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# Health literacy and the level of hypertension in urban Latinos

Marlene Rosetta Glashen  
*Walden University*

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# Walden University

College of Health Sciences

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Marlene Glashen

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## Review Committee

Dr. Georjean Stoodt, Committee Chairperson, Public Health Faculty

Dr. Aimee Ferraro, Committee Member, Public Health Faculty

Dr. James Rohrer, University Reviewer, Public Health Faculty

Chief Academic Officer

Eric Riedel, Ph.D.

Walden University  
2015

Abstract

Health Literacy and Hypertension Levels in Urban Latinos

by

Marlene Rosetta Glashen

MS, Columbia University, 1989

BS, Herbert H. Lehman College, 1985

BS, York University, 1978

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

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## Abstract

Health literacy (HL) plays a significant role in health care communication and patient compliance. Low health literacy leads to noncompliance with health instructions, poor health choices, failure to participate in recommended health screenings, frequent hospitalizations, and higher health care costs. Using the health belief model (HBM) as the conceptual framework, this quantitative, cross-sectional study addresses a gap in the literature related to the research questions of this study. The research questions are: (a) Is there a relationship between HL and the level of hypertension (HTN) in hypertensive urban Latinos?, and (b) Will HL predict the level of control of HTN in these participants? Purposive sampling resulted in 136 hypertensive Latino adults, English, Spanish, or both, consenting to participate. They completed the health literacy test (STOFHLA) in Spanish or English. Information regarding participants' demographics, hypertensive history, and status came from the emergency department (ED) visit intake form and participant medical records. The data were analyzed using the complementary log-log model of ordinal logistic regression and multiple regression. Although a statistically significant relationship ( $p < .05$ ) was found between at least one of the independent variables and the level of HTN ( $\chi^2(8) = 20.498, p = .009$ ) in hypertensive Latinos seeking health care in an urban ED, a statistically significant relationship between HL and HTN was not. The social change implication is that the findings of this study can be used in health education programs to inform individuals that increasing age, and smoking can increase the level of HTN.

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## Dedication

This work is dedicated to my mother, Esther Gillis, who not having had the opportunity to attend school beyond the elementary level, understood the importance of education and unselfishly provided the support and opportunities for my siblings and me to pursue levels of education beyond her own, even after the death of my father at 42 years of age and through very difficult financial times.

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## Chapter 1: Introduction to the Study

### **Introduction**

This study examined the relationship between health literacy and the levels of HTN in hypertensive Latinos seeking health care in a New York City hospital emergency department (ED). Go et al. (2013) indicated an improvement in health literacy could lead to improvement in the health status of a group of people with a greater prevalence of HTN and prehypertension than non-Hispanic whites. HTN is a major contributor to cardiovascular disease and morbidity due to stroke, atrial fibrillation, and end-stage renal disease (Soto-Greene, Salas-Lopez, Sanchez, & Like, 2004). The background of the research problem and the purpose of the study are discussed in this chapter. Also discussed in this chapter are the research questions, hypotheses, theoretical framework, assumptions, delimitations, limitations, and study significance.

### **Background of the Problem**

The knowledge to make fully informed decisions about health care is crucial to clinical outcomes (Krisberg, 2004). Adequate health literacy improves crucial aspects to fostering a healthy population such as: individual autonomy, motivation, and self-confidence. Improving health literacy through health education may lead to healthy choices, efficient use of health services, and compliance with prescribed health instructions. On a larger scale, this can result in improving social, economic, and environmental health (Nutbeam, 2006).

About 90 million Americans experience difficulties acting on health information because of low health literacy (Krisberg, 2004). Low health literacy is associated with

decreased medical knowledge, increased hospitalizations, greater use of emergency services, worsening control of chronic diseases and infrequent use of preventive services (Kriplani, Paasche-Orlow, Parker, & Saha, 2006). Low levels of health literacy lead to inadequate understanding of disease prevention and progression (Andrus & Roth, 2002). Individuals at risk for low health literacy are the elderly, ethnic minorities, those with limited education, those who speak little or no English or for whom English is a second language, and those with public or no insurance (Keller, Wright, & Pace, 2008).

Individuals often use overcrowded EDs for nonemergency complaints. Often patients will come to the ED with complaints of fever when they have not taken their temperature at home, or for complaints of extended nausea, but they have had no vomiting episode (Hung, 2010). Also, individuals with low health literacy often delay seeking health care and fail to utilize preventive health care due to lack of understanding the significance of preventive health care (Sudore et al., 2006). Additionally, health literacy is important because more people are managing their health care than in the past (Wagner et al., 2001).

Howard, Gazmararian, and Parker (2005) examined the impact of low health literacy on the medical costs of Medicare enrollees and found that patients with low health literacy tend to incur higher costs for health care than patients with adequate health literacy, and they tend to use a mixture of health services in an inefficient manner. It is important that health care providers identify patients with low health literacy and recognize that low health literacy is a potential barrier to effective partnership, efficient health care, treatment compliance, and disease self-management (Cornett, 2009).

Patients with low literacy are often ashamed and avoid notifying their health care providers when they do not understand health information given to them, verbally or in writing. Some patients are not aware of their low literacy skills (Cornett, 2009). Even patients with good literacy who are experiencing difficulty negotiating the health care system and understanding health instructions may avoid asking questions (Cornett, 2009).

Howard et al. (2005) also found that individuals with low health literacy had higher emergency room and inpatient costs than those with adequate health literacy (CI 95%,  $p < 0.0001$ ). This study consisted of 3260 elderly individuals from Ohio, Texas, and Florida, enrolled in Medicare Managed Care. Low health literacy plays a role in disparities in access to health care and use of preventive health services among some groups of people (Sudore et al. 2006). Individuals with low health literacy tend to have poorer health and higher hospitalizations rates than those with adequate health literacy (Baker, Parker, Williams, & Clark, 1998).

The chronic disease of hypertension (HTN) is an important public health problem in the United States. It is an important risk factor for heart disease, stroke, premature death, and disability from cardiovascular complications (Morbidity and Mortality Weekly Report [MMWR], 2006). The problem is that the level of HTN awareness, treatment, and control among Hispanic Americans is low. It is 17% for Mexican Americans compared to 30% for non-Hispanic whites (MMWR, 2006). In this fastest growing racial/ethnic population in the United States, the Centers for Disease Control (CDC) analyzed death certificate data from 1995-2002 show a high HTN related mortality rate among Hispanic Americans, particularly Puerto Rican Americans (MMWR, 2006). Therefore, this study



examined the relationship between health literacy and the level of HTN in the hypertensive Latino population utilizing the urban ED of a major medical center in New York City for care. The results of this study could be useful to health care personnel involved in HTN prevention and control programs.

### **Problem Statement**

The health literacy demands of the current culture are high as a result of advances in medical science, changes in the delivery of care, and increased consumerism (Black, 2008). Relevant literature exists on topics such as the association of low health literacy with compliance, disease awareness, and disease progression among patients with glaucoma (Juzych et al., 2008); the association of low health literacy with poorer individual health and higher hospitalization rates (Baker et al., 2007); low health literacy and HIV-AIDS (Kalichman & Rompa, 2000); and the association of low health literacy with higher medical costs in Medicare enrollees (Howard et al., 2005). The results of the studies by Juzych et al. (2008) on glaucoma, and Kalichman and Rompa (2000) on HIV/AIDS indicated an association between health literacy and disease outcome. Participants with low health literacy were found to experience worsening disease or disease complications related to HIV/AIDS and glaucoma in these studies. The patients with glaucoma and low health literacy had a greater visual field loss at their initial presentation for care than those with adequate health literacy (Juzych et al., 2008). Study participants with HIV infection and low health literacy had greater rates of hospitalization and poorer health (Kalichman & Rompa, 2000). Only two of these studies (Baker et al., 2007, & Howard et al, 2005) included Latinos in the sample population. Thirteen percent

of participants in the Howard et al. (2005) study were Latinos while Latinos made up 8% of the sample population in the study by Baker et al. (2007). According to the U.S. Census Bureau (CDC, 2013), the Latino population in the United States had grown to 52 million in 2011 (about 16.7% of the total U.S. population), and is projected to reach 132.8 million by 2050 (about 30% of the total U.S. population). Also, the ED was not mentioned as a site for any these studies and no mention was made about whether the study participants included ED patients (Baker, 2007; Black, 2008; Juzych, 2008; Howard, 2005; & Kalichman & Rompa 2000).

There were no studies on the relationship between health literacy and the level of HTN in hypertensive Latinos in an urban ED in the review of the literature. This study examined the relationship between health literacy and the level of HTN in hypertensive Latinos in an urban ED in New York City. In Chapters 4 and 5 of this study I provided information regarding the need for additional studies on health literacy and HTN in hypertensive Latinos.

### **Purpose of the Study**

Hung (2010) stated that most of ED physicians agree there is a need for improvement in the health literacy of ED users. The failure to recognize early signs and symptoms of HTN can result in an individual's delay in seeking health care intervention early in the HTN disease process. An individual's health literacy status may play a role in this failure to recognize the early signs and symptoms of a chronic illness and may be responsible for hypertensive Latinos using an urban ED for chronic illness care. Thus, the purpose of this quantitative study was to investigate the relationship between health

literacy (independent variable) and the level of HTN (dependent variable) in hypertensive Latinos seeking health care in the urban ED of a major medical center in NYC, controlling for the covariates (age, BMI, gender, insurance, preferred language, and smoking).

### **Research Questions and Hypotheses**

The research questions and hypotheses that guided this study are the following:

1. Is there a relationship between health literacy, and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED regardless of age, BMI, gender, insurance, preferred language, and smoking?
  - a. The Null Hypothesis  $H1_0$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, there is no relationship between health literacy and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED.
  - b. The Alternative Hypothesis  $H1_a$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, there is a relationship between health literacy and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED.
  
2. Will health literacy predict the level of control of HTN in hypertensive Latinos seeking health care in an urban ED?
  - a. The Null Hypothesis  $H2_0$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, health literacy (low, marginal,

adequate) does not predict the level of control of HTN (controlled HTN, pre HTN, Stage 1 HTN, Stage 2 HTN) observed in hypertensive Latinos seeking health care in an urban ED.

b. The Alternative Hypothesis  $H2_a$ : After controlling for age, BMI, gender, insurance, preferred language, smoking, health literacy (low, marginal, adequate) predicts the level of control of HTN (controlled HTN, pre- HTN, Stage -1 HTN, Stage -2 HTN) observed in hypertensive Latinos seeking health care in an urban ED.

These research questions and hypotheses are discussed in Chapter 3.

### **Theoretical Framework**

The theoretical framework for this study is the HBM. This model was selected because it is a psychological model that can be used to explain health behaviors. The health behavior of the population of Latinos chosen for this study was a significant factor in the assessment of the relationship between health literacy, and the level of HTN observed in this group of people utilizing an urban ED for medical care. The constructs, of the HBM, focus attention on the attitudes and beliefs of the individual. The HBM has the core assumptions that: (a) an individual will take health-related action if that person thinks that a health condition can be improved, (b) a negative condition can be avoided if action is taken, and (c) a person believes in successful self-implementation of the health action. There are six constructs in the HBM. These are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Mirotznik, Ginzler, Zagon, & Baptiste, 1998). These constructs of the HBM are used to

explain the results of this study in terms of the health behavior of the Latino participants. This is further discussed in Chapter 2.

### **Nature of Study**

The cross-sectional survey design was utilized for data collection in this study because it is economical and allows for rapid turnaround of data in the ED setting. Also, the survey design is best for exploratory studies and for studies in which individuals are the units of analysis (Babbie, 2007). This study required that data be collected from individuals. It was exploratory in terms of the purpose. The purpose was to examine the relationship between health literacy and the levels of HTN in urban hypertensive Latinos. Survey designs also allow inferences to be made to the population regarding a particular health behavior in the sample (Babbie, 2007). The key variables for this study are health literacy (independent variable), levels of HTN (dependent variable) with age, BMI, gender, insurance, preferred language, and smoking as covariates. Data were collected from Latino individuals 18 years and older with a history of HTN seeking health care in the ED of a major New York City hospital. The cross-sectional survey was the instrument used for data collection and the data analysis involved the use of multiple and the complimentary log-log model of ordinal logistic regression

### **Definition of Terms**

*Health literacy:* Cognitive and social skills necessary for individuals to access, understand, and use information in ways that promote a healthy lifestyle (Nutbeam, 2000). For this study, health literacy was operationally defined as the score study participants obtained on the Short Test of Functional Health Literacy in Adults

(STOFHLA). Health literacy was defined as low (0-16), marginal (17-22), or adequate (23-36) on the basis of the study participants reading fluency and numeracy skills as measured by STOFHLA on a measuring scale of 0-36 (Baker, 2006).

*Health literacy measuring tools:* Instruments that researchers use to assess the reading and numeracy skills of individuals on health related topics. For this study, the STOFHLA was used. The reliability of this tool is a Cronbach's alpha = 0.98 and the validity is 0.91 (Nielson-Bohlman, Pasnzer, & Kindig, 2004).

*Hypertension (HTN):* Systolic blood pressure reading > 140 mmHg and diastolic blood pressure reading > 80 mmHg (JNC7, 2010).

*Levels of HTN:* for this study this was controlled HTN ( $\leq$  130/80) mmHg, pre-HTN -blood pressure readings of (130-139/80-89) mmHg; stage 1 HTN- blood pressure readings of (140-159/90- 99) mmHg and stage 2 HTN – blood pressure readings  $\geq$  160 systolic or  $\geq$  100 diastolic (JNC 7, 2010).

### **Assumptions**

1. That participants understood the survey and/or interview questions.
2. That their answers to the survey and/or interview questions were honest.
3. That the health literacy measuring tools accurately reflected the health literacy status of the participants.
4. That participants' health records maintained at the facility were accurate and current.

These assumptions were necessary to ensure that the data collected for this study was meaningful and useful to the purpose of the study which was to examine the relationship between health literacy and the levels of HTN in hypertensive urban Latinos.

### **Scope and Delimitations**

1. This study focused on Latinos who use one or both of two languages, English and Spanish, and thus excluded groups with other languages who may be experiencing similar problems with health literacy and chronic diseases. This focus on English and Spanish limited the possible application of the results this study to only those who were English or Spanish speaking with HTN and in a similar urban environment.
2. The lack of random sampling (a threat to external validity). The sample for this study was a purposive sample and thus the study population may not have been representative of the facility's ED population, and the findings may not be generalized to other groups outside of this urban ED setting.

### **Limitations**

1. A limitation of this study was that its cross-sectional design allowed for the collection of data at a specific time in history. This type of data collection does not support generalization of study results to other population groups (Babbie, 2007)
2. Also a major limitation of this study's cross-sectional design (data collection at a specific point in time) is that findings cannot be used to show a causal relationship between variables (therefore a threat to internal validity). Findings that show causal relationship will require data collection over time (Babbie, 2007).
3. Participants were selected from those individuals seeking health care in an urban hospital setting, and resided in an urban environment, this limited the possible application of the results of the study to groups of people seeking health care outside

- an urban hospital setting and residing in non-urban areas. The setting chosen for sample selection was also a limitation in terms of external validity.
4. The use of written material for recruitment of study participants, and for health literacy assessment may have contributed to the low number of illiterate individuals participating in the study and thus can be considered possible sources of limitation to the results of this study.
  5. The covariates (age, BMI, gender, insurance, preferred language, and smoking) examined in this study may not have been adequate, since other covariates not considered in this study (non-compliance with medications, physicians visits, and diet, alcohol consumption, distance from health care facility, income, marital status, and the presence of co-morbidities) may have influenced the results obtained for this study (Schillinger et al., 2004, Berkman et al., 2004, & Morales et al., 2002).

### **Significance of the Study**

#### **Implications for Social Change**

Low health literacy may compromise the health and well-being of Americans (Carmona, 2003). Individuals with low health literacy may be more likely to engage in behaviors that contribute negatively to health such as: smoking, alcohol abuse, illegal substance usage, and a sedentary lifestyle (Lee, Arozullah, & Cho, 2004). Because of low health literacy, individuals may skeptically demonstrate noncompliance with medications, physician visits, and preventive care. Such a lack of compliance often leads to poor health (poor degree of disease control) and severe disease complications requiring emergency care and hospitalizations (Lee et al., 2004). The problem of low health



literacy has grown since people are expected to assume responsibility for their health in the current complex health care system (Carmona, 2003). Moreover, individuals with low health literacy often hide their confusion regarding medications, and prescribed self-care activities from health care providers because of shame and intimidation (Carmona, 2003). Such behavior further contributes to low health literacy among some groups of individuals. The results of this study (discussed in Chapter 4) provide information that could result in the improvement in health care for Latinos with HTN and low health literacy. Such improvement could include programs to address health literacy in patients upon discharge from the ED. This in turn may lead to improved patients' compliance with prescribed medications, treatments, scheduled physician visits, and decreased use of the ED for non-emergency care. Adequate health literacy in a population with a chronic disease like HTN may decrease the incidence of adverse health problems (myocardial infarctions (MI), strokes, chronic kidney disease (CKD)), disease severity, delay disease progression, and possible early death that could occur with unmanaged HTN.

### **Summary**

This chapter provided information on the focus of this study, the gap in the literature, how this study addressed this gap, and the anticipated contributions of this study to health care delivery in an urban ED setting. Sections of this chapter have highlighted how health literacy, specifically the lack of health literacy, can lead to adverse health outcome for individuals with chronic diseases. The use of HBM constructs as theoretical framework for this study were also discussed, as well as the study variable definitions. Also examined in this chapter were the assumptions, potential

limitations, delimitations, and significance of this study. Chapter 2 will provide a detailed discussion on recent health literacy and chronic disease research. The HBM, as it relates to the health behavior of the Latino study participants, will also be discussed in Chapter 2.

## Chapter 2: Literature Review

### **Introduction**

The review of the literature focused on information accumulated from 2000 to the present on health literacy and HTN in Latinos. Data on the ED use for chronic disease care from the same time period was also evaluated. This review is organized into five sections. The first section is a discussion of the theoretical framework which will be used to explain the health behaviors of the study participants. This will be followed by sections on studies on the relationship between health literacy and chronic diseases, the relationship between ED usage and chronic diseases, health literacy and HTN in Latinos, health literacy measuring tools and the identification of the measuring tool selected for this study, and the transition summary.

While several studies have shown an association between health literacy and various health outcomes the purpose of this study was to examine the relationship between health literacy as measured by STOFHLA, and the levels of HTN (controlled HTN, pre-HTN, stage-1 HTN, and stage-2 HTN) in hypertensive Latinos seeking health care in an urban ED. This chapter will provide information on the strategy used to search the literature, the theoretical framework for the study, health literacy and chronic diseases, EDs and chronic diseases, health literacy and HTN in Latinos, and health literacy measuring tools.

### **Literature Search Strategy**

A search of the literature was conducted electronically through remote access to libraries at Columbia University, Albert Einstein College of Medicine, Walden

University, and the local Hempstead and Uniondale Public Libraries in Nassau County, New York. Articles from both primary and secondary sources were reviewed. Every attempt, however, was made to select articles from primary sources. The databases used were MEDLINE, CINAHL, PsycINFO, ERIC, MEDLINE-Plus, Entrez, Proquest, Medscape, Google Scholar, and PubMed. E-Books and E-Journals were retrieved from AccessMedicine and Books@OVID. The list of terms used to conduct the search included *theories and health, Health Belief Model, health literacy, health literacy and disease self-management behaviors, health literacy and the health care delivery system, health literacy and Americans, health literacy and self-care, health literacy and culture/age/gender/income, health literacy and HTN, health literacy and Latinos, health care in an urban setting, minority populations, HTN and Americans, HTN and Latinos, city dwellers and HTN, EDs and chronic diseases, and primary care in urban settings*. More than three hundred articles were retrieved. Mainly, those that contained these terms, and contained studies done between the years 2000 and 2013, were selected as appropriate for this study, and for a thorough review. An occasional study from 1984 through 1999 was selected for foundational work.

### **Theoretical Framework**

According to Janz and Becker (1984), several researchers use the HBM to assess preventive health behaviors (actions taken to avoid the disease), sick-role behaviors (actions taken to restore health or to halt disease progress), and clinic-visits (reasons for clinic utilization). There are six constructs in the HBM and they are perceived susceptibility to disease, perceived severity of the disease, perceived benefits from

treatment of the disease, perceived barriers to seeking or obtaining treatment for the disease, self-efficacy, and cues to action (Strecher & Rosenstock, 1977). These constructs are appropriate for explaining the health behavior of the participants in this study in terms of perceived barriers to access to health care and in terms of the participants' belief in self care.

Self-efficacy is a source of motivation. Individuals with self-efficacy tend to approach difficulties as challenges to be mastered. Thus, they approach adverse situations with the confidence that they can control these situations (Bandura, 1994). According to Bandura, self efficacy is influenced by several factors including mastery of experiences, observing the success of others in similar circumstances, and by exposing individuals to situations which require self management.

Like self-efficacy, cues to action are external events which explain the individual's behavior in terms of a desire to change. Self efficacy describes the individual's mastery of experiences and ability to confidently tackle circumstances after observing others success with similar situations (Bandura, 1994). Cues to action explain the external events that move an individual from wanting to change to change (Janz & Becker, 1984). Figure 1 is a display of the HBM. As shown in Figure 1, health literacy has the potential to influence the constructs of the HBM. This conceptual framework provided a useful tool for interpreting the ways that health literacy operate in this population of urban Latinos to influence HTN.

Individual Perceptions                      Modifying Factors                      Likelihood of Action

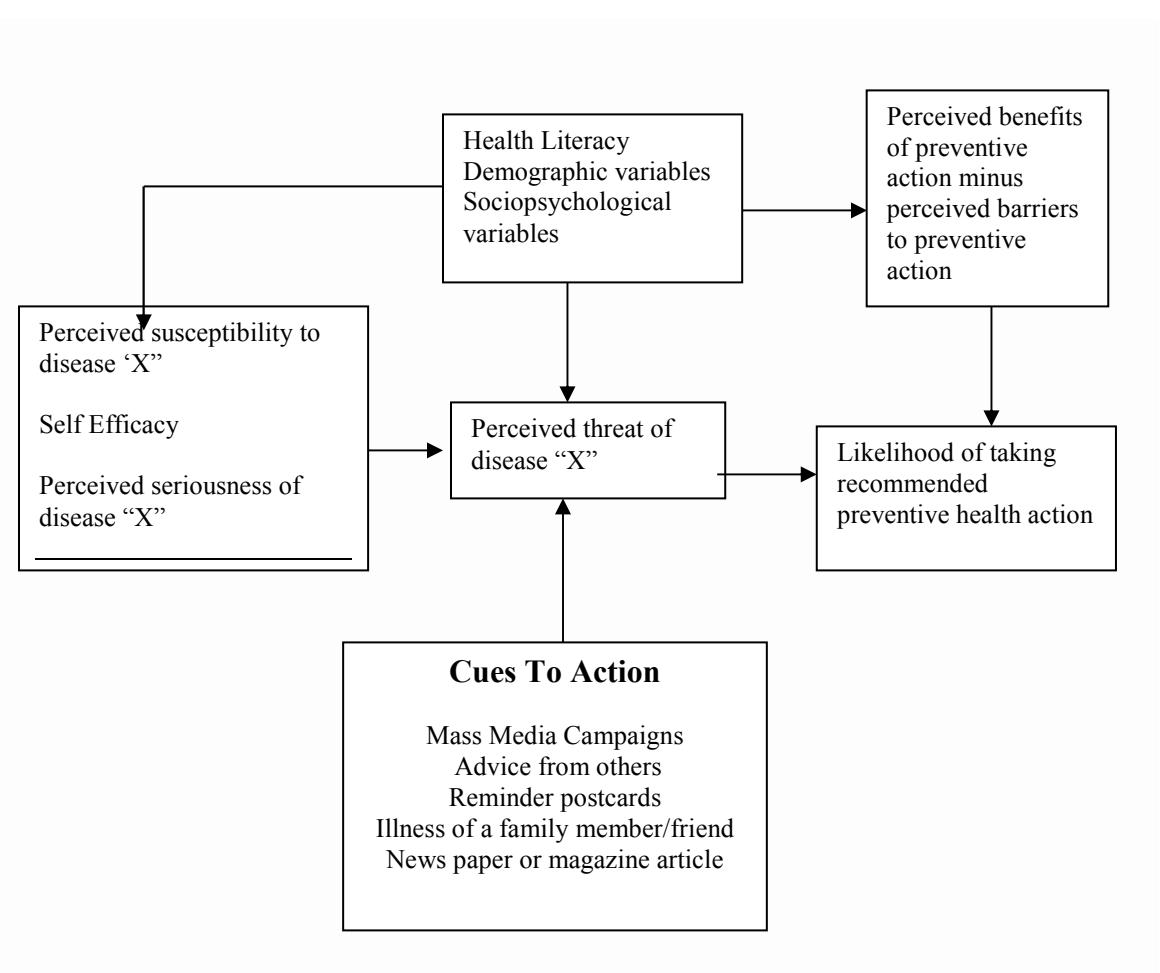


Figure 1. The health belief model

**Literature Review**

**Health Literacy and Chronic Diseases**

Patients with extensive and complicated health problems have the greatest risk for misunderstanding their diagnoses, medications, and how to take care of themselves (Parker, 2000). These patients experience health literacy struggles, often not obvious to health care providers. Physicians often assume that patients can read and understand health related materials. In fact, even though other factors may be involved, many

patients have difficulty communicating with their health care providers due to limited health knowledge (Parker). Low health literacy is associated with poor health outcomes and inadequate use of some health care services (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Several studies (Baker et al. 2007; Paasch-Orlow et al. 2005; Kalichman & Rompa, 2000; & Omachi et al. 2013) found a relationship between low health literacy and poor health outcomes. Baker et al. found an increase in death rates from cardiovascular disease, cancer, or other causes as the level of health literacy decreased. These researchers conducted a prospective cohort study of Medicare manage-care enrollees (1997-2003) in four U.S. metropolitan areas, Cleveland, Houston, Tampa, and Ft. Lauderdale/Miami. This study included 3,260 participants. These participants were 65 years and older. Baker et al. used the S-TOFHLA tool to assess the health literacy status of the study participants, and the National Death Index and The International Classification of Diseases to assess the different causes of mortality. The reported death rate for the group with inadequate health literacy was 19.3% (adjusted hazard ratio 1.52) compared to 16.7% loss from the group with marginal health literacy (adjusted hazard ratio 1.39), and only a 7.9% loss from the group with adequate health literacy (adjusted hazard ratio 1). The confidence interval (CI) was 95% across the groups (Baker et al.).

Paasche-Orlow et al., 2005 found a relationship between decreased health literacy and increased adverse health outcomes. These researchers examined the relationship between inadequate health literacy and difficulties learning and retaining instructions about asthma self-management skills in a study of patients with chronic asthma. This study was conducted in two inner-city hospitals, using the S-TOFHLA tool to assess

health literacy. The results did not only show that the study participants with inadequate health literacy experienced difficulties learning and retaining instructions on asthma self-management skills, but that participants with inadequate health literacy scored lower (5 out of 10 questions) on the asthma knowledge assessment test than those with adequate health literacy (or for better asthma medication knowledge score 0.08; CI 95%, 0.02-0.38;  $p= 0.002$ ) and that these participants with inadequate health literacy were more likely than those with adequate health literacy to experience both hospitalization for asthma related illness in the 12 months of data collection (81% versus 52%;  $p =0.04$ ), and to experience a higher rate of near fatal asthmatic episodes (63% versus 37%;  $p= 0.07$ )

Additionally, Kalichman and Rompa, 2000 found that a relationship between health literacy and the chronic disease of HIV/AIDS. Kalichman and Rompa, like Baker et al. 2007 and Paasche-Orlow et al 2005, examined the relationship between health literacy and health outcomes by comparing individuals with lower and higher health literacy in terms of HIV health status and disease treatment knowledge. This study consisted of 339 HIV infected men and women (22-69 years) recruited from AIDS service organizations, healthcare providers, social service agencies, community residencies, and infectious disease clinics. Using TOFHLA (a 50 item reading comprehension and 17 item numerical health literacy assessment tool) to assess the health literacy status of the study participants, Kalichman and Rompa found that individuals with the low health literacy (a score less than 80% on TOFHLA) experienced lower CD4 cell counts, higher viral loads, were more likely to be noncompliant with antiretroviral



medications, experienced more hospitalizations and overall poorer health than individuals with high health literacy (a score of 80% or more on TOFHLA).

Furthermore, Omachi, Sarkar, Yelin, Blanc, and Katz, 2013 found that limited health literacy is associated with poor health outcomes in individuals with chronic diseases. Omachi et al. conducted a study to examine the associations between the health outcome and health status of individuals with COPD. This was a cohort study of 277 non-Latino White individuals with COPD. These study participants were 55 years and older and 65% were women. Omachi et al. used random-digit telephone dialing to U.S. homes with landlines to select study participants diagnosed with COPD. To measure health literacy, the researchers (Omachi et al.) used a validated three-item questionnaire similar to the Rapid Estimate of Adult Literacy in Medicine with a total possible score of 3-15. Individuals with higher scores in this range were considered to have better health literacy than those who scored toward the lower end of this range (3 -15). Individuals were assigned to health literacy tertiles (highest, middle, lowest) based on their scores on the health literacy test (Omachi et al.). Several instruments were used to measure the COPD status of the study participants, specifically helplessness, severity, and respiratory qualities. The 13-item COPD Helplessness Index (CHI) measured the COPD health status of individuals. Higher scores on the range 0-52 correlated with greater COPD helplessness. Higher scores on the scale 0-20 on Airway Questionnaire-20R (AQ-20R) reflected poorer respiratory specific health related quality of life (HRQoL); similarly, higher scores on the range 0-35, correlated with more severe COPD (Omachi et al.). Using multivariate logistic regression analyses (controlling for age, gender, race, annual

household income and educational status) Omachi et al. reported a statistical association between poorer health literacy with worse COPD- related health status in terms of COPD severity, learned helplessness, and respiratory HRQoL. The researchers of this study found poorer health literacy (the lowest tertile 3.7; 95% CI 1.6-5.8) to be associated with greater COPD helplessness index and with worse respiratory-specific HRQoL (lowest tertile 3.5; 95% CI 1.8-4.9). Omachi et al. also found poorer health literacy to be associated with higher COPD related hospitalizations (OR 6.6; 95% CI 1.33-3.33) and COPD related ED visits (OR 4.7; 95% CI 1.5-15).

The relationship between health literacy and chronic disease outcomes is further supported by the findings in a study by Juzych et al., 2008. Juzych et al. examined 204 English speaking individuals (older than 18yrs) with glaucoma, treated in a Michigan urban eye institute for the association of health literacy with compliance, disease awareness, and disease progression. The researchers found that the group with poor health literacy experienced significantly ( $p < .001$ ) greater visual field loss on initial presentation, poorer medication compliance, worse disease understanding, and greater disease progression than the group with adequate health literacy (Juzych et al.). Similarly, Muir, Christensen, and Bosworth, 2013 reported that limited health literacy was associated with poor disease outcome. They conducted a review of the literature to examine the association between health literacy and health outcomes in terms of glaucoma disease status. Like Juzych et al., Muir et al. found that the results of the literature review showed that patients with limited health literacy experienced increased glaucoma related complications in terms of poor vision.

### **Emergency Departments and Chronic Diseases**

McCusker et al, 2010 found that individuals who use the ED for the care of chronic diseases do so often because of the perception of the lack of access to a regular health care provider, unmet health care needs, poor or no continuity of care, and perceived lack of rapid access to care. In a response to a telephone survey by McCusker et al., about one-third of the study participants stated that the health problem they visited the ED for could have been handled by their family physician but that they felt that the ED visit was more accessible. McCusker et al. found that individuals were using the ED for non-emergency care of chronic conditions like HTN, diabetes mellitus, asthma, chronic obstructive pulmonary disease (COPD), and heart disease. Even though everyone had universal health coverage in this group of 33,491 study participants of 18 years and older, individuals from rural areas with chronic diseases had the tendency to use the ED for primary health care more so than those in urban areas often citing a lack of access to a primary health care provider (McCusker et al.). The findings were similar for Oster and Bindman, 2003 who conducted a study to examine the number of preventable hospitalizations for chronic diseases directly related to emergency room visits. The study population consisted of the insured, Medicaid insured, and self-paying individuals, 18-64 years old. Oster and Bindman reported that African American patients and Medicaid Beneficiaries visited the ED for chronic ambulatory care sensitive diseases (asthma, chronic obstructive lung disease, congestive heart failure, diabetes mellitus, and HTN) at a rate disproportionate to the reported prevalence of these diseases among comparable aged persons in the United States. That patients tend to electively use ED physicians

instead of community-based primary care physicians for chronic disease care is further supported by Kaskie et al., 2011. These researchers examined Medicare claims for 1991 – 2007 of 5,510 older adults (65 years and older), specifically focusing on the reasons why these individuals used the ED. They found that of the 58.1 % of the adults who persistently used the ED for severe, non-severe, and indeterminate clinical health problems, 19.5 % of these adults visited the ED for non-severe clinical health problems (alcohol consumption, arthritis, and stroke). Like McCusker et al. the participants in this study (Kaskie et al.) shared similar reasons for ED use including immediate access, a full range of diagnostic and treatment services, and definitive resolution of their complaints.

However, some researchers have found that individuals with chronic diseases who had access to regular family physicians did not go to the ED for primary care related issues. Mian and Pong, 2012 examined the use of the ED for one year by 8,502 Ontario residents 16 years and older. Like McCusker et al., 2010, Oster and Bindman , 2003, and Kaskie et al., 2011, they examined ED use by individuals with chronic health conditions (HTN, DM, arthritis, stroke, cancer, respiratory problems including asthma, or depression) for primary care related issues, focusing specifically on the relationship between access to family physicians in the community and ED use. This was a population-based telephone survey to collect information on primary health care issues. The survey was designed by the Ontario Ministry of Health. Using multivariate logistic regression analysis, Mian and Pong found that individuals with chronic diseases who had access to regular family physicians were less likely than those without access to regular family physicians to go to the ED for primary care related issues (OR = 0.47, p = .01).

None of these studies on ED use for chronic disease care looked at health literacy as having a possible role in the use of the ED for chronic disease care. The study I am proposing will examine the relationship between health literacy and the use of the ED for chronic disease care in an effort to gather data that will fill this gap and add to the current information in the literature.

### **Health Literacy and HTN in Latinos**

The Hispanic population in the US is outpacing all other groups in growth. The Hispanic population increased by 43% from 15.2 million from 2000 – 2010, while the total population growth in the US was 10% during the same time period (DOC, 2010). Although, among adults in the United States (US) aged 18 years and older, about 29% has HTN (Ostchega, Yoon, Hughes, & Louis, 2008), the prevalence of HTN among Hispanics is lower than the prevalence of HTN among non-Hispanic White Americans (Lorenzo, Serrano-Rios, Martinez-Larrad, Gabriel, Williams & Gonzalez-Villalpando et al, 2002). HTN affects 25% of the Latino adults and rates of awareness, treatment, and control of HTN were reported to be lower in Latino men than in Latino women, in the NHANES III survey of 1999-2000 (Perez-Stable & Salazar, 2004). Nevertheless, HTN is one of the major risk factors for cardiovascular disease (myocardial infarction and other types of ischemic heart disease) in the Hispanic population (Aranda & Vasquez, 2004). The studies examined so far in this chapter regarding health literacy, and chronic disease indicate that there is a connection between health literacy, health related behaviors, disease knowledge, disease management, and disease related complications.

According to a study by Kountz, 2004, members of the Latino population in the US often are not aware that they have HTN, and if they know, they do not accept the need for medication as a source of treatment for this disease. Therefore, the rates of blood pressure control are lower for Latinos than for White or African Americans. Kountz collected data for this study from a multistage National Health and Nutrition Examination Survey (NHANES) conducted from 1988-2000 with a population of Latinos, White and Black Americans. This study showed a consistent increase in the prevalence of HTN among Latinos, specifically Mexican Americans, White and African Americans from 1988-2000, but the level of awareness of HTN among Latinos was consistently lower for Mexican Americans than for the White and African Americans. For 1988-1991, 54.4% of Mexican Americans were aware that they had HTN, compared to 70.6% and 73.3% for White and African Americans. Then for the 1991-1994 NHANES study, 62.0% of Mexican Americans were aware that they had HTN compared to 67.5% and 72.6% for White and African Americans, and 57.8% of Mexican Americans, compared to 69.5% and 73.9% of White and African Americans for the 1999-2000 NHANES (Kountz).

This lack of awareness of the presence of the chronic disease of HTN in the Latino population is further supported by the findings of a study by Bersamin, Stafford, and Winkleby, 2009 conducted to examine the awareness, treatment and control of HTN among Mexican American women and men. These researchers found that among a study population of 1359 non-pregnant Mexican American women and 1421 Mexican American men ages 25-84 years, 65% were unaware that they had HTN (Systolic blood pressure  $\geq$  140 mmHg, or diastolic blood pressure  $\geq$  90 mmHg). The findings of the

studies examined in this section show a lack of awareness and control of HTN in the Latino population. This study examined the relationship between health literacy and the level of HTN in hypertensive Latinos in an urban ED and provided information that will add to the current literature on HTN in Latinos.

### **Critique of Methods**

Baker et al., 2007 stated that the aim of their study was to determine if low health literacy independently predicted mortality rates in individuals with chronic diseases. Though costly, the prospective cohort study design was appropriately used for this study since this study design reduces exposure bias and allows for the study of disease associations (Babbie, 2007). Also, attrition can occur with individuals in a prospective cohort study, but, the sample size of this study (3260 Medicare managed-care enrollees) may have been large enough to allow for some attrition without significantly influencing the study results. The study participants were 65 years and older, the age group most likely to have chronic diseases. It is not clear if the study participants were randomly selected. Instrumentation for this study by Baker et al. included a letter of introduction, face to face interview for data on race/ethnicity, education, annual income, health behaviors, body mass index, and chronic medical conditions. Established tests (S-TOFHLA  $p < .001$ , the 12- Item Short-Form Health Survey, and the Geriatric Depression Scale) with known reliability and validity were appropriately used in this study to measure the respective variables. Data analyses were appropriately accomplished with Chi-squares and multivariate Cox models with a 2-tail P value of .05 to determine the differences in cause-specific deaths (cardiovascular, cancer, and other). The results of this

study supported an association between inadequate health literacy and cause specific mortality rates from chronic diseases, even though it was not clear what diseases the researchers used “other” to refer to.

Similarly, Kaskie et al., 2011 conducted a study to examine the ED use by three groups of seniors 65 years and older. One group of seniors had severe clinical conditions, one group had non-severe clinical conditions, and the third group of seniors had indeterminate severity of clinical conditions. This study was conducted over a 17-year period (1991-2007). The method of data collection, sampling technique and sample size utilized for this study (Kaskie et al.) were appropriate for the extended period the study was conducted. Data collection was by secondary analysis of the survey on Assets and Health Dynamic among the Oldest Old (AHEAD) previously administered at the University of Michigan (a prospective cohort study). The 5,510 individuals selected for this study (Kaskie et al.) from the original AHEAD also had data on the Medicare claims regarding the type of ED care these individuals received. This method of sample selection was appropriate in that by selecting individuals with recorded health information on Medicare claims enabled the researchers of this study to obtain the information needed to identify and to assign 3,201 (58.1%) of these individuals to the three study groups on the basis of the severity of their clinical conditions which led to the ED visit. The researchers reported that individuals who visited the ED for clinically severe health conditions made up 17.2% (948) of this population while 19.5% (1076 individuals) utilized the ED for non-severe clinical health conditions, and 21.4% (1177 individuals) utilized the ED for clinically indeterminate severe health conditions. Logistic regression, odds ratios, and



confidence intervals were appropriately used to analyze the results of this study in which the dependent variable was ED usage pattern and the independent variables were severity of clinical conditions, educational status, income and insurance coverage (Kaskie et al.). The researchers reported that the findings of their study showed a lack of significant differences between the three groups using the ED for health care in terms of access to health care, or in health behaviors such as obesity, or smoking but concluded that, on the basis of their statistical analysis, individuals utilizing the ED for non-severe clinical problems did so significantly for chronic health problems like moderate alcohol consumption (AOR 1.42; CI 1.03-1.94), and arthritis (AOR 1.28, CI 1.04-1.57).

McCusker et al., 2010 conducted a study to examine the use of ED physicians instead of community physicians for ambulatory care sensitive chronic conditions (ACSCC) by individuals with ACSCC. The researchers (McCusker et al.) appropriately used a cross-sectional survey design in this study to examine previously collected data for the Canadian Community Health Survey (CCHS) in 2003 and 2005. This data was collected on Quebec residents over the age 18 years, and the overall response rate was 76.4 % with a low probability of the same person participating in both surveys. The researchers (McCusker et al.) report a total sample size of 53,456 with 33,491 individuals reporting one or more contact with a primary care providing physician in the 12 months preceding the survey, and 1,677 of these individuals stated that the primary care providing physician they encountered was in an ED. Multiple logistic regression was appropriately used to analyze the findings of this study that the outcome (ED use for ACSCC) was strongly (OR 1.69, 95 % CI: .96, 2.97) associated with the unmet health

needs of individuals with ACSCC due to the lack of a community based primary care provider.

Bersamin et al., 2009 conducted a cross-sectional study to examine the predictors of HTN awareness, treatment and control among Mexican Americans using available data from the National Health and Nutrition Examination Surveys (NHANES), 1999-2004. The cross-sectional design was appropriately used for this study (Bersamin et al.) in which the aim of the researchers was to define the factors contributing to poor blood pressure control among Mexican Americans. The sample size of 1359 Mexican American women and 1421 Mexican American men (25-84 years) was large enough. Bersamin et al. appropriately used logistic regression analyses to evaluate the findings of this study which showed a relationship between the dependent variable of HTN and the independent variables of age, sex, country of birth, primary language spoken, education, health insurance and BMI. One such finding was that younger Mexican Americans (25-34 years) were significantly (OR = 5.5, 95% CI,  $p < 0.001$ ) less likely to be aware that they had HTN than older Mexican Americans (35% versus 72% respectively).

A review of the literature shows that the cross-sectional study design is the design most frequently used in studies in which the researchers are seeking to examine the relationship between independent and dependent variables such as is the case with my proposed study. The studies by Kaskie et al., 2011, Mc Cusker et al., 2010 and Bersamin et al., 2009 were similar in that these researchers selected cross-sectional survey designs, and logistic regression analyses to evaluate the results of their studies. The strengths of these studies are that this cross-sectional study design reduced the risk of attrition, was

appropriate for the chronic diseases evaluated and allowed the researchers to achieve the aims of their studies. Also, these studies (Kaskie et al., Mc Cusker et al., and Bersamin et al.), because of their cross-sectional design, may not have been too costly to conduct (Blumenthal & DiClemente, 2004). However, the use of secondary data by Kaskie et al., McCusker et al., and Bersamin et al. may be a source of weakness for the results of these studies.

Table 1.

*Summary of the Literature on Health Literacy and Chronic Disease*

Authors (years)	Health Literacy Measure	Chronic Disease Measure	Results	Design and Population
Baker et al. (2007).	Prospective cohort study of 3260 Medicare managed-care enrollees from four health plans in Ohio, Texas, and Florida.	Health literacy was measured with S-TOFHLA. Scores ranged from 0-100. Individuals who scored 0-55 were classified as individuals with inadequate health literacy. Those who scored 56-66 had marginal health literacy. Those who scored 67-100 had adequate health literacy.	The National Death Index was used to identify deaths and the cause of death (cardiovascular, cancer, or other) was determined by the International Classification of Diseases. The National Death Index provided matches based on the individual's name, race, sex, marital status, social security number, and date of birth.	Among the study participants, 64.2% were found to have adequate health literacy, 11.2% were found to have marginal health literacy, and 24.5% had inadequate health literacy. More deaths were recorded for participants in the inadequate and marginal health literacy groups than for those in the adequate health literacy group ( $p < .001$ ). The death rate from chronic diseases remained higher for the groups of individuals with inadequate and marginal health literacy even after adjusting for race, ethnicity, education, income, smoking, alcohol, and exercise.
Bersamin et al. (2009)				

Health Literacy Measure	Chronic Disease Measure	Results	Design and Population
<p>Cross-sectional analysis of secondary data from the National Health and Nutrition Examination Surveys (NHANES) from 1999-2004. The sample size was 1359 Mexican American women and 1421 Mexican American men.</p>	<p>Health literacy in terms of HTN awareness was self reported. A weakness of this study is that no established measuring tool was used to gather this data.</p>	<p>Chronic diseases for this study were HTN, obesity measured using BMI, and diabetes mellitus. HTN measurements were according to the guidelines of the Joint National Committee on the Prevention, Evaluation, and Treatment of HTN. Normal weight was a BMI of 18.5-24.9 kg/m<sup>2</sup>, overweight (BMI of 25-29.9 kg/m<sup>2</sup>), obese (BMI ≥ 30 kg/m<sup>2</sup>), or morbid obesity (BMI ≥ 40 kg/m<sup>2</sup>). Participants were classified as having diabetes mellitus if they were on insulin, taking diabetes medication, or had a fasting plasma glucose ≥ 126mg/dL. Fasting plasma glucose was measured using the national glucose oxidase reference method.</p>	<p>After controlling for age, gender, language, country of origin, education, and insurance, there was a significant association between awareness of HTN and age (OR=5.5, p&lt;0.001), country of origin (OR=1.7, p&lt;0.05), and insurance (OR=3.0, p&lt;0.005).</p>

Authors (years)	Health Literacy Measure	Chronic Disease Measure	Results	Design and Population
Juzych et al. (2008)	A cross-sectional Observational Study of 204 English-speaking Patients in Detroit, Michigan.	Health literacy was assessed with TOFHLA Comprising of a 50- item of Comprehension section scored on a scale of 1-50. Poor health literacy was a score of 0-30, and adequate health literacy was a score of 31-50.	Patients had one year diagnosis of glaucoma. The severity of glaucoma was determined by retinal nerve fiber layer (RNFL) thickness on optical coherence tomography (OCT). This visual field data was taken from the patients' medical records.	The number of patients found to have poor health literacy was 102 (50%). Patients with poor health literacy missed more eye clinic appointments (OR- 0.5, $p < .001$ ), and were found to have worse visual field parameters ( $p = .02$ ) than patients with adequate health literacy. Patients in the poor health literacy group had a RNFL of 65% on OCT, while the patients with adequate health literacy had a RNFL of 49% on OCT ( $p = .09$ ). Confounders adjusted for were race, ethnicity, education, income, marital status, and insurance coverage.
Kalichman & Rompa. (2000)	A cross-sectional study of 339 men and women infected with HIV-AIDS in Milwaukee, Wisconsin.	Health literacy was measured using the reading comprehension section of TOFHLA. Participants who scored $\leq 80\%$ on TOFHLA were defined as persons	HIV disease and treatment knowledge was measured using a 14-item instrument which assessed the basic knowledge of the HIV disease processes, transmission risks, medications, and viral load	After adjusting for confounders such as age, gender, ethnicity, education, income, and years of HIV-AIDS disease, using multiple logistic regression analyses, the results of this study showed a significant

Authors (years)	Health Literacy Measure	Chronic Disease Measure	Results	Design and Population
		with lower health literacy. Those who scored $\geq 81\%$ were defined as persons with higher health literacy.		relationship between health literacy and HIV viral load; between health literacy and the frequency of hospitalizations annually. Individuals with lower health literacy were more likely to be hospitalized for HIV/AIDS related illnesses ( $p \leq .05$ ) than those with higher health literacy. Also, individuals with higher health literacy had significantly lower viral loads ( $p < .01$ ) than those with lower health literacy.
Muir et al. (2013)	A review of data from previous studies to examine the relationship between health literacy and chronic diseases, specifically, glaucoma both in children and	Several established tools for health literacy measurements were presented in this study (REALM, WRAT, PIAT, and TOFHLA)	No discussion on how glaucoma was measured in the studies	Poor health literacy is associated with poor health outcomes in patients with chronic diseases, especially patients with glaucoma. Patients with poor health literacy and glaucoma missed more eye clinic appointments, did not take glaucoma medications as prescribed, and experience poorer vision health than

Authors (years)	Health Literacy Measure	Chronic Disease Measure	Results	Design and Population
	adults. This review was comprised of a study of 3260 Medicare enrollees with glaucoma (English and Spanish speaking).			patients with adequate health literacy, after controlling for age, education, and income in the various studies reviewed, using multiple logistic regressions.
Omachi et al. (2013)	A prospective cohort study of 277 adults with COPD throughout the US.	Health literacy was measured with a 3-item questionnaire developed by Chew and colleagues, and correlated strongly with the REALM health literacy measuring tool. Scores ranged from 3-15 (items had a five-option Likert response scale).	COPD was assessed using the validated 13-item COPD helplessness index (CHI) to measure COPD related helplessness. Scores range from 0-52, with the higher scores indicating greater helplessness. Respiratory health was measured with the airways questionnaire- 20R. Scores range from 0-20, with higher scores indicating poor respiratory health. The COPD	Poorer health literacy was found to be associated with increased COPD severity, greater COPD helplessness, and poorer respiratory health-related quality of life (HRQoL), after adjusting for age, gender, race, marital status, education, and income (CI-95%, p<0.05).



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Authors (years)	Health Literacy Measure	Chronic Disease Measure	Results	Design and Population
			Severity Score was used to assess COPD related dyspnea, frequency of medication usage (oxygen, corticosteroids and antibiotics), and frequency of hospitalization. Scores range from 0-35, with the higher scores indicating increased COPD severity.	

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Authors (years)	Health Literacy Measure	Chronic Disease Measure	Results	Design and Population
Paasche-Orlow et al. (2005).	Prospective cohort study of 73 adult patients with asthma from two inner city hospitals, one in Baltimore, Maryland, and the other in Boston, Massachusetts.	Health literacy was measured with S-TOFHLA. Scores ranged from 0-36. Patients who scored $\leq 16$ were considered to have low health literacy, while those patients who scored $>16$ were not.	Patients' knowledge of asthma medications and appropriate metered-dose inhaler (MDI) technique were measured using a 10-item questionnaire (Cronbach $\alpha = 0.62$ ).	At discharge from the hospitals, 22 % of the study participants had inadequate health literacy. After adjusting for age, sex, ethnicity, education, income, and smoking history, patients with inadequate health literacy were found to be hospitalized for asthma ( $p = 0.04$ ), and had lower asthma medication knowledge score (OR-0.11, $p = 0.001$ ) than those patients with adequate health literacy. However, after about two rounds of education on asthma medications and MDI technique, inadequate health literacy was not found to be significantly associated with asthma symptom control ( $p = 0.84$ ).

### **Health Literacy Measuring Tools**

Several tools have been used to measure health literacy. These include the National Adult Literacy Survey (NALS), the Peabody Individual Achievement Test-Revised (PIAT-R), the Slosson Oral Reading Test-Revised (SORT-R), the Wide Range Achievement Test-Revised (WRAT-R), the Rapid Estimate of Adult Literacy in Medicine Revised (REALM-R), and the Test of Functional Health Literacy in Adults (TOFHLA). NALS was created in response to the federal government's desire in 1988 to evaluate the levels of literacy among adults in the US. This survey was created to evaluate the English literacy of adults in the US on the basis of their performance on a variety of tasks that mimic tasks encountered in their daily lives. Thus, in 1992 the NALS was administered nationally, an hour long test administered in English to measure skills in prose, document and quantitative literacy. In terms of prose literacy, NALS was designed to assess the knowledge and skills needed to understand and use information from editorials, news, poems, and fiction. Document literacy was assessed for the knowledge and skills required for job applications, payroll forms, transportation schedules, maps, tables and graphs. Quantitative literacy was assessed for the knowledge and skills required for the use of numbers (Kirsch, Jungeblut, Jenkins, & Kolstad, 2002).

The PIAT-R is designed to assess the academic achievement of children K-12 in reading, mathematics, spelling, written expression and encyclopedia knowledge (Lazarus, 1990). The SORT, which is used to determine grade level in reading, is basically a reading test administered to assess the individual's oral word recognition ability. This tool is not a comprehensive tool for measuring all aspect of reading. It is a 3-5 minute test

(Slosson & Nicholson, 1990). The WRAT is a ten minute test which measures word recognition and the pronunciation of words by individuals, ages 5 - 75 years. This test compares the individual performance with that of others. This is a 57-item test. The disadvantages of this test are that the WRAT does not test comprehension, is not available in Spanish and does not use health related words (DeWalt, Berkman, Sheridan, Lohr, & Pignone, 2004).

The REALM is a 125 - word recognition and pronunciation test, not a comprehension test. The words are chosen from a health context, and the test is designed for a public health or primary care setting. The REALM is used to evaluate patients for low reading skills, usually those reading below the ninth grade level (DeWalt et al, 2004). According to Mancuso (2009) the 125- word REALM has a test-retest reliability of 0.98, and an established validity by correlation of REALM to SORT ( $r = 0.95$ ), and to PIAT-R ( $r = 0.98$ ). These tools can be used to measure one or more aspects of literacy.

However, for this study, the short form of the TOFHLA will be the measuring tool for health literacy. Of the tools mentioned in this study, the TOFHLA seems to be the most appropriate since it is available in both Spanish and English which is important since the study population will be Spanish or English speaking. The TOFHLA takes about 25 minutes to complete and measures both numeracy and reading comprehension using actual hospital medical terms. The short form (S-TOFHLA) takes about 12 minutes to complete (DeWalt et al, 2004). It has reliability (Cronbach's alpha) of 0.98 and a validity of 0.91 (Nielson-Bohlman et al., 2004). This tool will be discussed in depth under instrumentation in Chapter 3.

## Summary

In this chapter I focused on the association of health literacy with the underutilization of preventive health services such as vaccinations and cancer screenings. Additionally, I discussed the use of EDs by individuals in urban and rural areas for nonemergency health care because of the perceived lack of access to health care. Finally, I discussed the association between health literacy and mortality rates. A review of the literature revealed that low health literacy seems to be prevalent more among individuals who are older, with less than 12 years of education, low income, have little or no access to primary care, and are on Medicaid, Medicare, or are not insured. The STOFHLA seems to be the most preferred test to assess the health literacy status of the study population because of its availability in both Spanish and English and because it employs actual hospital medical terms to assess reading comprehension (Dewalt et al, 2004). Some of the studies reviewed in this chapter examined health literacy association with chronic diseases, none, however specifically examined the association between health literacy and the level of HTN in hypertensive Latinos in an urban ED which was the purpose of this study. The findings from this study provide information (discussed in Chapter 4) beneficial to improving health care for Latinos and other minority groups seeking health care in a similar urban ED. The next chapter, Chapter 3, will provide an in depth discussion and description of the study population selection process and sampling technique, including a discussion of ethical factors used to protect the study participants, data sources and collection techniques, the study instruments and analytic approach

## Chapter 3: Research Methods

### **Research Design and Rationale**

The aim of this study was to examine the relationship between health literacy, and the level of HTN in hypertensive Latinos using an urban ED for health care in a major health center in NYC. This chapter covers the research design and rationale, the methodology in terms of the population, sampling and sampling procedures, recruitment procedures, participation, and data collection. This chapter also covers instrumentation, operationalization of constructs, threats to validity, and ethical procedures.

This study employed a cross-sectional survey design and a quantitative method of hypotheses testing. The quantitative survey approach was selected for this study instead of the qualitative study design because it was the most appropriate design for this study that allowed for the collection of data that supported or refuted the hypotheses of this study. The qualitative design approach with its multiple strategies of case studies, ethnography, grounded theory, narrative research, and phenomenological research required that the researcher engaged in the activities of the study participants and observed their behaviors in order to collect appropriate study data; or that the researcher used case studies to collect the appropriate study data (Creswell, 2009). The qualitative approach is most suitable for studies in which the researcher does not know the important variables to examine while the mixed method approach is most appropriate when either a quantitative or qualitative design would be inadequate for the desired data collection, analysis, and interpretation (Creswell). Of the three study designs, a quantitative design, specifically the cross-sectional survey design, was the most suitable design to accomplish

the aim of this study (in a timely manner) in which the important variables examined were known. The longitudinal survey design might have been appropriate if the purpose of this study were to examine the relationship between health literacy and levels of HTN in the sample population over an extended period of time (Babbie, 2007). Also, the quantitative design is most suitable for studies which involve hypotheses testing in order to examine the relationship between the independent and dependent variables, such as was the case with this study. The independent variable in this study was health literacy. The dependent variable was the level of HTN, and the aim was to examine the relationship between these variables, controlling for the covariates (age, BMI, gender, insurance, preferred language, and smoking) selected as a result of the review of the literature discussed in Chapter 2. Individuals selected for this study were Latinos and were English and/or Spanish speaking. Three levels of health literacy were examined as measured by STOHFLA scored on a scale of 0-36 (DeWalt et al, 2004). The levels of health literacy were low health literacy (0-16), marginal health literacy (17-22) and adequate health literacy (23-36).

## **Methodology**

### **Population**

The population for this study was selected from the Latino patients that used the ED of a major health center in NYC often for non-emergency health care. This health center is a 457-bed acute care facility and has about 76,000 annual visits to the adult ED. The percentage of those patients who visited the ED for emergency versus non-

emergency cases was not obtainable. Latinos make up about 35% of this ED population (NYC.gov, 2011).

### **Sampling and sampling procedures**

A nonrandomized, purposeful sample of 136 participants, ages 18 years and older were selected for this study using the tool G\*Power for sample size calculation (G\*Power 3.1.6, 2013). This sample size was calculated by selecting on the G\*Power calculator the logistic regression test for 2 tail testing, a power of 0.84, odds ratio of 1.7, and  $\alpha$  of 0.05.

### **Inclusion Criteria**

The inclusion criteria for this study were that the participants were Latino adults (18 years or older), English speaking and/or Spanish speaking, with HTN, and were registered to be seen in the ED on the day of data collection at this major medical center in NYC. I utilized the information on the participant's medical record at the facility, and the medication profile that the participant provided on the day of the ED visit to determine the HTN history of the study participants. Study participants did not have to have a medical record at the facility to be included in the study, but most of them did. I utilized the self reported history of HTN provided by study participants who did not have a medical record at the research facility to determine HTN history.

### **Exclusion Criteria**

I excluded patients who were blind or deaf from the study because the data collection process for this study required individuals to participate in both a written and a verbal interaction with the researcher. I also excluded, from this study, individuals less



than 18 years old, individuals who did not speak English or Spanish, individuals who did not have HTN and individuals who were not Latino.

### **Procedures for Recruitment, Participation and Data Collection**

Sample selection was a two-stage process. Recruitment of study participants involved the distribution of flyers (in Spanish and English) advertising the study to patients in the ED waiting area of the major medical center in NYC on the day of data collection. The ED clerks, a research assistant, and I, distributed the flyers (Appendix A) to patients at the time these patients were given the mini ED registration forms. The flyers provided patients information on what the study was about, who was eligible to participate, and who to contact if they were interested in participating in the study. The research assistant and I remained in the ED waiting area to retrieve the flyers from the patients who indicated on the flyer, a desire to participate in the study. These patients were approached by a research assistant, or I, after they were registered to be seen in the ED had been placed in assigned rooms. In compliance with the facility's IRB requirements, flyers advertising the study were distributed to the ED health care providers prior to the day of data gathering, and on the day of data gathering. The ED providers were also informed that their patients had expressed a desire to participate in the study.

The patients completed the S-TOFHLA, (Appendix D), in the language of their preference (English, or Spanish), only after they have signed consent to participate in this study. The patients were left in the private rooms with 12 minutes to complete the S-TOFHLA. The research assistant, or I, collected the health literacy tests from the patient

after the 12 minute period, whether they were completed or not. The study participants' medical records were then reviewed to validate their information on the intake form (Appendix C), and to gather information needed for the study such as blood pressure readings, age, BMI, insurance coverage, and smoking history.

The data was then entered into an excel spread sheet with the participants' identifying information removed. Information with the participants' identification such as signed consent forms for the study, along with the S-TOFHLA results, have been kept by me in a locked cabinet at the facility. This file will be kept unavailable except for the retrieval of information necessary for correction or removal. A researcher guarantees study participants confidentiality with the agreement to refrain from publicly identifying that participant's response (Babbie, 2007).

Participants were described as having adequate health literacy if they scored on the STOFHLA between 23- 36. Those with a score of 17-22 were considered marginally health literate, and those with a score of 0-16 were classified as having inadequate health literacy (Wallace, 2006). The data was then transferred from Microsoft excel to the Statistical Package for Social Science (SPSS) software for data management, coding, storage, and analysis.

### **Instrumentation**

The instruments and materials used for this study were a flyer (Appendix A) with a brief description of the study, inviting patients in the ED of this major medical center to participate in the study, a consent form of agreement to participate in the study, including information about the participants' rights to change their minds about participating at any

stage of the study (Appendix B), the intake form used in the ED of this medical center (Appendix C) and STOFHLA, a 36 item test (Appendix D). Permission was obtained from the publisher to use STOFHLA (Appendix E). STOFHLA, which takes about 12 minutes to complete, has the reliability (Cronbach's alpha) of 0.98 and the validity of 0.91 (Nielsen-Bohlman, Pasnzer & Kindig, 2004).

### **Study Variables**

#### **Independent Variable**

**Health literacy.** This was the ability to read fluently and to have the numeracy skills to understand discharge health care instructions. Health literacy was ordinally classified as low health literacy (0-16 and coded as 0), marginal health literacy (17-22 and coded as 1), and adequate health literacy (26-36 and coded as 2). For this study, the 36-scale S-TOFHLA (Baker, 2006) was the measuring tool for health literacy.

#### **Dependent Variable**

**Hypertension (HTN).** **Hypertension** was defined as a systolic blood pressure (SBP) of 140 mm Hg or above and/ or a diastolic blood pressure (DBP) of 90 mm Hg or above (Fields et al, 2004). Study participants disclosed their history of HTN on the ED registration information at time of triage. Medical records were also reviewed for information regarding the study participants medical history after study participants have signed consent to participate in the study. For this study, HTN was operationally examined as an ordinal variable. The levels were normal blood pressure readings (coded as yes-1, and no- 0), pre HTN (coded as yes -1, and no- 0), stage 1 HTN (coded as yes -1, and no -0), or stage 2 HTN (coded as yes- 1, and no- 0).

## **Covariates**

According to the literature review for this study, potential covariates were race, age, gender, language, BMI, smoking, lack of insurance coverage, treatment regiment, length of time in care of physician, duration of HTN (Schillinger, D., Bindman, A., Wang, F., Stewart, A., & Piette, J., 2004), socioeconomic status, poor self efficacy, low trust in medical providers, and impaired access to care (Berkman et al, 2004). For this study, the covariates of age, gender, language, insurance coverage, BMI, and smoking, were addressed to determine the true influence of the independent variable (health literacy) on the dependent variable (levels of HTN). The study participants provided information on these covariates on the facility's intake form on that day and on their medical records kept at the facility. Like studies by Bersamin et al., 2009, Kaskie et al., 2011, McCusker et al., 2010, and Omachi et al., 2013, not addressing the other potential covariates mentioned in this section might weaken the results of this study, thus indicating the need for a more extensive study in the future.

**Age.** I assessed age as an interval variable. The study participants provided this information the facility's ED intake form. I defined age in categorical groups of years from 18 -29 (coded as 0), 30-39 (coded as 1), 40- 49 (coded as 2), 50- 59 (coded as 3), 60- 69 (coded as 4) and > 70 (coded as 5).

**BMI.** I obtained this value from the participant's medical record created at the time of the ED visit to the research facility on the day of data collection for this study. Routinely, the patient's height in feet and inches and the patient's weight in pounds are included on the patient's medical record on the day of the ED visit. The BMI is also

routinely calculated and recorded on the patient's medical record at the time of the ED visit.

**Gender.** I examined gender as a categorical dichotomous variable as male (coded as 0) or female (coded as 1). Participants provided this information on the ED intake form.

**Insurance.** I gathered this information from the ED intake form used at the research facility. Patients are routinely required to provide insurance information on this intake form. This was a dichotomous variable, yes (coded as 1) or no (coded as 0).

**Preferred Language.** This was examined as a categorical dichotomous variable. Participants indicated on the ED intake form whether they were English speaking (coded as 0) or Spanish speaking (coded as 1).

**Smoking.** I obtained this information from the ED intake form used at the research facility. Patients are required to provide information on whether or not they engaging in smoking. This was assessed as a dichotomous variable, yes (coded as 1) or, no (coded as 0).

Table 2

*Summary of Study Variables*

Study Variables	Classification	Responses
Health Literacy (Independent Variable)	Ordinal	1.Low Health Literacy (coded-0) 2.Marginal Health Literacy (coded-1) 3.Adequate Health Literacy (coded-2)
HTN (Dependent)	Ordinal	1.Normal Blood Pressure Reading(coded- yes-1, no- 0) ( $\leq 130/80$ ) 2. Pre- HTN-(coded –yes- 1, no- 0) (130-139/80-89) 3. Stage 1 HTN (coded- yes-1, no- 0) (140-159/90-99) 4. Stage2 HTN (coded –yes-1, no- 0) ( $\geq 160/\geq 100$ )
Age (Covariate)	Interval	Measured in Years 18-29(coded -0) 30-39(coded -1) 40-49(coded -2) 50-59(coded -3) 60-69(coded- 4) $\geq 70$ (coded- 5)
BMI (Covariate)	Interval	Normal weight- 18.5-24.9 kg/m <sup>2</sup> (coded -0) Overweight- 25-29.9 kg/m <sup>2</sup> (coded- 1) Obese- BMI $\geq 30$ kg/m <sup>2</sup> (coded -2) Morbid Obesity $\geq 40$ kg/m <sup>2</sup> (coded - 3) (Bersamin et al., 2009)

Study Variables	Classification	Responses
Gender (Covariate)	Categorical	1. Male (coded - 0) 2. Female (coded- 1)
Insurance (covariate)	Dichotomous	1. Yes- coded 1 2. No- coded 0
Preferred Language (Covariate)	Categorical and Dichotomous	1. English (coded 0) 2. Spanish (coded 1)
Smoking (covariate)	Dichotomous	1. Yes- (coded 1) 2. No- (coded 0)

### **Data Analysis Plan**

Spss software was used for all data analysis. The complementary log-log model of ordinal logistic regression and multiple regression analyses were used to examine the relationship between the independent and dependent variables in this study. These models of data analysis are most suitable for describing the relationship between a dependent variable and one or more independent variables (Laerd Statistics, 2013). Logistic regression has been the analytic method of choice by researchers of other studies on health literacy and chronic diseases (DeWalt et al, 2006, Hertz et al, 2005, Hicks et al, 2004; Morris et al, 2006) and is appropriate for analyzing the relationship between multiple independent variables and a single dependent variable. Since the dependent variable for this study (levels of HTN) is ordinal, ordinal logistic regression was selected to analyze the findings of the following research questions and hypotheses:

1. Is there a relationship between health literacy, and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED regardless of age, BMI, gender, insurance, preferred language, and smoking?
  - a. The Null Hypothesis  $H1_0$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, there is no relationship between health literacy and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED.
  - b. The Alternative Hypothesis  $H1_a$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, there is a relationship between health literacy and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED.
  
2. Will health literacy predict the level of control of HTN in hypertensive Latinos seeking health care in an urban ED?
  - a. The Null Hypothesis  $H2_0$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, health literacy (low, marginal, adequate) does not predict the level of control of HTN (controlled HTN, pre HTN, Stage 1 HTN, Stage 2 HTN) observed in hypertensive Latinos seeking health care in an urban ED.
  - b. The Alternative Hypothesis  $H2_a$ : After controlling for age, BMI, gender, insurance, preferred language, smoking, health literacy (low, marginal, adequate) predicts the level of control of HTN (controlled HTN, pre- HTN,



Stage -1 HTN, Stage -2 HTN) observed in hypertensive Latinos seeking health care in an urban ED.

### **Threats to Validity**

#### **Internal Validity**

The focus of this study was to examine the association of health literacy with the level of HTN in hypertensive Latinos seeking health care in an urban ED. This absence of causality helped to decrease the threat to the internal validity of this study. Internal validity measures the extent to which the independent variable causes a change in the dependent variable (Trochim & Donnelly, 2008). Another possible threat to internal validity is data collection bias. Data collection bias occurs when a researcher's recorded data is objective but is that person's perception influenced by the study participant's dress style, the way that participant speaks or that participant's inability to respond to the survey questions. Measurement errors in blood pressure can also decrease the internal validity of this study. According to Babbie (2007), to preserve the internal validity and external validity of this study, known data collection tools were used. Thus, STOFHLA a known health literacy measuring tool (Cronbach's alpha = 0.98, validity = 0.91) was chosen as the health literacy measuring tool for this study. The sphygmomanometer, which was used for measuring blood pressure, is also a known measuring tool with validity and reliability.

#### **External Validity**

A great threat to external validity is the technique used for sample selection. A purposive sampling approach was used for this study. Moreover, only Latinos (English

and/or Spanish speaking) with HTN were selected for this study, and only those individuals with HTN who used the ED for primary care. These factors along with the absence of randomization in the selection of the participants for this study limit the applicability of the results of this study only to groups similar to this study's sample of participants in a similar urban ED setting (Trochim & Donnelly, 2008).

### **Ethical Issues**

This study involved human subjects but did not involve the withholding of medications or necessary treatments from any of the study participants. Patients who were critical and in need of emergency care as determined by the triage nurse were not included in this study. However, the ethical principles that guided this research included voluntary participation in the study, informed consent, confidentiality, anonymity and right to service (Trochim & Donnelly, 2008). No study participant was coerced into joining the study. Each potential study participant was told that participation in the study was voluntary. Each participant was assured that refusing to participate in the study will not result in a loss of access to health care, change in the type or quality of health care they received at that time or in the future at this major health center in New York City. This included treatment of the participant in the facility's ED. Participants who agreed to join the study was asked to sign a consent form. The confidentiality of information participants shared with the researcher was protected.

I identified myself as the researcher and explained to the study participants the purpose of the research. I also made every attempt to report, truthfully, the findings of this study. According to Babbie (2007) honesty

and openness contribute to the progress of science. Truthfully reporting the findings of a study, including the problems encountered, will help to save other potential researchers from experiencing similar problems. Since this study was conducted at the facility where I am employed, data collection occurred outside of work hours, so as to avoid the potential for unethical or conflict of interest issues.

### **Protection of Human Participants**

Prior to collecting data for this study, I obtained the Institutional Review Board (IRB) approval for the study, and permission to conduct the study from Walden University (Walden IRB approval# 03-04-14-0021242), and from the Einstein College of Medicine affiliated with this major health center in New York City (Einstein IRB approval# 2014-3224). According to the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and of the IRB of the Einstein College of Medicine affiliated with the facility, I have devised a plan to protect the study participants' health information. During data collection, once the study participants have signed the consent form agreeing to participate in the study and the completed S-TOFHLA is scored, the identification information for each person was removed from the data entered on the excel spread sheet to ensure anonymity for the participants. The consent forms with the participants' signatures were attached to the health literacy tests and immediately placed in the locked file cabinet provided by the research facility. This information will be kept in the file cabinet for a period of five years after the research is completed. Only I will be able to identify the person from whom the material was collected using the person's name and date of ED visit. A researcher guarantees study participants confidentiality with the

agreement to refrain from publicly identifying that participant's response. This will serve to protect, partially, the anonymity of the study participants. Complete anonymity is only guaranteed when the researcher cannot match the data collected with individual study participants (Babbie, 2007).

To further ensure privacy and protection of study participants' medical and health information, interviews were conducted in private rooms requested by the researcher and provided by the facility. Participants did not receive an incentive for agreeing to participate in this study, according to the policy of the facility's IRB.

### **Summary**

This chapter described the research design, sampling technique, instrumentation, and quantitative method that was used to examine the research questions and hypotheses for this study on the association of health literacy with the level of HTN in hypertensive Latinos seeking health care in an urban ED. The study variables, including potential covariates were defined. This chapter also covered potential threats to internal and external validity and the steps that were taken to minimize these threats. The method of data collection, management, and storage was described in this chapter. The steps taken to protect the human participants and the limitations, delimitations and scope of this study were, also, described in this chapter.

## Chapter 4: Results

### Introduction

The purpose of this study was to quantitatively examine the relationship, if any, between health literacy and the level of HTN in hypertensive Latinos seeking health care in an urban ED. This was a cross-sectional survey design. The research questions and hypotheses that guided this study were the following:

1. Is there a relationship between health literacy, and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED regardless of age, BMI, gender, insurance, preferred language, and smoking?
  - a. The Null Hypothesis  $H1_0$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, there is no relationship between health literacy and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED.
  - b. The Alternative Hypothesis  $H1_a$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, there is a relationship between health literacy and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED.
2. Will health literacy predict the level of control of HTN in hypertensive Latinos seeking health care in an urban ED?
  - a. The Null Hypothesis  $H2_0$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, health literacy (low, marginal, adequate) does not predict the level of control of HTN (controlled HTN, pre

HTN, Stage 1 HTN, Stage 2 HTN) observed in hypertensive Latinos seeking health care in an urban ED.

b. The Alternative Hypothesis  $H2_a$ : After controlling for age, BMI, gender, insurance, preferred language, smoking, health literacy (low, marginal, adequate) predicts the level of control of HTN (controlled HTN, pre-HTN, Stage -1 HTN, Stage -2 HTN) observed in hypertensive Latinos seeking health care in an urban ED.

In this chapter I describe the data, data collection technique, and the sample population for this study. I also report the statistical analyses used to interpret the data and the answers to the research questions.

### **Changes in Methodology**

Except for a few changes, data collection procedures for this study occurred as described in Chapter 3. The research facility's IRB requested that the flyer in English and Spanish, be used to introduce the study to potential participants, and therefore suggested that it was redundant to have a recruitment letter. So the recruitment letter was removed from the list of instruments for data collection. The sample size was reduced from 207 to 136 and the power of the study from .95 to .84. These changes do not appear to have significantly affected the outcome of the study.

### **Data Collection**

Data collection occurred over a period of four months, from April 14, 2014 to August 18, 2014. One hundred, thirty-six individuals completed the health literacy assessment test, S-TOFHLA. The sampling technique for this study was that of

convenience sampling, and participation in the study was voluntary. Even though convenience sampling can be used to provide information on the relationship between variables in the study, some members of the population have no chance of being sampled as a result of this type of sampling technique, and therefore the extent to which the sample for this study is representative of the population from which it was selected is not known (Babbie, 2007).

### **Descriptive and Demographic Characteristics of the Sample**

Descriptive statistics for the sample population ( $N=136$ ) are presented in Table 3. This table shows the number and percentage of participants for the independent variable (health literacy), the dependent variable (level of HTN), and covariates (age, BMI, gender, insurance, preferred language, and smoking). The dependent variable, (level of HTN), is an ordinal variable comprising of the four levels of HTN described in Chapter 3 (normal, pre-HTN, Stage1-HTN, and Stage 2- HTN). Therefore, ordinal logistic regression, the complementary log-log model, was the method of data analysis selected for this data (Laerd Statistics, 2013).

Table 3  
*Composition of Study Sample in Percentage (N = 136)*

Variables	Frequency	Percent
<b>Health Literacy</b>		
low-HL-0-16	31	22.8
marginal-HL-17-22	12	8.8
adequate-HL-23-36	93	68.4
<b>Age</b>		
18-29yrs	19	14.0
30-39yrs	21	15.4
40-49yrs	24	17.6

Variables	Frequency	Percent
50-59yrs	30	22.1
60-69yrs	25	18.4
70-90yrs	17	12.5
<b>BMI</b>		
Normal weight (18.5-24.9 kg/m <sup>2</sup> )	20	14.7
Overweight (25- 29.9 kg/m <sup>2</sup> )	47	34.6
Obese- (≥30 kg/m <sup>2</sup> )	52	38.2
Morbid obesity (≥ 40 kg/m <sup>2</sup> )	16	11.8
<b>Gender</b>		
Male	57	41.9
Female	79	58.1
<b>Insurance</b>		
No Insurance	45	33.1
Insurance	91	66.9
<b>Language</b>		
English	95	69.9
Spanish	41	30.1
<b>Smoking</b>		
Non smoking	96	70.6
Smoking	40	29.4
<b>Level of HTN</b>		
HTNNormal (1)	29	21.3
HTNPre (2)	33	24.3
HTNStage (3)	41	30.1
HTNStage2 (4)	33	24.3

## Results

Ordinal logistic regression was used to determine if there is a relationship between health literacy and levels of HTN, regardless of the covariates, age, BMI, gender, insurance, preferred language, and smoking. The data were assessed for the four



assumptions for ordinal regression analysis (Laerd Statistics, 2013). Assumptions 1 and 2 were satisfied with the dependent variable, level of HTN, measured on an ordinal scale, and the independent variables being continuous (age, and BMI) and categorical (health literacy, gender, insurance, preferred language, and smoking). However, before proceeding with the analysis to check assumptions 3 and 4 for ordinal regression, the distribution of the study data was evaluated through frequency distributions and histograms. Figure 2 below shows that the dependent variable (level of HTN) is skewed towards the highest level. Therefore, the complementary log-log model of ordinal logistic regression was used to adjust for this issue (Statistics Solutions, 2014)

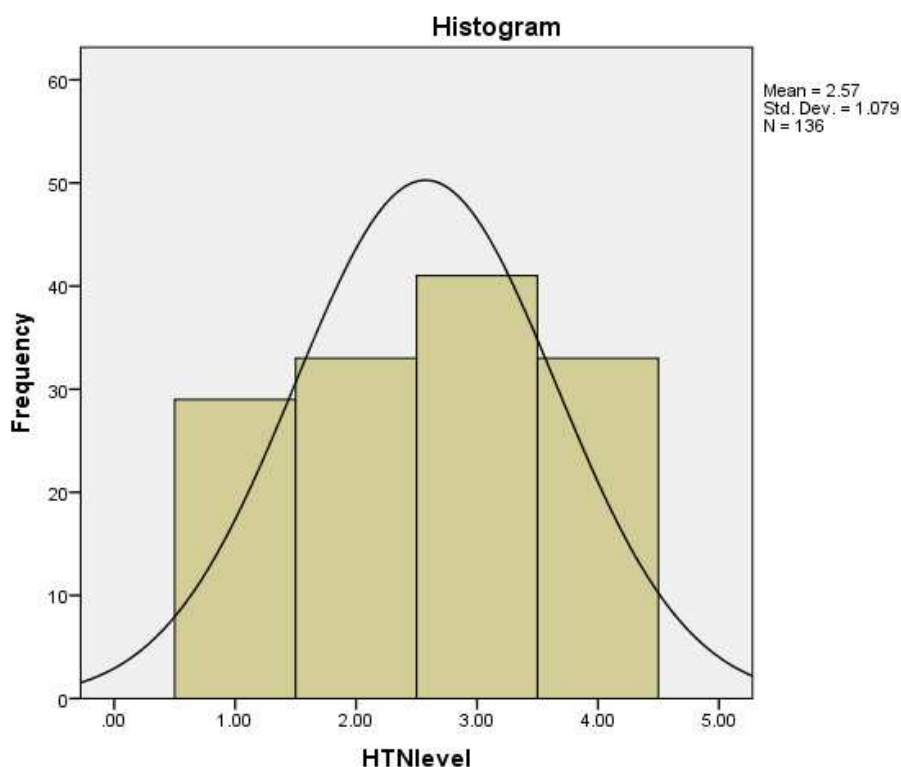


Figure 2. Frequency distribution and histogram of the 4 levels of HTN (normal-HTN, pre-HTN, Stage1-HTN, and Stage2-HTN). N =136

The study data was then analyzed to check for assumption 3 and multicollinearity, using multiple linear regression method because of the interaction between the independent variables (Laerd Statistics, 2013). Assumption 3 of ordinal logistic regression requires that there be no multicollinearity between the independent variables in the study. Table 4 below shows that the data met assumption 3 for no multicollinearity.

Table 4

*Collinearity- (dependent variable- level of HTN, and independent variables- health literacy, age, BMI, gender, insurance, preferred language, and smoking- N=136)*

Model	Variables	Collinearity	Statistics
		Tolerance	VIF
1	Health Literacy	.778	1.285
	Age	.782	1.278
	BMI	.941	1.062
	Gender	.853	1.173
	Insurance	.855	1.169
	Preferred Language	.815	1.228
	Smoking	.885	1.130

The “Tolerance” and “VIF” values in Table 4 show that there is no high correlation between two or more independent variables in this study. According to Laerd (2013), a “Tolerance” value greater than 0.1 and a “VIF” value less than 10 indicate that there is no collinearity problem with the data of this study. Correlation between two or more independent variables makes it difficult to determine which independent variable is responsible for the explanation of the variation observed in the dependent variable (Laerd Statistics, 2013). Analysis of the study data for assumption 4 of ordinal logistic

regression required the *test of parallel lines*. Table 5 below shows the results of the analysis of the study data for assumption 4.

Table 5.

Assumption 4 for ordinal regression analysis. The Test of Parallel Lines for relationship between the independent variables (Health Literacy, Age, BMI, Gender, Insurance, Preferred Language, and Smoking) and the dependent variable (Level of HTN, N =136)

Model	-2Log-Likelihood	Chi-Square	df	Sig.
Null Hypothesis	328.964			
General	303.391	25.573	16	.060

Assumption 4 for ordinal regression analysis is the assumption of proportional odds. The basis of this assumption is that each independent variable has identical effect on each level of the dependent variable, and lines of the same slope are parallel (Laerd Statistics, 2013). The test of parallel lines is the statistic used for testing assumption 4 for ordinal regression analysis (Laerd Statistics, 2013). The proportional odds model (the “Null Hypothesis” row) assumes that the relationship between the independent variables and each category of the dependent variable is the same, a set of parallel lines. The cumulative odds model (the “General” row) assumes that this relationship between the independent variables and each category of the dependent variable is not the same. If the assumptions of proportional odds is met the Chi-square value (a measurement of the difference between these two models) obtained from the test of parallel lines will be small and not statistically significant ( $p > .05$ ), indicating that the lines are parallel. The

assumption of proportional odds will be violated if the opposite occurs (the Chi-square value is large and statistically significant,  $p < .05$ ).

The results shown in Table 5 above indicate that the assumption of proportional odds for ordinal regression analysis was met,  $\chi^2(16) = 25.573, p = .060$  ( $p > .05$ ). Thus, the data for this study has met all four assumptions for ordinal regression analysis. The data was next evaluated for model fitness, that testing to determine how well the statistical method (ordinal analysis) selected for the data analysis for this study, will predict the relationship between the independent variable (health literacy), controlling for the covariates (age, gender, insurance, and preferred language), and the dependent variable (level of HTN, (Ordered Logistic Regression, UCLA)). The results for the goodness-of-fit tests for ordinal regression for the data of this study are presented in Table 6 below.

Table 6

*Goodness-of-fit for the relationship between health literacy and levels of HTN, controlling for the covariates age, BMI, gender, insurance, preferred language, and smoking (N=136).*

	Chi-Square	df	Sig.
Pearson	330.768	325	.401
Deviance	305.841	325	.770

Table 6 shows that the Pearson row and the Deviance row statistics provide information on the suitability of the ordinal regression model for the analysis of the data of this study. The results of these tests will have to be not statistically significant ( $p > .05$ ) to indicate a good fit between the data and the model of regression analysis (Laerd Statistics, 2013). Table 6 shows that these two tests indicate that the ordinal regression log-log model is a good fit for the data of this study. The Pearson goodness-of-fit test shows that the model is a good fit for the data,  $\chi^2(325) = 330.768, p = .401$ , and the Deviance goodness-of-fit test shows that the model is a good fit for the data,  $\chi^2(325) = 305.841, p = .770$ .

Additional testing was done to determine goodness-of-fit of the ordinal regression analysis for the data of this study and to test the null hypothesis for research question 2. The following Table 7 shows the pseudo R-square values for the data of this study, the higher the values the better the model fit (Ordered Logistic Regression, UCLA).

Table 7

*Pseudo R-Square goodness-of-fit tests for the relationship between the independent variable, health literacy and the dependent variable, levels of HTN, controlling for the covariates age, BMI, gender, insurance, preferred language, and smoking (N=136).*

Cox and Snell	.140
Nagelkerke	.149
McFadden	.055

These pseudo R-square values are measurements of the variability in the dependent variable (level of HTN) which can be explained by the model of ordinal

regression analysis used for the data of this study. The results of the three pseudo R-square tests shown in Table 7 indicate that there is a relationship between the independent variable (health literacy) and the dependent variable (level of HTN), controlling for the covariates, age, BMI, gender, insurance, preferred language, and smoking (research question 2). The Cox and Snell value shows that 14% of the variability in the dependent variable (level of HTN) can be explained by the influence of the independent variable (health literacy) controlling for the covariates (age, BMI, gender, insurance, preferred language, and smoking) as measured by the ordinal regression model used for the analysis of the data of this study. The McFadden value, on the other hand, shows that 5.5% of the variability in the dependent variable can be explained by the influence of the independent as measured by the ordinal regression model selected for this study, and 14.9% of the variability in the dependent variable as shown by the Nagelkerke value can be explained by the influence of the independent variable as measured by the ordinal regression model selected for this study. The higher pseudo R-square values, the greater the variability in the dependent variable explained by the influence of the independent variable as measured by the model of ordinal regression analysis selected for this study and the better the selected ordinal regression analysis model is suitable for this study (Ordered Logistic Regression, UCLA).

The information provided by Table 8 below includes answers to the hypothesis of research question 1.

Table 8

*Model fitting information for the relationship between the independent variable, health literacy and the dependent variable, levels of HTN, controlling for the covariates age, BMI, gender, insurance, preferred language, and smoking (N=136).*

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	349.463			
Final	328.964	20.498	8	.009

The value (shown in table 8) for the “intercept only” (the null model) under column “-2 (Log Likelihood)” is the result of the ordinal regression model (the Polytomous Model (PLUM)) analysis of the data with the exclusion of the independent variables (health literacy, age, BMI, gender, insurance, preferred language, and smoking). The -2 (Log Likelihood) value for the “intercept only” results from the assumption that there is no relationship between the independent variables in the study and the dependent variable, that the independent variables have zero effect on the dependent variable and therefore the results shown in Table 8 for the “intercept only” model supports the null hypothesis of research question 1 for this study.

The Null Hypothesis  $H_{10}$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, there is no relationship between health literacy and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED.

However, the value for the “Final” model (the fitted model), shown in Table 8, indicates a difference between the -2 (Log Likelihood) value for the “Intercept Only” model and the value for the “Final” model, thus indicating that there is a relationship between all of the independent variables in the study or, at least, between one independent variable (health literacy), while controlling for the covariates (age, BMI, gender, insurance, preferred language, and smoking), and the dependent variable (level of HTN), and that this relationship is a significant one ( $p < .05$ ),  $\chi^2(8) = 20.498$ ,  $p = .009$ . Therefore, on the basis of the results of the “Final” model shown in Table 8, there is a relationship between one (health literacy) or all of the independent variables (health literacy, age, BMI, gender, insurance, preferred language, and smoking) in this study and the dependent variable (level of HTN). The null hypothesis for research question 1 can be rejected.

Table 9 below shows that low health literacy has a positive *coefficient (B)* of .203, which indicates that these study participants have an increase in the log odds of .203 of experiencing a higher level of HTN (95% CI, -.360 - .765), controlling for age, BMI, gender, insurance, preferred language, and smoking. However, this finding was not statistically significant ( $\chi^2(1) = .499$ ,  $p = .480$ ). Similarly, participants with marginal health literacy had the logs odds of .365 of experiencing a higher level of HTN (95% CI, .430 - 1.160) controlling for age, gender, insurance, and preferred language. These findings were also not statistically significant ( $\chi^2(1) = .811$ ,  $p = .368$ ). The results in Table 9 below show that there is a relationship between the age of the study participants and the level of HTN observed in these participants. Since the



*coefficient “B” value (Estimate) for “Age” shown in Table 9 is a positive value, then for every 10 year increase in age (Table 3), the study participants have the logs odds of .198 of experiencing HTN (CI, .056 - .340). This finding for “Age” is significant ( $p < .05$ ),  $\chi^2 (1) = 7.454$ ,  $p = .006$ . Similarly, Table 9 shows that study participants who admitted to “smoking” have the log odds of .426 of experiencing HTN (CI, -.049 - .902). This finding for “Smoking” is marginally significant ( $\chi^2 (1) = 3.092$ ,  $p = .079$ ).*

Table 9

*Parameter Estimates for the relationship between the independent variables (health literacy, age, BMI, gender, insurance, preferred language, and smoking) and the dependent variable (level of HTN), N=136.*

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
						Lower Bound		Upper Bound
Threshold	[Normal HTN = 1.00]	-1.152	.357	10.425	1	.001	-1.852	-.453
	[Pre_HTN = 2.00]	-.184	.332	.306	1	.580	-.833	.466
	[Stage1_HTN = 3.00]	.758	.329	5.311	1	.021	.113	1.403
	Age	.198	.073	7.454	1	.006	.056	.340
	BMI	-.140	.113	1.519	1	.218	-.362	.082
	Gender	.073	.222	.109	1	.741	-.361	.508
	Preferred Language	.037	.251	.022	1	.883	-.455	.529
	Smoking	.426	.242	3.092	1	.079	-.049	.902
Location	Insurance	-.283	.241	1.381	1	.240	-.756	.189
	[Low Health Literacy=.0]	.203	.287	.499	1	.480	-.360	.765
	[Marginal Health Literacy=1.0]	.365	.405	.811	1	.368	-.430	1.160
	[Adequate Health Literacy=2.0]	0 <sup>a</sup>	.	.	0	.	.	.

Note. a = set to zero because this parameter is redundant

To further determine if there is a significant relationship between health literacy (the independent variable) and the level of HTN (the dependent variable) observed in the study participants, additional analyses of the data were performed using multiple regression. For this analysis the independent variable Health Literacy 2 was created by combining low health literacy with marginal health literacy to make one variable, low health literacy. Therefore, Health Literacy 2 is a composite of low health literacy (low health literacy and marginal health literacy), and high health literacy (formerly adequate health literacy). After evaluating the data for the eight assumptions of multiple regression, an initial multiple regression analysis was conducted to examine the relationship between health literacy (independent variable) and level of HTN (dependent variable) controlling for all of the covariates assessed in the study (age, BMI, gender, insurance, preferred language, and smoking). To obtain the best model fit, the data was analyzed again using multiple regression analysis and those covariates with a significance of  $p \leq 0.15$ . Thus, the covariates age ( $p=.003$ ), BMI ( $p =.053$ ), smoking ( $p=.027$ ) and insurance ( $p=.113$ ) were selected for the repeat multiple regression analysis (Table 10 below).

Table 10

*Correlations Information for the Variables in the study: Multiple Regression Analysis (N=136)*

		Level_HTN	Health Literacy2	Age	BMI	Smoking	Insurance	Gender	Pref_ Language
Pearson Correlation	Level_HTN	1.000	-.181	.236	-.139	.166	-.105	-.060	.022
	HealthLiteracy2	-.181	1.000	-.381	.073	-.012	.127	.063	-.277
	Age	.236	-.381	1.000	-.130	-.093	.117	.124	.175
	BMI	-.139	.073	-.130	1.000	-.013	.123	.149	-.109
	Smoking	.166	-.012	-.093	-.013	1.000	.077	-.237	-.178
	Insurance	-.105	.127	.117	.123	.077	1.000	.226	-.253
	Gender	-.060	.063	.124	.149	-.237	.226	1.000	-.091
	Pref_Language	.022	-.277	.175	-.109	-.178	-.253	-.091	1.000
Sig. (1-tailed)	Level_HTN	.	.017	.003	.053	.027	.113	.245	.399
	HealthLiteracy2	.017	.	.000	.199	.444	.071	.232	.001
	Age	.003	.000	.	.065	.140	.088	.075	.021
	BMI	.053	.199	.065	.	.442	.076	.042	.102
	Smoking	.027	.444	.140	.442	.	.188	.003	.019
	Insurance	.113	.071	.088	.076	.188	.	.004	.001
	Gender	.245	.232	.075	.042	.003	.004	.	.145
	Pref_Language	.399	.001	.021	.102	.019	.001	.145	.

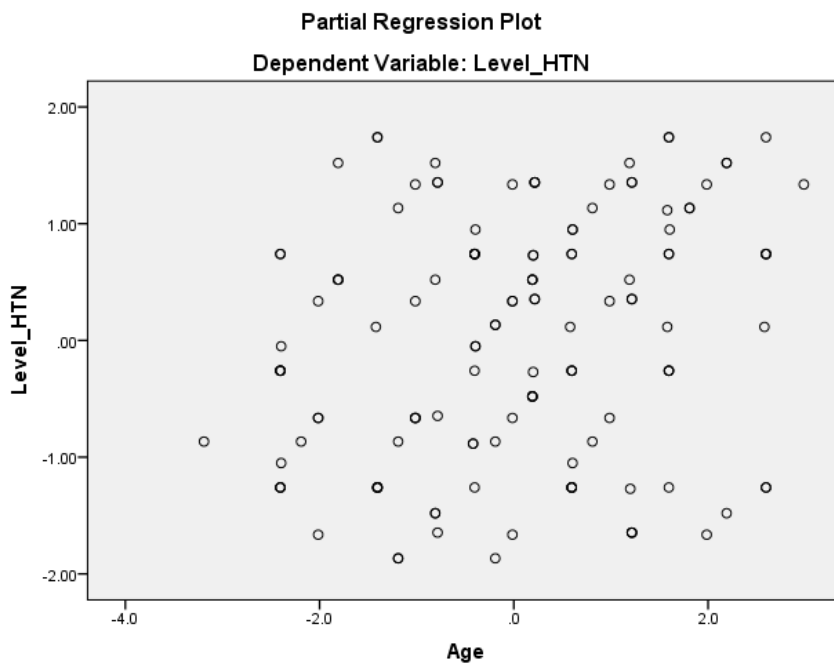
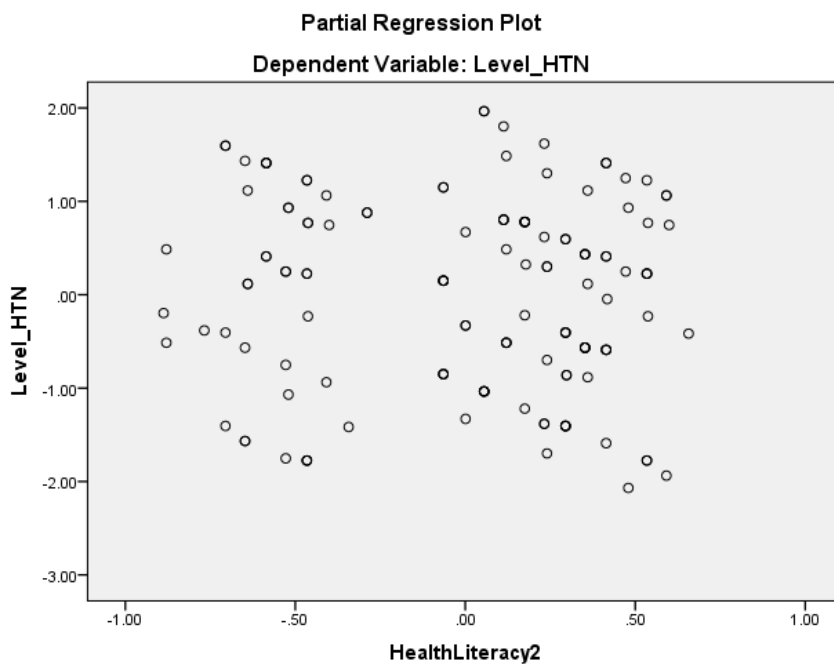
The data satisfied the eight assumptions of multiple regression analysis. The dependent variable (level of HTN) satisfies assumption 1, the number of independent variables is greater than 2 and this satisfies assumption 2 of multiple regression analysis. Assumption 3 requires that there is no serial correlation between the independent variables and the dependent variable. A Durbin-Watson value between 1.5 and 2.5 indicates that the data satisfies this assumption (Laerd Statistics). The Durbin-Watson value produced by the data for this study was 1.758 (Table 11). Assumption 3 for multiple regression analysis is satisfied.

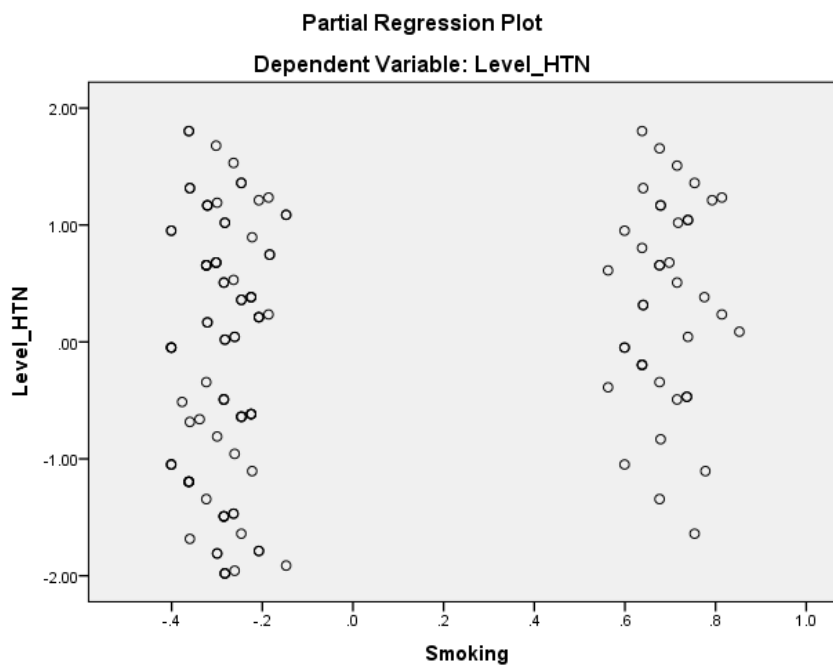
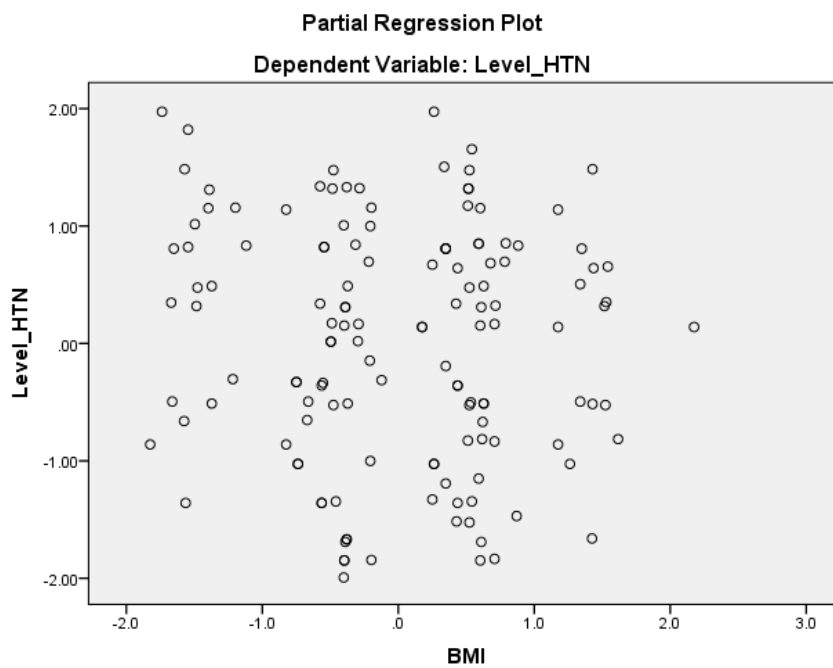
Table 11

*Durbin-Watson value (N=136)*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.343 <sup>a</sup>	.118	.091	1.02919	1.758

Assumption 4 of multiple linear regression analysis requires that there be a linear relationship between the dependent variable and each independent variable, and a linear relationship between the dependent variable and the independent variables collectively. The partial regression plots for the relationship between health literacy 2, age, BMI, smoking, and insurance (independent variables) and level of HTN (dependent variable) in Figure 4 below show that the data for this study satisfies this assumption for multiple regression analysis.





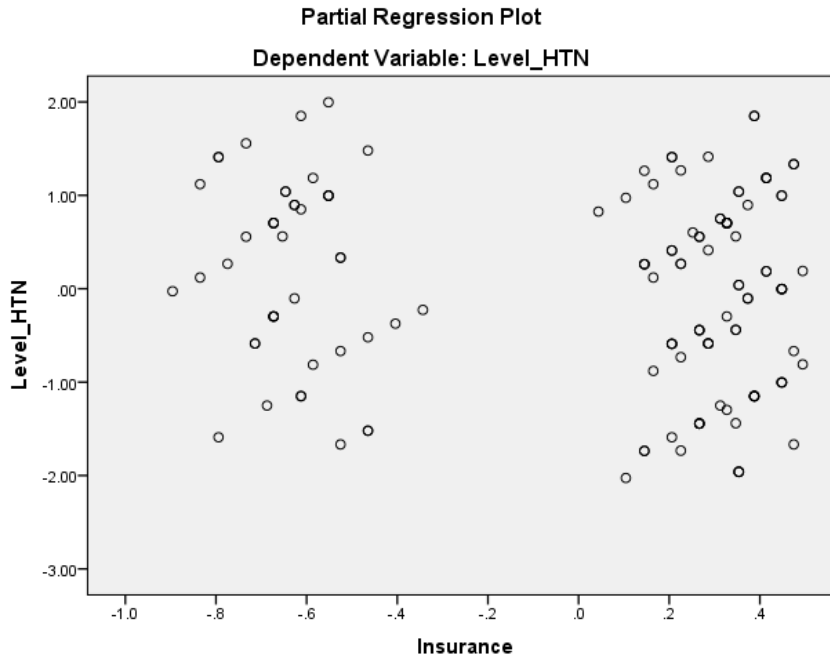


Figure 3. The Partial Regression Plots for Health Literacy 2, Age, Smoking, and Insurance.

Assumption 5 for multiple regression analysis involves the test for homoscedasticity. This test is satisfied when the variance in the relationship between the independent variables and the dependent variable is the same across all values of the independent variables (Statistics Solution, 2014). The normal P-P Plot in Figure 5 below shows that the data for this study satisfies this assumption.



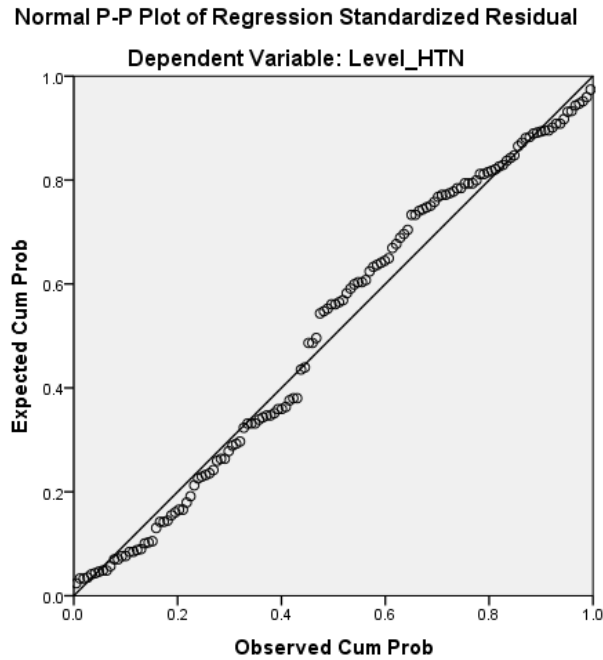


Figure 4  
 The Normal P-P Plot- test for homoscedasticity (N=136)

The test for multicollinearity between the independent variables in this study is necessary for multiple regression analysis to be conducted. This is assumption 6 and requires that the independent variables not be highly correlated. A “Tolerance” value greater than 0.1 and a “VIF” value less than 10 as shown in Table 12 below, indicate that there is no collinearity problem with the data of this study, and that assumption 6 is not violated (Laerd, 2013). Tolerance measures the influence of one independent variable on the other independent variables, while the variance inflation factor (VIF) is calculated using the information for “Tolerance”.

Table 12

*Collinearity Statistics – Assumption 6 of Multiple Regression Analysis (N=136)*

Model 1	Collinearity Statistics	
	Tolerance	VIF
Health Literacy2	.821	1.218
Age	.799	1.252
BMI	.962	1.039
Smoking	.977	1.023
Insurance	.924	1.083

The residual statistics for this data using the “Cook’s Distance” value shown below in Table 13 satisfies assumption 7 for multiple regression analysis. A “Cook’s Distance” value < 2 standard deviations satisfies assumption 7.

Table 13

*Cook’s Distance (N=136)*

Residuals Statistics <sup>a</sup>					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.6398	3.4270	2.5735	.38114	136
Std. Predicted Value	-2.450	2.239	.000	1.000	136
Standard Error of Predicted Value	.141	.311	.213	.036	136
Adjusted Predicted Value	1.6078	3.4800	2.5721	.38412	136
Residual	-2.03416	2.00024	.00000	1.00978	136
Std. Residual	-1.977	1.944	.000	.981	136
Stud. Residual	-2.024	1.968	.001	1.003	136
Deleted Residual	-2.13244	2.05110	.00144	1.05426	136
Stud. Deleted Residual	-2.049	1.991	.000	1.007	136
Mahal. Distance	1.545	11.353	4.963	1.944	136
Cook's Distance	.000	.033	.007	.008	136
Centered Leverage Value	.011	.084	.037	.014	136

a. Dependent Variable: Level\_HTN

The residuals for this study are normally distributed supported by the graph displayed in figure 6 below. This information satisfies the final assumption, 8, for multiple regression analysis.

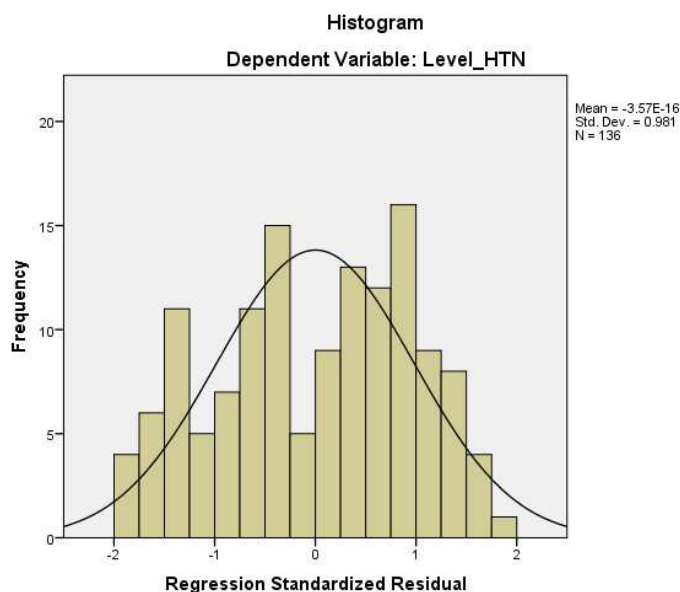


Figure 5  
Normal Distribution of Residuals

The results from standard multiple regression analysis of the data for this study show that 12.5% ( $R^2 = .125$ ) of the variance observed in the dependent variable (level of HTN) can be explained collectively by the independent variables (health literacy2, age, BMI, smoking, and insurance) as shown in Table 14 below. Moreover, the F-ratio (Table 15 below) shows that the multiple regression model used to analyze the data for this study is a good fit. Table 15 shows a statistically significant relationship between the independent variables (health literacy 2, age, BMI, smoking, and insurance) collectively

and the dependent variable (level of HTN),  $F(5, 130) = 3.704, p = .004$ . Therefore, the null hypothesis for research question 1 ( $H_{10}$ ) is rejected in favor of the alternative hypothesis ( $H_{1a}$ ).

Table 14

*Variance in the dependent variable influenced by the independent variables in the regression analysis (N=136).*

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.353 <sup>a</sup>	.125	.091	1.02902	1.748

a. Predictors: (Constant), Insurance, Smoking, BMI, HealthLiteracy2, Age

b. Dependent Variable: Level\_HTN

Table 15

*Regression Model Fit Information (N=136)*

ANOVA <sup>a</sup>					
Model	Sum of Squares	df	Mean Square	F	Sig.
1					
Regression	19.611	5	3.922	3.704	.004 <sup>b</sup>
Residual	137.654	130	1.059		
Total	157.265	135			

a. Dependent Variable: Level\_HTN

b. Predictors: (Constant), Insurance, Smoking, BMI, Health Literacy 2, Age

Table 16 presents information on the significance of the relationship between each independent variable (health literacy 2, age, BMI, smoking and insurance) examined by the multiple regression analysis and the dependent variable (Level of HTN). Table 16 shows that the covariate age makes the strongest contribution to the variance observed in the dependent variable (level of HTN),  $\beta = .232$ ,  $t = 2.526$ ,  $p = .013$  (significant). The covariate smoking also shows a significant contribution to the variance observed in the dependent variable of this study,  $\beta = .195$ ,  $t = 2.355$ ,  $p = .020$  (significant). Table 16 shows that for a 10 years increase in age, the level of HTN increases by .157 (B-value). Similarly, the results indicate that the level of HTN increases by .461 for an increase in smoking in terms of number of cigarettes (B-value). However, health literacy 2 (independent variable),  $\beta = -.068$ ,  $t = -.754$ ,  $p = .452$  ( $p > .05$ ); BMI (covariate),  $\beta = -.086$ ,  $t = -1.022$ ,  $p = .309$  ( $p > .05$ ); and insurance (covariate),  $\beta = -.127$ ,  $t = -1.491$ ,  $p = .138$  ( $p > .05$ ), do not contribute significantly to the variance observed in the dependent variable (level of HTN). On the basis of this finding for the relationship between health literacy 2 (independent variable) and the level of HTN (dependent variable), the null hypothesis (H2o) for research question 2 is accepted.

Table 16  
*Significance of the Relationship between the Independent Variables and the  
 Dependent Variable (N =136).*

Model	Unstandardized		Standardized	t	Sig.	95.0% Confidence		Correlations			Collinearity	
	Coefficients					Interval for B		Zero-	Partial	Part	Tolerance	VIF
	B	Std. Error	Beta			Lower	Upper	order				
(Constant)	2.494	.319		7.823	.000	1.863	3.125					
Health Literacy2	-.158	.209	-.068	-.754	.452	-.572	.257	-.181	-.066	-.062	.821	1.218
Age	.157	.062	.232	2.526	.013	.034	.280	.236	.216	.207	.799	1.252
BMI	-.101	.099	-.086	-1.022	.309	-.297	.095	-.139	-.089	-.084	.962	1.039
Smoking	.461	.196	.195	2.355	.020	.074	.849	.166	.202	.193	.977	1.023
Insurance	-.291	.195	-.127	-1.491	.138	-.677	.095	-.105	-.130	-.122	.924	1.083

### Summary

Ordinal regression analysis of the data using the complementary log-log model, shows that there is a statistically significant relationship ( $p < .05$ ) between at least one of the independent variables (Table 8) and the dependent variable (level of HTN),  $\chi^2(8) = 20.498$ ,  $p = .009$ . Therefore, the null hypothesis ( $H1_0$ ) for research question 1 is rejected in favor of the alternative hypothesis ( $H1_a$ ).

The Alternative Hypothesis  $H1_a$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, there is a relationship between health literacy and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED.

However, even though the pseudo R-square values presented in Table 7 show that the independent variable (health literacy) predicts the variation observed in the data on the dependent variable (level of HTN), controlling for the covariates age, BMI, gender, insurance, preferred language, and smoking, the results shown in Table 9 indicate that this finding is not statistically significant. Therefore, the following null hypothesis for research question 2 is accepted.

The Null Hypothesis  $H2_0$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, health literacy (low, marginal, adequate) does not predict the level of control of HTN (controlled HTN, pre HTN, Stage 1 HTN, Stage 2 HTN) observed in hypertensive Latinos seeking health care in an urban ED

Moreover, the low predictive R-square values (the Cox and Snell value of 14%, the Nagelkerke value of 14.9%, and McFadden value of 5.5%) seen in Table 7 indicate that there are other factors influencing the variation in the level of HTN observed in the study participants not included in the model selected for data analysis, and should have been included.

Additional analysis of the data was performed using the standard multiple regression model. The results also show that the null hypothesis ( $H1_0$ ) for research question 1 is rejected in favor of the alternative hypothesis ( $H1_a$ ) on the basis of the F-ratio information provided by the multiple regression analysis,  $F(5, 130) = 3.704, p = .004$  (Table 15). For the hypotheses of research question 2, multiple regression analysis of the study data provided information on the relationship between health literacy and the

level of HTN also in favor of the null hypothesis ( $H2_0$ ). The information presented in Table 16 shows that health literacy does not statistically significantly predict the level of HTN ( $beta = -.068, t = -.754, p = .452, (p > .05)$ ), even though Table 16 shows a statistically significant relationship between age, smoking (independent co-variables) and level of HTN (the dependent variable).

The key findings of this study will be analyzed and interpreted in the context of the theoretical framework for this study (the HBM) in Chapter 5. Also, in Chapter 5, limitations to the generalizability of the results of this study and recommendations for future research will be made.



## Chapter 5: Discussion, Conclusions, and Recommendations

### Introduction

This was a cross-sectional survey study, conducted to quantitatively examine if there is a relationship between health literacy and the level of HTN in hypertensive Latinos seeking health care in an urban facility. Ordinal logistic regression analysis of the data for this study provided information which resulted in the rejection of the null hypothesis ( $H1_0$ ) in favor of the alternative hypothesis ( $H1_a$ ) of research question 1, and in the acceptance of the null hypothesis ( $H2_0$ ) of research question 2.

The Alternative Hypothesis  $H1_a$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, there is a relationship between health literacy and the level of HTN observed in hypertensive Latinos seeking health care in an urban ED.

The Null Hypothesis  $H2_0$ : After controlling for age, BMI, gender, insurance, preferred language, and smoking, health literacy (low, marginal, adequate) does not predict the level of control of HTN (controlled HTN, pre HTN, Stage 1 HTN, Stage 2 HTN) observed in hypertensive Latinos seeking health care in an urban ED.

Multiple regression of the data for this study also provided information that supports the rejection of the null hypothesis ( $H1_0$ ) of research question 1 in favor of the alternative hypothesis ( $H1_a$ ) and accepts the null hypothesis ( $H2_0$ ) in terms of the relationship between health literacy (independent variable) and the level of HTN (dependent variable), Table 16.

### Interpretation of Findings

This study specifically examined the association between health literacy and the level of HTN in hypertensive Latinos seeking health care in an urban ED, controlling for age, BMI, gender, insurance, preferred language, and smoking. The findings of this study support the findings of several studies (Baker et al., 2007; Omachi et al., 2013; and Muir, Christensen & Bosworth, 2013) that there is a relationship between low health literacy and poor health outcomes. However, the findings of this study on the basis of both ordinal regression and multiple regression analyses show that the relationship between health literacy and the level of HTN in the study participants was not a statistically significant relationship (Table 9,  $\chi^2 (1) = .811, p = .368$ , Table) and imply that factors other than those examined in this study (health literacy, age, BMI, gender, insurance, preferred language, and smoking) may be influencing the level of HTN observed in the participants. Several studies (Ndumele, Shaykevich, Williams, & Hicks 2010; Appel, Brands, Daniels, Karanja, Elmer, & Sacks, 2006; and Ambaw, Alemie, Yohannes, & Mengesha, 2012) have shown that factors, not assessed for in this study, like compliance with anti-HTN medications prescribed, low salt diet, physician visits, alcohol consumption, the presence of co-morbidities, distance from health care, income, marital status, and the level of physical activity influence blood pressure outcome and may have played a role in the level of HTN observed in the participants in this study.

The results of the study by Appel et al. (2006) support the influence of decreased salt and alcohol intake and weight loss (by maintaining a high level of physical activity) on the levels of HTN. Similarly, the results of the study conducted by Ndumele et al.

(2010) showed that poor compliance with prescribed anti-hypertensive therapies (medication, diet, and physician visits) resulted in poor blood pressure control in African-American patients when compared to the findings for non-Hispanic White patients in the same study. Distance from health care, lack of transportation, poverty, the presence of more than one chronic disease, and marital status play a role in the level of HTN observed in patients (Ambaw et al., 2012). Ambaw et al. (2012), found that the results of a study of 384 patients at a university hospital in Northwest Ethiopia, showed that participants with longer distances from health care, those with more than one chronic disease added to that of HTN, and those who were single adhered less to prescribed anti-HTN treatment and therefore experienced more uncontrolled levels of HTN. These studies show that factors (such as non-compliance with low salt diet, alcohol consumption, marital status, income, and non-compliance with physician visits) not assessed in this study could be influencing the level of HTN observed in patients.

The Health Belief Model (HBM), as discussed in Chapter 2, was the theoretical framework for this study. The six constructs of the HBM are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Mirotznik et al., 1998). The core assumptions of the HBM are that an individual will participate in preventive health behaviors if that individual perceives susceptibility to the disease, perceives the severity of the disease, thinks that it is beneficial to seek treatment, and feels empowered to do so through the availability of access to care (Janz & Becker, 1984). In the context of this study, persons with lower levels of HL would be less likely to perceive susceptibility to the disease, to perceive the severity of the disease, and to

think it beneficial to seek treatment for the disease. Therefore these individuals would not have participated as fully in behaviors to control HTN, and it was expected that individuals with low HL would have higher levels of HTN when they visited the ED.

The results of this study imply that there is no relationship between health literacy and the level of control of HTN observed in the study participants. Furthermore, the results show that the higher the level of health literacy the higher the level of HTN (comparing the results for low health literacy with marginal health literacy in Table 9). These findings indicate that in spite of having a higher level of health literacy, these individuals were less likely to take health related actions to avoid a negative condition (an increase in the log odds of .203 for a higher level of HTN in those participants with low health literacy compared to an increase in the log odds of .365 for a higher level of HTN in those participants with marginal health literacy scores in the study). Applying the constructs of the HBM to explain these study results it would be appropriate to conclude that even though some participants scored in the marginal health literacy range, and above on the health literacy test (8.8% with marginal health literacy, and 68.4% with adequate health literacy), participants of all HL levels may not have had adequate knowledge of their chronic disease (HTN) for them to perceive their susceptibility to uncontrolled HTN, to perceive the severity of this chronic disease, and the benefits of disease control which would have served as cues to action regarding adopting health behaviors beneficial to HTN control. In other words, health literacy may be linked to several constructs of the HBM, so further study would be needed to better determine which construct is most likely to predict uncontrolled HTN.

### **Implications for Social Change**

The meaning of health literacy has been rapidly changing to include more than an individual's ability to understand and use health information. The term health literacy now refers to a range of concepts where the patient needs to acquire the skill to interact with education, health, social and cultural influences (Jordan, Buchbinder, & Osborne, 2010). Currently, evaluation of health literacy involves an assessment of the individual's reading comprehension and numeracy skills as assessed by health literacy testing tools such as the one used in this study, STOFHLA. However, according to Jordan et al. (2010), the findings of their study with 48 adult participants (18 yrs and older) from three different population groups in Australia, suggest that there is a need for health literacy testing tools broad enough to include the assessment of an individual's knowledge of when to seek health information, where to seek that information, an assessment of that individual's verbal communication skills, assertiveness, literacy skills, and capacity to process, retain and apply that information towards improving health. According to Kreps and Sparks (2008), it is important that health care professionals utilize a culturally sensitive approach to effectively influence individuals to adopt healthy behaviors when addressing the health literacy of a population with diverse backgrounds, and non-native English Speakers. It is important that individuals are health literate to assume responsibility for their health in the current complex health care system (Carmona, 2003), especially since individuals with low health literacy are more likely to engage in negative health behaviors such as smoking, alcohol abuse, illegal substance usage and sedentary lifestyle (Lee et al., 2004).

Implications for social change on the basis of the results of this study include the need for health educators to promote healthy behaviors by increasing the awareness of individuals about the relationship between increasing age, smoking and a corresponding increase in the level of HTN (Table 16). Also, a more comprehensive tool can ensure that the results more accurately reflect the health literacy status of Latino participants or other immigrant populations. Furthermore, an improved health literacy measuring tool may provide information to influence health policy changes in favor of providing patients with discharge information about their chronic diseases so that they can adopt healthy behaviors. The result could be a decrease in complications from chronic diseases such as HTN.

#### **Limitations of the Study**

The results of this study were statistically insignificant in terms of the relationship between health literacy and the level of HTN and this may be due to several limitations. I did not have data on the previous levels of HTN in the participants, or on the type and intensity of anti-HTN treatments used by the participants. Therefore, I could not control for these important factors in data analysis. The sample size, originally calculated to be 206 adults ages 18- 90 years with a power of .95 (using the G\*Power tool), was reduced to a power of .84 and a sample size of 136 adults of Latin origin (still adequate) in order to satisfy existing time constraints for data collection and the slow pace of data collection secondary to daily elimination from the study of potential participants. Some study participants changed their minds about participating in this study after completing the consent to participate in the study because they did not find the STOFHLA user friendly.

They expressed surprise that the test questions (Appendix D) did not seem to address their chronic disease of HTN. They were not included in the analysis.

Data collection for this study occurred over four months, an extension on this time may have allowed for a larger sample size. Although the number of study participants may have been small, the non-random selection of the study participants played a more important role in the study population not being representative of the 35% of Latinos who make up the 76,000 annual ED visits to the research facility. Also a sample size larger than 136 participants may have yielded more conclusive results. In addition, the urban setting in which this study was conducted, as well as the selection of only Latinos for this study, which resulted in the exclusion of other ethnic groups, were limitations to the generalizability of the results of this study.

The focus of this study was on Latinos, both English and Spanish speaking or both. That I am not a native Spanish speaking individual seemed to have made a difference in the willingness of the Spanish speaking patients who met the criteria for the study, to volunteer for the study. These patients were less willing to participate when I approached them with the flyer advertising the study, even though the flyer was in Spanish. Spanish speaking patients more willingly volunteered for the study when a research assistant who was Latino approached them this also contributed to the slow and sometimes frustrating pace of data collection, and may have contributed to inaccuracy in the information provided by participants, since I did not always have a Latino research assistant to help with data collection. Latinos who expressed illiteracy in English and Spanish did not participate in the study, a type of response bias which may be a source of

limitation to the results of this study. The study therefore did not capture a critical segment of the desired study population, those individuals with poor literacy who were expected to experience more of a variation in the level of HTN related to low health literacy.

Another limitation of this study is that, even though the ED may be an appropriate place for research which should yield information unique and useful for the development of programs to improve the health of individuals, patients in the ED were sometimes in crisis. Finding study participants in this setting who were well enough to complete surveys, and who met the study requirements, needed the researcher to be free of time constraints. The cross-sectional design of this study was another limitation since such a design allows for data collection at a specific time in history and this type of data collection does not produce results that show cause and effect (Babbie, 2007).

The data for this study came from information the patients provided in response to the facility's intake form, the health literacy test, and the information in an existing medical record for that individual; therefore the assumption that this information was accurate and truthful, may be the source of another limitation to results of this study. These pieces of information may have had inaccuracies that skewed the results of the ordinal logistic regression data analysis and thus the apparent discrepancies and the statistically insignificant relationship between low health literacy, and marginal health literacy with regards to the levels of HTN observed in the study participants (Table 9).



### **Recommendations**

To overcome some of the limitations listed for this study, I recommend a similar cross-sectional study examining the relationship between health literacy and HTN in Latinos be conducted in a similar ED setting, but carried out over a longer time period than four months so as to allow for data collection from a larger sample size. I think that the ED is a unique setting for a similar study which may yield results that will influence ED discharge health policies focused on helping ED providers identify which ED patients need health education, the type of health education they need, and how to tailor that health education to the needs of such patients. I also recommend that the researcher be fluent in the language of the sample population or work closely with a member of the sample population so as to gain the trust of the participants and this may result in the sharing of information with greater accuracy.

The short test of functional health literacy (STOFHLA) was the health literacy testing tool for this study. I think that a different health literacy tool should be used for health literacy assessment. My experience with administering STOFHLA to the participants in this study support the statement by Pleasant, McKinney, and Rickard (2011) that the current health literacy measuring tools such as REALM, STOFHLA, HALS (health activities literacy scale), MART (medical achievement reading test), and LAD (literacy assessment for diabetes) have been used to assess an individual's ability to read and comprehend clinical information. However, these researchers have found there is need for a health literacy measuring tool that, in addition to measuring the reading and comprehension skills of the individual, will also gather information on the individual's

cultural influence on the health practices of the individual ( Pleasant et al. 2011). Since, there are few studies about health literacy in Latinos and HTN specifically in an ED setting. I think that there is a need for more studies like this one. According to Pleasant et al. (2011), individuals with low health literacy tend to experience a higher number of hospitalizations, and ED care, lower use of health screening facilities, poor compliance with prescribed medications, poorer health, and higher mortality rates than individuals with adequate health literacy.

Also, a different research approach such as a qualitative study may yield valuable information about the relationship between health literacy and levels of HTN. Finally, since the results of this study seem to suggest that there may be factors other than health literacy influencing the variation in HTN observed in the participants of this study, I recommend that for a similar study on health literacy and HTN, that the number of covariates be expanded to include factors that were not measured in this study, such as the participants' previous levels of HTN, the type and intensity of anti HTN treatments used by the participants, compliance with medications, diet, comorbidities, physical activity, alcohol consumption, socioeconomic status, ethnic groups, and culture. Socioeconomic status should be included as a covariate in a future study since low socioeconomic status is often associated with unhealthy behaviors among Hispanics/Latinos (Morales, Lara, Kington, Valdez, & Escarce, 2002). Also, even though the Hispanic/Latino population in the United States is a composite of Mexican Americans (65.5%), Puerto Rican American (8.6%), Central American (8.2%), South American (6.0%), Cuban American (3.7%), other (8.0%) according to Caballero (2011), there is

similarity in the role of culture in the decision making process for the Hispanic/Latino individual. Therefore, culture should be a covariate in a future study on health literacy and HTN. A major cultural aspect is the tendency for Hispanic/Latino individuals to seek the advice or direction from a large number of family members in order to make health decisions (Caballero, 2011). Another cultural aspect which may affect the health outcomes for Hispanic/Latino individuals is the belief that a disease process may be part of an individual's destiny and therefore cannot be altered, and thus, the belief that there is no need to comply with prescribed medications or lifestyle changes. Also Hispanic/Latino men tend to think that it is a sign of weakness if a physician's help is sought early in a disease process (Caballero, 2011). Therefore, the implications of the findings of these studies (Morales et al., 2002; Cabellero, 2011) are that future studies on HTN should also assess the factors discussed in this section for their possible influence on the variation in HTN observed in patients.

### **Conclusion**

Low health literacy is a threat to the health and well-being of Americans (Carmona, 2003). Even though the findings of this study did not show a statistically significant relationship between health literacy and the levels of HTN in the hypertensive Latino participants, individuals are expected to assume responsibility for their health in the current health care system (Carmona, 2003) and therefore, it is vital that health care providers make every effort to ensure that all patients, regardless of preferred language, are given information that will influence their decisions in terms of healthy choices in managing their chronic diseases. To accomplish this, health care providers must be able

to identify the health literacy needs of patients using the appropriated health literacy assessment tools. These tools, not yet designed, must be user friendly to patients and available to health care providers. According to McCormack et al (2010), the Health Literacy Skills Instrument (HLSI) is a promising new comprehensive health literacy measuring tool. This instrument measures print, non-print, oral, and internet-based health literacy skills, in addition to evaluating the individual's knowledge regarding health promotion and disease prevention. If the health literacy status of patients is assessed and attended to, potential positive social change implications include decreased hospitalizations and ED care, increased use of primary health care facilities, improved compliance with prescribed medications, and improved health for these patients.

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## Appendix A: Flyer

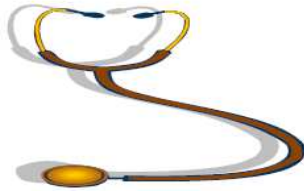
 IRB NUMBER: 2014-3224  
IRB APPROVAL DATE: 04/14/2014



Are you Latino?  
Do you have High Blood Pressure?  
Are you 18 years or older?  
We are conducting a research  
study on high blood pressure in  
Latinos. We will ask you to  
complete a 10 minute survey and  
your answers will be confidential.  
Please contact Marlene Glashen at  
718-918-5850 if interested.

 IRB NUMBER: 2014-3224  
IRB APPROVAL DATE: 04/14/2014





Eres Latino?

Tienes alta presión?

Tienes 18 años o mas?

Estamos conduciendo un estudio de alta presión en los Latinos. Solo son 10 minutos. Esto es confidencial.

Por favor llame a Marlene Glashen a este numero 718-918-5850.





## Appendix B: Consent Letter



IRB NUMBER: 2014-3224  
 IRB APPROVAL DATE: 04/14/2014  
 IRB EXPIRATION DATE: 04/13/2015

ALBERT EINSTEIN COLLEGE OF MEDICINE OF YESHIVA UNIVERSITY  
 JACOBI MEDICAL CENTER

## DOCUMENTATION OF INFORMED CONSENT AND HIPAA AUTHORIZATION

**Introduction**

You are being asked to participate in a research study called **Health Literacy and the Level of Hypertension in Urban Latinos**. Your participation is voluntary -- it is up to you whether you would like to participate. It is fine to say "no" now or at any time after you have started the study. If you say "no," your decision will not affect any of your rights or benefits or your access to care.

The researcher in charge of this project is called the "Principal Investigator." Her name is Yvette Calderon, MD. You can reach Dr. Calderon at:  
**Office Address: Jacobi Medical Center**  
**Rm 1B27, 1400 Pelham Pkwy S**  
**Bronx, NY 10461**  
**Telephone #: 718-918-5845**

For questions about the research study, or if you believe you have an injury, contact the Principal Investigator or the IRB.

The Institutional Review Board (IRB) of the Albert Einstein College of Medicine and Montefiore Medical Center has approved this research study. The IRB # is in the stamp in the upper right hand corner. If you have questions regarding your rights as a research subject you may contact the IRB office at 718-430-2253 or by mail:

Einstein IRB  
 Albert Einstein College of Medicine  
 1300 Morris Park Ave., Belfer Bldg #1002  
 Bronx, New York 10461

**Why is this study being done?**

The goal of this study is to examine the relationship between health understanding and the level of high blood pressure in Latinos seeking health care in an urban Emergency Department.

**Why am I being asked to participate?**

You are being asked to participate in this study because you are Latino, between 18 and 90 years old, English and/or Spanish speaking, and registered to be seen in Jacobi Hospital's Emergency Department for high blood pressure care. This study will take place at Jacobi Medical Center and you will be one of approximately 250 people who will take part in this study.

**What will happen if I participate in the study?**

You will be asked to complete a questionnaire after signing consent to participate. The questionnaire will take 12- 15 minutes to complete.



IRB NUMBER: 2014-3224  
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IRB EXPIRATION DATE: 04/13/2015

**Will I be paid for being in this research study?**

You will not receive any payment or other compensation for taking part in this study.

**Will it cost me anything to participate in this study?**

There will be no cost to you to participate in the study but you and/or your insurance company will have to pay for any costs that are part of your regular medical care.

**Are there any risks to me?**

**Confidentiality**

We will keep your information confidential, however, a risk of taking part in this study is that your confidential information might be shared accidentally with someone who is not on the study team and is not supposed to see or know about your information. This is very unlikely, because the study team takes confidentiality of your information seriously. Your research records will be kept confidential and your name will not be used in any written or verbal reports. Your information will be given a code number and separated from your name or any other information that could identify you. The form that links your name to the code number will be kept in a locked file cabinet and only the investigator and study staff will have access to the file. All information will be kept in a secure manner and computer records will be password protected. Your study information will be kept as long as they are useful for this research.

The only people who can see your research records are:

- the research team and staff who work with them
- groups that review research (the Einstein IRB and the Office for Human Research Protections)


These people who receive your health information, may not be required by privacy laws to protect it and may share your information with others without your permission, if permitted by laws governing them. All of these groups have been asked to keep your information confidential.

**Are there possible benefits to me?**

You may or may not receive personal, direct benefit from taking part in this study. The possible benefits of taking part in this study will be that your responses to the questionnaire, and the information you provide on the intake forms at the time of registration to be seen in the emergency department at Jacobi will help health care providers and health care policy makers to better understand the health needs of patients with high blood pressure.

**What choices do I have other than participating in this study?**

You can refuse to participate in the study. If you decide not to participate, the medical care providers at this facility will still give you all of the standard care and treatment that is appropriate for you.


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 IRB EXPIRATION DATE: 04/13/2015

**Are there any consequences to me if I decide to stop participating in this study?**

No. If you decide to take part, you are free to stop participating at any time without giving a reason. This will not affect your care and you will continue to be treated at this facility. However, some of the information may have already been entered into the study and that will not be removed.

<b>CONSENT TO PARTICIPATE</b>		
I have read the consent form and I understand that it is up to me whether or not I participate. I know enough about the purpose, methods, risks and benefits of the research study to decide that I want to take part in it. I understand that I am not waiving any of my legal rights by signing this informed consent document. I will be given a signed copy of this consent form.		
_____ Printed name of participant	_____ Signature of participant	_____ Date
_____ Printed name of the person conducting the consent process	_____ Signature	_____ Date



IRB NUMBER: 2014-3224  
IRB APPROVAL DATE: 05/30/2014

ALBERT EINSTEIN COLLEGE OF MEDICINE OF YESHIVA UNIVERSITY JACOBI MEDICAL  
CENTER

*Documento de Consentimiento Informado y Autorización de HIPAA*

**Introducción**

Pedimos su participación en un estudio llamado [Alfabetización de Salud y el Nivel de Hipertensión en Latinos Urbanos]. Su participación es voluntaria--- es opción de usted si quiere participar o no. Puede decir que "no" ahora o después que haya comenzado la investigación. Si dice que "no," su decisión no afectará ninguno de sus derechos o beneficios, o su acceso a cuidado médico.

El investigador encargado de este proyecto es llamado el "Investigador Principal." Su nombre es Dra. Yvette Calderon. La pueden contactar por: **Dirección de oficina: 1400 Pelham Parkway South, Cuarto 1B27, Bronx, NY 10461, o por Teléfono #: 718-918-5845**

Si tiene preguntas sobre este estudio, o si cree que sufrió un perjuicio, póngase en contacto con el Investigador Principal o con la Junta de Revisión Institucional (IRB).

La Junta de Revisión Institucional (IRB) de Albert Einstein Colegio de Medicina y el Centro Medico de Montefiore han aprobado este estudio de investigación. El número de protocolo del estudio esta sellado en la esquina derecha. Si tiene preguntas sobre sus derechos como un sujeto de investigación, puede contactar a la oficina del IRB: 718-430-2253 o por correo:

Einstein IRB  
Albert Einstein College of Medicine  
1300 Morris Park Ave., Belfer Bldg Room  
1002  
Bronx, NY 10461

**¿Cuál es el propósito de este estudio?**

El propósito de este estudio es para examinar la relación entre la alfabetización de salud y el nivel de presión alta en Latinos que buscan cuidado médico en el Departamento de Emergencia en un lugar Urbano.

**¿Por qué quieren que yo participe?**

Solicitamos su participación en este estudio porque usted es Latino, tiene entre 18 o 90 años de edad, habla usted español o inglés, y está registrado en el Departamento de Emergencia de Jacobi para el cuidado de la presión alta. Este estudio solo es conducido en el Centro Medico de Jacobi y usted será uno de aproximadamente 250 personas que participarán en el estudio.

**¿Qué pasará si participo en el estudio?**

Le pediremos que complete un cuestionario después de firmar el formulario de consentimiento para participar en el estudio. Este cuestionario tomara de 12 a 15 minutos para completar.

**¿Habrá una recompensa para mí si participo en este estudio?**

Usted no recibirá ningún pago u otra recompensación por participar en este estudio.

**¿Habrá algún costo de mi parte si participo en este estudio?**

No habrá costo para usted participar en el estudio pero usted y/o su seguro médico tendrá que pagar algún gasto que sea parte de su cuidado médico regular.

**¿Cuáles son los riesgos?**

**Confidencialidad**

Su información será mantenida en privado, sin embargo, coge riesgo de que su información sea compartida accidentalmente con alguien que no es parte del estudio y no está supuesto ver o saber sobre su información. Esto es improbable, porque el grupo encargado del estudio toma la confidencialidad de su información en serio. Sus documentos serán mantenidos en privado y su nombre no será usado en ningún reporte verbal ni escrito. Le daremos un código numeral a su información y su información no tendrá su nombre u otra información que pueda identificarlo(a). La forma cual une su nombre con el código numeral será mantenido bajo llave en un armario y solo el investigador y el personal tendrán acceso al archivo. Toda la información estará mantenida en una manera segura y los registros en la computadora estarán bajo contraseña. Guardaremos su información del estudio por el tiempo que sea necesario para esta investigación.

Solamente el grupo encargado del estudio, la organización que provee los fondos y el grupo que analiza el estudio tendrán acceso a su información. Estos grupos son el Einstein IRB y la Oficina de Protección de Investigación Humana. Estas personas que reciben su información de salud, quizás no serán requeridas a proteger su información por ley y pueden compartir su información con otros sin su autorización, pero solamente si es permitido por ciertas leyes.

**¿Hay beneficios para mí?**

Usted podrá o no recibir beneficios directos al participar en este estudio. Un posible beneficio de su participación en este estudio será que sus respuestas del cuestionario, y la información que puso en los formularios que completo usted cuando se registró en el Departamento de Emergencia en Jacobi ayudara a los proveedores de salud y los diseñadores de política entender mejor las necesidades de los pacientes con la presión alta.

**¿Qué otra posibilidad hay en vez de participar en este estudio?**

Puede rechazar su participación. Si decide no participar, los proveedores de medicina en esta instalación le darán todo el cuidado y tratamiento médico que sea apropiado para usted.

**¿Habrá consecuencias para mí si decido no continuar participando en este estudio?**

No. Si decide participar, en cualquier momento puede dejar de participar sin dar alguna razón. Esto no afectará su cuidado médico y seguirá siendo tratado en esta instalación. Aun así, si hay alguna información que ya ha sido obtenido para este estudio no se eliminará.

<b>Consentimiento para participar</b>		
Yo he leído este consentimiento y comprendo que será decisión mía si quiero participar. Yo comprendo el propósito, los métodos, riesgos y beneficios de este estudio para poder decidir que si quiero participar. Entiendo que no renuncio ningunos de mis derechos legales al firmar este consentimiento. Me van a entregar una copia firmada de este consentimiento.		
Nombre en molde del participante	Firma del participante	Fecha
Nombre en molde de la persona conduciendo el proceso de consentimiento	Firma	Fecha

Appendix C: Emergency Department Intake Form

**Jacobi ED Intake Form (English)**

**\*\*THIS FORM MUST BE FILLED OUT ENTIRELY\*\***  
**JACOBI MEDICAL CENTER**  
 1400 PELHAM PARKWAY SOUTH BRONX, NY 10461  
**ADULT MINI-ADD QUESTIONNAIRE**

Reason for Your Visit: \_\_\_\_\_

How Did You Get Here?: CAR TAXI MAS WALK CAM OAM POL OTH

LAST NAME	FIRST NAME

ADDRESS	APARTMENT

CITY	STATE	ZIP CODE	COUNTRY BORN

HOME/CELL PHONE NO	AGE	SEX	MARITAL STATUS

DATE OF BIRTH			SOCIAL SECURITY NUMBER
MONTH	DATE	YEAR	

RACE	MOTHER'S MAIDEN NAME

RELIGION	FATHER'S NAME

**\*\*\*FILL THIS SECTION OUT AFTER YOU HAVE BEEN SEEN BY THE NURSE\*\*\***

INSURANCE CARRIER	POLICY NUMBER

EMPLOYER NAME	TELEPHONE #

EMPLOYER ADDRESS

**EMERGENCY CONTACT:**

RELATIONSHIP	NAME
ADDRESS	PHONE #

## Appendix C

## Jacobi ED Intake Form (Spanish)

**\*\*THIS FORM MUST BE FILLED OUT ENTIRELY\*\***  
**JACOBI MEDICAL CENTER**  
 1400 PELHAM PARKWAY SOUTH BRONX, NY 10461  
**ADULTO CUESTIONARIO MINI-ADD**

**RAZON PARA LA VISITA:** \_\_\_\_\_

**Como Llegaste Aqui?:** CARRO TAXI TREN/BUS CAMINANDO AMBULANCIA POL OTH

APELLIDO \_\_\_\_\_ NOMBRE \_\_\_\_\_  
 \_\_\_\_\_

DIRECCION \_\_\_\_\_ APT# \_\_\_\_\_  
 \_\_\_\_\_

CIUDAD \_\_\_\_\_ ESTADO \_\_\_\_\_ CODIGO POSTAL \_\_\_\_\_ EN QUE PAIS NACISTES \_\_\_\_\_  
 \_\_\_\_\_

TELEFONO/CELLULAR \_\_\_\_\_ EDAD \_\_\_\_\_ SEXO \_\_\_\_\_ ESTADO CIVIL (Matrimonial) \_\_\_\_\_  
 \_\_\_\_\_

FECHA DE NACIMIENTO \_\_\_\_\_ LLENO SE SOCIAL \_\_\_\_\_  
 MES \_\_\_\_\_ DIA \_\_\_\_\_ AÑO \_\_\_\_\_

RAZA \_\_\_\_\_ APELLIDO SOLTERO DE MADRE \_\_\_\_\_  
 \_\_\_\_\_

RELIGION \_\_\_\_\_ NOMBRE DE PADRE \_\_\_\_\_  
 \_\_\_\_\_

**\*\*\*LLENA ESTA PARTE DESPUES QUE VEA LA ENFERMERA\*\*\***  
 COMPANIA DE SEGURO MEDICO \_\_\_\_\_ NUMERO DE POLIZA DE SEGURO \_\_\_\_\_  
 \_\_\_\_\_

NOMBRE DE EL EMPLEADOR \_\_\_\_\_ TELEFONO # \_\_\_\_\_  
 \_\_\_\_\_

DIRECCION DE EL EMPLEADOR \_\_\_\_\_  
 \_\_\_\_\_

**CONTACTO DE EMERGENCIA:**

RELACION: \_\_\_\_\_ NOMBRE: \_\_\_\_\_

DIRECCION: \_\_\_\_\_ TELEFONO: \_\_\_\_\_



## Appendix D: Health Literacy Measuring Tool



Test of Functional Health Literacy in Adults

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Short Test of Functional Health Literacy in Adults (STOFHLA)

STOFHLA  
Large Print Version  
English, 14 point font

Short Test of Functional Literacy in Adults  
STOFHLA  
READING COMPREHENSION

HAND PATIENT THE READING COMPREHENSION PASSAGES TO BE COMPLETED. FOLD BACK THE PAGE OPPOSITE THE TEXT SO THAT THE PATIENT SEES ONLY THE TEXT.

PREFACE THE READING COMPREHENSION EXERCISE WITH:

“Here are some other medical instructions that you or anybody might see around the hospital. These instructions are in sentences that have some of the words missing. Where a word is missing, a blank line is drawn, and 4 possible words that could go in the blank appear just below it. I want you to figure out which of those 4 words should go in the blank, which word makes the sentence make sense. When you think you know which one it is, circle the letter in front of that word, and go on to the next one. When you finish the page, turn the page and keep going until you finish all the pages.”

STOP AT THE END OF 7 MINUTES

PASSAGE A: X-RAY PREPARATION

PASSAGE B: MEDICAID RIGHTS AND RESPONSIBILITIES

## PASSAGE A

Your doctor has sent you to have a \_\_\_\_\_ X-ray.

- a. stomach
- b. diabetes
- c. stitches
- d. germs

You must have an \_\_\_\_\_ stomach when you come for \_\_\_\_\_.

- |           |        |
|-----------|--------|
| a. asthma | a. is. |
| b. empty  | b. am. |
| c. incest | c. if. |
| d. anemia | d. it. |

The X-ray will \_\_\_\_\_ from 1 to 3 \_\_\_\_\_ to do.

- |         |           |
|---------|-----------|
| a. take | a. beds   |
| b. view | b. brains |
| c. talk | c. hours  |
| d. look | d. diets  |

## THE DAY BEFORE THE X-RAY.

For supper have only a \_\_\_\_\_ snack of fruit, \_\_\_\_\_ and jelly,

- |           |           |
|-----------|-----------|
| a. little | a. toes   |
| b. broth  | b. throat |
| c. attack | c. toast  |
| d. nausea | d. thigh  |

with coffee or tea.

After \_\_\_\_\_, you must not \_\_\_\_\_ or drink

- |              |          |
|--------------|----------|
| a. minute,   | a. easy  |
| b. midnight, | b. ate   |
| c. during,   | c. drank |
| d. before,   | d. eat   |

anything at \_\_\_\_\_ until after you have \_\_\_\_\_ the X-ray.

- |         |        |
|---------|--------|
| a. ill  | a. are |
| b. all  | b. has |
| c. each | c. had |
| d. any  | d. was |

## THE DAY OF THE X-RAY.

Do not eat \_\_\_\_\_.

- a. appointment.
- b. walk-in.
- c. breakfast.
- d. clinic.

Do not \_\_\_\_\_, even \_\_\_\_\_.

- |           |            |
|-----------|------------|
| a. drive, | a. heart.  |
| b. drink, | b. breath. |
| c. dress, | c. water.  |
| d. dose,  | d. cancer. |

If you have any \_\_\_\_\_, call the X-ray \_\_\_\_\_ at 616-4500.

- |               |               |
|---------------|---------------|
| a. answers,   | a. Department |
| b. exercises, | b. Sprain     |
| c. tracts,    | c. Pharmacy   |
| d. questions, | d. Toothache  |

## PASSAGE B

I agree to give correct information to \_\_\_\_\_ if I can receive Medicaid.

- a. hair
- b. salt
- c. see
- d. ache

I \_\_\_\_\_ to provide the county information to \_\_\_\_\_ any

- |          |              |
|----------|--------------|
| a. agree | a. hide      |
| b. probe | b. risk      |
| c. send  | c. discharge |
| d. gain  | d. prove     |

statements given in this \_\_\_\_\_ and hereby give permission to

- a. emphysema
- b. application
- c. gallbladder
- d. relationship

the \_\_\_\_\_ to get such proof. I \_\_\_\_\_ that for

- |                 |                |
|-----------------|----------------|
| a. inflammation | a. investigate |
| b. religion     | b. entertain   |
| c. iron         | c. understand  |
| d. county       | d. establish   |

Medicaid I must report any \_\_\_\_\_ in my circumstances

- a. changes
- b. hormones
- c. antacids
- d. charges

within \_\_\_\_\_ (10) days of becoming \_\_\_\_\_ of the change.

- |          |          |
|----------|----------|
| a. three | a. award |
| b. one   | b. aware |
| c. five  | c. away  |
| d. ten   | d. await |

I understand \_\_\_\_\_ if I DO NOT like the \_\_\_\_\_ made on my

- |         |               |
|---------|---------------|
| a. thus | a. marital    |
| b. this | b. occupation |
| c. that | c. adult      |
| d. than | d. decision   |

case, I have the \_\_\_\_\_ to a fair hearing. I can \_\_\_\_\_ a

- |           |            |
|-----------|------------|
| a. bright | a. request |
| b. left   | b. refuse  |
| c. wrong  | c. fail    |
| d. right  | d. mend    |

hearing by writing or \_\_\_\_\_ the county where I applied.

- counting
- reading
- calling
- smelling

If you \_\_\_\_\_ TANF for any family \_\_\_\_\_, you will have to

- |          |              |
|----------|--------------|
| a. wash  | a. member,   |
| b. want  | b. history,  |
| c. cover | c. weight,   |
| d. tape  | d. seatbelt, |

\_\_\_\_\_ a different application form. \_\_\_\_\_, we will use

a. relax	a. Since,
b. break	b. Whether,
c. inhale	c. However,
d. sign	d. Because,

the \_\_\_\_\_ on this form to determine your \_\_\_\_\_.

a. lung	a. hypoglycemia.
b. date	b. eligibility.
c. meal	c. osteoporosis.
d. pelvic	d. schizophrenia.



**STOFHLA: Reading Comprehension  
Scoring Key**

**14 Point Font**

Passage A	Passage A	Passage A	Passage B	Passage B	Passage B
A1 a	A6 a	A12 c	B17 c	B24 d	B33 d
A2 b	A7 c	A13 b	B18 a	B25 b	B34 c
A3 d	A8 b	A14 c	B19 d	B26 c	B35 b
A4 a	A9 d	A15 d	B20 b	B27 d	B36 b
A5 c	A10 b	A16 a	B21 d	B28 d	
	A11 c		B22 c	B29 a	
			B23 a	B30 c	
				B31 b	
				B32 a	



Test of Functional Health Literacy in Adults

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Short Test of Functional Health Literacy in Adults (STOFHLA)

STOFHLA  
Large Print Version  
Spanish, 14 point font

Short Test of Functional Literacy in Adults  
STOFHLA-SPANISH  
READING COMPREHENSION

HAND PATIENT THE READING COMPREHENSION PASSAGES TO BE COMPLETED. FOLD BACK THE PAGE OPPOSITE THE TEXT SO THAT THE PATIENT SEES ONLY THE TEXT.

PREFACE THE READING COMPREHENSION EXERCISE WITH:

“Estas son ALGUNAS instrucciones médicas que Ud. o cualquier persona puede encontrar aquí en el hospital. En cada frase faltan algunas palabras; donde falta la palabra, hay un espacio en blanco y luego hay 4 posibles palabras para escoger. Quisiera que Ud. lea la frase y decida cuál de estas cuatro palabras es la palabra que falta en las frase, o que le da mejor sentido a la frase. Cuando Ud. decida cuál es la palabra correcta para aquel espacio, marque con un círculo la palabra que Ud. ha escogido y siga leyendo. Cuando termine la página, continúe en la página siguiente hasta terminar todas.”

STOP AT THE END OF 7 MINUTES

PASSAGE A: X-RAY PREPARATION

PASSAGE B: MEDICAID APPLICATION

## LECTURA A

Su doctor le ha \_\_\_\_\_ a sacarse Rayos X del \_\_\_\_\_.

- |                |                |
|----------------|----------------|
| a. distinguido | a. estómago.   |
| b. mandado     | b. caminar.    |
| c. corrido     | c. vestido.    |
| d. formalmente | d. comunmente. |

Cuando venga por los \_\_\_\_\_ debe de tener el estómago \_\_\_\_\_.

- |            |              |
|------------|--------------|
| a. libros  | a. volar.    |
| b. fiel    | b. cabeza.   |
| c. Rayos X | c. vacío.    |
| d. dormir  | d. contento. |

Este examen de Rayos X \_\_\_\_\_ de 1 a 3 \_\_\_\_\_.

- |               |             |
|---------------|-------------|
| a. durará     | a. millas.  |
| b. cantará    | b. luz.     |
| c. permanente | c. Rayos X. |
| d. silla      | d. horas.   |

El día antes de \_\_\_\_\_ radiografía, cene solamente alguna \_\_\_\_\_,

- |           |                 |
|-----------|-----------------|
| a. del    | a. bailar,      |
| b. alguna | b. inteligente, |
| c. la     | c. fruta,       |
| d. botón  | d. receta,      |

pan con mermelada, y \_\_\_\_\_ o té. Después de

- |                |
|----------------|
| a. lentes      |
| b. café        |
| c. cantar      |
| d. pensamiento |

la \_\_\_\_\_, no debe comer ni \_\_\_\_\_ absolutamente

a. taciturno,	a. beber
b. vehículo,	b. nadar
c. medianoche,	c. cabello
d. poder,	d. conocimiento

nada hasta después \_\_\_\_\_ que le hayan tomado la \_\_\_\_\_.

a. sentar	a. radiografía.
b. cansar	b. calcomanía.
c. de	c. advertencia.
d. contra	d. estrujar.

El día de la radiografía, no \_\_\_\_\_. No beba nada, ni \_\_\_\_\_.

a. faceta.	a. agua.
b. desayune.	b. hierba.
c. observe.	c. avaro.
d. estruendo.	d. maleta.

Si Ud. tiene alguna \_\_\_\_\_, llame al departamento de Rayos X

a. pregunta,
b. respuesta,
c. caliente,
d. doctor,

al número (310) 222-2821.

## LECTURA B

Yo acepto dar información correcta para ver si puedo recibir Medi-Cal.

Yo acepto proveer \_\_\_\_\_ al condado para verificar \_\_\_\_\_

a. información	a. desde
b. positivo	b. cualquier
c. procurar	c. fascinante
d. visión	d. bien

declaración dada en esta \_\_\_\_\_ y por consiguiente doy \_\_\_\_\_

a. solicitud	a. boletos
b. periódico	b. permiso
c. fantástico	c. mirar
d. amplitud	d. con

al condado para obtener \_\_\_\_\_ información. Yo entiendo que

a. dicha
b. noticias
c. estar
d. testarudo

\_\_\_\_\_ la responsabilidad de \_\_\_\_\_ a Medi-Cal dentro

a. una	a. comentar
b. desigualdad	b. papel
c. ganas	c. notificar
d. tengo	d. desalmado

de \_\_\_\_\_ período de diez días \_\_\_\_\_ de enterarme  
 a. un a. recipiente  
 b. a b. entonces  
 c. tiempo c. después  
 d. llamar d. formula

de un \_\_\_\_\_ en mi situación. Yo \_\_\_\_\_ que si no estoy  
 a. canto a. saco  
 b. cambio b. letra  
 c. girar c. entiendo  
 d. mes d. de

\_\_\_\_\_ con la decisión tomada \_\_\_\_\_ mi solicitud, yo  
 a. estudiando a. arriba  
 b. satisfecho/a b. sobre  
 c. lección c. pensado  
 d. sin d. pronto

tengo \_\_\_\_\_ a una audiencia con \_\_\_\_\_ condado. Yo  
 a. derecho a. el  
 b. prosperidad b. estos  
 c. salir c. increíble  
 d. valor d. hospital

puedo pedir \_\_\_\_\_ audiencia escribiendo o \_\_\_\_\_ a la  
 a. estipular a. candado  
 b. confianza b. honesto  
 c. donde c. llamando  
 d. una d. llorando

oficina del \_\_\_\_\_ donde entregué mi solicitud.

- a. condado
- b. escuela
- c. ver
- d. altivo

\_\_\_\_\_ Ud. quiere TANF/Welfare para \_\_\_\_\_

- |                  |               |
|------------------|---------------|
| a. A             | a. deber      |
| b. Corriendo     | b. cualquier  |
| c. Decididamente | c. escritorio |
| d. Si            | d. vacilar    |

miembro de su familia, tiene que llenar otro tipo de solicitud.



**STOFHLA: Reading Comprehension  
Scoring Key**

**Spanish: 14 Point Font**

Passage A	Passage A	Passage B	Passage B	Passage B
A1 b	A10 c	B17 a	B24 a	C34 a
A2 a	A11 a	B18 b	B25 c	C35 d
A3 c	A12 c	B19 a	B26 b	C36 b
A4 c	A13 a	B20 b	B27 c	
A5 a	A14 b	B21 a	B28 b	
A6 d	A15 a	B22 d	B29 b	
A7 c	A16 a	B23 c	B30 a	
A8 c			B31 a	
A9 b			B32 d	
			B33 c	

## Appendix E: Permission to use health literacy tool.

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Peppercorn Books & Press Inc  
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Fax: (269) 621-2709Email: [post@peppercornbooks.com](mailto:post@peppercornbooks.com)  
Website: [www.peppercornbooks.com](http://www.peppercornbooks.com)

# TOFHLA

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Test of Functional Health Literacy in Adults

Joanne R. Nurss, Ph.D.  
Center for the Study of Adult Literacy  
Georgia State University, Atlanta

Ruth M. Parker, M.D.  
Mark V. Williams, M.D.  
Department of Medicine  
Emory University, Atlanta

David W. Baker, M.D., M.P.H.  
Metro Health Center  
Case-Western Reserve University, Cleveland

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