

Online Health Information Seeking Behaviors of Hispanics in New York City

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## **ABSTRACT**

### **Online Health Information Seeking Behaviors of Hispanics in New York City**

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Hispanics are the fastest-growing minority group in the United States, but they are the most underserved population in terms of access to online health information. The specific aims of this descriptive, correlational study were to examine factors associated with online health information seeking behaviors of Hispanics and to examine the association between online health information seeking behaviors and health behaviors.

The study sample (n=4,070) was recruited from five zip codes in the Washington Heights/Inwood community of New York City for the Washington Heights Inwood Informatics Infrastructure for Comparative Effectiveness Research project. Survey data were collected via interview by bilingual community health workers in three settings: a community center affiliated with Columbia University, households and other community settings, and NewYork-Presbyterian Ambulatory Care Network clinics. Data were analyzed using logistic and linear regressions.

In regards to survey respondents' situational, sociodemographic, and literacy factors (health literacy, computer literacy) associated with their online health information seeking behaviors and those of their household members, the study found that that worse health status (OR=0.42,  $p<0.001$ ), lack of hypertension (OR=0.60,  $p<0.01$ ), a high level of education (OR=3.04,  $p<0.001$ ), and computer literacy (OR=3.78,  $p < 0.001$ ) were positively associated with respondents online health information seeking behaviors. Health literacy was only positively associated (OR=2.13,  $p<0.001$ ) in a subsample of respondents (n=2,680) in which it

was measured by one item related to understanding written health information. Respondents' factors significantly associated with online health information seeking by household members were: female gender (OR=1.60,  $p<0.01$ ), younger age (OR=0.75,  $p<0.01$ ), married (OR=1.36,  $p<0.01$ ), higher education (OR=1.80,  $p<0.001$ ), higher computer literacy (OR=2.24,  $p<0.001$ ), in worse health status (OR=0.592,  $p<0.001$ ), and presence of serious health problems (OR=1.83,  $p<0.01$ ).

Controlling for factors found to be significant in Aim 1, respondents' online health information seeking behaviors were hypothesized to be positively associated with fruit consumption, vegetable consumption, physical activity, and hypertension medication adherence and negatively associated with alcohol consumption. Hypotheses related to fruit consumption ( $p<0.05$ ), vegetable consumption ( $p<0.05$ ), and physical activity ( $p<0.01$ ) were supported.

This study contributes to the understanding of Hispanics' online health information seeking behaviors and provides the foundation for informatics and public health interventions.

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## **Legend of Abbreviations**

- 1. HISBs = Health Information Seeking Behaviors**
- 2. SNS = Social Networking Sites**
- 3. HIT = Health Information Technology**
- 4. NVS = Newest Vital Sign**
- 5. CCPH = Columbia-Community Partnership for Health**
- 6. HH = Household**



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## **DEDICATION**

This dissertation study is dedicated to the Washington Heights and Inwood community, to my mentor Prof. Suzanne Bakken, and to my parents, Prof. Eun Woo Lee and Mrs. Sun Ok Han.

## CHAPTER 1 INTRODUCTION

This chapter provides an overview of the dissertation study. It presents an introduction to the problem of online health information seeking behaviors (HISBs) among Hispanics population. Also, this chapter describes study aims and related research questions.

### **Background**

Patients have become active consumers of health information and their autonomy has increased in making health-related decisions (Alpay, Verhoef, Toussaint & Zwetsloot-Schonk, 2006; Anker, Reinhart & Feeley, 2011; Flynn, Smith & Freese, 2006). Also, their values have been incorporated during the decision making process. Since patient participation in healthcare decision making is increasing, their HISBs have become an important strategic issue in the health field (Alpay et al, 2006; Anker et al, 2011; Flynn et al, 2006).

In *Crossing the Quality Chasm*, the Institute of Medicine reported that “patients should receive care whenever they need it and in many forms, not just face-to-face visits. This recommendation implies that the healthcare system should be responsive at all times and that access to care should be provided over the Internet, by telephone, and by other means in addition to face-to-face visits” (WHCCAMP, 2002). As healthcare providers, government agencies, non-profit organizations, and for-profit companies have started to provide health information through the Internet, which improves two-way information channels and contact between providers and patients, the Internet has become a promising source of health information for the general public (Alpay et al, 2006; Koch-Weser, Bradshaw, Gualtieri & Gallagher, 2010; Nauert, 2002; Spittaels, De Bourdeaudhuij, Brug, & Vandelanotte, 2006)

Online health information has become as an important health information resource as the number of the Internet users has grown (Cheong, 2007). One objective of Healthy People 2020 is

“to increase the proportion of online health information seekers who report that they can easily access health information” (USDHHS, 2013). Appropriate access to the health information allows timely clinical intervention and improves patients’ active participation in medical decision making (Koch-Weser et al, 2010; McInnes, Gifford, Kazis & Wagner, 2010; Nauert, 2002). Furthermore, the Internet plays an important role in assisting marginalized groups to access health resources and social support (Cohall, Nye, Moon-Howard, Kukafka, Dye, Vaughan & Northridge, 2011; Lorence, Park & Fox, 2006).

### **Problem Statement**

Although the Internet helps marginalized people to access health information easily, not all of health consumers have the opportunity to access appropriate health information through the Internet. There are numerous disparities in terms of demographics, socioeconomic status, and health status with regard to online HISBs (Cohall et al, 2011; Peña-Purcell, 2008; Renahy, Parizot & Chauvin, 2008). Furthermore, it is not guaranteed that people who access health information utilize the information effectively since misinformation and unverified information exist on the Internet that cause harm to people (Kalichman, et al., 2006). Although cases of reported use of harmful Internet health information are rare (Gilmour, 2007), online health information seekers need to have a certain level of health literacy to understand and utilize health information safely.

Therefore, understanding patterns of online health information seekers is important for healthcare providers and organizations to increase the percentage of Internet use to seek health information for providing appropriate health information and potentially improving health consumers’ quality of life (McInnes et al, 2010). However, correlates of online HISBs have not

been clearly defined since the patterns and motivations of online HISBs are complex and affected by multiple variables at a time.

### **Significance**

A previous study showed that online health information does affect personal health management. The study found that online health information had an influence on decisions about individual's treatment. Also, the information helped to improve self-management skills (Gilmour, 2007). Moreover, online health information leads people to manage chronic diseases more effectively and improve their quality of life (Kalichman, et al., 2006).

Hispanics are the fastest growing minority group in the United States; however, they are the most underserved population in terms of access to online health information (Pena-Purcell, 2008). According to the U.S. Census Bureau, 16 percent of the U.S. population (50.5 million) identified themselves as Hispanic or Latino in 2010 (The U.S. Census, 2011). Among Hispanic Internet users, 55% have used the Internet for searching health information. However, non-Hispanic Whites and African Americans are more likely to seek health information through the Internet: 68% and 60% respectively (Fox, 2009).

However, all of the Internet users are not seeking health information. There are numerous disparities in terms of demographics, socioeconomic status, and social integration with regard to Internet access for health information seeking (Cohall et al, 2011; Pena-Purcell, 2008; Renahy et al, 2008). Reducing the inequality of access to health information is linked to reducing and preventing an unequal burden of disease. To increase the number of online health information seekers and reduce the disparities in access, the characteristics of individuals who search health information via the Internet need to be understood and identified (Kalichman, et al., 2006; McInnes et al, 2010). A growing body of literature examines correlates of online HISBs;

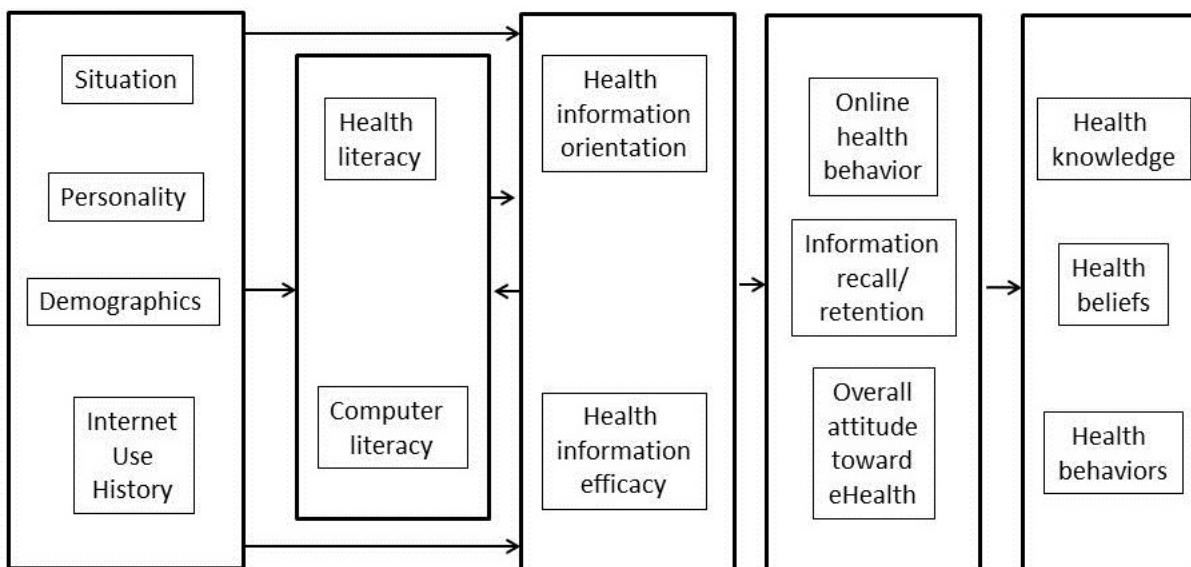
however, to our knowledge, there are few studies on correlates of online HISBs among the Hispanic community.

The dissertation study used an existing survey of Washington Heights and Inwood community residents to provide insights into the correlates of online HISBs and health-related outcomes. The Washington Heights and Inwood areas of Northern Manhattan have been designated medically underserved areas by the Centers for Medicare and Medicaid Services since those areas meet the criteria related to the level of poverty, the level of elderly, the level of infant mortality and the ratio of primary care providers in the community (Pati, Romero & Chavkin, 2002; Zach, Dalrymple, Rogers & Williver-Farr, 2012). Currently, 71% of Washington Heights and Inwood areas residents are Hispanic (NYCDHMH, 2006). Through the Washington Heights Inwood Informatics Infrastructure for Comparative Effectiveness Research (WICER) project (1R01HS019853), investigators aim to gain an understanding of the Washington Heights Inwood community toward the long-term goal of improving the health of the community. A key component of WICER is an in-depth community survey that was used to address the dissertation aims.

### **Conceptual Framework**

In this study, Bodie and Dutta's Integrative Model of eHealth Use was applied to inform selection of correlates and related health outcomes for online HISBs (Figure 1.1). According to the model, variables such as such as demographics, situational, personal, and cultural factors affect the use of the Internet for obtaining health information (Bodie & Dutta, 2008). Differences in these variables may contribute to health disparities and a digital divide between people who have and people who do not have access to Internet technology (Bodie & Dutta, 2008). This model suggests that disparities in social structures such as socioeconomic factors lead to

individual-level differences in motivation and online health information seeking ability. This difference in online HISBs causes disparities in lifestyle which are related to health outcomes, and continue to contribute to healthcare disparities (Bodie & Dutta, 2008).

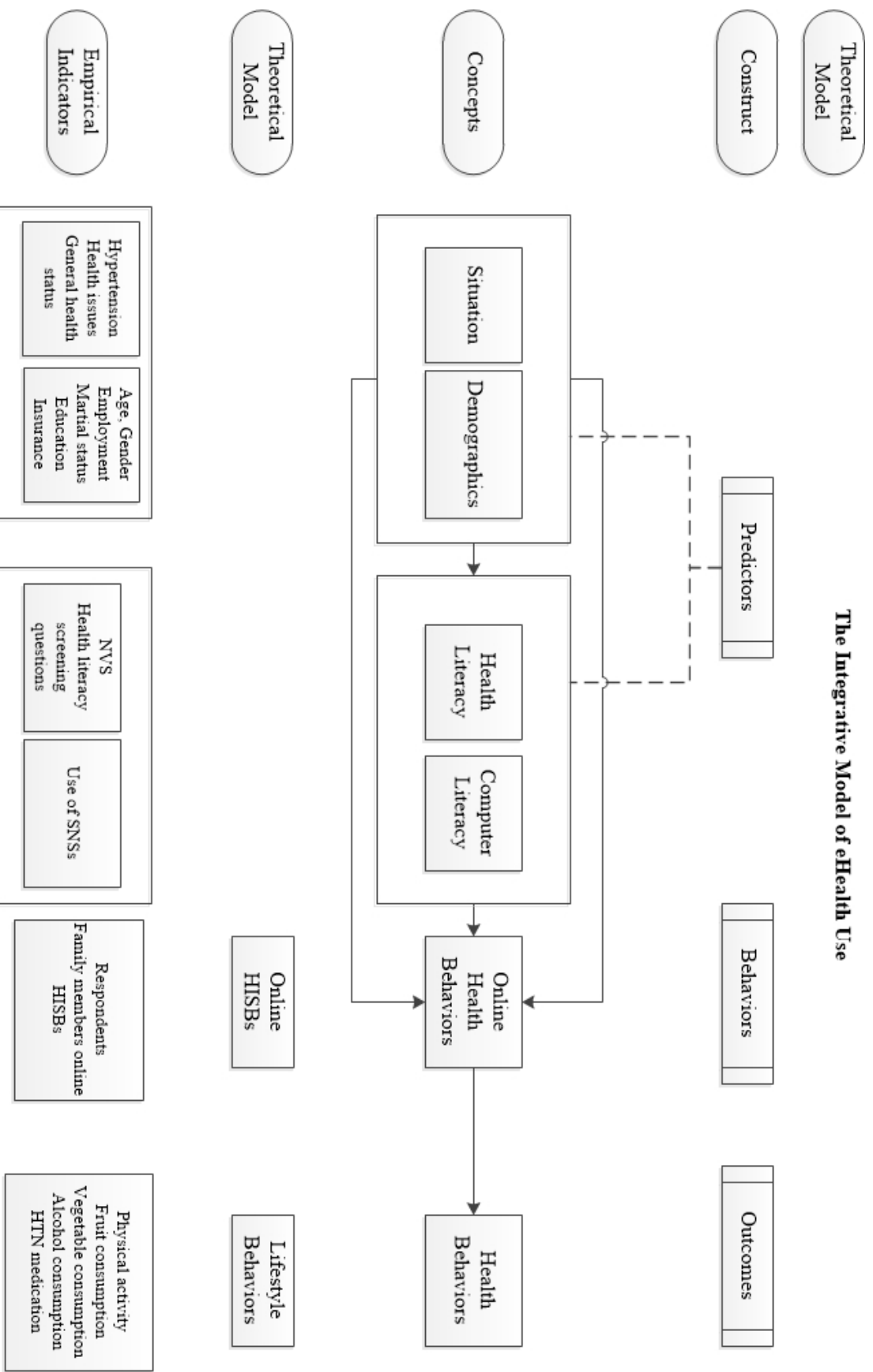


**Figure 1.1 The Integrative Model of the eHealth Use**

However, access to the health information does not mean that individuals can understand and utilize health information. Therefore, health literacy and computer literacy are incorporated into the Integrative Model of the eHealth Use to predict online HISBs and health behaviors. Differences in health literacy are related to sociodemographic factors such as age, race, nativity, education level and income which also influence online HISBs (Bodie & Dutta, 2008; Rudd, Kirsch & Yamamoto, 2004). High literacy scores are related to higher educational level, higher income, and Whites. The health literacy level of foreign-born individuals, the elderly (age 65 and over), and those with low income are more likely to be lower than the average. Studies consistently show that those with low health literacy less likely to access healthcare services and more likely to suffer from disease (Ghaddar, Valerio, Garcia & Hansen, 2012; NLMM, 2013;

Paasche-Orlow, Parker, Gazmararian, Nielsen-Bohlman, & Rudd, 2005). Similar patterns were found across socioeconomic levels (Bodie & Dutta, 2008). The components of the model that were measured in this study are displayed in Figure 1.2.





\*HISB= health information seeking behavior; SNS= social networking site; NVS=Newest Vital Sign; HTN=hypertension

**Figure 1.2. Theoretical Substruction of Selected Components of Integrative Model of eHealth Use for Dissertation Study**

## **Aims of the Study**

The purpose of this study is to examine the associated factors of online HISBs and related health behaviors among Hispanics. Table 1.1 summarizes the study aims, research questions, and methods.

**Aim I.** The first aim is to examine factors associated with online HISBs among Hispanics. There are two related research questions under this aim.

**R1.** What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with online HISBs among Hispanic survey respondents?

**R2.** What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with online HISBs among household members of Hispanic survey respondents?

**Aim II.** The second aim is to examine the association between online HISBs and health behaviors (physical activity, fruit and vegetable consumption, alcohol use, and hypertension medication adherence). There are 5 hypotheses under this aim.

**H1.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with fruit consumption.

**H2.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with vegetable consumption.

**H3.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with physical activity.

**H4.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be negatively associated with alcohol consumption.

**H5.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with hypertension medication adherence.

## **Conclusion**

The Internet is increasingly being employed in conveying health information, and online health information has positive effects on personal health management (Cohall et al, 2011; Lorence et al, 2006). However, not all people have equally access to online health information; differences in sociodemographic, personal, and cultural factors affect the use of Internet for obtaining health information (Bodie & Dutta, 2008). Hispanics are the most underserved population in terms of access to online health information (Peña-Purcell, 2008). There are numerous disparities in terms of demographics, socioeconomic status, and social integration with regard to Internet access for health information seeking (Cohall et al, 2011; Pena-Purcell, 2008; Renahy et al, 2008). To increase the number of online health information seekers and reduce the disparities in access among Hispanics, the characteristics of online health information seekers and their circumstances need to be identified. Also, it is necessary to examine the effect of online HISBs on health management to assess the feasibility of online interventions to improve the health of Hispanics.

**Table 1.1 Overview of Objectives, Research Questions, and Methods**

Objective	Research questions	Method
<b>To examine factors associated with online HISBs among Hispanics in Washington Heights and Inwood areas through the WICER community survey</b>	<p>What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with online HISBs among</p> <p>R1. Hispanic survey respondents R2. Household members of Hispanic survey respondents</p>	<p>Online HISBs is dependent variable. Correlates include situational, sociodemographic factors, health literacy and computer literacy.</p> <ul style="list-style-type: none"> <li>- Chi square or t-test</li> <li>- Binary logistic regression with</li> </ul> <p>R1. The difference in respondents' online HISBs and R2. The difference in household member's online HISBs</p>
<b>To examine the association between online HISBs and health behaviors (physical activity, fruit and vegetable consumption, alcohol use, and hypertension medication adherence) among Hispanics in Washington Heights and Inwood areas</b>	<p>Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be</p> <p>H1: Positively associated with fruit consumption H2: Positively associated with vegetable consumption H3: Positively associated with physical activity H4: Negatively associated with alcohol consumption H5: Positively associated with hypertension medication adherence.</p>	<p>Fruit and vegetables consumption, physical activity, alcohol consumption, and hypertension medication adherence are dependent variables. Respondents' online HISBs is an independent variable controlling for factors found to be significant in Aim I</p> <ul style="list-style-type: none"> <li>- Linear regression with fruit consumption, vegetable consumptions, and physical activity</li> <li>- Ordinal logistic regression with alcohol consumption and hypertension medication adherence</li> </ul>

## CHAPTER 2 LITERATURE REVIEW

This chapter provides literature reviews of (1) digital divide, (2) computer literacy, (3) health literacy – (i) health literacy measurement tools in Spanish, (ii) Newest Vital Sign, (iii) brief questions to identify patients with inadequate health literacy, (4) comprehensive review of online HISBs and (5) Online health information seeking behaviors (HISB) of Hispanics.

### **Digital Divide**

The U.S. Department of Health and Human Services defined health information technology (HIT) as “the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision making” (Thompson & Brailer, 2004). The Institute of Medicine (IOM) advocates for the use of HIT to improve communication and to access to health care to fill the gap between patients and health care providers (Dykes et al, 2010; Kohn, Corrigan & Donaldson, 1999).

However, as computer use has increased the inequities between those who have access and those who do not have access to technologies have broadened, which is called digital divide (Gilmour, 2007; Warren, Kivansny, Hecht, Burgess, Ahluwalia & Okuyemi, 2010).

Socioeconomic and other factors have influenced the digital divide; people who are deficient in social and technical support are less likely to access to health information (Warren et al, 2010). Therefore, individuals who do not have access to the health information are usually underserved (Warren et al, 2010).

Currently, Hispanic comprise 15.4% of the U.S. population; they are the largest minority and immigrant group in the U. S. (Livingston, 2010). In 2010, 65% of Hispanics had access to the Internet, which is comparable to that of African Americans (66%) but significantly lower

than the rate for non-Hispanic Whites (77%). Between 2000 and 2010, the proportion of Internet users who are African American and Hispanic has increased from 11 to 21 percent. However, Hispanics still face disparities in health information (Chang et al, 2004; Gibbons, Fleisher, Slamon, Bass, Kandadai & Beck, 2011).

Digital divide is not only affected by having access to the computers and the Internet, but also by the ability reflected in computer literacy and health literacy (Chang et al, 2004; Ginossar & Nelson, 2010). Although inequalities in access to the Internet still exist, these factors need to be considered in future studies to understand disparities related to online HISBs (Mesch, Mano & Tasmir, 2012).

### **Computer Literacy**

The U.S. Department of Education defines the computer literacy as “computer skills and ability to use technology to improve learning, productivity, and performance” (Bers, 2010). However, the definition of computer literacy keeps changing with the technology evolution (Lin, 2011). Several studies include using the networked communication, such as email or messenger, into the component of computer literacy (Lin, 2011; Lupo & Erlich, 2001; McDonald, 2004). The trend of networking is rapidly changing (Huls, 2012). Recently, social networking sites (SNS) have emerged. Several studies found that the use of SNS was positively related to computer literacy: these studies showed that SNSs users had significantly higher computer literacy score (Appel, 2012; Smith, Bedayse, Lalwah & Paryag, 2009).

Since computer literacy is dependent upon access to a computer and the Internet service, it is affected by socioeconomic factors (Ismail, 2012). For instance, Hispanics have been found to be less computer literate compared to other ethnic groups due to their low economic health status (Jin & Kling, 2009; Lenhart et al, 2003).

## **Health Literacy**

The IOM defined health literacy as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Nielsen-Bohlman, Panzer & Kindig, 2004). According to the National Adult Literacy Survey 2003, about 36% of adults in the U.S. have basic or below basic health literacy level (Kutner, Greenberg, Jin, Paulsen & White, 2006). Most of these low-health literacy population are foreign-born individuals, the elderly (age 65 and over), and those with low education and income levels (Kutner et al, 2006; Paasche-Orlow et al, 2005).

Low health literacy level is linked to health status: multiple studies indicate that marginalized populations are likely to have poor health status and to suffer from chronic diseases (Bodie & Dutta, 2008; Ghaddar et al, 2012; Koskan, Friedman & Hilfinger Messias, 2010; Paasche-Orlow et al, 2005). Hispanics are an important community to reach and improve the health literacy level due to their lower average health literacy when compared to other ethnic groups. Their low health literacy level is related to limited-English-proficiency (LEP), and also to lack of understanding at the Hispanic culture among healthcare providers (Koskan, Friedman & Hilfinger Messias, 2010).

Moreover, understanding of online health information in English and in Spanish requires above average literacy skills (Berland et al, 2001; Ginossar & Nelson, 2010). Therefore, it is important to improve health literacy level among the Hispanics to increase the proportion of online health information seekers among them (Ghaddar et al, 2012).

**Health literacy measurement tools in Spanish.** A number of instruments have been used to measure health literacy. Among them, the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA) are most commonly

used. However, these instruments only measure reading ability which is not reflective of various aspects of health literacy (McCormack et al, 2010). To supplement the shortcomings of traditional health literacy measurement tools, several tools have been developed such as the Newest Vital Sign (NVS) and Chew's health literacy screening questions to assess the literacy in clinical settings and the Consumer Assessment of Health Providers and Systems Item Set for Addressing Health Literacy to measure provider-level facilitation (McCormack et al, 2010).

As the Hispanic population becomes dominant in the U.S., it is important to integrate health literacy assessment in Spanish into clinical practice. There are several health literacy measurement tools which provide Spanish versions such as NVS-S, TOFHLA-S, The Short Assessment of Health Literacy for Spanish-speaking Adults (SAHLSA), and Instrument for Diagnosis of Reading (IDL) (Blanchard, Garcia & Carter, 1989). TOFHLA-S, NVS-S, and SAHLSA have demonstrated excellent to good level of internal consistency reliability (TOFHLA-S: Cronbach's  $\alpha=0.97$ , NVS-S:  $\alpha=0.69$ , SAHLSA:  $\alpha=0.92$ ). However, reliability estimates were not found for IDL. All four measurement tools provide good to moderate level of concurrent validity. TOFHLA-S was correlated with REALM ( $r=0.81$ ). NVS-S and SAHLSA had moderate to high correlations with TOFHLA-S of 0.49 and 0.69 respectively. IDL was correlated with REALM at  $r=0.65-0.70$  (Aguirre & Shea, 2005; Koskan et al, 2010; Lee, Ruiz & Cho, 2006; Weiss et al, 2005).

The psychometric properties of Spanish versions of measurement tools were not as robust as those of the English versions, although they were sufficient for screening patients for limited literacy due to the heterogeneity of language and culture among Spanish-speaking participants from Dominican Republic, Puerto Rican, Cuban, etc. (Minor, 1992; Cheong, 2007; Lee et al, 2006; Weiss et al, 2005).



To date, the health literacy research has not examined health literacy within specific Hispanic subpopulations. There is a need for further studies to define and measure health literacy among Hispanics in specific subgroups (Koskan et al, 2010). Furthermore, Hispanic cultures need to be considered in the measurement of health literacy. Current health literacy measurement tools are developed for English-speaking populations. Although some of these tools have been translated and used by Spanish speaking people, there are still need for research involving Hispanics in Spanish language assessment tools (Koskan et al, 2010; McLeod-Sordjan, 2011).

**The Newest Vital Sign (NVS).** The Newest Vital Sign (NVS) was developed by health literacy experts at the University of Arizona, College of Medicine in collaboration with colleagues at the University of North Carolina to screen for limited literacy in the primary health care setting (Weiss et al, 2005). The NVS includes 6 questions to test reading, interpretation, and numeracy skills based on a nutritional label from an ice cream container. A point is given for each correct answer, and the total points are categorized into three health literacy levels: high likelihood of limited literacy, possibility of limited literacy and adequate literacy (Weiss et al, 2005).

The NVS-S has some advantages compared to other Spanish health literacy assessments. The instructions and answer key are freely provided in the NVS manual (Weiss et al, 2005). Compared to other health literacy measurement tools such as TOFHLA-S, NVS-S has short administration time (3 to 5 minutes), thereby reducing the burden on both patient and healthcare providers (Osborn et al, 2007; Weiss et al, 2005). The use of a nutritional label provides practical information to people with chronic diseases such as hypertension, diabetes, and obesity (Osborn et al, 2007).

However, the NVS had poor predictive validity to assess disease knowledge, medication adherence or health status when it was administered in Spanish. Therefore, NVS-S needs to be interpreted cautiously when assessing the marginal or adequate literacy level (Osborn, 2007). Due to its practicality, researchers recommend NVS-S for detecting low health literacy in Hispanic populations although the evidence for reliability and validity of NVS-S is less substantial than that for TOFHLA-S and SAHLA (McLeod-Sordjan, 2011).

**Brief questions to identify patients with inadequate health literacy.** Chew and colleagues developed three self-reported health literacy screening questions to identify patients with inadequate or marginal health literacy, especially in the clinical setting (2004). Those questions are 1) how often do you have someone help you read hospital materials? 2) how confident are you filling out medical forms by yourself? 3) how often do you have problems learning about your medical condition because of difficulty understanding written information? (Sarkar et al, 2010). Each question has five categories: always, often, sometimes, occasionally, and never. The tool was compared with S-TOFHLA and criterion validity was measured by the area under the receiver operating characteristic curve (ROC) in a study of a Veterans Affairs (VA) clinic patients (n=332) (Chew et al, 2004). Those questions showed adequate level of criterion validity: 0.87, 0.80, and 0.76 respectively. Due to the short administration time and practical questions, Chew's health literacy screening questions are useful to assess low-health literacy patients in clinical setting (Chew et al, 2004). Furthermore, these questions can be asked on the phone or the Web since patients not need to have a face-to-face interview with clinicians as with other health literacy measurement tools (Sarkar et al, 2010).

Sarkar and his colleagues validated self-reported health literacy questions among Spanish-speaking people using S-TOFHLA (2010). Unlike the English version, the Spanish

version was validated within the population with type 2 diabetes. They reported that the question related to confidence in filling out medical forms had adequate level of validity in Spanish based on the ROC: 0.74, however, other two had less accurate validity: 0.63 and 0.68 respectively (Greiner, Pfeiffer & Smith, 2000). Both English and Spanish versions showed that the question about the confidence in filling out medical forms showed the best performance in identifying individuals with inadequate health literacy (Sarkar et al, 2010).

### **Comprehensive Review of Correlates of Online HISBs**

**Introduction.** Health information seeking behavior is “a measure of how actively people look for health information” (Niederdeppe et al, 2007). Nowadays, patient participation in health decision making are increasing, and health information is an important resource for them to make those decisions (Viswanath & Ackerson, 2011). Therefore, patients’ HISBs have become an important strategic issue in the health field (Alpay, Verhoef, Toussaint & Zwetsloot-Schonk, 2006; Anker, Reinhart & Feeley, 2011; Flynn, Smith & Freese, 2006).

As the number of Internet users increase, online health information has become an important health resource for the general public (Cheong, 2007; Cohall et al, 2011). People can easily access a wide range of health information via the Internet whenever they want from wherever they are. Moreover, online health information seekers can provide support and social interaction through virtual communities (Cohall et al, 2011; Koch-Weser, 2010; McInnes et al, 2010; Nauert, 2002).

Currently, there are at least 270 million U.S. households with access to the Internet (Internet World Stats, 2012); about 8 out of 10 American adults have sought health information through the Internet, and the number is increasing (Fox, 2006; McInnes et al, 2010). However, there are numerous disparities in terms of demographics, socioeconomic status, and health status

with regard to online HISBs (Cohall et al, 2011; Peña-Purcell, 2008; Renahy et al, 2008).

Healthy People 2020 includes the goal “to increase the proportion of online health information seekers who report that they can easily access health information” (USDHHS, 2013).

Understanding patterns and circumstances of online HISBs is important for healthcare providers and organizations in order to increase the percentage of Internet use to seek health information (McInnes et al, 2010).

A large body of literature examines the predictors of online HISBs; however, to our knowledge, there are no published comprehensive reviews on predictors of online HISBs. Therefore, the objective of this comprehensive review is to examine and compile factors predicting online HISBs. Factors increasing user engagement in online HISBs are also examined.

**Theoretical Framework.** In this review, predictors of online HISBs were categorized based on the concepts of the Integrative Model of eHealth Use (Figure 1.1). Among the total 14 concepts in the model, the concept of situation, personality, demographics, internet use history, health literacy, computer literacy, health information orientation, and health information efficacy were included in this review since they were predictors of online HISBs. Furthermore, these predictors were categorized based on the study of Anker et al (2011): 1) characteristics of online health information seekers and 2) factors increasing the user engagement in online HISBs.

## **Methods**

***Inclusion and Exclusion criteria.*** The researcher sought randomized controlled trials, non-randomized controlled trials, and cohort studies described predictors of online HISBs. The researcher also included observational and cross-sectional surveys and used them to inform the background knowledge and discussion. Studies published in English in peer reviewed journals between January 2006 and March 2012 were included in this review.

Studies were excluded if they were grey literature such as dissertations or government reports. Also, qualitative studies, editorials, brief reports, or other reviews were excluded in this review. Studies that only provided outcomes of online HISBs or provided other online health activities such as e-mail communication with doctors were also excluded.

***Search Strategies.*** The researcher searched articles using PubMed, PsychInfo, CINAHL, and Scopus with combined search concepts using “health information” OR “health information seeking” OR “health information seeking behavior” AND “Internet” OR “online”. As documented in figure 2.1, the initial search resulted in the identification of 261 records whose titles and abstracts were screened for potential relevance. After excluding irrelevant records and full-text articles that failed to meet this review’s inclusion criteria, the remaining articles were used for evaluation.

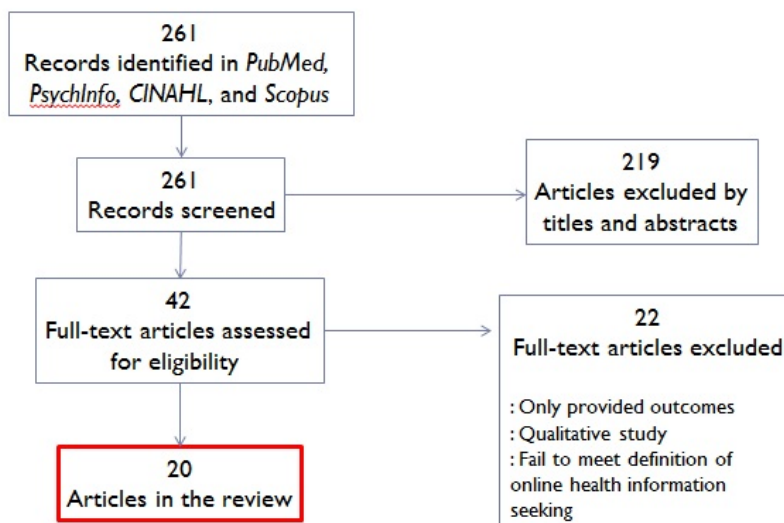
***Data extraction.*** This review adopted the extraction method from the study of van den Berg et al (2007) which has been demonstrated to be an appropriate method for systematic reviews (Estrabrooks, Field & Morse, 1994; van den Berg, Schoones & Vlieland, 2007). The extracted data from the selected studies were summarized based on the framework, but not statistically combined. The result of the selected studies were broken down, thoroughly analyzed, and then combined into a whole via a listing of concepts based on the framework, the integrative model of eHealth use (Bodie & Dutta, 2008). Extracted information on each study was recorded, including: (1) author(s) and year, (2) study design, (3) sample and sample size, (4) items included in study measures (outcome measurement), and (5) correlates.

***Assessment of methodological quality.*** For the quality assessment, the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement was used since the researcher expected that most of selected studies would be surveys, which is a type of

observational study (von Elm et al, 2008). The STROBE statement includes 22 items that are considered essential for good reporting of observational studies (von Elm et al, 2008). These items were related to the article's title and abstract (item 1), the introduction (items 2 and 3), methods (items 4–12), results (items 13–17), discussion sections (items 18–21), and other information (item 22 on funding) (von Elm et al, 2008). The STROBE checklist provides evidence about whether selected studies are well done or not (von Elm et al, 2008). All criteria can be answered either yes or no.

## **Results**

*Included studies in the review.* From all databases combined, a total of 261 abstracts were identified and screened (Figure 2.1). Among them, 42 publications were selected for retrieval of full text versions. Finally, 20 articles were included in this review. Studies are summarized in Table 2.1 and Table 2.2. All 20 studies used a cross-sectional design, employing a survey or structured interview to document experiences of online HISBs. Five of the selected studies were conducted outside of the United States, one in the United Kingdom (Powell, Inglis, Ronnie & Large, 2011), one in Netherlands (van Uden-Kraan et al, 2009), one in France (Renahy et al, 2008), one in Ireland (Gallagher & Doherty, 2009), and one in Australia (Reinfeld-Kirkman, Kaluch & Roger, 2010). All studies were published between 2006 and 2011.



**Figure 2.1 Article Search and Selection Process**

*Assessment of methodological quality.* All studies met most of the criteria in the STROBE statement (von Elm et al, 2008). The range of satisfied criteria was between 18 and 21. One study met 21 items on the checklist, 9 met 20 items, 9 others met 19 items, and one met 18 items. No studies provided information about power analysis.

*Characteristics of online health information seekers.* Twelve of these studies dealt only with characteristics of online health information seekers, and are described in Table 2.1. No studies included personality and computer literacy factors. All sample populations were adults; there was no study on adolescents. Most of the selected studies found that online HISBs were associated with main demographic factors (age, gender, education level, income, race/ethnicity) which discriminate Internet use in the public. Results showed that individuals who were white, women, younger age, higher level of education, and greater income were likely to seek health-related information through the online. However, Burndorf et al.(2006) found that age was not associated with online HISBs, and Rice (2006) described that older age between 50 and 64 years

tend to find more health information through the Internet compared to younger age group.

Although there is a gap in technology, several research studies showed that elderly patients learn to use computers and the Internet, and that they commonly use the Internet for health-related questions (Barnason, Zimmerman, Nieveen & Hertzog, 2006; Kim, Yoo & Shim, 2005).

The concept of situation in the model describes an individual's health status (Bodie & Dutta, 2008). Most studies showed that individuals with poor health status or health issues are more likely to seek health information online. However, findings of the Pena-Purecell study (2008) indicated that online health information seekers reported better self-rated health than non-seekers. Also, Cohall et al (2011) found that individuals with better self-rated health tend to seek health information more than those with worse health status. These results showed the potential utility of the Internet as a tool not only for disease management but also as for community-based health promotion activities to improve their quality of health.

Internet use history also was associated with online HISBs. Four studies (Bundorf et al, 2006; Lustria, Smith & Hinnant, 2011; Rains, 2008; Renahy et al, 2008) showed that individuals with Internet experiences tend to seek health information from the online rather than other sources. Use of the Internet is not sufficient for individuals to acquire their desired health information. Patients need to have an adequate level of health literacy to understand health information. However, only Jensen et al. (2010) focused on the association between health literacy and online HISBs. The study found that individuals with a high-literacy level seek more information through the Internet compared to those with low-literacy level. While individuals with a low literacy level may struggle to understand health information from the Internet, those with a high literacy level will search for their desired information on the right website (Jensen, King, Davis & Guntzviller, 2010).



*Factors increasing the user engagement in online health information seeking*

*behaviors.* Five of the selected studies focused on factors that increase user engagement in online HISBs. There were two types of facilitating factors: health information orientation and health information efficacy.

Health information orientation reflects people's interest in health and motivates them to seek health information from the Internet (Bodie & Dutta, 2008). Three studies (Flynn et al, 2006; Powell et al, 2011; Rice, 2006) considered motivation of using the Internet to seek health information to supplement information they have received from other health resources such as doctors. Flynn et al (2006) found that the timing of online HISBs was related to doctor visits. Older adults used health information from the Internet to supplement the information they receive at doctor visits (Flynn et al, 2006). Rice (2006) showed that a new diagnosis or prescription were the major reasons of online HISBs since it was easy to access health information that they needed. Also, the study showed that people with unanswered questions after a doctor's visit tended to search for health information through the Internet (Rice, 2006). Furthermore, Powell et al. (2011) found that the desire for understanding other health resources was associated with online HISBs.

To acquire their desired information from the Internet effectively, the Internet self-efficacy needs to be considered (Rains, 2008). Rains (2008) found that individual with high Internet self-efficacy demonstrate online HISBs. Also, Koch-Weser et al (2010) showed that individuals with high confidence in using the Internet are more likely to search health information through the Internet since they felt more comfortable doing so. Internet access does not guarantee Internet self-efficacy; online health information seekers need to have successful experiences with the Internet in the past (Rains, 2008).

**Discussion.** The review findings showed that being female, being younger, being in worse health status, and having more education were positively associated with online HISBs (Atkinson, 2009; Burndorf et al, 2006; Chou et al, 2011; Cohall et al, 2011; Flynn et al, 2006; Gallagher & Doherty, 2009; Jensen et al, 2010; Koch-Weser et al, 2010; Lustria et al, 2011; McInnes et al, 2010; Pena-Purcell, 2008; Powell et al, 2011; Renahy, 2008; Rice, 2006; van Uden-Kraan, 2009). Also, based on the characteristics of online health information seekers, high Internet self-efficacy, dissatisfaction with their physicians and health information related to their disease are all positively associated with factors increasing the user engagement with online health information. Several key findings suggest the need for further research to increase online health information seekers among marginalized populations.

First, high levels of education and income are related to having computer and the Internet access, which contributes to a digital divide among the populations, and consequently to their health outcomes. In addition to issues of computer and Internet access, some populations including Hispanics have difficulties in understanding online health-related information since most of information is provided in English. For instance, lack of a Spanish website relevant to Hispanic cultures is an issue that prevents digital equity across the general population (Cohall et al, 2011). Therefore, there is a need to study more specifically on the correlates of online HISBs among marginalized populations to identify modifiable factors and subsequently increase their proportions in online HISBs.

Second, there is a need to study on facilitators of online HISBs among marginalized population to make use of health information effectively. Online HISB is a complex process which reflects not only the characteristics of online health information seekers but also the circumstances and social context of the seekers (Anker et al, 2011). Although factors such as age,

gender or ethnicity cannot be changed, facilitating factors such as health literacy, health information orientation or health information efficacy can be managed and improved. Therefore, an understanding of these factors is needed to increase regular online HISBs among marginalized population.

**Limitations.** In this comprehensive review, only one reviewer categorized and rated the studies, so inter-rater reliability has not been evaluated. Also, all of the included studies were used self-reported survey format. To study deeper underlying reasons, other research methodologies such as qualitative studies or RCTs are needed to be included in the further study. Furthermore, rigorous quality assessment tools rather than a simple checklist should be applied. Finally, the sample population in all selected studies was adults; there was no study on online HISBs among adolescents. Adolescents use the computer and the Internet more than adults (Rideout, Foehr & Roberts, 2005). Moreover, teenagers are likely to use the Internet as a health resource rather than other traditional materials such as newspaper (Hamel, Robbins & Wilbur, 2011). Further studies about online HISBs need to include adolescents.

**Conclusion.** In sum, the Internet possesses tremendous potential to present useful health information; however, some populations lag behind others in online HISBs and also have disproportionate health disparities. This comprehensive review analyzed and summarized several correlates of online HISBs that had been identified in previous literature. The review suggests that there is a need for further study of marginalized populations to increase the number of online health information seekers and to help those populations to use health information effectively.

**Table 2.1. Characteristics of Selected Studies**

<b>Author/Year</b>	<b>Study method</b>	<b>Sample and size</b>	<b>Outcome measurement</b>	<b>Correlates of online HISBs</b>	<b>Quality of study</b>
Bundorf et al, 2006	Cross-sectional survey (12/2001~1/2002)	Random sample provided with free Internet access through the Web-TV; n=8,378	Internet use for health information	Individual with chronic conditions; uninsured; individual with longer travel times for their usual source of care; age is not related; women; higher education	20/22
Flynn et al, 2006	Longitudinal study; cross-sectional survey (2004)	Among Graduates from Wisconsin high schools in 1957; Random sample; N=4,528	1. Internet use for health information 2. The timing of health-related internet search	Women with fewer children; higher education level; higher high school cognitive scores; married; rural	20/22
Goldner, 2006	Cross-sectional survey (11/2002~12/2002)	Adult sample from Pew Internet and American life Project ( $\geq 17$ ); Random sample; n=2,038	1. Internet use for health information 2. Health Information topic	Individuals with a medical condition	19/22
Rice, 2006	Cross-sectional survey (3/2000~12/2000)	Data from the Pew Internet and American Life Project survey; n=13,978	1. Internet use for health information 2. Motivation for health information seeking among health information seekers	Women; not full time employment; older age; being engaged in more other internet activities ; having specific health issues; helping another deal with health issues	20/22
Pena-Purcell, 2008	Cross-sectional survey	Secondary data analysis from the Impact of the Internet and Advertising on Patients and Physicians; n=995	1. Perception of internet health information 2. Perception of the physician-patient relationship 3. Information-related perceptions 4. Internet use for seeking health information	Better health status; female; higher income;	19/22
Rains, 2008	Cross-sectional survey	Students enrolled in a communication course in a large Southwestern University; n=98	Internet use for health information	High Internet self-efficacy	19/22

Author/Year	Study method	Sample and size	Outcome measurement	Correlates of online HISBs	Quality of study
Renahy et al, 2008	Cross-sectional survey (2005-2006)	French-speaking adult in Paris ( $\geq 18$ ); Random sample; n=3,023	Internet use for health information	Women; health worries; individuals with difficulty understanding advice from physicians; younger age; higher income	20/22
Atkinson et al, 2009	Cross-sectional survey	Secondary data analysis of the HINTS 2005; Internet users; n=3,244	Internet use for health information	Women; higher education; fewer children	18/22
Gallagher & Doherty, 2009	Cross-sectional survey (1/2006~4/2006)	Data from the Health Research Board National Psychological Wellbeing and Distress Survey ( $\geq 18$ ); n=2,688	1. Internet use for health information 2. Willingness to use the internet as a source of health information	Individual with long-term sickness or disability; employed; higher education; women; younger age (30~39); individual who reported mental health issue	19/22
Van Uden-Kraan et al, 2009	Cross-sectional survey	Dutch patients with breast cancer, rheumatoid arthritis and fibromyalgia; n=679;	1. Internet use for health information 2. Frequency of online health information seeking	Younger age; higher education; employment; no significant relationship with health and psychological characteristics	20/22
Hou & Shim, 2010	Cross-sectional survey	Data from 2007 Health Information National Trends Survey (HINTS); n=4,551	Internet use for health-related activities	Low perceived patient centeredness during medical communication; trust in online health information; White; higher frequency of visit to health care providers; greater use of other media for health information	19/22
Jensen et al, 2010	Cross-sectional survey	Low-income adults lived in Indiana (at or below 200% of the poverty line); n=131	Utilization of the internet (Internet access for health information)	High health literacy skills; high health numeracy skills; women; younger; higher education (age-online health information seeking was mediated by participant literacy)	20/22
Koch-Weser et al, 2010	Cross-sectional survey (01/2008~05/2008)	Data from 2007 Health Information National Trends Survey (HINTS); n=2,338	Seeking health information from the internet first	Higher education; younger age; higher income ; high confidence in using the Internet	19/22

<b>Author/Year</b>	<b>Study method</b>	<b>Sample and size</b>	<b>Outcome measurement</b>	<b>Correlates of online HISBs</b>	<b>Quality of study</b>
McInnes et al, 2010	Cross-sectional survey (12/2001~1/2002)	Adults from US Veterans ( $\geq 21$ ); random sample; n=3,408	Health-related internet use	Higher education; living in urban areas; worse health status	19/22
Reinfeld-Kirkman et al, 2010	Cross-sectional survey (02/2008~07/2008)	Face-to-face interview; South Australian Health Omnibus Survey (HOS); n=3,034	Internet use for seeking health information	Worse self-reported; women; married; higher education	20/22
Tustin, 2010	Cross-sectional survey	Cancer patients and survivors from the Association of Cancer Online Resources (ACOR); n=178	<ol style="list-style-type: none"> <li>1. Rating the Internet as a more comprehensive source of information than the oncologists</li> <li>2. Internet as the first source for information on symptoms</li> <li>3. Internet for the health information</li> </ol>	Individuals who are dissatisfied with physicians (in terms of information provided by the oncologist at diagnosis, empathy, and quality of time)	19/22
Chou et al, 2011	Cross-sectional survey	Data from 2003, 2005 and 2008 Health Information National Trends Survey (HINTS); Random sample (with/without cancer diagnosis); n=2,637(3 years combined)	<ol style="list-style-type: none"> <li>1. Internet use for health information between individuals with/without cancer diagnosis</li> <li>2. Four forms of health related internet use among cancer survivors</li> </ol>	Younger; higher education; non-Hispanic White; metropolitan residence; worse self-rated health	19/22
Cohall et al, 2011	Cross-sectional survey (1/2005~4/2006)	Adults from Harlem, New York; random sample; n=646	<ol style="list-style-type: none"> <li>1. Computer use and internet access</li> <li>2. Internet use for seeking health information</li> <li>3. Type of online health information</li> </ol>	Younger; white/non-Hispanic; higher education; better self-reported health	21/22
Lustria et al, 2011	Cross-sectional survey (01/2008~05/2008)	Data from 2007 Health Information National Trends Survey (HINTS); n=3,473	<ol style="list-style-type: none"> <li>1. Internet exposure</li> <li>2. Health information seeking</li> <li>3. Online health information seeking</li> </ol>	Higher education; younger age; having home internet access	20/22

<b>Author/Year</b>	<b>Study method</b>	<b>Sample and size</b>	<b>Outcome measurement</b>	<b>Correlates of online HISBs</b>	<b>Quality of study</b>
Powell et al, 2011	Cross-sectional survey; qualitative interview	Online survey by the National Health Service (NHS) Direct website users in the UK; n=792 Subsample with semi-structured interview; n=26	1. Internet use for health information 2. Motivation of online health information search	Women; younger; higher education; searching health issues	20/22

**Table 2.2. Extracted Correlates of Online Health Information Seeking Behavior**

	Characteristics of online health information seekers				Factors increasing the user engagement in online HISBs		
	Situation	Demographic	Internet use history	Health literacy	Health information orientation	Health information efficacy	
Bundorf et al, 2006	✓	✓	✓				
Flynn et al, 2006	✓	✓			✓		
Goldner, 2006		✓					
Rice, 2006	✓	✓				✓	
Pena-Purcell, 2008	✓	✓					
Rains, 2008		✓	✓	✓			✓
Renahy et al, 2008		✓		✓			
Atkinson et al, 2009	✓	✓					
Gallagher & Doherty, 2009	✓	✓					
van Uden-Kraan et al, 2009	✓	✓					
Hou & Shim, 2010	✓	✓					
Jensen et al, 2010	✓	✓			✓		
Koch-Weser et al, 2010	✓	✓					✓
McInnes et al, 2010	✓	✓					
Reinfeld-Kirkman et al, 2010	✓	✓					
Tustin, 2010		✓					
Chou et al, 2011	✓	✓					
Cohall et al, 2011	✓	✓					
Lusitria et al, 2011	✓	✓		✓			
Powell et al, 2011		✓					✓



**Online HISBs of Hispanics.** Hispanics are the fastest growing minority group in the U.S.; however, they are the most underserved population in terms of access to online health information (Pena-Purcell, 2008). To access the Internet, a person needs to have a computer and broadband services or a mobile device with Internet access. This is closely aligned with economic opportunities which determine who benefits and who does not benefit from the Internet and a wide array of social benefits (Gilmour, 2007). The inequalities in Internet access are linked to the access to online health information which is related to the quality of life and improved health (Gilmour, 2007). However, as mentioned in earlier in this chapter, the Internet access is not the only prerequisite to acquire health information through the Internet due to the complexity of online HISBs (Zach, Dalrymple, Rogers & Williver-Farr, 2012).

Although Hispanics as a group are a predominantly economically underserved population, there are many variables that need to be considered in terms of online HISBs due to the fact that the patterns and motivations of online HISBs are complex and affected by not only socioeconomic status (Zach et al, 2012). The Hispanic community comprises heterogeneous cultures from multiple regions such as Dominican Republic, Puerto Rican, Cuban, etc (Weiss et al, 2005). Therefore, it is important to reflect their sociocultural context to understand their use of the Internet as a health information resource (Dutta-Bergman, 2005).

To provide health information via the Internet effectively, health information providers need to understand both the characteristics of the online health information seekers and patterns of their online HISBs (Zach et al, 2012).

**Conclusion.** Accessing appropriate health information helps to increase the quality of life and to reduce the burden of disease (Gilmour, 2007; Kalichman, et al., 2006). Although the Internet helps marginalized people to access health information easily (Cohall, Nye, Moon-Howard, Kukafka, Dye, Vaughan & Northridge, 2011; Lorence, Park & Fox, 2006), not all of health consumers have a chance to access appropriate health information through the Internet. To increase the number of online health information seekers and reduce the disparities in access, the characteristics of individuals who access to the Internet for health information need to be identified (Kalichman, et al., 2006). This literature review identified the potential correlates of online HISBs; however, there is a need for further studies on marginalized populations, especially Hispanics, which are the fastest growing population in the U.S.

This dissertation project using WICER household survey will provide an understanding of the online HISBs of a particular community, Washington Heights and Inwood in Northern Manhattan which is characterized by low socioeconomic status and a large Hispanic immigrant population. Based on the results of the study, healthcare providers and researchers may provide suggestion for improving online health information services among the Hispanic community.



## CHAPTER 3 METHODOLOGY

This chapter presents the study aims and their related research questions. The research procedures including sample, recruitment, study settings, study variables, data collection, data management and data analysis plan are also described. Statistical analyses for each aim and related research questions and hypothesis are presented in detail.

### Methods

The cross-sectional study was guided by two aims and related research questions.

**Aim I.** The first aim is to examine factors associated with online HISBs among Hispanics.

There are two related research questions under this aim.

**R1.** What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with online HISBs among Hispanic survey respondents?

**R2.** What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with online HISBs among household members of Hispanic survey respondents?

**Aim II.** The second aim is to examine the association between online HISBs and health behaviors (physical activity, fruit and vegetable consumption, alcohol use, and hypertension medication adherence). There are 5 hypotheses under this aim.

**H1.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with fruit consumption.

**H2.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with vegetable consumption.

**H3.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with physical activity.

**H4.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be negatively associated with alcohol consumption.

**H5.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with hypertension medication adherence.

### **Ethical Consideration**

The protocol of the WICER household survey was approved by the institutional review board (IRB) of Columbia University Medical Center (CUMC). Informed consent was obtained from all study participants in their language of choice (English or Spanish) by bilingual data collection staff.

### **Research Procedures**

**Setting.** The study setting was five zip codes (10031, 10032, 10033, 10034, and 10040) that comprise the Washington Heights Inwood community of Northern Manhattan. Data were collected in households, businesses, or at a designated community space, the Columbia-Community Partnership for Health (CCPH).

**Sample.** The sample comprises 4,070 residents who completed the WICER household survey between March, 2011 and November, 2012. Residents who were 18 years or older, English or Spanish speaking, and Hispanic were eligible for inclusion in the dissertation study. Residents who were non-Hispanic were excluded from the dissertation analyses.

**Recruitment procedures.** After approval by the IRB of CUMC, recruitment of eligible participants was initiated using multiple methods. For the Columbia-Community Partnership for Health (CCPH) sample, we recruited a convenience sample as participants who came to the center for blood pressure checks or who came to the center because they were referred from

friends. For the household survey, the survey employed three sampling methodologies: randomized household survey, cluster survey within block or building, and network survey.

Randomized household survey: Washington Heights and Inwood area consists of 8 health districts which are served primarily by CUMC. Over 70% of the community utilizes CUMC for all their health care. Approximately 68,000 dwelling units were listed in this area based on 2005 census data. The research team randomized these units and selected a weighted sample from each of the eight New York City Department of Health and Mental Hygiene (DOHMH) districts in the community. Sample size of each health district was weighted by the distribution of the population.

Cluster sampling: After the research team captured a household, neighboring households up to 5 households in the near vicinity were recruited. The research team moved to the households of neighbors to the right and left of the initial household and then across, above and below the household if applicable.

Network sampling: The survey team also recruited individuals in respondents' social networks. At the end of the survey interview, interviewers asked participants if they would call and introduce the research team to the identified members of their social network and ask them if they would be interested in participation.

### **Survey Procedures**

Before conducting the survey interview, bilingual study personnel obtained informed consent from the participant in their language of choice (English or Spanish). All survey items were self-reported. Study personnel also collected blood pressure (BP) measures, height, and weight on all participants and measured waist circumference in triplicate. The whole process took approximately 45 minutes to one hour for each participant to complete.

## **Participant Compensation**

At the end of the survey interview, respondents received their choice of three incentives worth \$25: two movie tickets, a \$25 value metro card or a \$25 food voucher to a local grocery store.

## **Measures**

The WICER survey is a combination of multiple patient assessment tools representing different relevant health measures. The survey includes demographic data, social role performance, health and illness perceptions, self-health assessment, depression, adherence, quality of life and health literacy. There are four versions of the community survey: CCPH version, Household version 1 through 3. CCPH was collected from March 2011 through December 2011, Household version 1 was collected from September 2011-March 2012, version 2 from April 2012 to August 2012, and version 3 from September 2012 to November 2012. From the perspective of the research questions for this dissertation, the majority of items were measured the same across versions. The total number of survey items was 199.

## **Study Variables**

The constructs of interest in this study were correlates of online HISBs, online HISBs, and health behaviors. For aim 1, the correlates of interest in this study were situational factors, demographic information, health literacy and computer literacy. The dependent variables in the study were online HISBs of respondents and their household members. For aim 2, the dependent variables were five health behaviors: physical activity, fruit consumption, vegetable consumption, alcohol consumption and hypertension medication adherence. Operationalization of these variables is described in Table 3.4.

Table 3.4 Conceptualization and Measurement of Study Variables

Concept	Variable	Definition	Data type	Measure
<b>Situational factors</b>	Hypertension, Health problems, General health status	The specific health situations faced by a patient and his or her subsequent consumer health information needs	Categorical Continuous	BP question SF-8
<b>Demographic information</b>	Age, Gender, Employment, Marital status, Educational level, Insurance		Categorical Continuous	
<b>Health literacy</b>	Health literacy	The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions	Continuous	Newest Vital Sign  One item assessing need for help to complete medical forms
<b>Computer literacy</b>	Experiences of social networking	Computer skills and ability to use technology to improve learning, productivity, and performance	Categorical	SNS use questionnaire
<b>Online health information seeking behaviors</b>	Online support group, Online communication with doctors, Online HISBs - Respondents - Family members	The interaction of an individual with or through an electronic device or communication technology to access or transmit health information or to receive guidance and support on a health-related issue (Cline, 2001)	Categorical	Health Information National Trends Survey (HINTS)
<b>Health behaviors</b>	Physical activity, Fruit consumption, Vegetable consumption, Alcohol use, Medication adherence		Categorical Continuous	NYCHANES Morisky 8-Item Medication Adherence Scale (MMAS-8)



**Situational factors.** Situational factors are the specific health situations faced by a patient and his or her subsequent consumer health information needs (McDonald, 2003). Variables such as hypertension, serious health problems, and self-reported health status were examined as they have been studied in the previous literature. Hypertension was measured by a dichotomous question, “Have you ever been told by a doctor, nurse, or other health professional that you had hypertension also called high blood pressure or pressure?” Serious health problems were measured by a question, “Have you experienced any serious personal health problems that have lasted for at least 6 months?” Response options for the question were yes and no. This question was extracted and modified from Chronic Burden form (Jackson Heart Study, 2009).

Self-reported general health status was recorded as five categories: excellent, very good, good, fair, and poor. General health status was considered as 5-point Likert scale; 1 was excellent and 5 was poor. This question was derived from a single-item of general health domain in the SF-8 Health Survey (SF-8), a short form of SF-36 Health Survey (SF-36) (Yen, Chen & Eastwoon, 2009). The SF-8, which was developed by Quality Metric, provides a generic measure of physical and mental health status of the general population and its advantages are short administration time (1-2 minute) and ease of translation (Yen et al, 2009).

**Sociodemographic factors.** Variables such as gender, age, employment, marital status, and educational level, and insurance were examined. Those variables have traditionally been associated with the access to the Internet (Cotton & Gupta, 2004). Gender was measured as male and female. Age was reported in years and categorized into three groups: 18-40, 41-65 and over 65 years old. Employment status was measured as currently employed or unemployed.

Marital status was assessed as married, currently living with a partner but not married, single/never married, divorced or separated, and widow. Marital status was recoded into two

variables, married and non-married. Participants who were married or lived with a partner at the time of the survey was recoded as married, and rest of answers were coded as non-married.

Education was measured by nine categories; however, it was recorded into a dummy variable comparing high school graduate and/or higher level or less than high school graduate (Cotton & Gupta, 2004). Insurance type was assessed by five categories: Medicare, Medicaid, Veteran's Affairs (VA), private insurance and no insurance. The insurance type was recoded into two categories: insured or uninsured.

In the WICER survey, nativity was assessed by birthplace question "Where were you born?" There were 8 categories of birthplaces: United States, Dominican Republic, Cuba, Mexico, Ecuador, Puerto Rico, Russia, and other countries. A person who was born in the United States was recoded as native-born, and rest of birth places was recoded as foreign-born.

**Health literacy.** The full version Newest Vital Sign Spanish version (NVS-S) was used to measure health literacy in the study population. The NVS-S includes 6 questions to test reading, interpretation, and numeracy skills based on a nutritional label from an ice cream container (Weiss et al, 2005). Patients were asked 6 questions based on the nutritional label about interpretation of the information. A point was given for each correct answer, and the total NVS score ranges from 0 to 6 and was categorized into three levels, high likelihood of marginal or inadequate literacy (0-1), possibility of marginal or inadequate literacy (2-3), and adequate literacy (4-6) (Weiss et al, 2005).

However, NVS-S was used as a continuous variable after checking the distribution of the NVS-S score because of the floor effect; most of the respondents got low scores on NVS-S (Everitt, 2006). To avoid losing valuable information, this study decided to use the score as a continuous value (Naggara et al, 2011).

In addition, another question was measured in household survey version 2 and 3, “How often do you have problems learning about your medical condition because of difficulty understanding written information?” The question was assessed by five categories: always, often, sometimes, occasionally, and never. The area under the receiver operating characteristic curve (ROC) of the question was 0.76 in a study of a Veterans Affairs (VA) clinic patients (n=332) (Chew et al, 2004). Based on the ROC of the question, this question was categorized into two categories, inadequate and adequate, since the performance of this measurement was weaker to identify patients with marginal or inadequate literacy (Chew et al, 2004). Therefore, always, often, and sometimes was recoded into inadequate literacy, and rest of answers were recoded into adequate literacy.

**Computer literacy.** There was no direct question regarding computer literacy in the WICER survey. Therefore, proxy measurement was used for computer literacy based on the literature. Several studies found that SNSs users had significantly higher computer literacy score (Appel, 2012; Smith, Bedayse, Lalwah & Paryag, 2009). Therefore, one dichotomous question related to SNS use was used as a measure of computer literacy, “Do you belong to any social networking sites like Facebook, MySpace, or Twitter?”

**Online health information seeking behaviors.** Robinson and colleagues defined interactive health communication as “the interaction of an individual-consumer, patient, caregiver or professional-with or through an electronic device or communication technology to access or transmit health information or to receive guidance and support on a health-related issue” (1998). Based on the definition, the study considered a participation of an online support group and an email communication with physicians as online HISBs in this study.

In the survey, there were four questions related to online HISBs: In the past 12 months, 1) have you participated in an online support group for people with similar health or medical issues? 2) have you used email or the internet to communicate with a doctor or doctor's office? 3) have you used the internet to look up health or medical information? 4) does anyone in your household use the internet to look up health or medical information? The study adopted these questionnaires from the instrument used in the Health Information National Trends Survey (HINTS, 2013). The HINTS was designed to assess knowledge, attitudes, and behaviors regarding health communication among the public at the national level (Rutten, Squiers & Hesse, 2006).

First three questions were related to respondents' online HISBs; however, the last question asked online HISBs of respondents' family members which is an important distinction from the current existing tools. If someone answered yes on any of the first three questions, then we considered the respondent as affirmative for seeking health information on the Internet. Respondents' online HISBs and that of family members were analyzed separately.

**Health behaviors.** There were five indicators measuring health behaviors: physical activity, fruit consumption, vegetable consumption, alcohol use, and medication adherence.

Physical activity, fruit and vegetable consumption and alcohol consumption questionnaires were adopted from New York City Health and Nutrition Examination Survey (NYCHANES). NYC HANES is modeled after a similar national survey, the National Health and Nutrition Examination Survey (NHANES, 2004). There were 6 components in the NYC HANES, and this study adopted the Computer Assisted Personal Interview (CAPI) component because the CAPI component included physical activity and fruit/vegetable consumptions (NYCHANES, 2004).

Moderate physical activity was measured with three items: first question is “Over the past 30 days, did you do moderate activities for at least 10 minutes that caused only light sweating or a slight to moderate increase in breathing or heart rate?” If a participant answered yes, then the degree of physical activity was measured by “Of the past 30 days, how often did you do these moderate activities?” There were three units of time: per day, per week and per month. For the analysis, all answers were standardized into weekly basis: daily answers were multiplied by 7, and the monthly answers were divided by 4.

Fruit consumption was assessed with three survey items: first question was “During the past 30 days, not counting juice, how many time per day, week, or month did you eat fruit?” If yes, participants put number of times in the next question and choose the unit of the time from the third question. There were three units of time; per day, per week and per month. Vegetable and dark vegetable consumption were asked using similar items. All types of fruit and vegetables were included such as fresh, frozen, or canned. The standardized unit was per week; therefore, daily and monthly answers were calculated as with physical activity.

Alcohol use was measured by the dichotomous question, “Have you ever had alcoholic beverages such as beer, wine, champagne or liquor at least once per month for 6 months or more?” If yes, the respondents were asked to describe how many times do they drink with nine categories of drinking patterns. For the variables categorization, this study adopted the categorization guideline from Friberg’s study since the study used the same questionnaire adopted from the NHANES as the WICER survey. Those nine patterns were recoded into three range of categories variables:  $<1$ ,  $1-19$ , or  $\geq 20$  per month (Freiberg, Cabral, Heeren, Vasan & Ellison, 2004). Other studies on alcohol consumption adopted different categorization methods

which were more detailed to avoid obscure U-shaped relationship, however, the original variable were different from the WICER, so it was not adopted (Pletcher et al, 2005).

Hypertension medication adherence questionnaires were adapted from the Morisky 8-Item Medication Adherence Scale (MMAS-8) (Morisky, Ang, Krousel-Wood & Ward, 2008). Medication adherence was answered only by participants who were taking high blood medication at that time. It was measured by the dichotomous question, “Over the past 2 weeks, were there any days when you did not take your high blood pressure medication?” There were 8 questions in the survey, and each ‘yes’ answer was for one point, except the question “Did you take your high blood pressure medication yesterday?” which was reverse coded. Five categories of answers were recoded as following: never or rarely and once in a while were considered as ‘no’, and sometimes and often were considered as ‘yes’. Highly adherent patients were identified with the score of 0 on the scale, medium adherence with a score of 1 to 2, and low adherence with a score of  $>2$  (Morisky et al, 2008).

### **Data Management**

All survey data were entered into Lime Survey (<https://www.limesurvey.org>), a web-based data management tool, on a secure server. The data are password protected and access is limited to the members of the research team. Paper copies of the completed survey were stored in locked cabinets in a locked office. Only approved members can access the cabinet. All duplicate respondents within and across the survey version were identified using personal information, such as birth date and address and only the first baseline survey of a respondent was used in the dissertation analyses.

The WICER survey is a complex dataset which includes complicated skip patterns, advanced data structures, and multiple responses and choices. To utilize data for the further

research, data management procedures were applied mandatory. To clean the raw data, there was need to identify not only invalid or out of range data but also logically inconsistent data and complex skip-patterns based on respondents answers. Managing logically inconsistent answers and skip-patterns was challenging because they cannot be dealt without the comprehensive understanding the entire structure and the content of the survey. These questions were cleaned manually after consulting the written version of the survey to confirm that patterns were observed correctly.

For example, question F7a asked “Over the past 30 days, on average about how long did you do these moderate activities each time?” There were two options: minutes and hours. If a respondent answered 25 hours that was dealt as an inconsistent answers because the maximum number of the hour was 24. Moreover, if the answer was 23 or 24 it did not make sense since people cannot do the physical activity for the day. Therefore, that answer was reported as an invalid value which needed to be checked again.

For CCPH and Household survey version 1 data sets, data were extracted from Lime Survey into Statistical Package for the Social Science (SPSS) Version 20.0 for subsequent data management. After identifying variables that needed to be checked, the list of respondents with unique ID numbers was given to the WICER Community Survey Project team. The team checked physical files and modified out of range data and missing data in the Limesurvey to correct differences between physical files and Limesurvey.

Data were migrated from Limesurvey to the REDCap (<http://www.project-redcap.org/>), a web-based program designed to support data for research studies. For household survey versions 2 and 3, the syntax of data quality functions in REDCap was used to identify invalid or out of range data and missing data. After identifying the variables and respondents with missing data,

the project team checked the physical files and made changes in Limesurvey. Subsequently, cleaned data were migrated into REDCap.

Once the data was cleaned in the Limesurvey, data imputation decisions were made. There was no imputation for most variables since it would be difficult to impute data for the dichotomous variables. However, missing data were imputed for items within the health literacy and hypertension medication adherence questions. Data imputation was considered acceptable since the missing rate was less than 10% (Langkamp, Lehman & Lemeshow, 2010). For the NVS, “refused” or “don’t know” were treated as “no”; therefore, 0 point was given. Missing values also were considered as the wrong answer so they were also scored as 0. For hypertension medication adherence, if only one question had a missing value among the total questionnaire, then 1 point was added to the existing total score. If more than two questions were missing, the total score was considered missing.

### **Data Quality**

There were missing responses across variables. With the exception of the use of SNSs variable, the amount of missing data for all variables was less than 5% (Fichman & Cummisngs, 2003). In the case of use of SNSs, information was missing for about 9.5 percent of respondents (n=388). For the regression, cases with missing data were eliminated using listwise deletion: if values of any of the variables in the regression were missing, the entire case was excluded from the analysis (UCLA: Statistical Consulting Group; Wayman, 2003). Therefore, the total available number of respondents for most regressions was 80.5% (n=3,278).

### **Statistical Analysis**

Data were analyzed using SPSS Version 20.0 software. Variables for the analysis are described in table 3.6. Initially univariate analysis was used to examine the frequency and



distribution of study variables calculating mean and standard deviation, range, frequency and percentage as appropriate. The level of significance for testing of each model was set to an alpha of 0.05 to control for the testing of multiple hypotheses with the same set of independent variables.

**Table 3.6 Computation of Composite Scores/Recoded Variables for Statistical Analyses**

<b>Variables</b>	<b>Computation of Composite Scores/Recoded Variables</b>
<b>General health status</b>	< Good = Fair, Poor ≥ Good = Excellent, Very good, Good
<b>Marital status</b>	Married/living with a partner = Married, Currently living with a partner but not married Not Married = Single/never married, Divorced or separated, Widowed
<b>Insurance</b>	Insured = Medicare, Medicaid, Veteran's Affairs (VA), Private insurance Uninsured = No insurance
<b>Educational level</b>	<High school graduate = Never went to school, Eighth grade or less, Some high school, not a high school graduate ≥ High school graduate = High school graduate or GED, Some college or technical, trade or vocational school, Associates degree, Bachelor's degree, Master's degree, Doctoral degree
<b>Nativity</b>	Native born = United States Foreign born = Dominican Republic, Cuba, Mexico, Ecuador, Puerto Rico, Russia, Other country
<b>1-item health literacy</b>	Inadequate literacy = always, often, sometimes Adequate literacy = never, occasionally
<b>Alcohol consumption</b>	<1 per month = Less than one per month 1–19 per month = 1-3 per month, 1 per week, 2-4 per week ≥ 20 per month = 5-6 per week, 1 per day, 2-3 per day, 4-5 per day, 6 or more per day
<b>Hypertension dedication adherence</b>	High adherence = 0 Medium adherence = 1,2 Low adherence = 3,4,5,6,7,8

**Aim I.** The primary purpose of this study was to examine factors associated with online HISBs among Hispanics, with situational factors, socio-demographic factors, and health literacy level being used as independent variables. The study included two dependent variables: 1) online HISBs of respondents and 2) online HISBs of respondents' family members. Correlates of respondents' health information seeking behavior and those of respondents' family members were analyzed separately.

First, bivariate analyses, including chi-square tests and t-tests, were used to examine differences between online health information seekers and non-seekers (respondents, family members) in terms of situational, socio-demographic, and literacy level (health, computer) variables. Chi-square was used to examine differences in categorical variables, such as gender and educational level, and t-test was used to examine differences in continuous variables, such as health literacy level variables.

Second, binary logistic regressions were conducted to examine associated factors of online 1) HISBs of respondent and 2) HISBs of household members. Variables that were significant in the chi-square or t-test were selected for regressions, and they were entered hierarchically (Figure 1.2) in that situational and demographic factors were entered first followed by literacy factors. Two additional regressions were computed for the sub-sample who completed the NVS and Chew's 1-item health literacy screening question.

**Aim II.** The second aim was to examine the association between online HISBs and health behaviors (physical activity, fruit and vegetable consumption, alcohol use, and medication adherence) among Hispanics in Washington Heights and Inwood areas. In this analysis, respondents' online HISBs was used as an independent variable while controlling for situational factors, socio-demographic factors, and health literacy factors that were found to be significant in

Aim I. Physical activity, fruit consumption, vegetable consumption, alcohol use, and hypertension medication adherence were used as dependent variables.

For physical activity and fruit and vegetable consumption, linear regression was used since those variables were continuous variables. There were several options to consider with behavior variables: quantile regression with quantiles of variables, binary logistic regression with dichotomized variables based on the CDC guideline (meet the guideline or not), and linear regression with continuous values. However, simulating all options, using continuous values showed the best fit of the model since large portion of the sample did not meet the CDC guidelines. Also, quantile regression models are used to examine the association between a set of correlates and specific percentiles (or quantiles) of the dependent variable which was not the aim at this study (Cornell Statistical Consulting Unit, 2007).

An ordinal regression was used for alcohol use and hypertension medication adherence since those two variables were coded as an ordered categorical data based upon the literature as described earlier in this chapter. Ordinal logistic regression and linear regression were used to investigate the association with five health behaviors and online HISBs. The ordinal logistic regression model is an extension of logistic regression model for ordinal dependent variables.

Variables were entered into both regression models hierarchically. Variables that were found to be significant in Aim I were entered into the model first, followed by online HISB variable. Although gender and age were not significantly associated with respondents' online HISBs, they were entered into the model in the first step since they can affect respondents' health outcomes (Dorbansky & Hargittai, 2012)



**Table 3.7 Overview of Objectives, Research Questions, and Methods**

Objective	Research questions	Method
<b>To examine factors associated with online HISBs among Hispanics in Washington Heights and Inwood areas through the WICER community survey</b>	<p>What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with online HISBs among</p> <p>R1. Hispanic survey respondents R2. Household members of Hispanic survey respondents</p>	<p>Online HISBs is dependent variable. Correlates include situational, sociodemographic factors, health literacy and computer literacy.</p> <p>- Chi square or t-test - Binary logistic regression with</p> <p>R1. The difference in respondents' online HISBs and R2. The difference in household member's online HISBs</p>
<b>To examine the association between online HISBs and health behaviors (physical activity, fruit and vegetable consumption, alcohol use, and hypertension medication adherence) among Hispanics in Washington Heights and Inwood areas</b>	<p>Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be</p> <p>H1: Positively associated with fruit consumption H2: Positively associated with vegetable consumption H3: Positively associated with physical activity H4: Negatively associated with alcohol consumption H5: Positively associated with hypertension medication adherence.</p>	<p>Fruit and vegetables consumption, physical activity, alcohol consumption, and hypertension medication adherence are dependent variables. Respondents' online HISBs is an independent variable controlling for factors found to be significant in Aim I</p> <p>- Linear regression with fruit consumption, vegetable consumptions, and physical activity - Ordinal logistic regression with alcohol consumption and hypertension medication adherence</p>

## CHAPTER 4 RESULTS

This chapter provides descriptive characteristics of the study population organized by conceptual model, the Integrative Model of eHealth Use. The results of the bivariate and multivariate analysis are used to answer the research questions and hypothesis:

**Aim I.** The first aim is to examine factors associated with online HISBs among Hispanics.

There are two related research questions under this aim.

**R1.** What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with online HISBs among Hispanic survey respondents?

**R2.** What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with online HISBs among household members of Hispanic survey respondents?

**Aim II.** The second aim is to examine the association between online HISBs and health behaviors (physical activity, fruit and vegetable consumption, alcohol use, and hypertension medication adherence). There are 5 hypotheses under this aim.

**H1.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with fruit consumption.

**H2.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with vegetable consumption.

**H3.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with physical activity.

**H4.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be negatively associated with alcohol consumption.

**H5.** Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be positively associated with hypertension medication adherence.

### **Descriptive Sample Characteristics**

**Demographic factors.** The demographics of the sample are described in Table 4.1. The average respondent's age was 51.2 years old (SD =16.8, Range: 18-104). The sample consisted disproportionately of women (71.3%) and the foreign-born (88.8%). More than half of the respondents were unemployed (65.2%), not married (63.1%), and had a less than high school education (51.7%). Seventy-seven percent of the participants were Medicare or Medicaid beneficiaries: 15.3% had private or other insurance, and only 8.8% had no insurance.

**Situational factors.** Most of the respondents reported that their general health status as good or better (75.1%), and lived without serious health problems (90.8%). More than half of respondents (59.6%) answered that they had not been diagnosed with hypertension by physicians or nurses.

**Health literacy, Computer literacy.** The mean health literacy as measured by NVS was 2.2 which was defined as possibility of marginal or inadequate literacy (SD=1.96). However, only WICER Household survey version 2 and 3 include Chew's health literacy screening question – the size of the subsample was 2,680. The question was categorized into two levels: inadequate and adequate literacy. More than half of subsample (56.2%) had inadequate literacy.

For computer literacy, only 21.3% of respondents answered that they had used social networking sites (SNSs).

**Online Health Information Seeking Behaviors.** Only 7.8% of respondents answered that they had gone online in search of health-related information. In addition, 11.4% of



respondents answered that their family members had visited a website for health-related information.

**Health behaviors.** The mean of moderate physical activity was about 1.3 times per week (SD=9.36). Respondents, on average, reported consuming fruit 0.8 times per day (SD=1.45) and vegetables 0.7 times per day (SD=1.54). More than half of respondents (69.2%) reported consuming less than one alcoholic drink per month, and a very small percentage (2.5%) answered that they drank alcohol more than 20 times per month. Only individuals taking hypertension medication answered to the Morisky hypertension medication adherence questionnaire, (n=1,387). Among the subsample, 35.0% had high adherence, 26% had medium adherence, and 38.9% had low adherence.

**Table 4.1 Descriptive Characteristics of the WICER Survey Sample**

Variables	Respondent (%) (n=4,070: CCPH=673 HH1=717 HH2=2,103 HH3=577)
<b>Gender</b>	
Men	1,133 (27.8)
Women	2,903 (71.3)
<b>Employment status</b>	
Employed	1,411 (34.7)
Unemployed	2,653 (65.2)
<b>Marital status</b>	
Married/living as	1,457 (35.8)
Otherwise	2,568 (63.1)
<b>Education</b>	
<High school graduate	2,106 (51.7)
≥ High school graduate	1,906 (46.8)
<b>General health status</b>	
< Good	921 (22.6)
≥ Good	3,055 (75.1)
<b>Nativity</b>	
Born in the U.S.	445 (10.9)
Born in the other countries	3,614 (88.8)
<b>Hypertension</b>	
Yes	1,608 (39.5)
No	2,426 (59.6)
<b>Serious personal health problems</b>	
Yes	342 (8.4)
No	3,696 (90.8)
<b>Insurance</b>	
Medicare/Medicaid	3,134 (77.0)
Others (VA, Private, etc.)	624 (15.3)
None	358 (8.8)
<b>Understanding written information</b>	
(only HH2 & HH3 include this question)	
Total: 2,763	
Inadequate literacy	1,553 (56.2)
Adequate literacy	1,009 (36.5)

Variables	Respondent (%) (n=4,070: CCPH=673 HH1=717 HH2=2,103 HH3=577)
Online HISBs	
Online HISBs	317 (7.8)
Family members' online HISBs	466 (11.4)
Social networking sites	
Yes	867 (21.3)
No	2,815 (69.2)
Alcohol consumption	
< 1 per month	2,818 (69.2)
1-19 per month	1,025 (25.2)
≥ 20 per month	102 (2.5)
Medication Adherence	Total: 1,387
Highly adherence	486 (35.0)
Medium adherence	361 (26.0)
Low adherence	540 (38.9)
Variables	Mean (SD)
Age	51.2 (16.8)
Health literacy	2.1 (2.0)
Physical activity	1.3 times/week (9.9)
Fruit consumption	0.8 times/day (1.4)
Vegetable consumption	0.7 times/day (1.5)

### **Aim I: Associated Factors of Online Health Information Seeking Behaviors**

The first aim is to examine factors associated with online HISBs among Hispanics. There are two related research questions under this aim. 1) What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with the likelihood of online HISBs among Hispanic survey respondents? 2) What situational, sociodemographic, and literacy factors (health literacy, computer literacy) are associated with the likelihood of online HISBs among household members of Hispanic survey respondents?

**Bivariate analysis.** For respondents' online HISBs, there were statistically significant differences in gender, age, education, employment status, hypertension, insurance, nativity, general health status, and use of SNS ( $p < 0.05$ ) (Table 4.2). For their household members' online HISBs, there were statistically significant differences in respondents' gender, age, education, employment status, hypertension, marital status, general health status, nativity, serious health problems, and the use of SNS ( $p < 0.05$ ).

**Multivariate analysis.** Regression results are shown in Table 4.3 with the odds ratios (95% confidence interval) for each of the independent factors. The model for respondents did not demonstrate a good fit with the data (Hosmer and Lemeshow  $\chi^2 = 17.78$ ,  $p < 0.05$ ). When controlling for other independent factors, the use of SNS was associated with respondents' online HISBs. Compared to those not using any kind of SNS, SNS users increased the odds of online HISBs (OR=3.78, 95% CI [2.78-5.13],  $p < 0.001$ ). Several demographic factors were also independently associated with online HISBs, including education (OR=3.034, 95% CI [2.15-4.29],  $p < 0.001$ ), general health status (OR=0.42, 95% CI [0.31-0.57],  $p < 0.001$ ) and hypertension (OR=0.60, 95% CI [0.43-0.84],  $p < 0.01$ ).

The model for household members' online HISBs demonstrated good fit data (Table 4.4, Hosmer and Lemeshow  $\chi^2=6.31$ ,  $p>0.05$ ). For household members' online HISBs, respondents' use of SNS was the only statistically significant factor (OR=2.24, 95% CI [1.74-2.89],  $p<0.001$ ), controlling for other factors. Several demographic factors were also independently associated with family members' online HISBs, including respondents' gender (OR=1.60, 95% CI [1.22-2.10],  $p<0.01$ ), age (OR=0.75, 95% CI [0.62-0.90],  $p<0.01$ ), marital status (OR=1.36, 95% CI [1.09-1.71],  $p<0.01$ ), general health status (OR=0.59, 95% CI [0.46-0.77],  $p<0.001$ ), serious health problems (OR=1.83, 95% CI [1.29-2.60],  $p<0.01$ ), and education level (OR=1.80, 95% CI [1.404-2.316],  $p<0.001$ ).

**Table 4.2 Bivariate Analysis for Online HISBs**

Variables	Use of Internet to seek health or medical information (respondent) %			Use of Internet to seek health or medical information (household member) %		
	Yes	No	<i>P</i>	Yes	No	<i>p</i>
<b>Gender</b>						
Men	6.2	93.8	0.015	8.3	91.7	0.000
Women	8.5	91.5		12.9	87.1	
<b>Age</b>						
18-40	12.2	87.8	0.000	16.1	83.9	0.000
41-65	6.1	93.9		11.1	88.9	
66+	6.2	93.8		6.5	93.5	
<b>Education</b>						
<High School	2.9	97.1	0.000	7.3	92.7	0.000
≥ High school graduate	13.3	86.7		16.3	83.7	
<b>Employment status</b>						
Yes	10.8	89.2	0.000	14.3	85.7	0.000
No	6.2	93.8		10.2	89.8	
<b>Hypertension</b>						
With	4.5	95.5	0.000	9.3	90.7	0.000
Without	10.1	89.9		13.3	86.9	
<b>Marriage (%)</b>						
Married	8.2	91.8	0.498	12.9	87.1	0.046
Otherwise	7.6	92.4		10.8	89.2	
<b>Insurance</b>						
Yes	7.1	92.9	0.007	11.3	88.7	0.156
No	11.0	89.0		13.8	86.2	
<b>General health status</b>						
< Good	10.5	89.5	0.000	15.1	84.9	0.000
≥ Good	6.9	93.1		10.5	89.5	
<b>Nativity</b>						
US born	17.1	82.9	0.000	16.2	83.8	0.002
Foreign born	6.7	93.3		11.1	88.9	

Variables	Use of Internet to seek health or medical information (respondent) %			Use of Internet to seek health or medical information (household member) %		
	Yes	No	<i>P</i>	Yes	No	<i>p</i>
Serious health problems						
With	8.3	91.7	0.768	19.9	80.1	0.000
Without	7.8	92.2		10.8	89.2	
Health literacy level	2.22	2.12	0.067	2.03	2.15	0.207
Use of SNS						
Yes	19.9	80.1	0.000	21.4	78.6	0.000
No	4.5	95.5		8.3	91.7	

**Table 4.3 Binary Logistic Regression: Correlates of Respondents' Online HISBs**

Correlates of variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Gender (0=M, 1=F)	1.30 (0.95-1.78)	1.33 (0.96-1.83)
Age (18-40, 41-65, 66+)	0.96 (0.78-1.19)	1.14 (0.92-1.41)
General health status (0: <Good, 1: ≥Good)	0.43 (0.32-0.59)***	0.42 (0.31-0.57)***
HTN (0=no, 1=yes)	0.54 (0.39-0.75)***	0.60 (0.43-0.84)**
Insurance (0=no, 1=insured)	0.88 (0.59-1.31)	0.81 (0.54-1.22)
Employment status (0=no, 1=yes)	1.31 (0.99-1.72)	1.14 (0.87-1.49)
Education level (0=<High school, 1≥high school)	3.96 (2.83-5.55)***	3.03 (2.15-4.29)***
Nativity (0=foreign born, 1=US born)	1.78 (1.23-2.49)**	1.25 (0.88-1.77)
Health literacy level (NVS)		0.99 (0.93-1.07)
Use of SNS (0=no, 1=yes)		3.78 (2.78-5.13)***
Hosmer and Lemeshow $\chi^2$	17.06*	17.78*

\*p< 0.05   \*\*p<0.01   \*\*\*p<0.001

**Table 4.4 Binary Logistic Regression: Correlates of Household Members' Online HISBs**

Correlates of variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Gender (0=M, 1=F)	1.58 (1.21-2.01)**	1.60 (1.22-2.10)**
Age (18-40, 41-65, 66+)	0.67 (0.56-0.80)***	0.75 (0.62-0.90)**
General health status (0: <Good, 1: ≥Good)	0.60 (0.46-0.77)***	0.59 (0.46-0.77)***
HTN (0=no, 1=yes)	0.87 (0.67-1.12)	0.93 (0.72-1.21)
Marital status (0=no, 1=yes)	1.30 (1.04-1.62)*	1.36 (1.09-1.71)**
Employment status (0=no, 1=yes)	1.23 (0.99-1.57)	1.18 (0.94-1.49)
Education level (0=<High school, 1≥high school)	2.13 (1.67-2.70)***	1.80 (1.40-2.32)***
Serious health problem (0=no, 1=yes)	1.84 (1.30-2.61)**	1.83 (1.29-2.60)**
Health literacy level (NVS)		0.97 (0.91-1.03)
Use of SNS (0=no, 1=yes)		2.24 (1.74-2.90)***
Hosmer and Lemeshow $\chi^2$	9.62	6.31

\*p< 0.05   \*\*p<0.01   \*\*\*p<0.001



### **Subsample analysis**

The subsample (n=2,680; Table 4.5) that completed both health literacy measures was analyzed to examine differences in contributions to variance in online HISBs between NVS score and Chew's 1 item health literacy screening measures.

**Subsample bivariate analysis.** The bivariate analysis with the subsample was slightly different from the entire sample. For respondents' online HISBs, there were statistically significant differences in age, insurance, education level, employment, nativity, general health status, hypertension, health literacy and use of SNS ( $p < 0.05$ ). Although health literacy level measured by NVS was not a statistically significant variable in the entire sample, health literacy level measured by Chew's health literacy screening questionnaire was statistically significant in the subsample.

For household members, respondents' gender, age, education level, employment status, nativity, marital status, hypertension, general health status, serious health problems, health literacy and use of SNS were statistically significant correlates (Table 4.6;  $p < 0.05$ ).

**Table 4.5. Subsample Bivariate Analysis for Online HISBs (Household version 2&3)**

Variables	Use of Internet to seek health or medical information (respondent) %			Use of Internet to seek health or medical information (household member) %		
	Yes	No	<i>P</i>	Yes	No	<i>p</i>
<b>Gender</b>						
Men	6.7	93.3	0.373	8.5	91.5	0.008
Women	7.7	92.3		12.1	87.9	
<b>Age</b>						
18-40	9.6	90.4	0.001	16.5	83.5	0.000
41-65	5.5	94.5		9.6	90.4	
66+	9.0	91.0		6.2	93.8	
<b>Education</b>						
<High School	2.9	97.1	0.000	6.3	93.7	0.000
≥ High school graduate	12.0	88.0		16.0	84.0	
<b>Employment status</b>						
Yes	10.6	89.4	0.000	14.6	85.4	0.000
No	5.6	94.4		9.0	91.0	
<b>Hypertension</b>						
With	4.4	95.6	0.000	8.1	91.9	0.000
Without	9.3	90.7		12.8	87.2	
<b>Marriage (%)</b>						
Married/living as family	7.7	92.3	0.584	12.7	87.3	0.05
Otherwise	7.2	92.8		10.2	89.8	
<b>Insurance</b>						
Yes	6.9	93.1	0.005	10.6	89.4	0.069
No	11.1	88.9		13.9	86.1	
<b>General health status</b>						
< Good	12.6	87.4	0.000	10.2	89.8	0.006
≥ Good	5.8	94.2		14.2	85.8	
<b>Nativity</b>						
US born	16.1	83.9	0.000	17.3	82.7	0.000
Foreign born	6.2	93.8		10.2	89.8	

Variables	Use of Internet to seek health or medical information (respondent) %			Use of Internet to seek health or medical information (household member) %		
	Yes	No	<i>P</i>	Yes	No	<i>P</i>
Serious health problems						
With	7.0	83.0	0.822	17.4	82.6	0.005
Without	7.4	92.6		10.6	89.4	
Health literacy level (NVS)	2.07	2.05	0.266	2.15	2.04	0.726
Health literacy level (Chew's)						
Adequate literacy	11.2	88.8	0.000	12.5	87.5	0.029
Inadequate literacy	5.4	94.6		9.8	90.2	
Use of SNS						
Yes	18.7	81.3	0.000	22.1	77.9	0.000
No	4.2	95.8		7.2	92.8	

**Multivariate analysis.** Regression results are shown in Tables 4.6-4.9 including odds ratios (95% confidence interval) for each of the independent factors. The model with Chew's health literacy screening (Table 4.6) was demonstrated good fit (Hosmer and Lemeshow  $\chi^2=7.26$ ,  $p>0.05$ ) whereas the model with NVS (Table 4.7) did not (Hosmer and Lemeshow  $\chi^2=18.04$ ,  $p<0.05$ ). For the household members' online HISBs, both regression model demonstrated good fit (Table 4.8: Hosmer and Lemeshow  $\chi^2=7.71$ ,  $p<0.05$ ; Table 4.9: Hosmer and Lemeshow  $\chi^2=6.53$ ,  $p<0.05$ ).

In the model with Chew's health literacy screening question, respondents with adequate health literacy had increased odds of online HISBs compared to respondents with inadequate health literacy (OR=2.13, 95% CI [1.52, 2.99],  $p<0.001$ ). SNS use as increased the odds of online HISBs (OR=4.21, 95% CI [2.86, 6.19],  $p<0.001$ ). However, in the model with NVS, health literacy was not significantly associated with the respondents' online HISBs ( $p=0.82$ ). Only the use of SNSs was significantly associated with online HISBs (OR=4.22, 95% CI [2.99, 6.18],  $p<0.001$ ). In both models, age, nativity, education level, hypertension, and general health status were independently associated with online HISBs.

Furthermore, both the use of SNS (OR=2.46, 95% CI [1.77-3.42],  $p<0.001$ ) and health literacy (OR=1.55, 95% CI [1.16-2.07],  $p<0.01$ ) were statistically significant associated with the family members' online HISBs in the model with Chew's health literacy question (Table 4.8). The use of SNS (OR=2.42, 95% CI [1.76-3.33],  $p<0.001$ ) was the only significant correlate in the model with NVS (Table 4.9;  $p=0.35$ ). In both models, respondents' education level, marital status, and general health status were also independently associated with their family members' online HISBs. However, age was a significant correlation of household members' online HISBs only in the model with NVS ( $p<0.05$ ).

**Table 4.6 Binary Logistic Regression with Chew's health literacy screening question: Correlates of Respondents' Online HISBs (HH2&3)**

Correlates of variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Age (18-40, 41-65, 66+)	1.44 (1.12-1.85)**	1.68 (1.29-2.20)***
General health status (0: <Good, 1: ≥Good)	0.35 (0.25-0.50)**	0.39 (0.27-0.57)***
HTN (0=no, 1=yes)	0.53 (0.35-0.80)**	0.64 (0.42-1.00)*
Insurance (0=no, 1=insured)	0.80 (0.53-1.22)	0.75 (0.48-1.16)
Employment status (0=no, 1=yes)	1.65 (1.18-2.30)**	1.40 (0.99-1.98)
Education level (0=<High school, 1≥high school)	4.10 (2.69-6.24)***	3.07 (1.99-4.75)***
Nativity (0=foreign born, 1=US born)	2.30 (1.53-3.46)***	1.68 (1.10-2.56)*
Health literacy level (Chew's)		2.13 (1.52-2.99)***
Use of SNS (0=no, 1=yes)		4.21 (2.86-6.19)***
Hosmer and Lemeshow $\chi^2$	14.50	7.26

\*p< 0.05 \*\*p<0.01 \*\*\*p<0.001

**Table 4.7 Binary Logistic Regression with Newest Vital Sign (NVS): Correlates of Respondents' Online HISBs (HH2&3)**

Correlates of variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Age (18-40, 41-65, 66+)	1.45 (1.13-1.86)**	2.23 (1.51-3.40)***
General health status (0: <Good, 1: ≥Good)	0.34 (0.24-0.48)***	0.34 (0.24-0.49)***
HTN (0=no, 1=yes)	0.53 (0.35-0.81)**	0.64 (0.42-0.99)*
Insurance (0=no, 1=insured)	0.80 (0.52-1.21)	0.71 (0.47-1.10)
Employment status (0=no, 1=yes)	1.60 (1.15-2.23)**	1.39 (0.99-1.95)
Education level (0=<High school, 1≥high school)	4.07 (2.68-6.17)***	3.11 (2.02-4.77)***
Nativity (0=foreign born, 1=US born)	2.23 (1.51-3.40)***	1.71 (1.13-2.59)*
Health literacy level (NVS)		1.01 (0.93-1.10)
Use of SNS (0=no, 1=yes)		4.22 (2.89-6.18)***
Hosmer and Lemeshow $\chi^2$	14.30	18.04*

\*p< 0.05 \*\*p<0.01 \*\*\*p<0.001

**Table 4.8 Binary Logistic Regression with Chew's health literacy screening question: Correlates of Household Members' Online HISBs (HH2&3)**

Correlates of variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Age (18-40, 41-65, 66+)	0.72 (0.57-0.91)**	0.80 (0.63-1.01)
General health status (0: <Good, 1: ≥Good)	0.58 (0.42-0.82)**	0.62 (0.44-0.86)**
HTN (0=no, 1=yes)	0.87 (0.62-1.22)	0.98 (0.69-1.39)
Marital status (0=no, 1=yes)	1.36 (1.01-1.82)*	1.40 (1.04-1.89)*
Employment status (0=no, 1=yes)	1.38 (1.03-1.84)*	1.26 (0.94-1.70)
Education level (0=<High school, 1≥high school)	2.19 (1.59-3.02)***	1.85 (1.33-2.59)***
Nativity (0=foreign born, 1=US born)	1.25 (0.84-1.86)	1.02 (0.68-1.53)
Serious health problem (0=no, 1=yes)	1.32 (0.80-2.20)	1.36 (0.81-2.28)
Health literacy level (Chew's)		1.55 (1.16-2.07)***
Use of SNS (0=no, 1=yes)		2.46 (1.77-3.42)***
Hosmer and Lemeshow $\chi^2$	7.85	7.71

\*p< 0.05 \*\*p<0.01 \*\*\*p<0.001

**Table 4.9 Binary Logistic Regression with Newest Vital Sign (NVS): Correlates of Household Members' Online HISBs (HH2&3)**

Correlates of variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Age (18-40, 41-65, 66+)	0.69 (0.55-0.86)**	0.78 (0.62-0.98)*
General health status (0: <Good, 1: ≥Good)	0.58 (0.42-0.80)**	0.57 (0.41-0.78)**
HTN (0=no, 1=yes)	0.86 (0.61-1.20)	0.95 (0.68-1.34)
Marital status (0=no, 1=yes)	1.40 (1.05-1.86)*	1.45 (1.09-1.83)*
Employment status (0=no, 1=yes)	1.37 (1.03-1.82)*	1.26 (0.94-1.68)
Education level (0=<High school, 1≥high school)	2.24 (1.63-3.07)***	1.92 (1.39-2.65)***
Nativity (0=foreign born, 1=US born)	1.30 (0.88-1.90)	1.08 (0.73-1.60)
Serious health problem (0=no, 1=yes)	1.14 (0.85-2.27)	1.41 (0.86-2.31)
Health literacy level (NVS)		1.03 (0.96-1.11)
Use of SNS (0=no, 1=yes)		2.42 (1.77-3.33)***
Hosmer and Lemeshow $\chi^2$	5.51	6.53

\*p< 0.05 \*\*p<0.01 \*\*\*p<0.001

**Aim 2: Association between Online HISBs and Health Behaviors**

The third aim is to examine the association between online HISBs and health behaviors (physical activity, fruit and vegetable consumption, alcohol use, and hypertension medication adherence). There are 5 hypotheses under this aim. Controlling for situational, sociodemographic and health literacy factors found to be significant in Aim 1, online HISBs will be 1) positively associated with fruit consumption, 2) positively associated with vegetable consumption, 3) positively associated with physical activity, 4) negatively associated with alcohol consumption, and 5) positively associated with hypertension medication adherence.

**Hypothesis 3-1. Association between Online HISBs and Fruit Consumption.** Table 4.10 shows the linear regression findings for the association between online HISBs and respondents' fruit consumption. The final model explained significantly 0.6% of the variance in the fruit consumption ( $R^2 = 0.006$ ,  $p < 0.01$ ). Controlling other variables, the final regression model showed that online HISBs were positively associated with fruit consumption ( $p < 0.01$ ,  $b = 0.27$ , 95% CI [0.09, 0.46]). Thus, the hypothesis was supported.

**Hypothesis 3-2. Association between Online HISBs and Vegetable Consumption.** Table 4.11 shows the linear regression findings for the association between online HISBs and respondents' vegetable consumption. The final regression was not statistically significant in explaining the association ( $p = 0.197$ ); however, the final model showed that respondents' online HISB was positively associated with their vegetable consumption ( $p < 0.05$ ,  $b = 0.22$ , 95% CI [0.02, 0.42]). The hypothesis was supported.

**Table 4.10 Linear Regression: Association between Online HISBs and Fruit Consumption**

Variables	Model 1 $\beta$ (95% CI)	Model 2 $\beta$ (95% CI)	Model 3 $\beta$ (95% CI)
Gender (0=M, 1=F)	0.08 (-0.03,0.19)	0.08 (-0.03, 0.19)	0.07 (-0.04, 0.18)
Age	-0.05 (-0.13, 0.03)	-0.03 (-0.11, 0.05)	-0.03 (-0.11, 0.05)
General health status	-0.14 (-0.26,-0.02)*	-0.15 (-0.26, -0.03)*	-0.13 (-0.25, -0.01)
HTN (0=no, 1=yes)	0.03 (-0.08,0.14)	0.05 (-0.06, 0.16)	0.06 (-0.06,0.17)
Education level	0.03 (-0.07,0.13)	-0.01 (-0.12, 0.10)	-0.03 (-0.17, 0.08)
Use of SNS (0=no, 1=yes)		0.19 (0.06, 0.31)**	0.15 (0.02, 0.28)*
Online HISBs (0=no, 1=yes)			0.27 (0.09, 0.47)**
Adjusted R <sup>2</sup>	0.001	0.003**	0.006**

\*p< 0.05    \*\*p<0.01    \*\*\*p<0.001

**Table 4.11 Linear Regression: Association between Online HISBs and Vegetable Consumption**

Variables	Model 1 $\beta$ (95% CI)	Model 2 $\beta$ (95% CI)	Model 3 $\beta$ (95% CI)
Gender (0=M, 1=F)	0.06 (-0.05, 0.18)	0.06 (-0.05, 0.18)	0.06 (-0.06, 0.18)
Age	-0.03 (-0.11, 0.06)	-0.01 (-0.10, 0.07)	-0.01 (-0.10, 0.07)
General health status	-0.02 (-0.15, 0.10)	-0.03 (-0.15, 0.10)	-0.01 (-0.14, 0.11)
HTN (0=no, 1=yes)	0.01 (-0.10, 0.13)	0.02 (-0.10, 0.14)	0.03 (-0.09, 0.15)
Education level	0.04 (-0.07, 0.15)	0.01 (-0.10, 0.13)	-0.004 (-0.12, 0.11)
Use of SNS (0=no, 1=yes)		0.12 (-0.02, 0.25)	0.09 (-0.05, 0.23)
Online HISBs (0=no, 1=yes)			0.22 (0.02, 0.42)*
Adjusted R <sup>2</sup>	-0.001	0.000	0.001

\*p< 0.05    \*\*p<0.01    \*\*\*p<0.001



**Hypothesis 3-3. Association between Online HISBs and Physical Activity.** The linear regression findings for the association between online HISBs and respondents' physical activity are presented in Table 4.12. The final model significantly explained 1.5% of the variance in the physical activity ( $p < 0.001$ ,  $R^2 = 0.015$ ). Controlling other variables, the final regression model showed that online HISBs were positively associated with physical activity ( $p < 0.01$ ,  $b = 2.28$ , 95% CI [1.09, 3.47]) supporting the hypothesis.

**Hypothesis 3-4. Association between Online HISBs and Alcohol Consumption.** The final model (Table 4.13) significantly explained 2.9% of the variance in alcohol consumption ( $p < 0.001$ ,  $R^2 = 0.029$ ). Respondents' online HISBs were not significantly associated with alcohol consumption after controlling other variables ( $p > 0.05$ ); the hypothesis 4 was not supported.

**Table 4.12 Linear Regression: Association between Online HISBs and Physical Activity**

Variables	Model 1 $\beta$ (95% CI)	Model 2 $\beta$ (95% CI)	Model 3 $\beta$ (95% CI)
Gender (0=M, 1=F)	-0.53 (-1.22, 0.17)	-0.52 (-1.22, 0.17)	-0.57 (-1.26, 0.12)
Age	-0.56 (-1.05, -0.06)*	-0.46 (-1.00, 0.04)	-0.48 (-0.98, 0.02)
General health status	-1.54 (-2.29, -0.80)***	-1.57 (-2.31, -0.82)***	-1.44 (-2.19, -0.69)***
HTN (0=no, 1=yes)	0.41 (-0.29, 1.11)	0.46 (-0.24, 1.16)	0.54 (-0.16, 1.24)
Education level	1.37 (0.73, 2.02)***	1.21 (0.54, 1.88)***	1.04 (0.37, 1.72)**
Use of SNS (0=no, 1=yes)		0.73 (-0.08, 1.53)	0.44 (-0.37, 1.26)
Online HISBs (0=no, 1=yes)			2.28 (1.09, 3.47)***
Adjusted R <sup>2</sup>	0.01***	0.01***	0.02***

\*p< 0.05    \*\*p<0.01    \*\*\*p<0.001

**Table 4.13 Ordinal Logistic Regression: Association between Online HISBs and Alcohol Consumption**

Variables	Model 1 estimate (95% CI)	Model 2 estimate (95% CI)	Model 3 estimate (95% CI)
Gender (0=M, 1=F)	0.37 (0.21, 0.52)***	0.39 (0.23, 0.55)***	0.38 (0.22, 0.54)***
Age	-0.07 (-0.18, 0.04)	0.02 (-0.11, 0.13)	0.01 (-0.11, 0.13)
General health status	0.26 (0.09, 0.44)**	0.20 (0.01, 0.38)*	0.20 (0.02, 0.39)*
HTN (0=no, 1=yes)	0.04 (-0.12, 0.20)	0.05 (-0.12, 0.22)	0.05 (-0.12, 0.22)
Education level	-0.25 (-0.40, -0.11)**	-0.14 (-0.30, 0.02)	-0.13 (-0.29, 0.03)
Use of SNS (0=no, 1=yes)		-0.49 (-0.67, -0.31)***	-0.48 (-0.66, -0.29)***
Online HISBs (0=no, 1=yes)			-0.07 (-0.34, 0.21)
Adjusted R <sup>2</sup>	0.02***	0.03***	0.03***

\*p< 0.05    \*\*p<0.01    \*\*\*p<0.001

### Hypothesis 3-5. Association between Online HISBs and Hypertension Medication

#### Adherence.

Among the entire sample, 1,387 respondents were taking hypertension medication at the time of the survey, therefore, the ordinary logistic regression used this subsample. The regression showed association between online HISBs and hypertension medication adherence of the subsample (Table 4.14). The final model significantly explained 2.0% of the variance in the hypertension medication adherence ( $p < 0.001$ ,  $R^2 = 0.02$ ). However, respondents' online HISBs was not significantly associated with hypertension medication adherence after controlling other variables ( $p > 0.05$ ). Thus, hypothesis 5 was not supported.

**Table 4.14 Ordinal Logistic Regression: Association between Online HISBs and Hypertension Medication Adherence**

Variables	Model 1 estimate (95% CI)	Model 2 estimate (95% CI)	Model 3 estimate (95% CI)
Gender (0=M, 1=F)	-0.04 (-0.27, 0.19)	-0.04 (-0.28, 0.21)	-0.04 (-0.29, 0.20)
Age	-0.28 (-0.46, -0.11)**	-0.26 (-0.45, -0.07)**	-0.26 (-0.45, -0.07)**
General health status	0.16 (-0.06, 0.37)	0.03 (-0.20, 0.26)	0.03 (-0.21, 0.26)
Education level	0.11 (-0.10, 0.33)	0.26 (0.02, 0.49)*	0.25 (0.02, 0.49)*
Health literacy level		0.06 (0.00, 0.11)*	0.06 (0.00, 0.11) (p-level=0.051)
Use of SNS (0=no, 1=yes)		-0.50 (-0.86, -0.14) **	-0.51 (-0.87, -0.14) **
Online HISBs (0=no, 1=yes)			0.05 (-0.50, 0.60)
Adjusted R <sup>2</sup>	0.01*	0.02**	0.02**

\*p < 0.05    \*\*p < 0.01    \*\*\*p < 0.001

## CHAPTER 5 DISCUSSION

This chapter presents a discussion of the findings in relation to the research questions, comparing and contrasting findings with the current body of evidence. The significance of the study results and implications for informatics, public health and policy are presented, followed by limitations of the study and recommendations for future research.

### Discussion of Findings

**Associated factors of Online Health Seeking Behavior.** This study showed that being in worse (poor/fair) health status, being without hypertension, having higher education, and being computer literate were positively associated with online HISBs. However, the final model of respondents' online HISBs demonstrated poor fit. Given the relatively large sample size of this (n=4,070), the significance level of the model may be affected by small divergences (University of Strathclyde, 2013).

Furthermore, the findings showed that respondents' situational, demographic, and literacy factors increased the odds of their households members' online HISBs. Household members of an respondent who was female, younger, married, highly educated, computer literate, in worse health status, and had serious health problems were more likely to seek health-related information through the Internet. Findings are discussed according to the Integrated Model for the eHealth Use.

**Demographic characteristics.** Studies of the general population in the United States have shown that being female (Atkinson et al, 2009; Gallagher & Doherty, 2009; Jensen et al, 2010; Koch-Wesler et al, 2010; Rice, 2006; Pena-Purcell, 2008; Renahy et al,2008), being younger (Chou et al, 2011; Cohall et al, 2011; Gallagher & Doherty, 2009; Koch-Weser et al, 2010; Lustria et al, 2011; Powell et al, 2011; Renahy, 2008;van Uden-Kraan, 2009), and having more

education are positively associated with online HISBs (Atkinson, 2009; Burndorf et al, 2006; Chou et al, 2011; Cohall et al, 2011; Flynn et al, 2006; Gallagher & Doherty, 2009; Jensen et al, 2010; Koch-Weser et al, 2010; Lustria et al, 2011; McInnes et al, 2010; Powell et al, 2011; Reinfeld-Kirkman et al, 2010; van Uden-Kraan, 2009).

The findings were consistent with previous studies that showed that better educated respondents were more likely to access health information through the Internet as well as other previous studies. Miller et al. (2007) found that Hispanics had the strongest relationship between education and online HISBs among ethnic and racial groups. Furthermore, family members' ability to attain a higher level of education affects their household members' online HISBs: high education level was positively associated with their family members' online HISBs. Recent studies have shown that children of less educated parents were less likely to seek health information (Ghaddar et al, 2012). In our study, respondents' education may affect their children's online HISBs, since about one third of household members who had sought health-related information were respondents' sons, daughters or grandchildren (33.9%).

However, some the findings were inconsistent with those reported in the literature. There was no age difference in online HISBs in our study whereas earlier studies showed that younger age is positively related to online HISBs (Chou et al, 2011; Cohall et al, 2011; Gallagher & Doherty, 2009; Koch-Weser et al, 2010; Lustria et al, 2011; Powell et al, 2011; Renahy, 2008; van Uden-Kraan, 2009). Recently, the number of elderly who use the Internet for their health resources has been increasing; about 69% of the population over age 65 used the Internet to seek health information (Fox, 2011; Huang, Hansen & Xie, 2012). The number of these users will continue to increase, since the majority of online health information seekers are adults between 40 and 59 years old (Gray, Elliott & Wale, 2013; Huang et al, 2012). The U.S. census

showed that among Internet users, older people are more engaged in online HISBs than younger people (The U.S. Census, 2013).

Previous studies showed that females were more likely to search health information through the Internet (Atkinson et al, 2009; Gallagher & Doherty, 2009; Jensen et al, 2010; Koch-Wesler et al, 2010; Rice, 2006; Pena-Purcell, 2008; Renahy et al,2008), however, it was not shown in our study. One study found that men and people without children were more likely to seek health information for themselves (Stern, Cotton & Drentea, 2011). Although our study did not indicate whether respondents have sought information for themselves or other, this may explain the lack of difference between gender and online HISBs.

However, respondents' gender may affect their household members' online HISBs in Hispanic households although it was not associated with respondents' online HISBs. A study found out that women play a role in managing the health of the Hispanic family (Pena-Purcell, 2008) – for example, household members may seek health information at her request. However, there was no previous study to support our result about the relationship between respondents' age and household members' online HISBs; therefore, it can be considered for further study.

The association between respondents' marital status and their household members' online HISBs is consistent with Sadasivam's finding that being married is was positively associated with surrogate-seekers' online HISBs (2013). In the study, a surrogate seeker was defined as a person who looked for health information for family members or friends (Sadasivam, 2013).

***Situational factors.*** This study showed that individuals being in worse (poor or fair) health status were more likely to seek health information through the Internet. Previous studies have found that people with poor health status may have stronger need for information (Shim, 2008; Xiao, Sharman, Rao & Upadhyaya, 2012). Online health information met their higher

demand for health information because of easy access. Their needs for health information may lead them to utilize health information; therefore, they can manage their health using the knowledge they have found (Xiao et al, 2012).

However, our finding regarding the hypertension was opposite to ‘being worse health status’ – respondents without hypertension were more likely to seek health information through the Internet. Previous studies have found that having chronic disease including hypertension was positively associated with online HISBs (Bundorf et al , 2006; Wagner, Baker, Bundorf & Singer, 2004). However, Ayers and Kronenfeld (2007) suggested that online HISBs are not merely affected by the presence of a particular chronic illness, but rather by the total number of chronic conditions. Furthermore, individuals who have hypertension seek health information less than those with other chronic diseases (Wagner et al, 2004). A Pew Internet survey showed that among the online health information seekers with one or more chronic conditions, the percentage of hypertension patients (57%) was less than that of cancer patients (62%) or lung patients (68%) (Fox & Purcell, 2010). These findings provide possible rationale for the association between hypertension status and online HISBs.

It is not possible to determine from this study if the household member looked up health information for themselves, the respondents or another friend or family member. Household members may have sought health information for respondents since respondents suffered from serious health problems and they perceived their health status as low. Familism, an important Hispanic cultural value with implications for the engagement of family members in the care of a patient, can be a rationale for this finding (Cheong, 2007; Pena-Pucell, 2008). Furthermore, most of the residents of Washington Heights and Inwood areas are immigrants. Among immigrants, the family plays an important role in HISBs. Instead of consulting with healthcare providers,

they ask their family members about health information and for advice (Leclere, Jensen & Biddlecom, 1994; Livingston, Minushkin & Cohn, 2008).

**Health literacy.** Health literacy is a big challenge when people use the Internet to search for health information (Benigeri & Pluye, 2003; Cline & Hynes, 2001; Gray, Klein, Noyce, Sesselberg & Cantrill, 2005; Pluye et al, 2013). The WICER survey includes two health literacy measurement tools: Newest Vital Sign (NVS) and Chew's health literacy screening questionnaire. Both screening tools have been used in other studies on online HISBs (Ghaddar et al, 2012; Miller, West & Wasserman, 2007).

This study showed that health literacy was significantly associated with HISBs only in the model with Chew's health literacy screening question. A possible explanation for the lack of significance of models with NVS by the floor effect, most of the respondents scored low on NVS (Everitt, 2006). NVS is more focused on the numeracy dimension of health literacy than on other health literacy measurements. Some studies have found that online HISBs are more related to reading levels than to other dimensions of health literacy, since online health information is often provided at a high reading level which is too advanced for many users (Bernstam, Shelton, Walji & Meric-Bernstam, 2005; Miller et al, 2007). The numeracy dimension may be more related to Internet access than to Internet use. People need to deal with numerical information such as phone numbers and email addresses when they access the Internet via computer or mobile device (Jensen et al, 2010). Meanwhile, Chew's health literacy question was about understanding written information, so it was not surprising that it was significantly associated with online HISBs.

Furthermore, studies have found that patients with adequate reading literacy skills often have low numeracy skills (Cavanaugh et al, 2008; Rothman et al, 2006; Shigaki, Kruse, Mehr &



Ge, 2012). Shigaki et al found out that even highly-educated patients may have a low score on NVS because high education level does not guarantee health-related numeracy skills (2012).

**Computer literacy.** This study also revealed the association between computer literacy and online HISBs; an individual who is computer literate is more likely to go to the Internet for finding health information. Although there were no specific measurement tools for computer literacy, several studies have shown that the ability to use a computer is related to online HISBs (Kahn, Aulakh & Bosworth, 2009; Lustria, 2007).

Moreover, the respondents' computer literacy was positively associated with household members' online HISBs. A study explained that parents' computer literacy affects children's computer use (Hains, Kirinic & Dusak, 2009). Respondents in our study answered that 33.9% of their household members who went to the Internet for health information were their children.

**Online HISBs and Health Behaviors.** A study found that online health information seekers tend to improve their health behaviors (Siliquini et al, 2011). This study examined the association between respondents' online HISBs and five health behaviors: fruit consumption, vegetable consumption, physical activity, hypertension medication adherence, and alcohol consumption. Our study showed that respondents' online HISBs were positively associated with fruit and vegetable consumption, and physical activity; online health information seekers were likely to consume more fruits and vegetables and to do more physical activity than non-seekers. Thus, this study supported three hypotheses.

However, the models explained only a small portion of the variance in the health behaviors. The small percentage of the variance in the model may be explained by the small percentage of respondents who reported engaging in health behaviors; most of the respondents did not meet the Center for Disease Control and Prevention (CDC) recommended guidelines.

For example, the CDC recommended vegetable consumption is eating vegetables 3 times/day in contrast to the respondents' consumption of 0.74 times per a day and only 3.0% of respondents met the CDC guideline. The average amount of fruit consumption of the WICER respondents was 0.79 times per day and only 10.1% met the CDC recommended amount of fruit consumption: twice a day (CDC, 2007).

In this study, only 11.5% of respondents answered that they had engaged in moderate physical activity for at least 10 minutes per week over the past 30 days, and the average number was 1.31 times per week. The CDC guideline for physical activity is 150 minutes per week (CDC, 2011). There is also a possibility that people may underestimate their health behaviors, since the questions asked about health behaviors on the past 30 days and respondents had to rely on their memories.

Online HISBs were not significantly associated with hypertension medication adherence and alcohol consumption although the final models were statistically significant. Thus, hypothesis 4 and 5 were not supported. The model explained 2.9% of variance in alcohol consumption, and 2.0% of the variance in hypertension medication adherence. However, computer literacy was a significant correlate of those health behaviors; users of any kinds of SNSs were likely to consume less alcohol and to adhere highly to hypertension medication. In addition, computer literacy was associated with fruit consumption; SNS users tended to eat more fruit than non-users.

In our study, use of SNSs was used to measure computer literacy. However, our findings suggest us that the use of SNSs needs to be considered beyond the meaning of the computer literacy. A study has revealed that study participants who were frequently visit SNSs were willing to communicate with others about health-related issues and exchange health information

through those sites (Shaw & Johnson, 2011). Since interactive health communication over the Internet was considered as online HISBs, SNS users may be more likely to check those sites to find or discuss health information.

Other variables were also associated with health outcomes. In this study, individuals with poor health status were more likely to consume less alcohol and to engage in more physical activity. This is consistent within Shim's finding that people who perceived their health status as low were likely to change their behavior after searching for health information online (Shim, 2008).

Sociodemographic variables such as age and education were also related to health outcomes. Individuals with higher education were more likely to be engaged in physical activity. Lower education and younger age were associated with higher hypertension medication adherence. These contrasts with prior research that showed that less education and younger age are correlated with non-adherence (Ho, Bryson & Rumsfeld, 2009). This may be due to the fact that the study sample consisted of Hispanics and immigrants, and little has been published about this population.

Online HISBs need to take social conditions and cultural environments into account (Cheong, 2007). Our study results showed that females were more likely to consume more alcohol, and this may be a feature of Hispanic culture. Previous research showed that Hispanic and Latina women immigrants were likely to consume more alcohol than males due to acculturation (Mayer & Brewer, 2009). Furthermore, community environment plays an important role in fruit and vegetable consumption (Lutfiyya, Chang & Lipsky, 2012). If affordable fresh fruit and vegetables were not available, community residents may not be able to meet the recommended guidelines.

## **Significance**

This is the first large-scale study of online HISBs in the Hispanic population. This study not only confirmed associated factors identified in previous literature, but also revealed findings which were not described in the previous literature. Also, this study showed that respondents' demographic, situational and literacy factors were associated with their household members' online HISBs. Studies of online HISBs need to consider various associated factors to explain behavior (Caiata-Zufferey, Abraham, Sommerhalder & Schulz, 2010). To increase the number of online health information seekers among Hispanics, their cultural values such as familism need to be considered.

Our study showed that online HISBs were associated with health behaviors in terms of fruit and vegetable consumption and physical activity. The aim of the WICER community survey is to gain an understanding of the Washington Heights and Inwood community toward the long-term goal of improving the health of the community. Although conclusions from one single study should be interpreted carefully (Tustin, 2010), the data in this study suggest potential avenues for informatics-based health interventions. However, health literacy and computer literacy modifiable factors associated with online HISBs must be carefully addressed for this potential to be realized.

## **Limitations**

There are several limitations in this study. The main limitation is that this study found that only 7.8% of respondents sought health-related information on the Internet. This is significantly lower than the national data; the National Health Interview Survey conducted by National Center for Health Statistics showed that 28.8% of 18-64 year-old Hispanics used the Internet to find health-related information (Cohen & Adams, 2011). However, our study areas,

Washington Height and Inwood are medically underserved. A study conducted in the medically underserved area showed that only 21% of respondents accessed to the Internet for health information (Zach et al, 2012). This indicates that there may be a significant disparity in online HISBs between underserved populations and the general population (Zach et al, 2012). There might also be inequalities in access to online health information within Hispanics due to the heterogeneity of that population (Cheong, 2007; Minor, 1992; Pena-Purcell, 2008; Weiss et al, 2005), which may explain differences between our findings and the national data.

Furthermore, this study did not explicitly identify respondents who accessed the Internet from their cell phones. A Pew Hispanic Center reported that Hispanics are more likely than non-Hispanics to access the Internet through mobile devices; about 50% of Hispanics access the mobile internet compared to 20% of non-Hispanics (Germaine, 2012). Therefore, this study may have underestimated online health information seekers among the survey respondents.

Also, the generalizability of this study to other Hispanics in Washington Heights and Inwood is limited due to the non-probability sampling method. Although the study adopted several sampling methods for recruitment, most participants were recruited using non-probability sampling and the resulting sample is more female and older than the Washington Heights and Inwood community. Furthermore, this study finding may not apply to other Hispanic communities due to heterogeneity of socioeconomic status, culture, and health (Cheong, 2007; Minor, 1992; Pena-Purcell, 2008; Weiss et al, 2005). More than half of our sample was from Dominican Republic (n=2,114; 51.9%); therefore it may not reflect the characteristics of other Hispanic community, for example, where Mexicans are dominate.

This study adopted a significance level of 0.05 for each regression. However, there is a possibility that actual risk of Type I error is higher than  $\alpha=0.05$  level since this study used the

non-probability sampling which may not provide adequate information to test hypotheses about this population (Warner, 2012). Moreover, the association between online HISBs and health behaviors is correlational, so it is not possible to draw causal inferences.

Finally, because our study relied on self-reported information, social desirability can be reflected in the survey answers. Sometimes respondents tend to answer in a way that they think the researcher wants; they tend to over-report for the desired behaviors such as physical activity and under-report undesirable ones such as alcohol consumption (Donaldson & Grant-Vallone, 2002). The problem of self-report bias is compounded by the fact that all variables are based on a single method of measurement (Donaldson & Grant-Vallone, 2002). However, our study included several measurement tools for variables such as health literacy to avoid mono-method bias (Donaldson & Grant-Vallone, 2002).

### **Informatics Implications**

The 2008 definition of nursing informatics is that of “a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, and knowledge in nursing practice. NI supports consumers, patients, nurses, and other providers in their decision-making in all roles and settings. This support is accomplished through the use of information structures, information processes, and information technology” (ANA, 2008). This definition supports the central role of nursing informatics in supporting consumers and patients in their decision making. An understanding of online HISBs is foundational to providing support.

Online HISBs can lead patients to make informed health care decisions by increasing their participation in health management. Those decisions may affect the relationship with healthcare providers (Ayers & Kronenfeld, 2007). To assist patients, there is a need for a health

information infrastructure for shared decision making between patients and the healthcare framework (Lorence et al, 2006). However, decision-making interventions may not be successfully implemented if the discrepancy exists across populations (Lorence & Park, 2008). Our study of online HISBs among Hispanics may suggest what needs to be considered to resolve the discrepancy and to implement the infrastructure in Hispanic community.

Our study also provides some evidence that online health information may be a valuable resource to promote health behaviors and manage health in Hispanic communities. This may transform their way of managing their health and serves a foundation for the use of personal health records (PHRs) (Ball, Smith & Bakalar, 2007; Monturu, Liu & Johnson, 2008). Personal health records are computer-based applications that have been proposed as a consumer-centric method to manage health, which increases patient access to credible health information, data, and knowledge in order to manage their health more easily. Although there is a big interest in using PHsR, the actual use of such systems is low. Online HISBs underpin the personal health PHR system; they are a prerequisite for increasing patients' engagement in the PHRs (Ball et al, 2007; Monturu et al, 2008). Therefore, understanding the targeted population and circumstances of online HISBs among Hispanics may help developers and providers to increase their engagement in use of PHRs.

Finally, our study suggests that SNSs may provide a platform for informatics-based interventions in Washington Heights and Inwood. Our study shows that SNSs are used by about 21.3% of our sample and SNS use was associated with some health behaviors. This suggests that SNSs may support the delivery of multi-faceted strategies aimed at improving health behavior. A large survey based on 23,000 people in U.S. indicated that 41% of respondents have used any social media as health information resources; 94% of those users chose Facebook to seek health-

related information (iHealthbeat, 2011). Furthermore, SNSs provide personalized information through user profiles, forums, blogs, and comments, search queries, and tags which may be used for delivery of the tailored health information in the future (Fernandez-Luque, Karlsen & Bonander, 2011).

### **Public Health Implications**

Our study findings provided some evidence that online HISBs may improve selected health behaviors of Hispanics. Understandable health-related information is a prerequisite; therefore there is a need to avoid providing difficult information for the general population (Bansil, Keenan, Zlot & Gilliland, 2006). Thus, the reading level for online information should be seventh- or eight-grade (Bernstam et al, 2005; Graber, D'Alessandro & Johnson-West, 2002). Hispanics may have difficulties in understanding online health information in Spanish because of its advanced reading level information and poor quality (Berland et al, 2001). Moreover, there is little online health information in Spanish (Vann, 2011). Healthcare providers not only need to increase online health information in Spanish, but also to provide online health information at an appropriate level of reading skills.

The Pew Internet and American Life study has shown that informal caregivers look for health information on the Internet to assist the people that they are caring for (Sadasivam, Kinney, Lemon, Shimada, Allison & Houston, 2012). The WICER survey was not designed to assess caregiving behavior, but household members may have sought health-related information for respondents who had health issues. To support these potential caregivers, Hispanic cultural values need to be considered when healthcare providers put health information on the web. Our results suggest that online HISBs among Hispanic population need to reflect *familism*. Close relationships with family and friends have a strong influence on health behaviors and values



(Leclere et al, 1994; Livingston et al, 2008). Healthcare providers need to adopt strategies to disseminate health information targeted to potential caregivers in the Hispanic community.

Culturally beliefs and values should be reflected in the content of online health information to encourage people to use health information more wisely and easily (Laz & Berenson, 2012). Our study may provide a foundation to understand the characteristics of Hispanics living in the Washington Heights and Inwood community which may support the dissemination of information online more strategically (Cheong, 2007).

Our study found no age differences in online HISBs, meaning that older people may have found health information from the Internet. Several studies suggest that many older adults go to the Internet for information about disease management or treatment options, not necessarily for general health information about diet and exercise (Hart, Henwood, & Wyatt, 2004; Miller & Bell, 2012). Our results showed that poor health status was positively associated with online HISBs. A study suggests that online health information related to recovery and treatment may have a higher utilization rate than information on prevention among those with poor health status (Xiao et al, 2012). The provision of sufficient information on their health conditions may help Hispanics with poor health status to manage their health issues which may be linked to lighten the burden of disease (Xiao et al, 2012).

### **Policy Implications**

Our study identified modifiable factors associated with online HISBs among Hispanic community and some potential value of online HISBs. However, overall access for health was lower than national data. Government agencies and policy makers need to understand unique characteristics of Hispanic community to design strategies and interventions for equitable access to online health information among underserved populations. This understanding may lead

governments to develop policies to allocate and disseminate infrastructures and resources (Lorence et al, 2006; Xiao et al, 2012). Large-scale improvement in the Internet technology infrastructure will reduce costs and barriers to accessing health information (Chou et al, 2011).

Furthermore, policy makers need to ensure high quality of online health information for underserved populations to avoid the pitfalls of online health information. To provide timely and accurate health information across populations, policy makers need to consider a broad spectrum of health literacy levels and cultural issues of the designated population (Tu & Cohen, 2008).

### **Future Research**

Our study defined use of SNSs as a measurement of computer literacy. However, other studies have proposed linking SNSs with social support (Greene, Choudhry, Kilabuk & Shrank, 2010; Lin & Lu, 2011; Subrahmanyam, Reich, Waechter & Espinoza, 2008). Studies have showed that the Hispanic population in the U.S. uses SNSs more frequently than non-Hispanics despite their lower rates of Internet usage (Germaine, 2012); this may be explained by Hispanics' collectivism. Collectivism is “a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty.” Familism is a component of collectivism, and can be applied to health care; Hispanics tend to consult their family and friends for health information (Germaine, 2012; Schwartz, 2007). Our study findings about the household members' online HISBs may support this cultural feature. For future research, the association between social support or networks including use of SNS and online HISBs among Hispanic population needs to be studied.

To examine associated and health behaviors of online HISBs more accurately, mobile Internet access should be assessed. Previous studies, including ours, have adopted computer use

as a variable as a means of Internet access and not asked about mobile access (Cohen & Adams, 2009; HINTS, 2013). The number of smartphone users continues to rise; by December 2012, 45% of Americans owned a smartphone, and 56% of smartphone users reported using the Internet through their phone (Fox & Duggan, 2012). According to one study, 74.1% of Americans will use a smartphone by 2016 (Statista, 2012). Furthermore, Hispanics are more likely to access the Internet from their mobile phones than from their desktop computers (Germaine, 2012). This trend needs to be accommodated and Internet access needs to be re-operationalized in future studies; specifying the mean of Internet access, including mobile access.

Our results showed that health literacy was an associated factor of online HISBs only when measured with Chew's health literacy screening question related to understanding written medical information; it was not associated with online HISBs when measured with NVS.

Health literacy measurements are being designed to incorporate numerous dimensions in the context of the Internet (Ghaddar et al, 2012). For example, the eHEALS scale can be measures electronic health literacy using eight items related to (Norman & Skinner, 2006). Psychometric testing of the eHEALS showed high internal consistency ( $\alpha=0.88$ ) (Knapp et al, 2010). However, no ehealth literacy measurement has been validated in Spanish. Therefore, the validation of existing electronic health literacy tools in Spanish is needed.

Finally, the WICER survey did not include all components of the Integrative Model of the eHealth Use. Additional studies need to focus on potential correlates of online HISBs such as trustiness, self-efficacy, and satisfaction. Future research should also explore the specific activities of online health information seekers in the interest of future health promotion; for example, the type of health information they sought under particular circumstances (Bundorf et al, 2006; Gallagher & Doherty, 2009).



## CONCLUSION

Online health information resources have the potential to disseminate health information effectively, improve communication with healthcare providers, and ultimately improve health outcomes (Corcoran, Haigh, Seabrook & Schug, 2010). However, online HISB is necessary to reap the benefits of such resources. Our large-scale study using a community survey found factors associated with online HISBs among Hispanic which merit closer examination. This study also showed a positive association between online HISBs and selected health behaviors that suggests the potential value of online HISBs as for a prerequisite behavior in the Hispanic community. To enhance online HISBs among Hispanics, healthcare providers and policy makers need to understand the culture and social context of the Hispanic population. We hope that this study can provide a foundation for the development of health-related interventions to improve the health of Hispanics in the Washington Heights and Inwood community of New York City.

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**APPENDIX A.**  
**WICER Household Survey Questionnaire**

**SECTION A: DEMOGRAPHIC AND SCREEN**

**A.1. Household ID:** \_\_\_\_\_

**A.2. Individual ID:** \_\_\_\_\_

**A.3. First Name:** \_\_\_\_\_ **Last Name:** \_\_\_\_\_

**A.4. What is your gender?**

1. Male
2. Female
3. TRANSGENDER (MALE TO FEMALE)
4. TRANSGENDER (FEMALE TO MALE)

**A.4a. Do you think of yourself as** (IF NEEDED SAY: "Straight or Heterosexual people have sex with, or are primarily attracted to people of the opposite sex, Gay (and Lesbian) people have sex with or are primarily attracted to people of the same sex, and Bisexuals have sex with or are attracted to people of both sexes."):

1. Straight or heterosexual
2. Gay
3. Lesbian
4. Bisexual
5. Other
- 7. DON'T KNOW
- 8. REFUSED

**A.5. What is your date of birth?** \_\_\_\_/\_\_\_\_/\_\_\_\_  
Month/ Day/ Year

**A.6. COMPUTER CALCULATED AGE** \_\_\_\_\_

**A.7. Mother's Maiden Name:** \_\_\_\_\_

**A.8. Father's First Name:** \_\_\_\_\_

**A.9a. Street Address:** \_\_\_\_\_

**A.9.b. Apt Number:** \_\_\_\_\_

**A.9.c. City:** \_\_\_\_\_

**A.9.d. State:** \_\_\_\_\_

**A.9.e. Zip code:** \_\_\_\_\_

**A.9.f. Home Telephone number:** \_\_\_\_\_ - \_\_\_\_\_

**A.9.g. Mobile Telephone number:** \_\_\_\_\_ - \_\_\_\_\_

**A.9.h. E-mail:** \_\_\_\_\_ @ \_\_\_\_\_

**A.10a. With whom do you live?**

Last Name: \_\_\_\_\_ First Name: \_\_\_\_\_

Relationship1: \_\_\_\_\_

Phone Number: \_\_\_\_\_

**A.10b. Who is your closest relative not living with you?**

Last Name: \_\_\_\_\_ First Name: \_\_\_\_\_

Relationship2: \_\_\_\_\_

Street Address \_\_\_\_\_

Apt. Number: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone Number: \_\_\_\_\_

*Please identify a few people not living with you who always know where you are*

**Note to Interviewer: Prompt: We will follow up with you once a year and providing information on people who always know where you are helps us to get in touch with you. Please provide as much information as possible.**

**A.10c.**

Last Name: \_\_\_\_\_ First Name: \_\_\_\_\_

Relationship3: \_\_\_\_\_

Street Address \_\_\_\_\_

Apt Number: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone Number: \_\_\_\_\_

Last Name: \_\_\_\_\_ First Name: \_\_\_\_\_

Relationship4: \_\_\_\_\_

Street Address \_\_\_\_\_

Apt Number: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone Number: \_\_\_\_\_

**SECTION B: HEALTH AND HEALTHCARE BEHAVIOR**

*First, we'd like to start by asking you some questions about hypertension, also called high blood pressure or just pressure.*

**B.1. Have you ever been told by a doctor, nurse, or other health professional that you had hypertension also called high blood pressure or pressure?**

1. Yes

- 2. No (\*SKIP TO B.13.)
- 7. DON'T KNOW
- 8. REFUSED

**B.2. How old were you when you were first told that you had hypertension or high blood pressure?**

|\_\_|\_\_| Enter age in years

- 7. DON'T KNOW
- 8. REFUSED

**B.3. Because of your high blood pressure or hypertension, have you ever been told to take medicine?**

- 1. Yes
- 2. No (\*SKIP TO B.13.)
- 7. DON'T KNOW
- 8. REFUSED

**B.4. Are you now taking medication for your high blood pressure hypertension?**

- 1. Yes
- 2. No (\*SKIP TO B.13.)
- 7. DON'T KNOW
- 8. REFUSED

**B.5. Do you ever forget to take your high blood pressure medication?**

- 1. Never or Rarely
- 2. Once in a while
- 3. Sometimes
- 4. Often
- 7. DON'T KNOW
- 8. REFUSED

**B.6. Over the past 2 weeks, were there any days when you did not take your high blood pressure medication?**

- 1. Yes
- 2. No
- 7. DON'T KNOW
- 8. REFUSED

**B.7. Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?**

- 1. Yes
- 2. No
- 7. DON'T KNOW
- 8. REFUSED

**B.8. When you travel or leave home, do you ever forget to bring along your medications?**

- 1. Never or Rarely
- 2. Once in a while
- 3. Sometimes

- 4. Often
- 6. NOT APPLICABLE, DON'T EVER TRAVEL OR LEAVE HOME
- 7. DON'T KNOW
- 8. REFUSED

**B.9. Did you take your high blood pressure medication yesterday?**

- 1. Yes
- 2. No
- 7. DON'T KNOW
- 8. REFUSED

**B.10. When you feel like your blood pressure is under control, do you ever stop taking your medicine?**

- 1. Never or Rarely
- 2. Once in a while
- 3. Sometimes
- 4. Often
- 6. NOT APPLICABLE, MY BLOOD PRESSURE IS NEVER UNDER CONTROL
- 7. DON'T KNOW
- 8. REFUSED

**B.11. Do you ever feel hassled about sticking to your blood pressure treatment plan?**

- 1. Never or Rarely
- 2. Once in a while
- 3. Sometimes
- 4. Often
- 7. DON'T KNOW
- 8. REFUSED

**B.12. How often do you have difficulty remembering to take all your blood pressure medication?**

- 1. Never or Rarely
- 2. Once in a while
- 3. Sometimes
- 4. Often
- 7. DON'T KNOW
- 8. REFUSED

**B.13. Before your visit today, about how long has it been since you last had your blood pressure checked? Has it been...**

- 1. Less than 1 month
- 2. 1 month but less than 6 months
- 3. 6 months but less than 1 year
- 4. 1 year but less than 2 years
- 5. 2 year but less than 5 years
- 6. 5 years or more
- 7. DON'T KNOW
- 8. REFUSED

**B.14. If someone's blood pressure is 160/100, it is...**

1. High
2. Low
3. Normal
- 7. DON'T KNOW
- 8. REFUSED

**B.15. Once someone has high blood pressure, it usually lasts for...**

1. A few years
2. 5 to 10 years
3. Rest of their life
- 7. DON'T KNOW
- 8. REFUSED

**B.16. What can people do to treat or control high blood pressure? \*DO NOT READ ANSWERS, RECORD ALL THAT ARE MENTIONED. If not mentioned, circle no.**

	YES	NO
1. TAKING PRESCRIBED MEDICINE	1	2
2. CONTROLLING WEIGHT OR LOSING WEIGHT	1	2
3. DECREASING STRESS	1	2
4. EATING MORE HEALTHY	1	2
5. CUTTING DOWN ON SALT OR SODIUM CONSUMPTION	1	2
6. EXERCISING MORE	1	2
7. CUTTING DOWN ON ALCOHOL CONSUMPTION	1	2
8. STOPPING SMOKING	1	2
9. OTHER CHANGES IN DIET	1	2
10. VISIT A MEDICAL PROFESSIONAL	1	2
11. OTHER, SPECIFY: _____	1	2

- 7. DON'T KNOW
- 8. REFUSED

**B.17. If you needed emergency services, what emergency room would you likely go to?**

1. NY Presbyterian Hospital (on 168<sup>th</sup> Street and Broadway)
2. Allen Hospital (on 220<sup>th</sup> Street and Broadway)
3. Other, SPECIFY: \_\_\_\_\_
- 7. DON'T KNOW
- 8. REFUSED

**B.18. What type of health insurance do you currently have? If you have more than one kind of health insurance, tell me all of the plans that you have \*DO NOT READ ANSWERS, RECORD ALL THAT ARE MENTIONED. If participant gives you the name of the insurance company, probe to determine if Medicare, Medicaid or private. Refer to insurance list if you are unsure of classification.**

	YES	NO
1. MEDICARE	1	2
2. MEDICAID	1	2
3. VA (US DEPARTMENT OF VETERAN'S AFFAIRS)	1	2
4. PRIVATE	1	2

5. NONE	1	2
6. OTHER, SPECIFY: _____	1	2

-7. DON'T KNOW

-8. REFUSED

***Now I'd like to ask questions about some ways that people use the internet. Some people have done these things, but other people have not. In the past 12 months, have you done the following things while using the internet? Note to interviewer: If respondent says that they have never used the internet, just confirm that that also means they do not use email, circle no for B19-B21 and resume questionnaire at B22.***

**B.19. In the past 12 months, have you participated in an online support group for people with similar health or medical issues?**

1. Yes

2. No

-7. DON'T KNOW

-8. REFUSED

**B.20. In the past 12 months, have you used email or the internet to communicate with a doctor or doctor's office?**

1. Yes

2. No

-7. DON'T KNOW

-8. REFUSED

**B.21. In the past 12 months, have you used the internet to look up health or medical information?**

1. Yes

2. No

-7. DON'T KNOW

-8. REFUSED

**B.22. Does anyone in your household use the internet to look up health or medical information?**

1. Yes

2. No (\*SKIP TO B.24.)

-7. DON'T KNOW (\*SKIP TO B.24.)

-8. REFUSED (\*SKIP TO B.24.)

**B.23. What is the relationship of these people to you.**

	YES	NO
1. SPOUSE OR LIVE-IN PARTNER	1	2
2. BOYFRIEND OR GIRLFRIEND	1	2
3. DAUGHTER	1	2
4. SON	1	2
5. SISTER	1	2
6. BROTHER	1	2
7. MOTHER	1	2
8. FATHER	1	2



9. AUNT	1	2
10. UNCLE	1	2
11. GRANDFATHER	1	2
12. GRANDMOTHER	1	2
13. NEICE	1	2
14. NEPHEW	1	2
15. GRANDDAUGHTER	1	2
16. GRANDSON	1	2
17. FRIEND	1	2
18. OTHER, SPECIFY: _____	1	2

-7. DON'T KNOW

-8. REFUSED

**B.24. What three health problems do you worry about the most?**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

-7. DON'T KNOW

-8. REFUSED

**SECTION C: BLOOD PRESSURE AND BODY SIZE**

*Now I am going to ask you a few quick questions before I take your body and blood pressure measures.*

*How long since you (C.1-3)...*

*\*[ENTER 0 FOR HOUR IF LESS THAN 1 HOUR]: Only enter number of hours and minutes since food or drink was consumed . Do not enter time of food or drink consumption.*

**C.1. Had something to eat?** |\_\_|\_\_| Hours and |\_\_|\_\_| Minutes

**C.2. Had a drink of coffee, tea, or other drink that contained caffeine?**

1. |\_\_|\_\_| Hours and |\_\_|\_\_| Minutes

-6. NOT APPLICABLE, NEVER HAS DRINKS WITH CAFFIENE.

-7. DON'T KNOW

-8. REFUSED

**C.3. Smoked a cigarette or cigar?** |\_\_|\_\_| Hours and |\_\_|\_\_| Minutes

-6. NOT APPLICABLE; DON'T CURRENTLY SMOKE

-7. DON'T KNOW

-8. REFUSED

**C.4. Height:** \_\_\_\_\_ Inches

-8. REFUSED

**C.5. Weight:** \_\_\_\_\_ Lbs

-8. REFUSED

**C.6. Calculate BMI:** \_\_\_\_\_ kg/m<sup>2</sup>

**C.7. Waist Circumference:** \_\_\_\_\_ Inches

-8. REFUSED

**Blood Pressure:**

C.8.a. 1<sup>st</sup> reading \_\_\_\_\_ / \_\_\_\_\_

-8. REFUSED

C.8.b. 2<sup>nd</sup> reading \_\_\_\_\_ / \_\_\_\_\_

-8. REFUSED

C.8.c. 3<sup>rd</sup> reading \_\_\_\_\_ / \_\_\_\_\_

-8. REFUSED

C.8.d. Machine Average of 2<sup>nd</sup> and 3<sup>rd</sup> \_\_\_\_\_ / \_\_\_\_\_

C.8.e. Database Average of 2<sup>nd</sup> and 3<sup>rd</sup> \_\_\_\_\_ / \_\_\_\_\_

## SECTION D: HEALTH

*The following questions are about how you feel and how well you are able to do your usual activities.*

**D.1.a. Would you say that in general your health is \_\_\_\_\_ ?**

**PLEASE READ**

1. Excellent

2. Very good

3. Good

4. Fair

5. Poor

-7 DON'T KNOW

-8. REFUSED

**D.1.b Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?**

|\_\_|\_\_|\_\_| Enter number of days

-6 NONE

-7 DON'T KNOW

-8. REFUSED

**D.1.c. Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?**

|\_\_|\_\_|\_\_| Enter number of days

-6 NONE

-7 DON'T KNOW

-8. REFUSED

**D.1.d. During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?**

|\_|\_| Enter number of days

-6 NONE

-7 DON'T KNOW

-8. REFUSED

**D.1.e. During the past 30 days, for about how many days did PAIN make it hard for you to do your usual activities, such as self-care, work, or recreation?**

|\_|\_| Enter number of days

-6 NONE

-7 DON'T KNOW

-8. REFUSED

**D.1.f. During the past 30 days, for about how many days have you felt SAD, BLUE, or DEPRESSED?**

|\_|\_| Enter number of days

-6 NONE

-7 DON'T KNOW

-8. REFUSED

**D.1.g. During the past 30 days, for about how many days have you felt WORRIED, TENSE, or ANXIOUS?**

|\_|\_| Enter number of days

-6 NONE

-7 DON'T KNOW

-8. REFUSED

**D.1.h. During the past 30 days, for about how many days have you felt VERY HEALTHY AND FULL OF ENERGY?**

|\_|\_| Enter number of days

-6 NONE

-7 DON'T KNOW

-8. REFUSED

**D.2. Have you ever been told by a doctor, nurse, or other health professional that you had...**

	Yes	No	DON'T KNOW	REFUSED
D.2.a. Heart disease including a heart attack?	1	2	-7	-8
D.2.b. Stroke?	1	2	-7	-8
D.2.c. Weak or failing kidneys?	1	2	-7	-8

D.2.d. Cancer? (type: _____)	1	2	-7	-8
D.2.e. Mental or psychiatric health problems?	1	2	-7	-8
D.2.f. Diabetes, high blood sugar, or sugar in the urine <b>ONLY WHEN YOU WERE NOT PREGNANT?</b>	1	2	-7	-8

### SECTION E: MENTAL HEALTH

*The following questions are about how you feel mentally.*

Note to Interviewer: Only ask section B and C if the participant answers yes to an item in section a. If they say no to a, then b and c can be skipped and you can move on to the next item. Ask every item in order.

	a. In your lifetime did you ever have a period of at least two weeks during which you were bothered by any of the following items?:		b. When this occurred, were you bothered by this problem: [Read List]				c. Did this occur during the past 30 days?	
	Yes	No	Several Days	More than half the days	Nearly every day	DK/REF	Yes	No
E1. Little interest or pleasure in doing things	1	2	1	2	3	8/9	1	2
E2. Feeling down, depressed, or hopeless	1	2	1	2	3	8/9	1	2
E3. Trouble falling or staying asleep, or sleeping too much	1	2	1	2	3	8/9	1	2
E4. Feeling Tired or having little energy	1	2	1	2	3	8/9	1	2
E5. Poor appetite or overeating	1	2	1	2	3	8/9	1	2
E6. Feeling bad about yourself – or	1	2	1	2	3	8/9	1	2

that you are a failure or have let yourself or your family down								
E7. Trouble concentrating on things, such as reading the newspaper or watching television	1	2	1	2	3	8/9	1	2
E8. Moving or speaking so slowly that other people could have noticed. Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	1	2	1	2	3	8/9	1	2
E9. Thoughts that you would be better off dead, or of hurting yourself	1	2	1	2	3	8/9	1	2

[IF 'YES' TO ANY QUESTIONS E1-E9 GO TO E10; OTHERWISE GO TO E11.]

E10. How difficult have these problems ever made it for you to do your work, take care of things at home, or get along with other people? Would you say: [READ CHOICES]

- 1 Not difficult at all
- 2 Somewhat difficult
- 3 Very difficult, or
- 4 Extremely difficult
- 7 [VOL] Don't know
- 8 [VOL] Refused

**E11. These questions relate to how you felt in the last 7 days. \*\*\* SHOW HAND CARD\*\*\***

	Never	Rarely	Sometimes	Often	Always	Don't	Refused
--	-------	--------	-----------	-------	--------	-------	---------

						Know	
E11a. In the past 7 days I felt fearful	1	2	3	4	5	-7	-8
E11b. In the past 7 days I found it hard to focus on anything other than my anxiety	1	2	3	4	5	-7	-8
E11c. In the past 7 days my worries overwhelmed me	1	2	3	4	5	-7	-8
E11d. In the past 7 days I felt uneasy	1	2	3	4	5	-7	-8
E11e. In the past 7 days I felt worthless	1	2	3	4	5	-7	-8
E11f. In the past 7 days I felt helpless	1	2	3	4	5	-7	-8
E11g. In the past 7 days I felt depressed	1	2	3	4	5	-7	-8
E11h. In the past 7 days I felt hopeless	1	2	3	4	5	-7	-8

## SECTION F: PHYSICAL ACTIVITY AND DIET

***The next series of questions are about physical activities that you may have done over the past 30 days. First, I will ask about activities that are related to transportation. Then I'll ask about your daily activities, and finally, about physical activities that you do in leisure time.***

**F.1. Over the past 30 days, have you walked or bicycled as part of getting to and from work, or school, or to do errands? \*CODE 'UNABLE TO DO' ONLY IF RESPONDENT VOLUNTEERS**

1. Yes
2. No (\*SKIP TO F.3.)
3. UNABLE TO DO ACTIVITY (\*SKIP TO F.3.)
- 7. DON'T KNOW (\*SKIP TO F.3.)
- 8. REFUSED (\*SKIP TO F.3.)

**F.2. Over the past 30 days, how often did you do this? walk or bicycle as part of getting to and from work, or school, or to do errands?**

PROBE: How many times per day, per week, or per month did you do these activities?

|\_|\_|\_| Enter number of times (per day, week, or month)

ENTER UNIT

1. Day
2. Week
3. Month
- 7. DON'T KNOW

-8. REFUSED

**F. 2a. On those days when you walked or bicycled, about how long did you spend altogether doing this?**

|\_|\_|\_| Enter number (minutes or hours)

ENTER UNIT

1. minutes

2. hours

-7. DON'T KNOW

-8. REFUSED

**F.3. Please tell me which of these four sentences best describes your usual daily activities? Daily activities may include your work, housework if you are a homemaker, going to and attending classes if you are a student, and what you normally do throughout a typical day if you are retired or unemployed...**

1. You sit during the day and do not walk about very much

2. You stand or walk about quite a lot during the day, but do not have to carry or lift things very often

3. You lift or carry light loads, or have to climb stairs or hills often

4. You do heavy work or carry heavy loads

-7. DON'T KNOW

-8. REFUSED

***The next questions are about physical activities including exercise, sports, and physically active hobbies that you may have done in your leisure time over the past 30 days. First I will ask you about vigorous activities that cause heavy sweating or large increases in breathing or heart rate. Then I will ask you about moderate activities that cause only light sweating or a slight to moderate increase in breathing or heart rate.***

**F.4. Over the past 30 days, did you do any vigorous activities for at least 10 minutes that caused heavy sweating, or large increases in breathing or heart rate? Some examples are running, lap swimming, aerobics classes or fast bicycling. *Please do not include housework or yard work that you have already told me about.* \*CODE 'UNABLE TO DO' ONLY IF RESPONDENT VOLUNTEERS**

1. Yes

2. No (\*SKIP TO F.6.)

3. UNABLE TO DO ACTIVITY (\*SKIP TO F.6.)

-7. DON'T KNOW (\*SKIP TO F.6.)

-8. REFUSED (\*SKIP TO F.6.)

**F.5. Over the past 30 days, how often did you do these vigorous activities?**

**PROBE:** How many times per day, per week, or per month?

|\_|\_|\_| Enter number of times (per day, week, or month)

ENTER UNIT

1. Day

2. Week

3. Month

- 7. DON'T KNOW
- 8. REFUSED

**F. 5A Over the past 30 days, on average about how long did you do these vigorous activities each time?**

|\_\_|\_\_|\_\_| Enter number (minutes or hours)

ENTER UNIT

- 1. minutes
- 2. hours
- 7. DON'T KNOW
- 8. REFUSED

**F.6. Over the past 30 days, did you do moderate activities for at least 10 minutes that cause only light sweating or a slight to moderate increase in breathing or heart rate? Some examples are brisk walking, bicycling for pleasure, golf, or dancing. *Please do not include housework or yard work that you have already told me about.* \*CODE 'UNABLE TO DO' ONLY IF RESPONDENT VOLUNTEERS**

- 1. Yes
- 2. No (\*SKIP TO F.8.)
- 3. UNABLE TO DO ACTIVITY (\*SKIP TO F.8.)
- 7. DON'T KNOW (\*SKIP TO F.8.)
- 8. REFUSED (\*SKIP TO F.8.)

**F.7. Over the past 30 days, how often did you do these moderate activities?**

**PROBE:** How many times per day, per week, or per month?

|\_\_|\_\_|\_\_| Enter number of times (per day, week, or month)

ENTER UNIT

- 1. Day
- 2. Week
- 3. Month
- 7. DON'T KNOW
- 8. REFUSED

**F. 7a Over the past 30 days, on average about how long did you do these moderate activities each time?**

|\_\_|\_\_|\_\_| Enter number (minutes or hours)

ENTER UNIT

- 1. minutes
- 2. hours
- 7. DON'T KNOW
- 8. REFUSED

***Now I will ask you about TV watching and computer use.***



**F.8. Over the past 30 days, on a typical day how much time did you spend sitting and watching TV or videos outside of work? Would you say...**

0. Less than 1 hour
1. 1 hour
2. 2 hours
3. 3 hours
4. 4 hours
5. 5 hours or more
- 6. NOT APPLICABLE, YOU DO NOT WATCH TV OR VIDEOS
- 7. REFUSED
- 8. DON'T KNOW

**F.9. Over the past 30 days, on a typical day how much time did you spend using a computer outside of work? Would you say...**

0. Less than 1 hour
1. 1 hour
2. 2 hours
3. 3 hours
4. 4 hours
5. 5 hours or more
- 6. NOT APPLICABLE, YOU DO NOT USE A COMPUTER OUTSIDE OF WORK
- 7. DON'T KNOW
- 8. REFUSED

**F.10. Now please compare the amount of activities you reported for the past 30 days to your activities in the past 12 months. Over the past 30 days, were you...**

1. More active
2. Less active
3. About the same
- 7. DON'T KNOW
- 8. REFUSED

**F.11. Compared with most {men/women} your age, would you say that you are...**

1. More active
2. Less active
3. About the same
- 7. DON'T KNOW
- 8. REFUSED

***In the next set of questions I will ask you more about physical activity. For the following questions, let me know if you 'STRONGLY AGREE,' 'AGREE,' 'DISAGREE' or 'STRONGLY DISAGREE.'***

**F.12.a. I have a place to do physical activity.**

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

**F.12.b. There are places that are easy to get to where I can do physical activity.**

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

**F.12.c. The activities I want to do cost too much.**

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

**F.12.d. I can make time for physical activity.**

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

**F.12.e. It is hard to find time to be physically active.**

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

**F.13. Do you consider yourself to be:**

1. Overweight
2. Underweight
3. Just about right
- 7. DON'T KNOW
- 8. REFUSED

***Now think about the foods you ate or drinks you drank during the past 30 days, including meals and snacks.***

**F.14. During the past 30 days, how many times per day, week or month did you drink 100% PURE fruit juices? Do not include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to. Only include 100% juice.**

PROBE: [IF NEEDED, SAY: "Your best guess is fine"]

[IF GIVES A NUMBER WITHOUT A TIME FRAME, ASK "Was that per day, week or month?"]

1. |\_\_|\_\_| Per Day
2. |\_\_|\_\_|Per Week
3. |\_\_|\_\_| Per Month
- 6. Never
- 7. DON'T KNOW
- 8. REFUSED

**INTERVIEWER NOTE:** Do not include fruit drinks with added sugar or other added sweeteners like Kool-aid, Hi-C, lemonade, cranberry cocktail, Tampico, Sunny Delight, Snapple, Fruitopia, Gatorade, Power-Ade, or yogurt drinks.

Do not include fruit juice drinks that provide 100% daily vitamin C but include added sugar.

Do not include vegetable juices such as tomato and V8 if respondent provides but include in "other vegetables" question E.17.

DO include 100% pure juices including orange, mango, papaya, pineapple, apple, grape (white or red), or grapefruit. Only count cranberry juice if the R perception is that it is 100% juice with no sugar or artificial sweetener added. 100% juice blends such as orange-pineapple, orange-tangerine, cranberry-grape are also acceptable as are fruit-vegetable 100% blends. 100% pure juice from concentrate (i.e., reconstituted) is counted.

**F. 15** During the past 30 days, not counting juice, how many time per day, week, or month did you eat fruit? Count fresh, frozen, or canned fruit.

1. |\_\_|\_\_| Per Day
2. |\_\_|\_\_|Per Week
3. |\_\_|\_\_| Per Month
- 6. Never
- 7. DON'T KNOW
- 8. REFUSED

**Read only if necessary:** "Your best guess is fine. Include apples, bananas, applesauce, oranges, grape fruit, fruit salad, watermelon, cantaloupe or musk melon, papaya, lychees, star fruit, pomegranates, mangos, grapes, and berries such as blueberries and strawberries."

**INTERVIEWER NOTE:** Do not count fruit jam, jelly, or fruit preserves.

Do not include dried fruit in ready-to-eat cereals.

Do include dried raisins, cran-raisins if respondent tells you - but due to their small serving size they are not included in the prompt.

Do include cut up fresh, frozen, or canned fruit added to yogurt, cereal, jello, and other meal items.

**F.16.** During the past 30 days, how many times per day, week, or month did you eat dark green vegetables for example broccoli or dark leafy greens including romaine, chard, collard greens or spinach?

PROBE: IF NEEDED, SAY: "Your best guess is fine"]

[IF GIVES A NUMBER WITHOUT A TIME FRAME, ASK "Was that per day, week or month?"]

1. |\_\_|\_\_| Per Day
2. |\_\_|\_\_|Per Week
3. |\_\_|\_\_|Per Month
- 6. Never
- 7. DON'T KNOW
- 8. REFUSED

**INTERVIEWER NOTE:** Each time a vegetable is eaten it counts as one time.

**INTERVIEWER NOTE:** Include all raw leafy green salads including spinach, mesclun, romaine lettuce, bok choy, dark green leafy lettuce, dandelions, komatsuna, watercress, and arugula.

**Do not include iceberg (head) lettuce if specifically told type of lettuce. Include all cooked greens including kale, collard greens, choys, turnip greens, mustard greens.**

**F. 17. Not counting what you just told me about, during the past 30 days, about how many times per day, week, or month did you eat OTHER vegetables? Examples of other vegetables include tomatoes, tomato juice or V-\* juice, corn, eggplant, peas, lettuce, cabbage, and white potatoes that are not fried such as baked or mashed potatoes.**

1. |\_\_|\_\_| Per Day
2. |\_\_|\_\_| Per Week
3. |\_\_|\_\_| Per Month
- 6. Never
- 7. DON'T KNOW
- 8. REFUSED

**Read only if needed: "Do not count vegetables you have already counted and do not include fried potatoes."**

**INTERVIEWER NOTE: Include corn, peas, tomatoes, okra, beets, cauliflower, bean sprouts, avocado, cucumber, onions, peppers (red, green, yellow, orange); all cabbage including American-style cole-slaw; mushrooms, snow peas, snap peas, broad beans, string, wax-, or pole-beans.**

**Include any form of the vegetable (raw, cooked, canned, or frozen).**

**Do not include products consumed usually as condiments including ketchup, catsup, salsa, chutney, relish.**

**Do include tomato juice if respondent did not count in fruit juice.**

**Include culturally and geographically appropriate vegetables that are not mentioned (e.g. daikon, jicama, oriental cucumber, etc.).**

**Do not include rice or other grains.**

**F.18. During the past 30 days, how many times did you drink regular soda or pop that contain sugar? Do NOT include diet soda.**

PROBE: *IF NEEDED, SAY: "Your best guess is fine"*

*[IF GIVES A NUMBER WITHOUT A TIME FRAME, ASK "Was that per day, week or month?"]*

1. |\_\_|\_\_|Per Day
2. |\_\_|\_\_| Per Week
3. |\_\_|\_\_|Per Month
- 6. Never
- 7. DON'T KNOW
- 8. REFUSED

**F.19. During the past 30 days, how often did you drink sweetened or fruit drinks such as lemonade, Kool-aid or cranberry drinks? Include fruit drink you made at home and added sugar to.**

PROBE: *IF NEEDED, SAY: "Your best guess is fine"*

*[IF GIVES A NUMBER WITHOUT A TIME FRAME, ASK "Was that per day, week or month?"]*

1. |\_\_|\_\_|Per Day
2. |\_\_|\_\_|Per Week

3. |\_\_|\_\_|Per Month

-6. Never

-7. DON'T KNOW

-8. REFUSED

**F.20. On average, how many time per week do you eat meals that were prepared in a restaurant? Please include eat-in restaurants, carry out restaurants and restaurants that deliver food to your house.**

*\*[MEALS MEAN MORE THAN A BEVERAGE OR SNACK FOOD LIKE CANDY BARS OR BAG OF CHIPS*

1. |\_\_|\_\_| Enter number of times

2. Never

3. Less than Weekly

-7. DON'T KNOW

-8. REFUSED

## SECTION G: SLEEP AND ENERGY

***Now I'd like to ask questions about your sleep patterns and energy in the past 7 days.***

**G.4. [Sleep109] In the past 7 days, my sleep quality was**

1. Very poor

2. Poor

3. Fair

4. Good

5. Very Good

-7. DON'T KNOW

-8. REFUSED

**G.5. [Sleep116] In the past 7 days, my sleep was refreshing**

1. Not at all

2. A little bit

3. Somewhat

4. Quite a bit

5. Very much

-7. DON'T KNOW

-8. REFUSED

**G.6. [Sleep20] In the past 7 days, I had a problem with my sleep**

1. Not at all

2. A little bit

3. Somewhat

4. Quite a bit

5. Very much

-7. DON'T KNOW

-8. REFUSED

**G.7. [Sleep44] In the past 7 days, I had difficulty falling asleep**

1. Not at all
2. A little bit
3. Somewhat
4. Quite a bit
5. Very much
- 7. DON'T KNOW
- 8. REFUSED

**G.8. [FATEXP41] In the past 7 days, how run-down did you feel on average?**

1. Not at all
2. A little bit
3. Somewhat
4. Quite a bit
5. Very much
- 7. DON'T KNOW
- 8. REFUSED

## SECTION H: SOCIOECONOMIC RESOURCES

### H.5. What is the highest level of education you completed?

1. Never went to school
2. Eighth grade or less
3. Some high school, not a high school graduate
4. High school graduate or GED
5. Some college or technical, trade or vocational school
6. Associates degree
7. Bachelor's degree
  
8. Master's degree
9. Doctoral degree
- 7. DON'T KNOW
- 8. REFUSED

### H.10. What is your current occupation?

Specify: \_\_\_\_\_

- 8. REFUSED

## RACE, ETHNICITY, ACCULTURATION

*Now we'd like to ask questions about your background.*

### H.16. Where were you born?

1. United States (\*SKIP TO H.22.)
2. Dominican Republic
3. Cuba
4. Mexico
5. Ecuador
6. Puerto Rico
7. Russia
8. Other country, Specify: \_\_\_\_\_
- 7. DON'T KNOW
- 8. REFUSED

### H.17. At what age did you move to the United States?

|\_\_| |\_\_| Enter age in years

- 7. DON'T KNOW
- 8. REFUSED

### H.22. Are you of Hispanic, Latino or Spanish origin?

1. Yes
2. No
- 7. DON'T KNOW
- 8. REFUSED

### H.23. Which of the following best describes your race? Select one or more responses.

1. White
2. Black or African American
3. Asian or Pacific Islander
4. American Indian or Alaska Native
5. Other race, Specify: \_\_\_\_\_
- 7. DON'T KNOW
- 8. REFUSED

**H.25. How many years have you lived in the community where you currently live?**

|\_\_|\_\_| Enter number of years

- 7. DON'T KNOW
- 8. REFUSED

**SECTION I: SOCIAL RELATIONS**

*Now I will ask you questions about your social relationships.*

**I.1. Which best describes your marital status? (\*CHOOSE ONLY ONE)**

1. Married
2. Currently living with a partner but not married
3. Single, never married
4. Divorced or separated
5. Widow
- 8. REFUSED

**I.2. Counting yourself, how many members currently make up your household?**

|\_\_|\_\_| Enter number of people

- 7. DON'T KNOW
- 8. REFUSED

**I.3. How many are under 18 years old?**

|\_\_|\_\_| Enter number of people

- 7. DON'T KNOW
- 8. REFUSED

**I.4. How many are between 18 and 64 years old? Count yourself if you are between 18 and 64 years old.**

|\_\_|\_\_| Enter number of people

- 7. DON'T KNOW
- 8. REFUSED

**I.5. How many are 65 years or older? Count yourself if you are 65 years or older.**

|\_\_|\_\_| Enter number of people

- 7. DON'T KNOW
- 8. REFUSED



**I.16. Do you belong to any social networking sites like Facebook, MySpace, or Twitter?**

1. Yes

2. No

-7. DON'T KNOW

-8. REFUSED

**I.17. In the past 7 days...**

	<b>Not at all</b>	<b>A little bit</b>	<b>Some what</b>	<b>Quite a bit</b>	<b>Very much</b>	<b>Don't Know</b>	<b>Refused</b>
I.17.a. [SRPSAT07] I am satisfied with how much work I can do (include work at home)	1	2	3	4	5	-7	-8
I.17.b. [SRPSAT24] I am satisfied with my ability to work (include work at home)	1	2	3	4	5	-7	-8
I.17.c. [SRPSAT47] I am satisfied with my ability to do regular personal and household responsibilities	1	2	3	4	5	-7	-8
I.17.d. [SRPSAT49] I am satisfied with my ability to perform my daily routines	1	2	3	4	5	-7	-8
I.17.e [SRPSAT50] I am satisfied with my ability to meet the needs of those who depend on me	1	2	3	4	5	-7	-8
I.17.f. [SRPSAT39] I am satisfied with my ability to do household chores/tasks	1	2	3	4	5	-7	-8
I.17.g. [SRPSAT06] I am satisfied with my ability to do things for my family	1	2	3	4	5	-7	-8
I.17.h. [SRPSAT38] I am satisfied with the amount of time I spend performing my daily routines	1	2	3	4	5	-7	-8

**SECTION J: PSYCHOSOCIAL AND COGNITIVE PROCESSES****CHRONIC STRESS**

**J.21. Have you experienced any serious personal health problems that have lasted for at least 6 months?**

1. Yes
2. No (*SKIP to J.23*)
- 8. REFUSED (*SKIP to J.23.*)

**J.22. Were these serious health problems...**

1. Not Very Stressful (NVS)
2. Moderately Stressful (MS)
3. Very Stressful (VS)
- 8. REFUSED

**J.23. Has someone close to you experienced serious health problems that have lasted for at least 6 months?**

1. Yes
2. No (*SKIP to J.25.*)
- 8. REFUSED (*SKIP to J.25.*)

**J.24. Were these serious health problems for someone close to you...**

1. Not Very Stressful (NVS)
2. Moderately Stressful (MS)
3. Very Stressful (VS)
- 8. REFUSED

**J.25. Have you experienced any difficulties with a job or the ability to work that have lasted for at least 6 months?**

1. Yes
2. No (*SKIP to J.27.*)
- 8. REFUSED (*SKIP to J.27.*)

**J.26. Were these difficulties with a job or the ability to work...**

1. Not Very Stressful (NVS)
2. Moderately Stressful (MS)
3. Very Stressful (VS)
- 8. REFUSED

**J.27. Have you experienced any financial problems that have lasted for at least 6 months?**

1. Yes
2. No (*SKIP to J.29.*)
- 8. REFUSED (*SKIP to J.29.*)

**J.28. Were these financial problems...**

1. Not Very Stressful (NVS)
2. Moderately Stressful (MS)

3. Very Stressful (VS)

-8. REFUSED

**J.29. Have you experienced any difficulties in a relationship with someone close to you that have lasted for at least 6 months?**

1. Yes

2. No (*SKIP to J.31.*)

-8. REFUSED (*SKIP to J.31.*)

**J.30. Were these difficulties in a relationship with someone close to you...**

1. Not Very Stressful (NVS)

2. Moderately Stressful (MS)

3. Very Stressful (VS)

-8. REFUSED

**J.31. Have you experienced any other ongoing difficulties that have lasted for at least 6 months?**

1. Yes, specify: \_\_\_\_\_

2. No (*SKIP to next section*)

-8. REFUSED (*SKIP to next section*)

**J.32. Were these ongoing difficulties...**

1. Not Very Stressful (NVS)

2. Moderately Stressful (MS)

3. Very Stressful (VS)

## SECTION K: NEIGHBORHOOD

### AVAILABILITY OF HEALTHY FOODS

**\*\*\*SHOW HANDCARDS \*\*\***

1. Strongly Disagree (SD)

2. Disagree (D)

3. Agree (A)

4. Strongly Agree (SA)

	SD	D	A	SA	REFUSED
K.6. A large selection of fresh fruits and vegetables is available in my neighborhood.	1	2	3	4	-8
K.7. The fresh fruits and vegetables in my neighborhood are of high quality.	1	2	3	4	-8
K.8. A large selection of low-fat products is available in my neighborhood.	1	2	3	4	-8

## SECTION L: ALCOHOL AND SMOKING

***Now, we are going to ask you some questions about alcohol and smoking.***

**L.1 Have you ever had alcoholic beverages such as beer, wine, champagne or liquor at least once per month for 6 months or more?**

1. Yes
2. No (\*SKIP TO L.9.)
- 8. REFUSED(\*SKIP TO L.9.)

**What type of alcohol beverage do you usually drink?**

	Yes	No	REFUSED
L.2. Beer	1	2	-8
L.3. Liquor	1	2	-8
L.4. Red Wine	1	2	-8
L.5. Other type of wine	1	2	-8
L.6. Other (Specify: _____)	1	2	-8

**L.7. Please think about your usual drinking patterns over the past 6 months. On average how many drinks do you usually have?**

1. Less than one per month
2. 1-3 per month
3. 1 per week
4. 2-4 per week
5. 5-6 per week
6. 1 per day
7. 2-3 per day
8. 4-5 per day
9. 6 or more per day
- 7. DON'T KNOW
- 8. REFUSED

**L.8. On a typical occasion when you drink, how many alcoholic drinks do you consume? Use the standard size for the type of drink. For example, a 1.5 oz shot for liquor, 12 oz for a can of beer or 5 oz for a glass of wine.**

1. 1 drink
2. 2 drinks
3. 3 drinks
5. 4-5 drinks
6. 5-6 drinks
7. 7 or more drinks
- 7. DON'T KNOW
- 8. REFUSED

***These next questions are about smoking.***

**L.9. Have you ever smoked at least one hundred cigarettes in your life?**

1. Yes
2. No (\*SKIP TO L.16.)
- 7. DON'T KNOW(\*SKIP TO L.16.)
- 8. REFUSED(\*SKIP TO L.16.)

**L.10. How old were you when you first started smoking?**

|\_\_|\_| Enter age in years

-7. DON'T KNOW

-8. REFUSED

**L.11. Currently, do you smoke cigarettes every day, some days, or not at all?**

1. Yes, every day (\*SKIP TO L.14.)

2. Yes, some days (\*SKIP TO L.15.)

3. Not at all

-8. REFUSED

**L.12. How old were you when you last smoked?**

|\_|\_|\_| Enter age in years

-7. DON'T KNOW

-8. REFUSED

**L.13. About how many cigarettes per day were you smoking before you last quit?**

|\_|\_|\_| Enter number per day (\*SKIP TO L.16.)

-7. DON'T KNOW (\*SKIP TO L.16.)

-8. REFUSED (\*SKIP TO L.16.)

**L.14. About how many cigarettes a day do you currently smoke?**

|\_|\_|\_| Enter number per day (\*SKIP TO L16)

-7. DON'T KNOW (\*SKIP TO L16)

-8. REFUSED (\*SKIP L16)

**L.15. About how many cigarettes a week do you currently smoke?**

|\_|\_|\_| Enter number per week

-7. DON'T KNOW

-8. REFUSED

**L.16. Have you ever smoked tobacco out of a water pipe, also known as hookah, even one or two puffs?**

1. Yes

2. No (\*SKIP TO SECTION N)

-7. DON'T KNOW

-8. REFUSED

**L.17. In the past 30 days, how often did you smoke tobacco out of a water pipe? Would you say**

1. Several times a day

2. Once a day

3. Several times a week

4. Several times a month

5. Once a month

6. Less than once a month

-7. DON'T KNOW

-8. REFUSED

<b>SECTION M: HEALTH LITERACY</b>
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***We are asking participants to help us learn how well patients can understand the medical information that doctors give them. Would you be willing to help us by looking at some health information and then answering a few questions about that information? Your answers will help us learn how to provide medical information in ways that patients will understand.***

***\*Read to Subject: "This information is on the back of a container of a pint of ice cream."***

***NOTE: IF a participant asks if they have answered correctly or incorrectly, say something like: "I can't show you the answers until you are finished, but for now you are doing fine. Now let's go on to the next question."***

ANSWER CORRECT?	YES	NO
M1. If you eat the entire container, how many calories will you eat? <i>ANSWER: 1,000 is the only correct answer</i>	1	0
M2. If you are allowed to eat 60 grams of carbohydrates as a snack, how much ice cream could you have? <i>ANSWER: Any of the following is correct: 1 cup (or any amount up to 1 cup) Half the container NOTE: If patient answers "two servings", ask "how much ice cream would that be if you were to measure it into a bowl?"</i>	1	0
M3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day? <i>ANSWER: 33 is the only correct answer</i>	1	0
M4. If you usually eat 2500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving? <i>ANSWER: 10% is the only answer</i>	1	0
<b><i>READ TO SUBJECT: Pretend you are allergic to the following substances: Penicillin, peanuts, latex gloves, and bee stings.</i></b>		
M5. Is it safe for you to eat this ice cream? <i>ANSWER: No</i>	1	0
<b><i>ASK ONLY IF PATIENT RESPONDS NO TO QUESTION 5. M6.</i></b> Why not? <i>ANSWER: because it has peanut oil</i>	1	0

**Newest Vital Sign Score: \_\_\_\_/6**

**M7. How confident are you filling out medical forms by yourself?**

1. Always
2. Often
3. Sometimes
4. Occasionally
5. Never

6. -7. DON'T KNOW
7. -8. REFUSED



**M8. How often do you have problems learning about your medical condition because of difficulty understanding written information?**

1. Always
2. Often
3. Sometimes
4. Occasionally
5. Never
6. -7. DON'T KNOW
7. -8. REFUSED

**M9. How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?**

1. Always
2. Often
3. Sometimes
4. Occasionally
5. Never
6. -7. DON'T KNOW
7. -8. REFUSED

#### SECTION N: Breast Cancer Supplemental Questions

***Only ask women the following questions***

**N1. How old were you when you first got your menstrual period?**

\_\_\_\_.\_\_\_\_ years (*enter whole or half years – use 0.5 for 6 months*)

- 6. Never had a period
- 7. Don't Know
- 8. Refused

**N2. How old were you when you gave birth to your first child? \_\_\_\_\_ years old**

- 6. Never gave birth to a child
- 7. Don't Know
- 8. Refused

**N3. Are you currently taking prescription hormone replacement therapy (“female hormones”)?**

1. Yes
2. No
- 7. Don't know
- 8. Refused

**N4. Has any of the following members of you family ever had breast cancer?**

Mother	1. Yes	2. No	-7. Don't know	-8. Refused
Sister	1. Yes	2. No	-7. Don't know	-8. Refused

	How many sisters? _____			
Daughter	1. Yes How many daughters? _____	2. No	-7. Don't know	-8. Refused

**SECTION O: Periodontal Disease**

***Gum disease is a common problem with the mouth. People with gum disease might have swollen gums, receding gums, sore or infected gums or loose teeth.***

**O1. Do you think you might have gum disease?**

- 1. Yes
- 2. No
- 7. DON'T KNOW
- 8. REFUSED

**O2. Overall, how would you rate the health of your teeth and gums?**

- 1. EXCELLENT
- 2. VERY GOOD
- 3. GOOD
- 4. FAIR
- 5. POOR
- 7. DON'T KNOW
- 8. REFUSED

**O3. Have you ever had treatment for gum disease such as scaling and root planing, sometimes called deep cleaning?**

- 1. Yes
- 2. No
- 7. DON'T KNOW
- 8. REFUSED

**O4. Have you ever had any teeth become loose on their own, without an injury?**

- 1. Yes
- 2. No
- 7. DON'T KNOW
- 8. REFUSED

**O5. Have you ever been told by a dental professional that you lost bone around your teeth?**

- 1. Yes
- 2. No
- 7. DON'T KNOW
- 8. REFUSED

**O6. During the past three months, you noticed a tooth that doesn't look right?**

- 1. Yes
- 2. No
- 7. DON'T KNOW
- 8. REFUSED

**O7. Aside from brushing your teeth with a toothbrush, in the last seven days, how many days did you use dental floss or any other device to clean between your teeth?**

|\_\_|\_\_| Enter number of days

-7. DON'T KNOW

-8. REFUSED

**O8. Aside from brushing your teeth with a toothbrush, in the last seven days, how many days did you use mouthwash or other dental rinse product that you use to treat dental disease or dental problems?**

|\_\_|\_\_| Enter number of days

-7. DON'T KNOW

-8. REFUSED

**O9. When did you last visit a dentist?**

1. Less than 6 months ago

2. 6 months to 1 year ago

3. 1-2 years ago

4. 2-3 years ago

5. 3-5 years ago

6. More than 5 years ago

-7. Don't know

-8. Refused

**O10. What was the main reason for your last visit to the dentist?**

1. Went on my own for checkup/examination/cleaning

2. Something was wrong/bothering/hurting

3. Went for treatment of a condition that was discovered earlier

4. Other

-7. Don't know

-8. Refused

**O11. What is the general condition of your mouth?**

1. Very good

2. Good

3. Fair

4. Poor

-7. Don't know

-8. Refused

***Thank you for taking the time to complete this survey.  
Your participation is very much appreciated.***