

KNOWLEDGE, PERCEPTIONS AND PRACTICES REGARDING CANCER

SCREENING

AMONG

GARIFUNA WOMEN

by

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A Dissertation submitted to the

Graduate School-Newark

Rutgers, The State University of New Jersey

in partial fulfillment of the requirements

for the degree of Doctor of Philosophy

Graduate Program in Urban Systems

written under the direction of

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Newark, New Jersey

January, 2020

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## ABSTRACT OF THE DISSERTATION

Knowledge, perceptions and practices regarding cancer screening among Garifuna

Women

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### **Rationale for the study**

Cancer screening disparities exist among immigrant groups in the United States, yet the cancer screening behaviors of ethnic Black immigrants remains relatively unknown. Low cancer screening rates among ethnic Black immigrant groups are associated with various structural, and sociocultural barriers. These barriers may be the same for all ethnic Black immigrants but evidence is lacking. The Garifuna, an Afro-Amerindian Central American group experience structural forces in their homelands and settling communities in urbanized spaces in the US with little known of their cancer screening practices. The purpose of this study was to examine breast, cervical, and colorectal cancer screening practices among Garifuna women residing in the boroughs of New York City, and to identify any disparities in their cancer screening practices. The study examined levels of adherence to the recommended breast, cervical, and colorectal cancer screening guidelines and their association with demographic factors, access to healthcare services, perceptions/barriers, acculturation, identity and level of guideline knowledge.

### **Method**

This study used a mixed method approach of interviews with eight key informants knowledgeable on the health behaviors of Garifuna women and surveying of four hundred Garifuna women, age 50 years and older residing in the New York City area. Content analysis was performed on key informant interview transcripts which confirmed survey sociocultural variable choices. Univariate analysis was used to describe the survey study sample and bivariate analysis to measure level of association between variables. Logistic regression examined the predictive nature of variables in explaining cancer screening adherence.

## **Results**

Four hundred two Garifuna women completed surveys over a twenty-two month period. The results show that disparities exist in cervical cancer screening and are suggested in colorectal cancer screening. Models for colorectal cancer screening by colonoscopy and fecal occult blood testing were the most predictive of the cancer screening types with knowledge and health belief models having the highest predictive variability.

## **Conclusion**

Further studies on cervical and colorectal cancer screening among Garifuna women are recommended to identify additional barriers contributing to these cancer screening disparities, and to develop culturally appropriate interventions aimed to end disparities in this unique immigrant group.



### Project Funding

This project was supported by an American Dissertation Fellowship Grant awarded by the American Association of University Women and the Rutgers School of Health Professions Department of Clinical Laboratory and Medical Imaging Sciences.

## Dedications

This dissertation project is dedicated to my mother Dawn Forrest, Mom I miss you every day, and my father Fitzburn Forrest. You instilled the importance and value of education in me and I hope I have made you proud. Cauline and Camille, I felt your support from across the miles. To my children Amber and Jordan who inspire me every day, and keep me focused on the prize! To Oscar for all your love and support over the years. Thank you all for lifting me up so I could power through!

## Acknowledgments

To the members of my dissertation committee, Dr. Rula Btoush, Dr. Arthur Powell, Dr. Ariane Chebel and Dr. Teri Lassiter, thank you for your guidance and support. A very special thank you to my dissertation chairperson, Dr. Rula Btoush for your unwavering support and mentorship throughout this process. I have grown as a writer and researcher under your tutelage. A million thanks to my research assistant Ms. Carmen Nunez, who spent countless hours in parks and churches in the Bronx and Brooklyn recruiting women for the study. Your passion and energy for the study was infectious. I could not have done it without you.

A special thank you to all the members of the Garifuna community in the New York City area who offered advice and constructive criticism, and to all the Garifuna women who took the time to complete the survey for the benefit of their community.

Seremein!

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## **CHAPTER ONE**

### **PROBLEM STATEMENT**

Pervasive disparities exist in cancer screening among immigrant and ethnic minority groups in the US; however, little is known about cancer screening practices of ethnic Black immigrants (Brown, Wilson, Boothe, & Harris, 2011; Consedine et al., 2009). Cancer screening rates for immigrant groups are as low as 21%, 60% and 49% for cervical, breast and colorectal respectively when compared to national screening rates of 80%, 72% and 58% for the three cancer types (Behbakht, Lynch, Teal, Degeest, & Massad, 2004; Brown, Consedine, & Magai, 2006; Sabatino, White, Thompson, & Klabunde, 2015). Colorectal and breast cancer screening rates as low as 15% and 43.5% among Haitians, and cervical cancer screening rates of 33.8% and 47.5% among Haitians and Afro-Caribbean immigrants respectively, exemplify typical disparities in ethnic Black immigrant cancer screening practices (Behbakht et al., 2004; Gwede et al., 2011; Mandelblatt et al., 1999). These low cancer screening rates are reflective of existing structural and cultural barriers in countries of origin persisting upon migration to largely urban, communities in the United States. Reported cancer screening rates and associated barriers, however, may not be the same for all ethnic Black immigrant groups. Recognizing the cancer screening practices of immigrants is crucial in addressing disparities known to exist among certain immigrant groups, yet little is known of the cancer screening practices of many Black immigrant groups (American Cancer Society, 2015; Seay et al., 2015; Tsui, Saraiya, Thompson, Dey, & Richardson, 2007; Zambrana, Breen, Fox, & Gutierrez-Mohamed, 1999). Moreover, studies show that ethnic Black

immigrants present with more advanced stages of cancer than their US born counterparts, leading to their increased risk of cancer death (Fruchter et al., 1985).

The Garifuna, a Central American, Afro-Amerindian indigenous group, face structural forces of poverty, discrimination and marginalization in their homelands, with very little known about their health behaviors upon migration to largely urbanized spaces in the United States (Anderson, 2007; Barrett, 1995; Bianchi, 1988; S. M. D. Grieb, 2010; Stansbury & Sierra, 2004). Rare studies have focused on their use of traditional healing practices over Western medicine but most studies on the health behaviors of Garifuna women have focused largely on HIV/AIDS revealing high rates of knowledge on the disease but engagement in risky sexual health behavior such as low condom use and casual, secondary partners (Anderson, 2007; Barrett, 1995; Bianchi, 1988; S. M. D. Grieb, 2010; Stansbury & Sierra, 2004). Immigrants with ethnic and geographic similarities to the Garifuna have low rates of cancer screening, lack knowledge on cancer screening tests, and have perceptions that serve as barriers to care (Agurto, Bishop, Sanchez, Betancourt, & Robles, 2004; Bessler, Aung, & Jolly, 2007; Brown et al., 2011).

In conclusion, rates for cancer screening among the Garifuna are hypothesized to be similar to immigrants of similar ethnic and geographic backgrounds, but evidence of cancer screening practices among the Garifuna is lacking. Furthermore, little is known about cancer death rates within the community that may be associated with low cancer screening rates. Therefore, the purpose of the proposed study is to investigate the factors associated with cancer screening among the Garifuna, and identify any disparities associated with their cancer screening behaviors. Using a mixed method approach of interviews with key informants, and cross-sectional surveying, this study examined the

knowledge, perceptions and attitudes towards breast, cervical and colorectal cancer screening practices of Garifuna women residing in the boroughs of New York City. The study answered the following research questions:

1. What is the *level of knowledge* about the recommended breast, cervical, and colorectal cancer screening guidelines among Garifuna women residing in the New York City area?
2. What are the *cancer screening practices* (i.e., level of adherence to the recommended breast, cervical, and colorectal cancer screening guidelines) among Garifuna women residing in the New York City area?
3. What are the *perceptions/barriers* for breast, cervical, and colorectal cancer screening among Garifuna women residing in the New York City area?
4. Is there an association between *cancer screening practices* and demographic factors, access healthcare services, acculturation, identity, and knowledge and perceptions/barriers for breast, cervical, and colorectal screening among Garifuna women residing in the New York City area?

## **CHAPTER TWO**

### **LITERATURE REVIEW**

Understanding the health behaviors of ethnic Black immigrants to the United States is critical to identifying and addressing disparities in health that are well recognized in certain immigrant populations. This study examined knowledge, perceptions, and practices regarding cancer screening among female Garifuna immigrants residing in an urbanized space, New York City. The study was conducted as a cross sectional examination of Garifuna women on their knowledge, perceptions, and practices regarding screening for breast, cervical, and colorectal cancers. More importantly, it examined how migration and concepts associated with the process inform their use of cancer screening methods. The goal of the study was two-fold. First, it served as foundational research on the Garifuna, a unique group of which little is known of their health and health behaviors. Second, it addressed disparities in cancer screening that have long been recognized to exist among certain immigrant groups to the United States. This study also adds to the body of literature that examines disparities in immigrant health specific to cancer as well as serves as the basis of future studies on cancer and immigrant groups settling in urban environments.

#### **The Garifuna**

The Garifuna or Garingua<sup>1</sup> are an Ameri-Indian, indigenous group originating from the Caribbean Basin and the Atlantic coastline of Central America. The group has a storied and unique history that has been the focus of several sociocultural anthropological

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<sup>1</sup> Several sources used Garingua and/or Garifuna. They noted that the Garifuna self-define “Garingua” as the group while the term “Garifuna” is defined as an individual. The term Garifuna is more commonly used in the literature and is used in this manuscript.

works (England, 2010a; Gonzalez, 1983; González, 1969, 1988; Greene, 2002; Johnson, 2002). The Garifuna as a group, are thought to have originated in the 1600s, from the mixing of shipwrecked African slaves and the Native Americans of the Caribbean Basin and are therefore recognized as an indigenous group (González, 1969). Originally from the island of St. Vincent, the Garifuna were removed by force and re-located to Central America (as shown in Figure 1), settling along the isolated, rural coastlines of Honduras, Nicaragua, Guatemala and Belize (England, 2006; González, 1969, 1988). Many Garifuna remain in those isolated, coastal villages until today (Anderson, 2007; England, 2006).

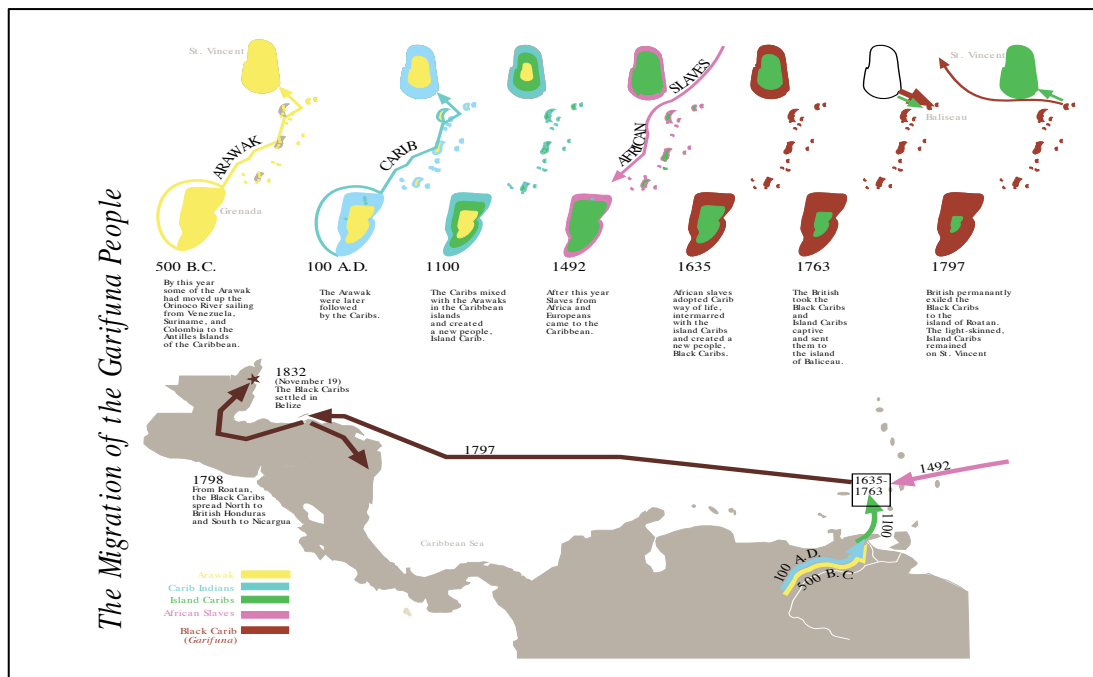


Figure 1. Map of Garifuna Migration (Morris, 2000)

Garifuna live in nuclear families with fishing and subsistence farming still their main types of labor but remittances from the United States are increasingly a main source of income for those in the home countries (Endo, Hirsch, Rogge, & Borowik, 2009; González, 1969). The language (also called

Garifuna) the group speaks is a unique blend of African, Arawakan, and Caribe dialects, with elements of French peppered throughout (Endangered Language Alliance, 2012). Cultural traditions of the group include Punta, a female led courtship dance, the accompanying Punta music, use of traditional herbs, and ancestral based ceremonies such as *dugu* (Barrett, 1995; Bianchi, 1988; González, 1988; Greene, 2002; Jenkins, 1983; Kirtsoglou & Theodossopoulos, 2004). In 2001, the United Nations Economic Social and Cultural Organization (UNESCO) granted the Garifuna the “Proclamation of Masterpieces of the Oral and Intangible Heritage of Humanity” for their unique heritage, culture and language (UNESCO, 2001). The exact number of Garifuna is difficult to pinpoint as many Central American countries group them under “indigenous” or “black” in their census (Anderson, 2009; England, 2006). Estimates are there are 400,000 in total with an estimated 100,000 residing in Honduras, the country with the largest Garifuna population (Anderson, 2009; England, 2006). Regardless of their number, the Garifuna are recognized as a minority group within their respective countries.

The number of Garifuna residing in the United States is not definitively known. Estimates are that there are 90,000 in the United States where as others report 200,000 in the New York City area alone (Garifuna Coalition USA Inc., 2015; Stevens, 2000). The Garifuna population in Los Angeles, California is mainly of Belizean descent whereas those in New York are Honduran (England, 1999). Census data collection limits groups to broad racial categories, limiting the identification of specific groups such as the Garifuna. New York reportedly

has the largest population of Garifuna in the United States with most Garifuna residing in the South Bronx, Harlem, Brownsville and East New York (Garifuna Coalition USA Inc., 2015). England (2006), reports that Garifuna settled in places such as the Bronx, primarily because of existing family ties. Many New Yorkers were introduced to the Garifuna as a group largely due to the Happy Land Social Club Fire that occurred in 1990. The fire set by an arsonist, killed 87 people, mainly Garifuna from Honduras (Garifuna Coalition USA Inc., 2015). In New York, many Garifuna women work as home health attendees while men work primarily in the construction industry (England, 2006). Cultural and political activism within the New York area Garifuna community is evident with events such as voter registration drives, cultural events and Garifuna music and language classes offered in various boroughs (Garifuna Coalition USA Inc., 2015). Garifuna also keep social ties with weekend cook outs and soccer games in parks throughout the boroughs, and with gatherings replicating funeral rites such as *dugu* (personal communication E. Guevara, February 19<sup>th</sup>, 2016).

Literature outside of anthropological works on the Garifuna is sparse with a very small proportion examining concepts of health within the group and so little is known about their health behaviors. The main theme identified in the literature relates to the indigenous and black paradigm of the Garifuna, and how they are associated with concepts of Garifuna identity (Anderson, 2007, 2009; Barrett, 1995; Chaney, 2012; England, 1999, 2010b; Gordon, Gurdian, & Hale, 2003; Johnson, 2002; Kirtsoglou & Theodossopoulos, 2004; Matthei & Smith, 2008; Mollett, 2006). As a minority group in countries that are mainly Hispanic



(except for Belize), the Garifuna face tremendous levels of discrimination based on their race and indigenous status (Anderson, 2007; England, 1999). The Garifuna response to historical and persistent discrimination and its relationship to their identity is a theme found in the reviewed literature but examination of how they in turn are associated with health and health behaviors in the group is not evident.

A few studies examined Garifuna identity and its association with race, politics, migration, globalization, and neoliberal movements. These studies are useful in forming some understanding of the sociocultural and political climate in which the Garifuna live but provide little insight into how Garifuna health is affected. Some studies argue that the formation of Garifuna identity is shaped by multidimensional factors such as historical forced migration, discriminatory land practices, and racialization associated with multiculturalism. Most studies find that while the Garifuna often identify as Black and/or indigenous, their identity is fluid, often changing with social and political conditions over time (Anderson, 2007; M. Anderson, 2009; Chaney, 2012; England, 1999, 2010b; Mollett, 2006).

Other studies examined Garifuna identity through a different and unique approach, namely Benedict Anderson's framework of *imagined communities*, in which self-identity is formed by the collective view or imagination of a group stemming from a shared experience (Anderson, 2006). In the case of the Garifuna, the shared experience is persistent uprooting and discrimination. Gordon et al. (2003) in their look on the effect of neoliberal political movements concerning Garifuna land rights in Nicaragua, found that the Garifuna claimed

indigenous status through a narrative of *invented traditions* surrounding historical claims of land ownership, created in response to rapidly changing and threatening political climate. Similarly, Johnson (2002) also describes Garifuna identity through the framework of *invented traditions* which he argues occurs due to out migration, reinforcing Garifuna indigenous status with the promotion of continued cultural practices in the diaspora. One study examined Garifuna identity through the use of health practices and belief using Anderson's framework finding that Garifuna identify as indigenous based on their continued practice of traditional healing methods even with knowledge of Western medical approaches (Barrett, 1995).

The effect of migration on Garifuna social and cultural norms was another theme evident in the literature. Garifuna began to migrate to urban spaces within Honduras in the 1970s and 1980s but international migration actually began in the 1930s and 1940s when Garifuna men were recruited for their sailing expertise to transport agricultural products to other Central American countries and the United States (England, 2006). In the United States, the Garifuna settled in port cities such as New Orleans, Los Angeles and, New York City (2006). The largest migration to the United States is thought to have occurred, however, as part of the large outmigration from Central America in the 1990s, following the devastation of Hurricane Mitch (De Souza, 2011). Several studies show that out migration has increased the upholding of Garifuna cultural customs and practices in the United States through a variety of mechanisms such

as the promotion of Garifuna language and music, and travelling back home to observe traditional practices (England, 1999; Greene, 2002; Jenkins, 1983).

Of particular interest to this proposed study were studies specific to Garifuna women. As this study examined the cancer screening behaviors of Garifuna women, knowledge of the lifestyles of Garifuna was important in understanding their health behaviors. Very few studies on Garifuna women were found but one theme emerged, namely that of empowerment. Grieb and Nielsen-Bobbit (2013) in their examination of how migration impacted the sexual beliefs and behaviors of Garifuna women living in the Bronx found that Garifuna women felt an elevated status associated with their increased socioeconomic status and shifting, more independent roles in America. This change in status results in their seeking out secondary partners, increasing their risk for contracting HIV/AIDS. Khan (1987) also examined empowerment and found that older Garifuna women were empowered by aging status, freedom of mobility, and lack of restrictions upon migration to urban spaces in Honduras. Murphy-Graham (2008, 2010) in two studies on education and the empowerment of Garifuna women in Honduras found that educational programs that gave women the ability to make choices, and increase resources, agency and achievement were successful in raising awareness of gender inequality, and division of labor.

Finally, only a few studies focused on the health of Garifuna. While a few studies focused on the group's use of traditional healing practices such as the use of plants, traditional healers and culture bound syndromes within Garifuna

culture (Barrett, 1995; Bianchi, 1988), the main focus of most studies concerned Garifuna and HIV/AIDS. Many of the studies discussed the high rates of HIV/AIDS in the Garifuna population believed to be some of the highest rates in Central America (Bedford, 2010; S. M. Grieb & Nielsen-Bobbit, 2013; Kim et al., 2006; Paz-Bailey et al., 2009; Sabin, Lubet, Sabin, Paredes, & Monterroso, 2008; Stansbury & Sierra, 2004). A few studies examined HIV/AIDS knowledge and perceptions among the group, constructs that were also important to this proposed study on cancer screening. Risky health behavior among the Garifuna was evident providing insight on possible similar findings associated with cancer screening. Grieb and Nielsen-Bobbit (2013) in their examination of migration, monogamy, secondary partners and HIV/AIDS among Garifuna women living in the Bronx, found that even with high rates of secondary sexual partners, Garifuna women were not concerned with HIV transmission. Paz-Bailey et al (2009) examining behaviors associated with increased risk of HIV and other sexually transmitted infections among the Garifuna in Honduras found while the Garifuna were knowledgeable about the diseases, there were low rates of condom use with regular and casual partners and statistically significant association between poverty, urban residence, and HIV infection. Similarly, Stansbury and Sierra (2004) found that Garifuna were knowledgeable about HIV/AIDS but still engaging in high risk behavior.

### **Cancer, the Disease**

Cancer has a long history as a human affliction and has recently been described as “The Emperor of All Maladies” (Mukherjee, 2010, p. xviii). The disease, described in

Egyptian hieroglyphics, is the second leading cause of death worldwide with over 8.2 million deaths and an estimated 14 million new cases annually (World Health Organization, 2015) . Cancer is increasing worldwide and is expected to increase 70% over the next twenty years. Causes for the disease include aging, use of tobacco products, obesity and infections transmitted both sexually and non-sexually (2015). Lung, breast, and gastrointestinal cancers are the leading causes of cancer deaths worldwide with lung, prostate and colorectal cancers the leading causes of death for men and breast, colorectal and lung cancers for women (2015). In the United States, over 1.6 million Americans are expected to be diagnosed with cancer annually with an estimated 589,430 deaths with cancer deaths by gender following global trends (American Cancer Society, 2015).

The largest increase in cancer disease burden is in developing countries such as those in the Caribbean Basin and Central America (World Health Organization, 2015). Almost half of the cancer deaths in the Americas occur in the Caribbean and Latin America (Pan American Health Organization, 2014). Cancer in the countries in the Caribbean and Central American region differs from the developed countries of the United States and Canada. For example, whereas breast cancer is the leading cause of cancer deaths in American women, cervical cancer, largely a sexually transmitted infectious disease is the leading cause of death among Central American women. Similarly, stomach cancer is a leading cause of cancer deaths in poorer American countries but is not a major cancer type in the United States (Pan American Health Organization, 2014).

## **Cancer Screening**

Early detection of cancer has been shown to reduce morbidity and mortality from the disease (World Health Organization, 2015). Screening for certain cancer types has long been purported as a mechanism for reducing morbidity and mortality rates of the disease. Currently there are three types of cancer where recommended screening (Table 1) has been shown to reduce burden from cancer, namely screening for breast, colon and cervical cancers (United States Preventive Task Force, 2015a, 2015b, 2016). For breast cancer, the United States Preventive Task Force recommends that women under the age of 50 years make individual decisions regarding screening and if they chose to do so, be screened once every two years until the age of 50 years. From age 50 to 74 years, those who are perceived to have an average risk of developing the disease, the Task Force recommends screening with mammography every two years (United States Preventive Task Force, 2016). Colorectal cancer can be screened for with either annual fecal occult blood testing, sigmoidoscopy, with accompanying fecal occult blood testing every five years or colonoscopy every ten years from ages 50 to 75 years (United States Preventive Task Force, 2015b). The Task Force recommends that for cervical cancer, women between the ages 21 and 65 years receive Pap tests every 3 years and for women 30 to 65 years, Pap tests in combination with Human Papillomavirus testing, every five years (United States Preventive Task Force, 2015a).

Table 1. Summary of USPTF Cancer Screening Recommendations

<b>Cervical Cancer</b>	<b>Colorectal Cancer</b>	<b>Breast Cancer</b>
<b>Women 21-30 years</b> Pap smear every 3 years	<b>Men and Women 50-75 years</b> Annual Fecal Occult Blood Test	<b>Women &lt; 50 years</b> Mammography every 2 years based on individual choice
<b>Women 30-65 years</b> Pap smear with HPV testing every 5 years	<b>Men and Women 50-75 years</b> Sigmoidoscopy every five years Colonoscopy every 10 years	<b>Women 50-74 years</b> Mammography every 2 years

Reports show that nationally, the cervical cancer screening rate is 83% with 71.5% and 62.4% screening rates for breast and colorectal cancers respectively (White et al., 2017). Breast cancer screening rates are 71.8% for Whites and 74.3% for Blacks, while rates are lower for Mexican-Americans and those from Central and South America at 77.2% and 74.6% respectively. Mexican-Americans and Central/South Americans also have lower screening rates for cervical cancer at 79% and 80.6% respectively in comparison to 85.3% for Blacks and 83.2% for Whites (2017). Similar low rates were reported for colorectal cancer screening with a 49% rate for Mexican-Americans, and 52.6% rate for Central/South Americans when compared to a 63.7% screening rate for Whites and 59.3% for Blacks (2017). Filipino women have the highest screening rates for breast cancer at 81.5% while Asians (other than Chinese and Filipino) have the highest cervical cancer screening rates with a rate of 88.9% (2017).

### **Cancer Screening Among Women Living in Central America and the Caribbean Basin**

The Caribbean Basin and Central America (as shown in Figure 2) are regions, South of the mainland United States consisting of diverse nations, ethnic groups and cultures (Global City Map, n.d.; Malik, 2013). The Pan American Health Organization reports varying policies and practices for cancer screening in the region with countries

such as Jamaica having semi-structured screening programs whereas others such as Haiti, none (Pan American Health Organization, 2011, 2013).



*Figure 2. Map of Central America and the Caribbean (Morris, 2000)*

The literature on cancer screening in Central America and the Caribbean was examined here, as there was a lack of literature on cancer screening among the Garifuna. The literature chosen for discussion are studies that focus on cancer screening in women similar to the Garifuna, in terms of geographic location and cultural norms. The number of studies on cancer specific to the region was sparse but informative. Focus was paid to any concepts of identity, acculturation, knowledge, practices, and perceptions but other themes identified are discussed as well.

The evidence from the literature reveals overall low rates of screening, higher rates of knowledge, poor perceptions of the screening tests, and various barriers to care in Afro-Caribbean countries in comparison to those of Central and Latin America (Bessler et al., 2007; Chekuri, Bassaw, Affan, Habet, & Mungrue, 2012; Christian & Guell, 2015;



Cruz-Castillo et al., 2014; Gosein, Pinto Pereira, Narinesingh, & Ameer, 2014). These findings were exclusive to cervical and breast cancer screening, with none of the studies examining screening for colorectal cancer. Reported screening rates for cervical cancer ranged from 88% (Bourne, Kerr-Campbell, McGrowder, & Beckford, 2010) to as low as 2% to 14% (Couture, Nguyen, Alvarado, Velasquez, & Zunzunegui, 2008; Felix et al., 2009). Higher rates of screening for breast and cervical cancer were positively predicted by doctor's recommendation, higher education and income levels, and having insurance (Bessler et al., 2007; Couture et al., 2008; Cruz-Castillo et al., 2014; Reyes-Ortiz, Velez, Camacho, Ottenbacher, & Markides, 2008). Two studies found no significant difference in knowledge about cancer screening by Afro-Caribbean country of origin (Chekuri et al., 2012; Gosein et al., 2014). However one study found higher rates of knowledge were associated with increased levels of screening (Bessler et al., 2007). Perceptions about cancer screening include the Pap tests being uncomfortable (Agurto et al., 2004; Bessler et al., 2007; Christian & Guell, 2015) and structural forces that limit access to cancer screening services such as living among rural populations as well as poverty common to the region (Agurto et al., 2004; Cazap et al., 2008). Barriers to screening reported were pain and fear, and embarrassment (Bessler et al., 2007) and the importance of perceptions of males regarding the screening test (Agurto et al., 2004; Claeys et al., 2002; Garrett & Barrington, 2013). While some studies found both males and females finding screening tests (primarily Pap test) favorably (Claeys et al., 2002), others found negative perceptions of males as a barrier to women getting cervical cancer screening services (Delpech & Haynes-Smith, 2014; Garrett & Barrington, 2013).

## **Cancer Screening among Immigrant Women**

Cancer screening among immigrant women is extensively studied in the literature. Numerous studies have reported on the positive association between screening and increased years of migration (Behbakht et al., 2004; Brown, Consedine, et al., 2006; Islam, Kwon, Senie, & Kathuria, 2006) and immigrant status (De Alba, Hubbell, McMullin, Sweningson, & Saitz, 2005; Echeverria & Carrasquillo, 2006; Tsui et al., 2007). Screening rates ranged from 6% to 94% for Pap testing and 3.6% to 27.9% for mammograms (Behbakht et al., 2004; Brown, Consedine, et al., 2006; Islam et al., 2006). Studies also found a positive association between acculturation and increased screening among specific immigrant groups (Brown, Consedine, et al., 2006; Ivanov, Hu, & Leak, 2010; Lawsin, Erwin, Bursac, & Jandorf, 2011; Menon, Szalacha, & Prabhughate, 2012) while others have found no significant association between the two (Chen & Bakken, 2004; Echeverria & Carrasquillo, 2006). Still, several studies have reported positive associations between varying ethnic and cultural beliefs and barriers to screening (Behbakht et al., 2004; Consedine, 2012; Gregg, Centurion, Aguillon, Maldonado, & Celaya-Alston, 2011; Ndukwe, Williams, & Sheppard, 2013). However, these associations were not as strong as those for length of years, acculturation, and immigrant status. Studies also found variations in screening patterns among varying ethnic and racial groups (De Alba et al., 2005; Tsui et al., 2007). De Alba et al. (2005), in their national study of non-citizens and naturalized immigrants, found that for both immigrant groups, Hispanics had higher Pap smear and mammogram use over White and Asian immigrants to the United States. Tsui et al. (2007) had similar findings in their comparison of breast and cervical cancer screening to the United States. Asian

immigrants had the highest rates of never received screening in comparison to Hispanic, and Black immigrants to the United States. Finally, positive associations have been reported between cancer screening practices and socioeconomic factors such as higher education and income levels, having health insurance, health literacy (Behbakht et al., 2004; Brown, Consedine, et al., 2006; Echeverria & Carrasquillo, 2006; Garbers & Chiasson, 2004a; Green, Freund, Posner, & David, 2005; Harcourt et al., 2013; Islam et al., 2006).

### **Cancer Screening among Migrants from Latin America and the Caribbean Basin**

The knowledge, perceptions, and practices of immigrants from the Caribbean Basin and Central America are here again examined due to the scarcity of literature on the cancer screening practices of migrant Garifuna women. Interest was also paid to studies conducted in urban environments. Studies on practices and perceptions make up the largest proportion of the studies found. Similar to the findings of studies in Latin America and the Caribbean, the bulk of these studies focused on cervical and breast cancer screening with very few addressing screening for colorectal cancer. Most of the studies regarding cancer-screening practices were quantitative in nature. Five of these examined screening practices nationally (Carrasquillo & Pati, 2004; Coughlin, Uhler, Bobo, & Caplan, 2004; Echeverria & Carrasquillo, 2006; Tsui et al., 2007; Zambrana et al., 1999). Overall, lower screening rates for breast and cervical cancer were reported for immigrant women but only Hispanic women were examined in these national samples (Carrasquillo & Pati, 2004; Coughlin et al., 2004; Echeverria & Carrasquillo, 2006; Tsui et al., 2007; Zambrana et al., 1999). Lower screening rates were associated with recent immigration, lower socioeconomic position, foreign born, non-citizen status, and not

having a source of care (Carrasquillo & Pati, 2004; Coughlin et al., 2004; De Alba et al., 2005; Echeverria & Carrasquillo, 2006; Tsui et al., 2007; Zambrana et al., 1999). Two studies examining colorectal cancer screening among Hispanics show low rates of colorectal cancer screening with doctor recommending tests associated with participating in screening and perceived risk from the test and fear of cancer cited as barriers to screening (Gorin, 2005; Lopez-Class et al., 2012).

Studies on cancer screening practices among Afro-Caribbean immigrants are largely isolated to the urban centers of the Northeast United States with a few studies in Florida and the United Kingdom (Brown et al., 2011; Consedine, 2012; Fruchter et al., 1990; Garbers & Chiasson, 2006; Green et al., 2005; Kernohan, 1996; Mandelblatt et al., 1999; Seay et al., 2015). Similar to the findings on Hispanics, women of Afro-Caribbean origin have low rates of cancer screening with these rates associated with lack of insurance, no regular source of healthcare, and lack of physician recommendation, (Consedine, 2012; Fruchter et al., 1990; Garbers & Chiasson, 2006; Green et al., 2005; Mandelblatt et al., 1999; Seay et al., 2015). Mandelblatt et al. (1999) for example reported screening rates of 52% for mammograms and 54.7% to 63% for Pap testing for women 45 to 64 years of age. Brown et al. (2011) in one of the few qualitative studies identified in the literature describes low rates of Pap testing associated with low levels of knowledge about the test.

Studies on perceptions of cancer screening are more qualitative in nature with a few examining perceptions on colorectal cancer screening. Many of these studies used the Health Belief Model as their theoretical framework for examining perceptions (Austin et al., 2009; Byrd, Peterson, Chavez, & Heckert, 2004; Fulton, Rakowski, & Jones, 1995;

Gany, Trinh-Shevrin, & Aragonés, 2008) while others sought to develop new frameworks related to constructs of emotion and culture (Consedine, Magai, & Neugut, 2004; Consedine, Reddig, Ladwig, & Broadbent, 2011; Erwin et al., 2010). Among Hispanic immigrants, common perceived barriers to receiving the screening tests include fear of pain (Byrd et al., 2004; Davis, Bynum, Katz, Buchanan, & Green, 2012; Gauss, Mabiso, & Williams, 2013), low self-efficacy (Fernandez et al., 2014), perceived lack of benefit to screening, no recommendation to receive screening (Fulton et al., 1995), and low levels of acculturation (Abraido-Lanza, Chao, & Gates, 2005; Behbakht et al., 2004; Byrd et al., 2004).

Acculturation is a key concept to the health of immigrants and in studies where acculturation was measured with low use of native languages, positive association with high levels of acculturation and screening tests were reported (Behbakht et al., 2004; Byrd et al., 2004). One study examined the impact of male perceptions on cancer screening in Hispanic women, tying in to previously discussed findings in studies in Central and Latin America. Erwin et al. (2010) found that the perceptions of male control of the power to seek medical care and male machismo as barriers for cancer screening among Latinas. Barriers to screening among Afro-Caribbean populations include the perceptions of embarrassment, cancer worry, and fear (Austin et al., 2009; Consedine et al., 2009; Consedine, Ladwig, Reddig, & Broadbent, 2011; Consedine et al., 2004; Consedine, Reddig, et al., 2011; Kobetz et al., 2010). Language was also a barrier to care among the non-English speaking Caribbean participants (Allen et al., 2013; F. M. Gany, Herrera, Avallone, & Changrani, 2006).

Studies specific to knowledge of cancer screening were fewer in comparison to those on practices and perceptions. Differences were reported in levels of knowledge with some groups having higher levels of knowledge than others (Brown, Consedine, et al., 2006; Ekechi et al., 2014; Francois, Elysee, Shah, & Gany, 2009). Brown, Consedine, et al. (2006) for example found higher levels of knowledge about breast cancer prevention among Afro-Caribbean women when compared to their Afro-American counterparts. Conversely, Ekechi et al. (2014) found lower rates of cervical cancer knowledge among Afro-Caribbean women in the United Kingdom when compared to their native born counterparts. Lack of knowledge was associated with low levels of health literacy and source of information (Garbers & Chiasson, 2004a, 2004b).

### **Cancer Screening and the Garifuna**

The review of the literature clearly supported a need for this study. There was an overall lack of knowledge on the health and health behaviors of the Garifuna and more specifically, lack of knowledge on their cancer screening knowledge, perceptions, and practices. The few studies on the Garifuna reveal a vulnerable minority group, facing structural forces of discrimination and globalization, grappling with identity and trying to preserve cultural norms in their homelands and in their settling communities (Barrett, 1995; Brondo, 2006; England, 1999; Kirtsoglou & Theodossopoulos, 2004; Norales, 2011).

The literature on cancer screening in the Caribbean Basin and Central America, points to low rates of cancer screening, lack of knowledge on the cancer screening tests and perceptions that serve as barriers to care regionally. Those conditions essentially remain upon migration to the United States where low rates of screening, lack of

knowledge and barriers to care persist. While the literature points to some improvement in cancer screening among Hispanic and Afro-Caribbean immigrants, disparities in care are evident. It is then hypothesized that cancer screening knowledge, practices, and perceptions among Garifuna women may be similar to those reported in the literature on female immigrants from the Central America and the Caribbean Basin. Knowing the true nature of these constructs of cancer screening was important in finding mechanisms to reduce disparities in cancer screening and in turn reduce the levels of morbidity and mortality in immigrant groups associated with the disease.

### **Summary of the Literature**

Overall, the literature examining health behaviors such as cancer screening of ethnic black immigrants to the United States is sparse, revealing a gap in knowledge in understanding the health behaviors of these immigrant groups. The Garifuna, a unique Afro-Amerindian group exemplify ethnic black immigrants of which little is known of their health behaviors. A marginalized group in their Central American homeland, the Garifuna have migrated increasingly to urbanized spaces in the United States such as New York City. Few studies have examined the health behaviors of the Garifuna with none examining cancer screening among the group. Early detection of cancer by the current three recommended screening tests for breast, cervical and colorectal cancer is known to reduce the risk of death yet nothing is known of the cancer screening behaviors of immigrant Garifuna and specifically, immigrant Garifuna women.

Studies that have examined various factors regarding the three screening tests among immigrant women to the United States show a range of rates when compared to the US born population. Studies that have examined cancer screening among women

geographically and culturally similar to the Garifuna also show variation in rates, and variation in behaviors, but overall low rates of screening, a variety of barriers to screening, and poor perceptions of the screening tests. Studies that have looked at the cancer screening constructs, knowledge, perceptions and practices, among female immigrants from Central America and Caribbean to United States have similar findings to cancer screening in the countries of origin.

While it can be hypothesized that the cancer screening behaviors of immigrant Garifuna women are similar to immigrant women that are culturally and geographically similar, the evidence is clearly lacking. The gap in knowledge on cancer screening behaviors of immigrant Garifuna women may result in unrecognized disparities leading to increased morbidity and mortality from the disease. Therefore, the purpose of this study was to examine the knowledge, perceptions and attitudes towards the breast, cervical and colorectal cancer screening among Garifuna women. The study answered the following research questions:

1. What is the *level of knowledge* about the recommended breast, cervical, and colorectal cancer screening guidelines among Garifuna women residing in the New York City area?
2. What are the *cancer screening practices* (i.e., level of adherence to the recommended breast, cervical, and colorectal cancer screening guidelines) among Garifuna women residing in the New York City area?
3. What are the *perceptions/barriers* for breast, cervical, and colorectal cancer screening among Garifuna women residing in the New York City area?



4. Is there an association between *cancer screening practices* and demographic factors, access healthcare services, acculturation, identity, and knowledge and perceptions/barriers for breast, cervical, and colorectal screening among Garifuna women residing in the New York City area?

## **CHAPTER THREE**

### **THEORETICAL FRAMEWORK**

This study examined the knowledge, perceptions and, practices regarding breast, cervical, and colorectal cancer screening among Garifuna women residing in the boroughs of New York City. The study was guided by an integrative conceptual framework (shown in Figure 6) that drew from four conceptual models, with constructs that were embedded in the study research questions. The integrative conceptual framework for the study combined constructs of individual factors that influence health behaviors, socio-cultural components addressing acculturation and identity, and the integration of multi-level constructs that relate to health behaviors, particularly cancer screening practices in this study.

#### **The Health Belief Model**

The Health Belief Model (HBM) served as the basis for examining individual factors associated with cancer screening (Glanz, Lewis, & Rimer, 1990). The HBM addresses perceived susceptibility and severity, perceived effectiveness/benefits, barriers, and cues to action (shown in Figure 3). These domains address the individual factors associated with cancer screening knowledge, perceptions and, practices (1990). It is an ideal Model for filling in the gaps in knowledge on the individual behaviors associated with cancer screening among the Garifuna women. The HBM has been used as the framework for numerous studies regarding cancer screening (Agurto, Sandoval, De La Rosa, & Guardado, 2006; Byrd et al., 2004; Coronado Interis, Anakwenze, Aung, & Jolly, 2015; Fulton et al., 1995; Gany et al., 2008; Gorin, 2005).

While the HBM is highly suited to address numerous individual constructs of cancer screening, it is limited in that it does not address domains of culture specific to acculturation and identity. There are gaps in the literature on the association between cultural norms and health behaviors among the Garifuna. The HBM is lacking in areas specific to acculturation, identity, and health behaviors and therefore an integration of concepts surrounding theories on acculturation and identity is necessary. Therefore, the constructs of acculturation and identity were integrated in the proposed study using Anderson's Imagined Communities Model (ICM) (Anderson, 2006), and Berry's theory on immigration, acculturation, and adaptation (TIAA) (Berry, 1997).

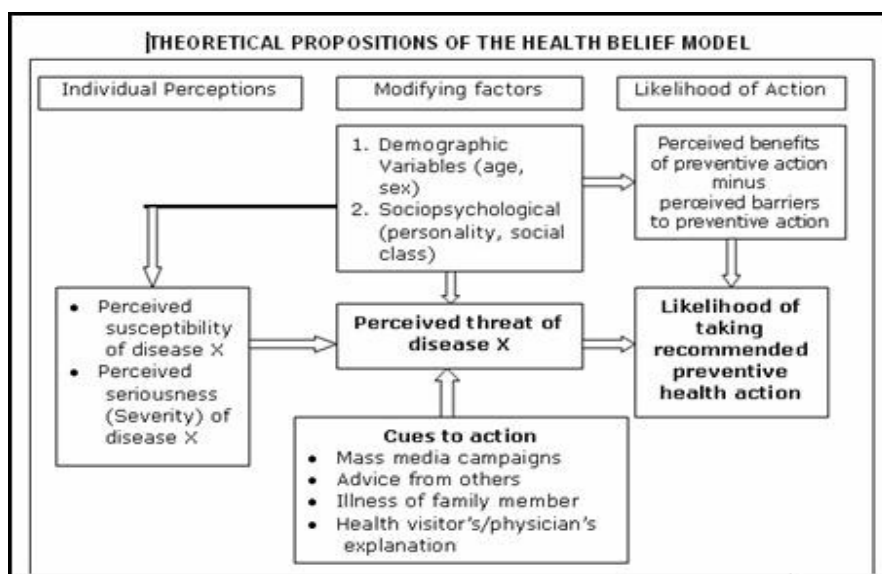


Figure 3. Adaptation of Glanz's Health Belief Model (Current Nursing, 2013)

### Anderson's Imagined Communities Model (ICM)

In the ICM, the concept of imagined communities is associated with nationalism, which is directly related to constructs of identity (Anderson, 2006). Identity, as expressed through cultural norms is said to have an historical basis or reference point, which provides underpinnings for the identity of the group. The historical basis for the

Garifuna is indigenous status and the struggles associated with that status. When groups are small, personal interactions maintain nationalistic tendencies. Identity and thus cultural norms must be imagined within the community when personal disconnections such as migration occur. Nationalist movements produce revered entities within communities such as adhering strongly to cultural norms in light of forces such as globalization and migration (Anderson, 2006). Imagined communities, provides a framework for examining the identity of Garifuna in their settling community, New York City. Adherence to cultural norms serves as evidence of strong nationalistic ties, and thus adherence to an identity in which the imagined concepts of Garifuna as indigenous is maintained.

### **Berry's Theory on Immigration, Acculturation, and Adaptation (TIAA)**

The TIAA Model (as shown in Figure 4) addressed the constructs associated with migration and culture (Berry, 1997). The TIAA theorizes that, as immigrants move from one culture to another, behavioral and cultural changes occur. Immigrants will assimilate, acculturate, and eventually adapt (long-term acculturation) based on what is important to them and how the dominant group in their environment affects them (Berry, 1997). Immigrants can either assimilate, integrate or become marginalized, identifying with either their ethnic or the overall national identity. The TIAA consists of both group and individual level factors. Group factors include the political, economic and demographic conditions in the society of origin, group acculturation factors such as physical, biological, economic, social and cultural forces, and settlement conditions such as attitudes and social support. Individual constructs include factors before acculturation inclusive of age, gender, education, language and religion and factors during

acculturation such as social support, coping and length of time since migration. These constructs all impact the process of acculturation as it evolves to its final, long term outcome, adaptation. The TIAA adds a more in-depth analysis of the process of acculturation than commonly used constructs of citizenship status, language use, and length of time since migration (De Alba et al., 2005; Echeverria & Carrasquillo, 2006; Mandelblatt et al., 1999; Tsui et al., 2007).

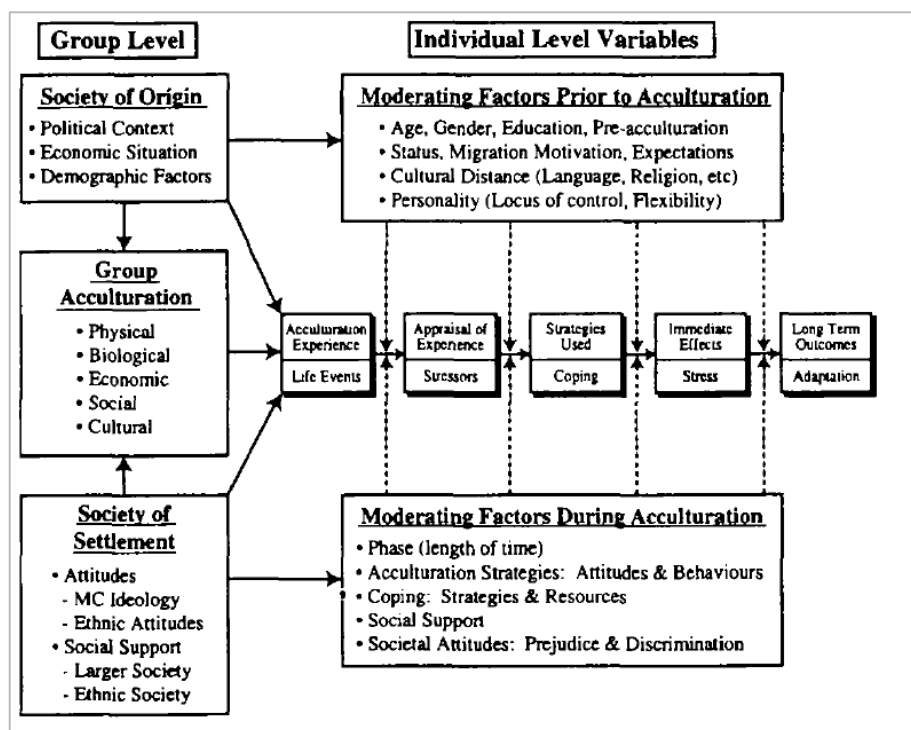


Figure 4. Berry's Acculturation Framework(1997)

### The Social Ecology Model (SEM)

The Social Ecology Model (SEM) (as shown in Figure 5) provided a multilevel framework for addressing the individual, interpersonal, organizational, community and policy factors affecting health behaviors. Its premise is that the environment is crucial in understanding health behaviors (McLeroy, Bibeau, Steckler, & Glanz, 1988). The SEM is flexible, allowing for the inclusion of the domains of the HBM as well as the constructs

of both the ICM and TIAA (Anderson, 2006; Berry, 1997). In the SEM, the intrapersonal domain addresses knowledge, attitudes and skills. The interpersonal domain addresses social networks such as relationships with physicians. Organizational, community, and policy domains address environmental, cultural norms and policy and regulations respectively (McLeroy et al., 1988).

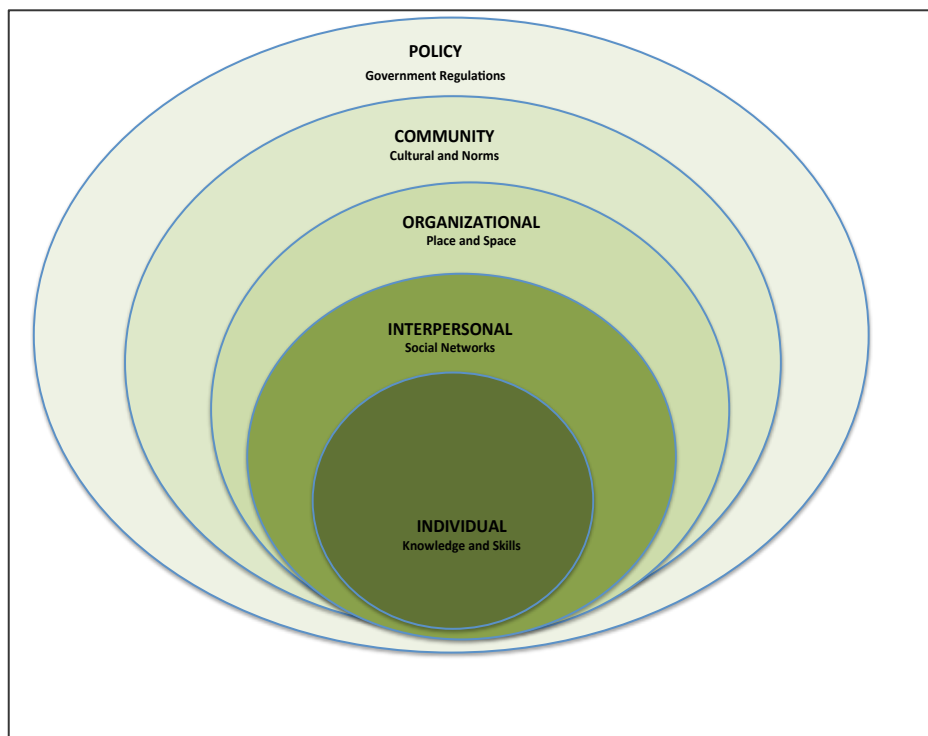


Figure 5. Social Ecology Theory Model

### The Integrative Conceptual Framework for the Proposed Study

The integrative conceptual framework for the study (as shown in Figure 6) incorporated the multilevel elements of the interpersonal, intrapersonal, community, organizational, and policy domains. Using the SEM in the study, the *intrapersonal domain* addressed knowledge, perceptions/barriers, and cancer screening practices. The HBM adds to the intrapersonal domain by addressing knowledge, self-efficacy, and

perceptions and barriers for cancers screening. The TIAA and the ICM added to the intrapersonal domain by addressing individual elements of acculturation and the Garifuna identity. The *interpersonal domain* addressed relationships with healthcare providers and social networks. The HBM adds to the interpersonal domain by addressing cues to action during the interaction with healthcare providers as well as social interactions. The *community domain* addressed connectedness with community resources. The TIAA and the ICM add to the community domain by addressing group elements of acculturation/identity paradigm as it relates to the surrounding community. The *organizational domain* addressed access to and use of cancer screening services. The *policy domain* addressed cost and insurance issues for cancer screening services.

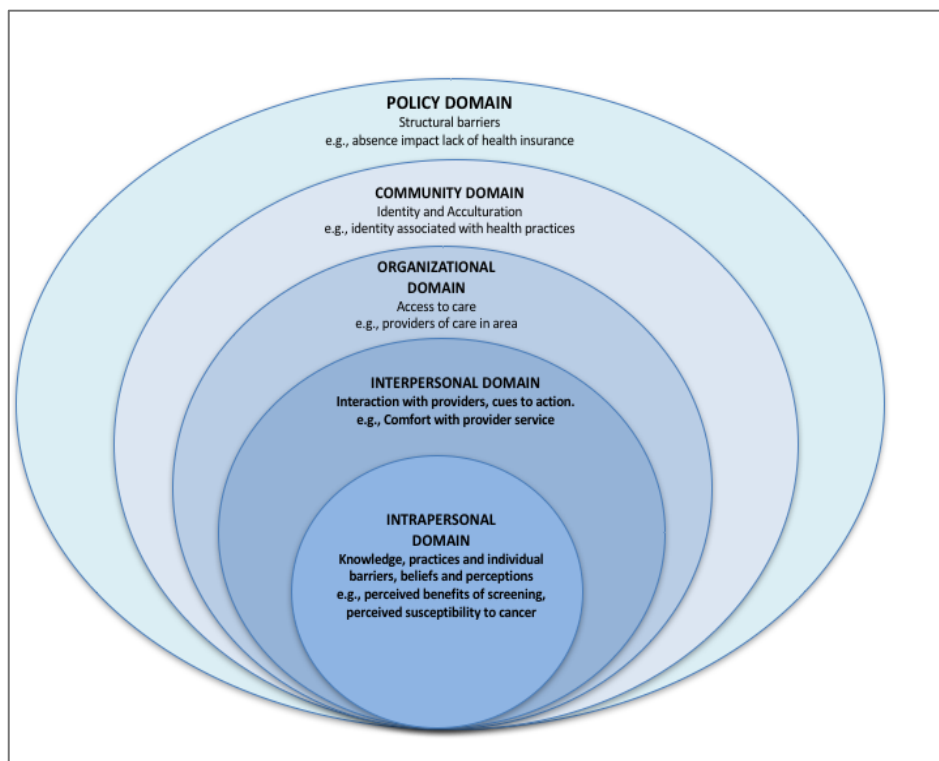


Figure 6. Integrative Conceptual Framework

In summary, the integrative conceptual framework provided the theoretical underpinnings for the study's examination of knowledge, perceptions and, practices regarding breast, cervical, and colorectal cancer screening among Garifuna women residing in the boroughs of New York City. The integrative conceptual framework was derived from the Social Ecology Model, a multilevel framework with domains that address factors that affect health behavior. The flexibility of the SEM allows for the addition of constructs related to the specifics of each domain. The five domains, intrapersonal, interpersonal, organizational, community and policy, address various factors that influence health behaviors. These factors are directly linked to the four research questions and the study's independent and dependent variables.

The intrapersonal domain that addressed individual factors such as knowledge on cancer screening, perceptions/ barriers to screening, demographics and cancer screening practices was directly related to the predictor variables that measured knowledge on the cancer screening tests, perceptions, practices and cues to action, and the outcome variable adherence to cancer screening practices. The interpersonal domain addressed the factors associated with interactions with providers of care and cues to action and is directly linked to the predictor variable which measures associations with providers of care, perceptions about the three cancer types and cues to action. The organizational domain addressed access to care and is directly linked to the predictor variable access to healthcare. The community domain addressed factors associated with identity and acculturation and is directly linked with the predictor variables acculturation and identity. Finally, the policy domain addressed factors such as the impact of lack of health



insurance and is directly linked to the variables access to healthcare and demographic variable factors such as employment, income and health insurance status.

The constructs of the integrative conceptual framework are therefore directly linked to the study's dependent and independent variables and the four research questions:

1. What is the *level of knowledge* about the recommended breast, cervical, and colorectal cancer screening guidelines among Garifuna women residing in the New York City area?
2. What are the *cancer screening practices* (i.e., level of adherence to the recommended breast, cervical, and colorectal cancer screening guidelines) among Garifuna women residing in the New York City area?
3. What are the *perceptions/barriers* for breast, cervical, and colorectal cancer screening among Garifuna women residing in the New York City area?
4. Is there an association between *cancer screening practices* and demographic factors, access healthcare services, acculturation, identity, and knowledge and perceptions/barriers for breast, cervical, and colorectal screening among Garifuna women residing in the New York City area?

## CHAPTER FOUR

### METHODS

The purpose of this study was to investigate breast, cervical and colorectal cancer screening among Garifuna women residing in the New York City area and to identify any disparities associated with their cancer screening behaviors. The study examined the following research questions:

1. What is the *level of knowledge* about the recommended breast, cervical, and colorectal cancer screening guidelines among Garifuna women residing in the New York City area?
2. What are the *cancer screening practices* (i.e., level of adherence to the recommended breast, cervical, and colorectal cancer screening guidelines) among Garifuna women residing in the New York City area?
3. What are the *perceptions/barriers* for breast, cervical, and colorectal cancer screening among Garifuna women residing in the New York City area?
4. Is there an association between *cancer screening practices* and demographic factors, access healthcare services, acculturation, identity, and knowledge and perceptions/barriers for breast, cervical, and colorectal screening among Garifuna women residing in the New York City area?

#### Study Design

This study used a mixed-method approach to examine cancer screening behaviors among Garifuna women residing in the boroughs of New York City and was divided into two phases. Phase 1 was a qualitative, ethnographic, semi-structured interview approach

with 8 to 10 key informants, knowledgeable on the sociocultural norms and health practices of the Garifuna community. Phase 2 was a quantitative, cross-sectional survey of 400 self-identified Garifuna women, aged 50 years and older who were residents of the New York City area and were able to speak and read English. The study was guided by the Integrative Conceptual Framework which drew from four conceptual models, the Health Belief Model, Anderson's Imagined Communities Model, Berry's Theory on Immigration, Acculturation and Adaptation, and the Social Ecology Model.

### **Phase 1: Interviews with Key Informants**

Phase 1 of the study used a qualitative, ethnographic, semi-structured interview approach to examine knowledge, perceptions/barriers, practices related to breast, cervical and colorectal cancer screening among Garifuna women residing in the New York City area. Phase 1 included interviews of 8 to 10 key informants within the Garifuna community. The inclusion criteria was Garifuna and non-Garifuna individuals having knowledge of the sociocultural and health behaviors norms of the Garifuna community through their published works (dissertations, published articles) on the Garifuna. They were also recognized for having expertise on the sociocultural and health behaviors of the Garifuna through media accounts (newspaper, conference speakers, on-line community recognition) of their work on sociocultural and health issues within the community. In addition, key informants were recognized as having expertise on the sociocultural and health behaviors of the Garifuna through contacts within the Garifuna community who identified individuals with expertise on the sociocultural norms and health behaviors of the Garifuna (example: Garifuna nurses, healers, community organizers).

The objective of the interviews was to inform the development and modification of the survey instrument used in the surveying of the Garifuna women in Phase 2. Little was known of the cultural and health practices of the Garifuna and so the topics for discussion in the interviews were linked directly to the domains of the Integrative Conceptual Framework and the four research questions. The interviews included broad questions specific to the domains and provided information on their constructs specific to the Garifuna community. Discussion questions were directly related to the research questions addressing levels of knowledge, adherence to the breast, cervical, and colorectal cancer screening guidelines and perceptions and beliefs on cancer screening which are addressed in the intrapersonal and interpersonal domains of the Integrative Conceptual Framework. There was particular interest in acquiring information on perceptions and beliefs on cancer screening that may be unique to the Garifuna community (example: unique cultural vulnerabilities) that may be lacking in the Phase 2 survey instrument. The interviews also addressed useful methods for distributing the survey instrument, the use of web-based versus paper/pencil data collection approach, as well as advertisement and recruitment strategies. Phase 1, key informant interviews were conducted via telephone which was the most convenient method for all key informants interviewed.

**Recruitment.** Recruitment for the key informant interviews occurred through contacts from the Garifuna Church, Christ the King, located in the Bronx, New York and identified through research by the Principal Investigator. Phase 1 key informants were individuals with knowledge on the sociocultural norms and health behaviors of the Garifuna community. Key informants were Garifuna and non- Garifuna individuals.

These key informants were recognized for having expertise on the sociocultural norms and health behaviors of the Garifuna through their published works (dissertations, published articles) on the Garifuna. They were also recognized for having expertise on the sociocultural and health behaviors of the Garifuna through media accounts (newspaper, conference speakers, on-line community recognition) of their work on sociocultural and health issues within the community. In addition, key informants were recognized as having expertise on the sociocultural and health behaviors of the Garifuna through contacts within the Garifuna community who identified individuals with expertise on the sociocultural norms and health behaviors of the Garifuna (example: Garifuna nurses, healers, community organizers). These key informants received IRB approved advertisement letters by e-mail/mail as part of the recruitment process.

**Sample Description.** All key informants were female ranging in age from thirty-two years of age. Seven of the nine key informants were Garifuna and two non-Garifuna. All of the Garifuna key informants were actively involved in community organizations within the Bronx that provided care and services to Garifuna communities in Honduras and Guatemala. Two of the Garifuna key informants worked as medical assistants/certified nursing assistants within the Bronx. One Garifuna key informant was a licensed social worker, and very active in HIV/AIDS work among the Garifuna community in the Bronx and Central America. The two non-Garifuna key informants were both licensed physicians. One, an infectious disease doctor who worked with and conducted HIV/AIDS research among the Garifuna community in the Bronx for the past 15 years and the other, a recent PhD graduate whose dissertation examined HIV and

STDs related health behaviors among Garifuna and other vulnerable populations residing in Honduras and the Bronx, New York.

**Consent.** Potential key informants were e-mailed consent forms to participate in the study along with the advertisement letters. Potential key informants signed the consent forms and returned to the PI through e-mail, mail or fax before the interview occurred. Once the consent forms were received, the PI scheduled either a telephone or in-person 30 to 60- minute interview with the key informant. The PI reviewed the study's purpose and procedures, risks and benefits and the confidential nature of the study before beginning the interview. Participants were also informed that they could withdraw from the study at any time, without any harm coming to them. Key informants were informed that the interview would be recorded, interview transcripts transcribed verbatim and audiotapes destroyed at the end of transcription. The PI then asked if the participants had any questions and answered their questions accordingly. The PI then asked for permission to continue with the interview.

**Data Collection.** All interviews were conducted by telephone at a date and time convenient for the key informant. Interviewees were asked about their personal knowledge on the screening tests for breast, cervical and colorectal cancers, and their knowledge of the recommended age screening guidelines for the three screening tests. In addition, the interviewees were asked to share their thoughts on adherence to these guidelines among the Garifuna women in the New York area.

**Data Analysis.** All data analysis was conducted at the Rutgers Department of Clinical Laboratory and Medical Imaging Science's, Cytotechnology Program's, Newark, New Jersey campus. The key informant interviews were audiotaped and then transcribed

verbatim. No identifiers were included in the interview transcripts. The audiotaping was destroyed upon conclusion of the transcription. Data analysis included conventional content analysis by hand of the interview transcripts in order to identify the emergence of any words and phrases associated with specific themes and concepts. Repeated analysis of the transcripts was conducted to identify themes surrounding specific domains of the Integrative Conceptual Framework and the research questions. Analysis focused on emerging themes not addressed within the integrative model domains. These included themes and concepts related to knowledge on cancer and cancer screening, perceptions on severity, susceptibility, and barriers to care, acculturation and identity, and structural forces.

## **Phase 2: Survey of Garifuna Women**

Phase 2 consisted of a cross sectional survey of 400 Garifuna women. The inclusion criteria for the survey of the 400 women was age 50 years and older, self-identifying as a Garifuna, residing in the boroughs of New York City and able to complete the study.

**Sample Size Calculation.** There are an estimated 200,000 Garifuna residing in the New York City area. Since the literature on the Garifuna was lacking and this study was explanatory in nature, several approaches to calculating sample size using odd ratios and the number of study predictors were used to justify this number. A sample size of 400 for the proposed study provides adequate power (greater than 80% at a significance of  $\alpha > 0.05$ ) to test the associations between the study outcomes and predictors. Appendix 1 provides more detail on the power analysis and sample size calculation .

**Recruitment.** Garifuna women were initially recruited at the Christ the King

Church located in the Bronx, New York and through snowball sampling through Church contacts. Contacts spread the word via word of mouth, and social media sites. These contacts also encouraged others to spread the word about the study by mouth and social media sites. Recruitment flyers advertising the study were also placed throughout the areas in New York where Garifuna women were known to frequent. These sites included restaurants, parks, beauty salons and community centers. The advertisement provided the contact name and e-mail of the Principal Investigator. Interested potential subjects contacted the PI directly via cell phone or e-mail regarding their interest in the study.

**Consent.** The survey and accompanying consent form was available through an on-line link available through e- mail, and by paper. For the paper and pencil survey, the study consent was read to potential participants by the PI and/or the study's research assistant. They reviewed the study purpose and procedures with the participants and informed them of the risks, benefits, confidential nature of the study and that they could withdraw from the study at any time with no harm. The PI asked if the participants had any questions and answered their questions accordingly. The PI then asked for permission to provide the survey instrument. For the on-line survey available through e-mail, an announcement email with information about the study and include a link to the online survey was sent to participants. Participants who used the online survey (on-line survey available through e-mail) were asked to review the informed consent and were provided with information to contact the PI with any questions. The consent script included verbiage indicating to the online participants that by starting the survey, agreement to take part in the survey was indicated.

**Survey Instrument.** The survey instrument was drawn from several instruments



with established statistical significant validity and reliability. The National Health Interview Survey and the Behavioral Risk Factor Surveillance System Questionnaire (Center for Disease Control and Prevention, 2001, 2013, 2014) has been used extensively and has high levels of validity and reliability. The Vancouver Acculturation Index has been used in a few studies and found to have high levels of validity and reliability (Ryder, Alden, & Paulhus, 2000). The EthnoCultural Identity Behavior Index and Wolf's Cancer Screening Survey have demonstrated adequate levels of validity and reliability (Yamada, Marsella & Yamada, 1998; Wolf et al., 2005). The Champion's Health Belief Model questionnaire for the three cancer types, have all demonstrated adequate levels of validity and reliability (Champion 1984, 1999; Guvenc, Akyuz, & Acikel, 2011). The 125 questions were established to address the domains of the Integrative Conceptual Framework.

The survey was available in two modes: on-line survey available through e-mail, and a paper and pencil survey. The survey was written in simple, clear, 8<sup>th</sup> grade level language based on the Flesch Kincaid Reading Level (Flesch, 1979; Kincaid, Fishburne Jr, Rogers, & Chissom, 1975). Survey questions related directly to the five domains of the Integrative Conceptual framework and addressed study the four research questions

**Study Independent Variables.** The study used delineated independent and dependent study variables. The study predictors were measured using 125 items relating to: demographic factors, access to healthcare services, acculturation, identity, knowledge about cancer screening, and perceptions about cancer screening. *Demographic factors* included age, income, marital status, education level, health insurance, and immigration status. Access to healthcare services addressed regular place of care, access to care within

the community, access to primary care physician, access to a specialist, regular visits to providers, and awareness of cancer screening services within the community.

Acculturation measured heritage preference and cultural influence. Identity addressed ethnocultural norms related to ethnic identity. Knowledge measured level of knowledge on the guidelines associated with breast, cervical and colorectal cancer screening.

Perceptions addressed perceived severity and susceptibility toward the three cancer types, perceived effectiveness of the three cancer screening tests, and barriers and motivations to receiving the tests. Response options ranged from single answers to 4 point Likert scale responses.

**Study Dependent Variables.** The study outcome variable, cancer screening practices was measured using the following questions specific to the three cancer types: Breast cancer: “have you had a mammogram in the last 12 months”, “have you ever had a mammogram”, “when did you have your most recent mammogram”. Cervical cancer: “have you had a Pap test in the last twelve months”, “have you ever had a Pap test”, “when was your most recent Pap test”. Colorectal cancer screening: “have you had a sigmoidoscopy/colonoscopy in the last five years”, “have you ever had a sigmoidoscopy/colonoscopy”, “when did you have your most recent sigmoidoscopy/colonoscopy”, “have you had a fecal occult blood test in the last twelve months”, “have you ever had a fecal occult blood test”, “when was your most recent fecal occult blood test”. Participants responded to categorical descriptors in the survey.

**Data Collection.** The pencil and paper surveys were conducted at locations convenient to study participants and included sites such as Garifuna churches, local parks and the homes of the Garifuna women. The survey was pilot tested on the first ten

participants. Participants who completed the survey online were emailed the link to the link. Participants who completed the survey, whether in person or on-line, received a \$5 gift card.

Surveys of Garifuna women were collected anonymously with no identifying or protected health information (PHI) collection on the survey instrument. The survey instrument (whether paper and pencil, or e-mailed) was designed using REDCap™ software. REDCap™ is a secure web application designed to support research data capture, providing an intuitive interface for users to enter data and have real time validation rules at the time of entry. REDCap™ software does not collect IP addresses. REDCap™ servers are securely housed in an on-site limited access data center managed by Rutgers University. All web-based information transmission is encrypted with all transactions securely delivered to the application with SSL (SHA-1 with RSA Encryption; 2048-bits). Data transmissions are protected internally at the Rutgers University database server by a firewall. All transactions are logged at the server layer (http logging), application layer (REDCap™ logs activity to a database table), and the database layer (using both query and binary logging). Access to the data is managed by institutionally sponsored login IDs. The REDCap™ system fully relies upon identity and access management infrastructure at Rutgers University. Rutgers University implements password complexity, history and expiration standards. Names and addresses provided by participants for the purpose of mailing the \$5 gift cards were immediately removed from data file.

**Data Analysis.** Data analysis proceeded in three stages. The first stage was a descriptive, univariate analysis, summarizing the means and standard deviations for the

continuous variables and the frequencies and proportions for the categorical variables. The second stage included bivariate analysis to examine the association between cancer screening practices and the study predictors. The third stage included building predictive models for cancer screening practices using multivariate analysis. In this stage, we included predictors that were found significant at  $p=0.3$  in the bivariate analysis. Logistic regression was used in the analysis of categorical and continuous predictors for cancer screening practices. The outcomes for the logistics regressions analysis included three binary study outcomes: 1) adherence to breast cancer screening (yes/no); 2) cervical cancer screening (yes/no); and 3) colorectal cancer screening (yes/no)). The logistic regression was conducted using a stepwise method to eliminate variables not significant in the regression models. The regression models also included the estimation of adjusted Odds Ratios (aOR) and 95% confidence intervals (95% CI) for the aORs.

**Data and Safety Monitoring.** The study was housed in the Rutgers School of Health Professions, Department of Clinical Laboratory and Medical Imaging Sciences, Masters in Cytopathology Program, Rm. GB01, Newark Campus. Electronic files were kept using a password protected Rutgers University computer with encryption capabilities.

**Risk of Harm and Potential for Benefits.** There were no known risks associated with taking part in the study. The study results was anticipated to however benefit the targeted community by informing the development of interventions to improve the health and wellbeing of Garifuna women.

## CHAPTER FIVE

### RESULTS

#### Phase 1: Interviews with Key Informants

Phase 1 included interviews with nine key informant individuals with knowledge on the sociocultural norms and health behaviors of the Garifuna community and were both Garifuna and non- Garifuna individuals. They were recognized for having expertise on the sociocultural norms and health behaviors of the Garifuna through their published works, through media accounts of their work within the community and through contacts within the Garifuna community who identified individuals with expertise on the sociocultural norms and health behaviors of the Garifuna (example: Garifuna nurses, healers, community organizers). All nine individuals contacted agreed to participate and interviewed either verbally or through e-mail contact. All interviews took place during the month of October, 2016.

**Background.** The interviews ranged from thirty-six minutes to one hour and seven minutes in length. An interview script rooted in the domains of the Integrative Conceptual Framework guided each interview.

**Cancer Screening Practices.** Overall, most of the participants indicated low level of knowledge among those interviewed about the cancer screening tests. One Garifuna participant stated *“I know about breast, I am well informed when do mammogram, colorectal and cervical never been approached”* [Garifuna key informant]. Another Garifuna interviewee stated *“I think it is after 35 years, 30 to 35 years I think it is a breast cancer exam I’m not very sure about those two. I don’t know what works because I haven’t done it myself yet”* [Garifuna key informant]. One of the two non-Garifuna

physicians stated that she was confused know whether mammograms were supposed to be done annually after 35 years or 40 years or if every year. The majority of those interviewed felt that the Garifuna women they knew adhered to the recommended United States Preventive Services Task Force ( USPSTF) age related screening guidelines for the three cancer types.

**Intrapersonal Domain.** Interview questions from the Interpersonal Domain of the Integrative Conceptual Framework were specific to demographics, knowledge on cancer and cancer screening tests, and perceptions on cancer and cancer screening. Key informants were asked their thoughts on these constructs as related to their experiences with Garifuna women residing in the New York City area. Demographic related questions related to country of birth, age, marital status, income, education and health insurance type. Most of those interviewed identified Honduras as the main country of origin of the women they knew. One of the participants stated that “*Mainly Honduras, the majority I know it’s in Honduras, Honduras has the biggest community in the world.*”. The overall consensus was that the Garifuna women in the New York encompassed all age groups.

There were differing opinions on the marital status of the Garifuna women. Comments like “*Garifuna women are single mothers, they're married or have a companion or living together, lot are separated, I can’t think of a married person., cohabitating partnerships*” are examples of the statements made regarding marital status. There was overall agreement that most of the Garifuna women they knew, were United States citizens and that their levels of education and income were low. Comments related to education levels included “*Some of the older group are not well educated, just to 12<sup>th</sup>*

*grade, roughly 9<sup>th</sup> grade lot of people did not finish anything beyond grade or high school.*” Annual income levels of \$20,000 to \$50,000 were reported. When asked whether or not the Garifuna women had health insurance, a theme emerged linking having health insurance to having legal immigration status here in the United States. One interviewee commented *“We have a lot of undocumented within our community those with issues with documentations sometimes have problem of insurance, don't have social security in this country, medically laid back because afraid to look at those bills”* [Garifuna key informant].

The key informants were then asked to comment on the level of knowledge among Garifuna women on breast, cervical, and colorectal cancers and their associated screening tests, as well as the level of knowledge among Garifuna women about the age appropriate guidelines for the three screening tests. Most felt that the Garifuna women knew about the age appropriate guidelines for cancer screening but that they did know the symptoms of breast, cervical, and colorectal cancers. Opinions were mixed as to the level of knowledge the women had about the screening tests for the three cancer types. One Garifuna informant said *“Know much more about the breast mammogram and colonoscopy, maybe they don't even know about the others”* [Garifuna key informant]. Another said *“No I don't know. I don't think these terms are familiar to them”* [Garifuna key informant]. Conversely, two other Garifuna key informants stated that they believed the women were knowledgeable about the three cancer screening tests.

The final interview questions related to the Intrapersonal Domain of the Integrative Conceptual Framework examined perceptions on cancer and cancer screening. Key informants were asked to provide their thoughts on the perceptions of risk of getting

the three cancer types and perceptions on getting screened for cancers among the Garifuna women. Probing questions as to thoughts on perceptions of severity of cancer as a disease and thoughts of benefits, beliefs and fears regarding getting screened for cancer were asked. Two Garifuna and one non-Garifuna key informant thought the Garifuna women felt they were at risk of developing the three cancers because of the perceived increase in cancers among Garifuna women. One informant stated “ *They do worry, surge in cancers in Garifuna women, haven’t seen before, we wonder what doing different from mothers, they died because they lived too long, here in this country think it is stress related, food related, we know there is risk*” [Garifuna key informant]. Other key informants felt that other diseases such as HIV, diabetes, and high blood pressure were of greater concern than cancer in the Garifuna community.

Three main themes emerged around the question of cultural beliefs associated with cancer, including voodoo, food, and ancestors. Four of the nine key informants discussed the belief among the Garifuna women of voodoo as a cause of cancer and other diseases. One Garifuna key informant said “*Some people still believe that if they have anything wrong with them, is witchcraft, somebody sent it to them, somebody is doing something to them*” [Garifuna key informant]. Another said “*...because of voodoo, other things why they get terrible sickness, many different sources except natural sources*” [Garifuna key informant]. Severe diseases were also thought to be associated with food but in two different ways. Differences in quality of American food versus the quality of the food back home was stated by two Garifuna key informants as a source of severe diseases while three of them associated food with a cultural belief associated with ancestors. Connecting to and honoring ancestors was identified by both Garifuna and



non-Garifuna women as a belief among Garifuna. One non-Garifuna informant described the belief that illness was caused by the belief of “*not pleasing the ancestors in some way*” [Garifuna key informant]. Not honoring ancestors with food was stated as a means of displeasing ancestors and thus, a source of diseases. One Garifuna key informant stated “*spiritual need that needs to be paid attention to, ancestors you did not feed him when hungry*” [Garifuna key informant].

**Interpersonal Domain.** Interview questions related to the Interpersonal domain focused on the relationships with providers of care and cues to action regarding healthcare decisions. Key informants were asked to discuss their thoughts on the relationships between Garifuna women and the service they received from providers of care within their community. Overall, the key informants stated that there was a good relationship between providers of care and Garifuna women. Feeling comfortable and good communication with Spanish-speaking providers provided for a more comfortable relationship with healthcare provider. While the Garifuna women generally felt comfortable with their providers, a main theme that emerged is physicians are not aware of the Garifuna as a distinct ethnic group with their own cultural norms. One non-Garifuna key informant stated “*lot of providers don’t even know what a Garifuna is*” and other non-Garifuna key informants stated “*I don’t think they know our culture*” [Non-Garifuna key informant] and “*I don’t think they understand the Garifuna needs*”. [Non-Garifuna key informant]. Questions related to cues to action focused on what motivated the healthcare decisions of the Garifuna women. Here, self-motivation, family and friends emerged as the main sources of motivation.

**Organizational Domain.** Questions from the organizational domain concerned access to providers of care within Garifuna neighborhoods and perceived barriers to receiving healthcare. Key informants were asked if they felt Garifuna women were able to access care in their neighborhoods. If so, participants were asked about the type of healthcare centers and the ability to access cancer screenings. Participants were then asked to comment on structural barriers to receiving healthcare by the Garifuna women. All key informants felt that access to care in clinics and hospitals were readily available in the Garifuna women's neighborhoods. All stated that transportation was not a barrier to receiving care. "*Transportation in New York is the easiest part, not a problem, and you can walk, there are buses*" [Garifuna key informant] are examples of statements related to lack of transportation as a structural barrier to receiving healthcare. The main theme to emerge as a barrier was lack of health insurance. Most of the non-Garifuna women thought this was a barrier, whereas the two non-Garifuna key informants stated that healthcare was available regardless of health insurance status.

**Community Domain.** Interview questions from the community domain addressed acculturation, identity, and cultural forces informing Garifuna health care decisions. Probing questions were asked on Garifuna cultural norms as it was essential to capture norms unique to the Garifuna and thus include in the survey for Phase two of the study. Key informants were asked their thoughts on the cultural norms of Garifuna living in New York. Informants shared their thoughts on the specifically on whether or not they felt Garifuna valued and participated in activities consistent with Garifuna heritage culture versus participating in and valuing activities aligned with American culture. The main theme that emerged was that Garifuna in New York participate in and value

Garifuna cultural activities more so than American cultural ones. One non-Garifuna informant summarized this theme by stating “*definitely a tight knit community and it is active, supportive of each other, spend a lot of time with extended family, connections from home communities and communities here*” [Non-Garifuna key informant].

Informants felt that Garifuna cultural activities were passed to the next generation and that valuing and participating in Garifuna cultural practices did not diminish with length of time in New York.

When key informants were questioned about how Garifuna identify themselves, whether as Garifuna, Black or Hispanic, all nine key informants felt that Garifuna identified first and foremost as Garifuna but that the Garifuna actively engaged in activities related to other cultures, especially Hispanic or “Spanish” culture. Garifuna were noted to speak Garifuna, Spanish and English as they desired and a few Garifuna informants stated that marriage to non-Garifuna was acceptable. Regarding Garifuna cultural forces that inform Garifuna health decisions, eight of the nine key informants felt that both traditional Garifuna and Western medicines informed Garifuna health decisions. Garifuna were described as using traditional medical practices before turning to Western medical practices. This practice however was thought to be generational, more common among older Garifuna. One non-Garifuna informant stated “*Some Buyeis are active in the community, traditional healers understand seen as more spiritual, visit for health or spiritual problems, and still seek Western medicine, no all healthcare needs attended by Buyeis*” [Non-Garifuna key informant].

**Policy Domain.** Questions from the policy domain comprised the final set of interview questions related to the Integrative Conceptual Framework. Key informants

were asked questions as to how regulations and policy impacted Garifuna's ability to seek care. The main question centered on Garifuna's ability to seek care without legal immigration status. There were a mixture of responses on this question. A few key informants felt that Garifuna without legal immigration status have access to care but that care was mostly limited to emergency rooms and clinics. Other key informants did not believe that immigration status affects access to care.

**Recommendations for Phase 2 of the Study.** The final questions posed to the key informants related to the logistics of conducting Phase 2 of the study which included surveying of 400 Garifuna women. Key informants were asked to provide their thoughts on the best mode of surveying the Garifuna women, the best method of recruiting Garifuna women for the survey, and provide suggestions on any other logistical issues related to the implementation of the study. Most informants suggested using Facebook posting and word of mouth emerged as the main recruitment strategies. They also recommended using paper and pencil over electronic forms of data collection (e-mail, iPad) for the mode of administering the survey. Key informants felt women that Garifuna women, 50 years and older (the inclusion criteria) would be more comfortable with paper surveys. Finally, all key informants suggested offering surveys in both English and Spanish.

In summary, the key informant interviews confirmed the sociocultural and Garifuna health norms, which were identified as variables to be examined in Phase 2 of the study. The interviews in Phase 1 did not provide additional variables for the survey instrument used in Phase 2 of the study or for variables to be removed.

## **Phase 2: Survey of Garifuna Women**

### **Study Sample Characteristics**

The study sample for Phase 2 included 402 women who self-identified as Garifuna. Characteristics of the study sample are summarized in Tables 2 and 3. Most of the study participants (73%) were between the ages of 50 to 65 years of age and were single, divorced, or separated (52%). A significant proportion of respondents were unemployed (53%) and have lived in the United States for over 20 years (71%). When asked about access to healthcare, 58% reported having government, military, or veterans insurance, 30% reported having private health insurance, and 12% reported having no type of health insurance. Most respondents reported having a regular provider of care (96%), seeing a specialist (91%), and having a place to go for the cancer screenings (94%).

Regarding knowledge of breast cancer screening tests, 98% of respondents had heard of mammograms and reported knowing how often they should receive the test. Similarly, most respondents reported having heard of the Pap test (98%) and how often to receive the test (95%). For colon cancer screening, a large proportion reported hearing of the sigmoidoscopy/colonoscopy test 95% and fecal occult blood test (78%), and knowing how often they should receive the test (71%).

Regarding cancer screening practices (*study outcomes*), the reported rates of receiving cancer screening tests in the past year were 82% for a mammogram, 60% for a Pap test, and 37% for fecal occult blood test. The reported rate of receiving a colonoscopy/sigmoidoscopy in past 5 years was 65%.

Table 2. Study Sample Characteristics – Categorical Predictors

	Variables	Categories	n	%
Demographics Characteristics	Age	50 to 65 years	291	73.1
		66 years and greater	107	26.9
	Marital Status	Single/Divorced/Separated	206	51.8
		Married/Unmarried Couple	192	48.2
	Employed	No	212	53.0
		Yes	188	47.0
	How long live in US	10 years or less	61	15.4
		11 to 20 years	54	13.6
		Over 20 years	282	71.0
Access to Healthcare Services	Type of health insurance	No health insurance	45	11.4
		Private	118	29.9
		Government/Military/Vet	231	58.6
	Do you have a regular provider	No	17	4.3
		Yes	382	95.7
	Do you see a specialist	No	34	8.5
		Yes	366	91.5
	Do you have a place to go for screening	No	22	5.6
		Yes	374	94.4
Knowledge of Cancer Screening	Heard of a mammogram	No	8	2.0
		Yes	392	98.0
	Do you know how often should receive mammogram	No	8	2.0
		Yes	392	98.0
	Heard of a Pap test	No	6	1.5
		Yes	394	98.5
	Do you know how often receive Pap test	No	20	5.0
		Yes	380	95.0
	Heard of sigmoidoscopy/colonoscopy	No	21	5.3
		Yes	379	94.8
Cancer Screening Practices	Mammogram in past year	No	86	21.6
		Yes	312	78.4
	Do you know how often get fecal occult blood test	No	115	28.9
		Yes	283	71.1
	Pap within past year	Yes	329	81.8
		No	73	18.2
	Colonoscopy in past five years	Yes	243	60.4
		No	159	39.6
	Fecal occult blood test in past year	Yes	264	65.7
		No	138	34.3
		Yes	149	37.1
		No	253	62.9

Two scales measuring sociocultural norms were used, one for *acculturation* and one for *identity*. For acculturation a mean total acculturation score and two subscale scores, mean heritage culture subscale and mean acculturation subscale. The mean total acculturation score was 55.05 (SD= 6.47) while the mean heritage culture and mean mainstream subscale scores were 32.79 (SD= 5.71) and 27.78 (SD=4.72), respectively.

The mean score on the identity scale was 52.39 (SD=8.65). Health belief model scales were used to measure constructs of the model for the three cancer types. The mean breast cancer scores were: 6.84 (SD=1.97) for breast cancer perceived susceptibility, 11.02 (SD=2.33) for breast cancer perceived severity, 12.80 (SD=2.29) for breast cancer perceived benefits, 8.14 (SD=1.96) for breast cancer perceived barriers and 9.68 (SD=1.61) for breast cancer motivation/cues to action. The mean cervical cancer scores were: 6.76 (SD=1.91) for cervical cancer perceived susceptibility, 10.94 (SD=2.46) for cervical cancer perceived severity, 12.83 (SD=2.27) for cervical cancer perceived benefits, 7.99 (SD=2.62) for cervical cancer perceived barriers, 9.59 (SD=1.45) for cervical cancer motivation/cues to action. Finally, the colorectal cancer mean scores were: 6.69 (SD=1.94) for colorectal cancer perceived susceptibility, 10.74 (SD=2.32) for colorectal cancer perceived severity, 12.53 (SD=2.69) for colorectal cancer perceived benefits, 7.95 (SD=2.2) for colorectal cancer perceived barriers, and 9.57 (SD=1.62) or colorectal cancer motivation/cues to action.

Table 3. Characteristics of Study Sample – Continuous Variables

<b>Continuous Study Variables</b>	<b>Mean</b>	<b>Std. Deviation</b>
Acculturation-Total Score	55.05	6.47
Acculturation-Heritage Culture	32.79	5.71
Acculturation-Mainstream Culture	27.78	4.72
Identity Scale	52.39	8.65
Breast Cancer-Perceived Susceptibility	6.84	1.97
Breast Cancer Perceived Severity	11.02	2.33
Breast Cancer -Perceived Benefits	12.80	2.29
Breast Cancer-Perceived Barriers	8.14	1.96
Breast Cancer-Motivation	9.68	1.61
Cervical Cancer-Perceived Susceptibility	6.76	1.91
Cervical Cancer-Perceived Severity	10.94	2.46
Cervical Cancer-Perceived Benefits	12.83	2.27
Cervical Cancer-Perceived Barriers	7.99	2.62
Cervical Cancer -Motivation	9.59	1.45
Colon Cancer- Perceived Susceptibility	6.69	1.94
Colon Cancer-Perceived Severity	10.74	2.32
Colon Cancer-Perceived Benefits	12.53	2.69
Colon Cancer-Perceived Barriers	7.95	2.23
Colon Cancer- Motivation	9.57	1.62

### Predictors of Breast Cancer Screening

Breast cancer screening in this study was measured as *having a mammogram in the past year (12 months)*. Chi-square tests were used to examine the bivariate associations between having a mammogram in the past 12 months and the categorical predictors. There were no statistically significant associations between having a mammogram in the past year and the demographic predictors, as shown in Table 4.

Regarding access to healthcare services, having a mammogram in the past 12 months was statistically associated with the type of health insurance, having a regular provider, and having a place to go for screening. Having a mammogram in the last 12 months was significantly higher among women with government/military or veterans' health insurance ( $X^2 = 22.678$ ;  $p=.000$ ), who had a regular provider ( $X^2=19.966$ ;  $p=.000$ ), and a place to go for screenings ( $X^2 = 11.311$ ;  $p<.001$ ). Having a mammogram in the past 12 months was not statistically associated with having a place to go when sick, or where go when sick. Regarding knowledge of breast cancer screening, having a mammogram in the last 12 months was statistically associated with knowing how often to have a mammogram ( $X^2 = 5.516$ ;  $p<.019$ ). There was no statistically significant association between having a mammogram in the past 12 months and having heard of a mammogram.

Bivariate analysis also included using independent samples t-test (shown in Table 5) to examine differences in continuous predictors (sociocultural and health belief factors) by having a mammogram in the last 12 months (yes vs. no). Garifuna women who reported having a mammogram in last 12 months had significantly higher breast



cancer motivation/cues to action scores ( $t = -2.867$ ;  $p = .004$ ). Having a mammogram in the last 12 months however was not statistically associated with acculturation, and identity scores, and the health belief factors, breast cancer perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.

Table 4. Bivariate analysis of differences in having a mammogram within the last 12 months, by demographic characteristics, access to healthcare services, and knowledge of breast cancer screening using Chi-Square

Variable		Categories	Had a Mammogram in last 12 months	X <sup>2</sup> (p)
<b>Demographics Characteristics</b>	Age	50 to 65 years 66 years and older	73.3% 26.7%	.036 (.850)
	Marital Status	Single/Divorced Married/Unmarried Couple	52.0% 48.0%	.41 (.839)
	Employed	No Yes	54.7% 45.3%	2.178 (.140)
	How long live in US	<11 years 11-20 years >20 years	13.0% 13.3% 73.8%	8.612 (0.13)
<b>Access to Healthcare Services</b>	Type of health insurance	No health insurance Private Government/Military/Vet	8.1% 29.2% 62.7%	22.678 (.000)
	Place go when sick	There is no place Yes, there is a place There is more than one place	0.6% 94.2% 5.2%	1.559 (.459)
	Where go when sick	Clinic or health center Clinic more than 30 mins away Hospital emergency room Hospital outpatient department Some other place Doesn't go to one place most often	62.9% 4.3% 2.9% 24.3% 2.9% 2.9%	6.193 (.288)
	Having a regular provider	No Yes	2.1% 97.9%	19.966 (.000)
	Place go for screening	No Yes	3.7% 96.3%	11.311 (.001)
	Heard of mammogram	No Yes	1.8% 98.2%	.249 (.618)
<b>Knowledge of Breast Cancer Screening</b>	Know how often to get mammogram	No Yes	1.2% 98.8%	5.516 (.019)

Table 5. Bivariate analysis of having a mammogram in last 12 months by sociocultural and health belief factors, using t-test

Variables		Had a Mammogram in last 12 months		t(p)
		No	Yes	
		Mean (SD)	Mean (SD)	
Acculturation Scale	Acculturation-Total Score	54.1 (6.708)	55.27 (6.416)	-1.305 (.193)
	Acculturation-Heritage Score	32.59 (5.701)	32.84 (5.729)	-.330 (.742)
	Acculturation-Mainstream Score	28.43 (5.280)	27.64 (4.589)	1.228 (.220)
Identity Scale	Identity score	52.94 (8.647)	52.26 (8.659)	.575 (.566)
Champion Health Belief Model Scale	Breast cancer perceived susceptibility score	6.72 (1.987)	6.87 (1.972)	-.581 (.562)
	Breast cancer perceived severity score	10.61 (2.521)	11.10 (2.285)	-1.594 (.112)
	Breast cancer perceived benefits score	12.81 (1.972)	12.80 (2.361)	.052 (.958)
	Breast cancer perceived barriers score	8.28 (1.778)	8.11 (2.030)	.649 (.517)
	Breast cancer motivation/cues to action score	9.19 (1.516)	9.79 (1.611)	-2.861 (.004)

The multivariate analysis (shown in Table 6) examined the predictors of breast cancer screening, including the demographic, access to healthcare services, sociocultural factors, and knowledge and health belief factors. In the first predictive model, demographic factors explained between 3% and 4% of the variability in breast cancer screening ( $X^2 = 10.693$ ,  $df=4$ ,  $P=.030$ ). The only significant predictor variable in this model was length of time lived in the US ( $p=.004$ ), where the odds of getting screened for breast cancer were 59% higher among women who had lived in the US for over 20 years ( $aOR=1.592$ ; 95% CI: 1.162-2.180).

In the second predictive model, access to healthcare services factors explained between 8% and 13% of the variability in breast cancer screening ( $X^2=33.520$ ;  $df=3$ ;

$p<.000$ ). Significant predictors in this model were type of health insurance ( $p<.000$ ), having a regular provider ( $p=.010$ ), and having a place for screening ( $p=.010$ ). The odds for having breast cancer screening were twice as high among women with government, military, or veterans' health insurance ( $aOR=1.975$ ; 95% CI: 1.373-2.841), over four times higher for those with a regular provider ( $aOR=4.416$ ; 95% CI: 1.401-12.267), and over three times higher for those with a place to go for the screenings ( $aOR=3.493$ ; 95% CI: 1.340-9.104).

In the third predictive model, sociocultural predictors explained less than 1% of the variability in breast cancer screening. There were no significant predictors among the model's variables. In the fourth predictive model, knowledge and health belief factors explained between 3% and 5% of the variability in breast cancer screening ( $X^2 = 12.265$ ;  $df=7$ ;  $P=.092$ ). The significant predictor in this model was motivation/cues to action to receiving breast cancer screening ( $p=.008$ ). The odds of receiving a mammogram were twice as high among women with higher levels of motivation/cues to action to receiving breast cancer screening ( $aOR=2.076$ ; CI: 1.207-3.570).

Table 6. Logistic regression analysis of predictors of breast cancer screening

Predictors	Criterion Variables	Havin a mammogram in last 12 months						
		B	SE	Wald	df	p	Exp(B)	95% CI
Demographic Predictors (N=390)								
Age (50 to 65 years vs. > 65 years)		-.324	.364	.792	1	.374	.724	.355-1.476
Marital status: (single/divorced/separated vs. married/unmarried couple)		.014	.270	.003	1	.960	1.014	.597-1.722
Employed (No vs. Yes)		-.540	.326	2.749	1	.097	.583	.308-1.103
How long live in US: (10 years or less vs.11 to 20 years vs. over 20 years)		.465	.160	8.390	1	.004	1.592	1.162-2.180
Constant		1.013	.726	1.950	1	.163	2.755	
Omnibus Tests of Model Coefficients	Chi-square =10.693; df=4; P=.030							
Model Summary	-2 Log likelihood= 362.397; Cox & Snell R <sup>2</sup> = 2.7%; Nagelkerke R <sup>2</sup> =4.4%							
Access to Healthcare Services (N=388)								
Type of health insurance:								

<i>(no health insurance vs. private vs. government/military/ veteran)</i>	.681	.186	13.451	1	.000	1.975	1.373-2.841
<b>Do you have a regular provider</b> <i>(No vs. Yes)</i>	1.422	.553	6.602	1	.010	4.146	1.401-12.267
<b>Place for screening</b> <i>(No vs. Yes)</i>	1.251	.489	6.550	1	.010	3.493	1.340-9.104
<b>Constant</b>	-1.934	.690	7.859	1	.005	.145	
<b>Omnibus Tests of Model Coefficients</b>	Chi-square=33.520; df=3; P<.000						
<b>Model Summary</b>	-2 Log likelihood= 338.751; Cox Snell R <sup>2</sup> =8.3%; Nagelkerke R <sup>2</sup> = 13.4%						
<b>Sociocultural Predictors (N=402)</b>							
<b>Acculturation-Heritage</b>	.116	.242	.230	1	.631	1.123	.699-1.806
<b>Acculturation -Mainstream</b>	-3.20	.299	1.145	1	.285	.726	.405-1.304
<b>Identity</b>	-.078	.272	.082	1	.775	.925	.542-1.577
<b>Constant</b>	2.238	1.058	4.480	1	.034	9.378	
<b>Omnibus Tests of Model Coefficients</b>	Chi-square=1.504; df=3, P=.681						
<b>Model Summary</b>	-2Log likelihood=379.430; Cox & Snell R <sup>2</sup> =.0.4%; Nagelkerke R <sup>2</sup> =0.6%						
<b>Knowledge of breast cancer screening and health belief factors (N=395)</b>							
<b>Heard of mammogram</b> <i>(No vs. Yes)</i>	-.481	1.101	.191	1	.662	.618	.071-5.343
<b>Know how often to receive mammogram</b> <i>(No vs. Yes)</i>	.359	1.035	.120	1	.729	1.432	.188-10.897
<b>Perceived breast cancer susceptibility</b>	.015	.251	.004	1	.952	1.015	.620-1.661
<b>Perceived breast cancer severity</b>	.352	.271	1.679	1	.195	1.422	.835-2.420
<b>Perceived breast cancer screening benefits</b>	-.288	.270	1.131	1	.288	.750	.442-1.274
<b>Perceived breast cancer screening barriers</b>	-.046	.315	.022	1	.883	.955	.515-1.769
<b>Perceived breast cancer screening motivation/cues to action</b>	.730	.277	6.971	1	.008	2.076	1.207-3.570
<b>Constant</b>	-.638	1.998	.102	1	.750	.528	
<b>Omnibus Tests of Model Coefficients</b>	Chi-square= 12.264; df=7; P=.092						
<b>Model Summary</b>	-2 Log likelihood=359.833; Cox & Snell R <sup>2</sup> =3.1%; Nagelkerke R <sup>2</sup> =5.0%						

## Predictors of Cervical Cancer

Cervical cancer screening in this study was measured as having a *Pap test within the past year (12 months)*. Chi-square tests were used to examine the bivariate associations between having a Pap test in the past 12 months and categorical predictors as shown in Table 7. Having a Pap test in the past 12 months was statistically associated with age, having a regular provider, a place to go for screening, having heard of a Pap test, and knowing how often to receive the test. Having a Pap test in the past 12 months was significantly higher among women age 50 to 65 years of age ( $X^2=11.708$ ;  $p=.001$ ),

who had a regular provider ( $X^2=13.760$ ;  $p<.000$ ), a place to go for screenings ( $X^2=5.734$ ;  $p=.017$ ), having heard of the Pap test ( $X^2=4.831$ ;  $p=.028$ ) and knowing how often to receive the Pap test ( $X^2=14.241$ ,  $p<.000$ ).

Table 7. Bivariate analysis of having a Pap test in the past year by demographic characteristics, access to healthcare services, and knowledge of cervical cancer screening using Chi-Square

Variable		Categories	Had a Pap test in past year	$X^2$ (p)
Demographic Characteristics	Age	50 to 65 years 66 years and older	36.3% 20.7%	11.708 (.001)
	Marital Status	Single/Divorced Married/Unmarried Couple	53.8% 46.2%	.960 (.327)
	Employed	No Yes	52.3% 47.7%	.125 (.723)
	How long live in US	<11 years 11-20 years >20 years	12.5% 14.6% 79.9%	3.975 (.137)
Access to Healthcare Services	Type of health insurance	No health insurance Private Government/Military/Vet	8.8% 30.5% 60.7%	4.195 (.123)
	Place go when sick	There is no place Yes, there is a place There is more than one place	0.8% 93.4% 5.8%	.049 (.976)
	Where go when sick	Clinic or health center Clinic more than 30 mins away Hospital emergency room Hospital outpatient department Some other place Doesn't go to one place most often	56.4% 2.9% 4.5% 33.7% 1.6% 0.8%	2.833 (.726)
	Having a regular provider	No Yes	1.2% 98.8%	13.760 (.000)
	Place go for screening	No Yes	3.3% 96.7%	5.734 (.017)
	Heard of Pap test	No Yes	0.4% 99.6%	4.831 (.028)
Knowledge of Cervical Cancer Screening	Know how often to get Pap test	No Yes	1.7% 98.3%	14.241 (.000)

Bivariate analysis included using independent samples t-test (as shown in Table 8) to examine differences in continuous predictors (sociocultural and health belief factors) by having a Pap test in the past 12 months (yes vs. no). Garifuna women who

reported having a Pap test within the past 12 months had significantly higher levels of perceived benefits of getting screened for cervical cancer ( $t = -2.302$ ;  $p = .022$ ). The analysis shows no significant association between having a Pap test and any of the other continuous predictors.

Table 8. Bivariate analysis years since Pap test by sociocultural and health belief factors, using t-test

Variables		Having a recent Pap Test		
		Two or more years	Within the past year	t(p)
		Mean (SD)	Mean (SD)	
Acculturation Scale	Acculturation-Total Score	55.57 (7.204)	54.71 (5.939)	1.215 (.225)
	Acculturation-Heritage Score	33.30 (5.615)	32.45 (5.772)	1.410 (.159)
	Acculturation-Mainstream Score	27.85 (4.925)	27.73 (4.595)	.224 (.808)
Identity Scale	Identity score	52.57 (8.604)	52.26 (8.697)	.332 (.740)
Champion Health Belief Model Scale	Cervical cancer perceived susceptibility score	6.76 (2.113)	6.76 (1.776)	-.013 (.990)
	Cervical cancer perceived severity score	10.83 (2.558)	11.00 (2.401)	-.674 (.501)
	Cervical cancer perceived benefits score	12.50 (2.495)	13.04 (2.092)	-2.302 (.022)
	Cervical cancer perceived barriers score	8.02 (2.170)	7.96 (2.161)	.243 (.808)
	Cervical cancer motivation/cues to action score	9.57 (1.595)	9.60 (1.351)	-.184 (.854)

The multivariate analysis (shown in Table 9) examined the predictors of cervical cancer screening within demographics, access to healthcare services, sociocultural predictors, knowledge of cervical cancer screening, and health belief factors. In the first predictive model, demographic factors explained between 5% and 6% of the variability in cervical cancer screening ( $X^2 = 18.5866$ ,  $df = 4$ ;  $p = .001$ ). Age was the only significant predictor in this model. Older women (>65 years older) had 66% lower odds of receiving screening for cervical cancer than younger women ( $aOR = .341$ ; 95% CI: .195-.595). In

the second predictive model, access to healthcare services explained 5% and 6% of the variability in cervical cancer screening. Having a health care provider was the only significant predictor in this model. Women who reported having a regular provider had over six times higher odds of receiving the Pap test than women who reported they did not have a regular provider of care ( $aOR=6.353$ ; 95% CI= 1.748-23.090). Sociocultural predictors, in the third predictive model, less than 1% of the variability in cervical cancer screening. There were no significant predictors in this model. In the fourth predictive model, knowledge of cervical cancer screening and health belief factors explained between 5% and 6% of the variability in cervical cancer screening. Knowing how often to receive a Pap test was the only significant predictor in this model. Women who reported knowing when to have a Pap test had close to eight times higher odds of receiving cervical cancer screening than women not knowing when to receive the Pap test ( $aOR=7.762$ ; 95% CI= 1.991-30.266).

Table 9. Logistic regression analysis of predictors of cervical cancer screening

Predictors	Criterion Variables	Having a Pap test in last 12 months						
		B	SE	Wald	df	p	Exp(B)	95% CI
Demographic Predictors (N=390)								
Age (50 to 65 years vs. 66 years and greater)		-1.076	.284	14.310	1	.000	.341	.195-.595
Marital status: (single/divorced/separated vs. married/unmarried couple)		-.264	.216	1.499	1	.221	.768	.503-1.172
Employed (No vs. Yes)		-.452	.259	3.042	1	.081	.636	.383-1.058
How long live in US: (10 years or less vs.11 to 20 years vs. over 20 years)		.215	.140	2.360	1	.124	1.240	.942-1.630
Constant		1.607	.592	7.369	1	.007	4.988	
Omnibus Tests of Model Coefficients	Chi-square=18.586; df=4; P=.001							
Model Summary	-2 Log likelihood= 504.699; Cox & Snell R <sup>2</sup> =4.7%; Nagelkerke R <sup>2</sup> = 6.3%							
Access to Healthcare Services (N=388)								
Type of health insurance: (no health insurance vs. private vs. government/military/ veteran)		.155	.156	.985	1	.321	1.167	.860-1.584
Do you have a regular provider (No vs. Yes)		1.849	.658	7.887	1	.005	6.353	1.748-23.090

<b>Place for screening</b> ( <i>No vs. Yes</i> )	.879	.474	3.441	1	.064	2.409	.952-6.101
<b>Constant</b>	-2.390	.774	9.540	1	.002	.092	
<b>Omnibus Tests of Model Coefficients</b>	Chi-square=18.495, df=3, P<.000						
<b>Model Summary</b>	-2 Log likelihood=501.056; Cox & Snell R <sup>2</sup> =4.7%; Nagelkerke R <sup>2</sup> =6.3%						
<b>Sociocultural Predictors (N=402)</b>							
<b>Acculturation-Heritage</b>	-.258	.189	1.873	1	.171	.773	.534-1.118
<b>Acculturation -Mainstream</b>	-.014	.227	.004	1	.951	.986	.632-1.538
<b>Identity</b>	.028	.216	.017	1	.896	1.029	.674-1.570
<b>Constant</b>	1.229	.834	2.171	1	.141	3.418	
<b>Omnibus Tests of Model Coefficients</b>	Chi-square=2.085; df=3, P=.555						
<b>Model Summary</b>	-2 Log likelihood= 537.523; Cox & Snell R <sup>2</sup> =0.5%; Nagelkerke R <sup>2</sup> =0.7%						
<b>Knowledge of cervical cancer screening and health belief factors (N=392)</b>							
<b>Heard of Pap test</b> ( <i>No vs. Yes</i> )	.522	1.293	.163	1	.686	1.685	.134-21.255
<b>Know how often to receive Pap test</b> ( <i>No vs. Yes</i> )	2.049	.694	8.712	1	.003	7.762	1.991-30.266
<b>Perceived cervical cancer susceptibility</b>	.030	.197	.024	1	.878	1.031	.700-1.517
<b>Perceived cervical cancer severity</b>	.000	.195	.000	1	1.000	1.000	.682-1.466
<b>Perceived cervical cancer screening benefits</b>	.340	.194	3.065	1	.080	1.406	.960-2.058
<b>Perceived cervical cancer screening barriers</b>	.113	.221	.262	1	.609	1.120	.726-1.728
<b>Perceived cervical cancer screening motivation/cues to action</b>	.012	.228	.003	1	.958	1.012	.647-1.584
<b>Constant</b>	-3.487	1.751	3.965	1	.046	.031	
<b>Omnibus Tests of Model Coefficients</b>	Chi-square=19.132; df=7; P=.008						
<b>Model Summary</b>	-2 Log likelihood= 507.853; Cox & Snell R <sup>2</sup> =4.8%; Nagelkerke R <sup>2</sup> =6.4%						

### Predictors of Colorectal Cancer Screening.

Colorectal cancer screening in this study was measured as having *fecal occult blood testing in the past year (12 months)* and *colonoscopy within the past five years*. Regarding fecal occult blood testing, Chi-square tests were used to examine the bivariate associations between having a fecal occult blood test in the past 12 months and categorical predictors, as shown in Table 10. Having a fecal occult blood test within the past 12 months was significantly associated with employment, length of time in US, type of health insurance, having heard of a fecal occult blood test, and knowing how often to receive the test. Having fecal occult blood testing in the past 12 months was significantly higher among women who are unemployed ( $X^2 = 4.889$ ;  $p < .027$ ), living in the US more



than 20 years ( $X^2 = 22.010$ ;  $p=.000$ ), having government/military or veterans' health insurance ( $X^2=23.320$ ;  $p=.000$ ), having heard of the fecal occult blood test ( $X^2=26.028$ ,  $p<.000$ ), and knowing how often to receive the test ( $X^2 = 38.976$ ,  $p<.000$ ).

Table 10. Bivariate analysis of screening by fecal occult blood testing in past 12 months by demographics, access to healthcare services and knowledge about colorectal cancer screening with fecal occult blood test using Chi-Square

Variable		Categories	FOBT in last 12 months	$X^2$ (p)
<b>Demographic Characteristics</b>	Age	50 to 65 years 66 y ears and older	71.3 % 28.7%	1.325 (.250)
	Marital Status	Single/Divorced Married/Unmarried Couple	50.3% 49.7%	.078 (.780)
	Employed	No Yes	57.7% 42.3%	4.889 (.027)
	How long live in US	<11 years 11-20 years >20 years	25.0% 12.5% 62.5%	22.010 (.000)
<b>Access to healthcare services</b>	Type of health insurance	No health insurance Private Government/Military/Vet	18.5% 20.8% 60.7%	23.320 (.000)
	Place go when sick	There is no place Yes, there is a place There is more than one place	0.6% 96.6% 2.8%	4.884 (.087)
	Where go when sick	Clinic or health center Clinic more than 30 mins away Hospital emergency room Hospital outpatient department Some other place Doesn't go to one place most often	55.1% 2.3% 3.4% 38.1% 0.6% 0.6%	10.188 (.070)
	See a specialist	No Yes	5.7% 94.3%	3.190 (.074)
	Place go for screening	No Yes	5.2% 94.8%	.005 (.945)
	Heard of fecal occult blood test	No Yes	9.8% 90.2%	26.028 (.000)
<b>Knowledge of colorectal cancer screening</b>	Know how often receive tests	No Yes	12.6% 87.4%	38.976 (.000)

Bivariate analysis also included independent samples t-tests (as shown in Table 11) to examine the differences in continuous predictors (sociocultural and health belief factors) by having a fecal occult blood test in the past 12 months. Statistically significant differences were found the participants' scores on the acculturation total scale,

acculturation heritage subscale, acculturation mainstream subscale, perceptions of the severity of colorectal cancer, perceived benefits to receive colorectal cancer screening, perceived barriers to receiving colorectal cancer screening tests, and motivation/cues to action to receiving colorectal cancer screening tests. Garifuna women who reported having fecal occult blood testing in the past 12 months had lower acculturation total scores ( $t = -5.047$ ;  $p = .000$ ), higher heritage culture subscale scores ( $t = -3.486$ ;  $p < .001$ ), and lower acculturation mainstream heritage subscale scores ( $t = -2.962$ ;  $p = .003$ ) than women who reported receiving no FOBT in the past 12 months. In the analysis, having a fecal occult blood test in the past 12 months was not statistically associated with scores on the identify scale.

Table 11. Bivariate analysis of screening by fecal occult blood testing in the past 12 months by sociocultural and health belief factors, using t-test

Variables		Having FOBT in last 12 months		
		No	Yes	t(p)
		Mean (SD)	Mean (SD)	
Acculturation Scale	Acculturation-Total Score	53.54 (5.686)	57.03 (6.993)	-5.047 (.000)
	Acculturation-Heritage Score	31.80 (4.610)	33.90 (6.793)	-3.486 (.001)
	Acculturation-Mainstream Score	28.34 (4.487)	26.86 (4.862)	2.962 (.003)
Identity Scale	Identity score	52.39 (9.217)	52.07 (8.013)	.333 (.739)
Champion Health Belief Model Scale	Colorectal cancer perceived susceptibility score	6.69 (1.962)	6.61 (1.973)	.360 (.719)
	Colorectal cancer perceived severity score	10.27 (2.063)	11.24 (2.527)	-4.055 (.000)
	Colorectal cancer perceived benefits score	11.95 (1.946)	13.18 (3.320)	-4.465 (.000)
	Colorectal cancer perceived barriers score	8.13 (2.011)	7.61 (2.460)	2.256 (.025)
	Colorectal cancer motivation/cues to action score	9.30 (1.364)	9.95 (1.811)	-3.970 (.000)

The multivariate analysis examined predictors of colorectal cancer screening by FOBT, including the demographics, access to healthcare services, sociocultural, knowledge of colorectal cancer screening and health belief factors predictors. In the first model, demographic predictors explained between 7% and 9% of the variability in colorectal cancer screening by FOBT ( $X^2=25.636$ ;  $df=4$ ,  $p<.000$ ). Employment status and length of stay in the US were statistically significant predictors in the model. The odds of having fecal occult blood test in past 12 months were 46% lower among unemployed women ( $aOR=.560$ ;  $95\% CI=.341-.922$ ) and 45% lower among women living less than 10 years in the US ( $aOR=.531$ ;  $95\% CI=.397-.711$ ). In the second model, access to healthcare services predictors explained between 1% and 2% of the variability in colorectal cancer screening with FOBT ( $X^2=4.262$ ,  $df=3$ ;  $p=.235$ ). There were no significant predictors in the model. The third model, sociocultural predictors explained 7% and 9% of the variability in colorectal cancer screening by FOBT ( $X^2=25.534$ ;  $df=3$ ;  $p<.000$ ). There were two significant predictors in the model, acculturation-heritage and acculturation-mainstream. The odds of receiving colorectal cancer screening with FOBT were two times higher with higher levels of heritage acculturation ( $aOR=2.287$ ;  $95\% CI=1.555-3.364$ ) and 56% lower with higher levels of mainstream acculturation scores ( $aOR=.444$ ;  $95\% CI=.275-.718$ ).

Finally, in the fourth predictive model, knowledge of colorectal cancer screening and health belief factors, explained between 19% and 26% of the variability in colorectal cancer screening by FOBT ( $X^2=78.699$ ,  $df=7$ ;  $p<.000$ ). There were four significant predictors in the model, knowing how often to receive a FOBT, perceived benefits of colorectal cancer screening, perceived barriers to colorectal cancer screening, and

perceived motivations/cues to action regarding colorectal cancer screening. The odds of receiving colorectal cancer screening with FOBT test are over three times higher when women who knew how often to receive the FOBT test ( $aOR= 3.645$ ;  $95\% CI=1.516-8.768$ ), twice as high among women with higher levels of perceived benefits of colorectal cancer screening ( $aOR=2.012$ ;  $95\% CI= 1.397-2.899$ ), twice as high among women with higher levels of perceived motivation/cues to action ( $aOR=2.001$ ;  $95\% CI= 1.292-3.100$ ), and 50% lower among women with higher levels of perceived barriers to colorectal cancer screening ( $aOR= .496$ ;  $95\% CI= .316-.778$ ).

Table 12. Logistic regression analysis of predictors of having fecal occult blood test in last 12 months

Last 12 months	Criterion Variables	Having fecal occult blood test in past 12 months						
Predictors		B	SE	Wald	df	p	EXp(B)	95% CI
<b>Demographic Predictors (N=370)</b>								
<b>Age</b> (50 to 65 years vs. 66 years and greater)		-.132	.287	.212	1	.645	.876	.499-1.537
<b>Marital status:</b> (single/divorced/separated vs. married/unmarried couple)		.132	.219	.365	1	.546	1.141	.743-1.753
<b>Employed</b> (No vs. Yes)		-.579	.254	5.195	1	.023	.560	.341-.922
<b>How long live in US:</b> (10 years or less vs. 11 to 20 years vs. over 20 years)		-.633	.149	18.094	1	.000	.531	.397-.711
<b>Constant</b>		1.847	.619	8.904	1	.003	6.344	
<b>Omnibus Tests of Model Coefficients</b>		Chi-square= 25.636; df=4; P<.000						
<b>Model Summary</b>		-2 Log likelihood=485.172; Cox & Snell R <sup>2</sup> =6.7%; Nagelkerke R <sup>2</sup> =8.9%						
<b>Access to Healthcare Services (N=368)</b>								
<b>Type of health insurance:</b> (no health insurance vs. private vs. government/military/ veteran)		-.165	.151	1.192	1	.275	.848	.630-1.141
<b>Do you have a specialist</b> (No vs. Yes)		.793	.446	3.153	1	.076	2.209	.921-5.300
<b>Place for screening</b> (No vs. Yes)		-.262	.498	.276	1	.600	.770	.290-2.045
<b>Constant</b>		-.421	.552	.580	1	.446	.657	
<b>Omnibus Tests of Model Coefficients</b>		Chi-square=4.262; df=3, P=.235						
<b>Model Summary</b>		-2 Log likelihood=503.108; Cox & Snell R <sup>2</sup> =1.2%; Nagelkerke R <sup>2</sup> =1.5%						
<b>Sociocultural Predictors (N=382)</b>								
<b>Acculturation-Heritage</b>		.827	.197	17.678	1	.000	2.287	1.555-3.364
<b>Acculturation -Mainstream</b>		-.811	.245	10.999	1	.001	.444	.275-.718
<b>Identity</b>		-.199	.220	.814	1	.367	.820	.532-1.263
<b>Constant</b>		-.062	.843	.005	1	.941		
<b>Omnibus Tests of Model Coefficients</b>		Chi-square=25.534; df=3; P<.000						
<b>Model Summary</b>		-2Log likelihood=501.977; Cox & Snell R <sup>2</sup> = 6.5%; Nagelkerke R <sup>2</sup> =8.6%						
<b>Knowledge of colorectal cancer screening and health belief factors (N=371)</b>								
<b>Heard of FOBT</b> (No vs. Yes)		.143	.495	.084	1	.772	1.154	.437-3.045

<b>Know how often to receive FOBT</b> ( <i>No vs. Yes</i> )	1.293	.448	8.345	1	.004	3.645	1.516-8.768
<b>Perceived colorectal cancer susceptibility</b>	-.032	.215	.022	1	.881	.968	.635-1.476
<b>Perceived colorectal cancer severity</b>	.431	.276	2.448	1	.118	1.539	.897-2.643
<b>Perceived colorectal cancer screening benefits</b>	.699	.186	14.091	1	.000	2.012	1.397-2.899
<b>Perceived colorectal cancer screening barriers</b>	-.701	.230	9.303	1	.002	.496	.316-.778
<b>Perceived colorectal cancer screening motivation/cues to action</b>	.694	.223	9.655	1	.002	2.001	1.292-3.100
<b>Constant</b>	-5.384	1.045	26.551	1	.000	.005	
<b>Omnibus Tests of Model Coefficients</b>	Chi-square=78.699; df=7, P<.000						
<b>Model Summary</b>	-2 Log likelihood=433.347; Cox & Snell R <sup>2</sup> =19.1%; Nagelkerke R <sup>2</sup> =25.5%						

Colorectal cancer screening was also measured with having a *colonoscopy in the past five years*. Chi-square tests were used to examine the bivariate association between having a colonoscopy in past five years and categorical predictors as shown in Table 13. Having a colonoscopy in the past five years was significantly higher among women that were employed ( $X^2=5.512$ ,  $p=.019$ ), and women living in the US for more than 20 years ( $X^2= 8.575$ ,  $p=.014$ ). Furthermore, the rates of having a colonoscopy in the past five years was significantly higher among Garifuna women who had a regular provider ( $X^2=10.350$ ;  $p<.001$ ), had a specialist ( $X^2=15.003$ ;  $p=.000$ ), and had a place to go for screening ( $X^2= 11.311$ ;  $p=.001$ ). In addition, having a colonoscopy in the past five years was significantly higher among women who reported hearing of the test ( $X^2=17.581$ ,  $p<.000$ ). The bivariate analysis showed no statistically significant associations between having a colonoscopy in the past five years and the access to healthcare predictors, type of health insurance, having a place to go when sick, and where go when sick. Significant statistical association however was found between having a colonoscopy in the past five years and having a regular provider of care, seeing a specialist, having a place to go for screening and having heard of colonoscopy/sigmoidoscopy.

Table 13. Bivariate analysis of screening by colonoscopy within the past 5 years by demographics, access to healthcare services and knowledge of colorectal cancer screening using Chi-Square

Variable		Categories	Having a Colonoscopy in last 5 years	X <sup>2</sup> (p)
<b>Demographic Characteristics</b>	Age	50 to 65 years 66 years and older	70.9% 29.1%	1.926 (.165)
	Marital Status	Single/Divorced Married/Unmarried Couple	50.8% 49.2%	.294 (.588)
	Employed	No Yes	57.3% 42.7%	5.512 (.019)
	How long live in US	<11 years 11-20 years >20 years	11.5% 13.8% 74.7%	8.575 (.014)
<b>Access to healthcare services</b>	Type of health insurance	No health insurance Private Government/Military/Vet	9.7% 29.8% 60.6%	2.394 (.302)
	Place go when sick	There is no place Yes, there is a place There is more than one place	1.1% 94.3% 4.6%	3.517 (.172)
	Where go when sick	Clinic or health center Clinic more than 30 mins away Hospital emergency room Hospital outpatient department Some other place Doesn't go to one place most often	57.2% 4.5% 3.4% 33.0% 1.1% 0.8%	4.311 (.506)
	Having a regular provider	No Yes	1.9% 98.1%	10.350 (.001)
	See a specialist	No Yes	4.6% 95.4%	15.003 (.000)
	Place go for screening	No Yes	4.3% 95.7%	11.311 (.001)
	Knowledge of colorectal cancer screening	No Yes	1.9% 98.1%	17.581 (.000)

The bivariate analysis also included independent sample t tests to examine differences the continuous predictors sociocultural and health belief factors (as shown in Table 14) by having a colonoscopy in the past five years (yes vs. no). The analysis showed a statistically significant association between having a colonoscopy in the past five years and colorectal cancer motivation and cues to action ( $t = -3.413$ ;  $p < .001$ ).

Garifuna women reporting having a colonoscopy in the past five years had higher scores on the colorectal cancer motivation/cues to action scale than those women not having a colonoscopy in the past five years. The analysis showed no statistically significant associations with the remaining sociocultural predictors.

Table 14. Bivariate analysis of colonoscopy within the past five years by sociocultural and health belief factors using t test

Variables		Having a colonoscopy in last 5 years		
		More than 5 years	Within the past 5 years	t(p)
		Mean (SD)	Mean (SD)	
Acculturation Scale	Acculturation-Total Score	54.90 (6.426)	55.13 (6.516)	-.321 (.749)
	Acculturation-Heritage Score	32.64 (5.417)	32.87 (5.880)	-.380 (.704)
	Acculturation-Mainstream Score	27.68 (4.520)	27.83 (4.835)	-2.85 (.776)
Identity Scale	Identity score	51.65 (7.719)	52.76 (9.070)	-1.131 (.259)
Champion Health Belief Model Scale	Colorectal cancer perceived susceptibility score	6.93 (2.010)	6.57 (1.890)	1.739 (.083)
	Colorectal cancer perceived severity score	10.52 (2.198)	10.85 (2.381)	-1.332 (.184)
	Colorectal cancer perceived benefits score	12.51 (2.288)	12.54 (2.883)	-.107 (.915)
	Colorectal cancer perceived barriers score	8.13 (1.978)	7.86 (2.349)	1.143 (.254)
	Colorectal cancer motivation/cues to action score	9.18 (1.738)	9.77 (1.525)	-3.413 (.001)

The multivariate analysis examined predictors of colorectal cancer screening by colonoscopy within the past five years within demographics, access to healthcare services, sociocultural, knowledge of colorectal cancer screening and health belief factors predictors. In the first predictive model, demographic predictors explained between 4% and 5% of the variability in colorectal cancer screening by colonoscopy ( $X^2=14.183$ ,  $df=4$ ,  $p=.007$ ). Women who reported living in the US over 20 years had 49% greater odds of receiving colonoscopies every five years S ( $aOR=1.486$ ;  $95\% CI= 1.128-1.957$ ).

In the second predictive model, access to healthcare explained between 3% and 5% of the variability in colorectal cancer screening by colonoscopy ( $X^2=13.432$ ,  $df=4$ ;  $p=.007$ ). Women reporting having a specialist had over three times the odds of receiving colonoscopy within the past five years ( $aOR=3.521$ ;  $95\% CI= 1.559-7.956$ ). In the third predictive model, sociocultural predictors explained less than 1% of the variability in colorectal cancer screening ( $X^2= 2.182$ ;  $df=3$ ;  $p=.536$ ). However, mainstream acculturation, heritage acculturation, and identify were not significant predictors in the model. In the fourth predictive model, knowledge of colorectal cancer screening and health belief predictors explained between 8% and 12% of the variability in colorectal cancer screening ( $X^2= 34.294$ ,  $df= 6$ ,  $p<.000$ ). The model showed four statistically significant predictors, heard of colonoscopy, perceived susceptibility to colorectal cancer, perceived severity of colorectal cancer, and perceived motivations and cues to action. The odds of receiving a colonoscopy in the past five years are seven times higher among women reporting hearing of colonoscopies ( $aOR= 6.973$ ,  $95\% CI=2.353-20.668$ ), and 38% lower among women with higher levels of perceived susceptibility to colorectal cancer ( $aOR=.617$ ,  $95\% CI= .403-.944$ ). Further, the odds of receiving a colonoscopy in the past five years were 70% higher among women with higher levels of perceived severity of colorectal cancer ( $aOR=1.701$ ;  $95\% CI=1.003-2.887$ ) and twice as high among women with higher levels of perceived motivation/cues to action ( $aOR=2.030$ ;  $95\% CI= 1.330-3.099$ ).





## **CHAPTER SIX**

### **DISCUSSION AND IMPLICATIONS**

This study aimed to identify factors associated with breast, cervical and colorectal cancer screening among Garifuna women residing in the boroughs of New York City and to identify any disparities associated with their cancer screening behaviors. The study examined Garifuna women's adherence to recommended breast, cervical and colorectal cancer screening guidelines and the association of their cancer screening practices with demographic factors, access to healthcare services, acculturation, identity, knowledge and perceptions/barriers for breast, cervical and colorectal cancer screening. This chapter summarizes and discusses the study's broad significance and specific significant findings and describes the findings implications. Furthermore, the chapter provides a comparison of the study findings in relation to other reported findings on cancer screening behaviors among women with cultural and geographic similarities to the Garifuna. The chapter concludes with discussion on the study's limitations and provides recommendations for future research.

#### **Summary of the Significant Findings**

This study identified factors associated with health behaviors and practices of a group of ethnic Black immigrants residing within an urban space in the United States. The study provides evidence on the factors that significantly influence health practices among ethnic Black immigrants, but also provides evidence that further exploration of health behavior constructs among this group is needed. The study findings are foundational to the development of interventions specific to Black immigrant groups with the goal of improving health outcomes in the population. The study also has implications

for the development of public health policies and programs that tie into the specific study findings, targeted to the health practices of immigrants with like those examined in this study but also those with cultural and geographic similarities. Moreover, the study provides insight on the limitations, challenges but more importantly opportunities for research of this type that examines the health practices and behaviors of ethnic Black immigrants to the United States.

In this study, access to healthcare services, healthcare knowledge, and health care beliefs and perceptions were the most significant of all the predictors in their impact on adherence to cancer screening practices among the Garifuna women. Access to healthcare services informed adherence to the recommended screening guidelines for both breast and cervical cancer. Knowledge regarding cancer screening guidelines informed adherence to the cervical and colorectal cancer screening. Health beliefs and perceptions informed adherence to cervical and colorectal cancer screening.

More specifically, the results show that Garifuna women have higher breast cancer screening rates in comparison to national screening rates for the disease but lower screening rates for cervical cancer than those reported nationally (Sabatino et al., 2015; White et al., 2017). The results also suggest lower rates for colorectal cancer screening with fecal occult blood testing in comparison to screening by colonoscopy or sigmoidoscopy (Sabatino et al., 2015; White et al., 2017).

Of the four predictive models, access to healthcare services explained the most variability in predicting breast cancer screening, while demographics, access to healthcare, knowledge of cervical cancer and health belief model predictors were more or less equal in explaining the variability in predicting cervical cancer screening.

Knowledge of colon cancer screening and health belief model predictors explained the most variability in both colonoscopy and fecal occult blood testing.

The findings of the study tie into the Integrative Conceptual Framework which provides the theoretical underpinnings for the study and combines constructs of the Health Belief Model and its examination of individual factors associated with health behaviors, Anderson's Imagined Communities Model and its examination of identity and health behaviors, Berry's Theory on Immigration, Acculturation, and Adaptation and its examination of long term acculturation and the impact of the dominant group on health behaviors, and the Social Ecology Theory Model which provides a multi-level framework for the studies domains (Anderson, 2006; Berry, 1997; Glanz et al., 1990; McLeroy et al., 1988).

The findings show that there are similarities and differences in the factors associated with cancer screening behaviors among Garifuna women when compared to cancer screening among Central American and Afro-Caribbean women and factors unique to the cancer screening behaviors of the Garifuna women residing in the boroughs of New York City.

The specific significant findings of the study are as follows:

- *Length of time lived in the United States* was a significant demographic predictor for breast and colorectal cancer screening (by both screening methods) but not for cervical cancer screening.
- *Employment* was a significant predictor of colorectal cancer screening by fecal occult blood testing.

- *Having a regular provider* was a significant predictor for breast and cervical cancer screening whereas *having a specialist* was a significant predictor for colorectal cancer screening by colonoscopy only
- *Sociocultural predictors* were significant only for colorectal cancer screening by fecal occult blood test
- *Knowledge of the screening tests* was a significant predictor for cervical and colorectal cancer screening (both colonoscopy and fecal occult blood testing).
- Specific predictors from the *health belief model* were found to be more significant for colorectal cancer screening than for breast and cervical cancer screening.

### **Interpretation of the Findings**

The results show the factors contributing to screening for each of the three cancer types, breast, cervical and colorectal cancer among the Garifuna women vary, and are multi-dimensional. Some cancer screening behaviors of Garifuna women are consistent with reported cancer screening behaviors among immigrant women from Central America and the Caribbean Basin, with cultural similarities to the Garifuna (Coughlin et al., 2004; De Alba et al., 2005; Garbers & Chiasson, 2006; Gorin, 2005). Differences in cancer screening behaviors from these similar immigrant groups however are also evident (Brown, Naman, et al., 2006; Mandelblatt et al., 1999; White et al., 2017). There are also cancer screening behaviors that are unique to the group. The following sections of this chapter discuss the findings in greater detail and their implications.

**Breast Cancer Screening Practices.** The Garifuna women residing in the boroughs of New York City adhere to the recommended guidelines for breast cancer screening but rates for cervical cancer and colorectal cancer screening by fecal occult blood suggest lack of adherence to the recommended guidelines for those two tests respectively (White et al., 2017). The breast cancer screening rate of 82% among Garifuna women in this study is higher than the most recently reported 71.5% national rate for breast cancer screening (White et al., 2017). National breast cancer screening rates reported from 2015 National Health Interview Survey (NHIS) for Mexican-American and for Central American women were 77.2% and 74.6% respectively, higher than national rates but not as high as the reported rates for Garifuna (2017). The few studies examining breast cancer screening among Central America and Caribbean residing in the New York City area showed low rates of screening by mammogram and lack of adherence to recommended screening guidelines (Mandelblatt et al., 1999). Rates for Columbian, Dominican, Ecuadorian and Puerto Rican women were 53%, 51%, 53% and 61% respectively (1999). These rates are lower than Garifuna women residing in the same communities.

Rates for Afro-Caribbean women are not reported separately in the NHIS study. The few studies examining breast cancer screening among Afro-Caribbean women in the New York area have reported difference in rates ranging from 47.5% to 86.1% (Garbers & Chiasson, 2006; Mandelblatt et al., 1999). Garbers and Chiasson (2006) comparative study of breast cancer screening rates between Afro-American and Afro-Caribbean women living in Brooklyn, New York found similar high rates of breast cancer screening among Afro-Caribbean and Afro-Caribbean women whereas Mandelblatt et al. (1999)

reported screening rates of 47.5% in Afro-Caribbean living throughout the boroughs of New York City when compared with women from Central America, Haiti and the Dominican Republic whose screening rates were similar. Again, these rates are lower than the rates for Garifuna women residing in the same communities.

As previously mentioned, overall rates of breast cancer screening among immigrant women are low with several factors significantly associated with adherence to breast cancer screening guidelines (Brown et al., 2011; Consedine, 2012; Fruchter et al., 1990; Garbers & Chiasson, 2006; Mandelblatt et al., 1999; Seay et al., 2015). Common predictors of adherence to the United States Preventative Task Force guidelines for breast cancer screening are years since migration, acculturation and various cultural barriers (Brown, Consedine, et al., 2006; Consedine, 2012; Islam et al., 2006; United States Preventive Task Force, 2016). In this study, access to healthcare services predictors had the strongest association with adherence to the breast cancer screening guidelines. Garifuna women with government insurance, a regular provider and a place to go for screening had greater odds of receiving breast cancer screenings. The findings show that Garifuna women are able to access healthcare services within their communities. The majority of Garifuna women 62.7% reported having government health insurance with 62.9% reporting receiving care in a clinic or health center suggesting that screenings are not initiated by physicians in private practice but through community healthcare settings.

The finding of access to healthcare services as a predictor of receiving breast cancer screening among Central American and Afro-Caribbean women is similar to the findings of other studies. Consedine (2012) in his study on women from the Dominican Republic and Afro-Caribbean, Haitian, US born Black, and White Eastern European

women residing in Brooklyn found Afro-Caribbean women with no health insurance and no regular physician had lower odds of adherence to breast cancer screening than women who did. Women with Medicare had greater odds of adhering to the screening guidelines as well (2012). Similar findings were reported in a study examining predictors of breast cancer screening among immigrant women from the same countries (Magai, Consedine, Conway, Neugut, & Culver, 2004). Mandelblatt et al. (1999) had similar findings on the importance of health insurance and a place to go for screenings in their study on Central/South American, Haitian and Afro-Caribbean women in New York. Women with a consistent place for screening and women with insurance had greater odds of receiving breast cancer screenings than those who did not. In the Mandelblatt study as in this study, women with government insurance had greater odds of receiving breast cancer screening than women who did not have government or private insurance (Mandelblatt et al., 1999). With rare exception, the findings of access to healthcare as a significant predictor of adherence to breast cancer screening among Garifuna, Central American and Afro-Caribbean women residing in New York are similar to other studies in the United States on immigrant women (Coughlin et al., 2004; De Alba et al., 2005; Echeverria & Carrasquillo, 2006; Zambrana et al., 1999).

In this study, demographic, sociocultural, knowledge and health belief factors were not strongly associated with predicting breast cancer screening among Garifuna women residing in New York City. The sole demographic predictor of significance was *length of time lived in the United States*. Garifuna women living more than twenty years in the United States had greater odds of adhering to the breast cancer screening guidelines. Length of time in the United States has been found to have significant



association with receiving breast cancer screening in some studies on immigrant women (De Alba et al., 2005; Garbers & Chiasson, 2006; Mandelblatt et al., 1999; Rosales & Gonzalez, 2013; Zambrana et al., 1999). For example, Zambrana et al. (1999) in their national study on breast and cervical screening women among Hispanic women nationally found women who had lived in the United States ten years or more had greater odds of receiving breast cancer screening by mammograms than women living in the United States for less than ten years. Similarly, De Alba et al. (2005) in their study of predictors of breast cancer screening among immigrant women in California found that women living in the United States for over ten years had greater odds of receiving mammograms than women living less than ten years in the United States. Rosales and Gonzalez (2013) in their study examining breast cancer screening among Mexican and Central American women in California found similar findings with women living in the United States over ten years having greater odds of receiving breast cancer screening. Similar to our findings on the Garifuna, Mandelblatt et al. (1999) reported that Central American and Caribbean women living in New York City who spent 50% or more of their lives in the United States had greater odds of receiving breast cancer screening with mammograms.

Length of time lived in the United States served as a demographic predictor in this study but in other studies examining predictors of breast cancer screening among immigrants, length of time lived in the United States served as a factor in the examination of the association between acculturation and breast cancer screening (Mandelblatt et al., 1999; Zambrana et al., 1999). In this study, recall that acculturation is measured by adherence more so to American cultural norms than Garifuna cultural norms (higher

mainstream scores versus heritage scores), so measures are not directly comparable. In the Zambrana et al. (1999) study, length of time in the United States along with language spoken and place where born served as acculturation measures while in the Mandelblatt study(1999), length of time was the sole acculturation measure. In both studies acculturation was not a significant predictor of breast cancer screening. Similarly Echeverria and Carrasquillo (2006) and Fernandez, Tortolero-Luna, and Gold (1998) in their examination of acculturation and its association with breast cancer screening in Hispanic women nationally and those residing in the Washington, DC area respectively, found no significant relationship between acculturation and adhering to the breast cancer screening guidelines. While measures of acculturation differed in this study in comparison to the aforementioned studies, the findings were similar in that acculturation did not have significant association with breast cancer screening among Garifuna women. Furthermore, in this study, the acculturation and identity measures explained the least amount of variability in the breast cancer screening multivariate model. The findings suggest that acculturation as measured by adherence to American cultural influence on health behaviors is not a strong predicator of breast cancer screening among Garifuna women and women with similar cultural and geographical similarities to the group.

As before mentioned, studies on the perceptions, beliefs and attitudes among immigrant women toward cancer screening are more qualitative in nature and use a variety of theoretical frameworks to examine various constructs of perceptions and attitudes (Allen et al., 2013; Byrd et al., 2004; Consedine et al., 2009; Erwin et al., 2010; Fulton et al., 1995; F. M. Gany et al., 2006). Health belief behaviors were not significantly associated in this study with breast cancer screening among Garifuna

women residing in New York. Of the five subscales of the Champion Health Belief Model, only motivation/cues to action was significantly associated with breast cancer screening among the Garifuna women. The results of other studies examining perceptions and attitudes towards breast cancer screening are mixed (Consedine et al., 2009; Consedine et al., 2004; Fulton et al., 1995). In one of the few studies examining perceptions and attitudes towards breast cancer screening using the Health Belief Model, Fulton et al. (1995) in their study of determinants of breast cancer screening among Hispanic women residing in Rhode Island, motivations/cues to screening and perceptions of mammograms were found to be significantly associated with adherence to breast cancer screening guidelines. Hispanic women had perceptions of their susceptibility to breast cancer, perceived breast cancer as a serious disease, recognized the benefits of having mammograms and cited cost of mammograms as a barrier to receiving them. Studies on perceptions and attitudes toward breast cancer screening among Afro-Caribbean women found they were less fearful of the disease with low levels of embarrassment about receiving the screenings in comparison to White and Black Americans and other immigrant groups residing in New York. (Consedine et al., 2009; Consedine et al., 2004).

Knowledge along with health belief behaviors was included in the fourth regression model examining predictors of breast cancer screening. *Having heard of a mammogram* and *how often to have a mammogram* were not significant predictors of adherence to breast cancer screening among the Garifuna women but the univariate analysis showed a large proportion (98%) of the Garifuna women reporting hearing of mammograms and reporting knowing how often to receive mammograms. Brown,

Naman, et al. (2006) examined knowledge of breast health among other variables as predictors of preventive health behaviors overall. The study results showed high levels of knowledge about breast cancer symptoms among the Afro-Caribbean women residing in Brooklyn, New York. While their knowledge of breast cancer symptoms measures differ from this study, the high levels of knowledge among Afro-Caribbean women does suggest some similarity regarding the level of knowledge about breast cancer between the groups. The high levels of knowledge regarding breast cancer and breast cancer screening among Garifuna and Afro-Caribbean women residing in New York suggests there is a factor in the New York City environment that may contribute to these high levels of knowledge.

**Cervical Cancer Screening Practices.** The cervical cancer screening rate of 60% among the Garifuna women in this study is well below the national screening rate of 83% (White et al., 2017). Cervical cancer screening rates for the Garifuna women are lower than national rates for White (83.2%), Black (85.3%) and Hispanic Americans (78.6%) as well as Mexican-Americans and Central Americans with rates of 79% and 80.6% respectively (2017). In one of the few national studies examining rates of Pap testing among Afro-Caribbean and Central American women, Tsui et al. (2007) reported Pap test screening rates of foreign born women (including Caribbean and Central American) to be significantly lower than women born in the United States. Cervical cancer screening rates of women with cultural and geographic similarities to the Garifuna, residing in the New York region are similar to the national trends. Mandelblatt et al. (1999) report Pap smear screening rates of 83% for Afro-Caribbean women residing in Brooklyn, New York in

comparison to rates of 71.8% for Columbian, 78.9% for Dominican and 80.8% for Ecuadorian women residing in the same vicinity.

The model testing for predictors of cervical cancer screening in this study found few significant predictors for adherence to the cervical cancer screening among the Garifuna women. *Age, having a regular healthcare provider and knowing when to receive the Pap test* were the three significant predictors of adherence to the cervical cancer screening guidelines. Age was the only demographic predictor in this study. Older women (age 50 to 65 years of age) had greater odds of receiving Pap tests than women younger than 50 years of age. The USPSTF recommends that women age 21-30 years receive Pap testing every three years while women age 30 to 65 years receive Pap test along with Human Papillomavirus testing every three years (United States Preventive Task Force, 2015a). Of the three cancer screening tests, cervical cancer has the widest range in age group recommendations in comparison to colorectal and breast cancer screening. Breast and colorectal cancer screening typically begins at age 50 years but can begin younger based on personal choice or physician recommendation (United States Preventive Task Force, 2015b, 2016). Our study focused on adherence to cervical cancer screening in Garifuna women age 50 years and older whereas many studies in the literature examining the association between age and cervical cancer screening considered a wider age range in their study design (Coughlin & Uhler, 2002; De Alba et al., 2005; Green et al., 2005; Mandelblatt et al., 1999; Tsui et al., 2007; White et al., 2017). In national studies, women age 50 years and older were second only to women age 21 to 30 years in having the lowest rate of Pap testing. Women between the ages of 30 and 40 years had the highest cervical cancer screening rates (De Alba et al., 2005;

White et al., 2017). De Alba et al. (2005) in their study of cervical and breast cancer screening among Hispanic women residing in California report a significant association with age and cervical cancer screening among women of all age groups. Mandelblatt et al. (1999) report age as a significant predictor of receiving cervical cancer screening and similar to De Alba's study (2005), older women having lower rates of screening than younger women. This study excluded Garifuna women younger than 50 years therefore a comparison of age differences in cervical cancer screening among the women cannot be clearly made.

*Having a regular healthcare provider* was the sole significant predictor of adherence to cervical cancer screening in the access to healthcare model. Access to healthcare predictors of cervical cancer screening reported in studies on Central American and Caribbean women similar to the Garifuna include having health insurance, and a provider for care (Coughlin & Uhler, 2002; De Alba et al., 2005; Echeverria & Carrasquillo, 2006; Green et al., 2005; Mandelblatt et al., 1999; Tsui et al., 2007; Zambrana et al., 1999). In some studies, access to care was measured as having a source of care or having a provider of care (De Alba et al., 2005; Mandelblatt et al., 1999). In this study, having a place for care was found not to be a significant predictor for cervical cancer screening.

Regarding knowledge of cervical cancer screening, as before mentioned, few studies have explored knowledge of cervical cancer screening among Central American and Afro-Caribbean women. These studies report low levels of knowledge about cervical cancer screening (Brown et al., 2011; Ekechi et al., 2014). Garifuna women who knew when to have the Pap test had significantly higher odds of receiving the test however

there was no statistical significance between having heard of a Pap test and adherence to cervical cancer screening guidelines. The findings suggest low levels of knowledge regarding cervical cancer screening which may contribute to the low rates of screening among the Garifuna.

Sociocultural and health belief factors were not significant predictors of cervical cancer screening. The  $R^2$  values (0.5%-0.7%) for the sociocultural model show that the model was weak in explaining the variability in cervical cancer screening among the Garifuna women. Similar results were found in the health belief and knowledge model. As before mentioned sociocultural factors have been explored as predictors of cervical cancer screening among immigrants with acculturation and the health belief model often examined as sociocultural constructs of screening. Study results are varied (Abraido-Lanza et al., 2005; Boyer, Williams, Callister, & Marshall, 2001; Byrd et al., 2004; Echeverria & Carrasquillo, 2006; Fernandez et al., 1998). The few studies that examined the association between cervical cancer screening and acculturation among women similar to the Garifuna found no significant relationship between the screening test and the sociocultural predictor (Mandelblatt et al., 1999).

Mandelblatt et al. (1999) found that acculturation was not a predictor of cervical cancer screening among Afro-Caribbean women living in Brooklyn, New York but yet again, acculturation in that study was measured by length of time lived in the United States whereas in this study, increased acculturation was measured by having higher levels of American cultural practices as opposed to maintaining Garifuna heritage practices. The Garifuna are a unique group with specific cultural norms. The items in the Vancouver Acculturation Index (Ryder, Alden, & Paulhus, 2000) may lack the sensitivity

needed to capture the nuances in Garifuna cultural norms. Similarly, the Ethnocultural Index may also lack the sensitivity required to capture constructs of identify specific to the group (Yamada, Marsella, & Yamada, 1998). Further studies using other indexes may be more useful in identifying sociocultural predictors specific to cervical cancer screening.

Health belief model predictors significant to cervical cancer screening reported in the literature that may serve as a barrier to receiving cervical cancer screening among women with similar cultures to the Garifuna include perceptions of pain, and lack of self-efficacy (Fernandez et al., 1998; Gauss et al., 2013). Psychosocial barriers not associated with the constructs of the health belief model include cost, and discomfort with instruments (Brown et al., 2011). Similar to the discussion regarding lack of significance with sociocultural predictors and cervical cancer screening, the health belief model items may be too broad to capture psychosocial norms specific to the Garifuna women and cervical cancer screening. With the low rates of cervical cancer screening among the Garifuna women residing in New York City, sociocultural and psychosocial factors specific to this particular cancer screening test need to be further explored.

**Colorectal Cancer Screening Practices.** Colorectal cancer screening adherence in this study was examined by both fecal occult blood testing and sigmoidoscopy/ colonoscopy methods of screening. The rates for fecal occult blood test use and screening by colonoscopy among the Garifuna women were 37% and 65% respectively. Nationally, of the three screening tests, rates for colorectal cancers screening are the lowest in comparison to cervical and breast cancer screening (Sabatino et al., 2015; White et al., 2017). Studies on colorectal screening combine rates for males and females,



and colonoscopy and sigmoidoscopy in their reporting (Sabatino et al., 2015; White et al., 2017). Overall the national colorectal cancer screening rate is 62.4% with rates of 63% and 59.3% for Blacks and Whites respectively. The rate for Mexican-Americans is 49.8% and for Central/South Americans, 52.6% (White et al., 2017). As before mentioned, there is a paucity of studies examining colorectal screening among immigrant groups (Consedine, Reddig, et al., 2011; Fernandez et al., 2014; Francois et al., 2009; Gorin, 2005; Gwede et al., 2011; Lopez-Class et al., 2012). Studies reporting on colorectal cancer screening practices report rates as low as 10.8% for fecal occult blood testing and 6.8% to 24% for colonoscopy among immigrants from Central America and Mexico (Fernandez et al., 2014; Lopez-Class et al., 2012). Gorin (2005) reports higher rates of colorectal cancer screening compliance among women from the Dominican Republic living in Northern Manhattan and the South Bronx in comparison to female immigrants from Central and South America. The colorectal cancer screening rate solely by colonoscopy among the Garifuna is higher than national rates for screening whereas the rate for colorectal cancer screening solely by fecal occult blood testing is lower. The results present a challenge when comparing the rates of colorectal cancer screening among Garifuna women with women of similar geographical and cultural similarities but provide baseline information on the screening practices of the Garifuna women residing in New York City.

Comparable predictors of colorectal cancer screening by both fecal occult blood testing and colonoscopy in this study included length of time in the United States, knowledge about each test type and constructs of the health belief model. Garifuna women living in the United States over twenty years had greater odds of adhering to the

colorectal cancer screening guidelines than women residing in the United States for shorter periods of time. Fernandez et al. (2014) also examined length of time lived in the United States as a predictor of colorectal cancer screening among Central American immigrants to the United States but while the bivariate results were significant showing those living longer than 20 years in the United States correlated with greater frequency of colorectal cancer screening, multivariate analysis showed no significant association. Fernandez also examined knowledge as a predictor but similar to length of time in the United States, knowledge was not found to be a significant predictor of colorectal cancer screening similar to the findings in this study (2014).

The regression model with health belief factors had the strongest predictors for both screening by fecal occult blood testing and colonoscopy. Specific constructs of the health belief model differed between the two screening tests. Perceived benefits, perceived barriers and motivation/cues to action were predictors of screening by fecal occult blood testing and perceived susceptibility, perceived severity and motivation/cues to action were predictors of screening by colonoscopy. Garifuna women with higher levels of motivation/cues to action had higher odds of adherence to the recommended guidelines for colorectal cancer screening by colonoscopy and fecal occult blood testing. This difference in the constructs of the health belief model is similar to other studies examining perceptions and barrier to colorectal cancer screening among immigrants with similarities to the Garifuna women in this study (Bynum, Davis, Green, & Katz, 2012; Consedine, Reddig, et al., 2011; Fernandez et al., 2014; Goldman, Diaz, & Kim, 2009; Gwede et al., 2011). Motivation/cues to action was the only significant predictor of colorectal cancer screening by both screening methods among the Garifuna women in

this study. Motivation/cues to action are measures of self-efficacy and individual health seeking behaviors found to be beneficial. Significantly high levels of motivation cues to action help to explain the higher rates of colorectal cancer screening among the Garifuna women when compared to national rates and rates among other immigrant groups.

Fernandez et al. (2014) report self-efficacy as a predictor of colorectal cancer screening as well but other studies did not report self-efficacy as a predictor of adherence to colorectal cancer screening test recommendations among immigrants with similarities to the Garifuna women (Gorin, 2005). As before mentioned, reported national rates are for both males and females and our findings are specific to Garifuna women. These findings suggest that high levels of motivation and cues to action among the Garifuna women may be linked to female gender and explain the colorectal cancer screening rates higher than national rates and rates among immigrants with similarities to the Garifuna women. These findings must however be considered in light of the low rates of fecal occult blood testing by the Garifuna women and should be further explored.

There were no sociocultural predictors for colorectal cancer screening by colonoscopy but significant relationships were found between sociocultural predictors, namely the acculturation-heritage scale and the acculturation-mainstream scale, and colorectal cancer screening by fecal occult blood testing. Women with higher heritage scores, an indication of stronger association with Garifuna culture over the mainstream American culture, were twice as likely to receive colorectal cancer screening with FOBT than women with lower heritage acculturation scores. Conversely, women with higher mainstream acculturation scores had lower odds of receiving colorectal cancer screening with FOBT. The findings suggest that Garifuna women with stronger Garifuna cultural

ties adhere to the recommended screening guidelines for fecal occult blood testing than Garifuna women who do not have such strong ties to Garifuna culture. Similar findings were found by Costas-Muniz et al. (2016) in their examination of acculturation among other factors as predictors of colorectal cancer screening. In that study, acculturation, measured in years living in the United States, was found to be a predictor of colorectal cancer screening among Hispanic immigrants from Central/South America and the Caribbean. Those living in the United States for less than 20 years had greater odds of receiving colorectal cancer screening (2016). As before mentioned, most studies examining the association between acculturation and cancer screening among immigrants with similarities to the Garifuna have used other measurements of acculturation than the Vancouver Acculturation used in this study (Mandelblatt et al., 1999; Rosales & Gonzalez, 2013; Ryder et al., 2000). Further exploration of the use of differing acculturation measures to examine its association with cancer screening among Garifuna women may provide further insight into its influence on adherence to cancer screening recommendations.

### **Study Limitations**

This study had several limitations related to its design and challenges related to research among this unique group of ethnic, Black immigrants. This study used a cross-sectional design and thus is limited in establishing causality. Instead, this study examined possible associations and correlations between the study predictors and breast, cervical, and colorectal cancer screening practices. The study also relied on self-reporting of cancer screening practices among Garifuna women, which could be subject to recall bias. Garifuna women were asked to self-report their adherence to the United States Preventive

Task Force recommended screening guidelines for breast, cervical and colorectal cancers. They may have reported adherence to cancer screening guidelines when in fact, they had not received the tests or did not recall correctly their cancer screening experiences. In a meta-analysis of the accuracy of self-reporting in cancer screening studies, Rauscher, Johnson, Cho, and Walk (2008) found inaccuracies and variations in self-reported cancer screening rates and that factors such as culture, location of survey implementation and the questionnaire itself with Blacks and Hispanics reportingly having higher rates of overestimation than Whites. Future studies should consider verifying receipt of screening tests through the use of medical chart review which would help to eliminate recall bias.

Social desirability may have also influenced the participants' responses given that the surveys were conducted face to face by the Principal Investigator and her study assistant using paper and pencil surveys. The close proximity may have influenced answer choices more so than if surveys were completed in a completely anonymous environment. This was minimized by the Principal Investigator and her assistant engaging in other activities that removed their attention from study participants (repositioning themselves away, reading a book) or distancing themselves physically from participants but remaining close enough to answer questions.

One of the challenges encountered in data collection was the reluctance of the Garifuna women to complete the survey in its on-line format. Virtually all study participants chose the pencil and pencil survey over the on-line format, available through an emailed link. The question that is raised is whether the preference for paper and pencil survey is due to a lack of comfort among the Garifuna women in using an electronic format, the age of the women participating in the study, or other factors. Further

exploration on the best methods of conducting research among this group is needed.

Close proximity can be minimized in future studies of the Garifuna by encouraging the use of on-line surveys which ensure completely anonymous survey completion but further evaluation of the use of such technologic modalities in this population is needed.

One other challenge encountered during the face to face surveys was that both the Principal Investigator and her research assistant were not Garifuna. Both members of the study team sensed that in some instances, Garifuna women when approached, refused to participate in the study because of the team members lack of Garifuna ethnicity. This reaction was more dominate among Garifuna women from Honduras than those from Belize. This was especially true for the Principal Investigator who was neither a Garifuna or Spanish speaker more so than for the research assistant who spoke Spanish. It is suggested that future research among the Garifuna include research assistants that are Garifuna in heritage and that studies explore the nuances of non-Garifuna investigators performing research among the group. Findings from such a study are bound to have implications on doing research on other ethnic, Black immigrants and immigrant groups overall.

The convenience sampling technique used in this study may have subjected the study to sampling bias, another study limitation. Sample bias could influence the generalizability of the findings. Most Garifuna women surveyed were members of Garifuna churches in the Bronx, Brooklyn and Harlem or approached for surveying by snowballing methods initiated by church contacts. With the exception of a few Catholic Churches, the women were primarily members of Pentecostal, Evangelical and Mennonite denominations. The Garifuna women sampled were from a particular segment

of the Garifuna population residing within the boroughs of New York City. The lack of inclusivity of women who were not church goers or specifically members of certain faith-based groups may have limited the findings.

Similarly, the study findings are limited to only Garifuna women residing in the boroughs of New York City and cannot be extrapolated to Garifuna population elsewhere in the United States. Large Garifuna communities also exist in New Orleans, Louisiana and Los Angeles, California (England, 1999). The predictors found to be significant in this study may be exclusive to the environment found within the boroughs of New York city and not in similar urban environments. Reproducing this study in other communities where Garifuna women reside will help in identifying factors that are consistently predictive of cancer screening behaviors among Garifuna women.

Furthermore, this study was limited to English-speaking Garifuna women only. Women not able to read or write English were excluded from the study. Our exclusion of women who spoke only Garifuna and/or Spanish may have impacted the study's findings. These women may differ from the women sampled who are English speakers. To minimize this effect, during the consent procedures and determination of inclusion and exclusion criteria status, Garifuna women who spoke and wrote some level of English were encouraged to try the survey with no coercion to complete. This limitation can be minimized in future studies with translation of the survey instrument into both Garifuna and Spanish. This would allow the inclusion of Garifuna women across the language spectrum.

Lastly, the sample in this study was limited to only women aged 50 years of age and older, which is not inclusive of the entire age group for cervical cancer screening.

While breast and colorectal cancer screening typically begins at 50 years of age, cervical cancer screening begins at age 21 years and so our findings specific to cervical cancer screening are limited due to the age limitation of this study. Future studies should consider methods using weighted sampling and other techniques to be ensure sampling across the age specific recommended screening guidelines.

### **Conclusions and Implications**

Overall, this study expands the body of knowledge on the health behaviors of Black immigrant groups to the United States. More specifically, it provides information on the cancer screening behaviors of a group of Black immigrant women with unique sociocultural and psychosocial norms. The study identified low rates of cervical cancer and colorectal cancer screening but also breast cancer screening behaviors that show that Garifuna women are adhering to the recommended breast cancer screening guidelines.

The study findings has several implications. The results of this study has implications for the providers of care of Garifuna women. The study identified structural forces behind the high rates of breast cancer screening. It is important that providers of care, physicians and healthcare administrators monitor these structural forces to ensure adherence to breast cancer screening guidelines are maintained. Access to healthcare services proved to be the main significant predictor of the breast cancer screening guidelines. While the Garifuna women surveyed hailed from lower socioeconomic status, having access to care in their neighborhoods in the boroughs of New York provided the necessary breast cancer screening care. An exploration of existing programs, public or private, leading to accessibility to breast cancer screening is needed. Identification of these programs is needed to support the need for continued accessible breast cancer



screening in neighborhoods where Garifuna women live. Access to healthcare services was not as robust a predictor for cervical and colorectal screening. Identification of policies and programs successful in providing access to breast cancer screening may be used by public health officials and healthcare administrators to evaluate and replicate cervical and colorectal cancer screening opportunities in the boroughs of New York where Garifuna women reside. This can lead to the implementation of policy designed to expand accessibility of care to ensure increased adherence to the cervical and colorectal cancer screening guidelines.

Future research on cervical cancer screening disparities among Garifuna women is needed to fully identify those disparities that serve as barriers to cervical cancer screening. It is recommended that studies examining cervical cancer screening among women age 21 to 49 years be conducted. This current study examined cervical cancer screening behaviors in women 50 years of age and older. The cervical cancer screening guidelines recommend that women begin cervical cancer screening at 21 years of age. As before mentioned, the exclusion of Garifuna women less than 50 years of age in this study served as a limiting factor. Results of studies inclusive of Garifuna women age 21 years to 49 years will benefit Garifuna women and their providers of care by providing an understanding of the barriers to cervical cancer screening across the spectrum of the Garifuna woman's life. Furthermore, it will inform the development of intervention programs specific to those barriers, inclusive of interventions that may require age specificity, that is for younger versus older Garifuna women. It is planned for a study of this type to be one of the first of many studies conducted from this first, exploratory study on cancer screening among Garifuna women.

Regarding acculturation, Garifuna women who maintained stronger cultural ties had higher levels of colorectal cancer screening. These findings provide an opportunity for designing programs specific to Garifuna cultural norms. More studies are needed however to pinpoint those specific cultural norms associated with this positive health practice outcome. Studies, qualitative in nature using methods such as focus groups and interviews of Garifuna women, healthcare providers and policy makers are ideal for identifying social and cultural norms unique to the group. Intervention programs specific to those sociocultural norms can then be designed to increase and maintain screening adherence for all three cancer types.

Further studies regarding the use of fecal occult blood testing and colonoscopy should be implemented as well. The paucity of studies on colorectal cancer screening among immigrants similar to the Garifuna women combined with the variations in reported rates of screening between the two screening modalities means our lack of understanding of colorectal cancer screening behaviors among the women remains. In this study, there was separation of the examination colorectal cancer screening into fecal occult blood testing and colonoscopy. Going forward, studies combining both fecal occult blood testing and colonoscopy/sigmoidoscopy modalities may provide a clearer picture of colorectal cancer screening behaviors among the group. The national reporting of colorectal cancer screening rates for both males and females provides an opportunity for research into the cancer screening practices of Garifuna men as well. Garifuna men who heard of this study and observed family members and friends participating in the survey often voiced concern that they were excluded from this study and shared with us

their interest in participating in a similar studies. It is encouraged that studies on cancer screening in Garifuna men be conducted with focus on colorectal and prostate cancer screening.

The findings have implications for the development of public health interventions and programs designed to increase breast, cervical and colorectal cancer screening among Garifuna women. The findings of this study and others that will be pursued are instrumental to the development of theoretical models that can be used to explore the constructs of cancer screening among the Garifuna. One key aspect of developing such a theoretical model are further studies examining cancer screening practices among Garifuna residing in communities across the United States. These studies will help to identify predictors that are consistent across all environments and spaces. These studies would also identify Garifuna cultural practices that are consistent across all environments. The less than robust findings of sociocultural and psychosocial factors that serve as predictors of breast, colorectal and cervical cancer screening indicates a need for further studies along these lines. Eliminating predictors associated with the environment may reveal significant predictors associated more so to sociocultural norms. These factors are essential to the development of any theoretical model.

Finally, the unique cultural heritage of the Garifuna may require unique assessments to measure both sociocultural and psychocultural factors specific to the group. Programs and interventions specific to the Garifuna women cannot be designed and implemented without an understanding of these social and cultural constructs. Again, qualitative research explorations such as focus groups and interviews may be worthwhile to help identify these cultural norms. Recognizing these cultural norms will ensure that

more specific tools can be developed to measure the association between the unique cultural norms of the Garifuna and their cancer screening practices. Study findings will be foundational to the development and implementation of interventions designed to increase cancer screenings among the Garifuna where disparities are found to exist.

The findings of this study will be shared with Garifuna women residing in the boroughs of New York in the hopes of increasing health literacy regarding health behaviors within the community. The sharing of information will inform the women of the structural, social and cultural factors that are positively impacting breast, cervical and colorectal cancer screening behaviors. More importantly, the sharing of information within the community will facilitate further studies designed to explore known barriers to cancer screening and to identify currently unknown barriers. The findings of the study will also be shared via manuscript publication in peer-review journals designed to share information to public health officials involved with decreasing mortality and morbidity from cancer by increasing cancer screening. It is also planned that the findings will be shared locally, regionally and nationally in order to develop public health programs and policies designed to develop and implement interventions aimed to end recognized disparities in cancer screening among this unique group of Black immigrant women residing in the boroughs of New York City.

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## APPENDICES

### Appendix 1

#### Power and Sample Size Calculation

The study's outcome variable is *cancer screening practices* which includes utilization of breast, cervical and colorectal cancer screening services (4 outcomes for ever having had screening, 4 outcomes for screening within the past year). There are three outcomes, all categorical. The predictor variables are demographic factors, access to healthcare services, acculturation, identity, knowledge and perceptions. *Demographic factors* are measured by age, marital status, employment, education, income, health insurance, and immigration status (7 predictors). *Access to healthcare services* includes measures on place of care in community, provider of care, use of place and provider (3 predictors). *Acculturation* and *identity* both have 1 variable each (2 predictors). *Knowledge* is about breast, cervical and colorectal cancer screening will provide 1 predictor for each of the study outcomes (1 predictor). *Perceptions* provides information on perceptions, barriers, and cues to action for each of the study outcomes (3 predictors). There are 16 predictors in total.

#### Power Analysis Principles

Power analysis is performed to calculate sample size so that the size of the sample provides 80% power with a 5% threshold for statistical significance. Sample size is affected by effect size, variation in the data, Type I error and Power.

Effect size impacts sample size in that if it is small, the sample must be large. Variation in data impacts sample size such that small standard deviations require a large sample. Type I errors occur if the sample size is not large enough allowing the rejection



of the  $p < 0.025$  over 0.05 in a two tail test. Finally, power which is 1-Type II error, has a positive effect on sample size.

### **Sample Size Calculation**

Several methods were considered in the sample size calculation. One recommendation is calculating the sample size based on outcome probability and the predictor's odd ratios estimated for single predictors (Hsieh, 1989; F. Y. Hsieh, Bloch, & Larsen, 1998). Another recommendation is finding sample sizes by dividing the estimated sample size by  $1-p^2$  ( $p$ =multiple correlation coefficient), and then tying the specific covariates to the other covariates. This is a challenge for exploratory studies such as this proposed one.

For the main study outcome cancer screening practices, a categorical measure, we used a conservative rate of 50% based on the results of immigrant cancer screening reported by Mandelblatt et al. (1999). There are 16 predictor variables for this study. Hsieh (1989) estimates that for a single predictor with a 50% chance of an outcome with an odds ratio of 1.2 and one of 2.0, **the sample size would range from 1,045 to 95**. This is also a challenge in an exploratory study such as this as estimates for all the odds-ratios of the predictors are not known.

Mandelblatt et al. (1999) examined breast and cervical cancer screening among multi-ethnic women. The screening rates for the 45 to 54 years age group was 64.3% for ever screened and 52% for recent screening using mammograms. Rates were 90.7% and 63.7% respectively for Pap smear screening. For women 55-64 years of age, ever and recent screening rates for mammograms was 70.6% and 52.2% respectively while ever and recent screening rates were 86.2% and 54.7% (Mandelblatt et al., 1999). The

unadjusted odds ratios for predictors of cancer screening in their study were reported as follows:

- Age with less than 65 years as reference- recent mammogram aOR was 0.99, recent Pap smear, aOR was 0.67 (which is an OR of 1.49 for reverse comparison)
- Education with less than grade twelve as reference-recent mammogram had an aOR of 1.20 and 1.24 for recent Pap smear
- Insurance with having no insurance as the reference-recent mammogram had an aOR of 1.96 with 1.55 for recent Pap smear
- Proportion of life in the United States (an acculturation measure) with less than 50% life in the United States- recent mammogram had an aOR of 1.40 while Pap smear had an aOR of 1.35

The range of odds ratios for these four predictors ranges from 1.5 to 2.0. The sample size would therefore range from 137 to 388 for a single predictor analysis

(<http://www.stat.ubc.ca/~rollin/stats/ssize/caco.html>) as shown below.

**Unmatched Case/Control Studies**

(To use this page, your browser must recognize JavaScript.)

Choose which calculation you desire, enter the relevant population values (as decimal fractions) for  $p_0$  (exposure in the controls) and  $RR$  (relative risk of disease associated with exposure) and, if calculating power, a sample size (assumed the same for each sample). You may also modify  $\alpha$  (type I error rate) and the power, if relevant. After making your entries, hit the **calculate** button at the bottom.

- \* Calculate Sample Size (for specified Power)
- \* Calculate Power (for specified Sample Size)

Enter a value for  $p_0$ :

Enter a value for  $RR$ :

- \* 1 Sided Test
- \* 2 Sided Test

Enter a value for  $\alpha$  (default is .05):

Enter a value for desired power (default is .80):

The sample size (for cases and controls, separately) is:

Reference: The calculations are the same as in [Comparing Proportions for Two Independent Samples](#) setting  $p_1=p_0$  and  $p_2=p_0*RR/(1 + p_0*(RR - 1))$ . See Schesselman, J. (1982), *Case Control Studies*, p. 145

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- \* Calculate Sample Size (for specified Power)
- \* Calculate Power (for specified Sample Size)

Enter a value for  $p_0$ :

Enter a value for  $RR$ :

- \* 1 Sided Test
- \* 2 Sided Test

Enter a value for  $\alpha$  (default is .05):

Enter a value for desired power (default is .80):

The sample size (for cases and controls, separately) is: 388

Reference: The calculations are the same as in [Comparing Proportions for Two Independent Samples](#) setting  $p_1=p_0$  and  $p_2= p_0*RR/(1 + p_0*(RR - 1))$ . See Schesselman, J. (1982), *Case Control Studies*, p. 145

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Courvoisier (2010) examined the relation between correctness of estimation and several data characteristics: number of events per variable (EPV), number of predictors, percentage of predictors that are highly correlated, percentage of predictors that were non-null, size of regression coefficients, and size of correlations. The conclusion was that there is no single rule based on EPV that would guarantee an accurate estimation of logistic regression parameters. Instead, the number of predictors, probable size of the regression coefficients based on previous literature, and correlations among the predictors must be taken into account as guidelines to determine the necessary sample size.

Courvoisier (2010) also indicates in the discussion:

*“The second noteworthy result is that the power of the regression models was often very low, even for 20 or 25 EPV when the OR is below 2 [11]. For comparative studies, the computation of sample size to achieve the desired power is well codified. In contrast, no such standard procedure exists for model building and multivariate analyses. A commonly used rule of thumb is that the number of EPV should be greater than 5 or 10. This rule of thumb will lead to insufficient power, so that variables that actually predict the outcome will be found non-significant in the initial model and, in the case of model building, dropped from the prognostic model. Thus, data structure should always be taken into account to obtain an estimate of necessary sample size.*

*Taken together, the results of this study imply that researchers should explore the correlations of their predictors of interest and should be careful about including several highly correlated predictors into a*

*logistic regression model. Possible solutions to this problem include the selection of uncorrelated predictors based on clinical criteria or the computation of a single score representing all correlated predictors (e.g., through factor analysis). ”*

From the above, we need at least 16 individuals per predictor. In the event the outcome is 50%-50%, the old rule indicates a sample size of 10-20 per predictor, if all predictors are independent of each other. This indicates a **sample size between 160 and 320**. Another approach is to use the online calculator, G-Power

(<http://www.gpower.hhu.de/>). We used the following formula:  $N = 10 \text{ times } k / p$  (where  $N$  = sample size;  $k$  – number of predictors;  $p$  – proportion of success [the 1 outcome]).

The calculation for the proposed study is  $N = 10 * (16) / (0.5) = 320$ .

Therefore, a sample of 400 for the proposed study provides adequate power (greater than 80% at a significance of  $\alpha > 0.05$ ) to test the associations between the study outcomes and predictors. This also provides larger than needed power to build a regression model by eliminating non-contributing predictors. At this time, we do not have estimates of the correlations between predictors, or whether the predictors will have high collinearity, which would lead to removal of one or more predictors by either forward or backward elimination techniques. The removal of non-contributing predictors will lead to a more parsimonious model with better prediction.

## Appendix 2

### Detailed Information on Study Variables

Variable Name	Instrument	# of Items	Level of Measurement
<b>Study Outcomes (<i>dependent variables</i>) - Cancer Screening Practices</b>			
Breast Cancer Screening Practices	2013NHIS AAU.540: <i>Mammogram in last 12 months?</i> NAF.230: <i>Ever had a mammogram?</i> NAF.260: <i>When have recent mammogram?</i>	3	Categorical
Cervical Cancer Screening Practices	2013NHIS AAU.530: <i>Pap test in last twelve months</i> NAF.130: <i>Ever had a Pap smear or pap test</i> NAF.150: <i>When most recent Pap test</i>	3	Categorical
Colorectal Cancer Screening Practices	2013NHIS AAU.550: <i>Sigmoidoscopy/Colonoscopy in last five years?</i> NAF.540: <i>Ever had a sigmoidoscopy/colonoscopy?</i> NAF.560: <i>When did have most recent sigmoidoscopy/colonoscopy?</i> AAU.550: <i>Fecal occult blood test in last twelve months?</i> NAF.620: <i>Ever had a fecal occult blood test?</i> NAF.640: <i>When most recent fecal occult blood test?</i>	6	Categorical
<b>Study Predictors (<i>independent variables</i>)</b>			
<b>Demographics Factors</b>			
Age	2014BRFSS 8.1 <i>What is your age?</i>	1	Continuous
Marital Status	2014BRFSS 8.6 <i>Are you married, divorced, widowed, separated, never married, member of unmarried couple?</i>	1	Categorical
Education	2014BRFSS 8.8 <i>What is the highest level of education you completed?</i>	1	Categorical
Employment	2014BRFSS 8.9 <i>Are you currently employed?</i>	1	Categorical
Income	2014BRFSS 8.10 <i>What is your annual income from all sources less than \$10,000, less than, less than \$15,000, less than \$20,000, less than \$25,000, less than \$35,000, less than \$50,000, less than \$75,000, more than \$75,000</i>	1	Categorical
Health Insurance	2014BRFSS Module 4. 1. <i>What type of health insurance?</i>	1	Categorical
Immigration Status	2000NHIS FSD.001 <i>Were you born in the United States?</i> FSD.004 <i>About how long have you been in the United States?</i> FSD.005 <i>Are you a citizen of the United States?</i>	3	Categorical
Access to Healthcare Services	2013NHIS AAU.20: <i>Regular place for care</i> AAU.50: <i>Access care within community</i> AAU.51: <i>Access to primary care doctor</i> AAU.200: <i>Access to OB/GYN</i> AAU.211: <i>Access to cancer screening services</i> AAU.305: <i>Last time visited doctor</i>	6	Categorical
Acculturation	Vancouver Cultural Index, <i>All items.</i> <i>Often participate in heritage traditions or American traditions, marry heritage person or marry white American, enjoy social</i>	20	Continuous

Variable Name	Instrument	# of Items	Level of Measurement
	<i>activities heritage or typical American social, comfortable interacting heritage people or typical American people, enjoy entertainment heritage culture or American entertainment, behave ways typical heritage culture or typical American, important maintain/develop practices my heritage or American heritage, believe values my heritage culture or believe values American, enjoy jokes and humor heritage culture or white American jokes and humor, interested having friends own heritage or white American friends.</i>		
Identity	Ethnocultural Identity Behavior Index. <i>All items Listing of Black, Hispanic, Garifuna-choose group, Extent identify with group, watch movie use group language, watch TV shows group language, shop at stores feature group products, speak Garifuna language with family/close friends, dress in traditional clothes of group, listen to Garifuna music, read Garifuna newspapers/magazines of the group (English/Garifuna), active in Garifuna political movement/ideology, learn Garifuna dances and music, marry/date Garifuna, listen and hear others speaking Garifuna even if don't understand, go the hair stylist, lawyers, physicians that are Garifuna, spend time talking and gossiping with other Garifuna, follow Garifuna movements locally or back home, interact frequently at informal Garifuna gatherings (parties), participate in which are popular among Garifuna, interact with close friends that are Garifuna, participate in sports popular with Garifuna.</i> Barrett (1995)	20	Continuous
	<i>Use traditional medicinal herbs in last year, visited Garifuna traditional healer in last year.</i>	2	
Knowledge about Cancer Screening			
Knowledge about Breast Cancer Screening	Wolf et al. (2005) <i>Ever heard of a test to find breast cancer with namely a mammogram? Do you know how often should receive test?</i>	2	Categorical
Knowledge about Cervical Cancer Screening	Wolf et al. (2005) <i>Ever heard of a test to find cervical cancer with namely a Pap smear/test? Do you know how often should receive test?</i>	2	Categorical
Knowledge about Colorectal Cancer Screening	Wolf et al. (2005) <i>Ever heard of a test to find colon or rectal cancer with namely a sigmoidoscopy/colonoscopy, do you know how often should receive test? Have you heard of test to find colon or rectal cancer with namely a fecal occult blood test? Do you know how often to receive test?</i>	4	Categorical
Perceptions about Cancer Screening			
Perceptions about Breast Cancer Screening	Champion Belief Model. Perceived Susceptibility: <i>chances getting breast cancer great, chance of getting breast cancer in future certain, worry lot about getting breast cancer.</i> Perceived Severity: <i>thought of breast cancer scares, heart beats fast when think breast cancer, breast cancer hopeless disease, life changes if get breast cancer.</i> Perceived Benefits/Effectiveness: <i>Mammograms prevent future problems, lot gain doing mammogram, less anxious about breast cancer if get mammogram, mammograms will find cancer early before symptoms.</i>	20	Continuous

Variable Name	Instrument	# of Items	Level of Measurement
	Perceived barriers: <i>mammograms are embarrassing, mammograms are painful, family/friends disapprove of mammograms, mammograms expensive.</i> Motivation/Cues to Action: <i>beneficial always follow medical orders, frequently do things improve health, have yearly physical exams, exercise regularly.</i>		
Perceptions about Cervical Cancer Screening	Champion Belief Model for Cervical Cancer and Pap Test. Perceived Susceptibility: <i>chances getting breast cancer great, chance of getting breast cancer in future certain, worry lot about getting breast cancer.</i> Perceived Severity: <i>thought of cervical cancer scares, heart beats fast when think cervical cancer, cervical cancer hopeless disease, life changes if get cervical cancer.</i> Perceived Benefits/Effectiveness: <i>Pap smears prevent future problems, lot to gain doing Pap smears, less anxious about cervical cancer if get Pap smears, Pap smears will find cancer early before symptoms.</i> Perceived barriers: <i>Pap smears are embarrassing, Pap smears are painful, family/friends disapprove of Pap smears, Pap smears are expensive.</i> Motivation/Cues to Action: <i>always eat a well-balanced diet, take vitamins, frequently do things improve health, search for new information related to health.</i>	20	Continuous
Perceptions about Colorectal Cancer Screening	Modified Champion Belief Model Colorectal. Perceived Susceptibility: <i>chances getting colorectal cancer great, chance of getting colorectal cancer in future certain, worry lot about getting colorectal cancer.</i> Perceived Severity: <i>thought of colorectal cancer scares, heart beats fast when think colorectal cancer, colorectal cancer hopeless disease, life changes if get colorectal cancer.</i> Perceived Benefits/Effectiveness: <i>sigmoidoscopy/colonoscopy/fecal occult prevent future problems, lot gain doing sigmoidoscopy/colonoscopy/fecal occult , less anxious about colorectal cancer if get sigmoidoscopy/colonoscopy/fecal occult , mammograms will find cancer early before symptoms</i> Perceived barriers: <i>sigmoidoscopy/colonoscopy/fecal occult are embarrassing, sigmoidoscopy/colonoscopy/fecal occult are painful, family/friends disapprove of sigmoidoscopy/colonoscopy/fecal occult testing, sigmoidoscopy/colonoscopy/fecal occult expensive</i> Motivation/Cues to Action: <i>have regular dental exams, exercise at least three times a week, visit doctor even when not sick, maintain good health is important for me.</i>	20	Continuous

### Appendix 3

#### Data Codebook

Variable Number & Name	Label	Measurement	Valid Ranges
Section 1 Demographics			
Q1 Age	AGE	Continuous	2 digit years data <b>Recode to Categorical</b> 1- 50 to 65 yrs 2- 66yrs and greater
Q2 Marital status	MARITAL	Nominal	1-Married 2-Divorced/ Separated 3-Widowed 4-Never Married 5-Members of Unmarried Couple
Q3 Education	EDUC	Nominal	1-Never attended school 2-Grades 1 through 8 3-Grades 9 through 11 4- Grades 12 or GED 5-Some College 6-College Graduate
Q4 Employment	EMPLO	Nominal	1-Employed for wages 2-Self-employed 3-Out of work 1/more yr 4-Out of work less than 1 yr 5-Homemaker 6-Student 7-retired 8-unable to work
Q5 Income	INCME	Nominal	1-Less than 10K 2-10K-30K 3-30K-50K 4-50K-75K 5-75K or more
Q6 Health Insurance	HLTHIN	Nominal	1-Private 2-Government 3-Military/Vet 0-No health insurance
Q7a Born in USA	IMBRNUS	Nominal	1-Yes 0-No -----
Q7B f no, where born	PLCBRN		1-Honduras 2-Guatemala 3-Belieze 4-Nicaragua 5-Other
Q8 Long live in USA	IMLIVUS	Nominal	1-Less than 5 years 2-5 to 10 years 3-11 to 15 years 4- 16 to 20 years 5- 21 to 25 years 6- over 25 years



Q9 US Citizen	IMUSCITZ	Nominal	1- Yes 0- No
Q10 Race	RACE	Nominal	0-White 1-American Indian 2-Asian Indian: Chinese Filipino 3-Black African American or Negro 4-Spanish, Hispanic and Latino 5-Native Hawaiian 6-Other
<b>Section 2 Cancer Screening Practices</b>			
Q11Mammo in last 12 months	MMOYR	Nominal	1-Yes 0-No
Q12 Ever had a mammo	MMOEVR	Nominal	1-Yes 0-No
Q13 Most recent mammo	MMORCN	Nominal	1-Within the past year 2-Two to five years 3-More than 5 years
Q14 Ever had a Pap test	PAPEVR	Nominal	1-Yes 0-No
Q15 Recent Pap	PAPRCN	Categorical	1-Within the past year 2-Two to five years 3-More than 5 years
Q16 Ever had colonoscopy	CLNEVR	Nominal	1-Yes 0-No
Q17 Most recent colon	CLNRCN	Nominal	1-Within the past year 2-Two to five years 3-More than 5 years
Q18 FOBT last 12 months	FOBYR	Nominal	1-Yes 0-No
Q19 FOBT ever doctor's office or home	FOBEVR	Nominal	1-Yes 0-No
Q20 Most recent FOBT	FOBRCN	Nominal	1-Within the past year 2-Two to five years 3-More than 5 years
<b>Section 3. Access to Healthcare Services</b>			
Q21 Place usually go when sick?	SCKUSL	Nominal	0-There is no place 1-Yes 2-There is more than one place
Q22 Where go when sick?	SCKGO	Nominal	1-Clinic or health center within neighborhood 2-Located more than 30 mins away 3-Hospital emergency room 4-Hospital outpatient department 5-Some other place 6-Doesn't go to one place most often
Q23 Have a regular provider?	RGPRVD	Nominal	1-Yes 0-No
Q24 See a specialized doctor	SPCPRVD	Nominal	1-Yes 0-No
Q25 Place go for screening	SCRNPRVD	Nominal	1-Yes 0-No
<b>Section 3 Acculturation - Q26 Vancouver Cultural Index</b>			
1. Participate in my heritage culture	PRTHRT	Ordinal	1-Strongly disagree 2-Disagree 3-Agree

			4-Strongly agree
2. Participate in mainstream American culture	PRTAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
3. Marry person my heritage	MARHRT	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
4. Marry a white American person	MARAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
5. Social activities my heritage culture	SCLHRT	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
6. Social activities with Americans	SCAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
7. Comfortable interacting with people my heritage	CMFHRT	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
8. Comfortable interacting with Americans	CMFAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
9. Entertainment from my heritage culture	ENTHRT	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
10. Enjoy American entertainment	ENTAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
11. Behave ways typical heritage	BH VHRT	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
12. Behave ways typical American	BH VAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
13. Important maintain or develop practices my heritage culture	MNTHRT	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
14. Important maintain or develop American cultural practices	MNTAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
15. Value my heritage culture	VLHRT	Ordinal	1-Strongly disagree

			2-Disagree 3-Agree 4-Strongly agree
16. Value mainstream American values	VLAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
17. Enjoy jokes my heritage culture	JKHRT	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
18. Enjoy white American heritage jokes	JKAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
19. Friends from my heritage	FRNDHRT	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
20. Friends white Americans	FRNDAMRC	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree
21. Use traditional herbs over Western meds	TRDMED	Ordinal	1-Strongly disagree 2-Disagree 3-Agree 4-Strongly agree

- Total **Acculturation scale** score  
 - High vs. low levels of Acculturation  
 - **Heritage** culture subscale score (odd items)  
 - **Mainstream** culture subscale score (even items)  
 COMPUTE ACCULTRN=PRTHRT + (5 - PRTAMRCA) + MARHRT + (5 - MARAMRC) + SCLHRT + (5 - SCLAMRC) + CMFHRT  
 + (5 - CMFAMRC) + ENTHRT + (5 - ENTAMRC) + BHVHRT + (5 - BHVAMRC) + MNTHRT + (5 - MNTAMRC) + VLHRT  
 + (5 - VLAMRC) + JKHRT + (5 - JKAMRC) + FRNDHRT + (5 - FRNDAMRC) .

EXECUTE.

COMPUTE HRTGACCUL=PRTHRT + MARHRT + SCLHRT + CMFHRT + ENTHRT + BHVHRT + MNTHRT + VLHRT + JKHRT +

FRNDHRT.

VARIABLE LABELS HRTGACCUL 'heritage acculturation'.

EXECUTE.

COMPUTE MAINSTACCUL=PRTAMRCA + MARAMRC + SCLAMRC + CMFAMRC + ENTAMRC + BHVAMRC + MNTAMRC + VLAMRC + JKAMRC + FRNDAMRC.

VARIABLE LABELS MAINSTACCUL 'main stream acculturation'.

EXECUTE.

#### Mean Scores Heritage and Mainstream Subscales:

##### Heritage Subscale Mean Score:

COMPUTE HRTGACCUL Mean=

Mean(PRTHRT,MARHRT,SCLHRT,CMFHRT,ENTHRT,BHVHRT,MNTHRT,VLHRT,JKHRT,FRNDHRT).

EXECUTE.

<b>Mainstream Subscale Mean Score:</b> COMPUTE MAINSTREAMACCUL_Mean= Mean(PRTAMRCA,MARAMRC,SCLAMRC,CMFAMRC,ENTAMRC,BHVMRC,MNTAMRC,VLA MRC,JKAMRC,FRNDAMRC). EXECUTE.			
<b>Section 4 Identity</b>			
Q27 Name of ethnic group	ETHN	Nominal	1- Garifuna 0-Other
<b>Section 4 Identity - Q28 Ethnocultural Identity Index</b>			
Identify with ethnic group	IDETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Watch films, movies from ethnic group	ENTETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Shop stores carry ethnic products	SHPEETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Speak language of group	SPKETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Dress clothes of group	DRSEETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Listen music of group	LSTETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Read newspapers/magazines of group	READETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Political action group	POLEETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Socialize members group	SOCETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Learn dances of group	DNCETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Listen to hear language of group	LNGETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Go to professionals from group	PRFETHN	Ordinal	1-Never

			2-Sometimes 3-Often 4-Always
Talk, gossip members of group	GSSPETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Study history of group of on own	HSTETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Follow politics of group local/country origin	PLCETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Informal gathering with group	GTHETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Participate hobbies group	HBSETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Close friends group	FRNETHN	Ordinal	1-Never 2-Sometimes 3-Often 4-Always
Q29 Used traditional herbs/medicine in past year	MEDSETHN	Nominal	1-Yes 0-No
Q30 Visited Garifuna or other traditional healer past years	HLRETHN	Nominal	1-Yes 0-No
<b>Ethnocultural Identity Index score</b> Syntax: COMPUTE IDENT=IDETHN + ENTETHN + SHPETHN + SPKETHN + DRSETHN + LSTETHN + RDETHN + POLETHN + SOCETHN + DNCETHN + LNGETHN + PRFETHN + GSSPETHN + HSTETHN + PLCETHN + GTHETHN + HBSETHN + FRNETHN. VARIABLE LABELS IDENT 'Identity scale'. EXECUTE.			
<b>Ethnocultural Identity Mean Score</b> COMPUTE IDENTITY_Mean= Mean(IDETHN,ENTETHN,SHPETHN,SPKETHN,DRSETHN,LSTETHN,RDETHN,POLETHN,SOCETHN,DNCETHN,LNGETHN,PRFETHN, GSSPETHN,HSTETHN,PLCETHN,GTHETHN,HBSETHN,FRNETHN). EXECUTE.			
<b>Section 5 Knowledge of Cancer Screening Tests</b>			
Q31 Have you heard mammogram	HRDMMO	Nominal	1-Yes 0-No
Q32 Know how often receive mammo	OFNMMO	Nominal	1-Yes 0-No
Q33 Have you heard of the Pap test/smear	HRDPAP	Nominal	1-Yes 0-No
Q34 Know how often you should receive Pap	OFNPAP	Nominal	1-Yes 0-No

Q35 Heard of colonoscopy/sigmoidoscopy	HRDOSPY	Nominal	1-Yes 0-No
Q36 Heard of fecal occult blood test	HRDCLN	Nominal	1-Yes 0-No
Q37 Know how often receive tests	OFNCLN	Nominal	1-Yes 0-No
<b>Section 6 Perceptions on Cancer Screening Tests</b>			
<b>Q38 Perceptions Breast Cancer Screening-Champion Belief Model</b>			
1. Chance getting breast cancer great	CHGRBST	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
2. Chance getting breast cancer in future certain	CHCNBST	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
3. Worry a lot about getting breast cancer	WRYBST	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
4. Thought of breast cancer scares me	SCRBST	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
5. When I think of breast cancer my heart beats faster	HBSBST	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
6. Breast cancer is a hopeless disease	HPLBST	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
7. Breast cancer would change my whole life	LCNBST		4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
8. Mammos can help prevent future problems	FTRBST	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
9. Gain a lot by having mammos	GAINMMO	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
10. Less anxious if get mammos	ANXMMO	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
11. Mammos find cancer before symptoms	BFSMMMO	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
12. 13. Embarrassing to have a mammo	EMBMMO	Ordinal	4- Strongly agree 3-Agree 2-Disagree

			1-Strongly disagree
14. Mammograms are painful	PNFMMO	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
15. Friends and family will make fun if I have a mammo	FUNMMO	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
16. Mammos are expensive	EXPMO	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
17. Always follow medical orders, benefit health	BNFMMO	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
18. Frequently do things improve health	IMPHTH	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
19. I have yearly physical exam	PHXYR	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree

#### **Breast Cancer Champion Health Belief Score**

##### **Perceived Susceptibility Score:**

COMPUTE BRSTPERCVSUSP= CHGBST + CHCNBST + WRYBST.

VARIABLE LABELS BRSTPERCVBENEFITS 'Breast perceived susceptibility scale'.

EXECUTE.

##### **Perceived Severity Score:**

COMPUTE BRSTPERCVSEVER=SCRBST + HBSBST + HPLBST + LCNBST.

VARIABLE LABELS BRSTPERCVSEVER 'Breast perceived severity scale'.

EXECUTE.

##### **Perceived Benefits/Effectiveness Score:**

COMPUTE BRSTPERCVBENEFITS=FTRBST + GAINMMO + ANXMMO + BFSMMO.

VARIABLE LABELS BRSTPERCVBENEFITS 'Breast perceived benefit scale'.

EXECUTE.

##### **Perceived Barriers Score:**

COMPUTE BRSTPERCVBARRIERS=EMBMMO + PNFMMO + FUNMMO + EXPMO.

VARIABLE LABELS BRSTPERCVBARRIERS 'Breast perceived barriers scale'.

EXECUTE.

##### **Motivation/Cues to Action Score:**

COMPUTE BRSTMOTIVATION=BNFMMO + IMPHTN + PHXYR.

VARIABLE LABELS BRSTMOTIVATION 'Breast motivation cues to action scale'.

EXECUTE.

#### **Breast Cancer Champion Belief Model Mean Scores**

##### **Perceived Susceptibility Mean Score:**

COMPUTE BRSTPERCVSUSP\_Mean=  
Mean(CHGBST,CHCNBSST,WRYBST).  
EXECUTE.

**Perceived Severity Mean Score:**

COMPUTE BRSTPERCVSEVER\_Mean=  
Mean(SCRBST,HBSBST,HPLBST,LCNBST).  
EXECUTE.

**Perceived Benefits/Effectiveness Mean Score:**

COMPUTE BRSTPERCVBENEFITS\_Mean=  
Mean(FTRBST,GAINMMO,ANXMMO,BFSMMO).  
EXECUTE.

**Perceived Barriers Mean Score:**

COMPUTE BRSTPERCVBARRIERS\_Mean=  
Mean(EMBMMO,PNFMMO,FUNMMO,EXPMO).  
EXECUTE.

**Motivation/Cues to Action Mean Score:**

COMPUTE BRSTMOTIVATION\_Mean=  
Mean(BNFMMO,IMPHTN,PHXYR).  
EXECUTE.

**Q30 Cervical Cancer-Champion Belief Model**

Chances getting cervical cancer great	CHGRCX	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Chances of getting cervical cancer in future certain	CHCNCX	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Worry a lot about getting cervical cancer	WRYCX	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Cervical cancer scares me	SCRCX	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
When think of cervical cancer heart beats fast	HBSCX	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Cervical cancer is a hopeless disease	HPLCX	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Cervical cancer would change my whole life	LCNCX	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree



Pap smears can help prevent future problems	FTRCX	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Have a lot to gain from Pap test	GNPAP	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Less anxious if get a Pap test	ANXPAP	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Pap smears will find cancer before I have symptoms	BFSPAP	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Embarrassing to have Pap	EMBPAP	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Pap smears are painful	PNFPAP	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Friends and family make fun if have Pap	FUNPAP	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Having a Pap test is too expensive	EXPPAP	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
I always eat a well-balanced meal	EATBAL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
I frequently do things to improve health	IMPHLTH	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
I search for new information related to health	INFOHLTH	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree

**Cervical Cancer Champion Health Belief Score**

**Perceived Susceptibility Score:**

COMPUTE CERVICALPERCVSUSP=CHGRCX + CHCNCX + WRYCX.

VARIABLE LABELS CERVICALPERCVSUSP 'Cervical perceived susceptibility scale'.  
EXECUTE.

**Perceived Severity Score:**

COMPUTE CERVICALPERCVSEVERITY=SCRCX + HBSCX + HPLCX + LCNCX.

VARIABLE LABELS CERVICALPERCVSEVERITY 'Cervical perceived severity scale'.  
EXECUTE.

**Perceived Benefits/Effectiveness Score:**

```
COMPUTE CERVICALPERCBENEFITS=FTRCX + GNPAP + ANXPAP + BFSPAP.
VARIABLE LABELS CERVICALPERCBENEFITS 'Cervical perceived benefits'.
EXECUTE.
```

**Perceived Barriers Score:**

```
COMPUTE CERVICALPERCBARRIERS=EMBPAP + PNFPAP + FUNPAP + EXPPAP.
VARIABLE LABELS CERVICALPERCBARRIERS 'Cervical perceived barriers'.
EXECUTE.
```

**Motivation/Cues to Action Score:**

```
COMPUTE CERVICALMOTIVATION=EATBAL + IMPHLTH + INFOHLTH.
VARIABLE LABELS CERVICALMOTIVATION 'cervical motivation scale'.
EXECUTE.
```

**Cervical Cancer Mean Scores****Cervical Cancer Perceived Susceptibility Mean Score:**

```
COMPUTE CERVICALPERCVSUSCEP_Mean=Mean(CHGRCX,CHCNCX,WRYCX).
VARIABLE LABELS CERVICALPERCVSUSCEP_Mean 'cervical cancer susceptibility mean '.
EXECUTE.
```

**Cervical Cancer Perceived Severity Mean Score:**

```
COMPUTE CERVICALPERCVSEVER_Mean=Mean(SCRCX,HBSCX,HPLCX,LCNCX).
VARIABLE LABELS CERVICALPERCVSEVER_Mean 'cervical cancer perceived severity mean '.
EXECUTE.
```

**Cervical Cancer Perceived Benefits Mean Score:**

```
COMPUTE CERVICALPERCVBENEFITS_Mean=Mean(FTRCX,GNPAP,ANXPAP,BFSPAP).
VARIABLE LABELS CERVICALPERCVBENEFITS_Mean 'cervical cancer benefits mean'.
EXECUTE.
DATASET ACTIVATE DataSet1.
```

**Cervical Cancer Perceived Barriers Mean Score:**

```
COMPUTE CERVICALPERCVBARRIERS_Mean=Mean(EMBPAP,PNFPAP,FUNPAP,EXPPAP).
VARIABLE LABELS CERVICALPERCVBARRIERS_Mean 'cervical cancer perceived barriers mean'.
EXECUTE.
```

**Cervical Cancer Motivation/Cues to Action Mean Score:**

```
COMPUTE CERVICALMOTIVATION_Mean=Mean(EATBAL,IMPHLTH,INFOHLTH).
VARIABLE LABELS CERVICALMOTIVATION_Mean 'cervical cancer motivation cues to action mean'.
EXECUTE.
```

**Q40 Colorectal Cancer-Champion Belief Model**

Chances of getting colon cancer is great	CHGRCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Chances of getting colorectal cancer in future certain	CHCNCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree

I worry a lot about getting colorectal cancer	WRYCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
The thought of colorectal cancer scares me	SCRCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
When I think of colorectal cancer my heart beats faster	HBSCCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Colorectal cancer is a hopeless disease	HPLCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Colorectal cancer would change my whole life	LCNCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Sigmoidoscopy/colonoscopy/F OBT can help prevent future problems	FTRCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Gain from having Sigmoidoscopy/colonoscopy/F OBT	GNCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Less anxious if have Sigmoidoscopy/colonoscopy/F OBT	ANXCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Sigmoidoscopy/colonoscopy/F OBT catch cancer before symptoms	BFSCCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Embarrassing to have Sigmoidoscopy/colonoscopy/F OBT	EMBCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Sigmoidoscopy/colonoscopy/F OBT are painful	PNFCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Friends and family fun if I have Sigmoidoscopy/ colonoscopy/FOBT	FUNCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Sigmoidoscopy/ colonoscopy/ FOBT are too expensive	EXPCL	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
I have regular dental exam	DENREG	Ordinal	4- Strongly agree 3-Agree 2-Disagree

			1-Strongly disagree
I exercise at least three times week	EXCREG		4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree
Maintaining good health is important	MNTHLTH	Ordinal	4- Strongly agree 3-Agree 2-Disagree 1-Strongly disagree

#### **Colorectal Cancer Champion Health Belief Model Score**

##### **Perceived Susceptibility Score:**

COMPUTE COLONPERCVSUSCEP=CHGRCL + CHCNCL + WRYCL.

VARIABLE LABELS COLONPERCVSUSCEP 'colon perceived susceptibility scale'.

EXECUTE.

##### **Perceived Severity Score:**

COMPUTE COLONPERCVSEVERITY=SCRCL + HBSCL + HPLCL + LCNCL.

VARIABLE LABELS COLONPERCVSEVERITY 'colon perceived severity scale'.

EXECUTE.

##### **Perceived Benefits Score:**

COMPUTE COLONPERCVBENEFITS= FTRCL + GNCL + ANXCL + BFSCL.

VARIABLE LABELS COLONPERCVBENEFITS 'colon perceived benefits'.

EXECUTE.

##### **Perceived Barriers Score:**

COMPUTE COLONPERCVBARRIERS=EMBCL + PNFCL + FUNCL + EXPCL.

VARIABLE LABELS COLONPERCVBARRIERS 'colon perceived barriers'.

EXECUTE.

##### **Motivation/Cues to Action Score:**

COMPUTE COLONMOTIVATION=DENREG + EXCREG + MNTHLTH.

VARIABLE LABELS COLONMOTIVATION 'colon motivation '.

EXECUTE.

#### **Colorectal Cancer Champion Belief Model Mean Scores**

##### **Perceived Susceptibility Mean Score:**

COMPUTE COLONPERCEVSUSCP\_Mean=Mean(CHGRCL,CHCNCL,WRYCL).

VARIABLE LABELS COLONPERCEVSUSCP\_Mean 'colon cancer perceived susceptibility mean'.

EXECUTE.

##### **Perceived Severity Mean Score:**

COMPUTE COLONPERCEVSEVER\_Mean=Mean(SCRCL,HBSCL,HPLCL,FTRCL).

VARIABLE LABELS COLONPERCEVSEVER\_Mean 'colon cancer perceived severity mean'.

EXECUTE.

##### **Perceived Benefits Mean Score:**

COMPUTE COLONPERCEVBENEFITS\_Mean=Mean(FTRCL,GNCL,ANXCL,BFSCL).

VARIABLE LABELS COLONPERCEVBENEFITS\_Mean 'colon cancer perceived benefits mean'.

EXECUTE.

##### **Perceived Barriers Mean Score:**

COMPUTE COLONPERCEVBARRIERS\_Mean=Mean(EMBCL,PNFCL,FUNCL,EXPCL).

VARIABLE LABELS COLONPERCEVBARRIERS\_Mean 'colon cancer perceived barriers mean'.

EXECUTE.

##### **Motivation/Cues to Action Mean Scores:**

COMPUTE COLONMOTIVATION\_Mean=Mean(DENREG,EXCREG,MNTHLTH).

VARIABLE LABELS COLONMOTIVATION\_Mean 'colon cancer motivation mean'.

EXECUTE.

**Overall frequencies:**

FREQUENCIES VARIABLES=AGE MARITAL EDUC EMPLO INCME HLTHIN IMBRNUS PLCBRN  
IMLIVUS IMUSCITZ RACE

MMOYR MMOEVR MMORCN PAPEVR PAPRCN CLNEVR CLNRCN FOBYR FOBEVR  
FOBRNC SCKUSL SCKGO RGPRVD SPCPRVD

SCRNPRVD PRTHRT PRTAMRCA MARHRT MARAMRC SCLHRT SCLAMRC CMFHRT  
CMFAMRC ENTHRT ENTAMRC BHVHRT BHVAMRC

MNTHRT MNTAMRC VLHRT VLAMRC JKHRT JKAMRC FRNDHRT FRNDAMRC TRDMED  
ETHN IDETHN ENTETHN SHPETHN

SPKETHN DRSETHN LSTETHN RDETHN POLETHN SOCETHN DNCETHN LNGETHN  
PRFETHN GSSPETHN HSTETHN PLCETHN

GTHETHN HBSETHN FRNETHN MEDSETHN HLRETHN HRDMMO OFNMMO HRDPAP  
OFNPAP HRDOSPY HRDCLN OFNCLN CHGBST

CHCNBST WRYBST SCRBSST HBSBST HPLBST LCNBST FTRBST GAINMMO ANXMMO  
BFSMMO EMBMMO PNFMMO FUNMMO EXPMMO

BNFMMO IMPHTN PHXYR CHGRCX CHCNCX WRYCX SCRCX HBSCX HPLCX LCNCX  
FTRCX GNPAP ANXPAP BFSPAP EMBPAP

PNFPAP FUNPAP EXPPAP EATBAL IMPHLTH INFOHLTH CHGRCL CHCNCL WRYCL SCRCCL  
HBSCL HPLCL LCNCL FTRCL GNCL

ANXCL BFSCL EMBCL PNFCL FUNCL EXPCL DENREG EXCREG MNTHLTH  
/ORDER=ANALYSIS

## Appendix 4

### Correlation Matrix

		2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.
1. Age	r	-.128*	-.363**	-.513**	.285**	.133**	-.063	-.047	.045	.060	.074	-.009	-.033	-.078	-.029	-.172**	.144**	.070	.059	.100	.068	.093	.057
	p	.011	.000	.000	.000	.009	.209	.351	.372	.233	.146	.851	.509	.121	.567	.001	.004	.166	.251	.053	.178	.082	.269
	N	395	398	397	393	390	393	396	395	396	392	398	397	398	398	398	396	398	378	373	398	351	377
2. Marital status recoded	r	1	.124*	.162**	-.036	-.013	.036	.005	-.095	-.065	.055	-.010	-.071	.023	-.007	-.049	-.073	.027	.014	.062	.011	.027	.042
	p		.013	.001	.476	.805	.477	.920	.058	.197	.274	.839	.155	.652	.894	.328	.148	.589	.781	.234	.822	.610	.413
	N	398	398	397	393	390	394	396	395	396	392	398	397	398	398	398	396	398	378	373	398	350	376
3. Level of education recoded	r	.124*	1	.339**	-.404**	-.036	.123*	.105*	-.059	-.075	-.140**	-.001	.092	.023	.083	.031	-.108*	-.053	.007	-.004	-.039	-.034	-.034
	p	.013		.000	.000	.476	.014	.037	.237	.134	.005	.976	.066	.650	.096	.531	.032	.289	.886	.943	.431	.526	.511
	N	398	401	400	396	393	396	399	398	399	395	401	400	401	401	401	399	401	381	376	401	353	379
4. Employed	r	.162**	.339**	1	-.469**	-.253**	.047	.027	-.077	-.074	-.050	-.074	.016	-.004	.054	.018	-.154**	-.117*	-.113*	-.129*	-.115*	-.113*	-.138**
	p	.001	.000		.000	.000	.356	.597	.127	.140	.325	.141	.758	.936	.281	.724	.002	.019	.027	.012	.021	.034	.007
	N	397	400	400	395	392	395	398	397	398	394	400	399	400	400	400	398	400	380	375	400	353	379
5. Income < 10K	r	-.036	-.404**	-.469**	1	.037	-.311**	-.025	-.002	.008	.042	.079	-.076	.013	-.133**	.020	.000	.002	.144**	.143**	.196**	.090	.139**
	p	.476	.000	.000		.470	.000	.619	.976	.881	.412	.116	.132	.803	.008	.689	.997	.968	.005	.006	.000	.093	.007
	N	393	396	395	396	389	391	394	394	394	391	396	395	396	396	396	394	396	376	371	396	351	375
6. Health insurance	r	-.013	-.036	-.253**	.037	1	.322**	-.021	.199**	.068	.037	.228**	.211**	.240**	-.037	.084	.097	.071	-.047	-.013	-.068	.021	-.046
	p	.805	.476	.000	.470		.000	.681	.000	.182	.464	.000	.000	.000	.466	.096	.054	.159	.364	.798	.179	.698	.376
	N	390	393	392	389	394	389	392	392	392	388	394	393	394	394	394	392	394	374	370	394	347	372
7. How long in the US	r	.036	.123*	.047	-.311**	.322**	1	.086	.208**	.156**	.062	.145**	.176**	.206**	.166**	.079	.206**	.137**	-.224**	-.204**	-.220**	-.211**	-.167**
	p	.477	.014	.356	.000	.000		.088	.000	.002	.224	.004	.000	.000	.001	.117	.000	.006	.000	.000	.000	.000	.001
	N	394	396	395	391	389	397	395	394	395	391	397	396	397	397	397	395	397	377	372	397	350	375
8. born in the US	r	.005	.105*	.027	-.025	-.021	.086	1	-.058	-.020	-.122*	-.071	.016	-.030	.027	.042	-.123*	-.086	.011	-.062	.039	-.046	.001
	p	.920	.037	.597	.619	.681	.088		.247	.687	.016	.155	.748	.547	.587	.406	.014	.086	.833	.233	.434	.393	.980
	N	396	399	398	394	392	395	400	397	398	394	400	399	400	400	400	398	400	380	375	400	352	378
9. regulr provider	r	-.095	-.059	-.077	-.002	.199**	.208**	-.058	1	.522**	.166**	.224**	.088	.203**	.024	.186**	.221**	.161**	.038	.025	.034	.024	.010
	p	.058	.237	.127	.976	.000	.000	.247		.000	.001	.000	.080	.000	.639	.000	.000	.001	.465	.632	.504	.650	.847
	N	395	398	397	394	392	394	397	399	399	395	399	398	399	399	399	397	399	379	374	399	352	377
10. see specialist	r	-.065	-.075	-.074	.008	.068	.156**	-.020	.522**	1	.326**	.227**	.046	.191**	.081	.212**	.276**	.194**	.092	.101	.141**	.015	.094
	p	.197	.134	.140	.881	.182	.002	.687	.000		.000	.000	.356	.000	.104	.000	.000	.000	.074	.051	.005	.777	.069
	N	396	399	398	394	392	395	398	399	400	396	400	399	400	400	400	398	400	380	375	400	352	378
11. place fo screening	r	.055	-.140**	-.050	.042	.037	.062	-.122*	.166**	.326**	1	.169**	.071	.096	-.048	.120*	.094	.077	.004	.028	.072	.095	.080
	p	.274	.005	.325	.412	.464	.224	.016	.001	.000		.001	.158	.057	.339	.017	.063	.125	.945	.596	.151	.077	.123
	N	392	395	394	391	388	391	394	395	396	396	396	395	396	396	396	394	396	376	371	396	350	374
12. mammo last 12 mths	r	-.010	-.001	-.074	.079	.228**	.145**	-.071	.224**	.227**	.169**	1	.180**	.686**	.009	.332**	.292**	.271**	.089	.044	.068	.069	.017
	p	.839	.976	.141	.116	.000	.004	.155	.000	.000	.001		.000	.000	.851	.000	.000	.000	.081	.399	.176	.193	.742
	N	398	401	401	396	394	397	400	399	400	396	402	401	402	402	402	400	402	382	377	402	354	380
	r	-.071	.092	.016	-.076	.211**	.176**	.016	.088	.046	.071	.180**	1	.130**	-.022	.047	.142**	.108*	-.078	-.098	-.100**	-.075	-.097

13. ever had mammo	p	.155	.066	.758	.132	.000	.000	.748	.080	.356	.158	.000		.009	.658	.350	.005	.031	.128	.058	.045	.158	.059
	N	397	400	399	395	393	396	399	398	399	395	401	401	401	401	401	399	401	381	376	401	353	379
14. Recent mammogram	r	.023	.023	-.004	.013	.240**	.206**	-.030	.203**	.191**	.096	.686**	.130**	1	.024	.451**	.266**	.264**	-.028	-.047	.040	-.081	-.067
	p	.652	.650	.936	.803	.000	.000	.547	.000	.000	.057	.000	.009		.631	.000	.000	.000	.581	.360	.420	.129	.192
	N	398	401	400	396	394	397	400	399	400	396	402	401	402	402	402	400	402	382	377	402	354	380
15. ever had pap	r	-.007	.083	.054	-.133**	-.037	.166**	.027	.024	.081	-.048	.009	-.022	.024	1	.243**	.006	.024	-.136**	-.144**	-.093	-.087	-.055
	p	.894	.096	.281	.008	.466	.001	.587	.639	.104	.339	.851	.658	.631		.000	.898	.638	.008	.005	.061	.104	.287
	N	398	401	400	396	394	397	400	399	400	396	402	401	402	402	402	400	402	382	377	402	354	380
16. recent pap recoded	r	-.049	.031	.018	.020	.084	.079	.042	.186**	.212**	.120*	.332**	.047	.451**	.243**	1	.131**	.154**	.058	-.023	.157**	-.065	-.072
	p	.328	.531	.724	.689	.096	.117	.406	.000	.000	.017	.000	.350	.000	.000	.009	.002	.256	.662	.002	.225	.159	
	N	398	401	400	396	394	397	400	399	400	396	402	401	402	402	402	400	402	382	377	402	354	380
17. coloscopy ever	r	-.073	-.108*	-.154**	.000	.097	.206**	-.123*	.221**	.276**	.094	.292**	.142**	.266**	.006	.131**	1	.720**	.038	.061	.040	.043	.068
	p	.148	.032	.002	.997	.054	.000	.014	.000	.000	.063	.000	.005	.000	.898	.009		.000	.458	.241	.423	.417	.186
	N	396	399	398	394	392	395	398	397	398	394	400	399	400	400	400	400	400	381	376	400	353	378
18. recent colonoscopy recoded	r	.027	-.053	-.117*	.002	.071	.137**	-.086	.161**	.194**	.077	.271**	.108*	.264**	.024	.154**	.720**	1	.107*	.053	.078	.017	.020
	p	.589	.289	.019	.968	.159	.006	.086	.001	.000	.125	.000	.031	.000	.638	.002	.000		.036	.302	.121	.749	.704
	N	398	401	400	396	394	397	400	399	400	396	402	401	402	402	402	400	402	382	377	402	354	380
19. fobt past 12 mths	r	.014	.007	-.113*	.144**	-.047	-.224**	.011	.038	.092	.004	.089	-.078	-.028	-.136**	.058	.038	.107*	1	.711**	.645**	.265**	.181**
	p	.781	.886	.027	.005	.364	.000	.833	.465	.074	.945	.081	.128	.581	.008	.256	.458	.036		.000	.000	.000	.001
	N	378	381	380	376	374	377	380	379	380	376	382	381	382	382	382	381	382	382	364	382	338	362
20. fobt ever dr office home	r	.062	-.004	-.129*	.143**	-.013	-.204**	-.062	.025	.101	.028	.044	-.098	-.047	-.144**	-.023	.061	.053	.711**	1	.590**	.183**	.186**
	p	.234	.943	.012	.006	.798	.000	.233	.632	.051	.596	.399	.058	.360	.005	.662	.241	.302	.000		.000	.001	.000
	N	373	376	375	371	370	372	375	374	375	371	377	376	377	377	377	376	377	364	377	377	331	357
21. recent fobt recoded	r	.011	-.039	-.115*	.196**	-.068	-.220**	.039	.034	.141**	.072	.068	-.100*	.040	-.093	.157**	.040	.078	.645**	.590**	1	.177**	.151**
	p	.822	.431	.021	.000	.179	.000	.434	.504	.005	.151	.176	.045	.420	.061	.002	.423	.121	.000	.000		.001	.003
	N	398	401	400	396	394	397	400	399	400	396	402	401	402	402	402	400	402	382	377	402	354	380
22. Acculturation scale	r	.027	-.034	-.113*	.090	.021	-.211**	-.046	.024	.015	.095	.069	-.075	-.081	-.087	-.065	.043	.017	.265**	.183**	.177**	1	.707**
	p	.610	.526	.034	.093	.698	.000	.393	.650	.777	.077	.193	.158	.129	.104	.225	.417	.749	.000	.001	.001		.000
	N	350	353	353	351	347	350	352	352	352	350	354	353	354	354	354	353	354	338	331	354	354	354
23. Heritage Accult scale	r	.042	-.034	-.138**	.139**	-.046	-.167**	.001	.010	.094	.080	.017	-.097	-.067	-.055	-.072	.068	.020	.181**	.186**	.151**	.707**	1
	p	.413	.511	.007	.007	.376	.001	.980	.847	.069	.123	.742	.059	.192	.287	.159	.186	.704	.001	.000	.003	.000	
	N	376	379	379	375	372	375	378	377	378	374	380	379	380	380	380	378	380	362	357	380	354	380
24. Mainstream Accult scale	r	.014	-.011	.013	.039	-.072	.067	-.003	.018	.094	-.006	-.064	-.011	.038	.048	-.013	.040	.015	-.157**	-.067	-.099	-.538**	.216**
	p	.792	.841	.805	.461	.178	.206	.951	.738	.074	.908	.220	.837	.472	.366	.808	.443	.776	.003	.217	.058	.000	.000
	N	359	362	361	360	356	359	361	361	361	359	363	362	363	363	363	362	363	347	340	363	354	354
25. Identity scale	r	.091	.004	-.103	.014	.100	.016	-.088	.112*	.052	-.028	-.031	.008	.027	-.025	-.018	.075	.061	-.018	.047	-.097	-.062	.180**
	p	.092	.947	.055	.793	.065	.761	.103	.037	.336	.601	.566	.882	.620	.646	.740	.164	.259	.739	.403	.072	.263	.001
	N	345	348	348	347	341	345	346	346	346	343	348	348	348	348	348	347	348	329	324	348	323	340
26. Breast ca perc v susp scale	r	.026	.038	.076	.056	-.012	-.103*	-.068	-.087	-.141**	-.070	.029	.025	.135**	-.009	.020	-.127*	-.124*	-.062	-.038	-.033	-.112*	-.053
	p	.609	.454	.133	.270	.820	.043	.182	.087	.005	.171	.562	.620	.007	.854	.698	.012	.015	.230	.467	.519	.036	.304
	N	388	391	390	388	384	386	389	389	389	386	391	390	391	391	391	389	391	371	367	391	349	373
27. Breast ca perceived severity scale	r	.052	.014	-.031	.163**	-.016	-.255**	.049	.000	-.016	.015	.081	-.032	-.006	-.022	-.017	-.054	.043	.214**	.167**	.194**	.239**	.145**
	p	.314	.781	.541	.001	.751	.000	.342	.993	.762	.764	.112	.530	.911	.671	.734	.292	.405	.000	.002	.000	.000	.006
	N	382	385	384	383	378	382	383	383	383	380	385	384	385	385	385	383	385	366	360	385	346	366

28.Breast perceived benefit scale	<i>r</i>	-.007	.021	-.083	.293**	-.155**	-.267**	.012	-.048	-.053	.008	-.003	-.080	.036	-.047	.087	-.036	-.006	.315**	.230**	.362**	.181**	.228**
	<i>p</i>	.893	.687	.102	.000	.002	.000	.819	.344	.296	.875	.958	.118	.475	.358	.086	.477	.911	.000	.000	.000	.001	.000
	<i>N</i>	384	387	386	383	380	382	385	385	385	381	387	386	387	387	387	385	387	368	363	387	346	368
29.Breast perceived barriers scale	<i>r</i>	.010	.001	-.024	.078	.058	.015	-.127*	-.064	-.133**	-.014	-.033	-.024	.101*	.021	.071	-.059	-.080	-.177**	-.099	-.115*	-.332**	-.283**
	<i>p</i>	.839	.978	.640	.127	.261	.770	.013	.213	.009	.784	.517	.644	.047	.686	.164	.245	.117	.001	.061	.024	.000	.000
	<i>N</i>	383	386	385	382	379	382	384	384	384	381	386	385	386	386	386	384	386	366	361	386	345	366
30.Breast motivation cues to action	<i>r</i>	-.060	.144**	.049	-.115*	.018	-.047	-.034	.024	.017	-.106*	.143**	-.065	.064	.134**	.024	.055	.075	.179**	.072	.025	.246**	.085
	<i>p</i>	.238	.004	.328	.023	.730	.354	.504	.642	.742	.037	.004	.200	.205	.008	.634	.277	.137	.001	.167	.619	.000	.101
	<i>N</i>	391	394	393	390	387	389	392	392	392	388	394	393	394	394	394	392	394	374	369	394	348	373
31.Cervical perceived susceptibility scale	<i>r</i>	.024	-.015	.016	.084	-.001	.009	-.044	-.039	-.052	-.013	.040	.033	.131**	.010	.001	-.067	-.132**	-.055	.000	-.094	-.162**	-.074
	<i>p</i>	.633	.764	.758	.098	.983	.866	.384	.436	.305	.791	.426	.513	.009	.848	.990	.185	.009	.288	.998	.062	.002	.154
	<i>N</i>	392	395	394	391	388	390	393	393	393	389	395	394	395	395	395	393	395	375	370	395	349	374
32.Cervical perceived severity scale	<i>r</i>	.058	-.004	-.040	.161**	-.012	-.198**	.058	-.022	.010	-.021	.042	.008	-.025	-.043	.034	-.029	.023	.213**	.141**	.180**	.185**	.096
	<i>p</i>	.260	.942	.437	.002	.810	.000	.253	.668	.852	.679	.411	.882	.617	.395	.501	.570	.648	.000	.007	.000	.001	.067
	<i>N</i>	385	388	387	384	382	385	387	387	387	383	389	388	389	389	389	387	389	369	365	389	345	369
33.Cervical perceived benefits	<i>r</i>	.011	.035	-.073	.282**	-.151**	-.224**	-.041	-.012	.012	-.040	-.003	-.089	.086	-.068	.116*	-.021	-.021	.307**	.222**	.371**	.137*	.114*
	<i>p</i>	.834	.498	.153	.000	.003	.000	.420	.820	.811	.441	.950	.080	.090	.180	.022	.687	.674	.000	.000	.000	.011	.029
	<i>N</i>	385	388	387	384	381	383	386	386	386	382	388	387	388	388	388	386	388	368	365	388	345	369
34.Cervical perceived barriers	<i>r</i>	.028	-.066	-.079	.130*	.087	-.030	-.117*	-.111*	-.101	.062	-.009	.020	.117*	-.033	-.013	-.125*	-.046	-.129*	-.051	-.092	-.324**	-.292**
	<i>p</i>	.587	.203	.128	.012	.095	.562	.023	.031	.051	.230	.857	.695	.023	.527	.808	.016	.374	.015	.339	.075	.000	.000
	<i>N</i>	372	375	374	371	369	371	374	374	374	371	376	375	376	376	376	374	376	356	352	376	334	358
35.cervical motivation scale	<i>r</i>	.018	.127*	.062	-.064	.038	.034	.011	-.040	.006	-.055	.075	-.016	-.041	.044	.009	.051	.034	.190**	.096	.019	.244**	.106*
	<i>p</i>	.726	.011	.222	.207	.459	.498	.825	.430	.899	.280	.137	.748	.412	.378	.854	.311	.502	.000	.065	.713	.000	.039
	<i>N</i>	392	395	394	391	389	391	394	394	394	390	396	395	396	396	396	394	396	376	371	396	350	375
36.colon perceived susceptibility scale	<i>r</i>	-.027	.014	.045	.095	-.040	-.066	-.098	-.060	-.086	-.020	.055	.017	.144**	.030	.019	-.067	-.087	-.019	-.001	-.035	-.174**	-.133**
	<i>p</i>	.592	.779	.374	.061	.429	.193	.052	.236	.089	.689	.275	.742	.004	.556	.702	.184	.083	.719	.983	.485	.001	.010
	<i>N</i>	392	395	394	390	388	391	394	393	394	390	396	395	396	396	396	394	396	376	371	396	350	376
37.colon perceived severity scale	<i>r</i>	-.017	-.054	-.054	.184**	-.038	-.209**	-.002	.015	.019	.025	.078	-.003	.024	-.028	-.005	.015	.068	.208**	.132*	.216**	.123*	.029
	<i>p</i>	.742	.286	.292	.000	.465	.000	.969	.764	.716	.621	.124	.953	.643	.581	.927	.765	.184	.000	.012	.000	.022	.578
	<i>N</i>	384	387	386	382	379	384	385	384	385	381	387	386	387	387	387	385	387	367	363	387	346	370
38.colon perceived benefits	<i>r</i>	-.021	.001	-.043	.287**	-.194**	-.222**	-.020	-.046	.000	.010	.010	-.087	.091	-.040	.132**	.007	.005	.225**	.164**	.307**	-.042	.065
	<i>p</i>	.678	.977	.392	.000	.000	.000	.699	.361	.998	.850	.836	.085	.070	.434	.009	.894	.915	.000	.002	.000	.431	.211
	<i>N</i>	391	394	393	389	387	390	393	392	393	389	395	394	395	395	395	393	395	375	370	395	350	375
39.colon perceived barriers	<i>r</i>	.003	-.053	.000	.057	.052	-.023	.012	-.054	-.097	.024	-.017	.007	.142**	.025	.117*	-.073	-.058	-.117*	-.054	-.023	-.345**	-.374**
	<i>p</i>	.949	.297	.993	.271	.317	.661	.817	.291	.057	.646	.742	.884	.005	.619	.022	.154	.254	.025	.305	.658	.000	.000
	<i>N</i>	382	385	384	380	378	382	384	383	384	380	386	385	386	386	386	384	386	366	362	386	342	366
40.colon motivation	<i>r</i>	.081	.089	.014	-.104*	.079	.116*	.059	-.038	.025	.040	.121*	.026	.031	.078	-.014	.162**	.170**	.202**	.083	-.008	.200**	.078
	<i>p</i>	.111	.077	.790	.040	.124	.023	.241	.449	.623	.430	.017	.608	.536	.122	.780	.001	.001	.000	.112	.873	.000	.134
	<i>N</i>	388	391	390	387	385	387	390	390	390	386	392	391	392	392	392	390	392	372	368	392	349	374