a potential link between education and screening behavior. Additionally, perceived health benefits significantly impact screening willingness, with 96.7% of participants acknowledging health benefits expressing willingness, compared to 80.0% among those who do not recognize these benefits ($\chi^2 = 12.098$, $p = .001$).

Socio-Demographic Characteristics and Constructs of the Health Belief Model (HBM)

Table 3 also examines the relationship between socio-demographic characteristics and the Health Belief Model (HBM) constructs pertaining to breast cancer screening. The analysis reveals significant associations between various factors and perceptions related to screening. Among staffing categories, graduate students are more likely to perceive cost as a barrier (33.3%) compared to faculty and staff (22.1%), suggesting a disparity in perceived barriers based on employment status ($\chi^2 = 5.407$, $p = .020$). Additionally, age relates with perceived susceptibility, with older participants (66.1%) more likely to perceive susceptibility to breast cancer compared to younger participants (33.9%) ($\chi^2 = 4.301$, $p = .038$). Education level also influences perceptions, as individuals with higher education universally perceive the benefits of early detection and treatment (100%), while 75.2% of those with a first degree or less education share this perception ($\chi^2 = 4.556$, $p = .033$).

The bivariate analysis revealed significant disparities in breast cancer knowledge and screening willingness across various sociodemographic groups. Younger participants (under 35 years) were more likely to be “not knowledgeable” about risk factors compared to older individuals (36 years and above), and racial/ethnic minorities exhibited lower knowledge levels than white participants. Education emerged as a critical factor, with those holding higher degrees demonstrating greater knowledge and willingness to undergo screening. Other socioeconomic variables, such as income, religion, and employment status, were also associated with knowledge and perceptions related to the Health Belief Model constructs - for instance, graduate students were more likely to perceive the cost of screening as a barrier, while older participants and those with higher education were more aware of their susceptibility and the benefits of early detection.

Multivariate Analysis

Table 4 presents the results of ordinal regression to test hypotheses**.** The ordinal Regression method was used to test each hypothesis, controlling for other socio-demographic characteristics.

The first hypothesis tested posits that women with higher educational attainment are more knowledgeable of breast cancer risk factors than women with lower educational attainment, controlling for other factors.

The overall model is statistically significant ($\chi 2(6) = 38.062$, $p < .001$), indicating that the independent variables collectively predict the level of knowledge about breast cancer risk factors. The parameter estimates show that education level significantly affects the dependent variable (Knowledge). Compared to women with higher education (reference category), the estimate for EDUCAT = 1.00 (first degree and less) is -0.598 ($p = 0.035$). ($\beta = -0.598$, $p = .035$). This negative coefficient indicates that women with a first degree or less have lower odds of being more knowledgeable about BC risk factors than women with higher education (the reference category). This means that the odds of being more knowledgeable about BC risk factors are approximately 0.55 times lower for women with a first degree or less than those with higher education, all else being equal. Specifically, for each one-unit increase in education level (going from first degree or less to higher education), the odds of being more knowledgeable about BC risk factors increase significantly, holding all other variables constant.

The other significant predictors of knowledge level include age ($\beta = 0.756$, $p = .016$), religion ($\beta = 0.780$, $p = .002$), and staff category ($\beta = -0.864$, $p = .005$). Race and income were not statistically significant in the model.

The model's goodness-of-fit statistics indicate acceptable model fit (Pearson $\chi^2 = 76.869$, df = 78, p = .515; Deviance $\chi^2 = 62.834$, df = 78, p = .894). The pseudo-R-squared values suggest that the model explains approximately 11.6% of the variance in knowledge of BC risk factors. The logistic regression model significantly fits the data well ($\chi^2 = 38.062$, df = 6, p < .001), suggesting that educational attainment contributes to the prediction of knowledge of BC risk factors. The result of this analysis supports the hypothesis that women with higher educational attainment are more knowledgeable of breast cancer risk factors than women with lower educational attainment, controlling for other factors.

The second hypothesis posits that faculty and staff are more knowledgeable of BC risk factors than graduate students. Parameter estimates reveal that being a faculty or staff member is associated with higher knowledge levels than being a graduate student (β = 0.864, p = .005). Other socio-demographic factors, such as age, race, income, religion, and education level, also influence knowledge levels. Compared to faculty and staff (reference category), graduate students have significantly lower ordered log odds of being in a higher category of knowledge (β = -0.864, p = .005). This means that for a one-unit increase in staff category (going from graduate student to faculty/staff), the ordered log odds of being in a higher knowledge category increase by 0.864, holding all other variables constant. The odds ratio for the staff is calculated as e^ (-0.864) = 0.422. This indicates that the odds of being in a higher knowledge category are 0.422 times lower for graduate students compared to faculty and staff controlling for other variables. The other significant predictors of knowledge level include age (β = 0.756, p = .016), religion (β = 0.780, p = .002), and education level (β = 0.598, p = .035). Race and income were not statistically significant in the model.

The logistic regression model significantly fits the data well ($\chi^2 = 38.062$, df = 6, $p < .001$), suggesting that the staffing category contributes to the prediction of knowledge of BC risk factors. The model's goodness-of-fit statistics indicate acceptable model fit (Pearson $\chi^2 = 76.869$, df = 78, p = .515; Deviance $\chi^2 = 62.834$, df = 78, p = .894). The pseudo-R-squared values suggest that the model explains approximately 11.6% of the variance in knowledge of BC risk factors. The results support the hypothesis that faculty and staff have more knowledge of breast cancer risk factors than graduate students.

The third hypothesis states that graduate students perceive the cost of services as a barrier to breast cancer (BC) screening more than faculty and staff. However, the parameter estimates reveal that the perception of the cost of screening tests as a barrier is not significantly associated with the staffing category (p = .904); therefore, the hypothesis is not supported. However, other socio-demographic factors, such as age, race, income, religion, and education level, influence perceptions of barriers to BC screening. Notably, younger age ($\beta = 0.804$, p = .008) is associated with a higher perception of the cost of screening tests as a barrier.

Interestingly, even while the hypothesis is not supported, the logistic regression model fits the data well ($\chi^2 = 25.565$, df = 6, $p < .001$), suggesting that the staffing category contributes to predicting perceived barriers to BC screening. However, compared to graduate students, faculty and staff do not have a significantly different perception of cost as a barrier ($\beta = 0.037$, p = .904). This means there is no statistically significant difference in the log odds of perceiving cost as a barrier between graduate students and faculty/staff, holding all other variables constant.

In summary, the results do not support the hypothesis that graduate students perceive the cost of services as a greater barrier to breast cancer screening compared to faculty and staff. After controlling for other demographic factors, the analysis shows no statistically significant

difference in the perception of cost as a barrier between these two staff categories. These findings suggest that the perceived cost barrier to breast cancer screening may be more universal across different groups within the study population rather than being specific to graduate students.

The final hypothesis posits that women with higher incomes are more willing to undergo mammograms than women with lower incomes. Interestingly**,** the analysis reveals that income category is not significantly associated with mammogram willingness ($p = .791$), thereby failing to support the hypothesis. Nonetheless, other sociodemographic factors such as religion, education level, and age demonstrate significant associations with mammogram willingness. Specifically, certain religious affiliations ($\beta = 1.298$, $p = .027$) exhibit a positive association with mammogram willingness, while lower education levels ($\beta = -1.903$, $p = .078$) show a negative association, albeit marginally significant.

Thus, while the overall model is statistically significant ($\chi2(6) = 13.998$, $p = .030$), indicating that the independent variables collectively predict the willingness to undergo mammogram, the parameter estimates shows that income level does not have a significant effect on the dependent variable (willingness to undergo mammogram) supported by the logistic regression model which suggests a marginally significant fit to the data ($\chi^2 = 13.998$, $df = 6$, $p = .030$), indicating that income category may contribute to predicting mammogram willingness. Therefore, the results do not support the hypothesis that women with higher incomes are more willing to undergo mammograms than women with lower incomes. After controlling for other demographic factors, the analysis shows no statistically significant difference in the willingness to undergo mammograms between these two income groups. These findings suggest that income level may not be the primary driver of willingness to undergo mammograms in this population.

Other factors, such as religious beliefs and cultural influences, may play a more significant role in shaping screening behaviors and attitudes.

Summarily, the ordinal regression analysis revealed several significant predictors of knowledge about breast cancer risk factors. First, educational attainment emerged as a critical, supporting the hypothesis that higher educational levels are associated with greater breast cancer knowledge. Additionally, older age ($\beta = 0.756$, $p = .016$) and certain religious affiliations ($\beta = 0.780$, $p = .002$) were positively linked to higher knowledge levels. The analysis also found that faculty and staff members had significantly higher knowledge than graduate students, with the odds of being in a higher knowledge category 58% lower for graduate students than faculty/staff ($OR = 0.422$, $p = .005$). This supports the hypothesis that faculty and staff are more knowledgeable about breast cancer risk factors. However, the study did not find a significant difference in perceived cost as a barrier to screening between graduate students and faculty/staff ($p = .904$), suggesting the perceived cost barrier may be more universal across the study population. Similarly, income level was not a significant predictor of willingness to undergo mammograms ($p = .791$), contrary to the hypothesis. Instead, factors such as religious beliefs and education level emerged as more influential in shaping screening behaviors.

CHAPTER V: DISCUSSION

Summary

This study aimed to assess the knowledge level of breast cancer and willingness to undergo screening among university women, focusing on the influence of socio-demographic factors on knowledge about breast cancer risk factors and perceptions of barriers to breast cancer screening. Bivariate analysis revealed a moderate level of knowledge among respondents, with notable gaps in accurate symptom recognition. While there was an improved understanding of common visible signs, such as breast lumps, misconceptions persisted, including the belief that chest pain and cough are prominent indicators of breast cancer. The majority of respondents fell into the “slightly knowledgeable” and “moderately knowledgeable” categories regarding breast cancer risk factors. Additionally, although there was an improvement in screening knowledge compared to previous studies, gaps remained in understanding screening method technicalities. Using ordinal regression analysis, significant associations were found between socio-demographic factors, knowledge levels, perceptions of screening barriers, and willingness to undergo mammograms. Educational attainment, faculty/staff status, age, religion, and education level emerged as influential predictors of knowledge levels and screening behaviors. However, income level did not significantly influence screening behaviors, highlighting the complexity of socio-demographic influences on breast cancer awareness and screening behaviors. Tailored interventions targeting specific demographic groups may enhance breast cancer outcomes.

Discussion of Findings

The findings from this study provide strong support for the hypothesis that women with higher educational attainment are more knowledgeable about breast cancer risk factors compared

to those with lower educational levels. These findings are consistent with the broader literature on the relationship between education and health knowledge. Numerous studies have reported that higher levels of educational attainment are associated with greater awareness and understanding of various health topics, including breast cancer risk factors (Akhigbe & Omuemu, 2009; Grunfeld et al., 2002; Linsell et al., 2008). As previous studies have argued, lack of adequate breast cancer knowledge negatively affects whether one will seek breast cancer care, the timing of the care, the development of the disease, and the prognosis (Caplan, 2014; Peek et al., 2008). The proposed mechanisms underlying this association can be understood through the Health Belief Model (HBM) lens. The HBM posits that an individual's health-related behaviors are influenced by their perceptions of susceptibility, severity, benefits, and barriers (Rosenstock, 1974; Champion & Skinner, 2008). In the context of this study, higher levels of education may contribute to a greater perceived susceptibility to breast cancer, as more educated women may have a better understanding of their risk factors and the seriousness of the disease. Additionally, education may shape health literacy and the ability to navigate healthcare systems, leading to a stronger perceived benefit of early detection and screening. The bivariate analysis also reveals the association between education, knowledge, and screening willingness. This association may be attributed to the HBM construct of perceived benefits, where more educated individuals are more likely to recognize the benefits of early detection and, consequently, be more willing to undergo screening. The observed link between perceived health benefits and screening willingness further supports this notion. Furthermore, the proposed mechanisms underlying the education-knowledge relationship include improved access to health information, the ability to critically evaluate and comprehend this information, and the adoption of healthier lifestyle factors that may influence breast cancer risk (Austoker, 1994; Facione, 1993). These factors can

be seen as contributing to the perceived severity and benefits constructs of the HBM, ultimately shaping breast cancer knowledge and screening behaviors. In summary, the findings of this study align with the HBM, suggesting that higher educational attainment is associated with greater perceived susceptibility, severity, and benefits, leading to enhanced knowledge and screening willingness among more educated women.

Supporting the second hypothesis, the study finds that faculty and staff members have significantly higher knowledge of breast cancer risk factors compared to graduate students, even after controlling for other variables such as age, religion, and education level. The statistically significant difference in knowledge levels between these two staff categories suggests important disparities in breast cancer risk factor awareness within the study population. The observed gap in knowledge may be attributed to various factors, such as differences in access to health information, educational backgrounds, and professional training. Faculty and staff, who are likely to have more advanced education and experience in the healthcare field, may have greater exposure to breast cancer-related education and resources compared to graduate students. These results align with the broader literature, consistently highlighting the role of education and professional background in shaping health knowledge and awareness. The bivariate analysis further supports these findings, revealing a clear association between staff category and breast cancer risk factors knowledge. Graduate students were more likely to be in the "Not Knowledgeable" category, while faculty and staff members were more likely to be in the "Knowledgeable" category. These findings emphasize the importance of addressing the observed disparities in breast cancer knowledge within the university setting. Targeted educational interventions and knowledge-sharing initiatives aimed at graduate students could help bridge the

gap and ensure more equitable access to breast cancer risk factor information across different staff categories.

The findings from this study contradict the hypotheses that graduate students perceive the cost of services as a greater barrier to breast cancer screening compared to faculty and staff and that women with higher incomes are more willing to undergo mammograms than those with lower incomes. Regarding the former hypothesis, the analysis revealed that the perception of cost as a barrier to screening was not significantly associated with the staff category. This suggests that the perceived cost barrier may be more universal across different groups within the study population rather than being specific to graduate students. Previous research has found that, regardless of income level, women can have positive attitudes toward mammography and perceive the benefits of early detection (Wagner et al., 2000). This implies that cost may not be the primary barrier, even for lower-income individuals. The current findings indicate that the perceived cost of screening as a barrier may be more complex and not necessarily tied to specific employment status, such as being a graduate student. For the latter and final hypothesis, the analysis showed that income level did not significantly affect willingness to undergo mammograms. This suggests that willingness to be screened may be influenced by a complex interplay of socioeconomic, cultural, and personal factors rather than primarily driven by income level alone. While the bivariate analysis (see Table 2) did reveal significant associations between staff category and perceived barriers, as well as between income and willingness to undergo mammograms, the multivariate models controlling for other demographic factors did not support the hypothesized relationships. The lack of significant associations between staff category, income, and perceived barriers to mammograms in the multivariate models could be attributed to the fact that most participants likely had health insurance coverage through Illinois State

University (ISU). This would mitigate cost concerns as a barrier, even for graduate students or those with lower incomes. The Illinois Breast and Cervical Cancer Program also offers free mammograms to uninsured women aged 35-64, reducing financial barriers for eligible participants without health insurance coverage.

These findings, therefore, highlight the importance of considering the broader context and the potential influence of other sociodemographic characteristics when examining barriers to and utilization of breast cancer screening services. Overall, the results suggest that the perceived cost barrier and screening willingness may be more nuanced and not solely determined by employment status or income level.

The study's results (see Table 3) provide additional insights regarding the influence of sociodemographic characteristics on knowledge and screening willingness, using the HBM as a guiding framework. The observed disparities align with previous research highlighting the role of socioeconomic status in shaping screening perceptions and behaviors. The association between older age and higher perceived susceptibility (personal or family history) is consistent with the HBM's construct of perceived susceptibility. Older women may have increased awareness of age as a risk factor and more personal experiences with the disease within their social networks.

The cross-tabulation analysis of the relationship between sociodemographic characteristics and knowledge of breast cancer risk factors also provides valuable insights. Consistent with the HBM, the findings align with and expand upon existing literature:

- Younger women's lower awareness levels compared to older counterparts may be attributed to differences in life experiences, access to health information, and perceived susceptibility.

- Racial and ethnic disparities in knowledge levels reflect barriers to accessing cancer-related education and screening services, contributing to knowledge gaps.
- The positive association between educational attainment and breast cancer risk factor knowledge aligns with the HBM's construct of perceived benefits, as higher education is linked to greater health literacy and engagement with preventive health practices.

These findings emphasize the importance of incorporating breast cancer education into broader public health initiatives that reach individuals across the educational and socioeconomic spectrum. By leveraging the HBM constructs, researchers and practitioners can develop more targeted and effective interventions to address the observed disparities in breast cancer knowledge and screening behaviors.

Limitations

While the findings from this study provide valuable insights into the sociodemographic determinants of breast cancer knowledge and screening behaviors, several limitations should be considered when interpreting the results. First, the generalizability of the findings may be limited by the study's sample characteristics. The participants were drawn from a university setting, which may not be representative of the broader population. The sample likely consisted of more educated, motivated, and higher socioeconomic individuals compared to the general public. Therefore, the observed patterns and disparities may not fully reflect the true population-level dynamics.

Additionally, the study relied on self-reported measures of breast cancer knowledge and screening behaviors. This approach is subject to potential recall and social desirability biases, where participants may over- or under-report their actual knowledge levels and screening

practices. The researcher did not have access to objective measures or medical records to validate the self-reported data.

Finally, the study focused on limited sociodemographic characteristics, such as education, staff category, age, race, income, and religion. The analysis did not include other potentially relevant factors, such as cultural beliefs. The omission of these additional variables may have resulted in an incomplete understanding of the complex determinants shaping breast cancer knowledge and screening behaviors.

Suggestions For Further Research

Future research should address the study's limitations by using more diverse and representative samples, incorporating objective measures of knowledge and screening practices, and exploring a broader range of sociodemographic, cultural, and contextual factors. This approach will enhance the generalizability and depth of understanding regarding the multifaceted influences on breast cancer awareness and prevention.

One key avenue for future inquiry is replicating this study in different university or community settings. By examining sociodemographic disparities across various educational and geographic locations, researchers can gain valuable insights into the contextual factors that shape breast cancer awareness and prevention practices. This would help determine whether the observed relationships are consistent or vary across diverse populations.

Additionally, comparative studies investigating sociodemographic disparities in breast cancer knowledge and screening behaviors across different demographic groups beyond the university setting would be particularly informative. Expanding the analysis to the general population and among underserved or marginalized communities could shed light on broader societal factors contributing to inequities in breast cancer outcomes.

Furthermore, future studies should delve deeper into the role of sociocultural factors in shaping screening behaviors and attitudes. Conducting in-depth investigations into the influence of religious beliefs, cultural norms, and other contextual determinants could enhance understanding of the complex interplay between socioeconomic status and screening practices.

By addressing these research gaps, future studies can provide a more comprehensive understanding of the multilevel factors contributing to disparities in breast cancer awareness and prevention, ultimately informing the development of more effective, equitable, and culturally responsive interventions.

Conclusion

This study provides important insights into the influence of sociodemographic factors on knowledge about breast cancer risk factors and screening behaviors among a university population. The findings highlight significant disparities in breast cancer knowledge and prevention practices, underscoring the need for targeted interventions to address these inequities. The analysis revealed that educational attainment is a critical determinant of breast cancer knowledge, with women holding higher education degrees demonstrating significantly greater awareness of risk factors compared to those with lower educational backgrounds. This suggests that improving access to breast cancer education and information, particularly among populations with lower levels of formal education, could be an effective strategy to enhance overall knowledge and prevention practices. Additionally, the study found that faculty and staff members had higher knowledge levels than graduate students, even after controlling for other sociodemographic characteristics. This disparity in breast cancer awareness between these staff categories within the university setting points to the importance of tailoring educational initiatives to address different groups' specific needs and barriers.

Contrary to the hypotheses, the analysis did not find significant differences in the perception of cost as a barrier to screening or in the willingness to undergo mammograms between income groups. These findings suggest that the perceived barriers to breast cancer screening may be more complex and universal rather than being solely determined by socioeconomic status. Factors such as religious beliefs, cultural influences, and access to healthcare resources may play a more influential role in shaping screening behaviors and attitudes. Overall, the study's results emphasize the need for a multifaceted approach to improving breast cancer awareness and prevention practices. By targeting educational disparities, addressing the unique needs of different staff categories, and considering the broader sociocultural determinants of screening behaviors, public health interventions can work towards more equitable and effective strategies to reduce the burden of breast cancer within this university population and beyond.

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TABLES

Table 1: Social Demographic Characteristics

Characteristics	**Frequency**	**Percentage**
Race/Ethnicity		
White/Caucasian	347	82
Black/African American	33	7.8
Hispanic/Latino	20	4.7
Asian	17	4
Other	6	1.4
Age		
22-35	138	32.6
36-76	283	67.2
Highest level of education completed		
Associate degree or less	18	4.3
Bachelors' degree	137	32.5
Master's degree	166	39.3
Doctoral degree or other advanced degrees	101	23.9
Current role at ISU		
Graduate student	126	29.9
Faculty Member	132	31.3
Staff	164	38.9
Marital status		
Married	239	56.6
Never married	131	31
Divorced, Widowed, Separated	52	12.3
Annual income		
< $49,999	162	38.4
$50,000-$74,999	120	28.4
$75,000 above	140	33.2
Religious affiliation		
None	163	38.6
Protestant	133	31.5
Catholic	80	19
Jewish and Others	46	10.9
Total	**422**	**100**
Source: *Researcher's Survey 2024*		

Table 2: Breast Cancer Knowledge and Willingness Assessment

Knowledge of respondents on breast cancer and its symptoms		
Likelihood of a typical woman developing BC	**Frequency**	**Percentage**
Slightly likely	80	19
Moderately likely	272	64.5
Very likely	64	15.2
Extremely likely	6	1.4
Awareness of early basic symptoms of breast cancer		
Very aware	57	13.5
Somewhat aware	287	68
Not very aware	73	17.3
Not at all aware	5	1.2
Symptoms of breast cancer		
Chest pain		
Strongly Agree	38	9
Agree	217	51.4
Strongly Disagree	17	4
Disagree	150	35.5
Changed nipple position		
Strongly Agree	233	55.2
Agree	169	40
Strongly Disagree	0	0
Disagree	20	4.7
Cough		
Strongly Agree	11	2.6
Agree	92	21.8
Strongly Disagree	48	11.4
Disagree	271	64.2
Swelling or a lump in the armpit		
Strongly Agree	334	79.1
Agree	81	19.2
Strongly Disagree	3	0.7
Disagree	4	0.9
Symptom experience		
Yes	157	37.2
No	265	62.8
Total	**422**	**100**
Table continues		

Table continued		
Age for first baseline mammogram		
30-35 years old	192	45.5
36-39 years old	46	10.9
40-44 years old	129	30.6
45-49 years old	14	3.3
50-54 years old	6	1.4
55-59 years old	1	0.2
60 years or older	3	0.7
Not sure/don't know	10	2.4
Others, please specify	21	5
Knowledge of breast cancer risk factors		
Not at all knowledgeable	21	5
Slightly knowledgeable	151	35.8
Moderately knowledgeable	163	38.6
Very knowledgeable	65	15.4
Extremely knowledgeable	22	5.2
Risk factor for breast cancer		
Age		
Strongly agree	201	47.5
Agree	198	46.8
Disagree	15	3.5
Somewhat disagree	7	1.7
Strongly disagree	1	0.2
Skin colour		
Strongly agree	51	12.1
Agree	152	36
Disagree	158	37.4
Somewhat disagree	30	7.1
Strongly disagree	31	7.3
Family history of breast cancer		
Strongly agree	379	89.8
Agree	41	9.7
Disagree	1	0.2
Somewhat disagree	1	0.2
Strongly disagree	0	0
Abortion		
Strongly agree	7	1.7
Agree	31	7.3
Disagree	214	50.7
Somewhat disagree	65	15.4
Strongly disagree	105	24.9
Alcohol consumption		
Strongly agree	49	11.6
Agree	156	37
Disagree	145	34.4
Somewhat disagree	48	11.4
Strongly disagree	24	5.7
Table continues		

Table continued		
Benign breast disorder		
Strongly agree	80	19
Agree	232	55
Disagree	76	18
Somewhat disagree	25	5.9
Strongly disagree	9	2.1
Screening Practices and Willingness		
Have you ever had a mammogram?		
Yes	256	60.7
No	166	39.3
Yes (I have ever had a mammogram)		
Once or twice in my lifetime	36	8.5
About every year	194	46
Two to four times per year	5	1.2
Others, (please specify)	18	4.3
How often, if ever, you perform breast self-examination		
I have never performed a breast self-examination	28	6.6
I have performed breast self-examination once or twice in my lifetime	80	19
About every year	59	14
Two to four times per year	118	28
About Every month	93	22
Two to three times a month	20	4.7
Every week	6	1.4
Several times a week	6	1.4
About everyday	5	1.2
About everyday	1	0.2
Others	6	1.4
Table continued		

Table continues		
How often, if ever, do you have a clinical breast examination?		
I have never had a clinical breast examination	50	11.8
I have had a clinical breast examination once or twice in my lifetime	68	16.1
About every year	276	65.4
Two to four times per year	15	3.6
About Every month	1	0.2
Others	12	2.8
Willingness to participate in Breast Cancer Screening		
Mammogram screening		
Yes	181	42.9
No	7	1.7
Unsure	18	4.3
Clinical Breast Examination		
Yes	141	33.4
No	4	0.9
Unsure	13	3.1
Breast self-examination		
Yes	128	30.3
No	4	0.9
Unsure	8	1.9
Motivating Factors		
Recommendations from healthcare providers		
Yes	410	97.2
No	12	2.8
Health benefits		
Yes	408	96.7
No	14	3.3
Media coverage or public awareness campaigns		
Yes	239	56.6
No	183	43.4
Personal history or family history of breast cancer		
Yes	398	94.3
No	24	5.7
Age		
Yes	388	91.9
No	34	8.1
Convenience/accessibility		
Yes	391	92.7
No	31	7.3
Total	**422**	**100**
Source: *Researcher's Survey 2024*		

Table 3: Bivariate Analysis

Social demographic characteristics and Knowledge of Breast cancer Risk factors					
Variables		**Not Knowledgeable**	**Moderately Knowledgeable**	**Knowledgeable**	**Chi Square**
AGE	Younger	70.0%	33.1%	23.0%	
	Older	30.0%	66.9%	77.0%	
					16.376
RACE	White	61.9%	83.1%	83.9%	
	Other minority	38.1%	16.9%	16.1%	
					6.275
EDUCATION	First degree and less	85.7%	78.3%	65.5%	
	Higher Education	14.3%	21.7%	34.5%	
					7.286
INCOME	Low income	95.2%	68.2%	55.2%	
	High income	4.8%	31.8%	44.8%	
					13.226
RELIGION	Non Religious	52.4%	42.0%	23.0%	
	Religious	47.6%	58.0%	77.0%	
					12.192
ROLE	Graduate Student	52.4%	26.4%	36.8%	
	Faculty and Staff	47.6%	73.6%	63.22%	
					8.837
		100%	100%	100%	
	Table continues				

	Table continued				
Socio-demographic characteristics and willingness to undergo screening					
VARIABLE		**WILLLINGNESS**		**Chi square**	
		YES	**NO**		
EDUCATION	First degree and less	80.1%	96.0%		
	Higher Education	19.9%	4.0%		
				3.764	
Motivating Factor - Health benefits	YES	96.7%	80.0%		
	NO	3.3%	20.0%	12.098	
		100%	100%		
Socio-demographic characteristics and constructs of the Health Belief Model (HBM).					
VARIABLE		**Perceived Barrier- Cost of screening tests**			
		YES	**No**		
STAFFINGCATEGORY	Graduate Student	33.3%	22.1%		
	Faculty and Staff	66.7%	77.9%		
				5.407[a]	
		Perceived Susceptibility			
AGE	Younger	**YES**	**No**		
		33.9%	13.0%		
	Older				
		66.1%	87.0%		
				4.301[a]	
		Perceived Benefits			
		YES	**NO**		
EDUCATION	First degree and less	75.2%	100.0%		
	Higher Education	24.8%	0.0%		
				4.556[a]	
	Total	100%	100%		
Source: Researcher's Survey 2024					

Table 4: Multivariate Analysis: Ordinal Regression

Variable	Coefficient	Std. Error	Wald	p-value	Odds Ratio	95% CI
Threshold						
[KnowledgeRC2 = 1.00]	-2.765	0.998	7.672	0.006	0.06	[-4.722, -0.808]
[KnowledgeRC2 = 2.00]	1.958	0.99	3.914	0.048	7.08	[0.018, 3.898]
AGE2	0.756	0.314	5.79	0.016	2.13	[0.140, 1.372]
RACERECODED	-0.609	0.346	3.105	0.078	0.54	[-1.287, 0.068]
INCOMECAT	0.439	0.268	2.691	0.101	1.55	[-0.086, 0.964]
RELIGIONCAT	0.78	0.252	9.615	0.002	2.18	[0.287, 1.273]
STAFFCATEGORY	-0.864	0.307	7.94	0.005	0.42	[-1.465, -0.263]
[EDUCAT=1.00]	-0.598	0.283	4.461	0.035	0.55	[-1.153, -0.043]
[EDUCAT=2.00]	0a	-	-	-	1	-
Source: *Researcher's Survey, 2024*						

Variable	Coefficient	Std. Error	Wald	p-value	Odds Ratio	95% CI
Threshold						
[KnowledgeRC2 = 1.00]	0.159	0.779	0.042	0.838	1.17	[-1.367, 1.686]
[KnowledgeRC2 = 2.00]	4.882	0.834	34.306	0	132	[3.249, 6.516]
AGE2	0.756	0.314	5.79	0.016	2.13	[0.140, 1.372]
RACERECODED	-0.609	0.346	3.105	0.078	0.54	[-1.287, 0.068]
INCOMECAT	0.439	0.268	2.691	0.101	1.55	[-0.086, 0.964]
RELIGIONCAT	0.78	0.252	9.615	0.002	2.18	[0.287, 1.273]
EDUCAT	0.598	0.283	4.461	0.035	1.82	[0.043, 1.153]
[STAFFCATEGORY=1.00]	0.864	0.307	7.94	0.005	2.37	[0.263, 1.465]
[STAFFCATEGORY=2.00]	0a	-	-	-	1	-
Source: *Researcher's Survey, 2024*						

Variable	Coefficient	Std. Error	Wald	p-value	Odds Ratio	95% CI
Threshold						
[Cost = 1]	2.581	0.784	10.848	0.001	13.2	[1.045, 4.117]
AGE2	0.804	0.305	6.954	0.008	2.23	[0.206, 1.402]
RACERECODED	-0.587	0.357	2.705	0.1	0.56	[-1.286, 0.113]
INCOMECAT	0.281	0.248	1.284	0.257	1.32	[-0.205, 0.767]
RELIGIONCAT	0.397	0.231	2.959	0.085	1.49	[-0.055, 0.850]
EDUCAT	0.023	0.266	0.007	0.931	1.02	[-0.499, 0.545]
[STAFFCATEGORY=1.00]	0.037	0.302	0.015	0.904	1.04	[-0.556, 0.629]
[STAFFCATEGORY=2.00]	0a	-	-	-	1	-
Source: *Researcher's Survey, 2024*						

Variable	Coefficient	Std. Error	Wald	p-value	Odds Ratio	95% CI
Threshold						
[WILLINGNESS = 1.00]	2.385	2.022	1.392	0.238	10.86	[-1.577, 6.348]
AGE2	0.329	0.552	0.356	0.551	1.39	[-0.752, 1.411]
RACERECODED	0.25	0.504	0.246	0.62	1.28	[-0.739, 1.239]
RELIGIONCAT	1.298	0.587	4.879	0.027	3.66	[0.146, 2.449]
EDUCAT	-1.903	1.081	3.099	0.078	0.15	[-4.021, 0.216]
STAFFCATEGORY	-0.276	0.527	0.275	0.6	0.76	[-1.310, 0.757]
[INCOMECAT=1.00]	-0.159	0.599	0.07	0.791	0.85	[-1.333, 1.015]
[INCOMECAT=2.00]	0a	-	-	-	1	-
Source: *Researcher's Survey, 2024*						

APPENDIX A: INFORMED CONSENT

You are being asked to participate in a research study conducted by Esther Oshaji, a graduate student and Dr. Winfred Avogo, a professor in the Department of Sociology and Anthropology at Illinois State University. The purpose of this study is to investigate the level of knowledge of risk factors associated with breast cancer and the willingness to undergo breast cancer screenings.

Why are you being asked?
You have been asked to participate because you are a female faculty, staff, or graduate student at Illinois State University over the age of 18.

Your participation in this study is voluntary. You will not be penalized if you choose to skip parts of the study, not participate, or withdraw from the study at any time.

What would you do?
If you choose to participate in this study, you will participate in a brief survey. In total, your involvement in this study will last approximately 10-15 minutes.

Are any risks expected?
We do not anticipate any risk beyond those that will occur in everyday life.

Will your information be protected?
We will use all reasonable efforts to keep any provided personal information confidential. You will not mention your name in the survey. Information that may identify you or potentially lead to reidentification will not be released to individuals that are not on the research team. The results of this study will be presented in a master's thesis and would be used for academic purposes only.

However, when required by law or university policy, identifying information (including your

signed consent form) may be seen or copied by authorized individuals.

Could your responses be used for other research?
The responses collected will only be used for this study even if it is deidentified in the future and no other research.

Who will benefit from this study?
While you will not experience any direct benefits from participation, information collected in this study may benefit you, the University, and the larger society in the future by better understanding the barriers to positive health behavior.

Whom do you contact if you have any questions?

If you have any questions about the research or wish to withdraw from the study, contact, Dr.

Winfred, my thesis advisor at wavogo@ilstu.edu or (309) 438-5227

If you have any questions about your rights as a participant, or if you feel you have been placed at risk, contact the Illinois State University Research Ethics & Compliance Office at (309) 438-5527 or IRB@ilstu.edu.

Documentation of Consent

If you are 18 or older and willing to participate in this study, click the arrow below to begin the survey.

APPENDIX B: QUESTIONNAIRE

INSTRUCTION: Kindly choose (√) your preferred answer

I would like to start by asking you a few questions about the symptoms of breast cancer

1. What do you think is the likelihood of a typical woman developing breast cancer in her lifetime?
    1. Not at all likely
    2. Slightly likely
    3. Moderately likely
    4. Very Likely
    5. Extremely Likely

2. How aware would you say you are, if at all, of the early basic symptoms of Breast cancer?
    1. **Very aware**: (I know all the early basic symptoms of breast cancer and am confident I could recognize them if they appeared).
    2. **Somewhat aware:** (I know some of the early basic symptoms of breast cancer but may not be confident I could recognize them all).
    3. **Not very aware:** (I am not very familiar with the early basic symptoms of breast cancer).
    4. **Not at all aware**: (I have no idea what the early basic symptoms of breast cancer are).

3. Which of the following, if any, do you consider a symptom of breast cancer?

S/N	Symptoms	Strongly Agree	Agree	Disagree	Strongly Disagree
i.	Chest pain				
ii.	Changed Nipple position				
iii.	Cough				
iv.	Swelling or a lump in the armpit				

4. Have you ever experienced any symptoms or changes in your breasts that led you to seek medical attention, such as lumps, pain, or discharge?

    1. Yes
    2. No

Now, I would like to ask you a few questions about breast cancer screening practices

5. At what age do you believe women should receive their first baseline mammogram for breast cancer screening?

    1. 30-35 years old
    2. 36-39 years old
    3. 40-44 years old
    4. 45-49 years old
    5. 50-54 years old
    6. 55-59 years old
    7. 60 years old or older
    8. Not sure/Don't know
    9. Others, (please specify) _____

6. What factors would motivate you to undergo regular breast cancer screening?

S/N	Factors	YES	NO

i.	Recommendations from healthcare providers		
ii.	Health benefits (e.g., early detection and treatment of breast cancer)		
iii.	Media coverage or public awareness campaigns		
iv.	Personal history or family history of breast cancer		
v.	Age (e.g., reaching a certain age, such as 40 or 50)		
vi.	Convenience/accessibility factors (e.g., availability of screening facilities nearby, easy scheduling, and appointment availability)		

7. Have you ever had a mammogram?

   1. Yes
   2. N0 (**SKIP TO QUESTION 9**)

8. If **YES**, how often do you have a mammogram?

   1. Once or twice in my lifetime
   2. About every year
   3. Two to four times per year
   4. Every month
   5. Others, (please specify) _____

9. How often, if ever, do you perform breast self-examination?

    1. I have never performed a breast self-examination
    2. I have performed breast self-examination once or twice in my lifetime
    3. About every year
    4. Two to four times per year
    5. About Every month
    6. Two to three times a month
    7. Every week
    8. Several times a week
    9. About everyday
    10. Others, please specify_____

10. How often, if ever, do you have a clinical breast examination? By clinical breast examination, I mean hands-on physical examination performed by a doctor or other medical professional.

    1. I have never had a clinical breast examination
    2. I have had a clinical breast examination once or twice in my lifetime
    3. About every year
    4. Two to four times per year
    5. About Every month
    6. Others, please specify_____

Now, I will be asking you about your willingness to undergo Breast cancer screening (ANSWER ONLY, IF YOU HAVE NEVER UNDERGONE ANY OF THE BREAST CANCER SCREENING METHODS IN QUESTIONS 11-13)

11. If you **have never had a mammography** before, how willing would you be to participate in a mammogram screening test for breast cancer?

    1. Yes, I would be willing to undergo a mammogram for breast cancer screening at some point.
    2. No, I am unwilling to undergo a mammogram for breast cancer screening.
    3. Unsure (I need more information before deciding).

12. If you **have never had a Clinical Breast Examination** before, how willing do you think you would be to participate in a Clinical Breast Examination?

    1. Yes, I would be willing to undergo a Clinical Breast Examination for breast cancer sometime.
    2. No, I am unwilling to undergo a Clinical Breast Examination for breast cancer.
    3. Unsure (I need more information before deciding).

13. If you have **never performed a Breast Self-Examination** before, how willing would you be to perform a breast self-examination?

    1. Yes, I would be willing to perform a breast self-examination at some point.
    2. No, I am unwilling to undergo a breast self-examination.
    3. Unsure (I need more information before deciding).

Now, I would like to ask you a few questions about the barriers to breast cancer screening.

14. Which of the following, if any, do you consider as barriers to breast cancer screening?

S/N	Barriers	Yes	No
i.	Lack of time to schedule or attend screening appointments		
ii.	Cost of screening tests		
iii.	Lack of insurance coverage		
iv.	Fear or anxiety about screening procedures		
v.	Lack of information or knowledge about screening guidelines		

15. Have you ever experienced any barriers to breast cancer screening?

1. Yes
2. No **(SKIP TO QUESTION 17**)

16. If **Yes** to question 13, which of the following, if any, did you consider as barriers to breast cancer screening?			
S/N	**Barriers**	**Yes**	**No**

i.	Lack of time to schedule or attend screening appointments		
ii.	Cost of screening tests		
iii.	Lack of insurance coverage		
iv.	Fear or anxiety about screening procedures		
v.	Lack of information or knowledge about screening guidelines		

Now, I would like to ask you a few questions about your knowledge of Breast cancer risk factors.

17. How knowledgeable, if at all, do you feel about breast cancer risk factors?

    1. Not at all knowledgeable
    2. Slightly knowledgeable
    3. Moderately knowledgeable
    4. Very knowledgeable
    5. Extremely knowledgeable

18. Which of the following, if any, do you consider a risk factor for breast cancer?

S/N	Factors	Strongly Agree	Agree	Disagree	Strongly Disagree
i.	Age				
ii.	Skin Color				
iii.	Family History of Breast Cancer				
iv.	Abortion				
v.	Alcohol consumption				
vi.	Benign Breast disorder				

19. Have you ever been diagnosed with breast cancer?

    1. Yes
    2. No

20. Have any of your immediate family members (e.g., mother, sister, daughter) ever been diagnosed with breast cancer?

    1. Yes
    2. No
    3. I don't know

21. How frequently do you consume alcohol?

    1. Never
    2. Rarely (less than once per month)
    3. Occasionally (1-3 times per month)
    4. Sometimes (1-2 times per week)
    5. Often (3-4 times per week)
    6. Very often (5 or more times per week)

22. Have you ever had a benign breast disorder? (By benign breast disorder, I mean changes in your breast such as breast lumps, pain, or nipple discharge).

    1. Yes
    2. No

Finally, I would like to ask you a few demographic questions.

23. What was your age on your last birthday (years)? _____

24. What is your race/ethnicity?

    1. White/Caucasian
    2. Black/African American
    3. Hispanic/Latinx
    4. Asian
    5. Native American or Alaska Native

6. Other (please specify) _____

25. What is your highest level of education completed?

    1. High school diploma/GED
    2. Associate degree
    3. Bachelor's degree
    4. Master's degree
    5. Doctoral degree or other advanced degrees

26. What is your current role at ISU?

    1. Graduate student
    2. Faculty member
    3. Staff member

27. What is your current Marital status?

    1. Married
    2. Never married
    3. Divorced/separated
    4. Widowed

28. What is your total annual income from all sources after taxes? (I am asking about your individual income and not asking you to include that of others in your household).

    1. Less than $25,000
    2. $25,000-$49,999
    3. $50,000-$74,999
    4. $75,000-$99,999
    5. $100,000 or more

29. What is your religious affiliation, if any?

    1. Protestant
    2. Catholic
    3. Jewish
    4. Others, (please specify) _____
    5. None

Thank you for your time!