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Predictors of Cancer Information Seeking Among Adults With a Family History of Cancer

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Abstract

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MPH, Johns Hopkins University, 2011

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Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy
Public Health Epidemiology

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Abstract

Cancer is a significant cause of illness and mortality in the United States. A family history of cancer is a valuable factor for assessing disease risk and increasing cancer information-seeking behaviors for prevention. Guided by the health belief model, this quantitative study addressed the predictors of cancer information seeking behavior among adults with a family history of cancer. In this study, data from 8,473 participants in the 2017–2019 Health Information Trends Analysis Survey were analyzed using multivariate logistic regression. This analysis addressed whether there was a statistically significant difference in sociodemographic factors, measures of health status, and health care engagement indicators between individuals with a family history of cancer who seek or do not seek cancer information when controlling for age, gender, and race. The results revealed a statistically significant ($p < .05$) association between education level, income, health insurance status, general health status, cancer diagnosis, cancer worry, having a regular health care professional, getting frequent care, and cancer information seeking. Age, gender, and race/ethnicity were not confounders on the association. The results may be used to increase the understanding of factors responsible for seeking cancer prevention information among populations with a family cancer history to reduce the health burden and mortality from cancer.

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Dedication

I dedicate this dissertation to my dear husband (Joseph Oluyinka Fawole) for his incredible support through this journey, my lovely children (Jesse, Joys, and Tunmise) for their superior understanding, my wonderful parents for their prayers, my sweet sisters, and my entire family for encouraging me throughout the process. I am very grateful to God for his exceeding grace and for surrounding me with the right people at the right time.

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Chapter 1: Introduction to the Study

Over 1.5 million new cancer cases are diagnosed annually in the United States (Siegel et al., 2020). For this reason, cancer remains the second leading cause of mortality in the United States (Yabroff et al., 2019). This high mortality rate is mainly due to the late diagnosis of individuals when the disease is already unresectable and incurable (Bray et al., 2018). Therefore, there is a need for the identification of populations at increased risk for cancer to establish preventive strategies that will reduce the high mortality associated with this disease. For instance, approximately 20% of those with hereditary cancers will have a family history that will place them at an increased risk (Fawz et al., 2020; Hidaka et al., 2020). Family history plays a crucial role in cancer development, and recognizing this risk is essential for prevention.

Family history is an integrated risk predictor for cancers of the breast, prostate, colon, lung, and ovary, the most common cancers in the United States (Bertoni et al., 2019; Misra-Hebert et al., 2017; Tsai et al., 2015; Yablonski-Peretz et al., 2016). In addition to environmental and lifestyle factors shared by family members, some genes contribute to the familial clustering of hereditary cancers (Flória-Santos et al., 2016). A family history of cancer is a significant risk factor for same cancer and other cancer types, particularly when it is diagnosed in a first-degree family member (Cleophat et al., 2018). The risk of cancer increases with an increasing number of affected relatives and is associated with the age at diagnosis of affected relatives (Tehranifar et al., 2015). Identifying hereditary cancer syndrome through a family history may influence seeking preventive information and other interventions.

Less than 50% of Americans have reported searching for cancer-related health information (Wigfall & Friedman, 2016). Cancer patients, their family members, and their friends are known to look up health information more than those without a friend or family member with cancer (Adjei Boakye et al., 2018; Ginossar, 2016; Richards et al., 2018). Despite the relevance of seeking health information among cancer patients and the general population, no study has addressed the predictors of cancer information-seeking behaviors among individuals with a family history of cancer. Chapter 1 includes the background, problem statement, summary of prior research on cancer information seeking, research problem, purpose of the study, research questions and hypotheses, theoretical framework, nature of the study, definitions, assumptions, scope and delimitations, and limitations. Chapter 1also provides the implications for social change, the significance of the study, and a summary.

Background

Cancer information-seeking behaviors facilitate health-related decision-making, motivate behavioral change, and modify health care utilization (S. T. Lee et al., 2018; Wigfall & Friedman, 2016). Seeking cancer-related health information can also help to address specific health risks and enhance coping skills, as well as health care self-efficacy (Jones et al., 2015; Scarton et al., 2018). Additionally, there is evidence that looking for cancer-related health information is associated with positive health behaviors, such as better knowledge of cancer, health risks, health prevention behaviors, adjustment to a new diagnosis, and adherence to treatment plans (Ginossar, 2016; Reyna et al., 2015;

Wigfall & Friedman, 2016). Not seeking preventive cancer information may be an indicator of engaging in high-risk behaviors like smoking (Upadhyay et al., 2019).

In the general population, the knowledge of cancer-related health information can help individuals avoid risk factors for prevention and improve disease management skills if cancer occurs (K. M. Oh et al., 2015; Richards et al., 2018). Cancer information seeking is beneficial for gaining insights into cancer-related risk factors, preventive behavior to decrease cancer incidence, screening, and adequate treatment to cope with cancer-related challenges (Ginossar, 2016; Wigfall & Friedman, 2016). Despite the apparent benefits of cancer information seeking, several demographic, psychological, environmental, cultural, financial, and individual factors act as barriers to accessing health information (Jacobs et al., 2017; Nelissen et al., 2017; Somera et al., 2016). These factors include lack of education, low income, poor health status, limited access to doctors, lack of health insurance, and fear of the disease (Jacobs et al., 2017; Nelissen et al., 2017; Somera et al., 2016). Additionally, specific populations, including ethnic minorities, are significantly less likely to look for health information, further increasing their need for reliable preventive strategies (Jungmi & Xiaoli, 2018; Luz et al., 2015; Wigfall & Friedman, 2016).

Cancer prevention programs for the general population typically include information about a family history of cancer because it is an important risk factor for the development of cancer (Bertoni et al., 2019; Misra-Hebert et al., 2017; Tsai et al., 2015; Yablonski-Peretz et al., 2016). There is evidence that people with a family history of cancer are more likely to seek cancer prevention information than those without (Adjei

Boakye et al., 2018; Ginossar, 2016; Richards et al., 2018). Although cancer patients and survivors are the primary consumers of cancer-related information, any person with a family history of cancer is a potential consumer of cancer-related information (Finney Rutten et al., 2016; Scarton et al., 2018). Individuals with a family cancer history might also seek information that would enable them to gauge their risk for developing cancer or identify strategies for prevention or early detection of cancer (Adjei Boakye et al., 2018; Ginossar, 2016; Richards et al., 2018). Moreover, exposure to a family member with cancer might motivate individuals to seek information regarding treatment options, disease outcomes, available rehabilitation, and other support resources.

The existing literature has mainly focused on cancer-related health information seeking behavior in general populations (Kobayashi & Smith, 2016; Wigfall & Friedman, 2016). Additionally, research regarding cancer information-seeking motives, preferences, behaviors, and experience of cancer patients and survivors is abundant (Finney Rutten et al., 2016; Richards et al., 2018; Scarton et al., 2018; Valera et al., 2018). However, similar information regarding those with a history of cancer is scarce. Differences may exist between those with a family history of cancer who seek or do not seek preventive cancer information. However, the literature on these potential differences is not available. Because cancer continues to be a leading cause of death in the United States, it is important to ascertain the predictors of cancer information-seeking behavior among adults with a family history of cancer who have an increased risk for the disease.

Problem Statement

Cancer information is relevant for individuals with a family history of cancer because of the increased risk of developing cancer (Adjei Boakye et al., 2018; Drake et al., 2020; Richards et al., 2018). In the United States, cancer-related health information seeking is evolving due to changes in individuals' risk perception and prevention need (Kobayashi & Smith, 2016; Wigfall & Friedman, 2016). Populations with a family cancer history demonstrate a higher risk for developing many types of cancers (Fawz et al., 2020; Hidaka et al., 2020; Mucci et al., 2016). Additionally, the burden of familial risk for hereditary cancers is estimated to be greater than 20% (Fawz et al., 2020). The most commonly seen cancers of the breast, prostate, colon, lung, and ovary occur more in those with a family history of cancer (Bethea et al., 2016; Byun et al., 2018). Therefore, having a cancer family history can increase the perception of risk and may facilitate seeking cancer-related health information.

However, little is known about individuals with a family history of cancer and their health information-seeking behaviors related to cancer prevention. Based on prior research, sociodemographic factors, health status, and health care engagement are associated with cancer preventive information seeking in general populations (Kobayashi & Smith, 2016; Wigfall & Friedman, 2016). There is a gap in the literature concerning predictors of cancer information seeking in individuals with a family history of cancer who are at higher risk of cancer and might benefit from interventions to meet their information needs. It is unclear whether sociodemographic factors, health status, and health care engagement are predictors of cancer information-seeking behaviors among individuals with a positive family history of cancer. In this study, I aimed to fill this gap in the literature regarding the predictors of cancer information-seeking behaviors among adults with a family history of cancer.

Purpose of the Study

The purpose of this study was to assess the predictors of cancer information-seeking behaviors among adults with a family history of cancer. The dependent variable was cancer information-seeking behaviors. The independent variables were sociodemographic factors, measures of health status, and indicators of health care engagement. These variables were based on the health belief model (HBM) consisting of perceived severity, susceptibility, benefits, barriers, and cues to action. In this study, sociodemographic factors (education, income, and health insurance) were measures of perceived barriers. Health status variables (general health status, cancer diagnosis, and cancer worry) were measures of perceived susceptibility and severity. The health care engagement variables (having a regular health care provider and frequent health care visits) were indicators of perceived benefits and cues to action. The findings from this research may be used to explain the factors that may influence cancer information-seeking behaviors among adults with a family history of cancer.

Research Questions and Hypotheses

The research questions (RQs) for this investigation addressed whether sociodemographic factors, health status, and health care engagement predicted cancer information-seeking behaviors among adults with a family history of cancer.

RQ1: Is there a significant difference in sociodemographic factors (education, income, health insurance) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race?

H_o1: There is no significant difference in sociodemographic factors (education, income, health insurance) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

H_a1: There is a significant difference in sociodemographic factors (education, income, health insurance) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

RQ2: Is there a significant difference in health status (cancer diagnosis, general health status, cancer worry) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race?

H_o2: There is no significant difference in health status (cancer diagnosis, general health status, cancer worry) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

H_a2: There is a significant difference in health status (cancer diagnosis, general health status, cancer worry) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

RQ3: Is there a significant difference in health care engagement (having a regular health care provider and getting frequent health care) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race?

H_o3: There is no significant difference in health care engagement (having a regular health care provider and getting frequent health care) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

H_a3: There is a significant difference in health care engagement (having a regular health care provider and getting frequent health care) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

Theoretical Framework

The HBM was the theoretical foundation for this study. A group of social scientists working at the U.S. Public Health Service developed the HBM to explain why patients did not receive free tuberculosis screening in the 1950s (Glanz & Bishop, 2010). Since then, the HBM has been used to describe different types of preventive behaviors (Jones et al., 2015; Scarton et al., 2018). The HBM states that people would take action to prevent diseases by engaging in healthy behaviors based on their health beliefs (Almadi & Alghamdi, 2019). This model is useful for explaining and predicting individual changes in health behaviors include cancer information seeking (Jones et al., 2015; Scarton et al., 2018). The HBM was ideal for the current study because cancer information-seeking behaviors are influenced by an individual's perception of threats posed by a health-related risk such as a family history of cancer (Ahadzadeh et al., 2015; Carter-Harris et al., 2016; Gautam, 2017).

In the current study, I drew on five constructs of the HBM model: perceived susceptibility, perceived severity, perceived benefits, barriers, and cues to action (see Jones et al., 2015). Perceived susceptibility is related to cancer information seeking in that an individual's perception of increased risk and the chance of developing cancer is relatively high among individuals with a cancer family history (Frank et al., 2015; Flória-Santos et al., 2016; Jones et al., 2015). Perceived severity refers to a person's perception of the negative consequences of having a higher risk and the seriousness of developing cancer due to their health status (Ahadzadeh et al., 2015; Carter-Harris et al., 2016; Zare et al., 2016). Perceived benefits are associated with an individual's view of a valuable action, such as health care engagement, for their communication needs to decrease cancer risks (Jones et al., 2015; Reblin et al., 2019). Perceived barriers refer to an individual's opinion of hindrances like sociodemographic factors that impact seeking preventive cancer information as a behavioral action (Ahadzadeh et al., 2015; Feinberg et al., 2016; Zare et al., 2016). Cues to action from external factors such as frequent health care visits can prompt an individual to take steps to seek cancer-related health information for prevention (Almadi & Alghamdi, 2019; Gautam, 2017; Jones et al., 2015).

The HBM attempts to explain the factors that influence cancer-related health information seeking from the health perspective of the individual (Almadi & Alghamdi, 2019; Reblin et al., 2019; Upadhyay et al., 2019). In epidemiologic research, individuals with higher perceived health risk have greater motivation to adopt preventive health behaviors such as seeking and using information (Gautam, 2017; Jones et al., 2015). For instance, women are more likely to seek health information because they tend to have a higher perceived health risk than men (Adjei Boakye et al., 2018; Loiselle, 2019; Manierre, 2015; Saab et al., 2018; Somera et al., 2016). Furthermore, health-conscious people who understand the benefits of having a regular health care provider are motivated to seek cancer information to improve or maintain their health (Espinosa & Kadić-Maglajlić, 2018; Nelissen et al., 2017). The HBM also assumes that individuals with perceived barriers such as low income and reduced knowledge cannot make a wise decision in health information-seeking behavior (Francis & Zelaya, 2020; Stiefel et al., 2019).

Determining the effects of perceived susceptibility, severity, benefits, barriers, and cues to action on cancer information seeking is crucial for understanding cancer prevention behaviors among individuals with a cancer family history. In this study, I used the constructs of the HBM (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action) to explore the predictors of cancer information seeking among adults with a cancer family history. Data related to these five HBM constructs were collected to examine the differences between those with a family history of cancer who seek or do not seek cancer information.

Nature of the Study

This quantitative study included a cross-sectional design to examine the predictors of cancer information seeking among adults with a family history of cancer. I assessed whether any predictive associations existed between sociodemographic factors, health status, health care engagement, and cancer information seeking. The independent variables were sociodemographic factors (education, income, health insurance), health status (cancer diagnosis, general health status, cancer worry), and health care engagement (having a regular health care provider and getting frequent health care). Age, gender, and race were the covariates in this study. Cancer information seeking was the dependent variable. The use of a cross-sectional design allows the researcher to collect data at one point in time to investigate any association between two or more variables (Setia, 2016). I utilized secondary data from the Health Information National Trends Survey (HINTS) of the National Cancer Institute (NCI). Multivariate logistic regression was used to analyze the relationship between sociodemographic variables, health status variables, health care engagement variables, and cancer information seeking among adults with a family history of cancer.

Definitions

Cancer: Uncontrolled and abnormal cell growth resulting in the development of a tumor in a particular region, or a malignancy that can invade nearby cells, tissues, or other parts of the body (Feitelson et al., 2015).

Cancer information seeking: The process or activity of attempting to obtain information about cancer prevention and control (Huerta et al., 2016).

Cues to action: The stimulus needed to trigger the decision-making process to accept a recommended health action like seeking cancer prevention information as a result of having a regular health care provider (Jones et al., 2015).

Family cancer history: Previous occurrences of cancer as a medical or health condition in family members or close relatives (Flória-Santos et al., 2016).

Health care engagement: The involvement of a person in their own care to improve health outcomes including seeking health information for cancer prevention (Adjei Boakye et al., 2018).

Health Information National Trends Survey (HINTS): A part of the National Cancer Institute's Division of Cancer Control and Population Sciences that collects data about the use of cancer-related information by the U.S. public (HINTS, 2018).

Health status: The medical conditions (both physical and mental health) of an individual, such as the perception of general health, cancer diagnosis, and cancer worry (Jacobs et al., 2017).

Perceived barriers: An individual's estimation of the level of challenge of social, personal, environmental, and economic obstacles to seeking cancer preventive information (Jones et al., 2015).

Perceived benefit: An individual's belief that specific positive outcomes will result from cancer information-seeking behavior (Jones et al., 2015).

Perceived severity: An individual's subjective belief in the extent of risks that may result from the negative consequences associated with an event or outcome, such as a diagnosis of cancer (Jones et al., 2015).

Perceived susceptibility: The subjective belief that a person is at risk of acquiring a disease or feelings of personal vulnerability to an illness such as cancer (Jones et al., 2015).

Sociodemographic factors: The characteristics of a population, which generally include age, gender, ethnicity, education level, income, and health insurance status (Stiefel et al., 2019).

Assumptions

A key assumption of this study was that the study participants had accurate knowledge of their family cancer history and did not withhold any self-reported data on cancer information-seeking behaviors. Given that the HINTS data set had been used in many studies, I assumed that the interviews were correctly done, and all data collected were accurate. I also assumed that the variables selected were the most appropriate for the study to determine the predictors of cancer information-seeking behaviors among individuals with a family history of cancer. Using data from the HINTS, I assumed that sampling was extensive with no random errors because the database is representative of national patterns regarding cancer information-seeking behaviors.

Scope and Delimitations

The scope of the study was the predictors of cancer information seeking behaviors among individuals with a family history of cancer using the HINTS data set. The sample for this study was delimited to adults age 18–99 years with a family history of cancer in the HINTS 5 Cycles 1, 2, and 3 data sets. This study did not include Hispanics because the data did not specify this race/ethnicity. Therefore, this study's results were limited to the sample and were not generalizable to the Hispanic population living in the United States.

Limitations

The main limitation of this study was the use of self-reported data from the HINTS data set. Self-reported information may not represent the real participants' characteristics and behaviors (Finney Rutten et al., 2019). Moreover, a cross-sectional study is not useful for causal relationships and is prone to biases (Setia, 2016). Furthermore, this study was guided by only five of the six constructs of the HBM. This abbreviated version without the measures of self-efficacy could have had an impact on predictability. There was also a possibility of residual confounding or glitches in the secondary data collection process that could have affected the interpretation of some variables in the data set (see Finney Rutten et al., 2019). Furthermore, the outcome of this study was limited to the sample and was not generalizable to the entire population. The limitations to causality, recall bias, social desirability influences, secondary data, generalizability, and other confounding variables not controlled for in the study may have affected the validity of the study. In addition to limitations linked to self-reporting, such as mis-reporting and nonreporting, measuring complex behavioral constructs such as asking about cancer information seeking from any source is often limited, adding to measurement bias. However, the HINTS data set had been used in many studies despite the limitations of the psychometric properties.

Significance

The findings of this study may provide insights into the factors that influence cancer information-seeking behaviors among adults with a family history of cancer. This investigation was an opportunity to bridge a gap in the literature on the need to understand the perceived susceptibility, severity, barriers, benefits, and cues to actions in individuals with a cancer family history seeking or not seeking cancer information (see Jones et al., 2015; Kobayashi & Smith, 2016; Wigfall & Friedman, 2016). Results from this study may guide future research on cancer information-seeking behaviors among subpopulations with a family history of cancer development. The study may provide valuable information that informs the development of public health interventions to enable easy access to cancer-related health information among at-risk populations.

This study may contribute to positive social change by clarifying the determinants of cancer information seeking among adults with a family history of cancer. Identifying the factors that influence cancer information seeking will reduce the late diagnosis of cancer at advanced stages, decrease mortality rates, and improve the quality of life among populations with a cancer family history (Bray et al., 2018; Torre et al., 2016). The knowledge of these predictors may minimize the barriers to cancer prevention information seeking among at-risk populations and may lead to a decrease in the public health impact of cancer within the community. In addition, the results of this study may help health care providers tailor cancer-related health communication to patients with a cancer family history and may reduce the overall burden of the disease. The proactive development of preventive cancer health education programs may ensure that information needs are adequately met by health professionals, policymakers, and advocacy groups.

Summary

The purpose of this study was to examine the predictors of cancer information-seeking behaviors among adults with a family history of cancer by applying the HBM. A family history of cancer plays a vital role in cancer development and increases the perception of disease risk among this population (Flória-Santos et al., 2016; Jones et al., 2015). Increased cancer risk perception can trigger more information-seeking behaviors among cancer patients and their family members or relatives (Adjei Boakye et al., 2018; Ginossar, 2016; Richards et al., 2018). However, not much is known about cancer-related health information-seeking behaviors of family members of cancer patients. As such, it was important to examine the factors associated with seeking or not seeking cancer prevention information among adults with a family cancer history. Chapter 1 provided an overview of the health problem, research questions investigated in this study, the significance of family history and cancer information-seeking behaviors, definitions of terms, assumptions, and limitations. In Chapter 2, I present a literature search strategy and a review of the literature related to the following areas: (a) the introduction of family history of cancer and cancer information-seeking behaviors, (b) the HBM and cancer information-seeking behaviors, (c) burden of cancer in the United States, (d) relevance of the family history of cancer, (e) cancer information-seeking behaviors, and (f) factors influencing cancer information-seeking behaviors.

Chapter 2: Literature Review

A family history of cancer is a significant risk factor for the development of cancer, the second leading cause of mortality globally (Cleophat et al., 2018; Nagai & Kim, 2017). For most cancer sites, there is evidence that individuals with a family history of cancer are more likely to develop the disease than those without a family history (Brewer et al., 2017; Hidaka et al., 2020). In general, family history reflects the consequences of genetic susceptibilities, shared environment, and common behaviors (Flória-Santos et al., 2016). The perception of an increased risk of cancer through the knowledge of family history may guide individuals, families, and populations to seek health information (Finney Rutten et al., 2016; Richards et al., 2018). Health information-seeking is necessary for cancer prevention and behavioral changes necessary to reduce disease risk (Jacobs et al., 2017; Kobayashi & Smith, 2016; Wigfall & Friedman, 2016).

Cancer information seeking enables individuals to adopt disease prevention and health promotion behaviors (Wigfall & Friedman, 2016). Prior research focused on general health information-seeking behaviors of individuals with cancer and minority populations (Adjei Boakye et al., 2018; Finney Rutten et al., 2016; Ghazavi-Khorasgani et al., 2018; Jacobs et al., 2017; Miller et al., 2018). There are also data on the predictors of cancer-related health information seeking among cancer patients and survivors (Ginossar, 2016; K. M. Oh et al., 2015). However, my review of the literature indicated no study had addressed the predictors of seeking cancer-related information among individuals with a family history of cancer. I addressed this gap in the literature by examining the determinants of cancer information-seeking behaviors among individuals with family cancer history using large-scale national data.

The purpose of this cross-sectional study was to identify the predictors of cancer information-seeking behaviors among adults in the United States with a family history of cancer. Unlike previous studies, this investigation addressed the factors associated with cancer information-seeking behaviors in adults with a family cancer history. The study was based on the constructs of the HBM, a predictive conceptual framework. A better understanding of the profiles of those who seek or do not seek cancer information among at-risk populations with a family history of cancer may help improve access to preventive measures. The identification of the determinants of cancer information seeking may inform interventions and prevention efforts among at-risk populations with a family history of cancer.

In this chapter, I present the literature search strategy and a review of the existing literature to confirm the relevance of the research problem under investigation. This review included relevant literature on the HBM because this model was the theoretical framework used for this study. To better understand the study population, I describe the existing literature related to cancer burden, family history of cancer, and hereditary cancers. I also provide an overview of studies that had been conducted on cancer information seeking among different populations. Additionally, I highlight how sociodemographic factors, health status, and health care engagement, as informed by the constructs of the HBM, impact cancer information seeking.

Literature Search Strategy

This literature review involved accessing the EBSCO, CINAHL, and MEDLINE databases from the Walden University library to identify the relevant literature. Other search engines included PubMed, ProQuest, Science Direct, and Google Scholar. The search period ranged from 2015 to the present. The following keywords were used in the search: *family cancer history*, *genetic predisposition to cancer*, *hereditary cancer*, *cancer information*, *cancer information seeking*, *cancer information-seeking behaviors*, *cancer prevention information*, and *health belief model*. Articles were selected from the databases based on their relevance to the research variables and study population. Only articles in English were considered. All included articles were peer-reviewed publications. Some older articles were included if they were appropriate for theoretical foundation purposes.

Theoretical Foundation

The HBM has been broadly applied to examine the health beliefs and behaviors about cancer prevention strategies (Jones et al., 2015; Scarton et al., 2018). Health beliefs play a notable role in an individual's willingness to participate in health-promoting and disease-preventing behaviors (Zare et al., 2016). The HBM is a practical theoretical framework for understanding the relationship between health beliefs and health behaviors (Jones et al., 2015). The HBM has been tested in different populations because the model focuses on people's health-related behavior for predicting future actions (Almadi & Alghamdi, 2019; Reblin et al., 2019; Upadhyay et al., 2019). This model implies that behavior is a product of the individual's knowledge and attitude (Almadi & Alghamdi, 2019). There are six constructs of HBM, namely perceived susceptibility to illness or condition, perceived severity of the disease or condition, perceived benefits of predictive action, perceived barriers that prevent action, cues to action that influences an individual to take action, and self-efficacy (Jones et al., 2015; Scarton et al., 2018).

According to this model, the decision to participate in a preventive activity is determined by perceived susceptibility to the condition, perceived severity of the consequences, and whether the perceived benefits exceed the perceived barriers (Almadi & Alghamdi, 2019; Jones et al., 2015). People will take action to prevent disease if they feel susceptible, if they think it would have serious negative effects, and if taking the prescribed action would lead to positive outcomes and negligible negative results. This model has been used for predicting participation in health behaviors, including seeking health information and adopting cancer preventive services (Ahadzadeh et al., 2015; Almadi & Alghamdi, 2019; Carter-Harris et al., 2016; Gautam, 2017). People may be more likely to seek preventive information or act on recommendations when they are aware of the risk of having cancer as a result of the knowledge of their family history (Almadi & Alghamdi, 2019; Farajzadegan et al., 2016; Rodríguez et al., 2016).

The importance of perceived susceptibility is highlighted by the HBM (Jones et al., 2015). Perceived susceptibility, which describes the extent to which individuals believe they are susceptible or vulnerable to a health problem, is closely associated with health status (Ahadzadeh et al., 2015; Zare et al., 2016). For example, those who do not have a concern with their health status will be unlikely to believe that they are susceptible to cancer (Gautam, 2017). Inadequate recognition of susceptibility to a condition is responsible for underutilization of health interventions because individuals who do not recognize health problems will be unlikely to seek information or care (Reblin et al., 2019; Zare et al., 2016). General health perception and cancer diagnosis as measures of health status have been examined to explain the differential rates of health information seeking among general adult populations (Adjei Boakye et al., 2018; Zare et al., 2016). Therefore, it was plausible to operationalize perceived susceptibility as health status measured by general health perception and cancer diagnosis as predictors of cancer information seeking among adults with a family cancer history.

Considering that perceived severity in the HBM involves the extent to which people believe that a problem has serious consequences and will interfere with daily functioning, cancer worry can reflect the severity of the disease (Carter-Harris et al., 2016; Zare et al., 2016). For instance, psychological distress from cancer worry may serve as a cue that the problem warrants professional attention (Jensen et al., 2017). There is evidence that cancer worry is a predictor of health behavior that can make both cognitive and affective evaluations necessary for consideration in any health context (Jensen et al., 2017; Reyna et al., 2015). Additionally, research has demonstrated that cancer worry is positively associated with a higher perception of the severity of cancer (Durazo & Cameron, 2019; McDonnell et al., 2018). However, relatively few studies have addressed the role of cancer worry in cancer information seeking (Francis & Zelaya, 2020; S. Y. Lee & Hawkins, 2016). Therefore, it was plausible to examine whether the awareness of disease risk and severity measured as cancer worry impact the decision-making to seek cancer information or not.

Sociodemographic factors including age, gender, race, education, income, and insurance status explain population-level differences in seeking preventive information for well-being (Stiefel et al., 2019). Perceived barriers to seeking cancer care or information may be physical, financial, or psychological (Cassim et al., 2019; Feinberg et al., 2016; Ginossar, 2016). Based on the HBM, perceived barriers to seeking health information are low educational levels, racial differences, lack of health insurance, and gender inequality (Ahadzadeh et al., 2015; Feinberg et al., 2016; Zare et al., 2016). Individuals who are unable to seek health information as a result of perceived barriers due to age, gender, race, or socioeconomic status are less likely to adhere to prevention recommendations (Francis & Zelaya, 2020). In contrast, higher educational attainment and having insurance may encourage individuals to seek health information about cancer prevention (Feinberg et al., 2016; Ginossar, 2016). The ability to engage in health-promoting behaviors by seeking medical help at the appropriate time also has significant health benefits (Rippe, 2018). Additionally, individuals with a regular health care provider who participate in cancer screening and attend regular medical checkups are less likely to engage in health-compromising behaviors, like smoking, associated with the development of cancer (Kim et al., 2019).

Perceived benefits involve the extent to which people believe that a health strategy will be effective in disease prevention (Jones et al., 2015; Reblin et al., 2019). Perceived benefits are critical for health information seeking because one must believe that the knowledge gained will help behavioral changes (Ahadzadeh et al., 2015; Chu et al., 2017). The perceived benefits of having a regular health care provider may also serve as cues to action for individuals to seek information about cancer prevention (Gholampour et al., 2018; Visser et al., 2017). The perceived benefits of a healthy lifestyle promoted by seeing health professionals frequently have been positively associated with seeking health information (Adjei Boakye et al., 2018; Chu et al., 2017; Jacobs et al., 2017; Musarezaie et al., 2019). Wong and Cheung (2019) found that seeking information about healthy behaviors was particularly important in deciding on changing daily lifestyle habits among adults seeking medical consultations. However, the extent to which having a regular health care provider influences seeking cancer information had not been studied.

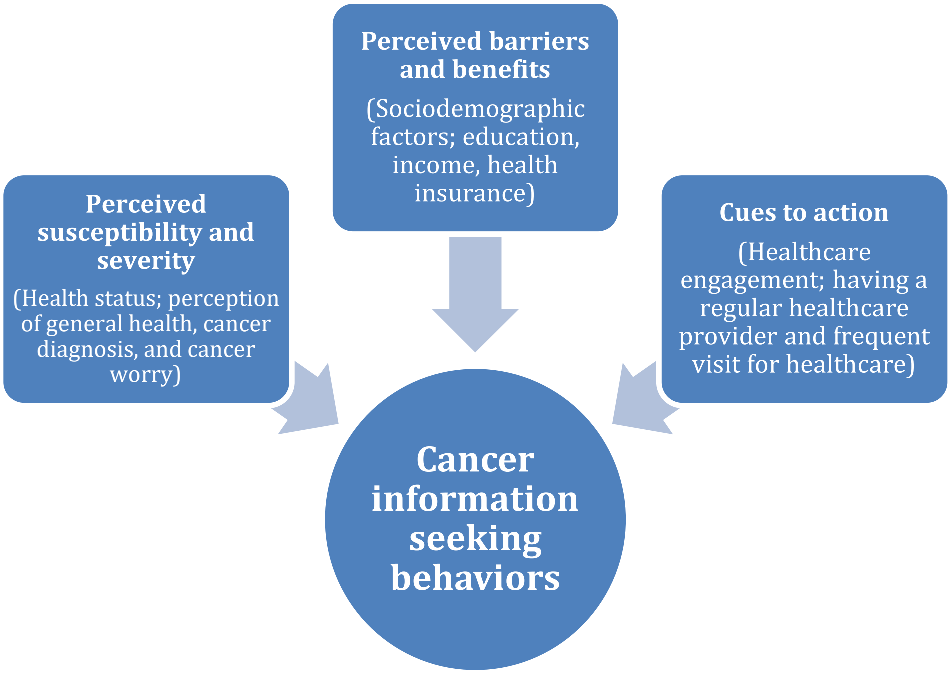
Cues to action is a modifying component of the HBM that is needed to trigger the decision-making process to accept a recommended health action (Almadi & Alghamdi, 2019; Gautam, 2017; Jones et al., 2015). Cues to action for seeking health information include strategies to activate the adoption of the behavior, such as advertising and having discussions with health professionals, family members, or peers (Lin et al., 2019; Upadhyay et al., 2019). Health professionals play a vital role in the provision of preventive health information and are in a position to encourage at-risk populations to receive cancer screening (Richards et al., 2018; Teufel-Shone et al., 2015; Yamashita et al., 2020). Few studies have focused on how physician–patient communication serves as cues to action for adopting preventive health behaviors (Adjei Boakye et al., 2018; Jones et al., 2015; Lin et al., 2019; Shirazi Zadeh Mehraban et al., 2018). It was unclear whether seeing a particular doctor, nurse, or other health care professional regularly may stimulate an individual with a cancer family history to take action related to seeking information about cancer prevention. Therefore, cues to action were examined in the current study by triggers that promote seeking cancer information such as having a regular health care provider and frequently getting care from health professionals.

Although the HBM has been used in many studies on health-related behaviors among different populations, there is limited information about using this model to predict cancer-information seeking behaviors (Jones et al., 2015). My literature search did not indicate any studies that had included the HBM to assess the determinants of cancer information-seeking behaviors among populations with a family cancer history. The HBM was appropriate in the current research because risk perception is a prerequisite for cancer-information seeking behaviors (see Ahadzadeh et al., 2015). Family history has been shown to be associated with health beliefs, such as perceived susceptibility, perceived severity, and perceived barriers (Farajzadegan et al., 2016; Paalosalo & Skirton, 2017; Prom-Wormley et al., 2019). Some of these constructs of the HBM were also found to impact the level of participation in preventive screening programs (Chon & Park, 2017; Gholampour et al., 2018; Luquis & Kensinger, 2019). Perceived susceptibility, perceived severity, perceived barriers, perceived benefits, and cues to action are essential for seeking preventive cancer information (Jones et al., 2015). Therefore, the HBM was an appropriate framework for understanding the predictors of cancer information seeking among individuals with a family history of cancer.

I examined the extent to which indicators of perceived severity, susceptibility, benefits, barriers, and cues to action account for cancer information seeking among adults with a family history of cancer. In this study, perceived barriers were impediments obstructing the adoption of cancer information-seeking behavior due to sociodemographic factors, such as age, gender, race, education, income, and insurance status. Perceived severity referred to the seriousness of having a cancer diagnosis. Perceived susceptibility was the likelihood of getting cancer among the target population based on their general health status and cancer worry. Perceived benefits were personal beliefs regarding the benefits of taking action for the purpose of finding an appropriate remedy from health care providers that would encourage seeking information for cancer prevention. Cues to action referred to circumstances like seeking health care frequently or having regular interactions with health care professionals that provoke behavior change related to seeking cancer information. Based on these concepts of the HBM, I evaluated the differences between individuals with a family history of cancer who seek or do not seek cancer information regarding their sociodemographic factors, health status, and health care engagement.

Figure 1

Directed Acyclic Graph (DAG) of the Health Belief Model



Burden of Cancer in the United States

Cancer is associated with substantial mortality and remains one of the primary public health concerns in the United States (Yabroff et al., 2019). More than 1.6 million new invasive cases of cancer are diagnosed annually (Siegel et al., 2020). The disease burden of cancer results in increased health care utilization, costs of care, and productivity loss (Yabroff et al., 2019). In addition to the existing burden, the number of cancer cases and deaths will increase more as people get older or adopt lifestyle behaviors that increase cancer risk (Bray et al., 2018; Torre et al., 2016). In the last 5 years, the average age-standardized cancer incidence rate per 100,000 in the United States was about 20% higher in men compared to women (Siegel et al., 2020). Similarly, the age-standardized cancer death rates per 100,000 during the most recent 5 years of available data were higher in men compared to women. Siegel et al. (2020) also estimated that approximately 1 in 3 men or women would receive a cancer diagnosis at some point during their lifetime.

The most commonly diagnosed cancers in the United States are prostate cancer in men and breast cancer in women, followed by cancers of the lung and colorectum in either sex (Siegel et al., 2020; Torre et al., 2016). Iadeluca et al. (2017) reported that breast cancer incidence was 156.4 per 100,000 women, and prostate cancer incidence rate was 167.2 per 100,000 men using publicly available data sources. Cancer death rates are highest for lung in either sex, followed by prostate and colorectal cancers among men and breast and colorectal cancers among women (Bray et al., 2018; Siegel et al., 2020; Torre et al., 2016). These 4leading cancers of lung, colorectal, prostate, and breast are hereditary (Chan et al., 2020; Theodoratou et al., 2017). Hereditary tumors occur in families more often than would be expected by chance and indicate a gene mutation that increases cancer risk (Hidaka et al., 2020). Although cancer is a multifactorial disease, genetics plays an important contributing etiologic factor (Drake et al., 2020). Overall, cancer genetics has tremendously helped characterize malignancies, tailor targeted therapies better, and identify individuals at high risk of cancer diagnosis (Malone et al., 2020).

Relevance of Family History of Cancer

A family history of cancer is a surrogate for genetic susceptibility to disease, high-risk behaviors, and environmental exposures common to families (Flória-Santos et al., 2016). Thus, family history is a major risk factor for many malignancies understudy in clinical and population-based cancer research (Frank et al., 2015). In preventive health, a family history of cancer is used to make recommendations for screening or surveillance for cancers of the breast, prostate, colorectum, and ovary (Bertoni et al., 2019; Misra-Hebert et al., 2017; Tsai et al., 2015; Yablonski-Peretz et al., 2016). Family cancer history is an important cancer risk assessment tool that is easy to use for genetic counseling referrals, genetic testing, and risk-reducing interventions (Flória-Santos et al., 2016). The family history is also vital for recognizing an individual's risk for primary cancer and assessing risk for secondary cancer. Critical family history includes first- and second-degree family history, maternal and paternal history, type of primary cancer, age at diagnosis, and ethnicity (Tehranifar et al., 2015). The impact of collecting complete family history data facilitates cancer risk calculation, recommendations for screening, prevention strategies, and referral for genetic testing (Cleophat et al., 2018).

Family history has been examined extensively as a risk factor for lung, colorectal, prostate, breast, and ovarian cancers (Bethea et al., 2016; Byun et al., 2018). There is evidence of cancer heritability since the familial contribution to the disease risk is high (Fawz et al., 2020; Mucci et al., 2016). In other words, hereditary cancer syndromes are usually characterized by significant family history because inherited genetic variation plays a vital role in cancer etiology (Bethea et al., 2016; Byun et al., 2018; Mucci et al., 2016). Thus, comprehensive family history is a valuable tool in cancer risk assessment and prevention management (Cleophat et al., 2018). The utilization of family history as a prevention tool is necessary for public health, given that a fraction of risk due to family history for breast, prostate, lung, colorectal, and ovarian cancers can result in a substantial number of cancers at the population level (Hidaka et al., 2020; Prom-Wormley et al., 2019).

In public health surveillance, family history information is periodically collected to estimate population prevalence of familial risk, stratify health behavior outcomes, and plan for allocation of preventive resources (Barber et al., 2018; Forsberg et al., 2015). There is an excess familial risk for cancer sites in the breast, colorectum, head and neck, lung, ovary, and prostate with heritability estimates ranging between 9% for head and neck to 57% in the prostate (Mucci et al., 2016). The literature also shows that a shared genetic component responsible for genetic variants is usually associated with more than one cancer type (Bossé & Amos, 2018; Kar et al., 2016; Weigl et al., 2018). For instance, a novel locus at 1q22 has been associated with breast and lung cancer (Bossé & Amos, 2018). Multiple novel susceptibility loci are shared by at least two out of three hormone-related cancers of the breast, ovarian, and prostate (Kar et al., 2016). The presence of established familial cancer predisposition genes explains the inherited susceptibility of multiple cancers.

Lung Cancer

Lung cancer is the leading cause of cancer-related deaths worldwide in both men and women (Barta et al., 2019). There is evidence that lung cancer occurs among family members, and Genome-wide association studies (GWAS) have identified the specific genes responsible for the increased risk (Bossé & Amos, 2018). Although smoking and other environmental factors play an essential role in the development of lung cancer, there is also an inherited predisposition to the disease due to germline mutations (de Alencar et al., 2020; Kanwal et al., 2017). Lung cancer susceptibility genes coding for enzymes is involved in the activation, detoxification, and repair of damages caused by tobacco smoke (Chen et al., 2019; Yoshida et al., 2019). The genetic modifiers, inflammatory, and cell-cycle pathways interact with the environmental factors to cause lung cancer more in those with a family history of cancer than their counterparts without a family history (Cheng et al., 2019). Understanding of the genetic factors underlying lung cancer development is necessary to develop and improve future clinical strategies for the control of lung cancer (Bossé & Amos, 2018; Kanwal et al., 2017). The knowledge of family history is a valuable genetic tool for identifying high-risk individuals that can benefit from lung cancer preventive information and care (Flória-Santos et al., 2016).

Prostate Cancer

Prostate cancer is the second most common cancer and the fifth leading cause of death in men globally (Rawla, 2019). According to cancer epidemiological data, approximately 1,276,106 new prostate cancer cases and almost 358,989 cancer deaths occurred worldwide in 2018 (Bray et al., 2018; Rawla, 2019). The cause of prostate cancer is complex, but family history is a recognized risk factor for prostate cancer development (Park et al., 2019; Ren et al., 2019). There is evidence that men with a family history of prostate cancer in first-degree relatives are three times more likely to develop prostate cancer than those without first-degree relatives with prostate cancer

(Abdel-Rahman, 2019; Ren et al., 2019). Predisposition genes are responsible for one-third of familial prostate cancer risk (Barber et al., 2018). There is also evidence that prostate cancer risk is increased in BRCA1 and BRCA2 genes that induce hereditary breast and ovarian cancer (Cavanagh & Rogers, 2015; Nyberg et al., 2020). Individuals with a family history of breast cancer are BRCA1 and BRCA2 mutation carriers (Cavanagh & Rogers, 2015; Junejo et al., 2020). Germline mutations in BRCA1 and BRCA2 increase prostate cancer risk in men less than 65 years of age (Cavanagh & Rogers, 2015). This germline mutation is closely related to the degree of prostate invasion, earlier death, and shorter survival time (Abdel-Rahman, 2019; Ren et al., 2019). A family history of breast cancer in first-degree relatives is associated with prostate cancer, including the fatal form of the disease (Ren et al., 2019).

Colorectal Cancer

Colorectal cancer is the third most common invasive cancer and the second leading cause of cancer mortality, with an estimated 135,430 new cases diagnosed, leading to 50,260 deaths in 2017 (Rawla et al., 2019). A positive family history of colorectal cancer is a significant risk factor, mainly when diagnosed in a first-degree family member (Mehraban et al., 2019). The risk of colorectal cancer increases with the incidence of more affected relatives and is inversely associated with the age at diagnosis of affected relatives (Beebe-Dimmer et al., 2017). Ma et al. (2018) reported that 3 - 6% of colorectal cancers might be attributed to rarer familial syndromes, such as Hereditary Non-Polyposis Colorectal Cancer (HNPCC) or Lynch syndrome, *APC* in Familial Adenomatous Polyposis (FAP) and *STK11* in Peutz-Jeghers syndrome (PJS).

Approximately 90% of individuals with these syndromes carry a lifetime risk of developing colorectal cancer (Beebe-Dimmer et al., 2017; Rawla et al., 2019). The remaining 10 - 20% of familial cases have been attributed to environmental factors interacting with genes of lower penetrance (Beebe-Dimmer et al., 2017; Rawla et al., 2019). Hence, having a family history of colorectal cancer puts an individual at a higher risk of developing the disease and may require seeking preventive information.

Breast Cancer

Breast cancer is the most common cancer in women and a leading cause of cancer-related deaths worldwide (Bray et al., 2018; Torre et al., 2017). In addition to well-established reproductive and lifestyle risk factors such as early age at menarche and HRT intake, a positive family history of breast cancer is a widely recognized predisposing factor (Sun et al., 2017). There is a twofold increase in the probability of developing the disease in women with a first-degree relative with a family history of breast cancer diagnosed before age 50 compared with after age 50 years (Brewer et al., 2017). About 13 - 19% of women diagnosed with breast cancer have an affected first-degree relative such as a mother, daughter, or sister compared to 8 -12% of women without breast cancer (Sun et al., 2017). Breast cancer risk increases to up to 4-fold with an increasing number of affected first-degree relatives than women without a first-degree family history (Brewer et al., 2017; Ren et al., 2019). However, women with a family history of breast cancer are more likely to adhere to mammography screening guidelines and need information about prevention (Himes et al., 2019).

Ovarian Cancer

Ovarian cancer is the most lethal gynecological malignancy and the third most frequent cancer among women (Reid et al., 2017). The annual incidence of ovarian cancer globally is 220,000, with approximately 14,600 attributed deaths annually (Torre et al., 2018). Despite the availability of current therapies, ovarian cancer carries a poor prognosis (Cortez et al., 2018). One of the potent reasons for the high fatality rate is because more than 70% of ovarian cancer cases are diagnosed at an advanced disease stage (Singer et al., 2019; Torre et al., 2018). The exact cause for ovarian malignancy remains unknown (Toss et al., 2015). However, a strong family history of ovarian or breast cancer has been described as an important risk factor for ovarian cancer (Eng et al., 2018; Singer et al., 2019). About 23% of ovarian cancers have hereditary susceptibility with germline mutations of BRCA1 and BRCA2 tumor suppressor genes, contributing to 65 - 85% of these cases (Toss et al., 2015).

A diagnosis of cancer in the family usually leads to heightened perceptions of cancer risk among family members, resulting in the need for cancer-related information (Chopra & Kelly, 2017). Obtaining the right information is necessary for making informed decisions about cancer screening and prevention (Kandasamy et al., 2017). Given the importance of family history, it is vital to understand the significant determinants of seeking information related to cancer prevention, control, and care. The knowledge of the family history of cancer has been utilized to promote screening since individuals with a family history are more likely to seek screening (Bertoni et al., 2019; Jiang et al., 2019; Tsai et al., 2015). Richards et al. (2018) reported that searches for information about cancer were commonly conducted after knowing about the cancer diagnosis of a family member. There is no data on the characteristics of individuals with a family history of cancer that seek or do not seek cancer-related information.

Cancer Information-Seeking Behaviors

Cancer information seeking is a form of health information seeking critical for disease prevention (Huerta et al., 2016; Lee et al., 2018). Generally, health information seeking is defined as intentional and active efforts to obtain specific information for health issues such as cancer (Kobayashi & Smith, 2016; Wigfall & Friedman, 2016). Seeking information is also a prerequisite to using information (Shneyderman et al., 2016). Notably, seeking cancer information may facilitate making informed decisions for healthy behaviors (Reyna et al., 2015). Sources of cancer information seeking include Internet searches, visiting healthcare providers, and interpersonal discussions regarding the cancer-related topic (Barnes et al., 2017; Richards et al., 2018). Low levels of general health information seeking have been associated with negative health outcomes such as delays in diagnosis or treatment of illnesses, and engagement in unhealthy behaviors (Lee et al., 2018). Access to health information can shape health outcomes by increasing a person's involvement in medical decision-making, thereby promoting the adoption of preventive behavior and health behavior change (Lee et al., 2018; Wigfall & Friedman, 2016).

Seeking preventive cancer information is essential to inform lifestyle and screening-related behavior changes (Ginossar, 2016; Wigfall & Friedman, 2016). As such, seeking health information related to cancer prevention is particularly important for behavior change (Oh et al., 2015; Richards et al., 2018). Researchers have found positive associations between individuals who actively seek cancer-related information and those who engage in ‘health-conscious’ behaviors (Espinosa & Kadić-Maglajlić, 2018; Nelissen et al., 2017). Health-information seeking can also lead to proactive behavioral changes in response to perceived health issues (So et al., 2019; Upadhyay et al., 2019). For instance, individuals looking for health information related to cancer prevention may be seeking a solution for a perceived problem (Wigfall & Friedman, 2016). This action may lead to proactive healthy behaviors, such as stopping smoking (Upadhyay et al., 2019). Moreover, smokers who perceive the negative health effects of tobacco use may seek additional information regarding their health risks leading to smoking reductions or cessation (Noh et al., 2016).

Most studies regarding the cancer informational needs have targeted general adult populations, ethnic minorities, specific genders, and patients with a cancer diagnosis (Drummond et al., 2019; Finney Rutten et al., 2016; Jungmi & Xiaoli, 2018; Luz et al., 2015; Richards et al., 2018; Saab et al., 2018; Scarton et al., 2018; Valera et al., 2018). The determinants of cancer information vary according to an individual’s unique information needs, culture, and beliefs. Consequently, there is evidence that people diagnosed with cancer are usually more interested in cancer-preventive information than those without a cancer diagnosis (Adjei Boakye et al., 2018). Moreover, having a cancer diagnosis is a known facilitator of seeking information regarding cancer prevention, treatment options, disease outcomes, and support resources (Kaplan et al., 2016). There is also evidence that cancer patients may seek information to support their families in preventing cancer or to understand better the underlying cause of their disease (Adjei Boakye et al., 2018; Ginossar, 2016; Richards et al., 2018). Receiving information on preventive strategies has also been shown to reduce the risk of cancer recurrence and have been linked to improved prognosis among cancer survivors (Finney Rutten et al., 2016; Scarton et al., 2018).

While research regarding the cancer information-seeking behaviors of the general population, cancer patients, and survivors is available, no similar study has been conducted specifically in those with a family history of cancer. A conceptual or theoretical framework informed very few studies on cancer information seeking. The existing research does not address cancer information-seeking characteristics among adults with a positive family history of cancer-based on a theoretical framework. More theory-driven questions are needed to explore the relationship between cancer information seeking and predicting variables among subpopulations, such as those with a positive family history of cancer. In light of these gaps in the existing research, it is necessary to understand the predictors of seeking cancer information among people with a positive family history of cancer informed by a theoretical framework.

Factors Influencing Cancer Information Seeking

Several factors related to health beliefs may distinguish between information seekers and non-seekers among cancer patients (Adjei Boakye et al., 2018; Ginossar, 2016). Although the general population might perceive cancer-related information as irrelevant or stressful, people with a family cancer history can have an increased need for cancer information (Bayne et al., 2020). This information need is likely related to the heightened risk of cancer diagnoses, the need for lifestyle modifications, and undergoing screening (Hamer & Warner, 2017). By integrating concepts of the HBM, perceived barriers, perceived susceptibility, perceived severity, perceived benefits, and cues to action are foundations of the different variables that can influence cancer information seeking (Gautam, 2017; Jones et al., 2015). Sociodemographic characteristics may act as perceived barriers to seeking health information related to preventing cancer patients (Adjei Boakye et al., 2018; Ginossar, 2016). The perception of health status, which reflects perceived susceptibility and awareness of the severity, can raise the need for cancer preventive information (Aldohaian et al., 2019). Perceived benefits of participating in specific cancer-preventive behaviors and cues to action from undergoing cancer screening have been associated with seeking cancer information (Gautam, 2017; Jones et al., 2015).

Sociodemographic Factors

Based on the literature, sociodemographic factors such as age, gender, socioeconomic status, and race or ethnicity affect cancer-related health information seeking (Jacobs et al., 2017; Nelissen et al., 2017; Somera et al., 2016). For instance, there are differences in the nature and extent of seeking health information related to cancer prevention among older people compared to young people (Adjei Boakye et al., 2018; Somera et al., 2016; Valera et al., 2018). One explanation for this difference is possibly due to increased concern over health issues among older populations. Gender also affects cancer information seeking patterns, with females more likely to seek information about cancer-preventive behaviors compared to males (Adjei Boakye et al., 2018; Loiselle, 2019; Manierre, 2015; Saab et al., 2018; Somera et al., 2016). Additionally, being female, younger in age, having a higher income and education are associated with seeking health information (Adjei Boakye et al., 2018; Finney Rutten et al., 2016; Rogith et al., 2016). Socioeconomic status influences various health outcomes and preventive behaviors, including cancer information seeking (Feinberg et al., 2016; Jacobs et al., 2017; Somera et al., 2016).

Ethnic minorities also struggle when seeking health information due to language barriers and lack of cultural familiarity with the US health care systems (Jungmi & Xiaoli, 2018; Luz et al., 2015; Wigfall & Friedman, 2016). Culture impacts how people get motivated for information seeking since intercultural communication issues contribute to the difficulty of engaging in care (George & Kagawa Singer, 2015; Kaplan et al., 2016). Educational attainment is a known proxy for literacy skills, and both determine if ethnic minorities will be formally equipped to seek cancer-related information or not (Emanuel et al., 2018; Gautam, 2017). There is evidence that people who have more years of education, without considering their literacy levels and other sociodemographic factors, are more likely to seek health information (Adjei Boakye et al., 2018; Feinberg et al., 2016). People with low educational levels are also more likely to be ethnic minorities such as Black, Native American, or Latino, have low income, and more likely to be elderly (Luz et al., 2015). Individuals with lower education levels may have more challenges seeking cancer-related health information from different sources (Adjei Boakye et al., 2018; Luz et al., 2015).

Insurance status can also influence health information seeking because those with insurance are more likely to seek health care and receive information due to their close contact with health professionals more than those who do not have health insurance (Ramirez et al., 2018; Swoboda et al., 2018). The relationship between health information seeking and health insurance status was also attributed to the amount spent on seeking health care (Amante et al., 2015; Nangsangna & da-Costa Vroom, 2019). When out-of-pocket payment and private insurance are costly, individuals with financial constraints may seek health information through other means, including the internet (Nangsangna & da-Costa Vroom, 2019). However, there is no study about the influence of health insurance on cancer information seeking among individuals with a family history of cancer. Most of the research examining individual characteristics associated with seeking cancer information has focused on sociodemographic factors (Adjei Boakye et al., 2018; Jacobs et al., 2017; Nelissen et al., 2017; Somera et al., 2016). It is not clear if these socioeconomic and demographic variations will also apply to seeking cancer information among individuals with a positive family history of cancer. Furthermore, seeking cancer-related health information is related to age, gender, educational attainment, income level, and insurance status, pre-existing disease conditions, and having a regular health provider (Adjei Boakye et al., 2018; Jacobs et al., 2017).

Perception of Health Status

The health status of specific individuals may require them to seek more care and health information than the general population (Jacobs et al., 2017; Nikoloudakis et al., 2018). Existing literature suggests that health status perception is an important determinant of seeking or not seeking general health information (Chang & Huang, 2020; Oh, 2015). There is evidence that having a chronic disease or knowing someone with a chronic disease and visiting health professionals are associated with seeking health information (Madrigal & Escoffery, 2019). Thus, individuals that perceived their health status as very poor might be more likely to seek preventive information than their counterpart that perceive their health status as very good (Hovick & Bigsby, 2016). The health information-seeking behavior of an individual could be stimulated by perception of their health, current health status, and family health history (Jacobs et al., 2017).

Perception of health status might motivate individuals to participate in screening and less risky health behaviors (Ferrer & Klein, 2015; Hovick & Bigsby, 2016). However, it is unknown if there is an association between the health status perception and seeking health information about cancer prevention (Ginossar, 2016; Simonovic et al., 2020). Access to information regarding risks to health and promotional measures for enhancing health status is an important component of preventive health practice (Swoboda et al., 2018). With more people living longer and a changing racial or ethnic demography in the US, there is a need to examine the factors related to health status perception that can predict seeking cancer preventive information (Van Stee & Yang, 2018). Although studies that investigated health information seeking for specific diseases, researchers have not addressed the role of health status and overall health perceptions on cancer information-seeking among populations with a cancer family history.

Health information seeking is mainly for a specific disease condition since those with chronic conditions are likely to seek specific rather than general information (Adjei Boakye et al., 2018). Thus, it is important to understand cancer information seeking behavior is related to having cancer as a disease condition. Cancer-related information seeking is a health behavior that is usually adopted to respond to threatening situations such as cancer diagnosis (So et al., 2019). Specifically, cancer risk perception plays an essential role in understanding how individuals seek preventive information (Alaa & Shah, 2019). Perceived susceptibility to cancer can positively or negatively influence if individuals will seek information relevant to screening, diagnosis, and cancer treatment (Adjei Boakye et al., 2018; Kobayashi & Smith, 2016; Wigfall & Friedman, 2016). Having a cancer diagnosis is a predictor of the ability and willingness to seek or not seek cancer-related information (Nelissen et al., 2015).

A cancer diagnosis might stimulate the need for more information among patients, their families, and friends (Finney Rutten et al., 2016). However, a cancer diagnosis could also engender information avoidance among individuals with fatalistic beliefs (Mitchell et al., 2015). Cancer patients with perceived fatalistic beliefs are unlikely to seek information about cancer (Kobayashi & Smith, 2016). Fatalistic cancer beliefs disproportionately affect ethnic minorities, the poor, less educated, and those having a family member with a cancer diagnosis (Valera et al., 2018). Despite the increased recognition of the role of a cancer diagnosis in health information seeking, there is a gap in understanding this effect among adults with a family history of cancer (Adjei Boakye et al., 2018; Kobayashi & Smith, 2016; Wigfall & Friedman, 2016). With the burden of cancer in the US, it is important to ascertain whether a cancer diagnosis is a predictor of cancer-related health information seeking among individuals with a family history of cancer.

Previous research supports that emotional states such as cancer worry are good predictors of adopting health behaviors and seeking information (Amuta et al., 2017; Lee & Hawkins, 2016). Worry is a negative emotion closely related to health anxiety, a distinct construct that can impact health care decisions, including health information seeking (Jensen et al., 2017; Simonovic et al., 2020). Nevertheless, detrimental health outcomes caused by negative emotions could also lead to positive health behaviors. For instance, worry motivates individuals to cope with the threats that cause them to have this negative emotion (Chasiotis et al., 2019). Within the context of cancer prevention, cancer worry is an emotional reaction to the threat of cancer that is empirically distinct from worry in general (Simonovic et al., 2020). Overall, the perceived severity of risk is an underlying factor of cancer worry.

Researchers have examined the effects of cancer worry on various health preventive behaviors, including screening behavior, breast cancer, and skin cancer preventive strategies (Bayne et al., 2020). There is evidence that cancer worry can prompt individuals to participate in genetic testing and screening for breast cancer (Spencer et al., 2019). A cancer diagnosis in the family also leads to heightened perceptions of cancer risk and cancer worry among family members (Adjei Boakye et al., 2018; Kobayashi & Smith, 2016). High levels of cancer worry are associated with paying more attention to health information (Amuta et al., 2017; Bayne et al., 2020; Lee & Hawkins, 2016; Van

Stee & Yang, 2018). Individuals aged 50-75 years who experience cancer worry on a day-to-day basis are more driven to seek cancer-related information (Jensen et al., 2017). However, researchers have not investigated the relationship between cancer worry and cancer information seeking among people with a family history of cancer.

Health Care Engagement

There is evidence that having regular healthcare providers can impact decisions to seek general health information or not (Adjei Boakye et al., 2018; Bhandari et al., 2020; Hovick & Bigsby, 2016). When individuals are motivated to be healthy, they are likely to show interest in actively seeking health information (Enwald et al., 2017). Specifically, the health-conscious behaviors of a person might influence cancer prevention information seeking (Ginossar, 2016; Wigfall & Friedman, 2016). The degree to which individuals feel that preventive action is important to them and worthy of engaging in determines how much information they would be interested in receiving (Bhandari et al., 2020; Hardcastle et al., 2015). Communication between patients and healthcare providers leads to the adopting health behaviors, including cancer-related health information seeking among minority cancer patients (Adjei Boakye et al., 2018; Ginossar, 2016; Wigfall & Friedman, 2016). The desire for health information increases after individuals have contact with healthcare providers (Upadhyay et al., 2019). However, it is unknown to what extent that having regular contact with health professionals can predict cancer information seeking among adults with a positive family history of cancer.

The psychological effects of new cancer diagnosis following a preventive medical checkup screening will undoubtedly trigger information seeking from patients and their families (Adjei Boakye et al., 2018; Wigfall & Friedman, 2016). Although there is empirical evidence that individuals seek out more information on diagnoses after a doctor’s appointment, few researchers have examined the effect of frequent medical consultations on cancer information seeking (Tan & Goonawardene, 2017; Waters et al., 2016). Hovick and Bigsby (2015) reported that information seeking was not associated with getting preventive care to screen for colon cancer and heart disease. Additionally, family caregivers without a regular health care provider encounter difficulty seeking general health information (Bangerter et al., 2019). There is sparse literature on the effects of seeing a doctor, nurse, or other health professionals regularly to get care among individuals that seek cancer information (Bhandari et al., 2020; Wigfall & Friedman, 2016). Consistently across most studies, age, gender, race or ethnicity, education, income, and insurance status profoundly influence on cancer information seeking among diverse populations. For instance, females, regardless of their educational attainment, income level, or insurance status, were more likely to seek cancer-preventive information compared to males (Adjei Boakye et al., 2018; Loiselle, 2019; Manierre, 2015; Saab et al., 2018; Somera et al., 2016). Similarly, young people, irrespective of the number of years spent schooling or their socioeconomic status, search for cancer information more than their older counterparts (Adjei Boakye et al., 2018; Somera et al., 2016; Valera et al., 2018). Additionally, racial and ethnic minorities are less likely to seek cancer information when compared to Caucasians within the same socioeconomic category (Adjei Boakye et al., 2018; Luz et al., 2015). As such, age, gender, and race are confounders in this study because they influenced both the dependent and independent variables to yield a spurious association.

The likelihood of seeking cancer information declined among populations with lower education and income levels irrespective of their background health conditions. Regardless of health status, those without a regular healthcare provider were less likely to seek cancer-related information. However, there are mixed findings on if cancer diagnosis or worrying about having cancer are significant predictors of cancer preventive information seeking. Similarly, it is not clear if healthcare engagement is a predictor of seeking health information specific for cancer prevention.

A summary of research articles that examined the determinants of cancer information seeking is summarized in Table 1. Based on the existing literature, there has been no nationally representative study that has explored the characteristics of adults with a family history of cancer who seek or do not cancer-related information. Future research is needed to examine the differences in cancer information seeking among adults with a positive family history of cancer to better tailor information to meet the needs of population at risk of cancer.

Table 1

A Summary of Studies Describing Factors Influencing Cancer Information Seeking

Author	Study population	Theoretical framework	Factors related to cancer information seeking
Adjei Boakye et al., 2018	Cancer Patients	Planned Risk Information Seeking Model (PRISM)	Gender, education, and having a regular healthcare provider
Bangerter et al., 2019	Family Caregivers	Not Specified	Race, Education, Income, Health Insurance Status, and

			Having a Regular Health Care Provider
Barnes et al., 2017	General Adult Population	Not Specified	Cancer Diagnosis, Education, Income, Race, and Health Insurance Status
Bhandari et al., 2020	Ethnic Minority Population	Not Specified	Education, Frequent access to doctors, and Perceived General Health Status
Drummond et al., 2019	Men	Not Specified	Age, Gender, Minority Population, Education, General Health Status, Cancer Worry, and Frequent Engagement with the Health Care System
Feinberg et al., 2016	General Adult Population	Not Specified	Age, Gender, Race, Education, and Health Status
Finney Rutten et al., 2016	Cancer Survivors	Not Specified	Age, Education, and Income
Francis & Zelaya, 2020	Women	Not Specified	Age, Gender, Race
Gautam, 2017	African Americans	Health Belief Model (HBM)	Education, Perceived Benefits, and Cues-to-Action
Ginossar, 2016	Cancer Patients and their Caregivers	Comprehensive Model of Information Seeking (CMIS) and Concepts of HBM	Age, Education, Race/Ethnicity, Self-Reported Health Status, Cancer Worry, and Cancer Diagnosis
Huerta et al., 2016	General Adult Population	Not Specified	Age and Race/Ethnicity
Jacobs et al., 2017	General Adult Population	Not Specified	Age, Race, Education, Gender, Socioeconomic Status, Cancer Status, and General Health Perception
Jensen et al., 2017	Older US adults (aged 50-75 years)	Not Specified	Cancer Worry

Summary and Conclusions

Despite the availability of many preventive and control measures, cancer remains the second leading cause of death and contributes to a significant public health burden worldwide (Siegel et al., 2020). Many studies that have been conducted in the last five years have documented the importance of family history in the development of cancer (Bertoni et al., 2019; Misra-Hebert et al., 2017; Tsai et al., 2015; Yablonski-Peretz et al., 2016). There is also evidence that family history knowledge is valuable for understanding cancer risk, complying with screening or genetic testing, and participating in prevention strategies (Cleophat et al., 2018; Flória-Santos et al., 2016). This review of the literature demonstrated that most studies on cancer information seeking did not use a conceptual framework or apply any theoretical foundations. Nevertheless, the components of HBM, which include perceived susceptibility, perceived severity, perceived barriers, perceived benefits, and cues to action, are applicable for understanding cancer information-seeking behaviors in people with a family cancer history.

According to available evidence, research on cancer-related health information seeking focused on populations consisting of adults, ethnic minorities, specific genders, cancer patients, and survivors. Perceived barriers due to sociodemographic factors, namely education and income level, were the most evaluated predictors of cancer-related health information seeking across most studies. In a few studies, perceived susceptibility and perceived severity based on the health status of study participants were considered together as a perceived threat that influences seeking cancer-preventive health information. Pertinent literature supports that frequent communication between individuals and healthcare professionals can influence general health information seeking. However, factors related to the perceived benefits of having a regular health care provider promote a healthy lifestyle were rarely examined as predictors of cancer-information seeking. It is unclear if frequent interactions with health professionals play a role in seeking preventive cancer information. Research examining the relationships between cancer information-seeking behaviors and having regular healthcare providers or getting frequent consultations with healthcare professionals as relevant cues to action is lacking. No study to my knowledge has examined if seeing health professionals frequently for care predicts cancer information-seeking among those with a family history of cancer. The available literature supports the need for a study that will assess the predictors of seeking information about cancer among people with a family cancer history. Chapter 3 described the research design and methodology, including the population and sampling procedure, a description of variables and HINTS data collection process, the data analysis plan, threats to validity, protection of human participants, and a summary.

Chapter 3: Research Method

This study addressed the predictors of cancer information-seeking behaviors among adults with a family history of cancer. I assessed whether sociodemographic factors, health status, and health care engagement influence the decision to seek or not seek cancer-related information in those with a family cancer history. I utilized data from the HINTS (2018). The HINTS is a cross-sectional survey tool developed by the NCI to study different aspects of health behavior and cancer. In this chapter, I present the research design, population, sampling procedures, data collection, and assessment of variables. I also describe sociodemographic factors, health status, and health care engagement as independent variables, cancer information-seeking behavior as the dependent variable, the covariates, and the instrument used to measure each variable. I also outline the data analysis plan, research questions and hypotheses, threats to validity, IRB approval, and ethical procedures.

Research Design and Rationale

The purpose of this study was to assess the predictive effects of sociodemographic factors, health status, and health care engagement on cancer-related information seeking among adults with a family history of cancer. This study was a cross-sectional quantitative study using secondary data from three cycles of the HINTS 5 (2018) survey. The HINTS is a large-sample cross-sectional survey that has been used by the NCI to study multiple aspects of health behavior and cancer. A major strength of the HINTS data is the reproducibility. This data set has also helped guide the NCI's program efforts in cancer prevention and general health promotion objectives. The HINTS is reliable because the survey was designed for cancers and included all of the crucial variables for the current study. Understanding the determinants of cancer information-seeking behavior among individuals with a family history of cancer using the HINTS may be beneficial for developing interventions targeting cancer risk factors among this population.

Methodology

I used a cross-sectional design including data from three cycles of the HINTS data set: the HINTS 5 Cycle 1 (2017), the HINTS 5 Cycle 2 (2018), and the HINTS 5 Cycle 3 (2019). The HINTS 5 Cycle 1 data were collected from January through May 2017. The HINTS 5 Cycle 2 data were collected from January through May 2018. The HINTS 5 Cycle 3 data were collected from January through May 2019. The HINTS (2018) survey included nationally representative samples utilizing both mail surveys and telephone-based surveys. Data from three HINTS came from a database managed by the Marketing Systems Group. The database consisted of random samples representing adult Americans who responded to the relevant information questionnaires about family history of cancer, sociodemographic factors, health status, and health care engagement. In this study, I examined sociodemographic factors, health status, and health care engagement as predictors of cancer information-seeking behaviors among adults with a family cancer history. Sociodemographic variables included educational attainment, income, and health insurance. Health status variables consisted of cancer diagnosis, general health status, and cancer worry. Health care engagement involved having a regular health care provider and getting frequent health care. The dependent variable of cancer information-seeking behavior was measured on a nominal scale (yes = 1, no = 0). Educational attainment, income, health insurance, cancer diagnosis, general health status, cancer worry, having a regular health care provider, getting frequent health care, age, and gender were measured as nominal (yes = 1, no = 0) or ordinal scale where applicable. Race was measured as a dichotomous variable of White (the majority or referent group) and non-White (the minority or comparison group). I used the Statistical Package for the Social Sciences (SPSS) Version 25 for statistical analysis.

Population

The HINTS (2018) is a nationally representative survey that has been conducted every few years by the NCI since 2003. The target population of the HINTS performed from 2017 to 2019 was adults over the age of 18 years in the civilian, noninstitutionalized population of the United States (HINTS, 2018). The HINTS 5 version of the HINTS utilized in this study included four mail-mode data collection cycles in the 3 years. In this study, I used three cycles of HINTS 5. Complete data were collected from 3,191 respondents for the 2017 HINTS 5 Cycle 1. Complete data were collected from 3,504 respondents for 2018 HINTS 5 Cycle 2. Complete data were collected from 5,247 respondents for 2019 HINTS 5 Cycle 3. A total of 11,942 interviews was conducted for the three cycles of HINTS 5 (HINTS, 2018).

The study population included all adults age 18 and above who responded to a questionnaire about having a family history of cancer. The other inclusion criteria were that HINTS participants had complete information regarding age, gender, race, educational level, income, health insurance, cancer diagnosis, general health status, cancer worry, having a regular health care provider, and getting frequent health care.

Sampling and Sampling Procedures

Through its HINTS survey, the NCI (HINTS, 2018) collects data about the use of cancer-related information by adults in the United States age 18 years and older. The HINTS is a nationally representative cross-sectional survey that collects data in a two-stage sampling design (HINTS, 2018). The first sampling method is the stratification of addresses selected from a file of residential addresses. The second sampling method involves one adult chosen within each sampled household using the next birthday method. The HINTS 5 Cycle 1 (2017) data were collected from January through May 2017. The method for data collection was mailing, and the sampling method was a random sample of address and next birthday method. A total of 3,191 participants responded to the questionnaires. HINTS 5 Cycle 2 (2018) data were collected from January through May 2018. The data collection method was mailing, and the sampling method was a stratified sample of address and next birthday method. A total of 3,434 participants responded to the questionnaires. The HINTS 5 Cycle 3 (2019) data were collected from January through May 2019. This data consisted of two samples collected by mailing and a push-to-web pilot. The sampling method was a stratified sample of address and next birthday method. A total of 5,247 participants responded to the questionnaires. The HINTS has the stratification done by grouping the sampling frame into three sampling strata: First sampling was related to areas with high concentrations of a minority population, the second addressed areas with a low concentration of minority population, and the third strata was counties composing Central Appalachia, regardless of the minority population. Weighted survey responses from Cycle 1, Cycle 2, and Cycle 3 of the HINTS 5 were used for multivariable logistic regression. HINTS data collection is presented in Table 2.

Table 2

How HINTS Data Were Collected

	HINTS 5, Cycle 1	HINTS 5, Cycle 2	HINTS 5, Cycle 3
Data Collection Period	January to May 2017	January to May 2018	January to May 2019
Mode of Data Collection	Mailing	Mailing	Mailing and Web Pilot
Sampling Method	Stratified Sample of Address; Next Birthday Method	Stratified Sample of Address; Next Birthday Method	Stratified Sample of Address; Next Birthday Method
Number of Respondents	Total Respondents: 3,285 Complete Responses: 3,191	Total Respondents: 3,504 Complete Responses: 3,434	Total Respondents: 5,438 Complete Responses: 5,247

Inclusion and Exclusion Criteria

This study included HINTS participants who identified as having a family history of cancer with complete responses to questions regarding age, gender, race, educational level, income, health insurance, cancer diagnosis, general health status, cancer worry, having a regular health care provider, and getting frequent health care. I excluded participants who responded to the HINTS questionnaires by identifying as not having a family history of cancer.

Power Analysis

To test the hypotheses in this study, I conducted binary multiple logistic regressions. The predictors for testing were educational level, income, health insurance, cancer diagnosis, general health status, cancer worry, having a regular health care provider, and getting frequent health care. The outcome variable was cancer information-seeking behaviors. I also adjusted for three cofounders, namely age, gender, and race. For this study, I performed power analysis for a logistic regression using G*Power 3.1.9.4 to determine sufficient sample size. According to Adjei Boakye et al., (2018), the probability of seeking cancer information among those with college degrees was *OR* = 0.53 (95% CI: 0.40–0.70) and the probability of seeking cancer information among those without college degrees was H0 = 0.21. Therefore, the parameters I used for the logistic regression analysis for the first research question was an odds ratio of 0.53, Pr(Y=1 | X=1) H0 = 0.21 alpha of 0.05, desired power of 0.80, R2 for three covariates (age, gender, and race) expected to have a moderate association with the variables = 0.125, binomial X distribution, and X parm π = 0.6. For the logistic regression analysis with these specifications, G*Power indicated a sample size with a minimum of 683 (two-tails) participants. According to Adjei Boakye et al. (2018), the probability of seeking cancer information among those with a poor health status was *OR* = 1.81 (95% CI: 1.26–2.60) and the probability of seeking cancer information among those with good health status was H0 = 0.70. Therefore, the parameters I used for the logistic regression analysis for the second research question was an odds ratio of 1.81, Pr(Y=1 | X=1) H0 = 0.70 alpha of 0.05, desired power of 0.80, R2 for three covariates (age, gender, and race) expected to have a moderate association with the variables = 0.125, binomial X distribution, and X parm π = 0.4. For the logistic regression analysis with these specifications, G*Power indicated a sample size with a minimum of 599 (two-tails) participants. According to Adjei Boakye et al. (2018), the probability of seeking cancer information among those with a regular health care provider was *OR* = 0.57 and the probability of seeking cancer information among those without a regular health care provider was H0 = 0.29. Therefore, the parameters I used for the logistic regression analysis for the third research question was an odds ratio of 0.57, Pr(Y=1 | X=1) H0 = 0.29 alpha of 0.05, desired power of 0.80, R2 for three covariates (age, gender, and race) expected to have a moderate association with the variables = 0.125, binomial X distribution, and X parm π = 0.6. For the logistic regression analysis with these specifications, G*Power indicated a sample size with a minimum of 658 (two-tails) participants. To ensure sufficient power for this study, I combined the data set from HINTS 5 Cycle 1 from 2017, Cycle 2 from 2018, and Cycle 3 from 2019 to get a sample size of 11,872.

Data Collection

The data source was secondary data from the HINTS. One primary methodological advantage of choosing HINTS was the availability of data from the NCI with the inclusion of information on multiple aspects of health behavior and cancer. Regarding the data collection process of the main study, a total of four mailings were sent out to participants during Cycles 1, 2, and 3 of HINTS 5 (HINTS, 2018). All households received the first mailing and the reminder postcard (HINTS, 2018). The data were collected for HINTS 5 Cycle 1 (2017) and Cycle 2 (2018) exclusively by single-mode mail with a $2 prepaid monetary incentive to encourage participation. HINTS 5 Cycle 3 respondents were offered the choice to respond via paper (in English or Spanish) or via a web survey (in English only).

After obtaining the Walden University Institutional Review Board (IRB) approval, I used the SPSS Version 25 to download data from 2017–2019 HINTS 5 Cycle 1, Cycle 2, and Cycle 3. I merged the data extracted into one file. I conducted data cleaning and pre-analysis screening procedures to ensure that the study variables adequately met the required statistical assumptions. The data set included all adults age 18 to 99 with a family history of cancer after filtering out all respondents without a family history.

Procedure for Accessing the Data Set

HINTS is a data set that is open to the public and is easily accessible through the HINTS website. On the main page, there is a column titled, “Data” between the columns of “About HINTS” and “View Questions/Topics.” In the Data column, there are the following subpages to guide the users in accessing the database:

- Download Data
- Summary Findings by Items
- Survey Instrument
- Methodology Reports
- How-to HINTS Webinar

The first subpage, “Download Data,” leads to “Public Use Dataset.” HINTS provided three ways to access each cycle (i.e., Statistical Analysis System, Statistics and Data - STATA, and SPSS).

Permissions to Gain Access to the Data

The results of HINTS are public data that are accessible online. Therefore, no permission was needed before data collection. However, I received approval from the Walden University IRB with approval number 11-16-20-0848246 before analyzing the data.

Description of Variables

In this study, I examined the predictive effect of educational level, income, health insurance, cancer diagnosis, general health status, cancer worry, having a regular health care provider, and getting frequent health care on cancer information-seeking behaviors. The study involved cancer information seeking as the dependent variable while educational level, income, health insurance, cancer diagnosis, general health status, cancer worry, having a regular health care provider, and getting frequent health care were the independent variables. Age, gender, and race were the covariates.

Dependent Variable

The dependent variable of seeking cancer information was determined when participants were asked, “Have you ever looked for information about cancer from any source?” The response was coded 1 for yes or 0 for no.

Independent Variables

The independent variables were sociodemographic factors (educational level, income, health insurance), health status (cancer diagnosis, general health status, cancer worry), and health care engagement (having a regular health care provider and getting frequent health care). In addressing RQ1, I assessed sociodemographic factors (educational level, income, health insurance) as predictors of cancer information seeking among adults with a family history of cancer while adjusting for age, gender, and race. For RQ2, health status (cancer diagnosis, general health status, cancer worry) were assessed as predictors of cancer information seeking among adults with a family history of cancer while adjusting for age, gender, and race. In RQ3, health care engagement (having a regular health care provider and getting frequent health care) were assessed as predictors of cancer information seeking among adults with a family history of cancer while adjusting for age, gender, and race.

Operationalization of Constructs

In this study, I used just a part of the questionnaire. This research was a secondary data analysis of a more extensive database. The HINTS 5 was the instrument of choice because the HINTS is reliable, incorporates a large sample, was explicitly designed for cancers, and includes all the crucial variables for this study. The survey questions were retrieved from the HINTS website. HINTS data information is in the public domain and does not require permission to access it. The different questions from the HINTS survey picked for analysis of this study was operationalized in this section.

Cancer Information Seeking

HINTS provided a questionnaire for cancer information seeking separately in Cycle 1, Cycle 2, and Cycle 3 of HINTS 5. Cancer information seeking was operationally defined in the HINTS self-report by asking the participants if they ever looked for cancer information. Thus, “Have you ever looked for information about cancer from any source?” was the question [A8], [A4], [A8] for HINTS 5 Cycle 1, Cycle 2, and Cycle 3, respectively. The response option is Yes or No. The response was coded 1 for yes or 0 for no.

Sociodemographic Factors

Educational attainment was operationally defined as the HINTS self-report of the number of years of education completed. Question [O6], [O17], and [O12] on HINTS 5 Cycles 1, 2, and 3 respectively were “What is the highest grade or level of schooling you completed?” There are multiple response options for this question (HINTS questionnaires and responses are indicated in Table 3: Data Dictionary). The response options were recoded as a binary variable of 12 years or less of schooling as low education and above 12 years of schooling as high education. All HINTS participants who failed to provide a response on educational attainment was excluded from the analysis.

The income level was operationally defined as the HINTS self-report of the combined annual income, meaning the total pre-tax income from all sources earned in the past year by the participants. Question [O19], [O17], and [O12] on HINTS 5 Cycles 1, 2, and 3 respectively were “What is your combined annual income, meaning the total pre-tax income from all sources earned in the past year?” Multiple response options are available for this question (HINTS questionnaires and responses are indicated in Table 3: Data Dictionary). I recoded the response options on three categorical scales of $0 to $49,999 as low income, $50,000 to $99,999 as middle income, and above $100,000 as high income. All HINTS participants who failed to provide a response on income level were excluded from the analysis.

Health insurance was operationally defined as the HINTS self-report of having any form of health insurance or not. The participants need to answer questions [C7] for HINTS 5 Cycle 1, Cycle 2, and Cycle 3 that states, “Are you currently covered by any of the following types of health insurance or health coverage plans.” Participants selected Yes or No. Any form of health insurance was Yes, and a lack of health insurance was No. All HINTS participants who failed to provide a response on health insurance status were excluded from the analysis.

Health Status

General health status was operationally defined as the HINTS self-report of overall health. Question [G1], [G1], and [F1] on HINTS 5 Cycles 1, 2, and 3 respectively was “In general, would you say your health is.” The multiple response options for this question include excellent, very good, good, fair, and poor. I recoded the response options as a binary variable of good general health status (excellent, very good, good) and poor general health status (fair and poor). All HINTS participants who failed to provide a response on general health were excluded from the analysis.

Cancer diagnosis was operationally defined as the HINTS self-report of having ever had cancer. The participants need to answer questions [M1] for HINTS 5 Cycle 1, Cycle 2, and Cycle 3 that states, “Have you ever been diagnosed as having cancer.” Participants will need to select Yes or No. The response was coded 1 for Yes or 0 for No. All HINTS participants who failed to provide a response on cancer diagnosis were excluded from the analysis.

Cancer worry was operationally defined as the HINTS self-report of the frequency of worrying about getting cancer. Question [N4], [N1], and [N2] on HINTS 5 Cycles 1, 2, and 3 respectively were “How worried are you about getting cancer” The multiple response options for this question include not at all, slightly, somewhat, moderately, and extremely. I recoded the response options as a binary variable of Yes (slightly, somewhat, moderately, extremely) and No (not at all). All HINTS participants who failed to provide a response on cancer worry were excluded from the analysis.

Health Care Engagement

Having a regular healthcare provider was operationally defined as the HINTS self-report of seeing a particular doctor, nurse, or other health professionals often. Question [C1] on HINTS 5 Cycles 1, 2, and 3 was “Not including psychiatrists and other mental health professionals, is there a particular doctor, nurse, or other health professionals that you see most often?” Participants selected Yes or No. The response was coded 1 for Yes or 0 for No. All HINTS participants who failed to provide a response on having a regular healthcare provider were excluded from the analysis.

Frequent visit for healthcare was operationally defined as the HINTS self-report of getting frequent care from a doctor, nurse, or other health professionals. Question [C3], [C3], and [C2] on HINTS 5 Cycles 1, 2, and 3 respectively was “In the past 12 months, not counting times you went to an emergency room, how many times did you go to a doctor, nurse, or other health professional to get care for yourself?" There are multiple response options for this question. I recoded response options as a binary variable of Yes (one time, two times, three times, four times, 5 – 9 times, and ten times or more) and No (none). All HINTS participants who failed to provide a response on the frequency of receiving healthcare were excluded from the analysis.

Covariates

Age was operationally defined as the respondent's self-report of how old in number of years on HINTS 5. The participants answered the question [O1] that states "what is your age" for HINTS 5 Cycle 1, Cycle 2, and Cycle 3. Participants are to respond with a number. The age variable was recoded on three categorical scales of age 18 - 40 as young age, 41- 65 as middle age, and above 65 years as old age. All HINTS participants who failed to respond with a valid number for their age were excluded for failing to meet this inclusion criterion.

Gender was operationally defined as a self-report of the gender of the respondents on HINTS 5. Question [K1], [K1], [L1] for HINTS 5 Cycle 1, Cycle 2, and Cycle 3 respectively were "Are you male or female." Participants selected one of the two options (male or female). The response was coded 1 for females or 0 for males. All HINTS participants who failed to provide a response were excluded from this analysis.

Race/ethnicity was operationally defined as self-report of being "White" or "Black or African American" or "American Indian or Alaska Native" or "Asian" on the HINTS 5. The participants answered questions [O11] for HINTS 5 Cycles 1 and 2, and

[O6] on Cycle 3 that states, “what is your race?” The response was coded in two categories of “White” and “Non-White” (Black or African American). All HINTS participants who failed to self-identify themselves as “White” or “Black or African American” were excluded from the analysis.

Table 3

Data Dictionary

Variables	Variable Type	Value Options for this Variable
Dependent Variable (DV)		
• Cancer Information Seeking	Nominal, Categorical	Yes = 1, No = 0
Independent Variables (IV)		
• Education	Ordinal, Categorical	Less than 8 years, 8 through 11 years, 12 years or completed high school, Post high school training other than college (vocational or technical), Some college, College graduate, Postgraduate
• Income	Ordinal, Categorical	$0 to $9,999, $10,000 to $14,999, $15,000 to $19,999, $20,000 to $34,999, $35,000 to $49,999, $50,000 to $74,999, $75,000 to $99,999, $100,000 to $199,999, $200,000 or more
• Health Insurance	Nominal, Categorical	Yes = 1, No = 0
• General Health Status	Ordinal, Categorical	Excellent, Very good, Good, Fair, or Poor
• Cancer Diagnosis	Nominal, Categorical	Yes = 1, No = 0
• Cancer Worry	Ordinal, Categorical	Not at all, Slightly, Somewhat, Moderately, Extremely
• Regular Healthcare Provider	Nominal, Categorical	Yes = 1, No = 0
• Frequent Visit for Healthcare	Ordinal, Categorical	None, 1 time, 2 times, 3 times, 4 times, 5-9 times,10 or more times
Covariates		
• Age	Integral, Continuous (Recoded to Ordinal, Categorical)	18-99 years (was categorized into age 18 - 40 as young age, 41- 65 as middle age, and above 65 years as old age)
• Gender	Nominal, Categorical	Female = 1, Male = 0
• Race/Ethnicity	Dichotomous, Categorical	White and Non-White (Black or African American)

Statistical Analysis Plan

Cross-sectional study design was used to examine the hypotheses of this dissertation. As mentioned above, public access data from HINTS was the source for the data about participants who are at least 18 years of age, their family history of cancer status, sociodemographic factors, health status, and healthcare engagement. The research questions identified if there are associations between the dependent variable of cancer information seeking (a binary variable) and the independent variables. In this study, the independent variables include sociodemographic factors educational level, income, health insurance), health status (cancer diagnosis, general health status, cancer worry), and healthcare engagement (having regular healthcare provider and getting frequent healthcare). Age, gender, and race are the covariates. These variables were coded as nominal or ordinal categorical variables.

Data from all participants who are at least 18 years of age in HINTS sample years 2017, 2018, 2019 were utilized. The data for the study was retrieved from the HINTS web site in SPSS files as the information in the files were analyzed with SPSS. A descriptive analysis was conducted using SPSS. In addition to the descriptive statistics, a logistic regression model was used to analyze the association between the independent and the dependent variables. All results were presented as odds ratios with 95% confidence intervals, and the prespecified level of significance for the p-value was <0.05. The combined data from the three years of HINTS was used within the statistical analysis described in this section. Table 4 shows the description of the variables, research questions, and statistical analysis.

Research Questions and Hypothesis

The aim of the research questions developed for this study was to identify the predictors of cancer information seeking behaviors among adults with a positive family history of cancer. Each hypothesis was analyzed separately using binary logistic multiple regressions. The three research questions for this study are as follows:

RQ1: Is there a significant difference in sociodemographic factors (education, income, health insurance) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race?

H_o1: There is no significant difference in sociodemographic factors (education, income, health insurance) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

H_a1: There is a significant difference in sociodemographic factors (education, income, health insurance) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

RQ2: Is there a significant difference in health status (cancer diagnosis, general health status, cancer worry) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race?

H_o2: There is no significant difference in health status (cancer diagnosis, general health status, cancer worry) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

H_a2: There is a significant difference in health status (cancer diagnosis, general health status, cancer worry) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

RQ3: Is there a significant difference in healthcare engagement (having regular healthcare provider and getting frequent care) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race?

H_o3: There is no significant difference in healthcare engagement (having regular healthcare provider and getting frequent care) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

H_a3: There is a significant difference in healthcare engagement (having regular healthcare provider and getting frequent care) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

Table 4

Description of Variables/Research Questions

Research Questions	Independent Variables (IV) and Measurement	Dependent Variables (DV) and Measurement	Statistical Analysis
RQ1	Sociodemographic Factors • Education – Ordinal • Income – Ordinal • Health Insurance – categorical	Cancer Information Seeking - Categorical	Multivariate logistic Regression
RQ2	Health Status • General Health Status – Ordinal • Cancer Diagnosis – categorical • Cancer Worry – Ordinal	Cancer Information Seeking – Categorical	Multivariate logistic Regression
RQ3	Healthcare Engagement • Regular Healthcare Provider – Categorical • Frequent Visit for Healthcare – Ordinal	Cancer Information Seeking – Categorical	Multivariate Logistic Regression
	Covariates • Age – Integral, Continuous (recoded to ordinal) • Gender – Nominal • Race – Dichotomous		

Binary Logistic Regression Analysis

The odds ratio from the binary logistic regression analysis was calculated using SPSS 25.0 to determine if there are significant associations between one and more of these variables. Hypotheses 1, 2, and 3 were tested using binary multiple logistic regression. The dependent variable is cancer information seeking, and the independent variables include components of sociodemographic factors, health status, and healthcare engagement, respectively. Binary multiple logistic regression is the right statistic for testing these hypotheses because the dependent variable (cancer information seeking) is measured on a dichotomous scale. Additionally, all the independent variables are categorical (i.e., ordinal or binary variables). The observations are also independent of each other, and the categories of the variables are mutually exclusive. None of the independent variables are measured on a continuous scale, so this analysis does not require a linear relationship to the log odds. Finally, this study was conducted using a large sample size of 8,473.

Threats to Validity

External Validity

Threats to validity refer to factors within or outside of independent variables accounting for the results obtained. As such, threats to external validity can arise from a causal relationship of interest interacting with participant characteristics, settings, the types of outcomes measured, or other procedural variations (Matthay & Glymour, 2020). Failure to identify potential threats to external validity can raise concerns about the populations and places to which study results can be generalized. The tentative answers to the research question or hypothesis must be free from threats to internal and external validity for findings to be translated into policy or program. The threats to external validity were addressed in the interpretation of results by clearly specifying the sociodemographic and geographic location of target population that the effect applies.

This study used data from the National Cancer Institute's Health Information National Trends Survey, HINTS 5 (Cycles 1, 2, and 3). The NCI has developed this nationally representative survey to provide baseline data about cancer communication practices, information preferences, risk behaviors, attitudes, and cancer knowledge across the US, with data collection repeated routinely to monitor trends. Multiple studies have used the HINTS survey because of its strength from reliance on standard methods to provide nationally representative estimates. Overall, there is no risk to external validity in the secondary data proposed for this study.

Internal Validity

According to Matthay and Glymour (2020), confounding because of subject selection, history, maturation, regression, testing, and instrumentation are threats to internal validity. However, history and maturation are not threating to internal validity in this research since the study was cross-sectional in nature and utilized secondary data from HINTS survey. Additionally, measurement bias is not a potential threat since the study was not experimental in design. Moreover, the reliability of the survey instrument was established in the primary study based on the best practices in survey research methodology, sampling, and procedures. The HINTS data are valid and reliable because information obtained from the three cycles that was used in this study (HINTS 5 Cycles

1, 2, and 3) came from nationally representative samples utilizing both mail and telephone surveys.

Ethical Procedures

Ethical procedures are an essential aspect of all stages of the research, from design to reporting. However, concern over ethics is not as pronounced as in other studies since this study is the analysis of secondary data, and I did not have any direct contact with human participants. The HINTS data were collected with a strict standard of ethical conduct for research. Ethics guideline requires anonymity, confidentiality, obtaining informed consent, mitigating the potential impact of the researcher on the participants, and vice versa. For example, the identity of the participants was protected by using random identification. Personal information such as name, social security number, and date of birth, phone number, or address was deidentified to ensure confidentiality. Although this study used secondary data, all necessary Institutional Review Board (IRB) approvals was received from Walden University (approval number 11-16-20-0848246) before any data download or analysis.

Summary

The data collection, the methodology, the research questions, and statistical analyses plan to accept or reject the hypotheses were described in this chapter. In this study, a quantitative, cross sectional design was used to identify the predictors of cancer information seeking behaviors among adults with a positive family history of cancer in the proposed study. A cross sectional design is the best approach for this study because it focused on the relationship between the predictors and outcomes proposed for analysis. A quantitative methodology was used since the study utilized numerical data from the HINTS database to test the null hypothesis, which is vital to answering the study research questions. The analyses for the present study include descriptive statistics consisting of frequency tables and multivariate logistic regression analyses. Logistic regression analyses help to determine the extent to which the independent variables of sociodemographic factors, health status, and healthcare engagement predicts cancer information seeking among adults with a family history of cancer in the US. In chapter 4, I will begin with the study purpose, research questions and hypotheses, provide an overview of the data analysis including the descriptive statistics of the participants, the results of the logistic regression analysis, and a summary.

Chapter 4: Results

The purpose of this study was to improve understanding of cancer information-seeking behaviors by utilizing a quantitative cross-sectional study to examine factors that predict cancer information seeking among adults with a family history of cancer. To conduct this study, I used secondary data from the HINTS data set from 2017 to 2019 to assess the association between sociodemographic factors, health status, health care engagement, and cancer information seeking. In this study, sociodemographic factors included age, sex, race, education, income, and health insurance. Health status was assessed by general health status, cancer diagnosis, and cancer worry. Health care engagement was measured as having a regular health care provider and getting frequent health care.

I extracted and merged HINTS data from 2017, 2018, and 2019 into one data set file to answer three RQs. Multiple logistic regression was used to determine associations between the independent and dependent variables. In this chapter, I provide the results obtained from the analyses and display them in tables. I discuss the data collection process and report the baseline descriptive and demographic characteristics of the sample. Next, the results of the analysis are discussed by providing frequencies for categorical data and descriptive statistics for quantitative data. The results of the analysis are organized by each RQ and hypothesis. Lastly, the results are summarized in the summary.

Research Questions and Hypotheses

RQ1: Is there a significant difference in sociodemographic factors (education, income, health insurance) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race?

H_o1: There is no significant difference in sociodemographic factors (education, income, health insurance) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

H_a1: There is a significant difference in sociodemographic factors (education, income, health insurance) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

RQ2: Is there a significant difference in health status (cancer diagnosis, general health status, cancer worry) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race?

H_o2: There is no significant difference in health status (cancer diagnosis, general health status, cancer worry) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

H_a2: There is a significant difference in health status (general health status, cancer diagnosis, cancer worry) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

RQ3: Is there a significant difference in health care engagement (having a regular health care provider and getting frequent health care) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race?

H_o3: There is no significant difference in health care engagement (having a regular health care provider and getting frequent health care) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

H_a3: There is a significant difference in health care engagement (having a regular health care provider and getting frequent health care) between individuals with a family history of cancer who seek or do not seek cancer information while controlling for age, gender, and race.

Data Collection

Publicly available secondary data from the HINTS 5 cycle of 2017, 2018, and 2019 were used to conduct this study. I accessed the data repository through the NCI HINTS website. I followed the data collection plan, as outlined in Chapter 3, without any deviation. I followed the IRB guidelines to be in compliance with Walden University's research requirements. The data repository provided access to three zip files that included all variables included in the three cycles of HINTS 5 from 2017 to 2019. I downloaded the files that included data from the 3 years, saved the files on my computer, and uploaded them into SPSS. In SPSS, I merged all three data sets (2017, 2018, 2019) into one data set file.

Data Analysis

Data Cleaning

I assumed that missing data were not due to the outcome variable but were missing at random. All variables were collected as categorical variables. No variable was calculated. I excluded variables not needed for my analysis and utilized data from 8,473 respondents who had a family history of cancer and provided a response to 12 different variables. I excluded cases with values of either, don't know/not sure, refused, or missing. Simple random sampling technique was used to select cases. The application of stratified random sampling to select the data made the sample a good representation of the study population and provided strong external validity and credibility to my results. The data set files included the data dictionary and codebook, which I used to recode the variables and input the values and labels in SPSS.

Data Coding

I created three new subcategories for age based on age grouping from the HINTS codebook, and recoded as 1 = 18–40 years (young age), 2 = 41–65 years (middle age), and 3 = above 65 years (old age). Gender was coded as 0 = male and 1 = female. Race was coded as 0 = non-White and 1 = White. Education was collected as less than 8 years, 8 years through 11 years, 12 years or completed high school, post high school other than college, some college, college graduate, and postgraduate. I recoded education level as 1 = 12 years or less of schooling (low education) and 2 = above 12 years of schooling (high education). Household annual income was collected as < $9,999, $10,000 to $14,999, $15,000 to $19,999, $20,000 to $34,999, $35,000 to $49,999, $50,000 to $74,999,

$75,000 to $99,999, $100,000 to $199,999, and $200,000 or more. I recoded household income as 1 = $0 to $49,999 (low income), 2 = $50,000 to $99,999 (middle income), and 3 = above $100,000 (high income). Health insurance coverage was collected as Yes or No. I coded health insurance coverage as 1 = Yes and 0 = No.

General health status was collected as excellent, very good, good, fair, and poor. I recoded general health status as 1 = good general health status (excellent, very good, good) and 2 = poor general health status (fair and poor). Cancer diagnosis was coded as 1 = Yes and 0 = No. Cancer worry was collected as not at all, slightly, somewhat, moderately, and extremely. I recoded cancer worry as 1 = Yes (slightly, somewhat, moderately, extremely) and 0 = No (not at all). Having a regular health care provider was coded as 1 = Yes and 0 = No. Getting frequent health care was collected as none, one time, two times, three times, four times, five to nine times, and ten times or more. I recoded getting frequent health care as 1 = Yes (one time, two times, three times, four times, five to nine times, and ten times or more) and 0 = No (none). The dependent variable cancer information seeking was collected as a dichotomous variable and was coded as 1 = Yes and 0 = No. I limited the covariates to age, sex, and race/ethnicity because other variables like marital status and sources of cancer information were not captured in the data sets and were not considered in the analysis. After IRB approval, the time frame to begin and complete the data collection process was approximately 3 weeks.

Descriptive and Demographic Characteristics of the Sample

The demographic characteristics of this study includes a sample size of 8,473 adults (age 18–99 years) with a family history of cancer, who responded Yes or No to seeking cancer information in the 2017, 2018, and 2019 HINTS survey. There were slightly more cases in the above 65 years group (*n* = 3,901, 46.0%) compared to the 41–65 years group (*n* = 2,866, 33.8%) and the 18–40 years group (*n* = 1,706, 20.1%). There were more females (*n* = 5,133, 60.6%) than males (*n* = 3,340, 39.4%). The frequency distribution of race variable showed that there were more Whites (*n* = 7,251, 85.6%) than non-Whites (*n* = 1,222, 14.4%). There were more respondents in the high education group (*n* = 6,405, 75.6%) than in the low education group (*n* = 2,068, 24.4%). Results of the income variable showed that most respondents were in the low-income group (*n* = 4,116, 48.6%), followed by the middle-income group (*n* = 2,385, 28.1%) and the high-income group (*n* = 1,972, 23.3%). The health insurance coverage variable showed that 8,007 (94.5%) respondents had at least one type of health insurance plan, while 359 (4.2%) respondents were without health insurance coverage.

For the general health status variable, 8,178 (97.4%) respondents indicated they had a good general health status, and 215 (2.6%) rated their general health status as poor. There were more respondents without a cancer diagnosis (*n* = 6,951, 82.1%) than those with a cancer diagnosis (*n* = 1,516, 17.9%). For the cancer worry variable, 7,857 (92.7%) had worried about having cancer, while 616 (7.3%) had not worried about having cancer at any time. The having a health care provider variable showed that 6,179 (73.8%) respondents had a regular health care provider while 2,189 (26.2%) respondents did not have a regular health care provider. Similarly, more respondents received frequent health care (*n* = 7,438, 88.7%) than those who did not receive frequent health care (*n* = 946, 11.3%). The descriptive statistics of the dependent variable (cancer information seeking) showed that out of the 8,473 cases, 4,940 (58.3%) of the respondents had looked for cancer information from any source while 3,533 (41.7%) of the respondents had not. The results of the frequency distribution of all variables are displayed in Table 5.

Table 5

Frequency Distribution of Demographic and Sample Characteristics

Variable	Frequency	Percent
Age Group		
Young Age (18-40 years)	1,709	20.1
Middle Age (41-65 years)	2,866	33.8
Old Age (> 65 years)	3,901	46.0
Gender		
Male	3,340	39.4
Female	5,133	60.6
Race/Ethnicity		
White	7,251	85.6
Non-White	1,222	14.4
Education Level		
Low Education (<12 years)	2,068	24.4
High Education (>12 years)	6,405	75.6
Income		
Low Income	4,116	48.6
Middle Income	2,385	28.1
High Income	1,972	23.3
Health Insurance		
No	359	4.3
Yes	8,007	95.7
General Health		
No	215	2.6
Yes	8,178	97.4
Cancer Diagnosis		
No	6,951	82.1
Yes	1,516	17.9
Cancer Worry		
No	616	7.3
Yes	7,857	92.7
Regular Provider		
No	2,189	26.2
Yes	6,179	73.8
Frequent Healthcare		
No	946	11.3
Yes	7,438	88.7
Cancer Information Seeking		
No	3,533	41.7
Yes	4,940	58.3

Results of Statistical Analysis

I examined the association between the independent variables (education, income, health insurance coverage, general health status, cancer diagnosis, cancer worry, having a health care professional, getting frequent health care) and one dichotomous dependent variable (cancer information seeking). I performed multiple logistic regression analysis to determine the association between the predictors and the outcome variable. I also utilized the Hosmer-Lemeshow goodness-of-fit test to compare the observed cases to the number predicted by the regression model. The SPSS calculated Exp(*B*), which is the *OR*, was used to describe the probability of associations and to reflect the effect size. The beta (β) value represents the change in odds of an outcome as a result of a unit change in the predictor variable and is essential in reporting the results.

Prior to conducting the inferential statistics, the assumptions of multiple logistic regression analysis (large sample size, multicollinearity, and outliers) were tested and met. A Pearson correlation and linear regression analyses were conducted for all predictor variables to test for multicollinearity. Results of the correlation analysis showed that none of the variables had a tolerance value of 10. Therefore, this assumption was met. For all analyses, a 95% confidence interval (CI) was used for statistical comparison. Hypothesis testing was two-sided at an alpha level of .05. Tables 6-11 show the results of the binary logistic regression analysis by RQs.

RQ1: Sociodemographic Factors and Cancer Information Seeking

To answer RQ1, I conducted a binary logistic regression to assess whether sociodemographic factors measured by education level, household income, and health insurance coverage were associated with cancer information seeking, after adjusting for the effects of age, sex, and race/ethnicity. For the binary logistic regression, the omnibus test of model coefficients was significant (chi-square = 394.417, *df* = 4, *p* < .001). The model summary showed the Nagelkerke R2 = .062, indicating that 6.2% of the variation in cancer information seeking was from education level, household income, and health insurance coverage. The Hosmer and Lemeshow goodness-of-fit test for this analysis was nonsignificant (chi-square = 0.674, *df* = 4, *p* > .05), indicating the model was a good fit for the data. The Hosmer-Lemeshow goodness-of-fit was good at *p* > .05.

Education Level

Results of the multiple logistic regression (see Table 6) showed that those with low education levels were 0.5 times less likely (*OR* = .497; 95% CI: .446, .553; *p* < .001) to seek cancer information when compared to respondents with high education level. The *p* value of <.05 showed that education level was a significant predictor of cancer information seeking. Therefore, I rejected the null hypothesis that there is no statistically significant association between education level and seeking cancer information. I concluded that the education level completed was significantly associated with seeking cancer information among adults with a family history of cancer.

Household Income Level

For this multiple logistic regression, the high-income group was the reference group because individuals that earn high income are more likely to seek cancer information (Adjei Boakye et al., 2018). The results showed that compared to the high-income group, middle income group was 0.6 times less likely (*OR* = .561; 95% CI: .497,

.632; *p* < .001) to seek cancer information. Similarly, the low-income group was 0.8 times less likely (*OR* = .782; 95% CI: .688, .889; *p* < .001) to seek cancer information compared to the high-income group. Based on these results, I rejected the null hypothesis that there was no statistically significant association between family income and seeking cancer information. Therefore, household income was significantly associated with seeking cancer information among adults with a family history of cancer.

Health Insurance Coverage

The multiple logistic regression results showed that health insurance coverage made a significant contribution to the model (*p* < .05). Compared to respondents with health insurance coverage, those without health insurance were 0.8 times less likely (*OR*: .767; 95% CI: .617, .954) to seek cancer information. This result showed that health insurance coverage was a predictor of seeking cancer information. Therefore, I rejected the null hypothesis that there was no association between health insurance coverage and seeking cancer information.

Table 6

Logistic Regression for RQ1 Variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B) Lower	95% C.I. for EXP(B) Upper
Step 1[a]	Education	-.700	.055	164.464	1	.000	.497	.446	.553
	High-Income			97.951	2	.000			
	Mid-Income	-.579	.061	89.894	1	.000	.561	.497	.632
	Low-Income	-.246	.066	14.048	1	.000	.782	.688	.889
	Health Insurance	-.265	.111	5.691	1	.017	.767	.617	.954
	Constant	.879	.050	314.503	1	.000	2.408		

a. Variable(s) entered on step 1: Education, Income, Health insurance.

Covariates: Age, Gender, and Race

In the next analysis, the covariates of age, gender, and race were added to the multiple logistic regression (Table 7). The model summary (chi-square = 473.107, df = 8, *p* < .001); the Nagelkerke R2 (.074) and the Hosmer-Lemeshow test (chi-square = 2.227, df = 8, *p* > .05) indicated a well fitted model. Using the 18–40 years (young age) group as a reference category, those in the 41 – 65 years (middle age) group were 0.9 times less likely (*OR*: 0.918; 95% CI: .812, 1.037, *p* > .05) and those in the >65 years (old age group) were 1.08 times no more nor less likely (*OR*= 1.075; 95% CI: .968, 1.194, *p* > .05) to seek cancer information. Additionally, the difference between the age groups was not statistically significant (*p* > .05). Therefore, I accepted the null hypothesis that there was no statistically significant association between age and seeking cancer information. I also conclude that age was not a significant predictor of cancer information seeking.

For gender as a covariate, males were 0.7 times less likely (*OR*: .683; 95% CI: .623, .750, $p < .001$) to seek cancer information compared to females. This result shows that gender was a predictor of seeking cancer information. Therefore, I rejected the null hypothesis that there was no association between gender and seeking cancer information. For race as a covariate, non-whites were 0.8 times less likely (*OR*: .796; 95% CI: .700, .905, $p < .001$) to seek cancer information compared to whites. This result shows that race was a predictor of seeking cancer information. Therefore, I rejected the null hypothesis that there was no association between race and seeking cancer information. Furthermore, by adding age, gender, and race to the model, the *OR* and the levels of significance across all categories for the education levels (low education and high education), income categories (low-income, middle-income, high-income), and health insurance coverage remained the same. Therefore, age, gender, and race had no confounding effect on the association between education level, household income, health insurance status, and seeking cancer information.

Table 7

Logistic Regression for RQ1 Variables With Covariates

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	Education	-.705	.055	163.365	1	.000	.494	.444	.551
	High-Income			96.717	2	.000			
	Mid-Income	-.600	.064	88.455	1	.000	.549	.485	.622
	Low-Income	-.248	.066	13.968	1	.000	.780	.685	.889
	Health Insurance	-.256	.113	5.130	1	.024	.774	.620	.966
	Young Age			6.016	2	.049			
	Middle Age	-.086	.062	1.900	1	.168	.918	.812	1.037
	Old Age	.072	.054	1.814	1	.178	1.075	.968	1.194
	Gender	-.381	.047	64.800	1	.000	.683	.623	.750
	Race	-.228	.065	12.105	1	.001	.796	.700	.905
	Constant	1.070	.066	263.077	1	.000	2.914		

a. Variable(s) entered on step 1: Education, Income, Health Insurance, Age, Gender, Race.

RQ2: Health Status and Cancer Information Seeking

To answer RQ2, I conducted a binary logistic regression to assess whether health status measured by general health status, cancer diagnosis, and cancer worry is associated with cancer information seeking, after adjusting for the effects of age, sex, and race/ethnicity. For the binary logistic regression, the omnibus test of model coefficients was significant (chi-square = 288.677, *df* = 3, *p < .001*). The model summary showed the Nagelkerke R2 = .046, indicating that 4.6% of the variation in cancer information seeking was from general health status, cancer diagnosis, and cancer worry. The Hosmer and Lemeshow goodness-of-fit test for this analysis was non-significant (chi-square = 0.232, *df* = 1, *p* > .05), indicating the model was a good fit for the data. The Hosmer-Lemeshow goodness-of-fit is good if *p* > .05.

General Health Status

Results of the multiple logistic regression (Table 8) showed that those with good general health status were 0.7 times less likely (*OR* = .693; 95% CI: .525, .914; *p* < .01) to seek cancer information when compared to respondents with a poor general health status. The *p*-value of <.05 showed that general health status was a significant predictor of cancer information seeking. Therefore, I rejected the null hypothesis that there was no statistically significant association between general health status and seeking cancer information. I conclude that general health status was significantly associated with seeking cancer information among adults with a family history of cancer.

Cancer Diagnosis

For this multiple logistic regression, the results showed that respondents without a cancer diagnosis was 0.4 times less likely (*OR* = .402; 95% CI: .354, .458; p < .001) to seek cancer information compared to those with a cancer diagnosis. Based on these results, I rejected the null hypothesis that there was no statistically significant association between cancer diagnosis and seeking cancer information. Therefore, a cancer diagnosis was significantly associated with seeking cancer information among adults with a family history of cancer.

Cancer Worry

The multiple logistic regression results showed that respondents who do not worry about getting cancer were 0.6 times less likely (*OR*: .568; 95% CI: .480, .673; *p* <

.001) to seek cancer information compared with those that frequently worry about getting cancer. This result showed that frequent cancer worry was a predictor of seeking cancer information. Therefore, I rejected the null hypothesis that says that there was no association between cancer worry and seeking cancer information.

Table 8

Logistic Regression for RQ2 Variables

Variables in the Equation

								95% C.I. for EXP(B)	
		B	S.E.	Wald	Df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Cancer Diagnosis	-.911	.066	192.559	1	.000	.402	.354	.458
	General Health	-.367	.142	6.730	1	.009	.693	.525	.914
	Cancer Worry	-.565	.086	42.991	1	.000	.568	.480	.673
	Constant	1.149	.061	357.876	1	.000	3.155		

a. Variable(s) entered on step 1: Cancer diagnosis, General health, Cancer worry.

Covariates: Age, Gender, and Race

In the next analysis, the covariates of age, gender, and race were added to the multiple logistic regression (Table 9). The model summary (chi-square = 417.716, df = 7, $p < .001$); the Nagelkerke R 2 (.065) and the Hosmer-Lemeshow test (chi-square = 7.706, df = 7, $p > .05$) indicated a well fitted model. By adding age, gender, and race to the model, the *OR*, and the level of significance for the general health status, cancer diagnosis, and cancer worry remained the same. Therefore, age, gender, and race had no confounding effect on the association between education level, household income, health insurance status, and seeking cancer information.

Table 9

Logistic Regression for RQ2 Variables With Covariates

Variables in the Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	Cancer Diagnosis	-1.044	.069	231.276	1	.000	.352	.308	.403
	General Health	-.347	.142	5.945	1	.015	.707	.535	.934
	Cancer Worry	-.494	.087	32.171	1	.000	.610	.514	.724
	Young Age			63.227	2	.000			
	Middle Age	.342	.062	30.442	1	.000	1.408	1.247	1.590
	Old Age	.393	.053	55.355	1	.000	1.481	1.336	1.643
	Gender	-.306	.047	43.110	1	.000	.737	.672	.807
	Race	-.316	.064	24.170	1	.000	.729	.643	.827
	Constant	1.222	.066	340.677	1	.000	3.394		

a. Variable(s) entered on step 1: Cancer diagnosis, General health, Cancer worry, Age, Gender, Race.

RQ3: Health Care Engagement and Cancer Information Seeking

To answer RQ3, I conducted a binary logistic regression to assess whether healthcare engagement measured by having a regular healthcare provider and getting frequent healthcare is associated with cancer information seeking, after adjusting for the effects of age, sex, and race/ethnicity. For the binary logistic regression, the omnibus test of model coefficients was significant (chi-square = 139.700, $df = 2$, $p < .001$). The model summary showed the Nagelkerke R2 = .022, indicating that 2.2% of the variation in cancer information seeking is from having a regular healthcare provider and getting frequent healthcare. The Hosmer and Lemeshow goodness-of-fit test for this analysis was non-significant (chi-square = 0.797, *df* = 1, $p > .05$), indicating the model was a good fit for the data. The Hosmer-Lemeshow goodness-of-fit is good if $p > .05$.

Having a Regular Health Care Provider

Results of the multiple logistic regression (Table 10) showed that those without a regular healthcare provider were 0.7 times less likely (*OR* = .663; 95% CI: .597, .736; $p < .001$) to seek cancer information when compared to respondents that have a regular healthcare provider. The *p*-value of <.05 showed that having a regular healthcare provider was a significant predictor of cancer information seeking. Therefore, I rejected the null hypothesis that there was no statistically significant association between having a regular healthcare provider and seeking cancer information. I conclude that having a regular healthcare provider was significantly associated with seeking cancer information among adults with a family history of cancer.

Getting Frequent Health Care

For this multiple logistic regression, the results showed that respondents that do not get frequent health care were 0.6 times less likely (*OR* = .649; 95% CI: .580, .751; $p < .001$) to seek cancer information compared to those that receive frequent health care. Based on these results, I rejected the null hypothesis that there was no statistically significant association between getting frequent health care and seeking cancer information. Therefore, getting frequent health care was significantly associated with seeking cancer information among adults with a family history of cancer.

Table 10

Logistic Regression for RQ3 Variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	Regular Provider	-.411	.054	58.841	1	.000	.663	.597	.736
	Frequent Healthcare	-.433	.075	33.364	1	.000	.649	.560	.751
	Constant	.503	.027	360.207	1	.000	1.654		

a. Variable(s) entered on step 1: Regular Provider, Frequent Healthcare

Covariates: Age, Gender, and Race

In the next analysis, the covariates of age, gender, and race were added to the multiple logistic regression (Table 11). The model summary (chi-square = 244.699, df = 6, $p < .001$); the Nagelkerke R2 = .039 and the Hosmer-Lemeshow test (chi-square = 15.754, df = 8, $p > .05$) indicated a well fitted model. By adding age, gender, and race to the model, the *OR* for having a regular healthcare provider and getting frequent healthcare, and the levels of significance across all categories remained the same. Therefore, age, gender, and race had no confounding effect on the association between having a regular healthcare provider and getting frequent healthcare and seeking cancer information.

Table 11

Logistic Regression for RQ3 Variables With Covariates

Variables in the Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	Regular Provider	-.454	.055	67.320	1	.000	.635	.570	.708
	Frequent Healthcare	-.441	.076	33.870	1	.000	.643	.555	.746
	Young Age			39.801	2	.000			
	Middle Age	.262	.062	17.837	1	.000	1.299	1.151	1.467
	Old Age	.307	.052	35.063	1	.000	1.359	1.228	1.504
	Gender	-.275	.046	35.124	1	.000	.760	.694	.832
	Race	-.365	.064	32.183	1	.000	.695	.612	.788
	Constant	.523	.041	163.277	1	.000	1.687		

a. Variable(s) entered on step 1: Regular Provider, Frequent healthcare, Age, Gender, Race.

Summary

In this chapter, I reported the results of the statistical analyses used to assess the association between sociodemographic factors (education, income, insurance coverage, health status (general health, cancer diagnosis, cancer worry), healthcare engagement (having a regular healthcare provider, getting frequent healthcare), and cancer information seeking. I further explained the effect of covariates age, gender, race on the association between sociodemographic factors, health status, healthcare engagement, and cancer information seeking. The results of the multiple logistic regression analyses showed that education, income, insurance coverage, general health, cancer diagnosis, cancer worry, having a regular healthcare provider, and getting frequent healthcare were associated with whether an individual with a family history of cancer would seek cancer information from any source. There was also an association between gender, race, and seeking cancer information. No association was observed between age and cancer information seeking.

Furthermore, when the covariate variables were added to the regression models, the results showed that age, gender, and race had no confounding effect on the association between education, income, insurance coverage, general health, cancer diagnosis, cancer worry, having a regular healthcare provider, getting frequent healthcare and seeking cancer information. These results support the hypotheses that education, income, insurance coverage, general health, cancer diagnosis, cancer worry, having a regular healthcare provider, and getting frequent healthcare are significant ($p < .05$) predictors of cancer information seeking. In chapter 5, I provided an interpretation of the results and the study findings, comparing them with what has been found in the existing literature. I included information on the significance of the findings, recommendations for future research, implications for positive social change, and the conclusion of the study.

Chapter 5: Discussion, Conclusions, and Recommendations

This quantitative cross-sectional study was conducted to examine the association between the independent variables (sociodemographic factors, health status, health care engagement) and the dependent variable (cancer information seeking) among adults with a family history of cancer using secondary data from 2017–2019 extracted from the HINTS data repository. I merged and analyzed data of 8,473 respondents. I used multiple logistic regression to determine the associations and explain the relationships between the predictors and the outcome variable. This study was justified because despite the relevance of seeking health information for cancer prevention, no study had addressed the predictors of cancer information-seeking behaviors among individuals with a family history of cancer.

The key findings revealed statistically significant associations ($p < .05$) between education, income, insurance coverage, general health, cancer diagnosis, cancer worry, having a regular health care provider, getting frequent health care, and seeking cancer information among adults with a family history of cancer. Moreover, age, gender, and race were not confounders on the associations. This chapter includes a detailed interpretation of the findings, limitations of the study, recommendations for future research, positive social change implications, and a conclusion.

Interpretation of the Findings

This study filled a gap in research on factors that predict whether an individual with a family history of cancer will seek information for cancer prevention. Findings from this research were based on three RQs.

RQ1: Sociodemographic Factors and Cancer Information Seeking

My first finding was that sociodemographic factors, as measured by education level, household income, and health insurance coverage, were significantly ($p < .05$) associated with cancer information seeking among adults with a family history of cancer. Therefore, sociodemographic factors were a predictor for seeking information for cancer prevention. For the education category, those in the low education group were 0.5 times less likely to seek cancer information ($p < .001$) compared to those who had a high level of education. As education level increased, so did the likelihood of seeking cancer information. This finding was consistent with the literature, which showed that people with lower levels of educational attainment are less likely to seek cancer preventive information (Adjei Boakye et al., 2018). Feinberg et al. (2016) noted that education level is a strong predictor of seeking cancer information because adults with lower education level are less likely to have the skills or knowledge to seek health information about preventive measures.

Relative to the high-income group, the middle-income group was 0.6 times less likely to seek cancer information seeking (*OR* = .561; 95% CI: .497, .632; $p < .001$), and low-income group was 0.8 times less likely (*OR* = .782; 95% CI: .688, .889; $p < .001$). This finding suggested that low-income and middle-income individuals with a family history of cancer may experience barriers that limit their ability to seek cancer prevention information (see Adjei Boakye et al., 2018; Finney Rutten et al., 2016; Rogith et al., 2016). The effect of income level on cancer information seeking should be examined relative to other variables that may have a substantial influence on seeking health information for cancer prevention. Findings from these analyses were consistent with other research findings that lower levels of education or lower income influences health outcomes and preventive behaviors, including cancer information seeking (see Feinberg et al., 2016; Jacobs et al., 2017; Somera et al., 2016).

Furthermore, compared to respondents with health insurance coverage, those without health insurance were 0.8 times less likely (*OR*: .767; 95% CI: .617, .954) to seek cancer information. This finding was consistent with previous research that insurance status is a significant predictor of cancer information seeking because those with insurance are more likely to seek health care and receive information as a result of their access to health professionals more than those who do not have health insurance (see Ramirez et al., 2018; Swoboda et al., 2018). Additionally, having less school education and lower income is associated with being uninsured or less likely to have health insurance coverage (Amante et al., 2015; Nangsangna & da-Costa Vroom, 2019). Because factors related to socioeconomic disadvantage predict seeking cancer information, there is a need to adopt strategies that account for all education levels, income levels, and insurance coverage to increase seeking health information for cancer prevention among adults with a family history of cancer.

A second model of the regression analysis was performed to ascertain the effects of age, gender, and race on cancer information seeking, and the results revealed no confounding effects on the association between sociodemographic factors and seeking cancer information. The difference between the age groups was not statistically significant ($p > .05$). However, this result was contradictory to findings from previous studies, which indicated that being younger in age is associated with seeking health information for cancer prevention (Adjei Boakye et al., 2018; Finney Rutten et al., 2016; Rogith et al., 2016). Differences regarding the association between age and cancer information seeking signify the need to better understand the effect of age on seeking cancer information among adults with a family history of cancer. This knowledge of the behavioral risk factors within groups may inform the design and implementation of cancer health information programs.

For gender as a covariate, males were 0.7 times less likely (*OR*: .683; 95% CI: .623, .750, $p < .001$) to seek cancer information compared to females. This result was similar to findings from previous research that being male, being non-White, having a lower income, and having less educational attainment are associated with not seeking health information for cancer prevention (Adjei Boakye et al., 2018; Finney Rutten et al., 2016; Rogith et al., 2016). Based on the evidence from prior studies, gender predicts cancer information seeking, with females being more likely to seek information about cancer prevention behaviors compared to males (Adjei Boakye et al., 2018; Loiselle, 2019; Manierre, 2015; Saab et al., 2018; Somera et al., 2016). Some researchers have suggested that the reasons for gender differences in cancer information seeking is because women have a higher perception of vulnerability to disease compared to men (Mehta et al., 2016; Symonds et al., 2016).

Similarly, non-Whites were 0.8 times less likely (*OR*: .796; 95% CI: .700, .905, $p < .001$) to seek cancer information compared to Whites. Evidence from previous research revealed that Whites are more likely to seek health information for cancer prevention compared to any other race (Jacobs et al., 2017; Nelissen et al., 2017; Somera et al., 2016). Also, non-Whites struggle when seeking health information due to language barriers and lack of cultural familiarity with the U.S. health care system (Jungmi & Xiaoli, 2018; Luz et al., 2015; Wigfall & Friedman, 2016). Based on these findings, there is a need to pay more attention on sociodemographic factors as barriers to cancer information seeking among adults with a family history of cancer. Multicomponent and culturally tailored cancer information-seeking programs may be important strategies for addressing differences among at-risk age, gender, and race groups.

RQ2: Health Status and Cancer Information Seeking

My second relevant finding from this research was that health status measured by general health status, cancer diagnosis, and cancer worry predicted whether an individual with a family history of cancer would seek cancer information or not. Results from this analysis further revealed that, age, gender, and race were not confounders on the association between health status and cancer information seeking. In this study, those with good general health status were 0.7 times less likely (*OR* = .693; 95% CI: .525, .914; $p < .01$) to seek cancer information when compared to those with poor general health status. Similarly, respondents without a cancer diagnosis were 0.4 times less likely (*OR* = .402; 95% CI: .354, .458; $p < .001$) to seek cancer information compared to those with a cancer diagnosis. Furthermore, respondents who do not worry about getting cancer were 0.6 times less likely (*OR*: .568; 95% CI: .480, .673; $p < .001$) to seek cancer information compared with those who frequently worry about getting cancer. This finding was consistent with prior research evidence that there is an association between general health status, cancer diagnosis, cancer worry, and cancer information seeking in populations at risk of cancer (Adjei Boakye et al., 2018; Kobayashi & Smith, 2016; So et al., 2019; Wigfall & Friedman, 2016).

Individuals with a perception of poor general health are more likely to seek health information for cancer prevention compared to those who believe they are in a good state of health (Hovick & Bigsby, 2016; Jacobs et al., 2017; Nikoloudakis et al. 2018). Existing literature indicated that perception of health status is an important determinant of seeking or not seeking cancer preventive information (Chang & Huang, 2020; Oh, 2015). Moreover, researchers have been suggested that having a chronic disease such as cancer predicts seeking cancer information among high-risk individuals (Madrigal & Escoffery, 2019; Nelissen et al., 2015). A cancer diagnosis in a relative can also trigger cancer worry among other family members (Adjei Boakye et al., 2018; Kobayashi & Smith, 2016). Frequent cancer worry is associated with an increased drive to seek or pay more attention to health information for cancer prevention (Amuta et al., 2017; Bayne et al., 2020; Jensen et al., 2017; Lee & Hawkins, 2016; Van Stee & Yang, 2018). Additionally, cancer information-seeking behavior of an individual could be stimulated by perception of their health status and family history (Jacobs et al., 2017). The perception of cancer risk influences how individuals seek prevention information (Alaa & Shah, 2019). Perceived susceptibility to cancer can determine whether individuals will seek information relevant for cancer prevention (Adjei Boakye et al., 2018; Kobayashi & Smith, 2016; Wigfall & Friedman, 2016).

The findings from these analyses persisted after controlling for age, gender, and race. These covariates (age, gender, and race) did not confound the relationship between the predictors and the outcome variable (cancer information seeking) as the odds ratios remained the same after adjusting for them. This result was consistent with previous research indicating that age, gender, and race do not confound the relationship between health status and cancer information seeking among cancer patients (Adjei Boakye et al., 2018). However, factors such as age, sex, and race are essential measures to assess cancer information-seeking behaviors in general populations (Kobayashi & Smith, 2016; Wigfall & Friedman, 2016). There is a need to further explore the influence of health status on cancer information seeking relative to other factors (age, sex, and race) that might have additional impact on this outcome. For instance, age, sex, race, and other social determinants of health have been associated with cancer information seeking in populations with a cancer diagnosis (Jacobs et al., 2017; Nelissen et al., 2017; Somera et al., 2016). These findings suggested that more research is needed to examine the effects of age, gender, and race in combination with measures of health status on cancer information-seeking behaviors of individuals with a family history of cancer.

Furthermore, findings from this study added to the public health knowledge base that general health status, cancer diagnosis, and cancer worry are linked to seeking cancer preventive information. To increase cancer information seeking, public health professionals need to promote initiatives that target individuals with a family history of cancer based on their general health status, cancer diagnosis, and level of cancer worry. This research also made a unique contribution to the theoretical foundation (HBM) that I selected to guide this study. The HBM is structured to develop an understanding of people's willingness to engage in preventive action to control disease (Glanz et al., 2015). By applying the concept of perceived susceptibility and severity, the results obtained from this study supported the HBM model and incorporated general health status, cancer diagnosis, and cancer worry as avenues to recognize the need for cancer information.

RQ3: Health Care Engagement and Cancer Information Seeking

My third relevant finding from this research was that health care engagement measured by having a regular health care provider and getting frequent health care predicted cancer information seeking among adults with a family history of cancer. Results from this analysis also revealed that age, gender, and race were not confounders on the association between health care engagement and cancer information seeking among adults with a family history of cancer. The findings showed that those without a regular health care provider were 0.7 times less likely (*OR* = .663; 95% CI: .597, .736; $p < .001$) to seek cancer information compared to respondents who had a regular health care provider. Similarly, compared to those who receive frequent health care, respondents who do not get frequent health care were 0.6 times less likely (*OR* = .649; 95% CI: .580, .751; $p < .001$) to seek cancer information. Therefore, having regular contact with health professionals and getting frequent medical consultations predicted cancer information seeking among adults with a positive family history of cancer. This finding was consistent with prior evidence that individuals with regular access to health care professionals are more motivated to seek health information compared to those with limited access (Adjei Boakye et al., 2018; Enwald et al., 2017).

Notably, inadequate access to health care professionals can impact decisions to seek general health information or not (Bhandari et al., 2020; Hovick & Bigsby, 2016). When an individual is in regular contact with a health professional or health care provider, the individual is likely to show interest in actively seeking preventive information (Ginossar, 2016; Wigfall & Friedman, 2016). The degree to which individuals have access to health care determines how much information they will be able to receive from medical professionals (Bhandari et al., 2020; Hardcastle et al., 2015). Consistent communication between patients and health care providers promotes cancer-related health information seeking among populations at risk of cancer (Adjei Boakye et al., 2018; Ginossar, 2016; Wigfall & Friedman, 2016). The existing evidence indicated that seeking health information increases among patients and their families after interactions with health care professionals (Adjei Boakye et al., 2018; Upadhyay et al., 2019; Wigfall & Friedman, 2016). Other studies addressed the effect of frequent medical consultations on health information seeking and indicated that individuals seek out more information on diagnoses after a doctor’s appointment (Tan & Goonawardene, 2017; Waters et al., 2016). However, people without a regular health care provider experience challenges with seeking general health information (Bangerter et al., 2019).

Furthermore, findings from these analyses suggested that more efforts are needed to encourage individuals with a family history of cancer to visit a health care professional for preventive purposes to get motivated to seek health information for cancer prevention. Additionally, to increase cancer information seeking among adults with a family history of cancer, public health professionals need to promote initiatives that will enhance access to health care providers (Adjei Boakye et al., 2018; Ginossar, 2016; Wigfall & Friedman, 2016). Moreover, having regular contact with health care professionals and getting frequent health care offer opportunities for individuals with a family history of cancer to seek cancer prevention information. These results also supported the application of cues to action, a construct of the HBM, that I selected as the theoretical foundation to guide this study. The findings from this research revealed that health care engagement serves as a cue to action that triggers seeking cancer information. Considering the lack of sufficient research on the use of HBM to understand the predictors of cancer information seeking among adults with a family history of cancer, this study provided a crucial foundation for future studies on this topic.

Limitations of the Study

Despite the contribution stated above, there are limitations to this study that need to be discussed. Firstly, using secondary data from the self-reported survey may be susceptible to recall bias (Althubaiti, 2016). Most of the HINTS survey questions depended on the ability of respondents to recall personal information. Although there is evidence of high reliability and validity of HINTS data, there is the possibility that some respondents might under-report or over-report responses. Inaccurate responses to survey questions, can significantly limit the accuracy of data analysis (Finney Rutten et al., 2019). The secondary data utilized for this study focused on family history of cancer in general and did not address specific cancer types. There is a potential for selection and information bias as more information may have been pulled from a specific category of the population. This study was also limited to participants living in the United States and may not be generalizable to countries beyond the United States.

Secondly, the original dataset included cases with missing data which I basically removed from the analysis, further limiting the results from generalization to the entire U.S. population of over 330 million people (U.S. Census, 2020). However, using stratified random sampling technique in selecting cases was helpful for minimizing the problem of missing data in the analytic stage of this research. The reliability of the results was similar to that of the full version of the HINTS dataset. Also, there was a limitation in the balance of the samples in some categories. For example, the frequency distribution shows that there are almost thrice as many respondents in the high education group compared to the low education group, and respondents in the White race/ethnicity group were over five times those in the non-White race groups.

Thirdly, although the use of a cross-sectional design was appropriate for this study, it is limited in its ability to conclude causal inferences for the study variables (Setia, 2016). Moreover, all six concepts of the HBM were not incorporated in this study, which could limit its ability to describe the impact of knowledge and self-efficacy aspect of cancer information seeking. Lastly, it was difficult to ascertain whether observed differences in results were confounded by other variables such as marital status and cancer information seeking sources that were not measured in the analysis.

Recommendations

The strength of this cross-sectional study is grounded in the use of multiple logistic regression analyses, which is an excellent model to estimate associations simultaneously with the effects of group-level predictors on the outcome (Ranganathan, Pramesh, & Aggarwal, 2017). Multiple logistic regression analyses used in this study adjusted for any effects of data collection at a different age, gender, and race/ethnicity categories. This study is beneficial because it reveals the relationship between sociodemographic, health status, healthcare engagement, and cancer information seeking. Consequently, this research identifies the need to develop targeted communication programs for different categories of individuals with a family history of cancer. Another advantage of this study is that it uses secondary data from a reliable and nationally recognized database in the US. By using the HINTs dataset, there is a high probability that my results are reliable and valid. Data from NCI HINTs are freely available and not time-consuming or expensive when compared with primary data collection (Trinh, 2018). Another strength is that most of the literature was pulled from recent articles published less than five years. The studies reviewed included research findings of both primary and secondary datasets from a global perspective. However, findings from this study showed statistically significant associations between the predictors and the outcome variable, which was limited to adults with a family history of cancer residing in the United States.

A recommendation for future research is that other quantitative studies can be conducted to examine the predictors of cancer information seeking among specific subgroups of populations with a positive family history of cancer. Future studies should focus on common specific family cancers such as lung, colorectal, prostate, breast, and ovarian instead of cancer in general. This study pointed to the role of sociodemographic factors, health status, and healthcare engagement as determinants of cancer information seeking in individuals with a family cancer history. However, the HINTS population is predominantly White adults with higher educational attainment. Other non-White racial groups are less represented in the HINTS data. Future research could focus on balancing the frequency distribution of all sociodemographic variables such as age, gender, race, education, income, and health insurance coverage. A randomized study will allow for a more generalized result that could apply to a larger population in the United States. It is essential for future researchers to conduct prospective studies with larger sample sizes to examine the intra-relation within specific predictor variables across all sociodemographic levels. Future researchers can assess if there is a difference in cancer information seeking restricted to race/ethnic groups at the same education level. A prospective study could focus on evaluating cancer information seeking in specific subgroups and estimate the effect of other demographic factors in populations with a positive family history of cancer.

Another recommendation for future studies is to evaluate the impact of frequent routine clinical encounters with healthcare providers, including periodic medical checkups on cancer information seeking among individuals with a family cancer history. I was only able to examine having a regular healthcare provider and getting frequent healthcare on cancer information seeking in this analysis. This study revealed that respondents diagnosed with cancer are more likely to seek cancer information than those without, but it is not clear if having a regular healthcare provider played a role. With this in mind, future studies can examine trends in cancer information seeking by the source among this population. Future cancer information interventions for individuals with a family history of cancer must incorporate clear patient-physician communication concepts for those who trust information from a healthcare provider than the internet or other traditional sources. Based on the existing literature and findings from this study, there are also potential predictors of cancer information seeking that need to be evaluated over time in future research studies. Therefore, longitudinal investigations may provide more than a snapshot of predictors of cancer information seeking among adults with a family history of cancer. These longitudinal studies will help see if cancer information-seeking behaviors change with time among at-risk populations with a family cancer history.

Social Change Implications

Findings from this study revealed that the predictors of cancer information seeking among adults with a positive family history of cancer are multifactorial. This information can help healthcare professionals and public health experts develop programs that may improve cancer information-seeking behaviors in adults with a family history of cancer. There is evidence that cancer information seeking among at-risk populations is deficient and has not improved over the years (Wigfall & Friedman, 2016). Moreover, despite efforts to promote and increase cancer information seeking, there is still some disparity due to sociodemographic factors, poor health status, and inadequate healthcare engagement. This study supports the need to understand the positive predictors of cancer information seeking to improve disease prevention among adults with a family history of cancer. To increase cancer information seeking, public health professionals can use findings from this study to understand which predictors significantly affect seeking health information for cancer prevention.

This study helps narrow the gap in knowledge by improving understanding of the effects of sociodemographic factors, health status, and healthcare engagement on cancer information seeking among adults with a positive family history of cancer. The findings could be excellent in advancing epidemiological knowledge as it applied HBM as a theoretical framework to studying cancer information seeking among a socioeconomically diverse sample of people with a family history of cancer. Public health professionals can design programs that target specific groups to help promote cancer information-seeking behaviors. The policy implications from this study are that there is an urgent need for public health policymakers who lead the development and implementation of programs at all levels to prioritize initiatives that focus on eliminating inequity in cancer information seeking behaviors among at-risk communities.

Key stakeholders for cancer information seeking initiatives may include public health professionals, physicians, community leaders, public health agencies, and advocates who will design communication programs to encourage cancer information seeking. These stakeholders will need to collaborate for the success of various public health initiatives aimed at improving cancer information seeking. Given that individuals with a family cancer history have frequent routine clinical encounters with their healthcare providers, every clinic appointment should be maximized to ensure that the right cancer-preventive health information is provided. Physicians can educate and recommend seeking preventive information for cancer when patients visit the clinics.

Furthermore, public health professionals can work with volunteer organizations to donate free cancer-preventive information, and educational materials to individuals with a positive family cancer history in communities. Overall, future public health interventions targeting individuals with a family history of cancer should consider these findings for tailored interventions to achieve optimal outcomes.

Conclusion

Cancer remains a leading cause of death in the United States (Siegel et al., 2020; Yabroff et al., 2019). Family cancer history plays a role in the development of cancer in both men and women (Flória-Santos et al., 2016). Considering the multiple benefits of cancer information seeking and better prognosis associated with early diagnosis, more efforts to increase seeking cancer-preventive health information are essential strategies to improve public health. Findings from this study suggest that predictors of cancer information seeking are based on perceived susceptibility, severity, benefits, barriers, and cues to action constructs of the HBM. The results showed that individuals with a family history of cancer who have lower education, lesser income, and are without health insurance experience barriers to seeking cancer information. Perceived susceptibility to disease measured by general health status, cancer diagnosis, and cancer worry was associated with seeking preventive cancer information. Lower odds ratios of cancer information seeking were observed among those without a regular health care provider and who do not receive frequent healthcare compared to those with regular access to healthcare professionals and healthcare services.

Although age, gender, and race were examined as covariates, they did not confound the relationship between the other predictors and cancer information seeking. No significant difference was found based on age for cancer information seeking among the adults with a family history of cancer examined in this study. Males with a positive family cancer history were less likely to seek health information for cancer prevention when compared to females with a family history of cancer. Race was significantly associated with cancer information seeking, such that non-Whites reported lower odds than Whites. These analyses provide insight into the specific sociodemographic and health-related factors associated with cancer information seeking in a population with a family history of cancer. The findings support that a targeted program can potentially help to improve cancer information seeking among individuals with a positive family history of cancer in the United States.

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