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Cervical Cancer Screening Among Women Across the United States

Srivathsan Vijaya Raghavan
Walden University

Walden University

College of Health Sciences and Public Policy

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Srivathsan V. Raghavan

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Review Committee
Dr. Shanna Barnett, Committee Chairperson, Public Health Faculty
Dr. Twanda Wadlington, Committee Member, Public Health Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2026

Abstract

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MA/MS, Western Illinois University, 2011

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Abstract

While cervical cancer is not among the most frequently diagnosed cancers in the United States, it remains a significant concern due to its preventability through regular Pap smears and Human Papillomavirus (HPV) vaccination. However, incidence rates are rising as screening participation among U.S. women declines. This quantitative study (N = 15714) explored cervical cancer screening behaviors by analyzing levels of community involvement and social functioning, guided by the socioecological model (SEM). The dependent variable was cervical cancer screening, while the independent variables were community involvement and social functioning. The study controlled for health insurance status, age, race, ethnicity, employment, education, and income. Three separate analyses were conducted; however, results for the two independent variables, both community engagement and social functioning, were statistically insignificant ($p > .05$). To address these findings, a policy brief memo based on the SEM and a community intervention plan were developed to reduce screening non-adherence. This study aims to promote positive social change by increasing awareness of screening tests among underserved communities.

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Dedication

I dedicate this capstone to my spiritual mentor, the late Pujyashri Mathioli R. Saraswathy, whose guidance, since her passing in 2018, has been a steady force helping me navigate every academic and personal milestone. I also honor the memory of our family's first dog, Leo Raghavan, who sat faithfully by my side through every Walden discussion post and assignment until her passing in 2021; I know she rejoices from heaven at this achievement. Finally, I dedicate this work to the late Dr. P. Ananthasubramaniam, MD, DCH, my childhood physician. His humility, vast medical knowledge, and approachable demeanor first inspired me to pursue a career in the health sciences. Though he passed in 2018, his legacy remains my blueprint for scholarly work and my commitment to creating positive social change for underserved populations.

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I take this opportunity to thank my wife, my parents, and my son for their support throughout my journey in the Doctor of Public Health (DrPH) program, from the start to the capstone stage. I cannot imagine coming to this stage without their love and support. I also thank Dr. Shanna L. Barnett, the Chair of my Doctoral Committee; Dr. Twanda Wadlington, the Committee Member; Dr. Zin Htway, Analytical Statistical Support Professor for validating all of my statistical procedures, APA format for writing the results, and guiding me to elucidate the outcome per Walden University standard; Dr. Joseph Gredler, Senior Editor and Faculty at the Office of Academic Support and Instructional Services at Walden University for helping with formatting and index hyperlink support; Mrs. Bethany Duarte, the Form and Style Reviewer at Walden; my Academic Advisors at Walden University; and Dr. Sriya Krishnamoorthy, Academic Program Coordinator for the CEPH-Accredited DrPH Degree at Walden University.

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Section 1: Foundation of the Study and Literature Review

Cervical cancer is one of the preventable cancers among women in the United States. The American Cancer Society (2026) estimates that about 13,490 new cervical cancer cases will be diagnosed in 2026, of which 4200 patients will succumb to this disease. Although the statistics highlight the seriousness of cervical cancer rates and the associated mortality rate, cervical pre-cancers are more frequently diagnosed to serve as an early warning of potential future disease (American Cancer Society, 2026). Women aged 35-54 are most affected, with a mean age at diagnosis of 50 (Fontham et al., 2020). While cervical cancer incidence rates significantly declined between the 1970s and 2000s, the incidence rate has increased by 1.7% annually between 2012 and 2019 (American Cancer Society, 2026). Given the detailed understanding of the types of cervical cancer and progression, early screening is an absolute necessity to prevent morbidity and mortality.

This cross-sectional study examines the associations of community engagement and social functioning, as key factors, with educational level, employment status, income level, and health insurance status, and their associations with cervical cancer screening rates among women in the United States. The goal of this study was to determine whether levels of community engagement and social functioning influence cervical cancer screening behaviors among women in the U.S. population.

This study is necessary to address a gap in the literature through a holistic analysis, aiming to reduce the burden on the unscreened female population in the United States. According to Siegel et al (2021), U.S. women with higher educational attainment

are more likely to adhere to cervical cancer screening guidelines. To the best of my knowledge, the literature search did not bring forth any other study that investigated the connection between levels of community engagement and social functioning, while controlling for factors such as education level, employment status, income level, and health insurance status, which may affect the likelihood of being screened for cervical cancer.

The potential implications for positive social change from this study include increasing cervical cancer screening rates among U.S. women, thereby helping to prevent delayed diagnoses and improve health outcomes. This study introduced and emphasized the possible significance of the levels of community engagement and social functioning, in addition to other contributing factors, on cervical cancer screening behaviors in the U.S. By addressing the unscreened population burden in the U.S, this study confirmed the public health expectations of helping to reduce the number of women who do not get screened according to Centers for Disease Control and Prevention (CDC) recommendations.

This section includes the study's characteristics, literature review strategies, relevant literature review, theoretical framework, definitions, assumptions, scope and limitations, constraints, rationale for the study's importance, a concise summary, and a conclusion.

Background

Cervical cancer, a type of reproductive cancer, can be detected early through regular screening among women in the United States. It remains one of the most fatal

cancers affecting U.S. women, with over 14,000 new cases diagnosed each year; approximately 4,000 Americans have succumbed to the disease (Siegel et al., 2023). Timely screening for cervical cancer is essential to identify risk and prevent delayed diagnosis. Tests such as Pap smear and HPV screening play a critical role in the early detection of cervical cancer across different age groups, racial groups, ethnic groups, educational levels, varying levels of income, and health insurance status (Siegel et al., 2023). Screening for cervical cancer is important since preventing this disease can save more lives than getting diagnosed with it later, increasing morbidity and mortality in the nation.

Access to health insurance is a significant factor influencing cervical cancer screening rates in the United States. The cost associated with getting health insurance is not the only reason that can deter a woman from getting screened for cervical cancer. The time and resources associated with arranging either a Pap smear test or the HPV test can also affect U.S. women's choice to get screened (Biddell et al., 2021). For instance, women who must miss work to undergo cervical cancer screening tests may experience financial strain, especially if they are hourly wage earners without paid leave (Biddell et al., 2021). In contrast, higher-income salaried individuals may face fewer barriers. As a result, access to health insurance and the cost the bearer has to pay influence their ability to get screened for cervical cancer.

U.S. women are expected to adhere to cervical cancer screening tests starting at age 21 once every 5 years (Jensen et al., 2023). Between the ages of 30 and 50, an HPV test is recommended every 5 years, with two consecutive negative results (Bouvard et al.,

2021; Rayner et al., 2023). As a result, age groups are a serious factor that affects the number of women who undergo cervical cancer screening tests. Age groups need to be analyzed in tandem with race, ethnicity, and other factors to see how cervical cancer screening rates change across the United States.

Race is also a factor that affects cervical cancer screening rates in the United States. Among different racial groups in the United States, such as African Americans, Asian Americans, white Americans, and American Indian Alaskan Native (AIAN), African Americans have higher screening rates for cervical cancer (75.0%) in comparison to other racial populations (69.0%) (Liang et al., 2021). Ethnicity is another major factor influencing cervical cancer screening rates. Among all the racial and ethnic populations in the United States, African Americans and Hispanic Americans are more likely to be delayed for screening procedures, and extensive research needs to be conducted for more clarity (Harper et al., 2020). An analysis by race and ethnicity brings forth the latest information about different racial and ethnic groups within the United States that are either afforded or deprived of the ability to screen for cervical cancer. This type of outcome obtained by some studies emphasizes why some specific racial and ethnic groups have an increased or decreased probability of getting diagnosed with cervical cancer during their lifetime.

Women who have employment to sustain their daily lives fare better than those who must depend on another source of income for their livelihood (Fedewa et al., 2022), and this affects their ability to get screened for cancer, including cervical cancer. The health coverage women get through their employment is a priority, and the resources that

accompany the employment to take care of their health, including screening options for cancer, such as cervical cancer, cannot be undervalued (Fedewa et al., 2022). This factor can also be categorized by race and ethnicity, as African American women and Hispanic American women were among the top 30.0% of unemployed Americans, and merely 20.0% of employed US women with health coverage and other allied benefits belonged to these two racial and ethnic groups (Harper et al., 2020). This type of disproportionate health coverage through employment affects the rate of women who can avail themselves of screening tests such as the Pap smear and the HPV test.

Women with a high school diploma or higher educational attainment also tended to pay more attention to details of screening options, tests, and follow-up procedures, including cervical cancer screening (Murfin et al., 2020; Harper et al., 2020). Because vocabulary improves with higher education, details and intricate information about cervical cancer screening and follow-up are generally more accessible to women with higher educational attainment (Harper et al., 2020). Hence, such women tend to adhere more to screening tests and follow-up procedures.

In some cases, educational attainment helps secure high-paying jobs, raise individual incomes, and improve quality of life (Biddell et al., 2020). Coupled with increased health care, this enables screening for cancer, including cervical cancer (Biddell et al., 2020). Low-income women, regardless of their racial or ethnic groups, preferred to undergo cervical cancer screening using the HPV test rather than a Pap smear, and the clear-cut reasons for this variation cannot be obtained (Biddell et al., 2020). In another study, low-income Hispanic American women had lower rates for

cervical cancer screening in comparison to African American women, White American women, Asian American women, and American Indian women (Riggs et al., 2021). Hence, this set of women added to the unscreened population burden, leading to more issues before and after cancer diagnosis later. U.S. women who are more likely to test positive because of their genetics or any other risk factor need to be provided with the necessary resources to facilitate cervical cancer screening tests (Rayner et al., 2023).

This study addressed a gap in the literature by combining two variables of interest that have not previously been studied together: levels of community engagement and social functioning. This study is necessary to address a gap in the literature and help alleviate the burden on the unscreened population of women in the United States.

Problem Statement

Cervical cancer contributes to more than 14,000 of all new cancer diagnoses in the United States, and more than 4,000 women die of this disease annually (Rimel et al., 2022). Various social determinants of health (SDOH) play a role in the diagnosis of cervical cancer; consequently, higher morbidity and mortality can be observed among American women across the nation (Sharma et al., 2022). Women belonging to certain disadvantaged groups (e.g., racial and ethnic minority communities, those with less income, and low educational attainment) have fewer resources for getting screened for cervical cancer and lower survival outcomes in comparison to women with higher socioeconomic status (Sharma et al., 2022). Education and income factors were more prevalent among White women in the United States (Hall et al., 2019). A woman's socioeconomic factors, such as income level, education level, and the affordability of

health insurance, impact whether she can get screened for cervical cancer (Sharma et al., 2022). The levels of community involvement and the levels of social functioning among women and cervical cancer screening behaviors have not been thoroughly investigated. This study filled the gap in the literature by investigating the levels of community involvement, the levels of social functioning, and the likelihood of a woman getting preventative screening for cervical cancer in the United States.

Purpose of the Study

This quantitative study examined preventative screening behaviors for detecting cervical cancer among women in the United States by analyzing the levels of community involvement and the levels of social functioning. The dependent variable is cervical cancer screening, and the independent variables are levels of community involvement and social functioning. This study controlled for health insurance status, age, race, ethnicity, employment status, education level, and income level. The data were sourced from the 2023 National Health Interview Survey (NHIS), which includes all relevant variables (e.g., age, gender, social functioning, community involvement, cervical cancer screening history, education, and employment status). The information gained from this study was used to develop field-based products and to inform the policy brief memo and the community health intervention plan.

Research Questions and Hypotheses

RQ1: What is the association between the level of community engagement and the screening of cervical cancer among women in the United States, controlling for health

insurance status, age, race, ethnicity, employment status, education level, and income level?

H_{01}: There is no association between the level of community engagement and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

H_{a1}: There is an association between the level of community engagement and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

RQ2: What is the association between the level of social functioning and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level?

H_{02}: There is no association between the level of social functioning and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

H_{a2}: There is an association between the level of social functioning and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

Theoretical and/or Conceptual Framework

Using the socio-ecological model (SEM), this study explored the multi-level factors influencing cervical cancer screening among women in the United States. Originally developed by Bronfenbrenner (1979) to describe environmental influences on child development, the SEM frames health behaviors through various spheres of influence. These include the individual level, focusing on personal behaviors that drive health outcomes, and the organizational level, which examines how interactions with peers and workplace environments shape those behaviors (Bronfenbrenner, 1979). Moving into broader influences, Bronfenbrenner (1979) identified the exosystem, specifically, the community and its constituents, as a level at which an individual's social interactions significantly shape their health behaviors and subsequent outcomes. While the model originated in developmental psychology, McLeroy et al. (1988) later adapted and expanded these concepts into the health promotion field. This evolution redefined the microsystem and macrosystem into five distinct levels of influence: intrapersonal, interpersonal, organizational, community, and public policy. By applying this refined SEM framework, the current study identified the specific barriers to cervical cancer screening across these layers, ranging from individual attitudes to community-wide structures.

Nature of the Study

This research aimed to examine the association between community involvement and social functioning (the two main independent variables) and cervical cancer screening (the dependent variable), while controlling for health insurance status, age,

race, ethnicity, education level, and income level. This study used secondary data from the NHIS 2023, which employed a cross-sectional design, and applied binary logistic regression to address the study's research questions. The NHIS conducts face-to-face interviews and telephone surveys to understand the population's health behaviors. The NHIS 2023 comprises free, validated data on U.S. adults (men and women) aged 18 and above residing in the United States. All individuals who participated in the NHIS 2023 survey were noninstitutionalized and were able to read, understand, and answer survey questions. The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 30.

Literature Search Strategy

The literature review for this study was conducted using a range of reputable academic databases and resources, including Google Scholar, PubMed, the Walden University Library, SAGE Journals, and ScienceDirect. Peer-reviewed articles that focused on preventative screening rates such as the Pap smear and an HPV test, in addition to any mention of the association between preventative screening for cervical cancer and the levels of community engagement, levels of social functioning, while controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level**.** To obtain the literature on these topics, the following search terms were included: *screening for cervical cancer, cancer screening, types of screening tests and cervical cancer, social functioning and cervical cancer, social functioning and cancer, community engagement and cancer, socioeconomic status (SES) and cancer, SES and screening tests for cancer, SES and cervical cancer screening, Pap smear or HPV*

test for cervical cancer, cervical cancer screening and community engagement, absence of screening cervical cancer and lack of community engagement, no social functioning and cervical cancer screening, cervical cancer screening and no community engagement, and incomplete social functioning, and *variation in cervical cancer screening and low SES and less community engagement and improper social functioning*. The research papers selected for the literature review were written in English, and the publications covered the period from 2019 to 2024.

Theoretical Framework

The theoretical model used in this study is the socio-ecological model (SEM) (McLeroy et al., 1988). Various theories are available for different studies; I selected the Socio-Ecological Model (SEM) because it was best suited to this study. The focus on the various levels identified in the SEM helps explain the observed outcomes. The SEM was proposed in the 1980s to explain how some health outcomes at (i) the individual level, (ii) the organizational level, and finally (iii) the community level elicit specific behavior outcomes (McLeroy et al., 1988). The SEM is influenced by biological views of individual behavior and by environment-based ideas, such as those at the organizational level. The community level (i.e., the interactions community members have with an individual) affects outcomes, such as the uptake of preventive screening tests for cervical cancer detection, including the Pap smear and the HPV test. Holistically, a single outcome, such as adherence to cervical cancer screening requirements, can be influenced by factors at the individual, organizational, and/or community levels.

Brofenbrenner clearly explains the process by which humans develop in environmental contexts. Bronfenbrenner developed the SEM based on Vygotsky's socio-cultural theory (SCT) and Lewin's behaviorism theory (Tuktur et al., 2025). Bronfenbrenner initially focused on child development and sought to explain how the environment can influence a child's development over time. The rationale for this approach is that a child uses the environment to develop their personality over time.

This theory was selected for this study because SEM operates at multiple levels of influence, including intrapersonal, interpersonal, community, organizational, and public policy. Bronfenbrenner initially explained how a person is influenced by every participant in their environment and by the active interactions they have with them daily (Bronfenbrenner, 1979). As a result, SEM has potential applications in several fields of public health and psychology (Hyde et al., 2020). The SEM employs a holistic framework that integrates the individual's health behavior with interactions within the family, circle of friends, organization, community, and legal authorities that implement public policy. This is one of the primary rationales for selecting SEM to explain an individual's willingness or unwillingness to undergo specific screening tests, such as the Pap smear or the HPV test.

This study benefited from the contextual application of SEM, as screening for cancer, particularly cervical cancer, depends not only on the individual but also on their interactions with the environment. Hence, this bidirectional influence can affect the expected outcome, helping to reduce disparities in cervical cancer screening, as seen in the application of SEM to reinvigorate medical educators and achieve results in such

settings (da Silva Louza et al., 2026). Bidirectional interaction between an individual and their surroundings can help in many situations, and it is believed that SEM can help explain how an individual interacts before deciding on a screening test for any cancer.

Strengths of Applying Theories or Models to Public Health Issues

As mentioned, the SEM was initially developed to explain how children develop certain behaviors through interactions with their ecological contexts (surroundings). The major strengths of the SEM in analyzing public health issues, such as screening tests for cancer, begin with the different levels of influence on an individual (the community level, the organizational level, and the interpersonal level) in comparison to specific other theories that focus only on individuals who may or may not decide to participate (Glanz et al., 2015). If an individual participates in a study, an analysis of their interactions with the environment can be obtained, as individuals interact with their surroundings both actively and passively and are influenced by them (a bidirectional process). Hence, as the SEM explains, a holistic, multidimensional influence is a significant strength compared to other health behavior theories.

The SEM's ecological constructs are unique among health behavior theories, as they can capture more than just the interaction between the individual and the environment. Another strength of the SEM is its ability to establish a setting and to incentivize individuals to participate in interventions that analyze and modify health behaviors for the better (Glanz et al., 2015). Incentives can be financial or non-financial, and ecological constructs within the SEM can be used to present incentives that promote healthy behavior. This type of incentive will not distract the individual from interacting

with the environment. Hence, the bi-directional approach of the individual and the environment remains, along with incentives that promote healthy behavior.

Limitations of Applying Theories or Models to Public Health Issues

A significant weakness of SEM is its lack of specificity in hypothesizing health behavior outcomes. Health professionals must identify the critical factors that lead to healthy behavior and a preferred outcome, as the SEM does not specifically complete this task during the intervention (Glanz et al., 2015). This task can be complex, given the SEM's holistic approach, as a health outcome is shaped by multiple levels of influence, ranging from the intrapersonal to the public policy. Investigating specific factors at each level of the SEM is challenging, and errors can occur when identifying and explaining a critical factor. Hence, this is a significant weakness of the SEM.

The researchers are responsible for developing an operational model, as the SEM lacks specific indicators of a particular health behavior. A lack of an operational model while using the SEM's holistic approach is another weakness that requires extensive alteration of the intervention since one critical factor at the intrapersonal level will not occur in other levels of the SEM; consequently, the method of conducting an intervention to elicit the expected healthy behavior will require complex modifications. To sum up, the absence of a feasible operational model directly derived from the SEM is a weakness that would require numerous modifications to the intervention, given the complexity of the multiple levels of influence between the environment and the individual.

Glanz et al. (2015) elucidate that over the years, public health scholars have outlined modified versions of the SEM with hierarchical levels such as (i) the individual

level taking into account the knowledge, attitude, and skills possessed by the individual; (ii) the interpersonal level which considers the social network the individual uses to interact with daily; (iii) the organizational level that comprises of the environment and the ethos, i.e., the moral character of the culture or the society where the individual lives; (iv) the community level, which considers the cultural values as well as the norms of the society; and finally (v) the public policy level, which is influenced by the lawmakers and other legal components in the society where the individual lives (Glanz et al., 2015). The SEM is more robust for elucidating screening behavior, as it accounts for multilevel influences from the individual to the public policy level. Hence, the SEM can be used holistically using all these distinct levels to explain how particular health behaviors, such as the screening for cervical cancer among women, can be influenced to attain the expected outcome.

The ways in which two levels of the SEM combine to yield a specific outcome are novel, and prospective outcomes in health behavior studies can inform public health. The intrapersonal and interpersonal levels of the SEM can converge to explain the social support dimension that enables individuals to discuss their health behaviors before adopting or changing them (Gambe et al., 2023; Glanz et al., 2015). The level of support people receive from caregivers during their battle with cancer, starting with the initial screening test to cancer treatment, can make a significant difference over days (Gambe et al., 2023). In summary, the SEM, as a theoretical model, can explain a sizable portion of the health behavior outcome, such as cervical cancer screening, by considering the interpersonal and intrapersonal levels of prevention.

The next level, used in theoretical constructs in cervical cancer screening studies, is the interpersonal level. This level emphasizes family dynamics and an individual's daily relationships with others (Glanz et al., 2015). This can include parents, siblings, and friends who have greater opportunities to discuss health-related matters with the individual (Gambe et al., 2023; Glanz et al., 2015). The emotions and thoughts associated with the individual (i.e., the intrapersonal theme) can be applied to this theme (i.e., the interpersonal theme) to discuss pressures, difficulties, and challenges related to finances and relationships (Gambe et al., 2023). Consequently, individuals participating at the intrapersonal level also exert influence at the interpersonal level, as the individual's thoughts and emotions (e.g., those of a person with cancer) are affected by individuals at both levels of the SEM.

The subsequent level focuses on community members who can provide support or guidance regarding decisions about screening tests for cervical cancer, such as the Pap smear or the HPV test. When an individual needs help or advice from community members, this community level can significantly influence the decision to undergo cervical cancer screening (Gambe et al., 2023; Glanz et al., 2015). Cultural influences from community members' advice or help regarding the willingness or unwillingness to undergo cervical cancer screening will result in more or fewer people at this level being influenced to undergo the screening test (Gambe et al., 2023). Some members of the community may also hesitate to advise in favor of screening due to cultural norms that prevent potential shaming of private parts during a pelvic exam, which can detect cancer

(Gambe et al., 2023). In summary, community members significantly influence the minds of people who may test positive for cancer.

As part of the SEM, the fourth level involves interactions between individuals and healthcare workers, considering organizational and public policy factors. When the healthcare service is far from the individual's place of residence or work, it is not easy to schedule and undergo screening tests for cervical cancer, for instance (Whitehorn-Smith et al., 2024; Zhang et al., 2022). This situation can cause depression in the individual (Zhang et al., 2022), and the members of the healthcare organizations, as well as those in the individual's organization, can play a significant role in mediating this physical obstacle (Zhang et al., 2022). As a result, integrating organizational and public policy aspects within the healthcare workforce can help eliminate obstacles to achieving the project's public health goals.

Ultimately, the SEM provides a robust framework for this study, as its stratified levels of influence directly align with the multifaceted nature of cervical cancer screening behaviors. At the intrapersonal level, a woman's unique attitudes and beliefs dictate her health choices, while interpersonal factors, such as her interactions with family, friends, and neighbors, further shape her decision-making process. These choices are also mediated by organizational factors, where the workplace environment and peer interactions influence how screening information is shared and normalized. Finally, while less central to the current analysis, public policy factors and legislative structures create the systemic environment in which these screenings occur. By mapping these specific

levels, this study directly addresses its research questions regarding why gaps in screening acceptance persist across diverse social and structural contexts.

Literature Review Related to Key Variables

Community Engagement and Cervical Cancer Screening

The National Institutes of Health (NIH), along with the Agency for Toxic Substances and Disease Registry (ATSDR) and the Centers for Disease Control and Prevention (CDC), define community engagement as follows.

> Community engagement is an ongoing, evolving process of multidirectional communication with and for people to solve the problems and address the concerns that matter to them. The process should be durable, long-lasting, and equitable to all who participate. The goal is to learn, implement, and disseminate the practices of equitable partnering and influence policies, programs, and practices for the betterment of the community. (Michener et al., 2025).

It often involves partnerships and coalitions that help mobilize resources, influence systems, change relationships among partners, and catalyze policy, program, and practice change (Michener et al., 2025). It may be a powerful vehicle for driving environmental and behavioral changes that improve community and member health.

Community engagement is critical while addressing disparities in cancer screening among different affected populations in the United States. Variations in cancer screening rates and potential positive outcomes at later stages may be due to any of the factors above or to synergistic effects, leading to an advantage for one racial group or ethnic community over others (Kale et al., 2023). Community engagement is the first step

in addressing disparities caused by these factors and reducing the burden on the unscreened population over time (Kale et al., 2023). Community engagement may help reduce the unscreened population burden by encouraging cultural competence, building trust, and encouraging cooperation between major stakeholders in the community and the health professionals, so that more people get screened for any cancer ahead of time to prevent delayed diagnosis, which leads to increased morbidity and mortality. After analyzing the factors that lead to these disparities, community engagement may be a good first step in addressing them at the population level.

Community engagement considers cultural sensitivity and supports the implementation of initiatives and interventions to promote cancer screening. The community engagement component designs, implements, and evaluates various initiatives and intervenes with individuals to improve cancer screening rates (Khera et al., 2024). The communities where these individuals lived before thinking of getting screened for cancer must be acknowledged as experts based on their situational experience and empowered to actively engage in the process of deciding to get screened for cancer (Kale et al., 2023; Khera et al., 2024). Community engagement may affect screening rates and subsequent steps after a positive screening test, including diagnosis, treatment, and palliative care. Community engagement tries to go to a more holistic approach level to invigorate the individuals in these affected populations across the United States to intervene appropriately and sustainably to change the screening test rates for cancer.

As part of the community engagement process, community members are recognized as having knowledge, experience, and perspectives that can help achieve the

cancer screening goals. This type of engagement with more than one individual (i.e., the engagement from the community's perspective) will shift the paradigm from the individual level to the members of the community to encourage active participation and collaboration to screen for cancer and make sure that any legitimate positive cancer test can be followed up with the subsequent steps including diagnosis, treatment, and palliative care (Leader & Aplin, 2021; Leader et al., 2023). When community members talk through various cancer screening tests, they open new doors for individuals who may want to get screened but have not yet registered with their medical provider. Community engagement may encourage some individuals to get screened for cancer through active participation and collaboration.

Community engagement can raise awareness and increase communication, encouraging individuals to undergo cancer screening. When analyzing Hispanic Americans and certain non-Hispanic Americans within the contiguous United States, a gap exists as to why many individuals in these ethnic groups are not getting encouragement from community members to undergo screening tests for cancer (Currier et al., 2023; Wright et al., 2025). Consequently, the main drawback identified in this situation was the absence of community engagement, which would facilitate communication among community members about cancer screening tests (Wright et al., 2025). Collaboration between individuals and the community may encourage strategic communication to facilitate the investigation of cancer screening options.

Social Functioning and Cervical Cancer Screening

Social functioning is a factor as well as a gap in this study, focusing on screening tests for detecting cervical cancer among U.S. women. Interpretation of social functioning is more subjective than objective, and a specific understanding of social networks and the primary social context is the first step (Carnahan et al., 2020, 2021). Social contexts generally focus on small factors, such as urbanity versus rurality, the level of socioeconomic disadvantage among certain U.S. women populations, or perceived access to cancer testing facilities (Carnahan et al., 2021). Finally, social functioning can be understood in terms of the extent to which individuals perceive support from social networks and their overall satisfaction with the social context (He et al., 2023). Social functioning encompasses factors such as social context and participation in social networks, which help explain how an individual obtains emotional support and informational guidance related to cancer screening.

The levels of social functioning were low for individuals screened for and diagnosed with lung cancer (Borger et al., 2022). Lung cancer is one of the most dangerous types of cancer, and individuals who live in non-urban areas with more access to cigarettes have reduced levels of social functioning due to their feelings of lung cancer and their status of smoking cessation (Moss et al., 2021). The reduction in social functioning was due to feelings of stigma related to lung cancer and how those who get screened for and potentially diagnosed with lung cancer isolate themselves, as they do not want to be victimized by the members of their social network (Moss et al., 2021). Hence, social functioning is also associated with the feelings of individuals as well as

individuals' perception of stigma concomitant with lung cancer screening and diagnosis. Social functioning may also be related to cervical cancer screening in this same manner.

The ability to maintain social functioning varies in individuals who are screened for and potentially diagnosed with prostate cancer (Moss et al., 2021). Individuals who were screened and diagnosed with prostate cancer had lower scores on the health quality of life (HQoL), which considers the physical, mental, and emotional conditions of these individuals (Moss et al., 2021). The reason for this variation in the HQoL among these individuals in comparison to the controls (those who did not get screened and diagnosed with prostate cancer) is that individuals who were screened for prostate cancer did not have prior preventative knowledge of this disease.

Since prostate cancer involves sexual function disturbance, social functioning capacities are directly affected due to individuals isolating themselves, assuming that their sexual function ability is reduced or fully diminished (Moss et al., 2021). Social functioning may also be directly affected by individuals who are screened for prostate cancer and their misunderstanding of the potential loss of sexual function since the prostate gland is involved in the sexual processes (Moss et al., 2021). The sexual functioning aspect of a human male is also affected when prostate cancer is being discussed, as most people assume that their sexual function will decrease because of cancer. This relationship between sexual functioning and social functioning may be related to women and their cervical cancer screening practices. The reason why prostate cancer sexual function disturbance is mentioned in concordance with social functioning is because cervical cancer in women has an impact on the social functioning aspect like

sexual dysfunction in prostate cancer in men, as both women and men are holistically affected by each of these cancers, including the community standpoint, and the personal interactions the cancer survivors have at the social level.

Health Insurance and Cervical Cancer Screening

Another factor influencing screening behavior is health insurance status. Health insurance is usually required to obtain cervical cancer screening (Huguet et al., 2019). Women who have more options for health insurance (including Medicaid and private health insurance plans) were 19% to 23% more likely to get screened for cervical cancer than women who do not have options for health insurance (Fuzzell et al., 2021; Huguet et al., 2019). Having health insurance helps to get medical resources for a woman who can discuss screening and preventative testing for cervical cancer. Hence, cervical cancer screening may be more accessible if a woman has health insurance, in most cases through an employer.

The presence or absence of health insurance affects people's ability to see a primary care medical practitioner, whether they have a concern, before opting for a type of screening test for reproductive cancers, such as cervical cancer. Suk et al. (2022) found that the proportion of American women who did not have health insurance had a higher propensity not to get screened for cervical cancer, and this outcome was not much different when analyzed by race or ethnicity. In 2019, there was a marked increase in the proportion of women without up-to-date cervical cancer screening across health insurance types, including Medicaid, Medicare, Anthem, Cigna, and UnitedHealthcare (Fuzzell et al., 2021; Suk et al., 2022). Hence, whether they had insurance or not, women

in some studies did not get screened for cervical cancer, causing the unscreened population burden to increase in the United States. The propensity to undergo preventive screening varies by health insurance type in the United States.

However, health insurance does not always encourage screening behavior among women. Women who already had health insurance, without regard to either government health insurance or private insurance, did not fully adhere to the cervical cancer screening requirements, as they felt that they did not need to undergo the screening (Suk et al., 2022). Some women who had private health insurance did not undergo cervical cancer screening tests as they did not feel the need to get tested for cervical cancer (Suk et al., 2022). System-level alterations, such as incentives from health insurance, can disincentivize women who intend to get screened for cervical cancer (Qin et al., 2021). Women without health insurance were less likely to report the need to get tested, as they may not be able to afford a doctor's visit even if the doctor were a primary care provider. Hence, the second major factor underlying the need for testing cannot be determined, and private health insurance is a significant contributor to this outcome.

Differences in health insurance types over time are observed in preventive screening behaviors among women. The African American women who had private insurance or were without insurance were more likely to get screened for cervical cancer using a Pap smear test after the implementation of the Affordable Care Act (ACA), in comparison to years before the implementation of the ACA (Huguet et al., 2019; Suk et al., 2022). When comparing a larger time frame, starting from 2005 to 2019, all the racial groups except the Asian American women had a higher deficit in up-to-date screening for

cervical cancer when health insurance was a determining factor. Hence, it is important to consider why health insurance is necessary for women belonging to different racial groups, such as African Americans and Asian Americans, as cervical cancer screening deficits can add more women to the unscreened population burden.

The ACA's expansion of government-sponsored health insurance significantly facilitates access to preventive screening tests for women. Whether governmental or private, the type of health insurance is a significant determinant of cervical cancer screening (Suk et al., 2022). With the ACA's 2010 expansion of Medicaid, the number of women who could not afford private health insurance due to financial constraints decreased significantly (Huguet et al., 2019). Still, many women, regardless of health insurance status, did not get screened for cervical cancer since they were not sure whether this screening was related to the HPV vaccination (Huguet et al., 2019). This disconnect in screening rates before and after ACA implementation warrants further exploration. Hence, it is evident that women belonging to a specific racial group, such as non-Hispanic Asian Americans without any specific health insurance, influence the need to get screened for cervical cancer as a preventative measure.

The affordability of private insurance, such as Anthem, Cigna, or UnitedHealthcare, without a solid financial framework, can be astounding to women. For instance, women report financial difficulty paying monthly premiums for employer-based insurance coverage each pay cycle (Biddell et al., 2021; Huguet et al., 2019). Some women with health insurance were unable to pay the out-of-pocket costs of these screening tests (Biddell et al., 2021). Even if the co-pay option can be waived, the rate of

change in cervical cancer screening test uptake cannot be determined nationwide. Consequently, the cost associated with private health insurance does have an impact on the uptake of preventative screening tests for cervical cancer, like the Pap smear and the HPV test.

Cost alone is not always a concern when using alternative insurance plans since the work-life balance associated with a given insurance type will also affect the rates of cervical cancer screening tests. The other factor that hinders women from getting screened for cervical cancer is the need to use their health insurance and miss work time, leading to less pay for that day (Biddell et al., 2021). Sequentially, this prevents them from scheduling future screening appointments, as reduced pay due to missed work leaves them unable to afford health insurance (Biddell et al., 2021). Maintaining their health insurance is vital to be able to see a doctor, and if they cannot afford to have their health insurance, then they will not be able to focus on preventative tests such as the Pap smear or the HPV screening test (Biddell et al., 2021; Suk et al., 2022). Having financial resources to help schedule screening tests is essential; health insurance is necessary to achieve this objective. As a result, preventive health screening tests for cervical cancer, such as a Pap smear or an HPV test, cannot be easily scheduled and completed on weekdays because the cost of the test is associated with a missed workday, affecting the current or future scheduled dates for such tests.

Health insurance, as a factor, yields different outcomes when other factors, such as education or income, are not controlled. Women who did not have health insurance preferred not to undergo cervical cancer screening unless more factors, such as

educational level or income level, were added for a better understanding of the interplay in this screening process (Biddell et al., 2021). Additional factors, such as education and income levels, were included, and variation in results was observed (Biddell et al., 2021; Suk et al., 2022). When an additional factor, such as educational attainment or income level, is incorporated into health insurance status, a clearer understanding of cervical cancer screening uptake, including Pap smears and HPV tests, can be achieved (Suk et al., 2022). This is the reason the availability of any health insurance is a necessity for a woman to get hold of the medical personnel for a basic check-up, which can potentially lead to preventative screening tests like a Pap smear for cervical cancer.

In summary, health insurance helps women access a primary care physician who can conduct a health check-up and guide them to preventive screening tests, such as the Pap smear or HPV test (Suk et al., 2022). Even if a woman has a type of health insurance, the potential premium cost or the out-of-pocket costs for such preventative screening tests affect the decisions to undergo these tests during a scheduled date and time, as missing a workday can impact their (the woman's) pay which affects their ability to make their ends meet and keep their insurance plan for themselves and their dependents (Suk et al., 2022). These are the reasons this study is important: it considers the potential interplay between levels of social functioning and community involvement while controlling for factors such as health insurance status, age, educational level, and income.

Age and Cervical Cancer Screening

Screening women with or without a prior history requires selecting the appropriate age range. Women between the ages of 26 and 30 had the lowest adherence

to cervical cancer screening tests when analyzed by all ethnic/racial groups, and the main reason for this type of non-adherence to screening is yet to be discovered (Jensen et al., 2023). Adherence here refers to at least one cervical cancer screening test every five years among women who are older than 21 years of age in the United States (Jensen et al., 2023). As a result, clustering the age groups from 21-30 years is better than looking at 18-24 years, since those below 21 years of age are way too nascent to evaluate the possibility of cervical cancer. Numerous studies cluster age groups to examine how outcomes may vary in analyses of cervical cancer screening uptake.

Specific tests will differ slightly for older age groups to clarify the basis for testing. The two available screening tests are the HPV test and the conventional Pap smear. The US Preventive Services Task Force (USPSTF) recommends screening for all individuals aged 21-29 years every 3 years in all U.S. states. Also, women at risk between the ages of 25 and 65 need to be screened every 5 years (Jensen et al., 2023). The various age groups in which the screening tests are recommended highlight the importance of preventive analysis of pre-cancerous lesions that may lead to future cancers. Hence, the different repetitive testing requirements underscore why some women are at a higher risk for cervical cancer than others.

Entering adulthood does not automatically mean that testing for cervical cancer is compulsory. Although it is challenging to begin testing earlier, women aged at least 21 can be tested at a medical facility to control for variables such as income level, educational attainment, ethnicity, and race (Arbyn et al., 2019). Consequently, the woman may test negative, although cancer would be in progress inside her cervix

(Rayner et al., 2023). When the immune system is combating the early stage of cervical cancer (Rayner et al., 2023), the test will not detect it. Consequently, the woman may overlook the possibility of cancer in the future. Although the focus is primarily on screening measures, the HPV example was cited to underscore why categorizing screening by a single age group can be challenging.

Surveillance for cervical cancer screening is generally performed using the same age groups, even within a US state. However, the screening evaluation period will have just a one-year window. Comparing screening rates across clinics and medical facilities will begin with age groups, ethnic groups, racial classifications, and health insurance status (Gargano et al., 2019). A case in point is the 18-20 age group; for instance, cervical cancer screening rates were evaluated in 2018-19, 2019-20, and 2020-21 to reduce conflicting results (Gargano et al., 2019). Women under 25 can undergo conventional cytology screening, whereas those aged 25-30 or older must undergo screening for external agents, such as the HPV test (Bruni et al., 2022). As a result, screening approaches for different age groups of women need to be tailored differently due to various causes leading to cervical cancer. Hence, a standard screening test, such as visual inspection with acetic acid (VIA) alone, is not advisable (Gargano et al., 2019). To sum up, screening tests for cervical cancer are differentiated by age group, as younger women can undergo the Pap smear. In contrast, the other age group can undergo the screening for HPV.

Regardless of screening test type or age group, screening efforts are unevenly distributed across the United States. In a study involving at least 376 women from

different states in the United States over five years, starting from 2013 to 2018, 228 women were not screened for cervical cancer using any testing method, and among those who were classified as not screened for cervical cancer, 72 women (32.0%) did not undergo any screening test, 156 (68.0%) had 1 or 2 Pap smear tests within the six-month time frame, and 93 (41.0%) had at least 1 HPV screening test as part of the cervical cancer screening approach (Benard et al., 2021; Serrano et al., 2022). This type of variation in adherence can be concerning. Also, although both the Pap smear and the HPV screening tests are equally invasive, the former was more uncomfortable for the sample of US women (41.0%+32.0%= 73.0%), who did not prefer a Pap smear by either not opting for screening or using an HPV test to detect cervical cancer (Serrano et al., 2022). The feasibility of the cervical cancer screening test can be effective in the acceptance of a Pap smear in comparison to an HPV test; more US women will prefer the HPV screening test in comparison to the more traditional Pap smear, as the latter is slightly more uncomfortable when seen as a process (Serrano et al., 2022). Further research is needed to identify other factors contributing to these variations across studies.

When examined by age group, there is a distinct difference in screening test adherence between younger and quasi-middle-aged groups and older groups. The age group 23-29 (20.6%) was not screened by any method for cervical cancer, and the age group 40-54 (44.3%) was not screened by at least one method. Among women in the 55 years and older age group, 35.1% were not screened using one or both testing methods (Pap smear and HPV screening as part of the cervical cancer screening approach) (Benard et al., 2021; Serrano et al., 2022). Several variables, including educational

attainment, income level, ethnicity, race, and health insurance status, may play significant roles among individuals aged 40- 54. Numerous factors, such as educational attainment, income level, ethnicity, race, and health insurance status, may play a role. Inconsistencies in this result prompt complex analyses that account for multiple factors, even when focusing on only a few age groups in the United States. Consequently, more focus is required on these abovementioned specific age groups to see how and why some women in different age groups are screened for cervical cancer.

This study is vital because women across age groups in the United States do not receive screening in accordance with USPSTF recommendations. Therefore, based on the study's findings, a policy brief and a community health intervention can be recommended. The intervention will focus on increasing participation in various cervical cancer screening tests across the United States. Other variables like ethnicity, educational attainment, income level, health insurance status, and race are controlled while trying to understand the relationship between the major independent variables (the levels of community engagement and social functioning) and the dependent variable (cervical cancer screening rate).

Race and Cervical Cancer Screening

Cervical cancer screening rates vary when comparing different racial populations in the United States. At least one-third of women who did not get screened for cervical cancer die every year, and the disproportion can be observed with African American women who do not get opportunities for screening with a Pap smear test (Ford et al., 2021; Liang et al., 2021), or by looking for the human papillomavirus (HPV) infection

(Liang et al., 2021). The African American women in some states in the US have a higher percentage of compliance with Pap smear cervical cancer screening in comparison to other racial populations (75.0% vs. 69.0%) (Liang et al., 2021). There is less follow-up screening after a medical practitioner visit; as a result, more research is needed to address this gap. At least one racial group (the African Americans) had better adherence to cervical cancer screening in comparison to other major racial groups, even if a basic cytology-based approach (Pap smear) was analyzed.

Screening tests conducted in other studies show distinct outcomes by race, even when the sample was large. Although more than 11,000 American women test positive in the cervical cancer screening test using the Pap smear method and HPV vaccination, more than 60.0% of these results affect racial minority populations and those living with lower education and income levels (Ford et al., 2021). The African American and Hispanic American populations were more likely to be delayed in getting screened for cervical cancer in comparison to other racial populations (Boitano et al., 2022). When analyzed by race, there were different possibilities leading to (a) the awareness about the HPV, (b) a medical report about the Pap smear test, (c) the Pap smear test after seeing a medical practitioner, (d) the woman received the results of the Pap smear, (e) if abnormal results were obtained, what steps were taken subsequently, and (f) the woman followed up the subsequent steps following positive results on the Pap smear (Boitano et al., 2022). Consequently, different outcomes will arise from raising awareness of HPV, the importance of the Pap smear, and how women should respond to positive or negative test results.

The differences in outcomes for African Americans are significant. The African American women fared differently on (a) the awareness about HPV, (b) the reports recommending a Pap smear test after seeing a medical practitioner, (c) obtaining the results from a recent Pap smear (if the time window was within the past three years), (d) consulting future steps after a positive test result is obtained (Ford et al., 2021). Provider bias when dealing with African American women does influence the level of adherence to cervical cancer screening guidelines, as those women who did get a positive test did not follow up, as the provider did not take steps to advise and guide them for treatment options (Liang et al., 2021). The reason this much detail is mentioned is to highlight a discrepancy in the screening for cervical cancer when racial heritage is considered in the United States. Differences in the time frame for when such preventive screening tests are recommended need to be considered judiciously, since the subjectivity component for each woman may arise within the 3-year window if a positive or negative test result is obtained.

The variations in cervical cancer screening will arise with other racial communities, such as with Asian American, American Indian, and Hispanic American women. Asian American women have a lower percentage of cervical cancer screening in comparison to White-American women (67.5% vs 71.3%). Hispanic American women have a lower percentage of cervical cancer screening in comparison to White American women (67.5% vs 71.3%). Hispanic American women (belonging to all races) had a screening rate of 67.3% (Lei & Lee, 2023). The American Indian and Alaskan Native (AIAN) women have the lowest cervical cancer screening percentage (60.4%) (Lei &

Lee, 2023). Although Asian American women have a moderate screening percentage, they were the highest among all racial populations when women were asked about the possibility of never being screened before for cervical cancer (24.9%) (Lei & Lee, 2023). Even if women know a good deal of facts about cancer, adherence to cervical cancer screening requirements is not high since the basic knowledge about cervical cancer screening is low (Zhang et al., 2025). Hence, some of these results highlight why there is a subtle discrepancy in the screening uptake among Asian American women in comparison to other racial groups in the United States. More research needs to be conducted to discern why such variations in cervical cancer screening uptake occur among these racial groups across the United States.

Non-adherence to cancer screening is common among different national-origin populations categorized under the Asian American citizenry. When compared with all other racial groups, Asian Americans had the least screening adherence, which is a matter of concern for public health scholars. Because of that, Asian American (Lee et al., 2022; Lei & Lee, 2023) (women whose heritage is from East Asia (Japan, Korea, China, etc.), South Asia (India, Pakistan, Nepal, etc.), Southeast Asia (Indonesia, Malaysia, Singapore, etc.)) women do not adhere to the cervical cancer screening requirement. There are no clear indicators of why this situation persists among this subset of Asian American women. As a result, this situation must be remedied before the burden on the unscreened population in the United States becomes unmanageable.

Asian Americans may not be able to say that their immediate family member had cervical cancer (Lee et al., 2021). At the same time, socioeconomic factors like

educational attainment and the income level among these racial populations will also influence the different cervical cancer screening percentages, as non-Hispanic White American women who have little education and work in blue-collar jobs tend to have lower cervical cancer screening percentages (Lee et al., 2022; Perkins et al., 2023). Therefore, they may not be referred to for cervical cancer screening. An individual component plays a role in preventing the disclosure of cervical cancer or another cancer in the family history, in addition to socioeconomic factors and work type, from getting screened for cervical cancer (Lee et al., 2022). Response patterns may be a concern when analyzing differences in cervical cancer screening rates.

U.S. citizens from racial populations other than White Americans who were born outside the United States were more likely to get screened for cervical cancer using a Pap smear or HPV. Two out of three women aged 30-49 worldwide do not receive screening, resulting in a greater population burden before migration to the United States (Lee et al., 2022). This is because U.S. immigration regulations may require such screening prior to admission to the United States (Lee et al., 2022). White Americans are mostly first-generation to fourth-generation Americans, so they do not get this screening opportunity (Bruni et al., 2022; Lee et al., 2022). Lee et al. (2022) elucidate that Asian American women and women belonging to other racial populations need to have basic oral and written literacy to correctly understand questions concerning screening for cervical cancer. The way written materials in English are presented to this ethnic group in a general sense will have a role in encouraging Asian Americans to get either screened or not screened for cervical cancer (Lee et al., 2022). Hence, the origin of Asian American

women and their ability to read and write may affect their propensity to adhere to cervical cancer screening requirements.

The costs associated with screening tests can also deter some racial minority communities that do not have the funds to cover what they need to make ends meet. Additionally, adding copayments or coinsurance, along with required premium payments, can cause some racial minority families to stretch their weekly or monthly expenditures beyond their means (Goding Sauer et al., 2019; Sauer et al., 2020). The African American women, as well as other racial minority populations, may not have similar cervical cancer screening methods regardless of the individual cost to cover screening tests (Sauer et al., 2020). Therefore, the percentage of women belonging to these racial minority populations will not get screened within the required age groups wherever they live in the United States (Sauer et al., 2020). Now that we have some information about various disparities in screening rates for cervical cancer by racial groups, we must investigate at a greater depth the interplay between racial groups as a factor in cervical cancer screening rates.

Ethnicity and Cervical Cancer Screening

Ethnicity plays a significant role in cervical cancer screening rates. In the United States, ethnicity can often be categorized into two simple types: (1) Hispanic and (2) Non-Hispanic (Sauer et al., 2020). Among the non-Hispanic ethnicities, many racial groups such as White-Americans, African Americans, American Indian and Alaska Native (AIAN), and Asian Americans can be analyzed. Many racial groups are collectively classified as Hispanic (Jensen et al., 2022). Categorizing populations by

ethnicity facilitates the collection and analysis of data on cervical cancer screening rates. This type of combination within a broader ethnic group will facilitate comparisons of screening test uptake in the US population.

Different outcomes are observed when ethnicity is analyzed with or without controlling for age and specific U.S. location. There are contrasting details when cervical cancer screening is analyzed by ethnicity, since African Americans have lower rates of screening when compared with other racial groups (Fuzzell et al., 2021). However, after controlling for location and age groups, there is minimal variation in screening rates across these ethnic groups (Fuzzell et al., 2021). A small subset of African American women and Hispanic American women have difficulty understanding complex details about cervical cancer screening, and this barrier is linked to women who do not have a higher level of education (Fuzzell et al., 2021; Ridgeway et al., 2021). Analyzing women across ethnic groups provides more detail when educational attainment is considered and helps understand how these women's medical and non-medical complexities (regardless of how they are presented) are handled during such screening tests.

The type of explanation at a medical site that a woman belonging to the African American population receives does influence her mind to get such a preventative cervical cancer screening test (Fuzzell et al., 2021). When a sample of members belonging to the African American community does not participate in the preventative screening test for cervical cancer, they will increase the unscreened population burden in the United States (Spencer et al., 2023). Without proper elucidation at a site to encourage African American women to get screened for cervical cancer, the level of awareness and the

seriousness of the condition will not be understood (Spencer et al., 2023). Hence, these women may have a positive diagnosis in the future, which is detrimental to their longevity. Additionally, a plausible reason is that educated advice from medical personnel may encourage them to undergo preventive tests for detecting cervical cancer.

The likelihood of getting screened for cervical cancer can vary by different racial and ethnic groups in the United States. Asian American women were more likely to get screened for cervical cancer, and this pattern is concordant with Hispanic American women (Hispanic people of all races), while African American women had a slightly higher screening rate than White American women (Haas et al., 2021; Sabatino et al., 2023). Women who are younger on average in each of these ethnic groups had a higher rate of screening for cervical cancer than those who were older (Haas et al., 2021). This type of variation in the outcome will not always be consistent across studies, as other potential factors, such as the age, ethnicity, and income level of the researchers included, are not consistently considered. Hence, the screening rates for cervical cancer by racial groups are a significant factor in these studies that help us understand why certain racial groups get screened more than others.

Employment Status and Cervical Cancer Screening

The employment status coincided with the information on the income of a woman and the connection with preventative screening for cervical cancer. More than 61.0% of non-elderly American men and women require employment to obtain employer-based health insurance, which helps them and their dependents address their health needs, including during emergencies (Sauer et al., 2020). Although most studies highlight the

connection between health insurance and the screening rates for cervical cancer (Fedewa et al., 2022), the data presented in many studies perfunctorily educate the importance of employer-based insurance in addition to other types of insurance like Tricare, Medicare, Medicaid, and other private insurance plans (Sauer et al., 2020). Hence, it is noteworthy that employer-based health insurance, which accounts for a significant share of health insurance among most non-elderly American women, is a major contributor to preventive health check-ups and screening tests, such as Pap smears and HPV tests, which focus on cervical cancer prevention.

Employment status and health insurance coverage varied before 2019 because analyses were conducted separately for major ethnic groups, including Hispanic and non-Hispanic Americans. Even before the COVID-19 pandemic, about 30.0% of unemployed women with any insurance belonged to the Hispanic American ethnic group and/or African American racial group (Fedewa et al., 2022; Harper et al., 2020). On the contrary, about 20.0% of employed nonelderly American women with access to health insurance belonged to the Hispanic American and/or the African American racial group (Harper et al., 2020). Health insurance coverage remains affected, despite the smaller number of employed and non-employed American women compared to unemployed and non-employed women. The purpose of presenting these facts is to emphasize the importance of health insurance as a crucial factor in cervical cancer screening. Without health insurance, obtaining preventive screening tests, such as Pap smears or HPV tests, will be more challenging.

The employment status of a woman can influence how she can procure a type of health insurance to afford preventative screening tests like a Pap smear and an HPV test. The percentage of employed non-elderly American women remained unchanged in the 2010s, even after the Affordable Care Act (ACA) was enacted (Harper et al., 2020). The percentage of unemployed Hispanic Americans between 2000 and 2018, a period spanning the 2000s and 2010s, was 13.1%, while those employed were 9.4% (Fedewa et al., 2022; Harper et al., 2020). Since the numbers of employed and unemployed individuals varied to some extent, employment status is vital to this study in the context of cervical cancer screening. Hence, most of these unemployed, nonelderly Hispanic American women fall into the burden of the uninsured population, exposing their risk of not getting screened for cervical cancer despite the presence of Medicaid in different states in the United States.

The percentages of employed non-elderly White and Asian Americans also did not change substantially. Non-elderly White Americans, African Americans, and Asian Americans also remained unchanged over the past several years (Harper et al., 2020). The nonelderly White American women had an unemployment rate of 64.2%, nonelderly African American women had an unemployment rate of 16.4%, and when nonelderly Asian American women are included, the unemployment rate goes down to 4.9% (Harper et al., 2020; Kindratt et al., 2020), which indicates that the uninsured burden increases alongside the unemployed population. Consequently, preventative screening for cervical cancer among women cannot be performed without solid employer-based insurance. This

is one of the reasons why having employer-based insurance helps take care of the preventative measures against cervical cancer, among other types of cancers.

When an employer-based insurance option is not possible, then a prospective variation in the past year's screening and a 10-year screening for cervical cancer, among other cancers, is possible. Unemployed, nonelderly American women were 10.0% to 30.0% less likely to be current on preventative screening for cervical cancer using any screening test, such as a Pap smear or the HPV test (Fedewa et al., 2022). Also, they are four times as likely as nonelderly American women to be uninsured (Fedewa et al., 2022; Spencer & Pignone, 2022). Without holistic insurance coverage, preventative screening tests such as the Pap smear and HPV test will not be possible for all women. Employer-based insurance can provide different options based on the type of plan the employee has subscribed to, facilitating cervical cancer screening by scheduling either an HPV test or dispatching a take-home Pap smear kit.

Employed women can seek either cervical cancer screening test, as they can obtain details on which option is economically feasible, whether with or without full support from their employer-based health insurance. The percentage of employed American women (65.4%) differed on the selection of tests with 68.3% of White American women preferring a Pap smear (81.6%) over an HPV test (48.9%) in comparison to employed African American women (66.4%) preferring a Pap smear (87.0%) over an HPV test (57.6%) (Sokale et al., 2023). Also, employed American Indian women (55.7%) preferred a Pap smear (78.7%) over an HPV test (51.0%), in contrast to employed Hispanic American women (54.3%) who preferred a Pap smear

(81.9%) over an HPV test (49.8%) (Sokale et al., 2023). Women from all these ethnic and racial groups can get such options if recommended by the medical personnel to choose from before getting tested for cervical cancer. To sum up, employer-based health insurance offers better options to choose from when it comes to preventative screening tests, such as Pap smear and HPV test, while unemployed women's options are limited.

Educational Attainment and Cervical Cancer Screening

Educational attainment is one of the social determinants of health (SDOHs), and a woman's education can cause a variation in the uptake of cervical cancer screening tests. Women with an education beyond high school are twice as likely to get screened as those with a high school diploma or less education (Murfin et al., 2020). Those with a high school education or higher tended to heed more to screening tests like Pap smear for cervical cancer than those who had less than a high school education (Harper et al., 2020). With easier understanding due to higher educational attainment, these women can have access to better health insurance and, in turn, better resources for cervical cancer screening options. Hence, a woman's educational attainment can help her understand the protocols related to these screening tests.

A woman's education can help them comprehend simple information regarding cervical cancer prevention and the types of screening tests available. Women with less educational attainment were a majority among the under-screened women since they could not understand and get a hold of information about cervical cancer screening (Zeno et al., 2022). Information about cervical cancer screening can be hard to follow if a woman does not have education beyond high school (Zeno et al., 2022). Women with

limited education also needed help navigating resources for a Pap smear test and HPV vaccination before HPV testing, i.e., issues with health literacy and inadequate help from medical personnel in explaining these preventive screening tests (Falk et al., 2022; Vega Crespo et al., 2022). Educational level may influence understanding of complex jargon associated with preventive screening tests (Vega Crespo et al., 2022), and women who comprehend such information do not ignore the need for cervical cancer screening (Falk et al., 2022). The level of education plays a role in the basic understanding of the need to undergo preventive screening tests, such as a Pap smear and an HPV test, with a healthcare provider.

Higher educational attainment positively correlated with higher health literacy and a better understanding of some complex information about cervical cancer screening tests (Goding Sauer et al., 2019; Zhang et al., 2022). As a result, these women with higher education, beyond high school, for instance, had higher screening rates in comparison to those who had education up to high school, since an average college degree will introduce more verbiage and meanings in any major, leading to more knowledge than those who had just a high school diploma (Zhang et al., 2022). Learning beyond high school is more important for understanding complex information about preventive screening tests for cervical cancer than for those who completed only high school.

While educational level can directly affect the understanding of cervical cancer screening, limited educational resources about the specifics of cervical cancer screening will affect the acceptance of screening tests like the Pap smear or the HPV vaccination

among women (Fuzzell et al., 2021; Petersen et al., 2022). Hence, specific resources about either type of preventive screening test can be interpreted differently depending on educational level. Consequently, they (these women with different educational levels) may or may not accept either of these preventative screening tests for cervical cancer.

A complex interplay between understanding the screening test, its location, and the cost of undergoing these tests affects uptake among educated women (Fuzzell et al., 2021). In addition to the educational resources available to women with higher educational attainment, factors such as geography, the cost of screening tests, and poorly managed healthcare systems may deter educated women from undergoing such preventive screening tests (Petersen et al., 2022). The lack of awareness about these cervical cancer screening tests can contribute to decreased rates for these tests. When educated women hesitate to seek local healthcare services, a synergistic effect results in lower acceptance of these preventive tests (Srinath et al., 2023). As a result, a complex understanding of preventive screening tests, their associated costs, and the geographic contexts in which they must be conducted should be instilled among educated women to increase uptake. Such a holistic understanding will help make a solid connection between educational attainment among some women and the rate of cervical cancer screening uptake.

The approachability of the medical providers and their staff to these educated women can influence them to undergo cervical cancer screening tests (Srinath et al., 2023). When women with higher educational attainment visit their healthcare provider, their expectations regarding the practitioner’s recommendations influence their decision

to undergo screening tests, such as Pap smears or HPV testing (Okunowo & Smith-Okonu, 2020). A note from a woman's medical practitioner can help her decide when to schedule a Pap smear to prevent a late-stage cervical cancer diagnosis (Okunowo & Smit-Okonu, 2020). Therefore, educated women need an educated referral or a recommendation from a medical practitioner to undergo preventative screening tests for cervical cancer, without which they are more likely to fall into the unscreened population burden in the United States.

All these factors affect the uptake of screening tests among women with higher educational attainment. In this regard, women with limited educational attainment will fare as well as those with higher levels of education. A case in point is the role of education, coupled with English proficiency, in increasing the likelihood of screening test uptake among some Korean American women in the USA (Choi et al., 2020; Lee et al., 2021). Hence, the level of education at or above high school can play a deep role in the propensity to get screened for cervical cancer.

Income and Cervical Cancer Screening

A woman's income level should be considered when analyzing the uptake of preventive cervical cancer screening tests. The income level of a woman influences either positively or negatively the efforts toward cervical cancer screening, as those with a higher income were able to afford better clinical facilities that can conduct cervical cancer screening, either using a Pap smear test or a test for HPV, which is associated with cervical cancer (MacLaughlin et al., 2019; Silvera et al., 2020). Also, a significant percentage of women who belong to some ethnic groups, such as Hispanic Americans,

tend to earn income below the poverty line in the United States (Silvera et al., 2020). These women do not want to be screened for cervical cancer due to cultural reasons not shared with every other Hispanic person in the United States (Silvera et al., 2020). As a result, the income level of a woman is influenced by cultural factors within ethnic groups before they think of getting screened for cervical cancer in the United States.

Low-income women have differential preferences for cervical cancer screening, although they did not undergo either of these tests before. In one study, women earning low income (at or below the Federal Poverty Line) preferred to undergo testing for the HPV rather than the Pap smear, and a similar outcome was obtained with low-income women living in rural areas of the United States in comparison to the urban areas (Biddell et al., 2020). Low-income Hispanic American women also preferred the HPV screening test in comparison to the Pap smear, alongside African Americans, Asian Americans, and American Indian Alaskan Native (AIAN) women (Biddell et al., 2020; McDaniel et al., 2021). The preference for a specific type of preventive cancer screening can be a selective factor, as personal choice influences the choice of one screening test over another.

Lower cervical cancer screening rates are associated with low-income women. Hispanic American women who had a lower income still reported having had a Pap smear test in comparison to White American women, African American women, and Asian American women in the United States (Riggs et al., 2021). Low income was also associated with abnormal Pap smear results, as women with less income did not have the opportunities to get screened for cervical cancer frequently. As a result, they could not

get guidelines ahead of time to protect themselves from cervical cancer (Kiser & Butler, 2020; Riggs et al., 2021). Hence, income level, being a risk factor for reduced compliance with cervical cancer screening guidelines, played a significant role when analyzing ethnic groups of women who lived in distinct parts of the country.

High-income White American women performed comparably to Hispanic American women when analyzing Pap smear test history and abnormal screening test outcomes (Riggs et al., 2021). One reason for this unique situation may be the comparable history of cervical cancer screening within the past five years in the samples of women who were analyzed in the study (Riggs et al., 2021; Shah et al., 2020). When a factor, such as income level, is combined with other factors, like smoking, alcohol consumption, or stress levels, in the analysis, outcomes indicating no difference between two ethnic communities are not inevitable. To sum up, other residual factors like smoking history and the time frame of the study interval affect the uptake of the preventative screening tests for cervical cancer.

Before seeking housing in private apartment complexes, an income assessment will be conducted. No study analyzing income levels found the same patterns as those explained in the previous paragraphs. Sharma et al. (2022) used a multi-theory approach (MTM) to analyze the variation in the uptake of cervical cancer screening among different subsets of women in the USA. They found that educational transformation is associated with higher income, attributable to higher-paying jobs, practices that promote cervical cancer screening, and changes in the social support environment, particularly among women earning less than USD 25,000 per year (Sharma et al., 2022). There is a

76.0% variation in adherence to the cervical cancer screening guidelines when educated women with a higher income are surveyed in comparison to women without educational attainment, which could lead to higher income in various parts of the USA (Sharma et al., 2022). Women who earn less than USD 25,000 without any health insurance have a higher likelihood of not undergoing preventative cervical cancer screening (Orji & Yamashita, 2021; Sharma et al., 2022). Consequently, the variation in adherence to the preventative screening tests for cervical cancer directly coincides with the income level of the woman. Low-income women without health insurance are unlikely to undergo these preventive screening tests.

Overall, all these complex factors need to be correctly considered, with the income level of the woman as one of the significant factors, before checking why there is a discrepancy in the adherence to preventative screening for cervical cancer in the United States. Consequently, income level significantly influences cervical cancer screening rates in the United States (Sharma et al., 2022). With some exceptions, a higher individual income will help in affording resources for undergoing cervical cancer screening tests as a preventive approach to advanced-stage cervical cancer in the future.

Cervical Cancer Screening

Screening for cervical cancer is the first step in trying to reduce the morbidity and mortality associated with this disease. Cervical cancer screening is a test to detect abnormal changes in the cervix of a human female, such as cervical intraepithelial neoplasia (CIN), squamous intraepithelial lesion (SIL), and dysplasia (Eifel et al., 2018). The level of abnormal cells in the cervix is ranked from 1 to 3, with 1 being less severe,

while 2 and 3 indicate more serious abnormal cells that can lead to cervical cancer soon (Eifel et al., 2018; Jhingran et al., 2020). The two main types of cervical cancers are squamous cell carcinoma and adenocarcinoma, and the most common type of cervical cancer among these two is squamous cell carcinoma (90.0%), which develops from the cells of the exocervix (Eifel et al., 2018). Hence, without screening for such abnormal cells in the cervix, cancer in this part of the body can be detrimental. The complex classification of cervical cancer is necessary to understand before we study why either the Pap smear or the HPV test is conducted to look for cervical cancer.

The less common type of cervical cancer is adenocarcinoma, which develops from the glandular cells that produce mucus in the cervix (Fontham et al., 2020). Even less common types of cervical cancer are adenosquamous carcinoma or mixed carcinoma, which have characteristics of both types of cancer cells (Eifel et al., 2018). Since more than one type of cell causes cancer of the cervix, proper screening per the guidelines of the US Preventive Services Task Force is required to save the lives of women who may be diagnosed with this disease at a later stage (Fontham et al., 2020).

Given the diversity of the types of cancer that affect the cervix (such as adenocarcinoma, squamous cell carcinoma, and mixed carcinoma), early screening for this cancer is the best way to prevent late diagnosis, which potentially leads to morbidity and mortality. A range of factors, including health insurance status, age, race, ethnicity, employment status, education level, and income level, influence cervical cancer screening rates. Analyzing each of these factors against the rate of screening for cervical

cancer can tell which of these factors has a more substantial influence on the rates of cervical cancer screening across the United States.

A systematic search of academic databases, including the Walden University library, revealed a distinct gap in the existing literature concerning the relationship between cervical cancer screening rates, community engagement, and social functioning. Notably, current research often fails to account for Social Determinants of Health (SDOH) as potential confounders within these variables. Following an exhaustive review of these findings, the current study was developed to address these gaps. This critical synthesis of the literature directly informs the research questions and their corresponding null and alternative hypotheses.

Definitions

Community engagement (independent variable): This variable assesses time spent volunteering or associating with an organization; it gauges community engagement (NCHS, 2023).

Social functioning (independent variable): This variable assesses the ability to fulfill social obligations, excluding individuals with any physical, mental, or emotional condition (NCHS, 2023).

USPSTF: Short for the United States Preventive Services Task Force. A third-party organization that uses evidence to make suggestions that help the health outcomes in a population within the United States (Barry et al., 2023).

Assumptions

The 2023 National Health Interview Survey (NHIS) is the long-standing and most extensive health interview survey in the United States. The NHIS datasets are accurate because they gather unedited answers to questions from interviewers in a diverse sample of the United States population, stratified by age, gender, and physical location. The social determinants of health (SDOH) mentioned in the dataset are very useful for evaluating cervical cancer screening rates across health insurance status, age, race, ethnicity, employment status, education level, and income level.

Scope and Delimitations

The main reason why this study was conducted because the rate of cervical cancer screening categorized by health insurance status, age, race, ethnicity, and socioeconomic factors (e.g., employment status, education level, and income level) across US women of different ages have not yet been studied with the women's levels of community engagement and levels of social functioning are analyzed cohesively for the first time. The analysis of numerous factors, including levels of social functioning and community engagement, supports the study's internal validity. The external validity of this study is supported using the socioecological model (SEM) and a population age range of 18 years and above, which defines the boundary for survey data collection. This study can be generalized to a certain degree since the respondents are all adults in the United States, the large sample size can be considered a credible factor to help with this level of generalization, however, not every US adult across the country will concur to these aspects if surveyed at a different time-frame and at any other standpoint, such as their

lack of family history for cancer, or their lack of positive result on two-to-three consecutive Pap smear tests after the age of 21. This study will provide further detail by analyzing all independent variables and confounding factors, along with their effects on the dependent variable (the rate of cervical cancer screening) in the United States, using the NHIS 2023 dataset.

Limitations

A significant limitation of this study involves the NHIS (2023) sampling methodology, which may introduce systematic biases into the data collection process and final outcomes (Ross & Zaidi, 2019). Additionally, the cross-sectional design limits definitive causal inference due to temporal ambiguity, as exposures and outcomes are measured simultaneously. To address these constraints, binary logistic regression (BLR) will be utilized to evaluate the construct validity of the SEM, testing cervical cancer screening against community engagement and social functioning while controlling for key confounders

Significance

Cervical cancer is a severe disease that can have devastating effects on the health of US women. The potential contribution to the advancement of knowledge begins with creating awareness about the seriousness of cervical cancer and how this disease can be prevented by timely screening. Preventing this disease through recommended screening is the most effective way to reduce morbidity and mortality in the United States (Fontham et al., 2020). Cervical cancer is one of the curable cancers among women. Suppose proper screening tests, such as the Pap smear, the HPV test, or a combination of both, are

implemented. In that case, US women will not be in the unscreened population burden, which puts them at a higher risk for a delayed cervical cancer diagnosis that can cause mortality. The potential contributions concerning the findings from this study are mentioned at the beginning of the following paragraph.

The findings from this study will highlight whether the levels of community engagement and social functioning directly affect the rate of cervical cancer screening among US women, while controlling for factors such as health insurance status, age, race, ethnicity, employment status, education level, and income level. The potential implications of this study are that the sooner US women get screened for cervical cancer using either the Pap smear or the HPV test based on the USPSTF guidelines, the better their likelihood of survival in the long term, since cervical cancer can be prevented if precancerous lesions in the cervix are identified earlier using these screening tests. This study aims to effect positive social change by reducing the number of unscreened individuals in the United States.

Summary and Conclusions

The public health literature does not show an association between the levels of community engagement and the levels of social functioning when analyzing US women's intention to get screened for cervical cancer while controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level**.** Most studies conducted in recent years have addressed one or a few factors, such as health insurance status, age, race, ethnicity, and the likelihood of US citizens undergoing cancer screening. This study fills at least one gap by addressing how the rates of screening tests for cervical

cancer will improve if the levels of community engagement and the levels of social functioning are considered as primary independent variables, and how more US women can be saved from a delayed cervical cancer diagnosis. This study brings about positive social change by encouraging or creating awareness among US women to get screened for cervical cancer per the USPSTF guidelines. In this way, it reduces the burden of the unscreened population across the United States. In the next section, the methods used to address the gap in the literature are described, and both descriptive and inferential statistical procedures are explained in detail.

Section 2: Research Design and Data Collection

This quantitative study aimed to investigate the associations among cervical cancer screening rates, community engagement, and social functioning, while controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level, among women in the United States. This is a quantitative, cross-sectional study aimed at addressing the gap in cervical cancer screening among US women, as well as levels of community engagement and social functioning, alongside health insurance status, age, race, ethnicity, employment status, and income level. This study employed binary logistic regression (BLR) to analyze the association between the cervical cancer screening rate and community engagement and social functioning variables. The analysis pulled data from the 2023 National Health Interview Survey (NHIS), which includes responses from the non-institutionalized adult population in the United States. BLR is appropriate for this study given the binary nature of the dependent variable, whether a woman has undergone cervical cancer screening. Model-controlled covariates, such as health insurance status, age, race, ethnicity, employment status, education level, and income level, were used to ensure a comprehensive understanding of factors influencing screening behaviors.

This section comprises the research design of the study. It includes details of the research design and methodology (cross-sectional study conducted in 2023), data instrumentation (NHIS 2023 by the CDC), variable operationalization (detailed description and allocation of variables using the NHIS 2023 codebook), the data analysis plan (the binary logistic regression), threats to validity (both the internal and external

validity), and ethical considerations (how to carefully safeguard research data, personal information of survey respondents collected as part of the NHIS 2023 operation), and concludes with a summary of the research design.

Research Design and Rationale

The NHIS is a cross-sectional survey that conducts face-to-face interviews with U.S. citizens, allowing participants to self-report in their own residences (NCHS, 2023). During the COVID-19 pandemic, the interviews were conducted primarily by phone rather than in person. The NHIS 2023 secondary dataset comprises U.S.-based non-institutionalized adults aged 18- 85+ years in the 50 states of the U.S. and the District of Columbia (NCHS, 2023). The NHIS has a contract with the U.S. Census Bureau to collect data nationwide. About 864 interviewers, called field representatives (FRs), were trained by health survey supervisors at the U.S. Census Bureau's regional offices to interview non-institutionalized U.S. adults (NCHS, 2023). The supervisors who trained the health survey interviewers were Civil Service employees with years of experience, who underwent rigorous training and testing in health survey interviewing and data collection (NCHS, 2023). The target population of this study included women who were either screened or unscreened for cervical cancer. The dependent or outcome variable is the cervical cancer screening rate. The independent (predictor) variables include community engagement and social functioning, and the confounding variables include health insurance status, age, race, ethnicity, employment status, and income level.

This doctoral study utilized the 2023 National Health Interview Survey (NHIS) data to evaluate the relationship between cervical cancer screening rates and the

independent variables of community engagement and social functioning. After Institutional Review Board (IRB) approval of the study design, binary logistic regression (BLR) was employed to analyze these variables while controlling for health insurance status, age, race, ethnicity, employment status, and income. The selection of the NHIS 2023 dataset was strategically informed by time and resource constraints, as it provided a high-quality, pre-existing national sample that facilitates a rigorous analysis within the scope of the DrPH timeline. BLR is more unambiguous since the dependent variable is dichotomous, and one or more independent variables can be binary. The variables used in this study are independent; they are not multicollinear, and the sample size is large enough to yield a normal distribution, thereby fulfilling all the requirements and assumptions of the BLR.

The sociodemographic variables are considered confounding because research and conceptual models demonstrate that they play a significant role in health and equity. The sociodemographic variables were controlled to examine a direct cause-and-effect relationship between levels of social functioning and community engagement and the rate of cervical cancer screening among U.S. women (Fontham et al., 2020). The NHIS 2023 dataset comprises over 30,000 respondents and is publicly available. The NHIS 2023 survey details background information, schematic information, codebook, technical information about the survey, and interviewer training information (NCHS, 2023). A cross-sectional study is an easy and inexpensive way to measure the prevalence of various health outcomes by observing individuals at a given point in time (Wang & Cheng, 2020). A cross-sectional study is also more relevant to the prevalence of the

potential health outcome, as it addresses the research questions. The outcome variables of a cross-sectional study will limit the potential implications for future studies on related topics (Wang & Cheng, 2020). The use of sociodemographic variables in a cross-sectional study based on the NHIS 2023 survey helped delineate the potential relationship between the dependent variable (DV), cervical cancer screening rates, and the independent variables (IVs), namely, levels of community engagement and social functioning. This cross-sectional study is appropriate since it analyzed the prevalence of screening tests for detecting cervical cancer among the female citizens of the United States.

The primary purpose of the NHIS is to monitor the health of U.S. citizens nationwide. The NHIS helped achieve national health goals by tracking illnesses, disabilities, health behaviors, and health insurance coverage (NCHS, 2023). The NCHS has been collecting surveillance data in the United States since 1957, and both the CDC and NCHS provide training for interviewers using modern computerized technologies (NCHS, 2023). When interviewers conducted face-to-face interviews, questions were generated from respondents' self-reported answers, and both the questions and answers were saved online to prevent duplication (NCHS, 2023). The CDC surveys up to 38,000 respondents annually via the NHIS to assess their health conditions, including potential disabilities.

Methodology

Population

The study population comprises 29,521 US adults (aged 18 and above) and 7,692 US children, for a total of 37,213 US citizens. The study's target population is all women aged 18 and older, with a specific focus on women aged 21 to 65, in line with the Centers for Disease Control and Prevention's (CDC) recommendations for cervical cancer screening. Only women aged 18 and above who are not institutionalized were included in the adult population.

Sampling

The NHIS conducts sampling by clustering dwelling units into 1,689 geographical areas, encompassing 5,350-5,650 house addresses each across the United States (NCHS, 2023). The NCHS employed a complex-stage probability sampling design, which helps reduce costs and constrain the time required to collect thousands of data points across the United States (NCHS, 2023). The NHIS cluster sampling plan for 2016-2025 was established based on the 2010 decennial census (Moriarity et al., 2022). The NHIS 2023 datasets are openly accessible and dependable. The NCHS provides additional documents with these datasets at no extra charge.

The weighting procedures and bias assessment document for the 2020-2023 NHIS states that the sample dataset is unbiased, explicitly noting that no bias was detected in health insurance coverage, health status, or health behaviors (Bramlett et al., 2021). The weighting procedure employed a multilevel binary logistic regression analysis to predict response probabilities and ranking procedures to address variables, including those

required for calibration and population control totals (NCHS, 2023). The English and Spanish versions of the interviewer questionnaire, field interviewer manual, codebook, method summary documents, and, finally, the SPSS datasets in CSV format (NCHS, 2023).

Inclusion and Exclusion Criteria

The NHIS included female U.S. citizens aged 18 and older residing in households and in noninstitutionalized group quarters, such as homeless shelters, rooming houses, and group homes. U.S. citizens who temporarily reside in student housing units will be excluded from the sample, as they do not reside in such units permanently. For this study, I confirmed that U.S. citizens excluded from sampling were those who resided in homeless shelters, active-duty military personnel who lived on a military base, chronically ill elderly citizens who lived in nursing homes, physically or intellectually disabled individuals who were disabled or neglected, as well as those who lived in juvenile detention centers, prisons, and jails. U.S. citizens who lived abroad in 2023 were also excluded from the survey. As stated previously, based on the CDC's screening recommendations, women between the ages of 21 and 65 were given specific priority while addressing cervical cancer screening rates in this study.

Procedure for Gaining Access to Data

The NHIS survey dataset is accessible to anyone in the United States. It does not require special permission, date-of-access clearance, or approval from the Centers for Disease Control and Prevention (CDC; NCHS, 2023). The NHIS has a reasonable degree

of quality control and validity, as the clustered sampling method, coupled with well-trained health interview survey supervisors, rarely leads to errors in data collection.

Reputability and Quality of the Data Source

The NHIS is known for high-quality data collected via clustered sampling, an error-free method that reduces distortion, and for the quality of the interviewers' work (NCHS, 2023). The CDC reviewed the quality of interviewers' questions and standardized the data-collection method to eliminate potential errors. The sampling method was both cost-effective and easy to implement, given the sample size. As a result, proper data cleaning procedures were implemented before publishing the data online for public access (NCHS, 2023).

The appropriate health information was presented as part of cancer screening among U.S. adults who may be diagnosed with any cancer during their lifetime. The NHIS dataset includes relevant information about cervical cancer, as well as other cancers and various illnesses, across different demographic criteria. As part of the sampling method, select citizens across the United States received a letter soliciting participation in the survey. This step was followed by a phone call to schedule an interview. The survey respondents were assured of the confidentiality of their personal and protected information, including, but not limited to, their names, addresses, phone numbers, employment status, insurance information, and health information, such as medical records, before starting the interview (NCHS, 2023).

To meet the survey inclusion criteria, respondents were evaluated using questions that directly assessed their ability to participate in the NHIS. More than 29,000 U.S.

citizens participated in the 2023 NHIS, and approximately 3,762 respondents reported a "yes" response when asked about any cancer diagnosis.

G-Power Analysis

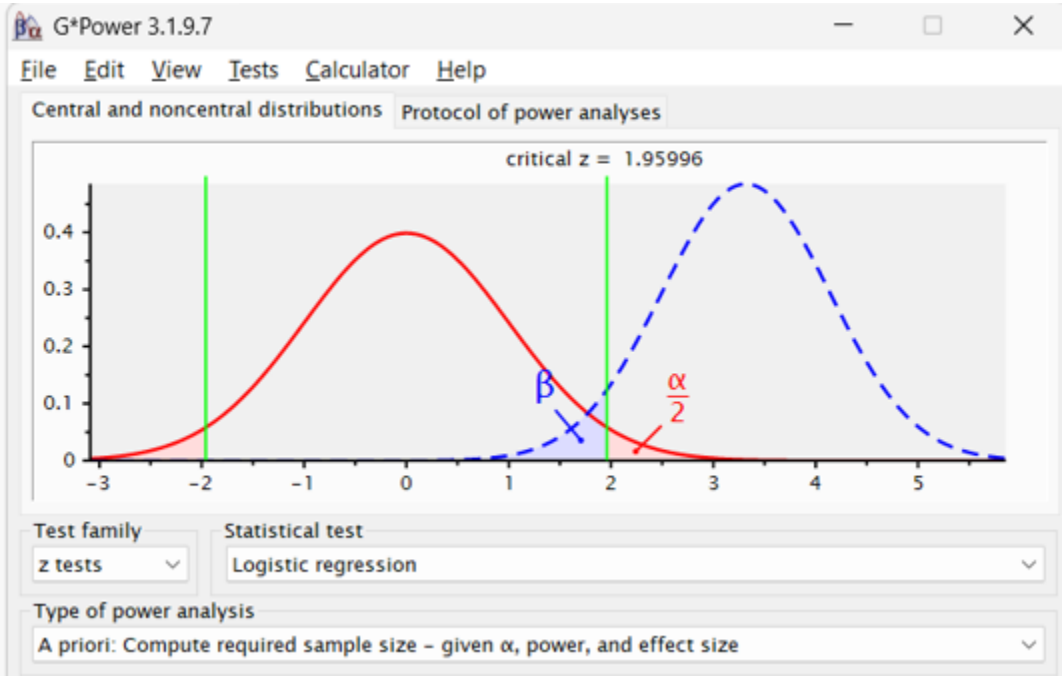
G*Power version 3.1.9.7 was used to calculate the appropriate sample size for this study. The data analysis section of this study will provide more detail on the research questions, dependent variables, independent variables, and relevant covariates. In this study, BLR was used to analyze the association between the dichotomous dependent variable and the two independent variables. The dependent variable, cervical cancer screening, is dichotomous (yes/no). The primary predictor variables for the power analysis are community engagement and social functioning.

The power analysis for Research Question 1 (RQ1) and Research Question 2 (RQ2) regarding the predictor variable, namely the cervical cancer screening rate, indicates that approximately 50.0% of respondents would provide a yes/no response to this variable (Sharma et al., 2022). For this study, BLR will be used when the variables are normally distributed, and the outcome variable is binary (Faul et al., 2009). The variables used for analysis include a *priori analysis*, Z tests (two-tailed), binary logistic regression, and related probabilities. The probability of intent for undergoing cervical cancer screening with community engagement and social functioning is 50.0% (0.50), and mathematically, this is represented by $Pr(Y = 1|X = 1)$ H_1. The probability of not undergoing cervical cancer screening due to community engagement and social functioning is 30.0% (0.30), which is mathematically represented by $Pr(Y = 1|X = 0)$ H_0. Cohen's d effect size converter for a medium effect (50.0%; 0.50) was used to obtain an

odds ratio of 2.33 (Lin, n.d.). The statistical significance level, also known as alpha (α), was set at 0.05 (α = 0.05). This alpha value provides the effect size and the strength of association between the dependent variable, the independent variable, and the covariates or confounding variables in this study. The power, denoted by 1 - β, was set at 80.0% (0.80), corresponding to the percentage of participants used to determine the appropriate statistical effect size. The R2 value is 0.25, the distribution is binomial, and the x parm value is 0.5. The total sample size to understand the beneficial effect on the variables in RQ1 and RQ2 is 207.

Figure 1

*G*Power Analysis for Research Questions 1 and 2*



Operationalization

Since 1957, the NHIS surveillance information, including data collected from respondents, has also been used by the U.S. Department of Health and Human Services

through the NCHS division of the CDC, and the U.S. Census Bureau trains the interviewers (NCHS, 2023). The NHIS is a quantitative cross-sectional survey designed to monitor the health of U.S. households across all 50 states and Washington, D.C. This dataset is suitable for the study, as it enables the tracking of the incidence and prevalence of various diseases and disabilities at the national level (NCHS, 2023). The NHIS 2023 dataset was published in 2024 and is available for public use. The age variable is continuous; the cervical cancer screening rate, the dependent variable, is dichotomous. The levels of community engagement, the first independent variable, are also dichotomous. The levels of social functioning, the second independent variable, is an ordinal variable, the woman's employment status is an ordinal variable, woman's ethnicity is dichotomous, woman's highest educational attainment is ordinal variable, woman's health insurance status is a dichotomous variable, woman's race is a nominal variable, and finally woman's income level is an ordinal variable. Regarding the levels of community engagement, the question presentation format mentions volunteering to explain what it means, but it is still a dichotomous variable. It has been used in DrPH research studies in the United States, and most population-based studies that rely on secondary data analysis use such datasets for their accuracy and validity (NCHS, 2023).

The reliability and validity of the 2023 NHIS survey are described in the NHIS Survey Description Document (NCHS, 2023). U.S. Census Bureau interviewers are trained to present questions and answer choices accurately and to avoid any bias that could affect the data collection process. The supervisors accompanying the interviewers use the PANDA system, which monitors performance indicators such as response rates,

session completion times, and time spent on each question, among other quality metrics, during data collection. Computer-assisted personal interviewing (CAPI) demonstrated the interview's validity. The Blaise software presents questions to the interviewer and records responses. Out-of-range values were flagged to prevent errors that require correction. Hard edits, such as correcting out-of-range entries, will flag 100 instead of 10, for instance. Soft edits, such as differences in body weight, can be ignored until all questions are presented and data have been collected. Missing values were verified and marked to avoid interfering with the rest of the data collection process.

Table 1

Operationalization of Variables

Variable Name	Type	Categorization/Question	Level of Measurement
Cervical Cancer Screening Measure	Dependent	NHIS: 1-Yes, 2-No. "Have you EVER HAD a test or tests to check for cervical cancer?"	Nominal
Community Engagement	Independent	NHIS: 1-Yes, 2-No. "During the past 12 months, did you spend any time volunteering for any organization or association?	Nominal
Social Functioning	Independent	NHIS: 1- No difficulty, 2- Some difficulty, 3-A lot of difficulty, 4-Cannot do at all	Ordinal
Age	Covariate	NHIS: 1-18-84 years, 2-85+ years. "Age of SA"	Continuous
Race / Ethnicity	Covariate	NHIS: 01 – Hispanic, 02- Non-Hispanic White only, 03- Non-Hispanic Black/African American, 04-Non-Hispanic Asian only, 05-Non-Hispanic AIAN only, 06-Non-Hispanic AIAN and any other group. "Single and multiple race groups with Hispanic origin"	Nominal
Income Level	Covariate	NHIS: 1-0.0-2.49, 2-2.50-5.0 or greater. "Ratio of family income to poverty threshold for SA's family"	Ordinal
Education Level	Covariate	NHIS: 00- Never attended /kindergarten only, 01-Grade 1-11, 02-12th grade, 03-GED or equivalent, 04-High school graduate, 05-Some college, no degree, 06-Associate degree - occupational, technical, or vocational program, 07-occupational, technical, or vocational program, 08-Bachelor's degree (Example: BA, AB, BS, BBA), 09-Master's degree (Example: MA, MS, MEng, MEd, MBA), 10-Professional School or Doctoral degree (Example: MD, DDS, DVM, JD, PhD, EdD) "Highest level of education of all the adults in the SA's family."	Ordinal
Employment Status	Covariate	NHIS: 1-Within the past 12 months, 2-1-5 years ago, 3-Over 5 years ago, 4-Never worked. "When was the last time you worked for pay at a job or business, even if only for a few days?"	Nominal
Health Insurance	Covariate	NHIS: 1-Covered, 2-Not covered "Coverage status as used in Health United States"	Nominal

Table 2

Operationalization of Variables

Variable Name	Type	Categorization/Question	Level of Measurement
Cervical Cancer Screening Measure	Dependent	NHIS: 1-Yes, 2-No. "Have you EVER HAD a test or tests to check for cervical cancer?"	Nominal
Community Engagement	Independent	NHIS: 1-Yes, 2-No. "During the past 12 months, did you spend any time volunteering for any organization or association?	Nominal
Social Functioning	Independent	NHIS: 1- No difficulty, 2- Some difficulty, 3-A lot of difficulty, 4-Cannot do at all	Ordinal
Age	Covariate	NHIS: 1-18-84 years, 2-85+ years. "Age of SA"	Continuous
Race / Ethnicity	Covariate	NHIS: 01 – Hispanic, 02- Non-Hispanic White only, 03- Non-Hispanic Black/African American, 04-Non-Hispanic Asian only, 05-Non-Hispanic AIAN only, 06-Non-Hispanic AIAN and any other group. "Single and multiple race groups with Hispanic origin"	Nominal
Income Level	Covariate	NHIS: 1-0.0-2.49, 2-2.50-5.0 or greater. "Ratio of family income to poverty threshold for SA's family"	Ordinal
Education Level	Covariate	NHIS: 00- Never attended /kindergarten only, 01-Grade 1-11, 02-12th grade, 03-GED or equivalent, 04-High school graduate, 05-Some college, no degree, 06-Associate degree - occupational, technical, or vocational program, 07-occupational, technical, or vocational program, 08-Bachelor's degree (Example: BA, AB, BS, BBA), 09-Master's degree (Example: MA, MS, MEng, MEd, MBA), 10-Professional School or Doctoral degree (Example: MD, DDS, DVM, JD, PhD, EdD) "Highest level of education of all the adults in the SA's family."	Ordinal
Employment Status	Covariate	NHIS: 1-Within the past 12 months, 2-1-5 years ago, 3-Over 5 years ago, 4-Never worked. "When was the last time you worked for pay at a job or business, even if only for a few days?"	Nominal
Health Insurance	Covariate	NHIS: 1-Covered, 2-Not covered "Coverage status as used in Health United States"	Nominal

Data Analysis Plan

IBM SPSS Statistics (Version 30) was used to perform both descriptive and inferential analyses of the interactions between the two independent variables, namely, community engagement and social functioning, with the dependent variable, the screening rate for cervical cancer. The descriptive statistics provided information on sociodemographic factors, including age, gender, ethnicity, educational attainment, income level, health insurance status, community engagement level, and social functioning level. For nominal variables, frequencies and percentages were determined, and for continuous variables, the arithmetic mean and standard deviation were calculated. Binary Logistic Regression (BLR) is an inferential statistical procedure used to assess the relationship between the independent variables, community engagement and social functioning, and the dependent variable, the rate of cervical cancer screening among women in the United States. The assumptions of the BLR were clarified with the dichotomous nature of the dependent variable, and at least one or more of the independent variable were dichotomous, the observations were independent, a potential *variance inflation factor* (VIF) can be used if multicollinearity is suspected, although each of the variables, including the confounders were independent in data collection pattern, and finally a major plus to the assumptions testing is the large data size to ensure normality of distribution. To prevent type I error (false positive) outcome due to weights obtained from NHIS 2023, as well as multiple testing of the same data set, a *Bonferroni correction* may be performed if necessary. An alternative approach is to conduct separate analyses of RQ1 and RQ2, along with an ad hoc analysis, to avoid Type I errors. The

NHIS weights for each question addressing the dependent variable, the independent variables, and the confounders were clearly accounted for, and after repeated checks and validation using statistical methodology, none of these variables were obtained in a complex manner that would warrant a Taylor Series Linearization to prevent type I error. For the BLR, the Adjusted Odds Ratio (AOR) will be set at 95.0%, and the p-value is expected to be less than 0.05. The Hosmer-Lemeshow test and the pseudo-R^2 test will verify the fitness of the BLR output.

Data Cleaning Procedures

The NHIS 2023 survey dataset has a reasonable level of quality control; however, it is essential to verify its quality before analysis. The initial focus was on removing missing values in the independent variables and covariates. The main justification for addressing missing data in the SPSS data file is to use "list-wise deletion" and to add the missing data codes in the data file to the missing values option in SPSS to prevent error reports before running descriptive and inferential statistics. When a column contains missing values, SPSS returns errors and does not generate output for descriptive and inferential statistical procedures. A method called "listwise deletion" is well-suited to address this situation, after which the resulting data can be used for statistical analysis. There is no plan to recode the independent variables or covariates, as adding more complexity may potentially compromise the analysis. Once the data are collected with IRB approval, irregular values and outliers will be checked and, if necessary, removed to prevent spurious outcomes in descriptive and inferential statistics.

Research Questions and Hypotheses

RQ1: What is the association between the level of community engagement and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level?

H_{01}: There is no association between the level of community engagement and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

H_{a1}: There is an association between the level of community engagement and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

RQ2: What is the association between the level of social functioning and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level?

H_{02}: There is no association between the level of social functioning and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

H_{a2}: There is an association between the level of social functioning and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

Statistical Analysis Plan

The Statistical Package for the Social Sciences (SPSS) version 30 was used to analyze the data. The Binary Logistic Regression (BLR) examined the interplay among the independent variables, the dependent variable, and the confounding covariates. Both the research questions facilitated descriptive and inferential analyses. The results section of this study presents measures of central tendency, levels of measurement, and variation when analyzing relationships among the dependent variable, independent variables, and confounding covariates.

A Binary Logistic Regression (BLR) was performed because the dependent variable (DV) is binary and the independent variables (IVs) are either categorical or continuous (Harris, 2021). The ordinal variables in this study were treated as nominal variables during the BLR analysis. The BLR is not a linear analysis; consequently, it does not use the sum of squares (R^2), but instead uses a transformation called "logits" (Crowson et al., 2021). The "S" curve, also known as the logistic curve, presented by the BLR, differs from the standard linear curve; hence, it does not predict intercepts and slopes. The S-curve predicts logits, which are like probabilities (Crowson et al., 2021). The model assumptions of the BLR are flexible, including, but not limited to, independent observations, with at least 50 observations. The independent variables must

not be multicollinear (i.e., two or more independent variables must not be correlated); otherwise, the regression may not accurately estimate the relationship between the independent variables and the dependent variable. No outliers must be present (Abuzaid & Nae'l, 2024).

Threats to Validity

External Validity

Incorrect sampling, including under- or oversampling, can distort the outcome and threaten external validity. This is because an incorrect outcome can lead to incorrect inferences, including misinterpretations of the p-value (Andrews, 2019). A major threat to external validity is generalizing the study's outcomes to a broader population without accounting for the small sample size and the larger, more complex real-world population beyond the study (Bhandari, 2022). The NHIS samples only non-institutionalized adults. When the p-value is less than 0.05, we reject the null hypothesis, indicating that the independent variables have a considerable influence on the dependent variable. The Type I error occurs when a "false positive" leads to rejecting the null hypothesis when it is true (Bhandari, 2022). The Type II error occurs when a "false negative" fails to reject the null hypothesis when it is true (Bhandari, 2022). A simple analogy for type I error is when a woman goes for cervical cancer screening, and tests positive, when she does not have this disease (false positive), and when another woman tests for cervical cancer, and tests negative, but later develops symptoms of cervical cancer (false negative).

Internal Validity

Threats to internal validity arise when the cause-and-effect relationship between the IVs and the DV is strong, but extraneous variables are not controlled (Bhandari, 2022). Such issues were identified during the study design and were addressed before statistical analyses were performed to obtain descriptive and inferential outcomes. Since the NHIS 2023 survey had responses that were "self-reported" when presented with questions by the interviewer, Major threats to internal validity include the ambiguity due to sampling survey adults at different points in time, i.e., one sample adult is interviewed today with the same set of questions, and then these same set of questions are used to interview another sample adult on another day, and the confounding variables can potentially influence the association between the dependent variable and the two independent variables (Slocum et al., 2022), although, this was addressed by separate analyses of RQ1, RQ2, and the ad hoc testing.

Construct/Statistical Conclusion Validity

One of the independent variables, namely the levels of community engagement, included "volunteering" in the question description, which could lead to a single-item measure even though the variable had a dichotomous set of answer options. This point was previously clarified and elaborated, but is emphasized because it could be construed as a threat to the study's construct validity. There was no individual weighting, as complex measures were not ascertained during dataset verification, variable coding, and classification before performing descriptive and inferential statistical analyses, such as

binary logistic regression (BLR). Hence, a potential false-positive outcome (type I error) may arise, posing a threat to the validity of the statistical conclusions in this study.

Ethical Procedures

The cervical cancer screening study used the NHIS 2023 dataset, which has been de-identified and is publicly available. The main ethical issues pertaining to the use of the NHIS 2023 dataset are doubts on equity, such as pulling a sample adult in a particular city, town, or village for a set of questions addressing cervical cancer screening; a potential for misclassification of a sample adult into any category during the interview; and the limitations of the data obtained after any interview. When a sample adult is presented with answer choices on demographic-identifying questions, and a potential misinterpretation occurs because the sample adult did not fully understand a choice or a couple of choices, an ethical issue arises. There were no ethical issues in the study, and no personally identifiable information (PII) was released. Geographic variables that could disclose locations and other salient identifiers were masked to protect respondents' identities (NCHS, 2023). The Institutional Review Board (IRB) approved the data source, and a confidential method was used to prevent disclosure of PII.

Data Security

The NHIS datasets are publicly available; however, appropriate safety and security measures will be implemented when data are collected via the NHIS portal following IRB approval. Some of the safety and security measures include, but are not limited to, storing data files in SPSS-accessible format on a protected computer with anti-tracking software, antivirus and antiphishing protection, and a password-protected device

lock, so that only the DrPH candidate can access them. The NHIS interviewers have already promised data confidentiality before the interview, so that United States citizens who participate in the survey will not have to worry about potential data leaks from their responses to the interview questions. All questions and survey responses from the NHIS were saved in a confidential folder on the computer. After completing this DrPH study, the data files will be expunged in accordance with Walden University Policies. The research process in this study will be conducted in accordance with Walden University's Institutional Review Board (IRB) guidelines, ensuring that all safety and security procedures are followed to avoid potential violations of local, state, and federal data security policies.

Equity in Research Design

An equity-focused approach is used to avoid specific individual variables, such as community engagement and/or social functioning, that exclusively impact the rate of cervical cancer screening to be categorized as drawbacks if the respondents have given a negative response such as a "no" without moderating the covariates, such as physical activity level, age, health insurance status, educational attainment, income level, and employment status. An unbiased, equity-focused approach was used to determine how a specific variable, such as community engagement, affected the cervical cancer screening rate after controlling for covariates. The researcher did not label negative responses to questions about the study's independent variables. Also, the researcher used an unbiased approach to negatively label respondents who did not get screened for cervical cancer, in addition to giving a "no" response to any of the covariates while analyzing data from

NHIS after IRB approval. In this way, the data were not interpreted in a way that distorted data based on federally protected categories such as age, ethnicity, gender, religion, national origin, and veteran status.

Summary

In this section, I presented the study methodology, the NHIS sampling information, the research design, the independent variables (IVs), the dependent variable (DV), the confounding covariates, the data collection information, the data analysis plan, the threats to both internal and external validity, and the ethical considerations. This study aimed to determine the relationship between community engagement levels and social functioning and cervical cancer screening rates and, in doing so, strives to promote health equity from a public health standpoint. Section 3 presents the study's results. Binary logistic regression (BLR) was performed after obtaining datasets from NHIS, and this step was preceded by approval from Walden University's Institutional Review Board (IRB). The operationalization sub-section clearly described the variables and the G*power analysis. The research questions were preceded by Tables 1 and 2, which explain the variables and covariates. Data security is of high importance, and proper ethical and equitable measures were taken after obtaining Walden University's IRB approval to ensure the study complies with Walden University's requirements and does not violate state or Federal laws and regulations about ethical and equitable procedures.

Section 3: Presentation of the Results and Findings

A secondary data analysis of the 2023 National Health Interview Survey (NHIS) is conducted in this study to address the two research questions, each focusing on a separate independent variable: levels of community engagement and social functioning. After reviewing the available inferential tests for analyzing these variables, a binary logistic regression (BLR) will be performed because the dependent variable, the cervical cancer screening rate, is dichotomous. The variables considered in this study are independent, with no multicollinearity, and the sample size is large enough to ensure normality of the variance before the actual BLR analysis. In this doctoral study, the association between cervical cancer screening rates (the DV) and levels of community engagement (IV1) and social functioning (IV2), while controlling for health insurance status, race, ethnicity, employment status, education level, and income level. Here are the two research questions along with the null and alternative hypotheses:

RQ1: What is the association between the level of community engagement and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level?

H_{01}: There is no association between the level of community engagement and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

H_{a1}: There is an association between the level of community engagement and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

RQ2: What is the association between the level of social functioning and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level?

H_{02}: There is no association between the level of social functioning and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

H_{a2}: There is an association between the level of social functioning and the screening of cervical cancer among women in the United States, controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level.

In this section, the sample's demographic statistics are presented, along with the inferential tests used to evaluate the hypotheses. I will conclude this section with a summary of the results obtained to evaluate the research questions, followed by transitional statements to Section 4 that highlight professional practice and elements of positive social change.

Accessing the Data Set for Secondary Analysis

The data for this study were obtained from the 2023 National Health Interview Survey (NHIS) conducted by the U.S. Centers for Disease Control and Prevention (CDC). The data are publicly accessible and can be used by doctoral candidates conducting secondary data analysis to test research questions and their associated hypotheses (NCHS, 2023). More than approximately 27,000 adult U.S. citizens fill in answers to questions on the NHIS via confidential face-to-face interviews conducted by U.S. Census Bureau-trained interviewers. The NHIS collects data from adults who are not institutionalized, those who are not on active duty in any branch of the military, and those who are not homeless, within the United States (NCHS, 2023). The median household response rate for the 2023 NHIS survey was 48.8%, with the adult response rate among sampled adults 47.0% (NCHS, 2023).

Walden University's Institutional Review Board (IRB) approved (Approval No. 0985836, granted on 11-12-2025) my request to obtain the NHIS 2023 survey dataset. This doctoral study includes two independent variables (IVs) and one dependent variable (DV), with seven confounding variables controlled, for a total of 10 variables after applying the inclusion and exclusion criteria. To facilitate inferential statistical procedures, missing responses were standardized using predetermined codes (7, 8, 9, 98, and 99). These values were treated as missing data during analysis, and the final sample size was adjusted accordingly to address the research questions and associated hypotheses.

Demographic Characteristics of the Sample

A total of 29,521 adult U.S. citizens and 7692 U.S. citizens under 18 were sampled and interviewed for the NHIS 2023 survey by Federal interviewers. Table 1 presents demographic characteristics, including age, race, ethnicity, income level, and educational level, for cervical cancer screening rates reported in the NHIS 2023 survey. A total of 15714 adult female U.S. citizens were asked whether they were screened for cervical cancer. Among White American women, 12382 (12.3%) and among African American women, 1885 (18.9%) responded affirmatively to the question about cervical cancer screening (NCHS, 2023). Also, 2325 Hispanic American women were able to get screened for cervical cancer, and 1414 American Indians and Alaskan Native (AIAN) women were able to get screened for cervical cancer (NCHS, 2023).

When measuring the income level of U.S. women living below 200.00% of the Federal Poverty Line (FPL), approximately 37.10% were screened for cervical cancer, and 62.90% of the U.S. women living above 200% of the FPL were screened for cervical cancer. Also, 75.40% of U.S. women between the ages of 21 and 65 were screened for cervical cancer (NCHS, 2023), 63.40% of U.S. women with less than a high school education were screened for cervical cancer, while 67.60% of U.S. women with a high school diploma were screened for cervical cancer and 80.40% of U.S. women who were educated beyond the high school level were screened for cervical cancer (NCHS, 2023).

Table 3

Demographic Characteristics of the Study Sample

Characteristic	Types of characteristic	Percentage
Gender	Female	100.00
Age	21-65	75.40
Ethnicity	Hispanic	14.80
	Non-Hispanic	85.20
Race	White American	78.80
	African American	12.00
	Asian American	6.10
	American Indian/Alaskan Native (AIAN)	1.0
	AIAN and any other group	0.9
	Other single and multiple races	1.3
Income level (% of federal poverty level [FPL])	Less than 200.00 FPL	37.10
	More than 200.00 FPL	62.90

Descriptive Statistics of the Sample

The descriptive statistics of the various independent variables (IVs) and the dependent variable (DV) are presented in Table 2. Out of the 15,714 U.S. women who answered the question about whether they were screened for cervical cancer, 12,682 (78.97%) responses were positive (yes as a response), while 3,032 (18.88%) responses were negative (no as a response). The first independent variable is community engagement: 21,449 (77.65%) reported not engaging in community activities, while 6,756 (22.88%) reported engaging in community activities. Hence, 22.88% of survey respondents had some level of community engagement, but the survey does not state whether this level of engagement had any direct impact on cervical cancer screening.

The second independent variable addressed social functioning and directly asked participants whether they had difficulty with errands due to a physical, mental, or emotional condition. Of the 29,198 participants, 26,598 (90.10%) reported no difficulty, and 1,564 (5.30%) reported difficulty. Also, 490 (1.66%) participants reported having a

lot of difficulty, and 859 (2.91%) reported that they could not do this at all, i.e., they could not fulfill the social functioning aspect. Participants were asked about their age; 223 (0.8%) respondents selected the 18 years or younger age group, and 19,736 (67.1%) selected the 21 through 65 age group. About 9082 (31.0%) respondents answered yes for the age group 66 and over. This is the way I am presenting the age group data, as the original dataset clustered 18-84 as one age group, which is insignificant, as the CDC does not warrant cervical cancer screening for U.S. women less than 21 years of age. A total of 1,714 (5.82%) U.S. women had professional degrees)such as MD, DDS, DVM, JD, PhD, EdD); 4,495 (15.27%) had a master's degree; 7,536 (25.59%) had a bachelor's degree; 2,865 (9.73%) had an associate degree in an academic program; 1,315 (4.47%) had an associated degree in occupational, technical, or vocational program; 3,991 (13.55%) said they had come college credits but did not earn a college degree; 5,432 (18.45%) said they have earned high school diploma; 489 (1.66%) had a GED or equivalent; and 367 (1.25%) said they studied 12th grade but did not graduate.

U.S. women's ethnicity was a less complex cofounder; the NHIS used only three categories: Hispanic (Mexican American), Hispanic (All other groups), and not Hispanic. On the survey, 2,410 (8.2%) respondents selected the Hispanic Mexican American category, 1,958 (6.6%) selected the Hispanic category, all other groups, and 25,105 (85.2%) selected the Not Hispanic category. U.S. women's employment status is another confounder with four categories among the response choices. A total of 1,546 (12.9%) respondents reported employment within the past 12 months; 2,677 (22.4%) respondents said they had employment 1 to 5 years ago; and 7,247 (60.5%) respondents said they had

worked 5 years ago. Finally, 499 (4.2%) respondents said they had never worked in their lifetimes.

A woman's health insurance status is another confounder with only two categories: not covered and covered. A total of 2031 (6.9%) respondents said they were not covered, while 27,399 (93.1%) respondents said they were covered with health insurance. Race used six categories: 21,992 (78.8%) said they were White American only, 3,344 (12.0%) said they were Black American only, 1,693 (6.1%) said they were Asian American only, and 275 (1.0%) said they were AIAN only. Further, 248 (0.9%) respondents categorized them as AIAN and one other race, while 373 (1.3%) respondents categorized them as of other single or multiple races.

The following confounding variable is the U.S. woman's income level, measured by the income-to-poverty ratio. About 10953 (862 (37.1%) respondents said their income-to-poverty ratio was between 0.0 and 2.49, and 18569 (62.9%) respondents said their income-to-poverty ratio was between 2.50 and 5.00 or greater.

Table 4

Descriptive Statistics of the Sample

Variable	Frequency	Percent
Community engagement		
Yes	6756	22.88
No	21449	72.65
Social functioning		
No difficulty	26,598	90.10
Difficulty	1,564	5.30
A lot of difficulty	490	1.66
Could not do it at all	859	2.91
Age		
18	223	0.80
19	206	0.70
20	210	0.70
21-65	19736	67.1
Educational attainment		
Grade 1-11	1240	4.2
12th grade, no diploma	367	1.2
GED or equivalent	489	1.7
High school graduate	5432	18.4
Some college, no degree	3991	13.6
Associate's degree: Occupational	1315	4.5
Associate's degree: Academic	2865	9.7
Bachelor's degree	7536	25.6
Master's degree	4495	15.3
Doctoral degree	1714	5.8
Ethnicity		
Hispanic (Mexican American)	2410	8.2
Hispanic (all other groups)	1958	6.6
Not Hispanic	25105	85.2
Employment status		
Worked within the past 12 months	1546	12.9
Worked within 1-5 years ago	2677	22.4
Worked 5 years ago	7247	60.5
Never worked	499	4.2
Health insurance status		
Not covered	2031	6.9
Covered	27399	93.1
Race		
White American only	21992	78.8
African American only	3344	12.0
Asian American only	1693	6.1
AIAN only	275	1.0
AIAN and any other group	248	0.9
Other single and multiple racial groups	373	1.3
Income-to-poverty ratio		
0.0 to 2.49	10953	37.1
2.50 or higher	18569	62.9

Results

The main goal of this research study is to ascertain the connection between cervical cancer screening rates among U.S. women and their levels of community engagement while controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level. I chose to implement binary logistic regression because the dependent variable, cervical cancer screening rate, is binary (yes/no) and easier to predict with two independent variables: levels of community engagement and levels of social functioning. The two major assumptions of binary logistic regression are that the independent variables are independent, that the levels of community engagement are mutually exclusive, and that there is no multicollinearity among the independent variables when controlling health insurance status, age, race, ethnicity, employment status, education level, and income level (Harris, 2021), and the third assumption is the potential cause-and-effect relationship between the variables taken into consideration.

RQ1

Table 5

Variables in the Equation of Binary Logistic Regression

								95% C.I.for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Age	-0.004	0.002	2.913	1	0.088	0.996	0.992	1.001
	Community engagement assessment	0.117	0.170	0.474	1	0.491	1.124	0.806	1.569
	Employment status	0.172	0.049	12.256	1	0.000	1.188	1.079	1.307
	Ethnicity			35.397	2	0.000			
	Hispanic	0.292	0.193	2.283	1	0.131	1.339	0.917	1.954
	Non-Hispanic	-0.482	0.142	11.545	1	0.001	0.617	0.467	0.815
	Highest educational attainment	-0.072	0.016	19.825	1	0.000	0.931	0.902	0.961
	Health insurance coverage	-0.531	0.152	12.169	1	0.000	0.588	0.436	0.792
	Race			48.953	5	0.000			
	African American	0.449	0.096	21.736	1	0.000	1.567	1.297	1.892
	Asian American	0.700	0.142	24.254	1	0.000	2.013	1.524	2.659
	AIAN	-0.817	0.370	4.866	1	0.027	0.442	0.214	0.913
	AIAN and any other group	-0.066	0.310	0.045	1	0.832	0.936	0.510	1.721
	Other single and multiple groups	-0.284	0.396	0.514	1	0.473	0.753	0.347	1.635
	Income level - range Ratio of income to poverty level	-0.020	0.010	4.568	1	0.033	0.980	0.962	0.998
	Constant	-0.121	0.263	0.211	1	0.646	0.886		

Note. a. Variable(s) entered on step 1: Age of the SA, Woman's Community Engagement Assessment, Employment Status, Woman's Ethnicity, Woman's Highest Educational Attainment, Woman's Health Insurance Coverage Status, Woman's Race, Woman's Income Level - Range Ratio of Income to Poverty Level.

From Table 3, the estimated odds ratio favored a decrease of nearly 0.4% [Exp(B) = 0.996, 95% CI (0.992, 1.001), p = .088] in cervical cancer screening among U.S. women for every 1-year increase in age; however, this difference was not statistically significant. There is a slight variation in the first independent variable, namely, the levels of community engagement. The estimated odds ratio favored an increase of

approximately 12.0% [Exp(B) = 1.124, 95% CI (0.806, 1.569), p = .491] in cervical cancer screening among U.S. women not engaged in the community engagement, compared with those engaged in the community engagement; however, these results are not statistically significant. Therefore, I cannot reject the null hypothesis.

Likewise, when focusing on employment status, the estimated odds ratio favored an increase of nearly 19.0% [Exp(B) = 1.188, 95% CI (1.079, 1.307), p < .000]in cervical cancer screening among U.S. women for every 1-unit increase in employment status. I can reject the null hypothesis as employment is related to cervical cancer screening. The next variable is the women's ethnicity. The estimated odds ratio favored an increase of nearly 34.0% [Exp(B) = 1.339, 95% CI (0.917, 1.954), p = .131] in cervical cancer screening among women of non-Hispanic ethnicity compared with Hispanic ethnicity; however, this difference was not statistically significant. I cannot reject the null hypothesis. When looking at non-Hispanic ethnicity, the estimated odds ratio indicated a 38.0% decrease [Exp(B) = 0.617, 95% CI (0.467, 0.815), p < .001] in cervical cancer screening among U.S. Hispanic women compared to non-Hispanic women. Hence, within the same category (ethnicity), the significance level differed when U.S. Hispanic women were compared with U.S. non-Hispanic women. I fail to reject the null hypothesis, as both subcategories must differ significantly in cervical cancer screening rates.

The next variable is educational attainment. The estimated odds ratio favored a decrease of 7.0% [Exp(B) = 0.931, 95% CI (0.902, 0.961), p < .000] in cervical cancer screening among U.S. women for every 1-unit increase in educational attainment. As a result, it is fair to say that every non-educated U.S. woman did not favor getting screened

for cervical cancer, leading to a potential increase in the unscreened population burden in the United States. I reject the null hypothesis for this confounding variable because the p-value is less than 0.000; hence, higher levels of educational attainment significantly increase the likelihood of being screened for cervical cancer.

For health insurance status, the estimated odds ratio indicated a 41.0% decrease [Exp(B) = 0.588, 95% CI (0.436, 0.792), $p < .000$] in cervical cancer screening among uninsured women compared to insured women. I reject the null hypothesis at $p < 0.000$; hence, the lower the likelihood of having any health insurance, the lower the likelihood of being screened for cervical cancer. So, clearly, the health insurance status does influence the screening rate of cervical cancer among U.S. women.

The next variable is the woman's race. The first racial group is African American. The estimated odds ratio favored an increase of 57.0% [Exp(B) = 1.567, 95% CI (1.297, 1.892), $p < .000$] in cervical cancer screening among women from other racial groups compared to African American women. So, African American women were getting screened for cervical cancer compared to U.S. women belonging to other racial groups. I reject the null hypothesis due to the p-value being less than 0.000; the likelihood of an African American woman (the survey adult of NHIS) getting screened for cervical cancer was significantly higher based on the odds ratio.

The next racial group is the Asian Americans, in which the estimated odds ratio favored an increase of 101.3% [Exp(B) = 2.013, 95% CI (1.524, 2.659), $p < .000$] in cervical cancer screening among U.S. women from other racial groups compared to Asian American women. I reject the null hypothesis here, with the p-

value being less than 0.000; there is an increased likelihood of getting screened for cervical cancer if a woman belongs to the Asian American racial group in comparison to any other racial group. American Indian Alaskan Native (AIAN) is the next racial group that needs to be analyzed for cervical cancer screening rates. The estimated odds ratio favored a decrease of 55.8% [Exp(B) = 0.442, 95% CI (0.214, 0.913), p = .027] in cervical cancer screening among U.S. women from other racial groups compared to American Indian Alaskan Native (AIAN) women. I reject the null hypothesis since the p-value is 0.03, and the likelihood of getting screened for cervical cancer decreases if a woman belongs to the AIAN race.

The second-to-last subcategory among racial groups is AIAN, and any other group. The estimated odds ratio favored a decrease of nearly 6.4% [Exp(B) = 0.939, 95% CI (0.510, 1.721), p = .832] in cervical cancer screening among U.S. women from other racial groups compared to women identifying themselves as American Indian Alaskan Native (AIAN) and any other group; however, these results are not statistically significant. Consequently, I fail to reject the null hypothesis because the p-value is 0.840. Finally, the last sub-category among the racial groups of U.S. women is the 'other single and multiple' group. The estimated odds ratio favored a decrease of nearly 24.7% [Exp(B) = 0.753, 95% CI (0.347, 1.635), p = .473] in cervical cancer screening among U.S. women from other racial groups compared to women identifying themselves in single- and multiple-race groups; however, these results are not statistically significant As a result, I fail to reject the null hypothesis with the p-value being 0.473.

The last confounding factor in this study is the income level of U.S. women. The estimated odds ratio favored a 2.1% decrease in cervical cancer screening [Exp(B) = 0.979, 95% CI (0.962, 0.998), p = .033] in cervical cancer screening among U.S. women for every 1-unit increase in the income-to-poverty ratio. Hence, U.S. women with a lower income-to-poverty ratio did not get screened for cervical cancer, and this is one of the major problems contributing to the increasing unscreened population burden in the United States. I reject the null hypothesis because the p-value is 0.03 ($p < .05$); thus, the likelihood of being screened for cervical cancer decreases with increasing income-to-poverty ratio.

RQ2

Table 6

Variables in the Binary Logistic Equation

								95% C.I.for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Age	-0.006	0.002	10.894	1	0.001	0.994	0.990	0.997
	Employment Status	0.187	0.045	17.376	1	0.000	1.206	1.104	1.317
	Ethnicity			36.937	2	0.000			
	Hispanic	0.252	0.184	1.871	1	0.171	1.286	0.897	1.845
	Non-Hispanic	-0.485	0.135	12.816	1	0.000	0.616	0.472	0.803
	Highest educational attainment	-0.095	0.015	41.402	1	0.000	0.909	0.883	0.936
	Health insurance coverage status(1)	-0.445	0.143	9.688	1	0.002	0.641	0.484	0.848
	Race			52.711	5	0.000			
	African American	0.394	0.091	18.959	1	0.000	1.483	1.242	1.771
	Asian American	0.784	0.132	35.505	1	0.000	2.190	1.692	2.835
	AIAN	-0.203	0.293	0.478	1	0.489	0.817	0.460	1.451
	AIAN and any other group	-0.043	0.298	0.020	1	0.886	0.958	0.534	1.718
	Other single and multiple groups	-0.404	0.389	1.077	1	0.299	0.668	0.312	1.432
	Income level - Range ratio of income to poverty level	-0.025	0.009	8.363	1	0.004	0.975	0.958	0.992
	Social functioning assessment	0.015	0.036	0.180	1	0.672	1.015	0.946	1.089
	Constant	0.109	0.205	0.285	1	0.593	1.115		

Note. a. Variable(s) entered on step 1: Age of the SA, Employment Status, Woman's Ethnicity, Woman's Highest Educational Attainment, Woman's Health Insurance Coverage Status, Woman's Race, Woman's Income Level - Range Ratio of Income to Poverty Level, Woman's Social Functioning Assessment.

As shown in Table 4, the estimated odds ratio favored a decrease of nearly 0.6% [Exp(B) = 0.996, 95% CI (0.990, 0.997), p = .001] in cervical cancer screening among U.S. women for every 1-year increase in age. The study's second research question examines the potential association between social functioning levels and cervical cancer screening rates among women. The estimated odds ratio favored a decrease of 1.5% [Exp(B) = 1.015, 95% CI (0.946, 1.089), p = .672] in cervical cancer screening among U.S. women for every person without good social functioning, compared with those with

it; however, these results are not statistically significant. I fail to reject the null hypothesis, as the p-value is 0.6 ($p > .05$). The decrease in the likelihood of being screened for cervical cancer with increasing social functioning is not statistically significant.

Likewise, when focusing on employment status, the estimated odds ratio indicated a nearly 21.0% increase in cervical cancer screening [Exp(B) = 1.206, 95% CI (1.104, 1.317), $p < .000$] for every 1-unit increase in employment status. I can reject the null hypothesis as employment is related to cervical cancer screening. The next variable is the ethnicity of the women who participated in the survey. The estimated odds ratio favored an increase of nearly 29.0% [Exp(B) = 1.286, 95% CI (0.897, 1.845), $p = .171$] in cervical cancer screening among women of Hispanic ethnicity compared with non-Hispanic ethnicity; however, this difference was not statistically significant. I fail to reject the null hypothesis. When looking at non-Hispanic ethnicity, the estimated odds ratio indicated a 38.0% decrease [Exp(B) = 0.616, 95% CI (0.472, 0.803), $p < .000$] in cervical cancer screening among U.S. Hispanic women compared to non-Hispanic women. Hence, within the same category (ethnicity), the significance level differed when U.S. Hispanic women were compared with U.S. non-Hispanic women. I fail to reject the null hypothesis, as both subcategories must differ significantly in cervical cancer screening rates.

The next variable is educational attainment. The estimated odds ratio favored a decrease of 9.0% [Exp(B) = 0.909, 95% CI (0.883, 0.936), $p < .000$] in cervical cancer screening among U.S. women for every 1-unit increase in educational attainment. As a

result, it is fair to say that every non-educated U.S. woman did not favor getting screened for cervical cancer, leading to a potential increase in the unscreened population burden in the United States. I reject the null hypothesis for this confounding variable because the p-value is less than 0.000; hence, higher levels of educational attainment significantly increase the likelihood of being screened for cervical cancer.

For health insurance status, the estimated odds ratio indicated a 36.0% decrease [Exp(B) = 0.641, 95% CI (0.484, 0.848), p < .002] in cervical cancer screening among uninsured women compared to insured women. I reject the null hypothesis at p < 0.002; hence, the lower the likelihood of having any health insurance, the lower the likelihood of being screened for cervical cancer. So, clearly, the health insurance status does influence the screening rate of cervical cancer among U.S. women.

The next variable is the woman's race. The first racial group is African American. The estimated odds ratio favored an increase of 48.3% [Exp(B) = 1.483, 95% CI (1.242, 1.771), p < .000] in cervical cancer screening among women from other racial groups compared to African American women. So, African American women were getting screened for cervical cancer compared to U.S. women belonging to other racial groups. I reject the null hypothesis due to the p-value being less than 0.000; the likelihood of an African American woman (the survey adult of NHIS) getting screened for cervical cancer was significantly higher based on the odds ratio.

The next racial group is the Asian Americans, in which the estimated odds ratio favored an increase of 119.0% [Exp(B) = 2.190, 95% CI (1.692, 2.835), p < .000] in cervical cancer screening among U.S. women from other racial

groups compared to Asian American women. I reject the null hypothesis here, with the p-value being less than 0.000; there is an increased likelihood of getting screened for cervical cancer if a woman belongs to the Asian American racial group in comparison to any other racial group. American Indian Alaskan Native (AIAN) is the next racial group that needs to be analyzed for cervical cancer screening rates. The estimated odds ratio favored a decrease of 18.3% [Exp(B) = 0.817, 95% CI (0.460, 1.451), p = .489] in cervical cancer screening among U.S. women from other racial groups compared to American Indian Alaskan Native (AIAN) women; however, the difference is not statistically significant. I fail to reject the null hypothesis since the p-value is 0.489, and the likelihood of getting screened for cervical cancer decreases if a woman belongs to the AIAN race.

The second-to-last subcategory among racial groups is AIAN, and any other group. The estimated odds ratio favored a decrease of nearly 4.2% [Exp(B) = 0.958, 95% CI (0.534, 1.718), p = .886] in cervical cancer screening among U.S. women from other racial groups compared to women identifying themselves as American Indian Alaskan Native (AIAN) and any other group; however, these results are not statistically significant. Consequently, I fail to reject the null hypothesis due to the p-value being 0.840. Finally, the last sub-category among the racial groups of U.S. women is the ‘other single and multiple’ group. The estimated odds ratio favored a decrease of nearly 33.2% [Exp(B) = 0.668, 95% CI (0.312, 1.432), p = .299] in cervical cancer screening among U.S. women from other racial groups compared to women identifying themselves in

single- and multiple-race groups; however, these results are not statistically significant As a result, I fail to reject the null hypothesis with the p-value being 0.473.

The last confounding factor in this study is the income level of U.S. women. The estimated odds ratio favored a 2.5% decrease in cervical cancer screening [Exp(B) = 0.979, 95% CI (0.958, 0.992), p = .004] in cervical cancer screening among U.S. women for every 1-unit increase in the income-to-poverty ratio. Hence, U.S. women with a lower income-to-poverty ratio did not get screened for cervical cancer, and this is one of the major problems contributing to the increasing unscreened population burden in the United States. I reject the null hypothesis because the p-value is 0.03 ($p < .05$); thus, the likelihood of being screened for cervical cancer decreases with increasing income-to-poverty ratio.

Table 7

Variables in the Equation of Binary Logistic Regression

							95% C.I.for EXP(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Age of the SA	-0.004	0.002	2.805	1	0.094	0.996	0.992	1.001
	Community engagement assessment	0.121	0.170	0.507	1	0.476	1.129	0.809	1.576
	Employment status	0.175	0.050	12.549	1	0.000	1.192	1.082	1.313
	Ethnicity			35.360	2	0.000			
	Hispanic	0.293	0.193	2.301	1	0.129	1.340	0.918	1.957
	Non-Hispanic	-0.481	0.142	11.490	1	0.001	0.618	0.468	0.816
	Highest Educational attainment	-0.072	0.016	20.161	1	0.000	0.930	0.901	0.960
	Health insurance coverage	-0.527	0.152	11.981	1	0.001	0.590	0.438	0.796
	Race			48.769	5	0.000			
	African American	0.448	0.096	21.653	1	0.000	1.566	1.296	1.891
	Asian American	0.699	0.142	24.168	1	0.000	2.011	1.522	2.657
	AIAN	-0.816	0.370	4.858	1	0.028	0.442	0.214	0.914
	AIAN and any other group	-0.063	0.310	0.041	1	0.840	0.939	0.511	1.726
	Other single and multiple groups	-0.285	0.396	0.518	1	0.472	0.752	0.346	1.634
	Income level - Range ratio of income to poverty level	-0.021	0.010	4.762	1	0.029	0.979	0.961	0.998
	Social functioning assessment	-0.022	0.037	0.335	1	0.563	0.979	0.910	1.053
	Constant	-0.103	0.264	0.153	1	0.696	0.902		

Note. a. Variable(s) entered on step 1: Age of the SA, Woman's Community Engagement Assessment, Employment Status, Woman's Ethnicity, Woman's Highest Educational Attainment, Woman's Health Insurance Coverage Status, Woman's Race, Woman's Income Level - Range Ratio of Income to Poverty Level, Woman's Social Functioning Assessment.

From Table 5, the estimated odds ratio favored a decrease of nearly 0.4% [Exp(B) = 0.996, 95% CI (0.992, 1.001), p = .094] in cervical cancer screening among U.S. women for every 1-year increase in age; however, this difference was not statistically significant. There is a slight variation in the first independent variable, namely, the levels of community engagement. The estimated odds ratio favored an increase of approximately 13.0% [Exp(B) = 1.129, 95% CI (0.809, 1.576), p = .476] in cervical cancer screening among U.S. women not engaged in the community engagement,

compared with those engaged in the community engagement; however, these results are not statistically significant. Therefore, I fail to reject the null hypothesis.

When performing the ad hoc analysis, I ran a combined binary logistic regression with the second independent variable, namely, the levels of social functioning. The estimated odds ratio favored a decrease of 2.1% [Exp(B) = 0.979, 95% CI (0.910, 1.053), p = .563] in cervical cancer screening among U.S. women for every person without good social functioning, compared with those with it; however, these results are not statistically significant. I fail to reject the null hypothesis, as the p-value is 0.6 ($p > .05$). The decrease in the likelihood of being screened for cervical cancer with increasing social functioning is not statistically significant.

Likewise, when focusing on employment status, the estimated odds ratio favored an increase of nearly 19.0% [Exp(B) = 1.192, 95% CI (1.082, 1.313), $p < .001$] in cervical cancer screening among U.S. women for every 1-unit increase in employment status. I can reject the null hypothesis as employment is related to cervical cancer screening. The next variable is the ethnicity of the women who participated in the survey. The estimated odds ratio favored an increase of nearly 34.0% [Exp(B) = 1.34, 95% CI (0.918, 1.957), p = .129] in cervical cancer screening among women of non-Hispanic ethnicity compared with Hispanic ethnicity; however, this difference was not statistically significant. Hence, I fail to reject the null hypothesis. When looking at non-Hispanic ethnicity, the estimated odds ratio indicated a 38.0% decrease [Exp(B) = 0.618, 95% CI (0.468, 0.816), $p < .001$] in cervical cancer screening among U.S. Hispanic women compared to non-Hispanic women. Hence, within the same category (ethnicity), the

significance level differed when U.S. Hispanic women were compared with U.S. non-Hispanic women. I fail to reject the null hypothesis because both subcategories differ significantly in cervical cancer screening rates.

The next variable is educational attainment. The estimated odds ratio favored a decrease of 7.0% [Exp(B) = 0.930, 95% CI (0.901, 0.960), $p < .001$] in cervical cancer screening among U.S. women for every 1-unit increase in educational attainment. As a result, it is fair to say that every non-educated U.S. woman did not favor getting screened for cervical cancer, leading to a potential increase in the unscreened population burden in the United States. I reject the null hypothesis for this confounding variable because the p-value is less than 0.001; thus, higher levels of educational attainment significantly increase the likelihood of screening for cervical cancer.

For health insurance status, the estimated odds ratio indicated a 41.0% decrease [Exp(B) = 0.590, 95% CI (0.438, 0.796), $p < .001$] in cervical cancer screening among uninsured women compared to insured women. I reject the null hypothesis at $p < 0.001$; hence, the lower the likelihood of having any health insurance, the lower the likelihood of being screened for cervical cancer. So, clearly, the health insurance status does influence the screening rate of cervical cancer among U.S. women.

The next variable is the woman's race. The first racial group is African American. The estimated odds ratio favored an increase of 57.0% [Exp(B) = 1.566, 95% CI (1.296, 1.891), $p < .001$] in cervical cancer screening among African American women compared to women from other racial groups. So, African American women were getting screened for cervical cancer compared to U.S. women belonging to other racial groups. I reject the

null hypothesis due to the p-value being less than 0.001; the likelihood of an African American woman (the survey adult of NHIS) getting screened for cervical cancer was significantly higher based on the odds ratio.

The next racial group is the Asian Americans, in which the estimated odds ratio favored an increase of 101.1% [Exp(B) = 2.011, 95% CI (1.522, 2.657), p < .001] in cervical cancer screening among Asian American women compared to women from other racial groups. I reject the null hypothesis here, with the p-value being less than 0.001; there is an increased likelihood of getting screened for cervical cancer if a woman belongs to the Asian American racial group in comparison to any other racial group. American Indian Alaskan Native (AIAN) is the next racial group that needs to be analyzed for cervical cancer screening rates. The estimated odds ratio favored a decrease of 55.8% [Exp(B) = 0.442, 95% CI (0.214, 0.914), p = .028] in cervical cancer screening among U.S. women from other racial groups compared to American Indian Alaskan Native (AIAN) women. I reject the null hypothesis since the p-value is 0.03, and the likelihood of getting screened for cervical cancer decreases if a woman belongs to the AIAN race.

The second-to-last subcategory among racial groups is AIAN, and any other group. The estimated odds ratio favored a decrease of nearly 6.1% [Exp(B) = 0.939, 95% CI (0.511, 1.726), p = .840] in cervical cancer screening among women from other racial groups compared to women identifying themselves as American Indian Alaskan Native (AIAN) and any other group; however, these results are not statistically significant. Consequently, I fail to reject the null hypothesis because the p-value is 0.840. Finally, the

last subcategory among women's racial groups is the 'other single and multiple' group. The estimated odds ratio favored a decrease of nearly 24.8% [Exp(B) = 0.752, 95% CI (0.346, 1.634), p = .472] in cervical cancer screening among U.S. women from other racial groups compared to women identifying themselves in single- and multiple-race groups; however, these results are not statistically significant As a result, I fail to reject the null hypothesis with the p-value being 0.473.

The last confounding factor in this study is the income level of U.S. women. The estimated odds ratio favored a 2.1% decrease in cervical cancer screening [Exp(B) = 0.979, 95% CI (0.961, 0.998), p = .029] in cervical cancer screening among U.S. women for every 1-unit increase in the income-to-poverty ratio. Hence, U.S. women with a lower income-to-poverty ratio did not get screened for cervical cancer, and this is one of the major problems contributing to the increasing unscreened population burden in the United States. I reject the null hypothesis because the p-value is 0.03 ($p < .05$); thus, the likelihood of being screened for cervical cancer decreases with increasing income-to-poverty ratio.

Although the second independent variable was previously mentioned, a more interesting way the binary logistic regression can be elucidated is in an equation format:

$$\ln\left(\frac{P(Y=1)}{1-P(Y=1)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2$$

Since there are no mediating variables, the probability of the event occurring is derived via the logistic function:

$$P(Y=1) = \frac{1}{1+e^{-(\beta_0+\beta_1 X_1+\beta_2 X_2)}}$$

$P(Y=1)=11+e-(\beta 0+\beta 1X1+\beta 2X2)$

The Logistic Regression Equation Components include Y, the dichotomous dependent variable aka. the outcome variable (the cervical cancer screening rate), and e is the base of the natural logarithm (e = 2.718), X_1 and X_2 are the two independent variables (X_1 is the levels of community engagement, and X_2 is the levels of social functioning), β_1, β_2 are the regression coefficients for the two independent variables.

As previously stated, the assumptions of the binary logistic regression were considered, the first being that all variables are continuous, as some are ordinal and others are either continuous or categorical. If the coefficients of the two variables (β_1, β_2) are binary, the independent variables need not always be continuous (Iacobucci, 2012). The second assumption is the absence of multicollinearity, as indicated by the odds ratio and its p-value. No variable influences the outcomes of the others. The last assumption is the cause-and-effect relationship between two variables.

Summary

The research question 1 (RQ 1) focused on analyzing the association between the levels of community engagement (the first independent variable) and the screening rate for cervical cancer among U.S. women. The estimated odds favored a 13.0% increase in cervical cancer screening for every person not active in the community engagement process compared with every person who is active. However, the p-value of 0.476 indicated that this result is not statistically significant; we fail to reject the null hypothesis for the levels of community engagement. This result was obtained while controlling various confounders, including health insurance status, age, race, ethnicity, employment

status, education level, and income level. The variables, aka the confounders, that had significant results include employment status (estimated odds ratio 19.2%, $p < .001$), ethnicity (not Hispanic) (estimated odds ratio -38.0%, $p < .001$), highest educational attainment (estimated odds ratio -7.0%, $p < .001$), health insurance status (estimated odds ratio -41.0%, $p < .001$), African American race (estimated odds ratio 56.6%, $p < .001$), Asian American race (estimated odds ratio 101.0%, $p < .001$), American Indian Alaskan Native (AIAN) race (estimated odds ratio -55.8%, $p = .028$), and Income level (estimated odds ratio -2.1%, $p = .029$). Given these significant outcomes, we reject the null hypothesis and conclude that each of these confounders is significantly associated with the dependent variable.

Research question 2 (RQ 2) examined a possible association with levels of social functioning. The odds ratio favored a decrease of 2.1% in cervical cancer screening rate among U.S. women for every 1-unit loss of social functioning, but this result is not significant. The variables, aka the confounders, that had significant results include age of the sample adult (estimated odds ratio 0.6%, $p = .001$), employment status (estimated odds ratio 21.0%, $p < .001$), ethnicity (not Hispanic) (estimated odds ratio -38.0%, $p < .001$), highest educational attainment (estimated odds ratio -9.0%, $p < .001$), health insurance status (estimated odds ratio -36.0%, $p < .001$), African American race (estimated odds ratio 48.3%, $p < .001$), Asian American race (estimated odds ratio 119.0%, $p < .001$), and Income level (estimated odds ratio -2.5%, $p = .004$). Given these significant outcomes, we reject the null hypothesis and conclude that each confounder is significantly associated with the dependent variable.

Finally, an ad hoc analysis was performed to combine the two research questions (RQs) with two independent variables, the levels of community engagement and social functioning, alongside the confounding variables. There was no significant association between either dependent variable and the independent variables, so we fail to reject the hypothesis. Significant results were obtained for employment status (estimated odds ratio 19.2%, $p < .001$), ethnicity (not Hispanic) (estimated odds ratio -38.0%, $p < .001$), highest educational attainment (estimated odds ratio -7.0%, $p < .001$), health insurance status (estimated odds ratio -41.0%, $p < .001$), African American race (estimated odds ratio 56.6%, $p < .001$), Asian American race (estimated odds ratio 101.0%, $p < .001$), American Indian Alaskan Native (AIAN) race (estimated odds ratio -55.8%, $p = .028$), and Income level (estimated odds ratio -2.1%, $p = .029$). Given these significant outcomes, we reject the null hypothesis and conclude that each confounder is significantly associated with the dependent variable. The interpretation of the binary logistic regression equation was mentioned to address model assumptions.

$$\ln\left(\frac{P(Y=1)}{1-P(Y=1)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2$$

All three assumptions, namely, the continuous distribution of variables, the multicollinearity of variables, and the cause-and-effect relationships, were addressed using the variables, including confounders as examples, the coefficients of the two independent variables (β_1, β_2), and the individual odds ratio values alongside the p-values. This concludes with Section 3. In the next section (section 4), I will discuss how the results obtained here will inform the development of a potential product to advance positive social change. This complements the interpretation of the results presented in

this section, clarifies how they relate to the SEM proposed earlier, and emphasizes the importance of addressing potential public health problems arising from the increased burden of unscreened individuals for cervical cancer screening.

Section 4: Application to Professional Practice and Implications for Social Change

In this study, I investigated the relationship between cervical cancer screening rates and community engagement and social functioning levels. According to the American Cancer Society, an estimated 13,490 new cases of invasive cervical cancer and 4,200 deaths will occur in the United States in 2026. This burden remains slightly lower than historical levels. Notably, increased cervical cancer screening utilization drove a 50% reduction in incidence from the mid-1970s to the mid-2000s; however, these rates have since plateaued, resulting in a public health problem addressed in this cross-sectional doctoral study (American Cancer Society, 2026). This study examines the association between the dependent variable (cervical cancer screening rates) and two independent variables (community engagement and social functioning), while controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level. The two research questions in this study delineate this association between the dependent and the independent variables.

Since the estimated number of new cervical cancer cases is more than 13,000, of which more than 4000 women with cervical cancer die (Rimel et al., 2022), this cross-sectional study contributes by unequivocally using the precise independent variables, namely, the levels of community engagement and social functioning, at the same time, using various social determinants of health (SDOH) to help understand how women belonging to certain disadvantaged groups tend to not get screened for cervical cancer (Sharma et al., 2022). Women with less education and living below the poverty line due to the absence of gainful employment do not get screened for cervical cancer, and health

insurance availability is another contributing factor to this problem (Sharma et al., 2022). This is one of the few reasons this study is useful for identifying which confounders (including SDOHs) influence the direct association between cervical cancer rate and community engagement and social functioning. In this section, I interpret my findings from Section 3 and explain the positive social change this study brings about, as well as the community health intervention that precedes it, including a policy brief.

Interpretation of the Findings

In this study, I evaluated the association between cervical cancer screening rates and levels of community engagement and social functioning, while controlling for health insurance status, age, race, ethnicity, employment status, education level, and income level. To address the study's objectives, Research Question 1 (RQ1) and Research Question 2 (RQ2) examined the proposed associations. As illustrated in Table 3, the analysis for RQ1 revealed no significant association between community engagement levels and cervical cancer screening rates. Analysis of the confounders in RQ1 revealed a significant positive association between employment status and cervical cancer screening (a 19.0% increase in odds per level; $p < .001$), while Hispanic women were 38.0% less likely to have been screened than non-Hispanic women ($p < .001$). Notably, the main independent variable, community engagement, did not reach statistical significance despite exhibiting a robust odds ratio. The second confounder is the educational attainment. A decrease of nearly 7.0% in cervical cancer screening rate was observed among women with every one-level increase in educational attainment ($p < .001$), and a decrease of 41.0% cervical cancer screening rate among women with health insurance

compared to uninsured women. The next confounder is race, and to bring forth clarity in RQ1 analysis (and subsequently RQ2 analysis, and the ad hoc analysis), I sequestered this confounding variable into different racial groups namely, White American (the baseline category), African American, Asian American, American Indian Alaskan Native (AIAN), AIAN and any other group, and finally Other single and multiple groups. There was an increase of nearly 57% increase in cervical cancer screening rate among African American women compared with White American women ($p < .001$), and an increase in cervical cancer screening rate of nearly 101.3% among Asian American women compared with White American women ($p < .001$). Although these two racial groups show a significant association based on p-values, they are not collinear; they do not influence each other to produce this significant association, i.e., between the cervical cancer screening rate and the different racial groups.

The last confounding racial group with a significant association in the RQ1 analysis is American Indian Alaskan Native (AIAN). A nearly 56.0% decrease in cervical cancer screening rate was observed among AIAN women compared with White American women ($p < .03$). Hence, based on the separate analysis on RQ1, AIAN women did not get screened much, and this is concerning since they would potentially contribute to the cervical cancer risk population in the United States. The last confounding variable significantly associated with the cervical cancer screening rate for RQ1 is income level. A decrease of nearly 2.0% in cervical cancer screening rate was observed among women with every one-level increase in the income-to-poverty ratio, starting at 0.0 all the way to 5.0 or greater ($p < .03$). Hence, women who were heading close to higher levels in the

income-to-poverty ratio scale were not getting screened compared to women at the bottom of this scale.

For RQ2, significant associations were observed with the sampled adults' age, employment status, ethnicity (excluding Hispanic), highest educational attainment, health insurance coverage, race (African American and Asian American), and income level. A decrease of nearly 0.6% in the cervical cancer screening rate was observed for every 1-year increase in the age of the sampled adult ($p = .001$). Regarding the second research question, the independent variable (social functioning) demonstrated a negative correlation with screening behavior; specifically, each one-level decrease in social functioning was associated with a 1.5% increase in cervical cancer screening rates. These results suggest that individuals with lower levels of social functioning are more likely to undergo screening.

There was an increase of nearly 21.0% in the cervical cancer screening rate among women with every one-level increase in employment status ($p < .001$). The NHIS scale begins with working in the past 12 months and then gradually progresses to never working in the past five years or longer. A decrease of 38.0% in cervical cancer screening rate was observed among Hispanic women compared to non-Hispanic women ($p < .001$). Additionally, with each one-level increase in educational attainment, cervical cancer screening decreased by nearly 9.0% among American women across different ethnic and racial groups ($p < .001$). Similarly, there was a 36.0% decrease in cervical cancer screening rate among uninsured women compared to insured women. Hence, health insurance is vital for increasing cervical cancer screening rates.

In terms of race, the two significant groups were African American and Asian American. Among African American women, there was a 48.3% increase in cervical cancer screening rate compared to White American women ($p < .001$), and an increase of nearly 119.0% in screening rates among Asian American women compared to White American women ($p < .001$). Although the odds ratios are highly significant for these two racial groups, there is no multicollinearity, and the confounding variables, along with the independent variables, did not influence the dependent variable, namely, the cervical cancer screening rate, in producing these outcomes.

In contrast to Benavidez et al. (2021), who identified a direct correlation between higher income and increased screening, this study found that income level was a significant confounding variable, showing an inverse association with the outcome. Specifically, every one-level increase in the income-to-poverty ratio was associated with a 2.5% decrease in cervical cancer screening rates. Applying the socio-ecological model (SEM), this unexpected decline may be explained by barriers at the individual and organizational levels, such as increased time poverty or workplace constraints (e.g., inability to take time off) that often accompany higher-income roles, which may outweigh the financial benefits of increased wealth.

The results of the combined ad hoc analysis were similar to those of the independent analyses of RQ1 and RQ2 described in the preceding paragraphs. Significant outcomes were observed for age, employment status, ethnicity (Not Hispanic), highest educational attainment, health insurance coverage status, race (African American, Asian American, and AIAN), and income level. The main reason this ad hoc analysis was

performed is to make sure that the independent variables, namely, the levels of community engagement and social functioning, do not have large variations in odds ratio and p-value when analyzing their association with the dependent variable, the cervical cancer screening rate, while controlling for the confounding variables.

An increase of nearly 19.0% in cervical cancer screening rate was evident with every one-level increase in employment status ($p < .001$). This outcome was similar to the results obtained in the separate analyses of RQ1 and RQ2 on employment status. For the ethnicity confounder, a decrease of 38.0% in cervical cancer screening rate was evident among Hispanic women compared with non-Hispanic women ($p < .001$), and a decrease of nearly 7.0% in cervical cancer screening rate was observed with every one-level increase in educational attainment ($p < .001$). These two outcomes are also like the independent analyses of RQ1 and RQ2.

The cervical cancer screening rate decreased by 41.0% for women without health insurance compared to those with health insurance ($p < .001$), and navigating to racial groups (African American women, Asian American women and AIAN women), the ad hoc analysis lead to an increase of 56.6%, increase of 101.1%, and a decrease of 56.0% in cervical cancer screening rates compared to White American women ($p < .001$ for African American women and Asian American women; $p = .03$ for AIAN women). These outcomes for health insurance status and racial groups were similar to the independent analyses of RQ1 and RQ2. The final confounding variable, namely the income level, interpreted as the income-to-poverty ratio, indicated a 2.1% decrease in the

cervical cancer screening rate for each one-level increase in income, on a scale from 0.0 to 5.0 or higher ($p = .03$).

While Asare et al. (2024) similarly explored social determinants of health, including ethnicity, socioeconomic status, and rurality, to identify disparities in cervical cancer screening, their research differs from the current study in that it does not address the specific intersection of variables analyzed in RQ1, RQ2, and the ad hoc analysis. Consistent with Matz et al. (2021), this study identified significant disparities in cervical cancer screening, noting that Non-Hispanic White American women are screened earlier and diagnosed at more treatable stages than African American women. Utilizing the Socio-ecological Model (SEM) to examine these findings, disparities at the intrapersonal level may stem from differences in perceived susceptibility or knowledge regarding screening guidelines. At the interpersonal level, the quality of provider-patient communication and social support networks can significantly influence screening adherence. Finally, at the community level, these differences are often reinforced by inequitable access to healthcare facilities and varying levels of community-based outreach, further aligning with the baseline comparison framework used by Matz et al. (2021).

For instance, on the RQ1 analysis, almost 57.0% of African American women in the NHIS indicated that they were screened for cervical cancer with either the Pap smear or the HPV test. This doctoral study identifies a unique 2.0% decrease in screening prevalence for every one-level increase in the income-to-poverty ratio, contrasting with the direct positive relationships reported by Benavidez et al. (2021) and Fedewa et al.

(2022) regarding insurance and employment. When viewed through the Socio-Ecological Model (SEM), these results suggest that while employment serves as an organizational-level facilitator by providing health insurance (Benavidez et al., 2021), it may simultaneously introduce intrapersonal-level barriers, such as "time poverty" or high-stress work environments that lead women to deprioritize preventive care as their income rises. At the inception of this doctoral study, a gap existed in the United States-based literature regarding a holistic analysis of cervical cancer screening rates as influenced by the independent variables of community engagement and social functioning, while controlling for confounding factors. Although recent research has examined social determinants of health (SDOH) alongside related constructs, they do not align with the specific operational definitions used in this study. For instance, Bauer et al. (2022) and Lee et al. (2024) utilized psychological evaluations and urban-versus-rural dichotomization; however, these studies were excluded from comparison as they do not precisely equate to the levels of community engagement and social functioning analyzed herein. Through the lens of the Socio-Ecological Model (SEM), this study fills a critical void by examining how the community and interpersonal levels intersect to shape screening behaviors—a complexity not fully captured by broader SDOH frameworks or geographic categorizations in contemporary literature. In the next part of this section, I will show the limitations of this study.

Limitations of the Study

The first limitation of this study is the reliance on self-reported data from the 2023 National Health Interview Survey (NHIS). There is potential for recall and social

desirability biases; as a result, accuracy and validity may not be consistently assessed. The second limitation is selection bias before the interviewer presents the sample of adults with questions. The third limitation is the reliance on familiar social determinants of health (SDOH), such as age, income level, employment status, health insurance status, ethnicity, and race. Although these SDOHs are considered confounders, separate analyses of RQ1 and RQ2, as well as ad hoc analyses, were performed to mitigate potential multicollinearity. The fourth limitation concerns the pattern of response choices across levels of social functioning, income, and employment status: the odds ratio and the likelihood of rejecting or failing to reject the null were always computed in reverse order for each variable. Additionally, each of these variables can have a multidimensional impact, which means the results presented here cannot be fully accounted for by either the analyses or the interpretation (Washington & Masters, 2021). Although these limitations are discussed and some were addressed through mitigation measures in the analysis, this study offers sound recommendations for future research.

Recommendations for Future Research

The main purpose of this study was to identify whether the levels of community engagement and social functioning were associated with cervical cancer screening rates among women in the United States. A thorough analysis was conducted by addressing community engagement and social functioning separately as RQ1 and RQ2, and by combining them in an ad hoc analysis. There is still room for future research to address how the levels of community engagement and social functioning can be multifactorial – how new dimensions of community engagement and social functioning are identified,

explained, and analyzed using SDOH to narrow down on new aspects that increase or decrease cervical cancer screening rates among women in a county, or in a state, or in the entire continental United States. The multifactorial nature of these two variables remains underexplored, and a potential case-control study would be a narrower approach in a small to medium-sized clinical setting for identifying complex multifactorial interactions within each variable on cervical cancer screening rates among women in that sample size, and a community-based outreach can also be employed in addition to the abovementioned approach for future investigations to address disparities in cervical cancer screening rates (Perkins & Mitchell, 2023; Perkins et al., 2023). If future research projects investigate disparities in cervical cancer screening rates using the suggested approach, I think a more conclusive understanding of specific local or regional factors contributing to multifactorial variations in community engagement and social functioning can be ascertained across the United States.

Implications for Professional Practice and Social Change

Professional Practice

This study discerned the holistic way by which levels of community engagement and social functioning can be associated with cervical cancer screening rates among women in the United States. The separate analyses for each of these variables – the levels of community engagement and social functioning as RQ1 and RQ2 produced slightly different results that were significant based on the p-value, and the final ad hoc combined analysis produced results comparable to these two separate analyses. The professional practice implications of these analyses delineate how a woman can be influenced by her

employment status, health insurance status, educational attainment, non-Hispanic ethnicity, African American race, Asian American race, AIAN race, and income level, to undergo cervical cancer screening ahead of time, to prevent potential late-stage cancer diagnosis, which could be hard to cure, leading to mortality.

The social determinants of health (SDOHs), as well as employment status and educational attainment, influence a woman before she gets screened for cervical cancer. At the professional level, even medical doctors and nurse practitioners can advise and guide a woman, as professionals, after she discusses a pap smear, an HPV screening, or a colposcopy (visual inspection by acetic acid) with community members, as potential ways of cervical cancer screening available in the United States.

Public Health Practice & Field-Based Products

This study integrates four field-based products to address cervical cancer screening disparities among marginalized populations, including African American, Asian American, and American Indian/Alaska Native (AIAN) women. By combining a policy brief (Appendix A), a community health worker (CHW) intervention plan with a schematic diagram of the SEM constructs (Appendix B), and a one-page fact sheet (Appendix C), this work seeks to improve health outcomes for those impacted by employment, insurance, ethnic/racial, and income inequalities. The Socio-Ecological Model (SEM) provides the foundational framework, enabling comprehensive analysis across the intrapersonal, interpersonal, organizational, community, and public policy levels. The policy brief memo uses the SEM constructs to emphasize how these constructs can help increase cervical cancer screening rates in a multi-level influence

elucidation. The community health intervention plan will test the SEM on two dimensions: the clinical compliance to cervical cancer screening, and educational awareness about screening. Different percentages are used to evaluate the success of this intervention in a twelve-month period. Various levels of the SEM are presented in a diagram, with statements explaining how these levels may affect cervical cancer screening rates. This is the third field-based product. The fourth field-based product is a one-page fact sheet that summarizes cervical cancer and how screening can save lives.

Positive Social Change

The primary way this study promotes positive social change is by raising awareness of the importance of cervical cancer screening among women in the United States. Human beings are social animals; still, the SDOHs are vital for ensuring women are screened to promote early detection and, in turn, contribute to a potential decrease in mortality. The more awareness about cervical cancer screening spreads across communities within the United States, the higher the propensity to lower the unscreened population burden is. Consequently, more women will opt to get screened via a Pap smear, an HPV test, or a colposcopy test. A positive social change will become evident in a community where there are few unscreened women, and there is a lower percentage of women who are diagnosed with late-stage cervical cancer between the ages of 21 and 65.

Conclusion

Using a cross-sectional design and data from the 2023 National Health Interview Survey (NHIS), this study found that cervical cancer screening rates among U.S. women were significantly associated with employment status, health insurance coverage, income

level, and racial/ethnic identification—specifically Hispanic, African American, Asian American, and American Indian/Alaskan Native ($p < .05$). The findings suggest that professional practice should focus on leveraging interactions at the interpersonal-level of the SEM to improve cervical cancer screening rates. The strength of SEM here is its ability to discern specific barriers, such as employment status and health insurance status, associated with cervical cancer screening; a major limitation is the difficulty of determining which level in the SEM has a stronger influence than another. Interventions should prioritize educating women about the specific screening tests available and addressing intrapersonal factors, such as perceived importance of screening, to foster proactive health behaviors. A major ethical issue is the confidentiality of PII before and after NHIS survey interviews, as the data are used by a variety of researchers across the United States. This study communicates with diverse stakeholders such as the community health workers (CHWs), the clinical personnel, the state and federal lawmakers, as well as potential funding sources to promote cervical cancer screening among women between 21 and 65 years of age. This study contributes to positive social change by enhancing awareness of cervical cancer, which may increase community-wide screening rates and reduce late-stage diagnoses through the timely utilization of Papanicolaou (Pap) smears, Human Papillomavirus (HPV) testing, and colposcopy. As part of the doctoral study, I also bring forth four field products in the appendices A, B, and C., starting with a policy brief memo, a community health intervention with community health workers (CHWs), a visual representation using SEM, and a one-page fact sheet outlining cervical cancer screening importance.

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Appendix A: Policy Brief Memo

The Critical Importance of Cervical Cancer Screening to Save Lives

Background/Context and Importance of the Problem

Introduction

A multifactorial relationship pertaining to cervical cancer screening was investigated in this study, as cervical cancer is a genetic disease, i.e., it is caused by the DNA present in the cervical cells. Cervical cancer begins when cells in the cervix undergo abnormal replication, which is partly attributable to the human papillomavirus (HPV) (Gershenson et al., 2022). Although cervical cancer has a high 5-year survival rate (90.0%) if caught early, late-stage cervical cancer survival is just 20.0% (American Cancer Society, 2026). The United States Preventive Services Task Force (USPSTF) recommends cervical cancer screening for women aged 21 through 65, with a Pap smear test every 3 years and an HPV screening test every 5 years (National Cancer Institute, 2025b).

Scope of the Problem

This doctoral study examined the association between cervical cancer screening rates and the levels of community engagement and social functioning, while controlling for health insurance status, age, race, ethnicity, employment status, educational attainment, and income level. I performed independent analyses of community engagement and social functioning, as well as an ad hoc combined analysis, to assess whether the results obtained from the independent analyses were comparable to those from the combined analysis. I also made sure that the confounding variables, such as health insurance status, employment status, educational attainment, and income level, are independent, not multicollinear, and that the sample size is large enough to maintain a normal distribution. Based on the ad hoc analysis, the confounding variables, namely employment status, health insurance status, and educational attainment, non-Hispanic ethnicity, African American women, Asian American women, American Indian Alaskan Native (AIAN) women, and the income level of the woman, were all significantly associated with cervical cancer screening rates among women in the United States.

Current Approaches

Presently, the Pap smear test, the HPV test, or the colposcopy are the three major cervical cancer screening tests available for American women between the ages of 21 and 65 (Mayo Clinic, 2026). Adhering to the USPSTF guidelines is the option to get screened for cervical cancer, but the screening rate by ethnicity, race, employment status, educational attainment, and income level varies, leading to an unscreened population across the United States. The literature does not have other approaches to screen for cervical cancer.

Proposed Program or Policy

I propose addressing discrepancies in cervical cancer screening rates by employment status, educational attainment, ethnicity, racial groups, and income level

using the Socio-ecological model (SEM) (Bronfenbrenner, 1979) stating how each level of the SEM can influence a woman to get screened, in turn, save lives. At the intrapersonal level, the woman's attitude and beliefs about the screening tests can encourage her to get more information from her family, friends, and neighbors. At the interpersonal level, all these people who interact with her can guide her to seek a consultation with her family doctor. The doctor, who is part of the community level, can elucidate more about the importance of cervical cancer screening. The next level is the organization level, wherein the place of employment or field of work will have a role to help the woman seek resources for getting screened for cervical cancer, and finally, the public policy level is at the lawmakers and legal personnel in a county, state, or in the US government. The public policy level can help increase taxes on tobacco products and fund community health workers to spread awareness about cervical cancer screening.

Major Constituencies

The key stakeholders are the medical personnel, clinical staff, community health workers, public policy enforcement authorities, such as lawmakers, legal personnel, and those who may oppose this policy brief are the tobacco product manufacturers. I plan to gather support by using the SEM and involving every level of this model to emphasize the need and urgency of cervical cancer screening approaches to save lives.

Conclusion

This policy brief memo proposed an SEM-based approach to increase cervical cancer screening rates and save lives. A multi-level influence to encourage screening can help enforce the USPSTF's recommended guidelines, so that women aged 21 to 65 can get screened via a Pap smear, an HPV test, or, in rare cases, colposcopy.

Appendix B: Community Health Intervention Plan

A Community Framework for Cervical Cancer Awareness

Problem Definition

Cervical cancer is preventable if the recommended screening tests, such as a pap smear, an HPV test, or a colposcopy, are completed for women between the ages of 21 and 65 once every three years or once every five years (Benavidez et al., 2021). The unscreened population has a profound public health impact since more women in this unscreened population are risking their lives way before they approach their senior years. Some contributing factors include employment status, health insurance status, non-Hispanic ethnicity, racial group, and income level.

Goal Setting

This intervention aims to achieve two types of goals: clinical screening and educational awareness. The clinical screening goal entails the reduction of unscreened women in the community by 20% within the first 12 months, and also provide 100% of women who had abnormal screening results with medical resources for subsequent steps to prevent cervical cancer diagnosis in the future. The educational awareness goal will comprise at least 50 community health education sessions in public libraries or faith-based centers to increase community knowledge of cervical cancer screening by 30% within the first 12 months.

Target Population

The target population for this community health intervention is non-institutionalized American women aged 21 to 65 who live in Evansville, Indiana.

Intervention Strategies

Intervention Strategies

I propose an intervention using the Socio-ecological model (SEM) as shown in figure B1.

Figure B1

Intervention Strategy Using SEM for Cervical Cancer Screening

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health education quarterly*, *15*(4), 351-377.

Implementation Plan

Months 1-2: The timeline begins with hiring and certifying at least 5 community health workers (CHWs), then confirming a clinical screening protocol with leading hospitals, such as Deaconess Health System.

Months 3-4: Start community education sessions in the public library with cervical cancer screening information.

Months 5-10: The CHWs perform active case management, including house calls, checking with current screening status, and aiding with next steps.

Months5-12: CHWs will help women with abnormal test results to follow up with clinical personnel for next steps to prevent late-stage cervical cancer diagnosis.

Months 11-12: Evaluate the goals at the end of the year (20% increase in cervical cancer screening) and present before the cancer consortium in the State of Indiana.

Resources: Potential grant money from the National Breast and Cervical Cancer Early Detection Program (NBCCEDP), evidence-based cervical cancer toolkits in English and Spanish, paid bus passes to get to cervical cancer screening at clinics, and support from clinical partners.

Roles: Program Coordinator – He/she will oversee the intervention, manage the budget, coordinate communication with clinical personnel, and the women.

Community Health Worker (CHW) – Build trust, conduct outreach, speak in educational sessions, and facilitate removing any barriers to screening

Clinical Staff – Manage CHW referral for screening and communicate test outcome confidentially for intervention evaluation and presentation

Regional Welfare Coordinator – Helping women living below 200% of the poverty line get bus passes and state Medicaid before cervical cancer screening.

Evaluation Plan

A simple evaluation plan involves process, impact, outcome, and equity.

Process – Number of unscreened women addressed, number of educational sessions. These are evaluated by CHW logs and sign-in sheets.

Impact – Evaluation before and after screening tests (Pap smear or HPV). Analyzed by survey questions and responses

Outcome – Number of women who tested for cervical cancer using both tests. Evaluated by clinical referral data.

Equity – Screening rates by employment status, health insurance status, income level, and ethnicity/race. Evaluated by survey questions and responses.

Benchmark Evaluation

A 20% increase in the cervical cancer screening rate among women after the intervention started, and also an increase of 30% in knowledge about cervical cancer screening to prevent late-stage diagnosis, even before a woman attains senior years.

Appendix C: Fact Sheet on Cervical Cancer Screening

Cervical Cancer Screening

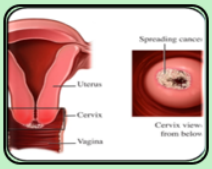
Cervical cancer is preventable

- 13360 new cases (2025)
- 4320 deaths (2025)

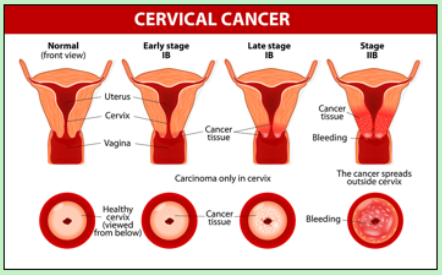
Cervical cancer is the 4th leading cause of death

Pap Smear Every 3 years (21-29)

HPV test Every 5 years (30-65)



SDOHs – o) Employment status, o) Educational attainment, o) Insurance status, o) Ethnicity/Race, and o) Income Level were all significantly associated with cervical cancer screening



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