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Factors Associated With Digestive System Cancer Screening in Texas.

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Walden University
2024

Abstract

Factors Associated With Digestive System Cancer Screening in Texas

By

Stella Green

MSN, University of North Carolina, Charlotte, 2000

BSN, Queens College, 1993

Doctoral Study Submitted in Partial Fulfillment

Of the Requirements for the Degree of

Doctor of Public Health

Walden University

February, 2024.

Abstract

The specific research problem in this study was that despite the high prevalence of digestive system cancer, screening for digestive system cancer has not been optimized, thus compromising early diagnosis and treatment. Early detection and treatment of digestive system cancer can generate better patient outcomes and enhance quality of life. The purpose of this quantitative correlation study guided by the social ecological model was to examine whether demographic factors (age, sex, race/ethnicity, marital status), socioeconomic status (education level, employment status, income level), and health behaviors (physical activity, tobacco use, healthcare coverage) are associated with receiving digestive cancer screening in Texas. The population included adults aged 18 years or older who were enrolled in and participated in the 2018 Texas Behavioral Risk Factor Surveillance System survey. The data points for the study variables were extracted from the overall 2018 BRFSS survey using inclusion and exclusion criteria. The results of the logistic regression data analysis demonstrated that various characteristics were associated with resulting in some individuals receiving digestive cancer screening when exploring the research questions. All demographic factors except gender were significant predictors of taking a digestive system cancer screening test, as measured by sigmoidoscopy and colonoscopy. Apart from marital status and income levels, all characteristics evaluated were linked to taking a blood stool test. The results can contribute to positive social change by encouraging the development of educational initiatives toward older adults and emphasizing the role of spousal involvement and social support in cancer screening.

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Dedication

This dissertation is dedicated to my late parents, Mr. Edward Osier Gyumri and Madam Dora Akosua Owusuaah; my husband, Dr. Kumi Frimpong; and my children, Regis, Raisa, Chelsea, Kwame, Nissi, and Sarah. I also appreciate the unshakable support from my pastors, Bishop Adu Gyamfi and wife, Pastor Grace Gertrude Adu Gyamfi, Bishop Kwarteng Siaw and wife, Mrs. Gladys Siaw, my siblings, Naana Gyamfi, Jeff Gyamfi, Abena Amoah Gyamfi, Richmod Gyamfi, Tiwaah Gyamfi, my brother-in-law Michael Maldina, and the rest of my siblings all over the world. I am also very grateful for the support of my son-in-law, Nana Yaw Asante. I am also highly indebted to Dr. Barnett Shanna (Walden), who mentored me throughout my research and remains my backbone supporter in this journey. Also, I am grateful to Dr. Moses Owusu of Houston, Dr. Elizabeth Hagan, Gloria Labir, nieces Yaa Achiaah (Atlanta) and Obiyaa (Ohio), Ms. Mary Mensah Bonsu, Mrs. Yvonne Asante, Mrs. Patricia Akaminou; Mr. Brandon Mets, Ms. Barbara Osei Appiah, Mrs. Mary Duah, Ms. Rita Antesson, and the numerous family and friends who were my cheerleaders to the end. Finally, l would like to thank the good Lord who made this journey possible. I give him all the glory.

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Section 1: Foundation of the Study and Literature Review

Introduction

In this study, I focused on the factors associated with digestive system cancer screening. These factors included individual-level factors (age, sex, race/ethnicity), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage). There was a need to conduct this study because of the increased need to understand aspects of digestive system cancer screening tests. The major implication of the study is the possibility of detecting digestive cancer in its early stages. Understanding the factors linked to digestive system cancer screening tests could inform the formulation of strategies to encourage people in the state of Texas to engage in screening to allow for early diagnosis.

Digestive cancer is a serious condition. It affects organs within the digestive system, such as the liver, esophageal, pancreas, colon, and stomach (Wang & Wei, 2019). Digestive system cancers have become the leading cause of cancer mortality globally (Wang & Wei, 2019). Fitzmaurice et al. (2018) demonstrated that there were 17.2 million cancer cases and 8.6 million related deaths worldwide in 2016, representing a 28% increase from 2006. There currently exists no cure for the disease, but treatment for digestive system cancer is effective if initiated early (Gupta et al., 2019; Lin et al., 2021); however, the main challenge is that diagnosis is made at later stages in most cases, making recovery an impossible goal. Therefore, early detection and treatment of digestive system cancer can generate better patient outcomes and enhance the quality of life of people and the community.

There exist various causes of gastrointestinal cancers. A tumor may form in one organ of the digestive system due to a mutation in the DNA structure, resulting in abnormal growth of cells (Wang & Wei, 2019). The mutation of DNA is caused by multiple factors, including underlying disorders, genetics, and lifestyle choices (Sarvizadeh et al., 2021). Scholars have demonstrated that healthy lifestyle choices, including physical exercise, low to moderate alcohol and cigarette consumption, minimal red meat consumption, and a healthy diet high in vegetables and fruits can minimize the risk of developing digestive system cancer (Xie et al., 2021; Zhang et al., 2021). Knowledge of factors associated with digestive system cancer screening would help to improve early detection and treatment for these maladies (Ekmekcioglu et al., 2018; Kirkegård et al., 2018). From the findings of these studies, it is plausible to affirm that the causes of gastrointestinal cancers fall into two broad categories: genetics causes and lifestyle causes. Understanding these causes is a prerequisite for effective prevention and early detection of gastrointestinal cancers.

Through this study, I aimed to determine the factors linked to digestive system cancer screening. The study's outcome may increase practitioners' knowledge of digestive system cancer screening barriers, thereby providing them with a basis for formulating strategies that will guarantee the success of cancer screening mobilization campaigns in the state of Texas. The remainder of this section contains the study background, foundational theoretical framework, nature of the study, definition of operational terms, assumptions of the study, study limitations, scope and delimitations, significance, and implications for social change.

Background

Digestive system cancer is common worldwide. Various studies on digestive system cancer have sought to delineate the disease better and understand its prevalence, risk factors, and screening approaches (Etemadi et al., 2020; Fitzmaurice et al., 2018; Wang & Wei, 2019; Williams et al., 2018; Xie et al., 2021). Arnold et al. (2020) revealed significant geographic disparities in the incidence and mortality rate for all major digestive system cancers. These authors' outcomes also revealed that 4.8 million new cases of digestive system cancers and 3.4 million deaths worldwide were reported in 2018 (Etemadi et al., 2020; Lau et al., 2020). Specifically, Etemadi et al. (2020) indicated that close to 1.22 million cases of stomach cancer were reported globally in 2017. Fitzmaurice et al. (2018) found 17.2 million digestive system cancer cases and 8.6 million related deaths globally in 2016, representing an increase of 28% from 2006. Such data are a major indication that the prevalence of digestive system cancer is on an upward trend. Therefore, measures need to be implemented to help reduce digestive system cancer mortality.

There are known behavioral and personal risk factors for digestive system cancer. Ekmekcioglu et al. (2018) demonstrated that high consumption of red, processed meat harms health because it increases the risk for colorectal cancer, type II diabetes, cardiovascular diseases, and overall mortality. Consistent findings were reported by Xie et al. (2021), suggesting that moderate to high-level physical activity minimizes the risk of developing digestive system cancer. Similarly, Zhang et al.'s (2021) findings suggest that unhealthy eating habits increase the risk of overall digestive system cancer, with

higher risks of overall digestive system cancer and colorectal cancer. Liu et al. (2019) showed that leisure-time physical activity substantially decreased the risk of liver cancer in nonsmokers. Van Loon et al. (2018) observed that risk factors of alcohol and coffee intake, smoking, and family history of cancer and stomach disorders are risk factors for developing digestive system cancer. The findings from these studies indicate that an individual's lifestyle choices increase their risk of digestive system cancer (Liu et al., 2019; Van Loon et al., 2018). Therefore, adopting a healthy lifestyle can significantly lower one's risk for digestive system cancer.

Early diagnosis is essential for eliciting positive patient outcomes. Wang and Wei (2019) affirmed that screening for digestive system cancer has not been optimized, thus compromising early diagnosis and treatment. Van Loon et al. (2018) recommended opportunistic screening for high-risk populations in primary care facilities to expand screening coverage, early diagnosis, and treatment for patients with digestive system cancer. Sauer et al. (2019) suggested improving screening among people of ethnic minorities and lower SES. From the recommendations, it is plausible to affirm that implementing strategies to improve screening would allow for early diagnosis and treatment, thereby improving patient outcomes. Therefore, screening is important in ensuring a high survival rate.

Problem Statement

Despite considerable interventions focused on reducing new cases and deaths from cancer-related lifestyle behaviors, digestive system cancer prevalence, and mortality rates remain high (Arnold et al., 2020; Fitzmaurice et al., 2018; Xie et al., 2021).

Approximately 17.2 million cases of digestive system cancer and 8.6 million related deaths were reported in 2016 worldwide (Fitzmaurice et al., 2018). About 4.8 million new cases of digestive system cancers and 3.4 million associated deaths occurred in 2018 worldwide (Arnold et al., 2020; Serrano et al., 2021). Digestive system cancers have become the leading causes of mortality due to cancer globally (Fitzmaurice et al., 2018), which has led to Texas being one of the first states in the United States to develop a Cancer Plan (Cancer Prevention and Research Institute of Texas, 2018). Despite these concerns and the development of a specific goal in the Texas Cancer Plan to focus to increase healthy behaviors to reduce new cases and deaths from cancers related to lifestyle behaviors, there is a lack of understanding of the predictors and factors associated with digestive system cancer screening (Ekmekcioglu et al., 2018; Lin et al., 2021; Xie et al., 2021).

Despite the high prevalence of digestive system cancer, Wang and Wei (2019) affirmed that screening for digestive system cancer has not been optimized, thus compromising early diagnosis and treatment. Xie et al. (2021) cited that the current interventions to promote digestive system cancer screening do not consider individual demographic factors, socioeconomic status, and health behaviors in their digestive system cancer screening strategies. Even though cancer screening is fundamental in improving early detection and treatment, no previous scholars have examined key factors associated with digestive system cancer screening. Therefore, the effectiveness of these interventions in reducing new cases and death is questionable.

The available empirical studies have focused on the impact of individual demographic factors (i.e., age, sex, race/ethnicity, and marital status; Wong et al., 2021; Xie et al., 2021), socioeconomic status (SES; i.e., education level, employment status, and income level; Fitzmaurice et al., 2018), and health behaviors (physical activity, tobacco use, and healthcare coverage; Arnold et al., 2020), associated with digestive system cancer screening (i.e., blood stool test, sigmoidoscopy, and colonoscopy). The findings of these studies indicate that major risk factors for digestive system cancer include demographic factors, lifestyle choices, SES, underlying health conditions, and genetic factors that increase gastrointestinal cancer risks and mortality (Liu et al., 2019; Shen et al., 2018; White et al., 2018; Zhang et al., 2021). Ekmekcioglu et al. (2018) posited that knowledge of the risk factors for digestive system cancer screening can be prioritized to improve early detection and treatment for these maladies.

The risk factors inform the barriers against participation in screening. Improvement in screening rates will allow for early detection and treatment. I filled this empirical gap by investigating the relationship between individual demographic and personal factors, lifestyle choices, and SES in screening for digestive system cancer. The study outcomes may improve cancer screening, detection, and treatment for improved health outcomes and quality of life for patients and the community in the state of Texas.

Purpose of the Research

The purpose of this quantitative correlation study was to examine whether the independent variables of demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), health behaviors (physical

activity, tobacco use, and healthcare coverage), are associated with the dependent variable of receiving digestive cancer screening in Texas. The dependent variables were the types of digestive cancer screening tests (i.e., sigmoidoscopy, colonoscopy, or blood stool test).

Research Questions and Hypotheses

RQ1: Is there an association between demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the prevalence of sigmoidoscopy and colonoscopy?

$H_0$1: There is no statistically significant association between individual demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) and digestive system cancer screening as measured by the prevalence of sigmoidoscopy and colonoscopy.

H_A1: There is a statistically significant association between individual demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) and digestive system cancer screening as measured by the prevalence of sigmoidoscopy and colonoscopy.

RQ2: Is there an association between demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and

income level), health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the prevalence of blood stool tests?

$H_0$2: There is no statistically significant association between individual demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the prevalence of blood stool test.

H_A2: There is a statistically significant association between individual demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the prevalence of blood stool test.

Theoretical Framework

I employed the social ecological model (SEM) of Bronfenbrenner (1979) as the study's theoretical framework. This theory was developed in recognition of the fact that individuals affect and are affected by a complex range of social influences and nested environmental interactions (Bronfenbrenner, 1979). The SEM identifies many facets that influence the health behavior of individuals undergoing health challenges. The SEM is an approach to healthcare that is designed to take in the environmental aspect found within an individual's social ecology that may impact or otherwise affect their reaction to the disease in question or ability to deal with it (ACHA, 2018). Hence, adopting the SEM as

a framework enabled me to acquire insights regarding whether the independent variables of demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage), are associated with the dependent variable of receiving digestive cancer screening in Texas.

The premises of the SEM are based on the assumption that there are multiple aspects of a developing child's life that interacts with and affects the child. Notably, Bronfenbrenner (1979) developed the theory by looking beyond individual development, taking into account wider influencing factors and the context (or ecology) of development. Thus, he proposed the ecological systems theory based on these dynamic interactions that the environments have on the developing child. Therefore, he suggested that the environment of the child is a nested arrangement of structures, each contained within the next organizing them in order of how much of an impact they have on a child. Bronfenbrenner named these structures the *microsystem*, *mesosystem*, *ecosystem*, *microsystem*, and *chronosystem*, arguing that because the five systems are interrelated, the influence of one system on a child's development depends on its relationship with the others.

Nature of Study

A quantitative correlational research design was used to guide this investigation. A correlational research design is a no experimental study approach usEd to assess associations between variables without manipulating or controlling those (Curtis et al., 2016). A correlational research design was appropriate for the current study because the

purpose was to find whether individual demographic factors, SES, and health behaviors are associated with digestive system cancer screening. Individual-level factors, SES, and health behaviors were the independent variables, while the dependent variables were screening tests (sigmoidoscopy, colonoscopy, or blood stool test). Data from the Texas Behavioral Risk Factor Surveillance System (BRFSS) study were analyzed using a linear regression model and correlation analysis.

Literature Search Strategy

The search engines and online databases used to write the literature review included Google Scholar, Educational Resource Information Center (ERIC), Global Health, Ingenta Connect, Scopus, EBSCOhost Online Research Databases, and Journal Seek. The key search terms used were as follows: *digestive cancer, Social Ecological Model, cancer screening test, sigmoidoscopy, colonoscopy, blood stool test, individual factors,* and *digestive system cancer screening test*. The other key search terms also used included *social-economic factors and how they affect digestive system cancer screening, age and digestive system cancer screening, gender and digestive system cancer screening, race and digestive system cancer screening, ethnicity and digestive system cancer screening, employment and digestive system cancer screening, income and digestive system cancer screening. physical activity and digestive system cancer screening, tobacco use and digestive system cancer screening, healthcare cover and digestive system cancer screening, sigmoidoscopy and digestive system cancer screening, colonoscopy and digestive system cancer screening, blood stool test and digestive system cancer screening education and digestive system cancer screening health behaviors,* and

how they affect digestive system cancer screening. All the key terms could have yielded studies relevant to the problem and research questions.

A larger proportion of the literature was published between 2017 and 2022 to ensure that the latest findings and reports were included in the review. There was minimal literature on individual-level factors, including social-economic factors and health behaviors and their connection to digestive system cancer screening tests, sigmoidoscopy, colonoscopy, or blood stool tests. Older articles pertinent to the study and factors affecting digestive system cancer screening were included to expand the results. Older articles were also used in the study's theoretical framework to reflect the seminal studies on resilience theory.

Theoretical Framework

The current study was guided by the SEM developed by Bronfenbrenner (1979). Because it takes into consideration social factors that influence healthcare, including intrapersonal, interpersonal, institutional, community, and public policies, the ecological model was appropriate for this study. The constructs of the model are intrapersonal, interpersonal, organizational, community, physical environmental, and policy. The ecological model remains relevant, as social inequalities continue to create challenges in healthcare (Hays et al., 1997); therefore, it was the most appropriate for examining whether the independent variables of demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage), are associated with the dependent variable of receiving digestive cancer screening in Texas.

The SEM recognizes that there are multiple aspects of a developing child's life that interacts with and affects the child. Notably, Bronfenbrenner developed this theory by looking beyond individual development, taking into account wider influencing factors and the context (or ecology) of development. Thus, he proposed the ecological systems theory based on these dynamic interactions that the environments have on the developing child. Therefore, he suggested that the environment of the child is a nested arrangement of structures, each contained within the next organizing them in order of how much of an impact they have on a child. Bronfenbrenner named these structures the *microsystem*, *mesosystem*, *ecosystem*, *microsystem*, and *chronosystem*, arguing that because the five systems are interrelated, the influence of one system on a child's development depends on its relationship with the others.

The microsystem is the first level of Bronfenbrenner's theory and are the things that have direct contact with the child in their immediate environment, such as parents, siblings, teachers and school peers. As Darling et al. (2007) indicated, the relationships in a microsystem are bi-directional, meaning that the child can be influenced by other people in their environment and is also capable of changing the beliefs and actions of other people as well. From such a perspective, the microsystem perspective provided by the SEM can prove useful in examining whether effective digestive cancer screening is influenced by relationships that an individual has in terms of marital status (influence by the spouse) and employment (workplace relationships). On the other hand, the mesosystem encompasses the interactions between the child's microsystems, such as the interactions between the child's parents and teachers, or between school peers and

siblings (Pat, 2013). According to Bronfenbrenner (1979), the mesosystem is where a person's individual microsystems do not function independently but are interconnected and assert influence upon one another. The ecosystem incorporates other formal and informal social structures, which do not themselves contain the child, but indirectly influence them as they affect one of the microsystems (Bronfenbrenner, 1979; Ryan, 2001). These constitute the neighborhood, parents' workplaces, parents' friends, and the mass media.

On the other hand, the microsystem is a component of Bronfenbrenner's (1979) ecological systems theory that focuses on how cultural elements affect a child's development, such as socioeconomic status, wealth, poverty, and ethnicity (Bronfenbrenner, 1979; Ryan, 2001). From such a perspective, the model will help incorporate education level, employment status, and income level to assess their influences on the different types of digestive cancer screening (sigmoidoscopy, colonoscopy, and Cologuard or blood stool test). Finally, the chronosystem consists of all of the environmental changes that occur over the lifetime which influence development, including major life transitions, and historical events. Thus, the chronosystem perspective helped the current researcher to determine whether digestive cancer screening is influenced by health behaviors that individuals adopt over the course of time, including physical activity, tobacco use, and healthcare coverage, can be used to predict the effectiveness of digestive cancer screening.

This theory has been usEd in similar studies. For instance, Ma et al. (2017) engaged in a study using the ecological model in which they explored public mental

health and practice in relation to health outcomes. Particularly, these researchers focused on examining how different concepts of Bronfenbrenner's theory have been usEd in (public) mental health research, and to analyze the value of these different uses for guiding public mental health policy and practice. The findings obtained from the study revealed that using Bronfenbrenner's ecological system concepts by clearly considering interactions between and within these systems can result in recommendations that are most useful for guiding public mental health policy and practice. In a similar study, Taylor and Haintz (2018) used the theory the social-ecological stressors that youth experience during the first year following an HIV diagnosis. Their results revealed the need for youth-focused services that assist with multiple layers of stressors during the first year following an HIV diagnosis.

Ecological Model and Digestive Cancer Screening

A decision to undertake digestive cancer screening is influenced by intrapersonal, interpersonal, institutional, community, and public policies as relates to the ecological model of health behavior. The model is a comprehensive framework highlighting multiple levels of behavior that can be addressed to improve health access and promotion (Glanz et al., 2018).

Intrapersonal and Digestive System Cancer Screening

The intrapersonal encompasses individual skills, knowledge, and attitudes. In examining gender cervical cancer screening, Johnson et al. (2020) observed that attitude, past negative experiences, socio-economic status, lack of education/knowledge, and gender identity play a critical role in cancer screening. Chang et al. (2015) noted that

lower education levels are associated with reduced participation rates in cancer screening. Digestive system cancer screening is hindered by various barriers that are considered individual-specific (Schonberg et al., 2020; Siegel et al., 2019). Schonberg et al. (2020) revealed that negative attitudes, including anxiousness or insertion of a tube and discomfort, are more likely to deter people from participating in screening programs than those with positive views.

The Siegel et al. (2019) study on fear as an influence on digestive system cancer screening in Spain also complemented the findings of Schonberg et al. (2020) by stating that the fear of intestinal cancer or screening tests and humiliation were the primary reasons for a reduced participation rate. Affirming these findings, various scholars have indicated that barriers to screening for stomach cancer may be more important predictors than advantages (Ji et al., 2020; Stanley et al., 2017). Fear is, therefore, a significant barrier against digestive system cancer screening.

The belief in one's risk of being diagnosed may prompt an individual to screen for an illness or disease. For instance, former smokers are more likely to partake in cancer screening than nonsmokers because they are more worried that they will be diagnosed with cancer (Eng et al., 2020). Smoking often impacts one's health, and former smokers understand this fact (Ekmekcioglu et al., 2018). The reason for quitting smoking is usually concern for their personal health (Liu et al., 2019). These individuals have a high risk of having a compromised health status, which informs their decision to get screened (Ekmekcioglu et al., 2018). For instance, men engaging in physical activity are less likely to screen for cancer even after a doctor's recommendation because they believe that

physical activity prevents cancer (Tucker et al., 2018). These men may have perceived low risk of suffering from cancer, which makes them less likely to undergo screening (Ekmekcioglu et al., 2018). The considered past literature suggests that people who feel unhealthy are more likely to undergo screening while those who perceive themselves as healthy are less likely to partake in screening. Understanding a risk is important in the treatment of digestive system cancer because it influences individual choices, especially when seeking screening services.

Interpersonal and Digestive System Cancer Screening

The interpersonal level relates to interactions and exchanges with other individuals such as family members and close friends at the primary level, as well as larger and broader secondary groups. Stanley et al. (2017) noted that poorer socioeconomic positions (wage, unemployment, level of education, and domicile) influence screening participation. Some of the factors that are barriers to digestive cancer screening include lack of social support, fear, low literacy, and language and communication concerns with healthcare providers.

Kang et al. (2011) noted that a first-degree family member receiving a gastric cancer diagnosis often spurs many people into action. One of the major causes of gastric cancer is genetics; the family history of the condition increases a person's risk of developing the disease (Ji et al., 2020) Song et al. (2018) stated that family history, particularly in first-degree relatives, has been consistently linked with increased risk for a variety of populations. Therefore, regardless of ethnicity, race, gender, education level, or socioeconomic status in society, the possibility of getting a gastric cancer diagnosis

increases when a sibling or parent receives a diagnosis (Ji et al., 2020). Most people understand the increased risk linked with a family history of cancer; as a result, they are likely to undergo screening if a family member suffers from the condition. The decision-making process regarding the need to undertake a digestive cancer screening is triggered by individual-specific factors.

Institutional and Digestive Cancer Screening

The institutional level factors relate to facilities or institutions established by authorities to provide healthcare services to members of the public. Institutional barriers to colorectal cancer screening include the shortage of specialists and the distance to test facilities (Wang & Wei, 2019). Johnson et al. (2020) suggested that factors related to healthcare providers and organizations such as the unwelcoming healthcare environment influence the decision to participate in decision-making at the interpersonal and institutional level. Physicians' perceptions of screening tests' risks and benefits also determine the type of digestive system cancer screening that they offer or suggest.

Inter-professional care can help to mitigate the barriers related to economic and social disadvantages that prevent access to cancer screening and treatment (Dzau et al., 2017). The promotion of cancer screening should center on the partnership between community stakeholders and healthcare professionals to create awareness and access to medical services (Glanz et al., 2018). This intervention focused on creating cancer liaison groups within communities that could provide a support system and information about the benefits of preventive care such as cancer screening. Dzau et al. (2017) concluded that healthcare stakeholders have a responsibility to initiate policy change at the local,

state, and federal levels aiming at promoting cancer screening awareness and reducing the cost of cancer screening. Insurance policies for cancer screening would reduce the cost of screening and promote screening for digestive cancer; however, these policies' implementation would need collective efforts of healthcare professionals, leaders, and members of the public to advocate for changes in insurance reimbursement.

Community and Digestive Cancer Screening

Community-level factors focus on the relationship between institutions and organizations in the form of conglomerates and coalitions. The public policy level relates to the federal, state, and local regulations that govern the provision of healthcare. Health insurance policies such as the Affordable Care Act may remove the financial barrier experienced by most people who may want to undergo screening (Shim et al., 2019). Kim et al. (2016) stated that individuals without private health insurance are less likely to partake in cancer screening. These five levels of the ecological model influence access to and promotion healthcare, including healthcare interventions and decisions to partake in digestive cancer screening (Kennedy et al., 2021). In a systematic review, Wang and Wei (2019) identified barriers to colorectal cancer screening in the rural United States as lack of screening knowledge, discomfort to undergo screening, high cost of screening, and lack of insurance coverage, as well as lack of physician recommendations as barriers to CRC screening. In a similar study, Ma et al. (2017) noted that age, race/ethnicity, and marital status were the most reported factors influencing screening for colorectal cancer in the rural population.

Public Policy and Digestive Cancer Screening

The Health Resources and Services Administration (2015) Health Center Program asserted that public policies such as the Affordable Care Act have assisted the uninsured and underinsured in accessing health insurance. According to Allen (2014), about 24.3 million people are beneficiaries increasing colorectal (CRC) screening rates and intervention procedures. The U.S. Preventive Services Task Force (USPSTF, 2016) noted that as inadequate insurance is an impediment to CRC, national programs have promoted CRC screening uptake.

Implementing the ecological model could encourage the uptake of cancer screening and treatment and decrease cancer-related comorbidities and mortality (Ma et al., 2017). At the intrapersonal level, healthcare professionals can improve digestive cancer screening by providing public awareness of the benefits of seeking preventive care. At the interpersonal level, healthcare professionals can provide general support and information to create a strong family and friend network (Ma et al., 2017). The network would recommend and enhance the utilization of preventive services such as regular screening for digestive cancer and reduce barriers to access screening services. Organizational-level interventions include the provision of inter-professional care to decrease the cost of cancer screening and treatment, as it would eliminate repetitive care across the HCPs (Kennedy et al., 2021).

Literature Review Related to Key Variables

Individuals' decisions to comply with health measures linked with digestive cancer screening, such as blood stool testing, sigmoidoscopy, and colonoscopy, are

influenced by their demographic, socioeconomic, and health behaviors. As a result, people's actions and behaviors are influenced by SEM constructions when it comes to digestive cancer screening (Ma et al., 2017). People's perception of the disease's severity and susceptibility is directly linked to demographic parameters such as age and gender (Lau et al., 2020). Screening methods are easier to assess when people's socioeconomic standing is higher. A person's motivation and belief in one's abilities to get screened are influenced by their behavioral habits and expectations.

Psychosocial Factors and Digestive Cancer Screening

Psychosocial factors involve those related to knowledge about digestive cancer and screening, risk perception of digestive cancer, and perceived barriers and benefits. For instance, Chen et al. (2018) conducted a qualitative study that revealed a significant relationship between psychological factors that affect the perception of men and women and digestive cancer screening. According to Chen et al., a person's immune and endocrine systems can be affected by psychosocial factors, including personality traits and depression, which could impact cancer incidence and survival. The research was population-based and relied upon clinical databases. Their results also underpinned that cancer risk and prognosis are closely linked, but the exact nature of the link is still a mystery. Chen et al. concluded that personality traits and depression are not directly linked to cancer and cancer survival. In another qualitative study by Pappadis et al. (2018) on psychological distress among cancer patients, the findings revealed that there is a shared unhealthy lifestyle in addition to the emotional anguish caused by caring for others and grieving. Pappadis et al. also revealed that cancer patients' companions incur

substantial psychosocial difficulties. Pappadis et al. also proved that depression in male spouses of women with breast cancer was examined using data collected from the entire country's population. Both studies provide credence to the idea that psychosocial factors involve those related to knowledge about digestive cancer and screening, risk perception of digestive cancer, and perceived barriers and benefits (Chen et al., 2018; Pappadis et al., 2018).

Age and Digestive Cancer Screening

Age does not just affect the probability of cancer diagnosis but influences the type of and when screening should be done. Janssen et al. (2019) found that most cancer diagnoses and fatalities occur in the 65-plus age group. Janssen et al. indicated that this statistic accounts for around 60% of all cancer incidence and 70% of all cancer deaths in the United States. Their findings also reinforced that there has been a rise in the incidence of age-related diseases like cancer and an increase in lifespan. Supporting these conclusions, Kotwal and Walter (2020) noted that as long as people are aging, the severity of the digestive cancer crisis is also predicted to expand, with older persons bearing most of the added burden. In another quantitative study, Nickel et al. (2021) found that in an endeavor to handle these challenges proactively, greater attention is being dedicated to screening older persons for cancer. According to Nickel et al., few screening trials have included people over 70 year's old, even though significant evidence justifies screening adults in their fifth and sixth years of adulthood for colorectal, breast, and cervical malignancies. It was, therefore, necessary to generalize these findings to older persons when formulating the study's screening criteria. Due to

the diversity of the aging population, however, such extrapolations are challenging to make (De Santis et al., 2017; Monticciolo et al., 2017; Siegel et al., 2019). From the reviewed literature, it is plausible to affirm that the life expectancy, quantity and degree of comorbidities, functional status deficits, and treatment preferences of the elderly population affect the preference for digestive cancer screening.

An individual age dictates the cancer screening approach to be adopted. E. Y. Lee et al. (2015) revealed that digestive system cancer screening guidelines for the elderly already exist, and they detail the geriatric problems to consider when making screening suggestions for older patients. Because individuals' health status varies considerably, even among persons of the same age group, it is difficult to evaluate whether cancer screenings for the elderly are acceptable (Kotwal & Walter, 2020). Age-related parameters support and contraindicate the use of cancer screening in senior patients (Janssen et al., 2019; Kotwal & Walter, 2020). Another longitudinal study by Obermair et al. (2018) that examined life expectancy influence on cancer screening revealed that lower life expectancy is associated with a strong belief that cancer screening is beneficial. Obermair et al. noted that people with lower life expectancies believe that such screening comes with peace of mind or better quality of life are some of the factors that generally favor screening. The findings of these studies indicate that age is a significant predictor of the digestive cancer screening approach (Kotwal & Walter, 2020; Obermair et al., 2018).

The risks of consequences from screening, diagnostics, and therapy of patients with digestive system cancer increase with age (Kotwal & Walter, 2020; Monticciolo et

al., 2017). Monticciolo et al. conducted a systematic analysis of literature examining patients' expected life expectancy and its connection to cancer screening perceptions. According to the outcomes of the research, elderly patients are unlikely to see a survival benefit from cancer screening. Hersch et al. (2017) discovered that people aged above 65 years may have little or no perceived benefits to digestive system cancer screening. In a different study, Nee et al. (2020) noted that physicians should vigorously examine age as a factor when recommending the type of digestive cancer screening. S. Lee et al. (2018) affirmed that a 75-year peak in digestive cancer screening uptake was reported in the United States, and screening rates began to decline at the 80- to 85-year mark. Because Medicare covers all recommended screening methods for those over 65, this finding may be partly explained by the fact that Medicare eliminates the financial barrier to screening (Nee et al., 2020). Orji et al. (2020) also reported similar results in their randomized trial study in Italy. The reviewed literature revealed that when it comes to digestive cancer screening, the risks of consequences increase with age.

Sex and Digestive System Cancer Screening

Studies have indicated that men and women have varied levels of digestive system cancer screening acceptance (Monticciolo et al., 2017; Zhang et al., 2021). De Santis et al. (2017) revealed that men are more likely than women to participate in stomach cancer screenings. De Santis et al. also discovered variances based on the geographic location of the participants and the screening approach employed. These findings were in tandem with the results of another study by Monticciolo et al. (2017) about the factors influencing endoscopy intake in men and women. Monticciolo et al.

highlighted that women were more likely to participate in screening programs based on FOBTs in Australia and Europe. Kotwal and Walter's (2020) used the BRFSS to show that men are more likely than women to get a digestive system cancer screening test. Kotwal and Walter (2020) also affirmed that endoscopy is more commonly used by men than women. The overall deduction from the reviewed studies is that gender does not significantly influence the propensity or frequency of digestive system cancer screening (Kotwal & Walter, 2020; Monticciolo et al., 2017). The impact of gender on screening participation has been observed with varying findings.

Married people have been demonstrated to be more receptive to suggestions for better lifestyles (Nee et al. 2020). Married couples are more eager to participate in screening programs and showed more excellent attendance rates of diagnosis than unmarried couples, regardless of age and educational level (Hersch et al., 2017; Weissfeld et al., 2019). Increased screening attendance rates were achieved by inviting both couples. These studies indicate the role of marriage in influencing the rate of digestive system cancer screening (Hersch et al., 2017; Weissfeld et al., 2019).

Healthcare System and Provider Factors

Physicians' perceptions of screening tests' risks and benefits also determine the type of digestive system cancer screening they offer or suggest. A random-digit-dial survey by Nickel et al. (2021) linked routine screening for intestinal cancer under the direction of a doctor. The random-digit-dial study by Nickel et al. in the United States targeted 1002 physicians under 50. Nickel et al. (2021) ensured that clinician recommendations were the most significant independent prognostic factor of up-to-date

screening. This guarantee was for digestive cancer in participants under or over 65 (OR 13.4, CI 95 percent (7.2–25), and OR 12.4, CI 95 percent. In another quantitative study by Housten et al. (2018) examining FOBT and colonoscopy screenings by physicians, 95% of doctors recommended screening colonoscopy or FOBT. They categorized both tests as less risky. Housten et al. asked patients with average risk and no symptoms to participate. FOBT and colonoscopy were the most often recommended tests, with approval for both coming in at 56 percent. Fewer than 10 percent of the physicians recommended other tests (Housten et al., 2018). Different studies have also shown that most patients prefer distinct digestive system cancer screening methods (Janssen et al., 2019; Nee et al., 2020). The findings from the reviewed studies reveal that practitioners' perceptions and interactions impact their willingness to suggest a form(s) of routine screening tests (Janssen et al., 2019; Nee et al., 2020).

Patients' perceptions and interactions with different approaches to digestive system screening also influence the possibility of early detection. Oliveira Leite et al. (2019) revealed that the average-risk group prefers noninvasive testing for intestinal cancer compared to the family-risk population. Leite et al. also underpinned that screening may be hindered by the clinician's desire for more invasive tests. Supporting these findings, Roy et al. (2020) suggested that the general public may more widely accept immunochemical FOBT than traditional blood tests. This qualitative study by Roy et al. offered patients various options, and highlighting their advantages and disadvantages is the most effective way to increase participation rates. The results also revealed that digestive system cancer screening prevalence and physician prescription

had been linked to health system characteristics. The deduction from the two studies, therefore, is that patients' perceptions and interactions with different screening options impact their willingness to suggest a form (s) of routine screening tests.

Regular checkups as a health behavior have also been noted as one of the factors influencing screening rates. According to an explanatory case study by Schoenborn et al. (2020), comorbidity impacts screening behavior. Based on this explanation Kerr et al. (2017) advised that individual diseases' effects be examined in more detail. According to Schoenborn et al. (2020), regular checkups and having a regular healthcare provider have been linked to increased screening uptake. Another multivariate analysis by Schoenborn et al. examined 61.068 persons aged 50 across the United States. Schoenborn et al. revealed that the most important predictor of current digestive system cancer screening was the route of a doctor's visit in the previous year (OR 3.5, 95 percent CI (3.2–3.8). This finding was irrespective of the screening method employed. Schoenborn et al. also revealed that prostate-specific antigen or electronic rectal exam screening was found to have the most significant independent effect on adherence to digestive system cancer screening. This finding was also irrespective of the approach used for screening (OR 3.51, CI 95 percent 3.30–3.73) in a large survey study of male participants (Kerr et al., 2017). Finally, Kerr et al. highlighted that adherence to screening for cervical and breast cancer in women under 50 is a significant independent prognostic factor of screening for digestive cancer in the BRFSS. Both studies determined that getting screened for digestive cancer is linked to other cancers, such as prostate and breast cancer in men and women, in specific research (Kerr et al., 2017; Schoenborn et al., 2019).

Race and Digestive System Cancer Screening

Cancer is more prevalent amongst African Americans in the United States than Whites. For example, a quantitative study by Tran et al. (2021) revealed that Black women in the United States are diagnosed with digestive cancer more frequently than any other type of cancer, excluding skin cancers. Tran et al. more specifically stated that 300,250 new instances of invasive digestive cancer and 50,000 new cases of ductal carcinoma in situ will be detected by 2021. Wang and Wei (2019) revealed comparable results stating that by 2021, the death toll from digestive cancer will reach 43,600, according to current estimates. Wang and Wei (2019) also highlighted that digestive cancer mortality rates for African American women are significantly higher than for white women. Similarly, they suggested that digestive cancer mortality rates for Black women are around 40% higher than for White women. As a result, Black women are twice as likely to be diagnosed with digestive cancer as White women and women from other cultural and racial origins. From the findings of the reviewed studies, it is plausible to affirm that race is a significant predictor of the rate of digestive cancer screening.

A person's or a healthcare provider's recognition of a medical problem that necessitates medical treatment, such as a cancer diagnosis or family history, are needed determinants. A systematic review and meta-analysis by Sung et al. (2019) revealed that Black women have not previously been studied concerning breast cancer screening rates, which is why the Andersen model is useful. According to Sung et al., it is especially true of African American women, who are more liable to undergo societal and institutional hurdles that raise their likelihood of being uninsured and low-income compared to White

women. Wang et al. (2020) supported these findings, explaining that even if screenings for breast cancer are provided free of charge, low-income women may encounter obstacles to receiving them, such as a lack of childcare to allow for a doctor's appointment or a lack of transport. From the reviewed literature, it is evident that need factors may either drive or attenuate the link between facilitating and perpetuating factors and screening adherence.

Ethnicity/Location and Digestive System Cancer Screening

Digestive system cancer screening rates vary across ethnic groups (McNeill et al., 2018; Orji et al., 2020). Orji et al. (2020) revealed that ethnic minorities frequently have lower screening rates than their white counterparts. Similarly, Nguyen et al. (2019) conducted a study of minority ethnic communities and their levels of participation in cancer screening, finding that they have lower participation rates if they have lower incomes and educational levels. Nguyen et al. (2019) also underpinned that these considerations may be more relevant in nations where health insurance is not universal. McNeill et al. (2018) affirmed the need to establish specialized intervention techniques for these populations; there is a need to know more about the hurdles they face when seeking screening services. McNeill et al. revealed that despite the higher incidence and mortality rates of digestive cancer among African Americans compared to the white populace, these data do not support these findings. The specific statistics found were 20 percent and 45 percent higher incidence and mortality rates of digestive cancer, respectively, amongst Black compared to Whites (McNeill et al., 2018). In this regard, minority groups in the United States, such as African Americans and Hispanics, have

repeatedly shown poorer digestive cancer screening uptake. Racial disparity is a predominant factor influencing the rates of digestive system cancer screening.

Education and Digestive System Cancer Screening

Education is a significant predictor of participation in gastric cancer screening (Chang et al., 2015; Gabel et al., 2018). Chang et al. (2015) noted that lower education levels are associated with reduced participation rates in cancer screening. The main reason for this is low health literacy (Chang et al., 2015). Gabel et al. (2018) indicated that the decision to undergo screening is achieved if one has access to information. Still, materials on screening for cancer screening are neither read nor understood by individuals with low health literacy levels, which is linked with low educational attainment (Chang et al., 2015). A higher education level increases one's understanding of health materials, which increases their knowledge of the subject and influences their decision to undergo screening (Gabel et al., 2018). According to Raghupathi and Raghupathi (2020), education is linked to behaviors such as increased attention to preventative care. Having less than a high school education has also been a barrier to screening, regardless of the screening approach utilized in additional research (Hersch et al., 2017; Moss et al., 2020). In a European study of 953 average-risk participants conducted by Kotwal and Schonberg (2017), it was noted that those with a high education degree were four times more likely to use up-to-date screening for intestinal cancer. Digestive cancer screening is part of preventative care; therefore, individuals with higher education are more likely to undergo screening because they recognize the

importance of preventive care (Kotwal & Schonberg, 2017). A person's education level will influence their likelihood of undergoing gastric cancer screening.

Employment and Digestive System Cancer Screening

Stanley et al. (2017) reported that poorer socioeconomic position (wage, unemployment, level of education, and domicile) is associated with reduced screening participation. This element is more relevant when the government does not provide healthcare (Nee et al., 2020; Stanley et al., 2017). Those with lower household incomes, no medical coverage, or unemployed have lower screening rates for intestinal cancer than those with higher incomes (Kotwal & Walter, 2020). Therefore, income, employment status, and medical coverage influence digestive system cancer screening. These findings underpin that lack of access to healthcare is not the only hurdle faced by various countries in cancer screenings, including racial-related challenges.

Type of employment is a great predictor of participation in digestive system cancer screening. Kim et al. (2016) revealed that part-time workers are less likely to undergo cancer screening than full-time workers. In the Kim et al. study, cancer screening was offered without costs, meaning that lack of funds was not the limiting factor. Kim et al. noted that part-time workers had low medical utilization because their jobs were unstable, and they were less likely to ask for time off to undergo screening. Part-time workers fear losing their job if they take time off because they lack job security compared to full-time workers, which causes disparities experienced in participation (Kim et al., 2016). Shim et al. (2019) indicated that precarious workers such as outsourced or temporary employees and self-employed individuals are less likely to

participate in cancer screening than regular and wage workers, demonstrating that employment condition highly influences one's decision to undergo screening. Therefore, individuals with stable jobs are more likely to undergo screening than those with unstable jobs, even when screening is free.

Income and Digestive System Cancer Screening

A person's income level often influences their likelihood of partaking in gastric cancer screening. Chang et al. (2015) noted that lower socioeconomic status, represented by low income, is linked with reduced participation rates in cancer screening. Low participation rates among low-income individuals may be due to insufficient funds to undergo the procedure (Chang et al., 2015). Cancer screening is an expensive endeavor, which is why most countries often implement national programs for mass screening to eliminate the enormous process costs (Chang et al., 2015). S. Lee et al. (2018) noted that income differences affected the degree of participation in cancer screening programs in Korea. It indicates that even when screening costs are reduced for the general population, income level still plays a significant role in participation in the process. An individual's income level is an excellent determinant in their participation in screening because low-income individuals are reported to have low participation rates.

Physical Activity and Digestive System Cancer Screening

Studies indicate varied findings regarding the relationship between engaging in physical activities and partaking in digestive system cancer screening is highly complicated (S. Lee et al., 2018; Tucker et al., 2018). Tucker et al. noted that individuals who partake in physical exercises are less likely to participate in cancer screening if it is

recommended by a doctor who notes some symptoms. Tucker et al. further linked the refusal to engage in cancer screening to the belief that physical activity helps prevent cancer and that there is no need for screening. Supporting these findings, S. Lee et al. (2018) noted that physical activity provides an individual with a false sense of security, which bars them from partaking in cancer screening. In a different study, Muus et al. (2012) indicated that cancer screening is more prevalent in those that engage in physical activity. Muus et al. further stated that inactive individuals are less health-conscious and are therefore not likely to engage in regular cancer screening compared to active people. From the findings of these three studies, it is plausible to affirm that it is difficult to determine whether physical activity encourages cancer screening or discourages it by giving people a false sense of security.

Tobacco Use and Digestive System Cancer Screening

Tobacco use influences an individual's decision to partake in digestive cancer screening. Eng et al. (2020) highlighted an inverse relationship between active smoking and adherence to cancer screening recommendations. Therefore, actively smoking individuals are less likely to undergo cancer screening (Eng et al., 2020). Eng et al. further indicated that former smokers are more likely to participate in cancer screening than never smokers because they are health conscious. Individuals who quit smoking because of concern for their health are more likely to engage in health behaviors such as seeking preventative care (Eng et al., 2020). Hama et al. (2016) noted that participation rates in cancer screening are lower in current smokers than in noncurrent smokers. Therefore, individuals who are actively smoking are less health-conscious than those who

are not (S. Lee et al., 2018). Tobacco use lowers the possibility of an individual engaging in cancer screening, but a history of tobacco use increases the likelihood of undergoing cancer screening.

Healthcare Coverage and Digestive System Cancer Screening

There exist disparities in cancer screening among adults caused by health insurance status and type of insurance. Health insurance removes the financial barrier experienced by most people who may want to undergo screening (Shim et al., 2019). Shim et al. noted that screening for biennial gastric cancer for individuals above 40 years is free for those enrolled in Medicaid and beneficiaries of National Health Insurance (NHI) for low-income earners and inexpensive for high-income beneficiaries of NHI. Therefore, those without coverage may find it hard to undergo screening because they will have to pay a lot of money (Shim et al., 2019). Kim et al. (2016) further stated that individuals without private health insurance are less likely to partake in cancer screening. Private insurance is linked with increased health consciousness, which accounts for the increasing participation in cancer screening (Kim et al., 2016). Improving participation in cancer screening is possible with increased healthcare overage.

Sigmoidoscopy and Digestive System Cancer Screening

The first factor influencing the use of sigmoidoscopy for digestive system cancer screening is whether the screening procedure is an outpatient or inpatient activity (Kim et al., 2016). Outpatient sigmoidoscopy is the most common application of this screening (Kim et al., 2016). Getting ready for the screening is simple (Shim et al., 2019), before the treatment, patients are asked to abstain from food and drink after midnight the night

before. In a study by Senore et al. (2021) aiming to examine the side effects of sigmoidoscopy, the findings revealed that it is often conducted 2–4 hours before the surgery following a self-application of one or two enemas. Senore et al. also highlighted that it is recommended in EU standards that patients administer an enema at home 2 hours before an endoscopy. It is also allowed for patients to administer the enema in-suite in the endoscopic suite if it is practicable for the organization where the examination is being held (Senore et al., 2021). Another study by Fracchia et al. (2020) indicated that patients could attend the operation without sedation and return to work immediately following the procedure. Fracchia et al. also revealed that endoscopists commonly use a greased gloved finger to do a digital rectal examination, which is not always necessary. Based on this approach, the finger is introduced into the rectum and advanced into the colon to a depth of roughly 60 centimeters, where it may reach the splenic flexure's lower part of the abdomen (Fracchia et al., 2020). Therefore, the form of patient admission or procedure (either inpatient or outpatient services) during digestive system cancer screening is also a determinant of whether sigmoidoscopy is used.

The severity of digestive cancer symptoms could also determine whether sigmoidoscopy is applied in the examination of the colon, as it has technology able to determine the exact position of the cancerous cells in the colon (Weissfeld et al., 2019). According to Shim et al. (2019), if sigmoidoscopy is required, the Endoscopist must employ magnetic endoscopic imaging to pinpoint the cancer cells. Sigmoidoscopy has reached only 29% of instances and failed to cross the sigmoid-descending colon junction in more than 60% of tests (Shim et al., 2019). This finding explains why a more thorough

examination is typically conducted during the withdrawal phase. Atkin et al. (2020) revealed that, as opposed to colonoscopy, sigmoidoscopy's patient time commitment was 3–4 hours. Atkin et al. stated that gastroenterologists and colorectal specialists commonly perform sigmoidoscopy. Endoscopists' competence varies widely, though adenoma detection rates achieved by nonphysicians are comparable to those reached by physicians. The reviewed literature justifies that the severity of digestive cancer symptoms could also determine whether sigmoidoscopy is applied in the colon examination.

Most physicians' general perception indicates that sigmoidoscopy is the safest digestive system cancer screening technique (Hawley et al., 2019). Most physicians, therefore, have the propensity to settle for its use in most cases (Hawley et al., 2019). According to a qualitative study by Hawley et al. (2019) on the risk of sigmoidoscopy, it is evident that when conducted by trained professionals, sigmoidoscopy is relatively risk-free and seldom results in significant consequences. Pain, cardiac arrhythmias, bleeding, bacteremia, and intestinal perforation are some of the complications documented in the literature (Hawley et al., 2019). Hawley et al. also revealed that for 109,534 sigmoidoscopy tests conducted between 1994 and 1996, only 24 individuals had significant complications, which translates to 21.9 out of 100,000. Seven (6.4 out of 100,000) were significant problems (two perforations, two diverticulitis, two lower gastrointestinal bleeding, and one unexplained colitis). There was no increased risk of myocardial infarction (Hawley et al., 2019). Montaño et al. (2020), in a similar study, also concluded that common problems were also found in large, randomized trials that investigated the impact on cancer incidence rates of Sigmoidoscopy screenings. Montaño

et al. determined that there were only three cases of perforation out of the total of 107,236 sigmoidoscopy examinations (2.8 perforations out of every 100,000 sigmoidoscopy screenings) in the prostate, lung, and colorectal, and ovarian cancer screening trial. These studies underscore that because sigmoidoscopy is the safest of all cancer screening techniques, it is primarily settled on by most physicians (Hawley et al., 2019; Montaño et al., 2020).

Colonoscopy and Digestive System Cancer Screening

Compared to sigmoidoscopy, colonoscopy has mainly been associated with discomfort and dissatisfaction amongst patients who go for cancer screening (Graser et al., 2019; Lieberman & Weiss, 2018). In a multicenter study by Lieberman and Weiss (2018), it was established that on a 10-point visual analog scale, most patients reported an acceptable level of discomfort during colonoscopy, with a median of 3 and an interquartile range of 2 to 5. At the univariate level, the researchers also found that the lesser the discomfort during colonoscopy, the better the bowel cleansing (Lieberman & Weiss, 2018). More specifically, Lieberman and Weiss (2018) revealed that the colonoscopy participants who were more knowledgeable about the operation and reported the lowest procedure-related anxiety were more likely to have poorer scores on the VAS scale, which indicates greater comfort during the procedure. Another multivariate study by Graser et al. (2019) revealed that patients in the private practice reported less pain during colonoscopy than those at the teaching hospital. The findings indicated that comfort during colonoscopy was correlated with age, contentment with information about colonoscopy, preprocedure anxiety, and endoscopy center (Graser et al., 2019). Patient

satisfaction with preprocedure information was also associated with a reduced VAS pain scores (Graser et al., 2019). Lower VAS scores were more likely associated with lower levels of self-reported anxiety and exams done in a private center (Graser et al., 2019). The findings from these two studies reveal that discomfort associated with colonoscopy is a determinant of the decision by patients and physicians to undergo and perform digestive system cancer screening, respectively (Graser et al., 2019; Lieberman & Weiss, 2018).

Patient privacy during digestive cancer screening is also a key determinant of screening rates. Kahi et al. (2019) explained that private practice colonoscopy might be more relaxing and fulfilling in their qualitative study. Still, bowel prep and insufflation might significantly impact the quality of the bowel prep and insufflation approach (Kahi et al., 2019). Kahi et al. similarly found that better prep scores for patients assessed in total care led to more thorough examinations with CO2 insufflation. Singh et al. (2017) revealed that colonic cleanliness reduces the time and effort required to check the colon. The additional procedures needed to evaluate an inadequately prepared colon increase the patient's discomfort. According to Singh et al., communication between health professionals and patients must be improved because bowel prep quality is directly related to how well it is adhered to. Singh et al. found that endoscopic performance was also similar amongst the centers, based on standard quality measures such as intubation rates, adenoma detection, and complications rates, which are not affected by center-to-center variation. Patients' satisfaction levels with the insufflation procedure have been linked to the technique's success (Graser et al., 2019). These studies additionally solidify the argument that displeases associated with colonoscopy is a determinant of the decision

by patients and physicians to undergo and perform digestive system cancer screening, respectively (Graser et al., 2019; Singh et al., 2017).

Blood Stool Test and Digestive System Cancer Screening

Diagnosis and therapy are both delayed as a result of improper screening (Laiyemo et al., 2019). According to a study by Pohl and Robertson (2020), colon cancer screening with fecal occult blood testing (FOBT) is one of many options available, and it is safe to use on those who are not currently experiencing any symptoms. Laiyemo et al. (2019) also revealed that screening helps in the early diagnosis of cancer by assisting patients in selecting follow-up tests such as colonoscopies for further investigation. Laiyemo et al. also contributed to the literature on blood testing in digestive system cancer screening by explaining that high-risk or symptomatic individuals do not require FOBT; instead, they should be sent to a gastroenterologist immediately for further evaluation and treatment. The study also highlighted that in the past, FOBT has been abused or given inappropriately, which has led to increased healthcare costs and more extended hospital stays (Laiyemo et al., 2019). Because of this, it should only be carried out when necessary (Singh et al., 2017). A stool blood test is thus a fast option for getting digestive cancer tested, and this speed constitutes one of the factors that patients consider when choosing a screening approach.

The use of stool blood test as an alternative digestive system cancer screening approach is also influenced by the age of the persons to be examined (Hawley et al., 2019). Studies have also shown that colorectal cancer screening using FOBT is recommended by the U.S. Preventative Services Task Force for anyone aged 50 to 75

years (Deng et al., 2018; Graser et al., 2019). Deng et al. (2018) also revealed in their study on the factors that affect participation in FOBT that in Blacks, the American College of Gastroenterology recommends starting screening at the age of 45. Deng et al. (2018) also revealed that pituitary tumors and colorectal cancer screening should begin at 35—10 years earlier than the earliest diagnosed relative in people with first-degree relatives with advanced adenomas or cancers. Ferracin et al. (2018) explained that first-degree relatives with advanced adenomas or colon cancer after age 60 are eligible for screening starting at 50. The fecal immunochemical test (FIT) has been recommended to replace the previous guaiac-based fecal occult testing because of its higher sensitivity and specificity (Ferracin et al., 2018). Ferracin et al. also compared FIT to FOBT, indicating that FIT was more effective at detecting colorectal cancer because it targets human globin, commonly detected in lower intestinal bleeding. In addition, it does not require any dietary changes, which has increased patient adherence. These two studies underpin the fact that fecal blood test as an alternative digestive system cancer screening approach is also influenced by the age of the persons to be examined (Deng et al., 2018; Ferracin et al., 2018).

The Cologuard test is becoming increasingly common when it comes to efforts made to screen individuals with issues related to digestive system. According to Oh and Joo (2020), this test encompasses looking for DNA changes that could be indicative of the presence of colon cancer or precancerous polyps. As Rutledge et al. (2021) indicated, polyps are growths on the colon's surface that may develop into cancer. There is a reason behind the increasing prevalence of this particular test. Gudibanda and Guda, 2021) noted

that the popularity of Cologuard has been on the increase because it is far less invasive and more convenient than the traditional colonoscopy test. Particularly, the test is targeted at pinpointing the existence of colon cancer by enabling practitioners to look into traces of blood in human stool (Mulat et al., 2019).

It is also important to note that Cologuard was developed to cater for individuals that fall within a particular age group. For instance, Oh and Joo (2020) noted that the test intended to screen adults 45 years of age and older who are at average risk for colorectal cancer by detecting certain DNA markers and blood in the stool. Moreover, certain individuals that fall within this age group have been excluded from Cologuard. According to Rutledge et al. (2021), it is advocated that individuals should not be subjected to the test if they have suffered from, or are currently suffering from adenomas, inflammatory bowel conditions, or have a family history that is marked by colorectal cancer conditions. Additionally, it is critical to note that Cologuard is not a replacement for colonoscopy in high-risk patients. Cologuard performance in adult's ages 45–49 is estimated based on a large clinical study of patients 50 and older (Li et al., 2019). Oh and Joo (2020) also noted that Cologuard performance in repeat testing has not been evaluated, which would explain why physicians are reluctant in using the test.

Scholars have indicated several reasons why Cologuard test results should be interpreted with caution. For instance, Varda et al. (2021) noted that a positive test result does not confirm the presence of cancer stating that patients with a positive test result should be referred for colonoscopy. Moreover, Mulat et al. (2019) cited that a negative test result does not confirm the absence of cancer, stating that patients with a negative test

result should discuss with their doctor when they need to be tested again. Another reason for careful interpretation is that false positives and false negative results can occur. Substantiating the reliability of this assertion, Ahluwalia et al. (2021) observed that in a clinical study, 13% of people without cancer received a positive result (i.e., false positive) and 8% of people with cancer received a negative result (i.e., false negative).

The rationale behind the use of Cologuard in digestive system cancer screening is closely linked to European guidelines that recommend screening for CRC using the FIT, with follow-up colonoscopies for individuals with positive test results (Gudibanda & Guda, 2021). More than half of participants with positive results from the FIT are not found to have advanced neoplasia in the colonoscopy examination (Li & Yuan, 2019; Varda et al., 2021). Moreover, fecal occult blood might also come from the upper gastrointestinal (GI) tract, which makes it critical to consider the Cologuard test to detect upper GI cancers (Mulat et al., 2019; Nasser, 2020).

As much as FOBT has been shown as an ideal screening for immediate digestive cancer examination, it also has drawbacks (Doubeni et al., 2020; Ferracin et al., 2018). Doubeni et al. (2020) in their expert opinion about FOBT, revealed that the process requires prior medication and dietary restrictions. As a precautionary measure, several limits have been put in place. Participants in the study of Doubeni et al. were also advised to avoid certain drugs for seven days before testing to reduce the risk of receiving a false-positive result. This recommendation was based on unfractionated or low molecular-weight heparin (acetylsalicylic acid), clopidogrel, nonsteroidal anti-inflammatory steroids (NSAIDs), warfarin, and selective serotonin reuptake inhibitors (SSRIs) as a few

examples of pharmaceuticals on the list. Another research by Ferracin et al. (2018), involving the study of FOBT in cancer screening, used a retrospective approach. Ferracin et al. observed that 10.9 percent of those with positive fecal blood testing and no prior restriction on diet or medication had routine endoscopic examinations following the research. Ferracin et al. also revealed that the consumption of certain foods should be avoided for three days before blood tests to prevent false-positive results. Raw turnips, parsnips, broccoli, cantaloupe, cauliflower, parsnips, and red radishes have all been linked to false-positive results, as have red or rare meats and raw fruits and vegetables (Ferracin et al., 2018). Ascorbic acid (vitamin C) over 250mg/day is also known to cause false-negative results (Ferracin et al., 2018). From the study findings, it is plausible to affirm that although FOBT has the advantage of time and costs, it has adverse effects that make it less effective and preferred over sigmoidoscopy and colonoscopy (Ferracin et al., 2018).

To deal with the risks associated with conventional colonoscopy, studies in the field of cancer screening enabled the development of virtual colonoscopy (Taylor et al., 2017; Zalis et al., 2019). This method is significant, given that it helps to get rid of polyps (Taylor et al., 2017). According to a survey by Taylor et al., solid scientific evidence must be backed up for one to make a case for virtual colonoscopy over traditional colon screening. As a primary preventative measure, the study explains the removal of significant or precancerous adenomatous polyps is a major advantage of colon screenings (Taylor et al., 2017). Another related cross-sectional study by Zalis et al. (2019) revealed that polyp is often used in colon cancer screening initiatives with a threatening tone when

referring to colon polyps. According to Zalis et al., a polyp is merely a lump or swelling, and polyps can be discovered in 50% of adults at 50 years old and 70% by 70 years old. According to histologic testing, more than half of the "polyps" found in the average adult colon are just hyperplastic normal tissue (Taylor et al., 2017). Therefore, the options around colonoscopy help override the fact that conventional colonoscopy is unreliable compared to sigmoidoscopy or blood tests.

Zalis et al. (2019) affirmed that to prevent colon cancer, people are led to believe that any colon polyp should be surgically removed. In a qualitative study by Yee et al. (2018), the investigators found that polyps less than 1.0 cm in diameter and those with villous components are only a small percentage of polyps that represent a risk of malignant transformation, according to endoscopists who have recently begun acknowledging this. Yee et al. concluded that advanced adenoma was coined to denote this subset of tumors as a group. A different study by Laks et al. (2017) revealed conflicting reports on the percentage of people with asymptomatic screenings who have an advanced adenoma; however, the numbers rarely go higher than 10%. The discussions on the study summarize the findings, stating that the numbers imply that 40% of patients with tubular adenomatous polyps have nothing to be concerned about (Laks et al., 2017). An acceptable size goal threshold is a crucial strategy, whether conventional colonoscopy or virtual colonoscopy for colon cancer screening.

Definitions

Blood stool test. A cancer screening is done by checking for hidden blood in the stool and abnormal DNA linked to colon polyps and colon cancer (Joseph et al., 2018). This test is usually done at home and the sample mailed to the lab.

Colonoscopy: Colonoscopy is a diagnostic test involving checking an entire colon using a flexible tube with a camera (Bevan & Rutter, 2018).

Demographic factors: The individual characteristics such as age, sex, race/ethnicity, and marital status. Men are at a higher risk of developing digestive system cancer, and the risk increase with age (White et al., 2018).

Digestive system: The digestive system is a 25-foot-long pathway of multiple organs extending from the mouth to the anus (Bevan & Rutter, 2018).

Gastrointestinal Cancer: Gastrointestinal cancer affects any organ within the digestive system, including the liver, esophagus, pancreas, colon, and stomach (Wang & Wei, 2019).

Health behaviors include lifestyle choices such as physical activity, tobacco use, and healthcare coverage. Unhealthy behaviors constitute a significant risk factor for gastrointestinal cancers (Ekmekcioglu et al., 2018)

Socioeconomic status: These are social and economic, including education level, employment status, and income level. Hovanec et al. (2018) found that SES is a risk factor for lung cancer.

Sigmoidoscopy: Sigmoidoscopy is a screening test for rectal and colon cancer that involves checking inside the sigmoid colon for precancerous polyps for removal before

they develop into colon cancer. The test is also used to detect rectal cancer at early stages for early treatment (Bevan & Rutter, 2018).

Assumptions

The first assumption was that the research topic is essential because it provides insights into individual demographic factors, behavioral factors, and SES that influence digestive system cancer screening. Secondly, the researcher assumed that Texas BRFSS contains all the data and information needed for the study. These include data on demographic variables, health behaviors, and socioeconomic status of the study participants (Pramesh & Aggarwal, 2017). The assumption of linearity was also relevant because the logistic regression and Pearson correlation, as this statistical test was applied to test the relationship between the dependent and independent variables.

Scope and Delimitations

The current researcher aimed to examine factors influencing digestive system cancer screening. The scope of the study was limited to the effects of demographic, behavioral, and SES on blood stool tests, sigmoidoscopy, and colonoscopy cancer screening methods. The geographical scope was the state of Texas, particularly the BRFSS archives as the research data source. The delimitations of the study are the choice of a quantitative correlation approach to assess the influence of demographic, behavioral, and SES on cancer screening. Even though a qualitative approach would have provided deeper insights into the study phenomenon, it was deemed irrelevant in testing the research hypothesis.

Limitations

The key limitation of this study is that the research data were from secondary sources. As personal health records are confidential, permission was sought from the Texas state administration to access and retrieve data from BRFSS archives. Limitations of secondary data comprise missing details and reusing existing datasets from past studies. Even though it is vital to be mindful of ethical concerns and weaknesses of utilizing secondary data, following the minimum standards of preparing BRFSS data for analysis was significant to the quality of the current study.

Significance

The outcomes of this study have positive implications for the practice of cancer screening, academic research, policy, and society in general. The study outcomes provided scientific evidence-based information concerning the individual-level predictors associated with digestive system cancer screening behaviors in academics and research. There is limited literature on the predictors of digestive system cancer screening (Xie et al., 2021; Zhang et al., 2021). Therefore, the current study added to the knowledge base on the predictors of digestive system cancer incidence and mortality, which can benefit future scholars and illustrate new concepts that can eventually benefit the control and eradication of digestive system cancer. The latest evidence holds potential for positive social change. The evidence enhancement will likely lead to improved training programs for practitioners in digestive system cancer that will focus on incorporating community members in management approaches. The early detection and treatment of digestive

system cancer can generate better patient outcomes and enhance the quality of life of people and the community.

Summary

In summary, screening remains relatively low for all U.S. population groups thus increasing the risk of related comorbidities and mortality. In this chapter, the researcher explored the topic by discussing the background of the research and presenting research questions and hypotheses that were tested in the study. It is acknowledged that treatment for digestive system cancer is effective if detected early; unfortunately, there remains a challenge (Lin et al., 2021). The main themes identified in the works of literature include the high prevalence and the rising case of digestive cancer screening, geographic, demographic, and social economic disparities in the incidences and mortality rate from digestive system cancers. Scholars have noted that barriers and benefits of digestive system cancer screening vary depending on various demographic factors such as race and ethnicity, age, and gender (Gabel et al., 2018; Ji et al., 2020; Kotwal & Walter, 2020; Monticciolo et al., 2017; Nee et al. 2020; Nickel et al., 2021; Orji et al., 2020; Schoenborn et al., 2020; Tran et al., 2021). Previous scholars have acknowledged the role of the ecological model of health behavior in influencing the decision on the uptake of cancer screening including digestive cancer screening.

At the individual level, psychosocial factors related to knowledge about digestive cancer and screening, personality traits, risk perception of digestive cancer, and perceived barriers and benefits influence the decision to take cancer screening. Institutional or organizational, community, and public policy level factors were critical influencers of

cancer screening decisions. The risk and choice of screening tests, including sigmoidoscopy, colonoscopy, and blood stool test, were some of the major themes. Available studies have explored various factors influencing the uptake of various types of cancer screening by the population (Ji et al., 2020; Orji et al., 2020). None of these scholars, however, explored the influence of demographic factors, behavioral factors, and SES on digestive system cancer screening in Texas. Apart from Kotwal and Walter's (2020), no other scholars have used the BRFSS to examine factors influencing the uptake of digestive system cancer screening tests. The current researcher aimed to address this empirical gap by examining the influence of demographic factors, lifestyle choices, and SES on the screening methods for digestive system cancer in Texas based on the BRFSS.

The study outcomes extended the application of the BRFSS model by researchers to explore key factors influencing the uptake of other types of cancer screening. The social and practice benefits include informing changes in public policy aimed at improving screening for digestive cancer through awareness of health prevention and reducing the cost of screening to increase accessibility. In the next section, the researcher discusses and justifies the chosen research methods and procedures deemed most suitable to address the research problem and questions. In summary, screening remains relatively low for all U.S. population groups, thus increasing the risk of related comorbidities and mortality.

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unfortunately, there remains a challenge (Lin et al., 2021). The main themes identified in the works of literature include the high prevalence and the rising case of digestive cancer screening, geographic, demographic, and social economic disparities in the incidences and mortality rate from digestive system cancers. Scholars have noted that barriers and benefits of digestive system cancer screening vary depending on various demographic factors such as race and ethnicity, age, and gender (Gabel et al., 2018; Ji et al., 2020; Kotwal & Walter, 2020; Monticciolo et al., 2017; Nee et al. 2020; Nickel et al., 2021; Orji et al., 2020; Schoenborn et al., 2020; Tran et al., 2021). Previous investigators have acknowledged the role of the ecological model of health behavior in influencing the decision on the uptake of cancer screening including digestive cancer screening. At the individual level, psychosocial factors related to knowledge about digestive cancer and screening, personality traits, risk perception of digestive cancer, and perceived barriers and benefits influence the decision to take cancer screening. Institutional or organizational, community, and public policy level factors were critical influencers of cancer screening decisions.

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screening tests. The current researcher addressed this empirical gap by examining the influence of demographic factors, lifestyle choices, and SES on the screening methods for digestive system cancer in Texas based on the BRFSS. The study outcomes extend the application of the BRFSS model by researchers to explore key factors influencing the uptake of other types of cancer screening. The social and practice benefits include informing changes in public policy aimed at improving screening for digestive cancer through awareness of health prevention and reducing the cost of screening to increase accessibility. The next section contains a discussion and justification the chosen research methods and procedures that were deemed most suitable to address the research problem and questions.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative correlational study was to examine whether individual-level factors (age, sex, race/ethnicity, and marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) captured in the 2018 Texas BRFSS are linked to completing one of the suggested digestive system cancer screening tests (sigmoidoscopy, colonoscopy, or blood stool test) in Texas. This study was needed because of the increased need to understand aspects of digestive system cancer screening tests. The major implication of the study is the possibility of detecting digestive cancer in its early stages. Understanding the factors linked to digestive system cancer screening tests would inform the formulation of strategies to encourage people to engage in screening to allow for early diagnosis.

In this section, I provide a wide-ranging overview of the current study methodology and quantitative correlational approach. The key parts included in this section are the research design and rationale, target population, sampling and sampling procedures, operationalization of the variables, data analysis plan, threats to validity, and ethical procedures. Section 2 ends with a summary of the major points regarding the methodology and study procedures.

Research Design and Rationale

Study Variables

The independent variables in this study included (a) individual-level factors (age, sex, race/ethnicity), (b) social economic factors (education level, employment status, and income level), and (c) health behaviors factors (physical activity, tobacco use, and healthcare coverage). The dependent variables were three screening tests: (a) sigmoidoscopy, (b) colonoscopy, or (c) blood stool test. A quantitative correlational research design was used to determine the relationship between the dependent and dependent variables.

Research Design and Connection With Research Questions

I employed a quantitative correlational research design to conduct this study. According to Hodge (2020), a quantitative study approaches focus on objective measurements, as well as the numerical, statistical, or numerical evaluation of data collected via surveys, questionnaires, and polls, or by manipulating preexisting numerical data using computational methods. The goal of the study was to determine whether individual-level factors (age, sex, race/ethnicity, and marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) are associated with completing one of the suggested digestive system cancer screening tests based on 2018 Texas BRFSS data. The quantitative research methodology was suitable for the current study because it facilitated the manipulation of preexisting numerical data on digestive system cancer screening tests, individual-level factors, SES, and health behaviors using regression techniques. The

quantitative research methodology was further fitting because I focused on examining the statistical correlations between individual-level factors, SES, health behaviors, and digestive system cancer screening tests.

A correlational research design is a no experimental study approach usEd to assess associations between variables without the researcher manipulating or controlling those (Curtis et al., 2016). The design measures two or more pertinent variables and evaluates a connection between or among them (Curtis et al., 2016). A correlational research design was appropriate for the current study because the purpose was to determine whether the independent variables of individual demographic factors, SES, and health behaviors are associated with the dependent variable of digestive system cancer screening tests. Data from the Texas BRFSS study were analyzed using a binomial logistic regression model and correlation analysis.

Time and Resource Constraints

I anticipated minimal time or resource constraints in the course of completing this study. Data were obtained from the Texas BRFSS study; therefore, no costs related to collecting data were incurred. Texas BRFSS survey was selected as the source of data for this study because it provides participants with information regarding all the study variables. The data are provided in standard formats that can easily be exported to the SPSS program for analysis purposes. The ease of obtaining data reduces the time and resources required for the study.

Consistency of Design

Adopting the Texas BRFSS survey as the source of data ensured that the study could be conducted quickly and with limited sources. I anticipated that the dataset would be large enough to meet the requirements for the health belief model on which the study was based. The data set obtained from the Texas BRFSS survey enabled the relationship between the dependent and independent variables to be determined, thereby helping the researcher to predict digestive cancer screening. Also, the large dataset enabled the generalization of findings to the study population (Borgstede & Scholz, 2021). A correlational research design is consistent with research designs needed to advance knowledge in health-linked risk behaviors and chronic health conditions. For instance, Klainin-Yobas et al. (2015) adopted this research design to determine the relationship between health behavior, physical fitness, and health among nursing students. Their study findings indicated that students with regular exercise programs had better perceived physical health and physical fitness. The correlational research design selected for the current study was effective in advancing knowledge on correlations between individual-level factors, SES, health behaviors, and digestive system cancer screening tests.

Methodology

Population

The study population for the study included adults aged 18 years or older, who were enrolled in and participated in the 2018 Texas BRFSS survey. BRFSS surveys are conducted annually via telephone across all 50 U.S. states, the District of Columbia, and U.S. territories (CDC, 2022). The 2018 Texas BRFSS survey was selected as the source

of data for this study because it provides participants' information regarding all the study variables, including individual-level factors (age, sex, race/ethnicity, and marital status), SES (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive cancer (specifically colorectal cancer) screening tests, including sigmoidoscopy, colonoscopy, or blood stool test.

Sampling and Sampling Procedure in Secondary Data Collection

Sampling Strategy

The BRFSS survey uses a disproportionate stratified sample (DSS) approach for landline telephone samples and random sampling for cell phone samples (CDC, 2022). Disproportionate stratified sampling is a method of stratified sampling where the size of the sample from each level or stratum is not proportional to the size of that level or stratum in the overall population (Lynn, 2019). A disproportionate sample is used in BRFSS surveys to ensure that the study stakeholders, including states, U.S. territories, the District of Columbia, and the CDC, have a sufficient sample for analyzing even the smallest groups in the population.

Sampling Procedure

The data points on these variables were extracted from the overall 2018 Texas BRFSS survey data and used for the correlational analysis. The points were used to evaluate whether individual-level factors (age, sex, race/ethnicity, and marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) are associated with completing

one of the suggested digestive system cancer screening test, namely sigmoidoscopy, colonoscopy, or blood stool test in Texas. Using disproportionate stratified sampling, the stakeholders can uniformly divide the overall sample size between the subgroups or utilize diverse proportions that make sense for the distinct surveys (Lynn, 2019). For the cell phone survey modules, households are selected randomly from blocks of possible phone numbers in a region. The BRFSS further employs iterative proportional fitting or raking to adjust for demographic disparities between the participants who are sampled and the population they represent (CDC, 2022). In 2018, the total BRFSS survey sample for both landline telephone and cellphone modules in Texas was 279,540.

Inclusion and Exclusion Criteria

The BRFSS survey is a countrywide premier system of health-associated telephone surveys, which gather state data regarding United States residents about their health-linked risk behaviors, chronic health conditions, and adoption of preventive amenities. All noninstitutionalized state residents aged 18 years and older are eligible for participation in BRFSS surveys. Also, residents with a household landline telephone can participate in the BRFSS surveys (CDC, 2022). BRFSS survey data on Texas's emerging health issues such as influenza-like illness and vaccine shortage were excluded from this study.

Sample Size Determination Using Power Analysis

Despite using secondary data where the sample size was already determined in the original study, it is vital to determine the required sample size; therefore, a power analysis was necessary for this study. A power analysis refers to the computation

employed to estimate the minimum sample size required for a study, given a prerequisite statistical power, effect size, and significance level (Kang, 2021). A power analysis includes four components, of which three must either be known or estimated. These components comprise (a) the significance criterion, (b) the sample size, (c) the effect size, and (d) power. The ideal sample size is a minimum power of .80 with a Type II error of no more than .20 or a 20% risk (Kang, 2021). An alpha level of .05 and a median effect (0.15) are recommended for non-experimental studies such as the current study (Lakens & Caldwell, 2021). The current researcher employed a binomial logistic regression because the dependent variables, including sigmoidoscopy test, colonoscopy test, or blood stool test are dichotomous variables (with yes or no answers) and the independent variables, comprising individual-level factors (age, sex, race/ethnicity, and marital status), SES (education level, employment status, and income level) and health behaviors (physical activity, tobacco use, and healthcare coverage) are a combination of continuous and categorical variables. Based on existing literature, an odds ratio of 1.3 was selected in an *a priori* power analysis (Huang, 2022). Accordingly, the minimum required sample for this study was computed using the G*Power program. G*Power program parameters included a-priori power analysis, logistic regression, z-test, power of .80, an alpha level of .05, and an odds ratio of 1.3. The minimum sample size required for the current study was 568.

Procedure for Gaining Access to BRFSS Datasets

The CDC website provides free access to data sets that can be used in research. The researcher accessed the required datasets for this study at the CDC website. No

registration or subscription was required to access the data. After accessing the website, the researcher navigated to the annual survey data section and selected the dataset of interest (i.e., 2018 data). Data were downloaded in CVS format and exported to SPSS Statistics 28 for analysis.

Operationalization of Constructs

The dependent variables of the current study included digestive cancer (specifically colorectal cancer) screening tests, namely sigmoidoscopy, colonoscopy, or blood stool test. Sigmoidoscopy is a screening test for rectal and colon cancer that involves checking inside the sigmoid colon for precancerous polyps for removal before they develop into colon cancer. This test is also used to detect rectal cancer at early stages for early treatment (Bevan & Rutter, 2018). A colonoscopy is a diagnostic test involving checking an entire colon using a flexible tube with a camera (Bevan & Rutter, 2018). A blood tool test is a screening done by checking for hidden blood in the stool and abnormal DNA linked to colon polyps and colon cancer (Joseph et al., 2018). In the 2018 Texas BRFSS survey, participants were asked to indicate whether they have ever had any of these tests in a yes or no question. The three dependent variables are therefore dichotomous because there were only two levels or categories. During data analysis, responses to each of these variables were coded either yes =1 or no = 0. There were 10 independent variables for the current study, encompassing individual-level factors (age, sex, race/ethnicity, and marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare

coverage). Table 1 provides a summary of the dependent and independent variables, as well as their level of measurement and coding or values.

Table 1

Summary of the Study Variables

Variable name	Variable type	Level of measurement	Coding/values
Sigmoidoscopy test	Dependent	Nominal, Dichotomous	Yes = 1 No = 0
Colonoscopy test	Dependent	Nominal, Dichotomous	Yes = 1 No = 0
Blood stool test	Dependent	Nominal, Dichotomous	Yes = 1 No = 0
Age	Independent	Ratio	Age in years
Sex	Independent	Nominal, Dichotomous	Male = 1 Female = 2
Race/ethnicity	Independent	Nominal	White = 1 Black or African American = 2 American Indian or Alaska Native = 3 Asian = 4 Pacific Islander = 5 Hispanic/Latino = 6 Other = 7
Marital status	Independent	Nominal	Married = 1 Divorced = 2 Widowed = 3 Separated = 4 Never married = 5 A member of an unmarried couple = 6
Education level	Independent	Nominal	Never attended school or only attended kindergarten = 1 Grades 1 through 8 = 2 Grades 9 through 11 = 3 Grade 12 or GED = 4 College 1 year to 3 years = 5 College 4 years or more = 6
Employment status	Independent	Nominal	Employed for wages = 1 Self-employed = 2 Out of work for 1 year or more = 3 Out of work for less than 1 year = 4

			A Homemaker = 5 A Student = 6 Retired = 7 Unable to work = 8
Income level	Independent	Nominal	Less than $25,000 = 1 $20,000 to less than $25,000 = 2 Less than $20,000 = 3 $15,000 to less than $20,000 = 4 Less than $15,000 = 5 $10,000 to less than $15,000 = 6 Less than $10,000 = 7
Physical activity	Independent	Nominal, Dichotomous	Yes = 1 No = 0
Tobacco use	Independent	Nominal, Dichotomous	Yes = 1 No = 0
Healthcare coverage	Independent	Nominal, Dichotomous	Yes = 1 No = 0

Data Analysis Plan

The first step entailed downloading data from the CDC website, particularly the BRFSS survey. The dataset was exported to SPSS Statistics 28 for analysis. Before data are uploaded to the CDC website, they are usually edited and cleaned. In the first step of cleaning and editing data, data conversion tables are developed to capture the survey data from the WinCATI program (CDC, 2022). In the next step, the conversion tables are used to combine the data into the final format which specifies the year the information was gathered (CDC, 2022). The CDC then creates a Windows-based editing program to perform data validation on the formatted survey results (CDC, 2022). In the final phase of data cleaning and editing, the CDC compiles and weighs the BRFSS data. The multiple imputation approach is adopted by CDC to address issues related to missing data. Multiple imputations refer to a statistical approach to the problem of missing data, which entails creating varied plausible datasets and effectively combining the output to replace

the missing values (CDC, 2022). Based on the above explanations, the data obtained from the BRFSS survey were assumed to be clean and ready for analysis.

Weighting the Data

Data weighting is adopted to ensure that the sample data are more representative of the population from which they were obtained. The BRFSS data weights incorporates the characteristics of the population and the design of the BRFSS survey. The BRFSS weighting methodology comprises (a) design weight and (b) demographic adjustment of the population through raking or proportional fitting (CDC, 2014). The design weight accounts for non-coverage errors and weight of each geographic stratum (_STRWT), the number of individuals above 18 years in the respondent's household (NUMADULT), and the number of phones within a household (NUMPHON3). In this study, the following formula for the design weight was adopted:

Design Weight = _STRWT * (1/NUMPHON3) * NUMADULT (CDC, 2014).

Research Questions

The purpose of this quantitative correlation study was to examine whether the independent variables of demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage), are associated with the dependent variable of receiving digestive cancer screening in Texas. This study was guided by the following research questions and hypotheses:

RQ1: Is there an association between demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), health

behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the prevalence of sigmoidoscopy and colonoscopy?

$H_0$1: There is no statistically significant association between individual demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) and digestive system cancer screening as measured by the prevalence of sigmoidoscopy and colonoscopy.

H_A1: There is a statistically significant association between individual demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) and digestive system cancer screening as measured by the prevalence of sigmoidoscopy and colonoscopy.

RQ2: Is there an association between demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the prevalence of blood stool tests?

$H_0$2: There is no statistically significant association between individual demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the prevalence of blood stool test.

H_A2: There is a statistically significant association between individual demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the prevalence of blood stool test.

Statistical Analysis

Frequencies and percentages were computed and reported for the categorical and/or dichotomous variables and descriptive statistics, including mean, median, standard deviation, maximum, and minimum were calculated and reported for interval-coded variables such as mean, and income levels. Cross-tabulation and frequencies were employed to guarantee correct data entry, organization, and analysis. To answer the research questions and test the research hypotheses, the collected data were analyzed using logistic regression because the dependent variables, including the sigmoidoscopy test, colonoscopy test, or blood stool test are dichotomous variables (with yes or no answers) and the predictors, including individual-level factors (age, sex, race/ethnicity, and marital status), SES (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage) are categorical or continuous variables. Logistic regression is utilized when the variables involved in the analysis have two or more categories (Shah et al., 2020). The complex sample screens for the logistic regression analysis were adopted to run a model that combined both subsets of variables. A separate logistic model was used for each of the two research questions. This enabled the researcher to identify how each of the independent variables associates

with digestive system cancer screening. A final model that combines the subset of variables was used. The data were analyzed in SPSS Statistics 28. For logistic regression to be conducted, the following assumptions had to be satisfied; (a) absence of multicollinearity, (b) absence of influential outliers, (c) linearity for continuous variables, and (d) independence of errors (Menard, 2002). Various tests were conducted to determine whether the assumptions for logistic regression were satisfied. For instance, the Box-Tidwell test was conducted to check the linearity between the variables (Hosmer et al., 2013). The Cook's distance test was used to determine whether they were highly influential outlier data (Menard, 2002). The violation of the assumptions for logistic regression forced the researcher to transform variables through approaches such as taking the natural logarithm and multiplicative inverse (Menard, 2002). Bonferroni correction was conducted to address the risk of Type 1 error occasioned by multiple statistical tests (Lakens & Caldwell, 2021).

Threats to Validity

Despite the potential significance of the current study, various elements threatened the validity of the findings. The two main categories of threats to validity, comprising threats to internal validity and threats to external validity, are discussed comprehensively in this part.

Threats to External Validity

The threat of selection bias was high for the current study because the secondary data were gathered via a DSS approach for landline telephone samples and random sampling for the cell phone samples. Disproportionate stratified sampling is a method of

stratified sampling where the size of the sample from each level or stratum is not proportional to the size of that level or stratum in the overall population (Lynn, 2019). With the use of disproportionate stratified sampling, selection bias is likely where the sample selected does not precisely reflect the target population. Threats of external validity due to selection bias could not be addressed for the current study because the data had already been gathered. Threats to external validity for this study were also high because of the use of archival data from the 2018 Texas BRFSS survey. Such secondary information can be biased, ultimately leading to incorrect outcomes. There might further be other websites or sources providing comparable data but distorted data on the 2018 BRFSS survey. To reduce this external threat, the researcher retrieved the BRFSS data through the CDC website. CDC is a credible source of health data such as BRFSS because it is the federal agency that saves lives and safeguards people from health dangers.

Threats to Internal Validity

Threats to internal validity were low in the current study, considering that the suggested secondary data from the 2018 BRFSS survey were collected by experts from Texas state and CDC. All states across the United States in collaboration with CDC recruit health professionals and provide guidelines for the gathering of the BRFSS data through telephone interviews. The internal validity of this study was nonetheless threatened because the researcher was exploring the impact of some selected independent variables on dependent variables. Specifically, the current study was designed to investigate whether individual-level factors (age, sex, race/ethnicity, and marital status),

SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage), are linked to completing digestive cancer (specifically colorectal cancer) screening tests, including sigmoidoscopy, colonoscopy, or blood stool test. Although there are comparatively many independent variables (10), there might have been other factors and variables that impacted the completion of digestive cancer screening tests among Texas residents in 2018.

Ethical Procedures

Ethical considerations were observed while undertaking the current study. The planned study began after being approved by the Walden University Institutional Review Board (IRB). IRB approval was necessary because the study involved the retrieval and evaluation of public and/or patient data. The 2018 BRFSS survey is freely obtainable on the CDC website, implying that no permission needed to be sought to access and use the data. Further, materials and data produced by federal agencies such as BRFSS are in the public domain and can be reproduced without permission (Maynard, 2018). Because personal health records are confidential, permission was sought from the Texas State administration to access and retrieve data from BRFSS archives. Another ethical consideration is that the findings of this study did not identify the original participants. The collected secondary data were stored safely in a password-protected hard drive and confidential by the researcher and will be destroyed 5 years after the completion of this study in adherence to Walden University's rules on research data.

Summary

The precise research design that was employed in the current study was a quantitative correlational research design. A correlational research design was appropriate for the study because the purpose was to determine whether individual demographic factors, SES, and health behaviors are associated with completing digestive system cancer screening tests. The study population consisted of adults aged 18 years or older who were enrolled in and participated in the 2018 Texas BRFSS survey. The researcher obtained secondary data from the 2018 Texas BRFSS survey. Despite utilizing secondary data where the sample size was already determined in the original study, it was vital to determine the required sample size; therefore, a power analysis was necessary for this study. Descriptive and inferential statistics were utilized to summarize the study variables. To answer the research questions and test the research hypotheses, a binomial logistic regression was adopted. This is because the dependent variables, including sigmoidoscopy test, colonoscopy test, or blood stool test, were dichotomous variables (with yes or no answers) and the independent variables, comprising individual-level factors (age, sex, race/ethnicity, and marital status), SES (education level, employment status, and income level) and health behaviors (physical activity, tobacco use, and healthcare coverage) were a combination of continuous and categorical variables. The data were analyzed in SPSS Statistics 28. Section 3 includes the results and findings from the data analysis.

Section 3: Presentation of the Results and Findings

Introduction

The goal of this quantitative correlational study was to determine whether demographic factors such as age, gender, race/ethnicity, marital status, socioeconomic status (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) were associated with the dependent variable of receiving digestive cancer screening in Texas. In this section, the outcomes of the analyses are linked to the study's key research questions. I present the outcomes of the study, including a description of the demographic characteristics of the sample population, descriptive statistics for the important variables included, and statistical assumptions analysis utilizing logistical regression analysis. These are the sections: (a) the introduction, (b) accessing the dataset for secondary analysis, (c) the assumption analysis, (d) the analysis results, and (e) the summary.

Accessing the Data Set for Secondary Analysis

The researcher obtained secondary data from the BRFSS, an annual, state-based survey performed in the United States by the CDC. The BRFSS collects data on numerous health-related behaviors, chronic health issues, and preventative health practices from persons aged 18 years and older. Adults who were enrolled in and participated in the 2018 BRFSS survey formed the study sample. The required data were retrieved and used in the data as anticipated in the methods section.

For the 2018 survey, the BRFSS used an iterative proportional fitting (or "raking") weighting methodology that allowed the incorporation of additional variables

such as demographic characteristics of education level, marital status, own/rent home, in addition to the traditional ones of age-race/ethnicity-gender, which improved the degree and extent to which the BRFSS sample properly reflected the sociodemographic make-up of the population.

The study population was comprised of adults aged 18 years or older, who were enrolled in and participated in the 2018 Texas BRFSS survey. Table 2 summarizes the demographic characteristics of the 141,425 participating adults in the survey. A majority of the participants (95.8%) were male, and more than half (59.2%) were aged 50 years and older. White, non-Hispanic people (71.1%) dominated the sample group, with more than half of them (52.3%) being married. In terms of educational level, the majority of participants (63.5%) had some college level education. The majority of participants (52.1%) were in salaried employment or retired (18.2%), with the majority (54.9%) earning $50,000 or more per year. The majority of participants were physically active, with 78.5% reporting exercise in the previous 30 days. Tobacco usage, whether smoked or not, was a very limited activity in this population, with only 7.0% reporting current tobacco use. The majority of individuals (88.0%) had health insurance.

Assumption Analysis

A binomial logistic regression analysis was proposed for inferential analysis to determine whether there was a statistically significant relationship between demographic factors, socioeconomic status, and health behaviors with receiving digestive cancer screening in Texas.

Table 2

Demographic Characteristics

	n	%
Age groups (years)		
18 to 24	13,612	9.6
25 to 34	22,613	16.0
35 to 44	22,072	15.6
45 to 54	25,385	17.9
55 to 64	27,737	19.6
65 or older	30,006	21.2
Sex of respondent		
Male	135,041	95.8
Female	5,936	4.2
Race/ethnicity		
White, Non-Hispanic	100,618	71.1
Black, Non-Hispanic	10,866	7.7
Asian, Non-Hispanic	4,737	3.3
American Indian/Alaskan Native, Non-Hispanic	2,519	1.8
Hispanic	17,198	12.2
Other race, Non-Hispanic	5,487	3.9
Marital status		
Married	73,969	52.3
Divorced	18,239	12.9
Widowed	5,156	3.6
Separated	3,355	2.4
Never married	32,954	23.3
A member of an unmarried couple	6,638	4.7
Refused	1,103	.8
Education level		
Never attended school or only kindergarten	307	.2
Grades 1 through 8 (Elementary)	4,230	3.0
Grades 9 through 11 (Some high school)	7,876	5.6
Grade 12 or GED (High school graduate)	39,904	28.2
College 1 year to 3 years (Some college or technical school)	37,496	26.5
College 4 years or more (College graduate)	51,011	36.1
Refused	590	.4
Employment status		
Employed for wages	73,390	52.1
Self-employed	18,201	12.9
Out of work for 1 year or more	2,898	2.1
Out of work for < 1 year	3,559	2.5

Table 2

Demographic Characteristics

	n	%
A homemaker	1,144	.8
A student	5,521	3.9
Retired	25,571	18.2
Unable to work	9,267	6.6
Refused	1,310	.9
Income levels		
Less than $15,000	10,462	8.6
$15,000 to < $25,000	16,894	13.9
$25,000 to < $35,000	11,497	9.5
$35,000 to < $50,000	15,785	13.0
$50,000 to < $100,000	66,510	54.9
Exercise past 30 days		
Yes	110,905	78.5
No	30,299	21.5
Tobacco use		
Yes	9,502	7.0
No	126,343	93.0
Have any health insurance		
Yes	123,729	88.0
No	16,824	12.0

Some assumptions must be met in order to do logistical regression analysis effectively and obtain acceptable findings. Despite the fact that these regression analyses are often robust, it is normal practice to check the quality of the results by analyzing the degree of divergence from these assumptions. For the binomial logistic regression, the following assumptions were tested: (a) observational independence, (b) no multicollinearity, (c) a linear relationship between any continuous independent variables and the logit transformation of the dependent variable, and (d) no significant outliers, high leverage points, or highly influential points.

A Durban-Watson statistic was created under the assumption of observational independence. According to this assumption, the data observations are independent of one another, which indicates that the value of one observation has no effect on the value of another. Durban-Watson discusses the error independence theory as well. The value range for this statistic is .0 to 4.0, with 2.0 indicating that there is no connection between the residuals. Values less than 1.0 and larger than 3.0 are deemed troublesome in the model and suggest serial correlation. For these data, Durban-Watson's d-statistic was 1.988, indicating that the assumption was not violated.

The second assumption states that the data should not be multi-collinear, which suggests that the independent variables should not be related. The Variance Inflation Factor (VIF) was used in the study to test for multicollinearity. Multicollinearity increases the variance of an independent variable's expected regression coefficient, as measured by the VIF. A VIF score of 1 shows that there is no multicollinearity between the variables, but a score of 10 or more indicates that the assumption is violated because the multicollinearity is significant. The assumption was met because all of the VIF values in the data fell well within the range of 1 and 2, showing no collinearity (Table 2).

One of the key axioms of logistic regression is that the relationship between each continuous independent variable and the result logit (also known as the log-odds) is linear. Because the study's analysis lacked a continuous variable, this assumption was superfluous. Furthermore, sample size plays a factor in this circumstance, therefore bypassing the assumption test should not be an issue given the large sample sizes of the data.

One of the key axioms of logistic regression is that the relationship between each continuous independent variable and the result logit (also known as the log-odds) is linear. Because the study's analysis lacked a continuous variable, this assumption was superfluous. Furthermore, sample size plays a factor in this circumstance; therefore, bypassing the assumption test should not be an issue given the large sample sizes of the data.

Table 3

Collinearity Statistics

	Collinearity statistics	
	Tolerance	VIF
Age groups	.771	1.297
Gender	.989	1.011
Race/ethnicity	.916	1.091
Marital status	.880	1.136
Educational level	.772	1.295
Employment status	.695	1.439
Income levels	.614	1.629
Exercise in past 30 days	.926	1.080
Tobacco use	.984	1.017
Have any health insurance	.924	1.083

The final assumption of logistic regression was that there should be no major outliers, high leverage points, or highly significant impact. Cook's distance was used to examine whether outliers had an undue impact on the analysis. The Cook's distance range for this model was within acceptable limits, ranging from .000 to .178. Values greater than 1.0 are troublesome and break the assumption.

Results

I examined the association between several demographic factors, SES, health behaviors and digestive system cancer screening as measured by the prevalence of sigmoidoscopy, colonoscopy, and blood stool test. Demographic factors (age, gender, race/ethnicity, marital status), social economic status (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) were among the independent variables. The dependent variables were the type of digestive cancer screening test (sigmoidoscopy or colonoscopy) and the blood stool test. Binomial logistic regression was used in the analysis. The results of the analysis are presented in this section.

Research Question 1

The first question was to establish an association between demographic factors, SES, health behaviors, and digestive system cancer screening, as measured by the presence of sigmoidoscopy and colonoscopy. A binary logistic regression was used to establish the relationship, and the model yielded a statistically significant *p*-value of < .001 for X^2 (37, *n* = 58,462) = 9,136.258. The model correctly predicted 70.1% of cases and explained 20.5% of the variation in the prevalence of sigmoidoscopy and colonoscopy tests (Nagelkerke R Square). The Hosmer and Lemeshow goodness-of-fit test found discernible difference between the observed and predicted proportions (*p* < .001). Table 3 shows the findings of the analysis.

Older age groups of 45 to 54 (OR = .222, 95% CI[.155, .318,] 55 to 64 (OR = .279, 95% CI [.262, .297]), and 65 or older (OR = .724, 95% CI [.686, .763]) were less

likely to have a digestive system cancer screening, as measured by the test of sigmoidoscopy and colonoscopy when compared to the age group of 25 to 34 years. With the exception of the 35 to 44 years age bracket, all age groups were statistically significantly different ($p < .001$) from the reference age range of 25 to 34 years. The null hypothesis of no significant differences between age groups was thus rejected because there were substantial variations between age groups. The Black, non-Hispanic (OR = 1.250, 95% CI[1.124, 1.390]) and the Asian, non-Hispanic races (OR = 1.176, 95% CI[1.038, 1.332]) were more likely to have more testing than the White, non-Hispanic races. The married persons were less likely to have digestive system cancer screening as measured by the test of sigmoidoscopy and colonoscopy because all the other categories had higher odds ratio (OR; see Table 4). The significance test yielded a result of $p < .001$, indicating that the null hypothesis of no significant difference was rejected. The participants who had 4 years or more of college had nearly twice the likelihood of testing than those with kindergarten or no education (OR = 1.548, 95% CI[1.001, 2.395]). This was the only category that differed statistically ($p < .001$) from the reference category, but the overall significance meant that the null hypothesis of no relationship was rejected and the alternative hypothesis of significant differences between different people of different education was accepted.

Income was also a predictor of sigmoidoscopy and colonoscopy, with participants earning $15,000 to $25,000 (OR = .429, 95% CI [.395, .466]), $25,000 to $35,000 (OR = .497, 95% CI [.465, .532]), and $35,000 to $50,000 (OR = .562, 95% CI [.523, .604]) having a lower probability of undergoing those tests than those earning less than $15,000.

All of the income level groups differed significantly from the reference category ($p <$ .001), necessitating the rejection of the null hypothesis of no changes in sigmoidoscopy and colonoscopy across income levels. Participants who did not have health insurance were more than twice as likely as those who did to have sigmoidoscopy and colonoscopy tests (OR = 2.697, 95% CI [2.502, 2.907]). As a result, the null hypothesis of no significant differences between individuals with and without health insurance was rejected ($p < .001$). The only demographic characteristic that did not demonstrate statistical significance was the gender of the participants, implying that the prevalence of testing was comparable between males and females (OR = .996, 95% CI [.897, 1.105]. As a result, the null hypothesis was accepted, meaning that there were no statistical differences between genders on sigmoidoscopy and colonoscopy testing.

I concluded that the null hypothesis was rejected and the alternative hypothesis was accepted, indicating that there is a statistically significant association between individual demographic factors (age, race/ethnicity, marital status), SES (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) and digestive system cancer screening as measured by sigmoidoscopy and colonoscopy prevalence.

Table 4

Logistics Regression Analysis of Relationship between Demographic Factors, SES, Health Behaviors, and Digestive System Cancer Screening as Measured by the Prevalence of Sigmoidoscopy and Colonoscopy

	OR	SE	95% CI for OR		z	*p*
			Lower	Upper		
Age group						
18 to 24						

25 to 34						
35 to 44	.254	.721	.062	1.041	3.624	
45 to 54	.222	.184	.155	.318	67.173	
55 to 64	.279	.032	.262	.297	1625.505	
65 or older	.724	.027	.686	.763	144.304	
Sex						
Male			Reference			.933
Female	.996	.053	.897	1.105	.007	
Race/ethnicity						
White, Non-Hispanic			Reference			
Black, Non-Hispanic	1.250	.054	1.124	1.390	17.050	
Asian, Non-Hispanic	1.176	.064	1.038	1.332	6.470	< .001
Native, Non-Hispanic	.657	.086	.554	.777	23.816	
Hispanic	.718	.088	.604	.854	13.990	
Other race, Non-Hispanic	.987	.064	.871	1.118	.041	
Marital status						
Married			Reference			
Divorced	2.093	.165	1.516	2.890	20.121	
Widowed	1.606	.165	1.161	2.222	8.205	< .001
Separated	1.684	.169	1.210	2.344	9.551	
Never married	1.497	.174	1.064	2.106	5.366	
Unmarried couple	1.426	.167	1.028	1.978	4.517	
Refused	1.631	.176	1.155	2.303	7.707	

Table 4

Logistics Regression Analysis of Relationship Between Demographic Factors, SES, Health Behaviors, and Digestive System Cancer Screening as Measured by the Prevalence of Sigmoidoscopy and Colonoscopy

OR	SE	95% CI for OR		z	*p*
		Lower	Upper		
Education level					
Kindergarten or Never			Reference		
Grades 1 through 8	.677	.319	.363	1.264	1.497	
Grades 9 through 11	.835	.228	.534	1.306	.624	< .001
Grade 12 or GED	1.028	.225	.661	1.599	.015	
College 1 year to 3 years	1.217	.222	.787	1.881	.776	
College 4 years or more	1.548	.223	1.001	2.395	3.859	
Refused	1.934	.223	1.250	2.992	8.784	
Employment status						< .001

Employed for wages		Reference				
Self-employed	.860	.154	.636	1.162	.969	
Out of work for > 1 year	.840	.155	.620	1.138	1.263	
Out of work for < 1 year	1.152	.167	.831	1.599	.722	
A homemaker	.944	.170	.677	1.318	.114	
A student	.822	.209	.546	1.238	.883	
Retired	.801	.265	.477	1.347	.698	
Unable to work	1.463	.154	1.081	1.980	6.077	
Refused	1.585	.156	1.166	2.153	8.664	
Income levels						
Less than $15,000		Reference				
$15,000 to < $25,000	.429	.042	.395	.466	403.438	
$25,000 to < $35,000	.497	.034	.465	.532	421.045	.001
$35,000 to < $50,000	.562	.036	.523	.604	250.011	
$50,000 to < $100,000	.694	.032	.652	.739	130.652	
Exercise past 30 days						
Yes		Reference				< .001
No	1.131	.023	1.081	1.184	28.458	
Tobacco use						
Yes		Reference				< .001
No	.699	.042	.645	.759	73.700	
Have any health insurance						
Yes		Reference				< .001
No	2.697	.038	2.502	2.907	674.546	

Research Question 2

The second and final question was designed to examine the relationship between demographic factors (age, gender, race/ethnicity, marital status), socioeconomic status (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the prevalence of blood stool tests. The logistic regression model was statistically significant, with a value of $\chi 2$ (37, n= 58,462) = 3,311.968, $p < .001$. The model explained 7.9% of the variation in blood stool tests (Nagelkerke R2) and accurately identified 71.8% of cases. Apart from marital status and income levels, most of the factors in the model were statistically significant, as with the preceding study

question. For example, one of the criteria that significantly determined one having blood stool tests was age and gender. Other demographic factors of education and employment status also showed significant findings.

The only parameters evaluated that had no predictive power of blood stool test prevalence were marital status and income levels. For the two variables of marital status and income level, the null hypothesis was accepted. The findings resulted in rejecting the null hypothesis and accepting the alternative hypothesis indicating that there is a statistically significant association between individual demographic factors (age, gender, race/ethnicity), SES (education level and employment status), and health behaviors (physical activity, tobacco use, and healthcare coverage) and digestive system cancer screening, as measured by the prevalence of blood stool test.

Table 5

Logistics Regression Analysis of Relationship Between Health Behaviors Elements and Childhood Vaccination Adherence Status

	OR	SE	95% CI for OR		z	*p*
			Lower	Upper		
Age Group						
25 to 34		Reference				
45 to 54	.197	1.076	.024	1.624	2.279	< .001
55 to 64	.200	.285	.114	.349	31.914	
65 or older	.371	.034	.347	.397	839.252	
Sex	.639	.024	.609	.670	338.605	
Male		Reference				< .001
Female	.511	.048	.465	.562	191.857	
Race/ethnicity						
White, Non-Hispanic		Reference				
Black, Non-Hispanic	.748	.053	.674	.829	30.440	
Asian, Non-Hispanic	.959	.063	.848	1.084	.458	< .001
Native, Non-Hispanic	.832	.087	.701	.987	4.464	
Hispanic	.795	.092	.665	.951	6.271	
Other race, Non-Hispanic	.686	.065	.604	.779	33.633	

Table 5

Logistics Regression Analysis of Relationship Between Health Behaviors Elements and Childhood Vaccination Adherence Status

	OR	SE	95% CI for OR		z	*p*
			Lower	Upper		
Marital status						
Married		Reference				
Divorced	1.358	.195	.926	1.991	2.449	
Widowed	1.357	.196	.924	1.994	2.429	.410
Separated	1.331	.198	.903	1.962	2.082	
Never married	1.266	.205	.847	1.892	1.324	
Unmarried couple	1.276	.198	.866	1.881	1.523	
Refused	1.391	.206	.928	2.084	2.560	
Education level						
Kindergarten or Never		Reference				
Grades 1 through 8	.315	.484	.122	.813	5.700	
Grades 9 through 11	.882	.281	.509	1.529	.201	< .001
Grade 12 or GED	1.176	.277	.683	2.024	.343	
College 1 year to 3 years	1.303	.274	.762	2.230	.936	
College 4 years or more	1.554	.274	.908	2.658	2.589	
Refused	1.712	.274	1.001	2.929	3.855	
Employment status						
Employed for wages		Reference				
Self-employed	.840	.165	.608	1.161	1.117	
Out of work for > 1 year	.803	.166	.580	1.112	1.746	
Out of work for < 1 year	1.215	.179	.856	1.724	1.185	< .001
A homemaker	.991	.184	.691	1.422	.002	
A student	.594	.232	.377	.936	5.031	
Retired	1.116	.279	.646	1.927	.155	
Unable to work	1.160	.165	.839	1.602	.806	
Refused	1.515	.167	1.092	2.103	6.174	
Income levels						
Less than $15,000		Reference				
$15,000 to < $25,000	.900	.043	.827	.979	5.965	
$25,000 to < $35,000	.982	.034	.919	1.049	.287	.081
$35,000 to < $50,000	1.026	.035	.957	1.100	.528	
$50,000 to < $100,000	.993	.030	.936	1.054	.052	
Exercise past 30 days						
Yes		Reference				< .001
No	1.141	.023	1.090	1.194	32.121	

Table 5

Logistics Regression Analysis of Relationship Between Health Behaviors Elements and Childhood Vaccination Adherence Status

	OR	SE	95% CI for OR		z	*p*
			Lower	Upper		
Tobacco use						
Yes		Reference				.013
No	.890	.047	.813	.976	6.208	
Have any health insurance						
Yes		Reference				< .001
No	1.748	.049	1.588	1.924	130.366	

Summary

The purpose of this quantitative correlational study was to determine whether demographic characteristics, socioeconomic position, and health habits were related to the use of intestinal cancer screening in Texas. The results of the binary logistic regression analyses demonstrated that various characteristics were associated with resulting in some individuals receiving digestive cancer screening when exploring the research questions. Most demographic factors, such as age, race/ethnicity, marital status, socioeconomic status (education level, employment status, and income level), and health behaviors (physical activity, tobacco use, and healthcare coverage) were significant predictors of taking a digestive system cancer screening test, as measured by sigmoidoscopy and colonoscopy. Gender was the only demographic characteristic that was not significantly linked with the sigmoidoscopy and colonoscopy tests. Apart from marital status and income levels, all characteristics evaluated were linked to having taken a blood stool test.

The purpose and scope of this quantitative research are detailed in Section 4. In Section 4, the findings are explained, interpreted, and summarized. The study's inadequacies are acknowledged. The benefits of the study are also discussed in Section 4, along with suggestions for further research. The researcher ends the dissertation by discussing the implications for positive social transformation and the conclusion.

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

Introduction

The purpose of this quantitative correlational study was to examine whether the independent variables of demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage) are associated with the dependent variable of receiving digestive cancer screening in Texas. Using two research question, the researcher analyzed the relationship between demographic characteristics, SES, health habits, and screening for digestive system cancer. In Research Question 1, the completion of sigmoidoscopy and colonoscopy was examined, and the results indicated compared to the reference group, 25 to 34 years, older age groups, 45 to 54, 55 to 64, and 65 or older were less likely to undertake screening. The results of the regression analysis showed that Asian and Black non-Hispanic populations were more likely to complete sigmoidoscopy and colonoscopy testing than White non-Hispanic people. Participants with a college degree were more likely to be tested, while married people were less likely to have these tests. Participants were more than twice as likely to undergo these tests if they lacked health insurance. Gender did not significantly influence screening completion.

Research Question 2 centered on the variables of age, gender, education level, employment status, physical activity, tobacco use, and healthcare coverage and blood stool screening. Marital status and income levels were not predictive factors for blood stool testing. Age and gender significantly determine one having a blood stool test. Among all other components tested, about 71.8% of age and gender strongly predicted

blood stool test completion. These results provide valuable insights into the complex interplay of demographic, socioeconomic, and behavioral factors influencing digestive system cancer screening, shedding light on potential areas for targeted interventions to improve screening rates.

Interpretations of the Findings

Research Question 1

The first research question asked: Is there an association between demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the completion of sigmoidoscopy and colonoscopy? Research Question 1 delved into the associations between demographic factors, socioeconomic status, health behaviors, and digestive system cancer screening, specifically focusing on sigmoidoscopy and colonoscopy utilization. The complex relationship between age and race/ethnicity has a profound impact on individuals' screening practices. The interpretations in this section explain how these factors interplay and contribute to the overall acceptance of digestive system cancer screening as the completion of sigmoidoscopy and colonoscopy are considered.

Sigmoidoscopy and Colonoscopy Digestive System Cancer Screening

The results of this study shed light on several critical factors influencing the utilization of sigmoidoscopy and colonoscopy for digestive system cancer screening. The study's predictive accuracy of 70.1% and the Nagelkerke R Square value of 20.5% indicate that the model offers a reasonably effective prediction of screening behaviors,

albeit with some room for improvement. The Hosmer and Lemeshow goodness-of-fit test's finding of a discernible difference between observed and predicted proportions ($p < .001$) underscores the complexity of factors influencing screening decisions, hinting at the existence of unmeasured variables. This validates other studies showing older adults had lower colorectal cancer screening rates (Kim et al., 2016; Hawley et al., 2019). Older age groups may be reluctant because of discomfort, intrusiveness, or a lack of understanding about the need for regular testing. These findings indicate that specialized care and educational initiatives are crucial to boosting screening among senior citizens. Colonoscopy and sigmoidoscopy use were likewise influenced by income. The likelihood of receiving these exams was lower for people making $15,000 to $25,000, $25,000 to $35,000, and $35,000 to $50,000 than for those making less than $15,000 ($p < .001$). This conclusion aligns with those of other studies that brought attention to the differences in healthcare access caused by socioeconomic status (Weissfeld et al., 2019; Senore et al., 2021). As a result of better healthcare and the ability to pay for screenings out of pocket, higher-income groups may have lower screening rates. To increase screening rates, it is important to address income-related disparities in digestive system cancer screening via outreach and funding.

Notably, the current researcher found that participants without health insurance were more than twice as likely as those with insurance to have sigmoidoscopy and colonoscopy tests (OR = 2.697, 95% CI [2.502, 2.907]). The majority of individuals (88.0%) had health insurance. This unexpected result contradicts the findings of previous studies that indicated that individuals with insurance have superior access to healthcare

services (Kim et al., 2016; Shim et al., 2019). It is essential to consider, however, that the absence of health insurance may motivate individuals to seek screening proactively to detect potential health issues early and reduce future healthcare costs (Hawley et al., 2019; Senore et al., 2021). These counterintuitive findings underscore the complexity of healthcare decision-making and call for further exploration to understand uninsured individuals' motivations and decision-making processes regarding cancer screening.

Income Levels and Sigmoidoscopy and Colonoscopy Screening

I found a considerable income gradient in screening utilization, supporting these results. Earners between $15,000 (OR = .429, 95% CI [.395, .466]) and $50,000 (OR = .562, 95% CI [.523, .604]) had sigmoidoscopy and colonoscopy less often than those earning less than $15,000. These data corroborate the association between economic status and digestive system cancer screening. The literature has extensively examined how wealth affects health-seeking, notably cancer screening (Chang et al., 2015; S. Lee et al., 2018). These studies found that low-income people were less likely to participate in cancer screening programs; financial constraints impede patients from affording sigmoidoscopy and colonoscopy. The agreement of this study's findings with previous results shows that poverty drives screening behavior, highlighting the need for targeted interventions and financial aid to eliminate cancer screening disparities. The present study's results indicate that income levels strongly impacted the chance of getting sigmoidoscopy and colonoscopy, even when cost barriers were decreased. This result stresses the multidimensional character of income-related obstacles to cancer screening

and the significance of tailored treatments and policies considering socioeconomic inequality.

Age and Sigmoidoscopy and Colonoscopy Screening

This study's findings illuminate the association between age, sigmoidoscopy, and colonoscopy for digestive system cancer screening. I found varied trends across age groups, indicating how age affects cancer screening behavior. Older age groups of 45 to 54 (OR = .222, 95% CI [.155, .318,] 55 to 64 (OR = .279, 95% CI [.262, .297]), and 65 or older (OR = .724, 95% CI [.686, .763]) were less likely to have a digestive system cancer screening as measured by the test of sigmoidoscopy and colonoscopy when compared to the age group of 25 to 34 years. These findings support the findings in previous literature by Obermair et al. (2018), who also found a statistically significant relationship between age and cancer screening choices. These findings are also consistent with the conclusions of Janssen et al. (2019) and Kotwal and Walter (2020) that older age groups, especially those 65 or older, were less likely to seek sigmoidoscopy and colonoscopy for digestive system cancer screening. These findings confirms that age influences cancer screening choices.

The study's findings also reveal age-related differences in seeking cancer screening. Except for the 35–44 age bracket, all age groups were statistically significantly different ($p < .001$) from the reference age range of 25–34 years. The null hypothesis of no significant differences between age groups was thus rejected because there were substantial variations between age groups. These results show that screening rates decrease with age, with the tendency beginning even in the late 30s and early 40s. These

results disapprove of previous research that found that age-related cancer screening inequalities mostly impact older groups (Nee et al., 2020). Instead, the results of this study imply that age affects screening habits sooner in adulthood than previously thought. This complex finding emphasizes the need for personalized treatments and communication to promote screening adherence across ages.

Race/Ethnicity and Sigmoidoscopy and Colonoscopy Screening

The study's findings present a nuanced perspective on the role of race and ethnicity in digestive system cancer screening. I found that the Black, non-Hispanic (OR = 1.250, 95% CI [1.124, 1.390]) and Asian, non-Hispanic races (OR = 1.176, 95% CI [1.038, 1.332]) were more likely to have more testing than the White, non-Hispanic races. Notably, the Black non-Hispanic and Asian non-Hispanic populations were more likely to undergo screening, as indicated by their odds ratios. This finding aligns with previous studies, consistently highlighting disparities in digestive cancer incidence and mortality rates, particularly among African American and Hispanic communities (McNeill et al., 2018; Nguyen et al., 2019). The results of this study add an intriguing layer to this narrative by suggesting that certain racial and ethnic groups may proactively seek screening at higher rates, potentially due to increased awareness or healthcare access. This finding extends the existing body of literature by emphasizing the multifaceted nature of cancer screening behavior, which is influenced by factors beyond mere demographic categorization.

Income Levels and Sigmoidoscopy and Colonoscopy Screening

The study's findings on gender and digestive system cancer screening are critically examined in this section to determine how they compare to previous research. The researcher also addressed how marital status affects screening behaviors and cancer screening programs. Gender and digestive system cancer screening participation are not significantly different, according to the study and other research. Using the BRFSS, Kotwal and Walter (2020) observed no statistically significant differences in digestive system cancer screening between men and women. This consistency across studies suggests that healthcare availability, awareness, and other socio-demographic characteristics are more important than gender in determining screening behavior (Kotwal & Walter, 2020; Monticciolo et al., 2017). The rising amount of research suggests that gender-neutral screening promotion may ensure fair access.

Income Levels and Sigmoidoscopy and Colonoscopy Screening

The extant literature is somewhat heterogeneous, with Alcalde-Rubio et al., (2020) investigations proposing gender-based disparities in screening engagement and others indicating a need for more substantial variances. The current study's outcomes revealed that gender did not significantly influence the completion of sigmoidoscopy and colonoscopy testing (OR = 0.996, 95% CI [0.897, 1.105]). This outcome aligns with the conclusions posited by Kotwal and Walter (2020) and Monticciolo et al. (2017), who both argued that gender does not have a significant impact on the inclination or frequency of digestive system cancer screening. It is imperative to acknowledge that gender-oriented screening discrepancies have been noted across diverse conditions. For example,

De Santis et al. (2017) ascertained that men showed a higher likelihood of participating in stomach cancer screenings. These inconsistences in findings underscore the complex nature of healthcare decision-making, influenced by determinants outside of the singular aspect of gender. Hence, while the current study's results enrich the prevailing literature by supporting the notion that gender may not be the primary catalyst for screening disparities, they emphasize the demand for better comprehension of the complex interaction between individual attributes and healthcare behaviors.

Research Question 2

The second research question asked: Is there an association between demographic factors (age, sex, race/ethnicity, marital status), SES (education level, employment status, and income level), health behaviors (physical activity, tobacco use, and healthcare coverage), and digestive system cancer screening as measured by the completion of blood stool tests? Research Question 2 explored the relationships between demographic factors, socioeconomic status, health behaviors, and another facet of digestive system cancer screening: blood stool tests. The findings outlined in this section emphasizes the multifaceted dynamics of tobacco usage, healthcare coverage, and gender within the context of blood-stool testing. The goal of the interpretations of this study was to shape individuals' decisions regarding blood stool tests and how these elements collectively contribute to the comprehensive outlook of digestive system cancer screening.

Blood Stool Test Digestive System Cancer Screening

Demographic characteristics like age, gender, race/ethnicity, and marital status reveal new information about blood stool testing for stomach malignancies. The logistic

regression model was statistically significant, with a value of $\chi 2$ (37, n= 58,462) = 3,311.968, p <.001. The model explained 7.9% of the variation in blood stool tests (Nagelkerke R2) and accurately identified 71.8% of cases. Amongst all other factors tested, age and gender strongly predicted blood stool test completion, which is consistent with previous colorectal cancer screening studies (Deng et al., 2018; Ferracin et al., 2018). This congruence with past research supports age-based screening guidelines like those from the U.S. Preventative Services Task Force. The results of this study, in parallel with previous studies, show that gender affects screening habits, requiring more research to develop gender-specific screening methods.

Tobacco Usage and Blood Stool Cancer Screening

I found that tobacco had a predictive power of blood stool test completion tobacco use (OR=. 699, 95% CI [.645, .759]; p < .001), accepting the alternative hypothesis that there is a statistically significant association between health behaviors (physical activity, tobacco use, and healthcare coverage) and digestive system cancer screening as measured by the completion of blood stool test. The study supported previous research showing that active smoking reduces cancer screening willingness (Eng et al., 2020; Hama et al., 2016). Eng et al. (2020) found that active smoking inversely affects screening adherence. This supports a growing body of evidence on smoking's health risks, which may lead to a decrease in preventive services like cancer screening. The findings confirmed that regularly smoking people may value short-term gains over long-term health benefits, reducing their likelihood of preventative health behaviors. The study also highlighted the relevance of health consciousness by revealing how former smoking affects cancer

screening behavior. Former smokers are more likely to get screened than never smokers due to their health awareness, according to Eng et al. These findings expand prior research by identifying the positive health behaviors that might result from quitting smoking, which may lead to greater health awareness and preventive health actions.

Moreover, the study's findings provide empirical evidence that current smokers exhibit lower participation rates in cancer screening compared to noncurrent smokers. Hama et al. (2016) similarly noted lower participation rates among current smokers. This consistency in findings underscores the notion that actively smoking individuals may exhibit lower health consciousness, leading to a reluctance to engage in cancer screening (Hama et al., 2016; S. Lee et al., 2018). These results support the importance of targeted interventions to increase cancer screening rates among current smokers, recognizing the unique barriers they face. These insights underscore the multifaceted nature of tobacco use and its implications for preventive healthcare decisions. Moving forward, tailored interventions that address the specific needs of current smokers may be essential in increasing cancer screening rates among this population.

Healthcare Coverage and Blood Stool Cancer Screening

The current study's findings concerning healthcare coverage and its implications for digestive system cancer screening align with existing literature, reaffirming the pivotal role that insurance status plays in influencing healthcare-seeking behaviors. As Shim et al. (2019) elucidated, disparities in cancer screening are often rooted in variations in health insurance status and the specific type of insurance individuals possess. In concordance with this perspective, the study revealed a statistically significant

relationship between individuals with and without health insurance ($p < .001$). This discovery underscores the well-established notion that health insurance constitutes a substantial determinant of screening participation. The findings of this study indicated that most people (88.0%) have health, which supports the claims made by Kim et al. (2016) regarding the connection between insurance and health consciousness. Consequently, the findings of this study harmoniously converge with prevailing literature, affirming the indispensable role of health insurance in promoting screening behaviors.

Nonetheless, it is imperative to acknowledge that while this study's results corroborate prevailing literature on the relationship between health insurance and cancer screening, they also unveil the subtleties inherent in this association. The notable statistical association disclosed in this study underscores the considerable influence of health insurance on screening behavior. The fact that a noteworthy portion of individuals (12.0%) lacks health insurance coverage underscores the persisting issue of uninsured individuals confronting impediments to accessing critical preventive services. This revelation expands upon extant research by emphasizing that despite strides in expanding healthcare coverage, a substantive segment of the population remains uninsured, potentially impeding their capacity to engage in essential health-promoting activities (Kim et al., 2016; Shim et al., 2019). This study, in tandem with the existing body of literature, underscored the imperative of adopting a holistic approach to enhance screening rates to ensure equitable access to digestive system cancer screening services for all individuals.

Marital Status and Blood Stool Cancer Screening

The study also shows that married status strongly influences digestive system cancer screening behavior, supporting previous studies on marriage's health benefits. Married couples are more open to screening recommendations and attend more diagnosis appointments, independent of age or education, according to Hersch et al. (2017) and Weissfeld (2019). These findings support the hypothesis that marital social support, shared decision-making, and encouragement can improve healthcare utilization (Hersch et al., 2017; Weissfeld, 2019). The study reinforced the relevance of sending screening invitations to both couples, recognizing the potential synergy in persuading individuals to participate when their spouses are involved (Hersch et al., 2017; Weissfeld, 2019). These findings support gender-equal screening programs the study also showed that marital status affects screening decisions and increases participation rates. These findings emphasize the importance of social support and relational aspects in cancer screening strategies Furthermore, this study extended this preexisting research by not only corroborating that married individuals manifest elevated screening participation rates, but also elucidating that the inclusion of both marital partners in screening invitations can yield a supplementary augmentation in attendance rates.

Relevance to the Theoretical Framework

According to Bronfenbrenner's social ecology model, people's health behaviors and outcomes are highly impacted by their complex social and environmental environments (Bronfenbrenner, 1979). In the context of this study, in which the researcher attempted to understand digestive system cancer screening in Texas, this

theoretical framework exposes the complicated link between demographic factors, SES, and health habits.

Demographic Factors

The study's findings resonate with the tenets of the SEM. Older age groups exhibited a reduced likelihood of undergoing digestive system cancer screening, echoing Bronfenbrenner's notion that individuals are shaped by the broader societal and environmental context as they age (Bronfenbrenner, 1979; Hays et al., 1997). As people progress through life stages, they encounter varying social and environmental influences that can impact their health behaviors, potentially leading to decreased screening rates. Furthermore, the role of race/ethnicity in screening behaviors is consistent with the model's emphasis on nested systems of influence. Black and Asian non-Hispanic individuals demonstrated a heightened propensity for screening, illuminating the model's recognition of cultural and societal factors inherent to different racial and ethnic groups that profoundly affect health behaviors.

Socioeconomic Status (Education Level, Employment Status, Income Level)

The current study's results regarding SES factors align seamlessly with Bronfenbrenner's (1979) SEM. Participants with higher income levels exhibited an increased likelihood of undergoing screening, by the model's assertion that educational environments are instrumental in shaping individual behaviors. This observation underscores the model's perspective that economic factors within an individual's environment can significantly mold health behaviors and access to healthcare services (Bronfenbrenner, 1979; Ryan, 2001). From the findings, income levels emerged as

influential determinants of screening rates, with lower-income individuals displaying a reduced likelihood of screening.

Health Behaviors (Physical Activity, Tobacco Use, Healthcare Coverage)

The study's findings concerning health behaviors are in line with the SEM's emphasis on individual behaviors within the context of their social and environmental surroundings Notably, participants lacking health coverage exhibited a greater likelihood of undergoing screening, suggesting that the absence of coverage might act as a motivating factor, driving individuals to seek preventive care services like cancer screening (Bronfenbrenner, 1979; Ma et al., 2017). In summary, the study's findings provide empirical validation for the applicability of Bronfenbrenner's SEM in elucidating the determinants of digestive system cancer screening in Texas. This model's framework, which encompasses nested ecological systems, effectively explicates how demographic factors, SES, and health behaviors intertwine within the broader social and environmental context of individuals to influence their likelihood of undergoing cancer screening.

Limitations of the Study

One of the primary limitations of this study stemmed from the use of secondary data, specifically the 2018 Texas BRFSS survey. The survey data were collected through a disproportionate stratified sampling approach for landline telephone samples and random sampling for cell phone samples. This method could have introduced selection bias because the sample selected might only partially reflect the entire target population. As a result, the study's external validity was compromised, and the findings were only

partially representative of the broader population, particularly those who did not use landline telephones or cell phones.

Utilizing data from the 2018 BRFSS survey entailed the risk of data source bias. Although the CDC website is a credible source of health data, secondary information can be biased or incomplete, potentially leading to erroneous outcomes. Other sources might have provided similar data, but variations or inconsistencies in data collection and reporting methods could have introduced errors. To mitigate this external threat, the researcher relied on data that were obtained directly from the CDC website, a recognized and reliable source for health-related data.

The 2018 Texas BRFSS survey data were cross-sectional, capturing a snapshot of the population simultaneously. This cross-sectional design might not have allowed for the assessment of causal relationships between variables. While associations could have been identified, causality could not have been established definitively, limiting the ability to conclude the direction of influence between the independent and dependent variables. These limitations primarily pertained to issues of generalizability, data source bias, incomplete information, limited control over data collection, potential unaccounted variables, and the cross-sectional nature of the data. Researchers and readers should exercise caution when interpreting the current study's findings and consider these limitations when applying the results to broader populations or drawing causal inferences.

Recommendations

The current study employed a cross-sectional design, which provides valuable insights into associations between variables at a single point in time. In order to establish

causal relationships and better understand how changes in demographic factors, SES, and health behaviors influence cancer screening over time, future scholars should consider longitudinal designs Longitudinal studies would allow for the tracking of individuals' screening behaviors and associated factors over several years, providing a more comprehensive understanding of the dynamics involved. The study primarily used quantitative methods to examine associations. To gain a deeper understanding of the underlying motivations and barriers related to cancer screening, qualitative research methods such as interviews or focus groups could be employed. Qualitative data can help capture the nuances of individuals' experiences and perceptions regarding cancer screening, shedding light on the cultural, social, and contextual factors that quantitative data alone may not fully reveal.

While the study examined the influence of demographic factors individually, future research should explore intersectionality—the interconnectedness of various demographic characteristics. An intersectional analysis would investigate how race, gender, and SES influence cancer screening behaviors. This approach recognizes that multiple dimensions of identity shape individuals' experiences and can lead to more tailored interventions. The current study focused on Texas, but cancer screening behaviors vary significantly by geographic region. Future researchers should consider conducting similar studies in other states or regions to identify potential regional disparities in screening rates and associated factors. This could provide insights into the impact of local healthcare systems and policies on cancer screening.

Based on an examination of digestive system cancer screening habits in Texas, the current researcher found substantial connections between demographic characteristics, SES, and health behaviors, highlighting the complexities of screening uptake. The study focused on differences in screening rates among different population categories, notably in terms of age, education, income, and health insurance status. Several focused recommendations for public health practice are warranted based on the study's findings. To begin, public health practitioners may consider implementing specialized teaching efforts that particularly target demographic groups that have been identified as having lower screening rates. To reach varied communities, these efforts should emphasize the necessity of screening, dispel myths, and use culturally relevant language. Furthermore, treatments should include attempts to address the unique barriers to screening services that older persons confront. These could include informational resources for seniors and careers, as well as community-based outreach programs.

The study shed insight on the significance of SES on cancer screening practices. Notably, those with greater education levels and income had higher screening rates, whereas those with lower SES indicators had lower uptake. This emphasizes the necessity of initiatives that remove economic barriers to screening, as well as the value of education in raising awareness and knowledge of the importance of preventive healthcare. To overcome these discrepancies, public health practitioners can push for legislation that provides access to affordable healthcare, especially among low-income individuals. Supporting Medicaid expansion efforts or implementing state-specific initiatives to ensure underprivileged populations have access to subsidized or free cancer

screening services may be part of this. Furthermore, interventions should include programs focused on boosting health literacy among lower socioeconomic groups, as well as providing individuals with information about screening advantages and financial support.

Tobacco usage and health insurance coverage have also influenced cancer screening uptake. Participants without health insurance had higher screening rates, indicating that this demographic has unmet healthcare requirements. Furthermore, cigarette users were less likely to get screened, emphasizing the necessity of addressing these habits to promote preventive healthcare. Public health practice should focus on treating health behaviors by including screening promotion in cigarette cessation programs. Offering incentives or packaged services that combine cancer screening with smoking cessation can encourage people to take preventative measures for their health. There is a need for targeted initiatives to connect the uninsured population with inexpensive or subsidized healthcare options, ensuring that financial restrictions do not impede access to preventive treatment.

Implications for Professional Practice and Social Change

In this section, the implications of the results of this study for both professional practice and the broader realm of social change are discussed. The findings can potentially inform and enhance professional practices in the healthcare field and catalyze meaningful transformations in society's approach to digestive system cancer screening. In professional practice, the researcher scrutinizes how the insights can empower healthcare professionals to develop more targeted and effective screening strategies.

Simultaneously, the researcher considers how these findings promise to drive social change by fostering greater equity and accessibility in digestive system cancer screening practices, ultimately leading to improved public health outcomes.

Professional Practice

The findings of this study have the potential to significantly affect and transform current professional practice in the realm of cancer screening. One key transformation pertains to the tailoring of educational initiatives. The study's revelation that older adults exhibit lower digestive system cancer screening rates underscores the need for public health professionals to design age-specific educational programs. By customizing information and outreach efforts to address the concerns and preferences of older individuals, practitioners can foster a greater understanding of the importance of regular screening and dispel any apprehensions associated with these procedures (Kim et al., 2016). Such tailored initiatives can increase participation among older populations, ultimately contributing to early cancer detection and improved patient outcomes.

Another transformative aspect is recognizing the role of socioeconomic disparities in screening behaviors. The study's identification of income-related barriers to screening suggests that healthcare providers and policymakers should prioritize initiatives to reduce these disparities. Implementing subsidized screening programs, expanding outreach to underserved communities, and offering financial assistance to lower-income individuals are some practical steps that could mitigate the impact of socioeconomic factors on cancer screening rates (Weissfeld et al., 2019). This transformation in practice aligns with a broader movement towards achieving healthcare equity, ensuring that individuals from

all socioeconomic backgrounds have equal access to life-saving cancer screenings. Professionals can contribute to a more just and equitable healthcare system by addressing these disparities.

Furthermore, the study's findings challenge conventional assumptions regarding health insurance and its impact on cancer screening behavior. The unexpected result that uninsured individuals were more likely to undergo certain screening tests calls for reevaluating how healthcare professionals engage with different populations. Professionals should provide clear and accessible information about screening options to all individuals, regardless of their insurance status, to ensure informed decision-making. This transformation in practice underscores the importance of a patient-centered approach that prioritizes individuals' healthcare needs and preferences over assumptions based on insurance coverage (Senore et al., 2021). Healthcare professionals and policymakers should continue efforts to expand healthcare coverage to ensure that individuals have access to preventive services, including cancer screening.

In addition, the study findings highlighted the need for gender-neutral screening promotion by recognizing that gender does not significantly influence digestive system cancer screening participation, professionals can adapt their communication strategies to reach a wider audience. Gender-neutral messaging and outreach can help ensure that both men and women receive equal access to information and opportunities for screening, aligning with the principles of inclusivity and equitable healthcare access (Kotwal & Walter, 2020). This transformation in practice reflects a more contemporary and progressive approach to healthcare communication that embraces diversity and

recognizes that healthcare decisions are influenced by various factors beyond gender. In conclusion, the study's findings have the potential to revolutionize professional practice by promoting tailored education, addressing socioeconomic disparities, reevaluating assumptions about health insurance, and adopting gender-neutral approaches to screening promotion, ultimately contributing to more equitable and effective cancer screening programs and public health delivery.

Social Change

The results and findings of this study hold significant potential to bring about positive social change at the individual level by enhancing awareness and promoting proactive health-seeking behaviors. One of the key individual-level implications of this research is the understanding that age significantly influences digestive system cancer screening behaviors. Older individuals were found to be less likely to undergo sigmoidoscopy and colonoscopy tests. This insight can contribute to positive social change by encouraging public health providers to target educational initiatives towards older adults. These initiatives can focus on dispelling age-related myths and misconceptions about screening tests, emphasizing their importance in early cancer detection, and addressing potential discomfort or lack of understanding that may deter older individuals from screening. By tailoring educational efforts to address the specific needs and concerns of older adults, public health providers can empower individuals to make informed decisions about their health and potentially increase screening rates among this demographic.

The study's findings can impact positive social change within families by emphasizing the role of spousal involvement and social support in cancer screening decisions. Marital status was identified as a significant factor influencing screening behavior, with married individuals exhibiting higher participation rates. This insight suggests that family dynamics and support systems are crucial in health-related decisions. Public health practitioners can leverage this knowledge to encourage family involvement in cancer screening discussions and decisions. By sending screening invitations to both spouses and highlighting the benefits of spousal support in healthcare choices, healthcare providers can foster a culture of health-consciousness within families. This approach can extend beyond the nuclear family to encompass broader support networks, ultimately promoting a collective commitment to preventative public health practices.

Organizations involved in public healthcare delivery and cancer screening programs can leverage the study's findings to enact positive social change at the organizational level. The study findings underscored the importance of addressing socioeconomic disparities in cancer screening. Income levels were identified as significant predictors of screening utilization, with lower-income individuals exhibiting lower screening rates. To promote equity in cancer screening, public health organizations can implement targeted interventions and outreach programs to reach underserved communities. These initiatives can include subsidized screening programs, community-based education, and awareness campaigns, and partnerships with local organizations to provide financial assistance to individuals in lower income brackets. By proactively addressing socioeconomic disparities, public health organizations can contribute to

positive social change by ensuring that access to cancer screening is not determined by financial status.

The study's findings have implications for positive social change at the societal and policy levels by highlighting the complex interplay of factors that influence cancer screening behavior. The unexpected result that uninsured individuals were more likely to undergo sigmoidoscopy and colonoscopy tests challenges common assumptions about healthcare access. This finding underscores the need for public health providers to influence policymakers to consider the multifaceted nature of healthcare decision-making. It suggests that individuals without health insurance may prioritize proactive screening as a means of early detection and cost reduction, potentially reducing future healthcare expenses. Policymakers can use this insight to inform healthcare policy reforms that address not only access to insurance, but also the motivations and decision-making processes of uninsured individuals regarding cancer screening. By adopting a holistic approach to public health policy, policymakers can contribute to positive social change by promoting equitable access to preventive public health services and addressing the unique needs of various demographic groups.

Conclusion

In summary, this study offered a crucial message of enclosing a central nature to the research endeavor. The researcher discerned that individual demographics, socioeconomic determinants, and health-related conduct profoundly influence the complexities surrounding digestive system cancer screening behaviors. The most important lesson from this investigation reflects interventions tailored to addressing the

urgent needs and barriers diverse demographic groups encounter. These tailored approaches are crucial in advancing equitable access to preventive healthcare services, making significant progress toward enhancing public health.

Throughout this study, the researcher adeptly demonstrated the mastery of a range of foundational and concentration-specific competencies pertinent to the Doctor of Public Health (D.Ph.) program. Firstly, the adept design of a quantitative correlation study is symbolic of the capacity to craft methodologically rigorous research initiatives geared toward addressing pressing public health predicament. This study exemplified the application of quantitative methods to unravel the intricacies of a multifaceted public health predicament. This refined analysis delved into the strengths and limitations of applying theoretical frameworks to diverse public health issues. This study seamlessly integrated theories, bridging demographic determinants, socioeconomic foundations, and health behavior paradigms. By scrutinizing the applicability of these theories, the researcher demonstrated proficiency in recognizing their benefits and pertinence to real-world public health perplexities.

Ethical considerations have consistently underscored the current research endeavors. In conscientiously navigating the design and execution of this study, the researcher vigilantly upheld the principles of research ethics. Safeguarding participant confidentiality, respecting data privacy, and adhering to ethical tenets governing responsible data usage remained paramount. The commitment to ethical rigor underscores the ethical compass that has consistently guided this research initiative. Effective communication of the research findings to diverse stakeholders, encompassing

individuals characterized by varied levels of health literacy, is another notable facet of scholarly insight. By disseminating research outcomes in an accessible and intelligible manner, the researcher strived to bridge the difference between empirical findings and verifiable action. This pursuit has provided individuals and policymakers with the knowledge requisite for informed decision-making, advocating for beneficial behaviors and policies.

In conclusion, this study has profound significance within the broader realm of public health. The findings spotlighted the multifaceted facets of cancer screening behaviors and their underpinnings. As the researcher outlines this trajectory forward, she anticipates that the knowledge gained from this investigation shall serve as a model guiding the formulation of evidence-based interventions, policies, and strategies. These initiatives aid the researcher's proposals that will prove instrumental in advancing universal access to preventive healthcare services and, in the final analysis, in fortifying the edifice of public health by fostering the health and well-being of these communities.

References

ACHA. (2018). *Ecological model.* https://www.acha.org/HealthyCampus/HealthyCampus/Ecological_Model.aspx

Alcalde-Rubio, L., Hernández-Aguado, I., Parker, L. A., Bueno-Vergara, E., & Chilet-Rosell, E. (2020). Gender disparities in clinical practice: are there any solutions? Scoping review of interventions to overcome or reduce gender bias in clinical practice. *International Journal for Equity in Health*, *19*(1), 166.

Arnold, M., Abnet, C. C., Neale, R. E., Vignat, J., Giovannucci, E. L., McGlynn, K. A., & Bray, F. (2020). Global burden of 5 major types of gastrointestinal cancer. *Gastroenterology, 159*(1), 335–349. https://doi.org/10.1053/j.gastro.2020.02.068

Atkin, W., Wooldrage, K., Parkin, D. M., Kralk-Hans, I., MacRae, E., Shah, U., Duffy, S., & Cross, A. J. (2017). Long term effects of once-only flexible sigmoidoscopy screening after 17 years of follow-up: The UK Flexible Sigmoidoscopy Screening randomized controlled trial. *Lancet, 389*(10076), 1299–1311. https://doi.org/10.1016/S0140-6736 (17)30396-3

Bevan, R., & Rutter, M. D. (2018). Colorectal cancer screening: Who, how, and when? *Clinical Endoscopy*, *51*(1), 37. https://doi.org/10.5946/ce.2017.141

Borgstede, M., & Scholz, M. (2021). Quantitative and qualitative approaches to generalization and replication—a representation list view. *Frontiers in Psychology*, *12*(2), 60–91. https://doi.org/10.3389/fpsyg.2021.605191

Bronfenbrenner, U. (1979). *The ecology of human development*. Harvard University Press.

Cancer Prevention and Research Institute of Texas. (2018). *Texas cancer plan.* https://www.cprit.texas.gov/about-us/texas-cancer-plan

Centers for Disease Control and Prevention. (2014). *Behavioral risk factor surveillance system (BRFSS).*

Centers for Disease Control and Prevention. (2022). *Behavioral Risk Factor Surveillance System*. https://www.cdc.gov/brfss/index.html

Chang, Y., Cho, B., Son, K. Y., Shin, D. W., Shin, H., Yang, H. K., Shin, A., & Yoo, K. Y. (2015). Determinants of gastric cancer screening attendance in Korea: A multi-level analysis. *BMC Cancer*, *15*(1), 1–7. https://doi.org/10.1186/s12885-015-1328-4

Curtis, E. A., Comiskey, C., & Dempsey, O. (2016). Importance and use of correlational research. *Nurse Researcher, 23*(6), 1–22. https://doi.org/10.7748/nr.2016.e1382

Darling, N. (2007). Ecological systems theory: The person in the center of the circles. *Research in Human Development, 4*(3-4), 203–217. https://doi.org/10.1080/15427600701663023

Doubeni, C. A., Corley, D. A., Jensen, C. D., Schottinger, J. E., Lee, J. K., Ghai, N. R., Levin, T. R., Zhao, W. K., Saia, C. A., Wainwright, J. V., Mehta, S. J., Selby, K., Doria-Rose, V. P., Zauber, A. G., Fletcher, R. H., & Weiss, N. S. (2020). The effect of using fecal testing after a negative sigmoidoscopy on the risk of death from colorectal cancer. *Journal of Medical Screening, 28*(2). https://doi.org/10.1177/0969141320921427

Dzau, V. J., McClellan, M. B., McGinnis, M. J., Burke, S. P., Coye, M. J., Diaz, A., Daschle, T. A., Frist, W. H., Gaines, M., Hamburg, M. A., Henney, J. E., Kumanyika, S., Leavitt, M. O., Parker, R. M., Sandy, L. G., Schaeffer, L. D., Steele, G. D., Jr., Thompson, P., & Zerhouni, E. (2017). Vital directions for health and health care: Priorities from a national academy of medicine initiative. *Journal of the American Medical Association, 317*(14), 1461–1470. https://doi.org/10.1001/jama.2017.1964

Ekmekcioglu, C., Wallner, P., Kundi, M., Weisz, U., Haas, W., & Hutter, H. P. (2018). Red meat, diseases, and healthy alternatives: A critical review. *Critical Reviews in Food Science and Nutrition, 58*(2), 247–261. https://doi.org/10.1080/10408398.2016.1158148

Eng, V. A., David, S. P., Li, S., Ally, M. S., Stefanick, M., & Tang, J. Y. (2020). The association between cigarette smoking, cancer screening, and cancer stage: A prospective study of the women's health initiative observational cohort. *BMJ Open*, *10*(8), 17–45. https://doi.org/10.1136/bmjopen-2020-037945

Etemadi, A., Safiri, S., Sepanlou, S. G., Ikuta, K., Bisignano, C., Shakeri, R., Amani, M., Fitzmaurice, C., Nixon, M., Abbasi, N., Abolhassani, H., Advani, S. M., Afarideh, M., Akinyemiju, T., Alam, T., Alikhani, M., Alipour, V., Allen, C. A., Almasi-Hashani, A.…. & Sekerija, M. (2020). The global, regional, and national burden of stomach cancer in 195 countries, 1990–2017: A systematic analysis for the global burden of disease study 2017. *Lancet Gastroenterology & Hepatology*, *5*(1), 42–54. https://doi.org/10.1016/S2468-1253(19)30328-0

Fitzmaurice, C., Akinyemiju, T. F., Al Lami, F. H., Alam, T., Alizadeh-Navaei, R., Allen, C., Alsharif, U., Alvis-Guzman, N., Amini, E., Anderson, B. O., Aremu, O., Artaman, A., Asgedom, S. W., Assadi, R., Atey, T. M., Avila-Burgos, L., Awasthi, A., Ba Saleem, H. O., Barac, A., & Naghavi, M. (2018). Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 29 cancer groups, 1990 to 2016: A systematic analysis for the global burden of disease study. *JAMA Oncology, 4*(11), 1553–1568. https://doi.org/10.1001/jamaoncol.2018.2706

Gabel, P., Larsen, M. B., Kirkegaard, P., Edwards, A., & Andersen, B. (2018). The LEAD trial: The effectiveness of a decision aid on decision making among citizens with lower educational attainment who have not participated in FIT-based colorectal cancer screening in Denmark: Study protocol for a randomized controlled trial. *Trials*, *19*(1), 1–10. https://doi.org/10.1016/j.pec.2019.08.029

Glanz, K. B., Rimer, B. K., & Viswanath, K. (Eds.). (2018). *Health behavior and health education: Theory, research, and practice* (4th ed., pp. 465-486). Jossey-Bass.

Gudibanda, S., & Guda, N. (2021). Impact of COVID-19 pandemic on routine colorectal cancer screening. *American Journal of Gastroenterology, 116*, S1343. https://doi.org/10.14309/01.ajg.0000786568.26999.fb

Gupta, S., Tao, L., Murphy, J. D., Camargo, M. C., Oren, E., Valasek, M. A., Gomez, S. L., & Martinez, M. E. (2019). Race/ethnicity-, socioeconomic status-, and anatomic subsite-specific risks for gastric cancer. *Gastroenterology*, *156*(1), 59–62. https://doi.org/10.1053/j.gastro.2018.09.045.

Hama, H., Tabuchi, T., Ito, Y., Fukushima, W., Matsunaga, I., Miyashiro, I., & Nakayama, T. (2016). Smoking behavior and participation in screening for lung, gastric, and colorectal cancers. *Japanese Journal of Public Health*, *63*(3), 126–134. https://doi.org/10.11236/jph.63.3_126

Health Resources and Services Administration. (2015). Nation's health centers: An overview of service and growth. https://doi.org/10.1016/j.jamda.2015.12.017

Hodge, S. R. (2020). *Quantitative research*. Routledge.

Hosmer, D. W., Jr., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression* (Vol. 398). John Wiley & Sons.

Hovanec, J., Siemiatycki, J., Conway, D. I., Olsson, A., Stücker, I., Guida, F., Jöckel, K.-H., Pohlabeln, H., Ahrens, W., Brüske, I., Wichmann, H.-E., Gustavsson, P., Consonni, D., Merletti, F., Richiardi, F., Simonato, L., Fortes, C., Parent, M.-E.… & Behrens, T. (2018). Lung cancer and socioeconomic status in a pooled analysis of case-control studies. *PLoS ONE, 13*(2), 19–99. https://doi.org/10.1371/journal.pone.0192999

Joseph, D. A., King, J. B., Richards, T. B., Thomas, C. C., & Richardson, L. C. (2018). Peer-reviewed: Use of colorectal cancer screening tests by state. *Preventing Chronic Disease, 15*(2), 9–22. https://doi.org/10.11236/jph.63.3_12610.5888/pcd15.170535

Kang, J. M., Shin, D. W., Kwon, Y. M., Park, S. M., Park, M. S., Park, J. H., & Cho, B. L. (2011). Stomach cancer screening and preventive behaviors in relatives of gastric cancer patients. *World Journal of Gastroenterology, 17*(30), 3–18. https://doi.org/10.3748%2Fwjg.v17.i30.3518

Kim, S. J., Han, K. T., & Park, E. C. (2016). Impact of job status on the accessibility of cancer screening. *Cancer Research and Treatment: Official Journal of Korean Cancer Association, 48*(2), 825–833. https://doi.org/10.4143/crt.2015.040

Kirkegård, J., Cronin-Fenton, D., Heide-Jørgensen, U., & Mortensen, F. V. (2018). Acute pancreatitis and pancreatic cancer risk: A nationwide matched cohort study in Denmark. *Gastroenterology, 154*(6), 1729–1736. https://doi.org/10.1053/j.gastro.2018.02.011.

Klainin-Yobas, P., He, H. G., & Lau, Y. (2015). Physical fitness, health behavior and health among nursing students: A descriptive correlational study. *Nurse Education Today*, *35*(12), 1199–1205. https://doi.org/10.1016/j.nedt.2015.06.014

Lau, J., Lim, T. Z., Wong, G. J., & Tan, K. K. (2020). The health belief model and colorectal cancer screening in the general population: A systematic review. *Preventive Medicine Reports*, *20*(2), 2–22. https://doi.org/10.1016/j.pmedr.2020.101223

Lee, E. Y., Lee, Y. Y., Suh, M., Choi, E., Mai, T. T. X., Cho, H., & Choi, K. S. (2018). Socioeconomic inequalities in stomach cancer screening in Korea, 2005–2015: After the introduction of the National Cancer Screening Program. *Yonsei Medical Journal, 59*(8), 923–929. https://doi.org/10.3349/ymj.2018.59.8.923

Lee, S., Jun, J. K., Suh, M., Park, B., Noh, D. K., Jung, K. W., & Choi, K. S. (2015). Gastric cancer screening uptake trends in Korea: Results for the National Cancer Screening Program from 2002 to 2011: A prospective cross-sectional study. *Medicine*, *94*(8), 22–34. https://doi.org/10.1097%2FMD.0000000000000533

Lin, Z. Z., Xu, Y. C., Liu, C. X., Lu, X. L., & Wen, F. Y. (2021). Physical activity and liver cancer risk: A systematic review and meta-analyses. *Clinical Journal of Sports Medicine: Official Journal of the Canadian Academy of Sports Medicine*, *31*(1), 86–90. https://doi.org/10.1097/JSM.0000000000000689

Liu, Q., Zeng, X., Wang, W., Huang, R. L., Huang, Y. J., Liu, S., Huang, Y.-H., Wang, Y.-X., Fang, Q.-H., He, G., & Zeng, Y. (2019). Awareness of risk factors and warning symptoms and attitude towards gastric cancer screening among the general public in China: A cross-sectional study. *BMJ Open*, *9*(7), e029638. http://dx.doi.org/10.1136/bmjopen-2018-022097

Menard, S. (2002). *Applied logistic regression analysis* (No. 106). SAGE.

Muus, K. J., Baker-Demaray, T. B., Bogart, T. A., Duncan, G. E., Jacobsen, C., Buchwald, D. S., & Henderson, J. A. (2012). Physical activity and cervical cancer testing among American Indian women. *Journal of Rural Health*, *28*(3), 320–326. https://doi.org/10.1111/j.1748-0361.2011.00394.x

Raghupathi, V., & Raghupathi, W. (2020). The influence of education on health: An empirical assessment of OECD countries for the period 1995–2015. *Archives of Public Health*, *78*(1), 1–18. https://doi.org/10.1186/s13690-020-00402-5

Sarvizadeh, M., Hasanpour, O., Ghale-Noie, Z. N., Mollazadeh, S., Rezaei, M., Pourghadamyari, H., & Mirzaei, H. (2021). Allicin and digestive system cancers: from chemical structure to its therapeutic opportunities. *Frontiers in Oncology*, *11*(2), 3–22. https://doi.org/10.3389/fonc.2021.650256

Sauer, A. G., Siegel, R. L., Jemal, A., & Fedewa, S. A. (2019). The current prevalence of major cancer risk factors and screening test use in the United States: Disparities by education and race/ethnicity. *Cancer Epidemiology and Prevention Biomarkers*, *28*(4), 629–642. https://doi.org/10.1158/1055-9965.EPI-18-1169

Serrano, J., Rinaudo, J. A., Srivastava, S., Ghosh, S., Unalp-Arida, A., & Andersen, D. K. (2021). The National Institute of Health's approach to addressing research gaps in pancreatitis, diabetes, and early detection of pancreatic cancer. *Current Opinion in Gastroenterology*, *37*(5), 480–485. https://doi.org/10.1097/MOG.0000000000000758

Shen, X., Zhu, G., Liu, R., Viola, D., Elisei, R., Puxeddu, E., Fugazzola, L., Colombo, C., Jarzab, B., Czarniecka, A., Lam, A. K., Mian, C., Vianello, F., Yip, Y., Riesco-Eizaguirre, G., Santisteban, S., O'Neill, C. J., Sywak, M. S., Clifton-Bligh, R., Bendlova, B…. & Xing, M. (2018). Patient age-associated mortality risk is differentiated by BRAF V600E status in papillary thyroid cancer. *Journal of Clinical Oncology*, *36*(5), 438. https://doi.org/10.1200/JCO.2017.74.5497

Shim, H. Y., Jun, J. K., & Shin, J. Y. (2019). Employment conditions and use of gastric cancer screening services in Korea: A nationwide survey. *BMC Public Health*, *19*(1), 1–10. https://doi.org/10.1186/s12889-019-6841-y

Song, M., Camargo, M. C., Weinstein, S. J., Best, A. F., Männistö, S., Albanes, D., & Rabkin, C. S. (2018). Family history of cancer in first-degree relatives and risk of gastric cancer and its precursors in a Western population. *Gastric Cancer*, *21*(5), 729–737. https://doi.org/10.1007/s10120-018-0807-0

Sung, H., DeSantis, C. E., Fedewa, S. A., Kantelhardt, E. J., & Jemal, A. (2019). Breast cancer subtypes among Eastern-African–born black women and other black women in the United States. *Cancer*, *125*(19), 3401–3411. https://doi.org/10.1002/cncr.32293

Taylor, J., & Haintz, G. L. (2018). Influence of the social determinants of health on access to healthcare services among refugees in Australia. *Australian Journal of Primary Health, 24*(1), 14–28. https://doi.org/10.1071/PY16147

Tucker, C. M., Lippold, G. M., Guastello, A. D., Arthur, T. M., Desmond, F. F., Rivers, B. M., & Green, B. L. (2018). Predictors of cancer screening among culturally diverse men. *American Journal of Men's Health, 12*(4), 837–843. https://doi.org/10.1177%2F1557988316644398

Van Loon, A. J., Goldbohm, R. A., & Van den Brandt, P. A. (2018). Socioeconomic status and stomach cancer incidence in men: results from The Netherlands Cohort Study. *Journal of Epidemiology & Community Health*, *52*(3), 166–171. https://doi.org/10.1136/jech.52.3.166

Wang, G. Q., & Wei, W. W. (2019). A new transition of the screening, early diagnosis, and early treatment project of the upper gastrointestinal cancer: Opportunistic screening. *Chinese Journal of Preventive Medicine*, *53*(11), 1084–1087. https://doi.org/10.3760/CMA.j.issn.0253-9624.2019.11.002

White, A., Ironmonger, L., Steele, R. J., Ormiston-Smith, N., Crawford, C., & Seims, A. (2018). A review of sex-related differences in colorectal cancer incidence, screening uptake, routes to diagnosis, cancer stage and survival in the U.K. *BMC Cancer*, *18*(1), 1–11. https://doi.org/10.1186/s12885-018-4786-7

Williams, L. A., Richardson, M., Marcotte, E. L., Poynter, J. N., & Spector, L. G. (2019). Sex ratio among childhood cancers by single year of age. *Pediatric Blood & Cancer*, *66*(6), 27–62. https://doi.org/10.1002/pbc.27620

Wong, M. C., Huang, J., Chan, P. S., Choi, P., Lao, X. Q., Chan, S. M., Choi, P., Lao, X. Q., Chan, S. M., Teoh, A., & Liang, P. (2021). Global incidence and mortality of gastric cancer, 1980–2018. *JAMA Network Open*, *4*(7), e2118457–e2118457. https://doi.org/10.1001/jamanetworkopen.2021.18457

Xie, F., You, Y., Huang, J., Guan, C., Chen, Z., Fang, M., & Han, J. (2021). Association between physical activity and digestive-system cancer: An updated systematic review and meta-analysis. *Journal of Sport and Health Science*, *10*(1), 4–13. https://doi.org/10.1016/j.jshs.2020.09.009

Zhang, Y., Song, M., Chan, A. T., Schernhammer, E. S., Wolpin, B. M., Stampfer, M. J., & Ng, K. (2021). Unrestrained eating behavior and risk of digestive system cancers: A prospective cohort study. *American Journal of Clinical Nutrition*, *2*(1), 7–22. https://doi.org/10.1093/ajcn/nqab235