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THE HEALTH STATUS OF LATINO IMMIGRANTS IN METROPOLITAN ATLANTA: A QUANTITATIVE STUDY OF LATINO IMMIGRANT HEALTH CARE SEEKING BEHAVIOR AND MEDICAL PROVIDER COMPETENCY IN TREATING NEGLECTED PARASITIC INFECTIONS OF PARTICULAR CONCERN IN THE LATINO IMMIGRANT COMMUNITY

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ABSTRACT

THE HEALTH STATUS OF LATINO IMMIGRANTS IN METROPOLITAN ATLANTA: A QUANTITATIVE STUDY OF LATINO IMMIGRANT HEALTH CARE SEEKING BEHAVIOR AND MEDICAL PROVIDER COMPETENCY IN TREATING NEGLECTED PARASITIC INFECTIONS OF PARTICULAR CONCERN IN THE LATINO IMMIGRANT COMMUNITY

By Ashley Tippins

Background. Immigration from Latin America to the United States, specifically to the South, has increased rapidly in recent years. This represents a growing public health concern, as new immigrants often lack accessibility to healthcare services for a myriad of reasons such as language barriers, cost, insurance coverage and other limited resources. The medical and public health communities need to understand factors that attribute to Latino immigrants' utilization of healthcare services in order to adequately provide care for this growing sector of the population. Furthermore, due to increased immigration rates of Latinos, a number of diseases that were otherwise rare in the United States (e.g. Chagas disease, cysticercosis, leishmaniasis) are increasing in prevalence as infected individuals immigrate from endemic regions in Central and South America. Medical providers who treat immigrant Latinos need to be able to recognize and treat these infectious diseases, as the associated health burden increases as immigration rates increase.

Goal. There exists a public health need to understand both Latino immigrant health seeking behavior and how well medical providers can recognize neglected parasitic infections in Latino immigrant populations. To address these public health needs, the overall goal of this study was to model health status of Latino immigrants in the metropolitan Atlanta to identify important gaps that may exist in the current health system that may contribute to poorer health outcomes for Latino immigrants.

Methods. The results from two quantitative surveys conducted in the Atlanta-Sandy Springs metropolitan statistical area, between March 2012 – October 2012, were analyzed to understand both Latino immigrant health seeking behavior and the capability of medical providers in the region to accurately recognize neglected parasitic infections which disproportionately affect the Latino immigrant population.

Results. The study results suggested that Latino immigrants in Atlanta seek healthcare predominantly when pain or illness is severe enough to warrant treatment, or when prenatal care and obstetric care is specifically needed among Latinas. In regression analysis, the only significant factor for seeking care was age, although female gender, urban residence and fewer years spent living in Georgia were also correlated with care seeking, though not statistically significant. Among medical professionals in Atlanta, knowledge of Chagas disease, cysticercosis and leishmaniasis were generally low, which may suggest a gap between patient population care needs and the ability of medical providers to adequately meet these needs. Overall physicians performed statistically higher on all disease components than other medical professions, suggesting an educational gap between medical curricula and physician assistant and nursing curricula.

Discussion and Conclusion. Results from these surveys can be used to develop effective health communication tools for the Latino immigrant community and educational materials for medical providers treating this community in order to improve health outcomes for this vulnerable population.

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REVIEW OF THE LITERATURE

Introduction

Immigration from Latin America to the United States, specifically to the South, has increased rapidly in recent years.(Yesenia D. Acosta, 2011) This represents a growing public health concern, as new immigrants often lack access to healthcare services for a myriad of socioeconomic and cultural reasons and subsequently health care seeking behavior is diminished within this population. Diminished health seeking behavior negatively impacts the overall health status of this population. The medical and public health communities need to understand factors that attribute to Latino immigrants' utilization of healthcare services in order to adequately provide care for this growing sector of the population.(Yeh & Sheffield, 2008) Furthermore, due to increased immigration rates of Latinos, a number of diseases that are otherwise rare in the United States are increasing in prevalence as infected individuals immigrate from endemic regions in Central and South America.(Norman et al., 2010) Medical providers who treat this population need to be able to recognize and treat these infectious diseases, as the health burden associated with them increases as immigration rates increase.(Kirchhoff, 1993)

Barriers to Care and Consequent Health Seeking Behavior for Latino Immigrants in the United States

Barriers to health care services directly impact the health seeking behavior of populations. Access to health care services is disproportionately low for Latino immigrants compared to other immigrant groups, thereby negatively impacting the health

seeking behavior of this population in the United States.(Waidmann & Rajan, 2000) A number of interrelated factors contribute to diminishing health care access for this population, in what Heyman *et al.* refer to as a "web of effects" in the breakdown of health seeking behavior for both legal and unauthorized Latino immigrants. (Heyman, Nunez, & Talavera, 2009) Some barriers include legal denials of insurance for the unauthorized, refusal of services due to nonpayment, fear of detainment when seeking care, institutionalized racism, work and family related inconvenience in seeking care, lack of necessary services available in nearby locations and culturally incompetent or ethnocentric health care providers. Moreover, factors not specific to Latino immigrants but exacerbated by minority ethnicity and immigrant status include low socioeconomic status, lack of transportation and poor health literacy. It should be noted that many of these socioeconomic and cultural factors are specific not only to unauthorized immigrants, but also pertain to legal Latino immigrant residents as well.

Although a high percentage of Latino immigrants participate in the work force, there is a paradoxical association with their access to care, which is greatly diminished by lack of health insurance among many Latino immigrants. The Latino immigrant workforce works predominantly in agriculture, manufacturing, construction and service sectors. (U.S. Census Bureau, 2006-2010 ACS) Wages for these occupations are generally too low to purchase private health insurance and often employer-based insurance is not offered. (Castaneda 2011, Chavez 1992) Moreover, many Latino immigrants do not qualify for Medicare or Medicaid, predominately due to immigration status. (Heyman, et al., 2009) Cost is also a significant barrier to health, particularly for Latino immigrants

who live below the poverty line. In a study by Cersosimo *et al.*, 23.9% of Hispanics/Latinos reported that cost was a significant barrier to health compared to 8.2% of non-Hispanic whites. Latinos were also more concerned about the expense of medications than other races.(Cersosimo & Musi, 2011)

Another significant predictor of access to care for Latino immigrants is acculturation or assimilation, often indicated in research studies by English language proficiency and number of years spent living in the United States. Studies indicate that Latinos who have lived in the United States fewer than ten years have higher rates of no insurance and lesser English proficiency than more assimilated Latino immigrants.(Castaneda, Ruelas, Felt, & Schenker, 2011) Latinos with limited English proficiency are more likely to have difficulty understanding doctors, written material provided by the doctor's office and the instructions on prescription bottles. (Kim, Bryant, Goins, Worley, & Chiriboga, 2012) Conversely, successful patient-provider communication is associated with increased compliance to treatment, overall enhanced health outcomes and increased perceived quality of care. (Cortes, Mulvaney-Day, Fortuna, Reinfeld, & Alegria, 2009) These factors ultimately affect health-seeking behavior among Latino immigrants, who may choose alternative healers in their communities rather than accredited health care providers, or choose not to seek care when it is needed if they are unable to effectively communicate with their medical providers. (Diaz, 2002) According to one survey of Latino immigrants, language difficulties were the leading barrier to health care for children according to the parents surveyed. (Ku & Matani, 2001) Ocular health is often used as an indicator of health status, and in a study conducted by Varma *et al*., undetected

eye disease in Mexican-Americans was significantly linked to lack of health insurance and English language proficiency. Language alone was significantly associated with undetected eye disease even when controlling for insurance and other socioeconomic factors. (Varma, Mohanty, Deneen, Wu, & Azen, 2008)

Latinos may also make health decisions based on culturally derived interpretations of symptoms. For example, Latinos describe diabetes as "silent", and if physical symptoms are not apparent, they may not follow blood-testing protocols as prescribed.(Waidmann & Rajan, 2000) Responses to symptoms may include no action, self-treatment or seeking alternative care sources such as natural healers. These behaviors may also be associated with limited health literacy. Low health literacy has been associated with poor health outcomes. (Waidmann & Rajan, 2000)

Legal status is an important indicator of health care access and health seeking behavior among Latino immigrants. Unauthorized Latino immigrants are less likely to have a usual source of care than legal Latino residents, and report fewer visits to physicians each year. (Arturo Vargas Bustamante, 2010) They are also more likely to be young, single, poor, lack insurance, have less education, lower English proficiency and be less assimilated than legal Latino residents, which are all factors associated with diminished access to health care. (Arturo Vargas Bustamante, 2010) A study by Ku *et al.* controlled for health status, income, race/ethnicity and other factors that affect insurance coverage and utilization in order to determine the effect of immigration status on health care access for Latinos. (Ku & Matani, 2001) Non-citizens were more likely to be uninsured, lack

Medicaid coverage, lack employer based insurance and less likely to have a usual source of care. Non-citizens also had a significant reduction in access to ambulatory care and emergency department use. These implications were true even for naturalized children of noncitizen parents.

Indicators for access to care and health seeking behavior differ significantly depending on gender. While women are more likely to seek preventative and behavioral health services than men, they are generally poorer than men, thereby further impeding their access to care. (Castaneda, 2011) Men and women also have very different and significant cultural indicators which impact access to care and their health seeking behaviors. For example, an additional barrier to preventative health for Latino men may include *machismo*, or attitudes, behaviors and qualities associated with Hispanic men. However, this idea of machismo as a barrier to health care seeking is multifaceted, and may not be applicable to Latino men as a whole, but rather impact certain ethnicities in particular. A qualitative study by Getrich found marked differences in the role of machismo in affecting preventative care seeking based on Latino ethnicity. (Getrich *et al*., 2012) According to the study, Mexican men living in New Mexico considered "machismo" to be a component of everyday life, while Hispano men, those tracing their ethnic roots to Spanish ancestry, did not consider the idea relevant in their life. As a result, Mexican men were less supportive of the idea of having a colonoscopy compared to Hispano men. These studies illustrate the impact the idea of "machismo" may have on preventative health seeking behaviors among some Latino men, and may indicate the role cultural identities and ideologies play in influencing health seeking behaviors. A qualitative study

by Minneman *et al.* found discernible differences in health care seeking behavior between women and men, and even intra-gender differences between urban and rural men. (Minneman, 2012) Men participating in focus group discussions in this study acknowledged waiting to seek care until they are very ill for reasons associated with lack of financial resources and the idea of "machismo". Latina women exhibit different disparities in health status and behaviors than Latino men. A study by Marshall indicated that Latino women have a lower perceived health status than either black or white women, and also are more uninsured than any other race/ethnicity studied. Furthermore, documented Latino women were three times as likely to report excellent health than undocumented Latino women, and none reported poor health while 6.3% of undocumented women in the study reported poor health. (Marshall, Urrutia-Rojas, Mas, & Coggin, 2005) In the Minneman study, women reported a different paradigm to seeking care than either urban or rural men. For women in the study, the first step in health care began with using traditional medicines, including teas and other herbal remedies. If traditional remedies failed, women reported waiting stoically, similar to the men in the study, until pain or illness became too unbearable. Reasons for waiting to seek care among women included lack of resources, fear of serious illness, mistrust in mainstream physicians, and carelessness with their health.

According to the aforementioned Marshall study and others, perceived health status and perceived quality of care are also indicators of health seeking behavior among Latino immigrants. In a study using Pew Center statistics, Rodriguez *et al*. found foreign born and undocumented Latinos were more likely to have perceived poor quality health care

and less likely to have blood pressure or cholesterol tests in the previous two years. Reasons provided for their perceived poor quality of care included not being able to pay, and apparent racism due to their ethnic background or accent. (Rodriguez, Bustamante, & Ang, 2009) Patient activation is the willingness and ability to manage one's own health and health care. In one study, native-born Latinos had significantly greater patient activation scores than foreign born Latinos. (Alegria, Sribney, Perez, Laderman, & Keefe, 2009) According to the study, perceived health status and language ability were also associated with better activation scores. Greater patient activation is associated with greater perceived quality of care and better doctor-patient communication.

Disparity in the use of health services may exist for Latinos compared to non-Latino whites based on availability of community health clinics in their neighborhoods. In a nationally representative study presented by Alegria *et al.*, a significant disparity exists in behavioral services use between insured Latinos and non-Latino whites when neighborhood clinics are not available; when both insured populations have access to neighborhood clinics, no significant disparity exists. (Alegria *et al*., 2012) Furthermore, type of community may also impact how Latinos access care. A study by Berdahl *et al.* demonstrates a disparity in usual source of care between metropolitan residing Latino immigrants and non-metropolitan residing Latino immigrants. Those in non-metro areas are less likely to have a usual source of care, most likely due to limited sources of care, less insurance coverage and English proficiency as barriers to care. (Berdahl, Kirby, & Stone, 2007)

Latino Perceptions of the United States Health Care System

Mistrust of medical providers and unfair treatment at medical facilities has extensive effects on Latino health. Uebelacker *et al.* found that Latinos utilize mental health services far less frequently than whites, even when they have health insurance, and are less compliant with prescriptions. (Uebelacker *et al*., 2012) Focus group discussions revealed barriers to mental health care access include fear of breach of confidentiality, past experiences of mistreatment, inability to schedule appointments, feeling dehumanized in the healthcare system, difficulty in attaining interpreters, distrust in interpreters, feeling culturally different than the healthcare providers and financial difficulty. (Uebelacker, et al., 2012) Additionally, barriers to implementing care included stigma, cultural perceptions of depression, lack of information about treatment and familial responsibilities. Many of these factors may be associated with diminished utilization of health services and compliance with treatment across other specialties as well. (Berdahl, *et al*., 2007) Latinos may not only mistrust individual medical providers, but the healthcare system and the government as a whole. According to Brooks *et al.*, Hispanics reported mistrust and fear of the government as reasons not to participate in clinical trials. (Brooks, Newman, Duan, & Ortiz, 2007)

Latinos are more likely to report perceived discrimination in healthcare settings than non-Latino whites**.** However**,** Latinos with higher SES status and health insurance coverage are less likely to report perceived discrimination than their peers with lower SES and no insurance coverage. Perceived discrimination has been shown to be a barrier to seeking health care among Latinos. According to the study by Perez, younger Latinas and those

reporting lesser health status are also more likely to report discrimination. (Perez, Sribney, & Rodriguez, 2009) Perceived discrimination and other associated factors may also result in dangerous health behaviors. In a study by Song, over 15% of Latino immigrants interviewed reported receiving prescription medications from any of a number of non-prescription sources. These sources include flea markets, non-traditional healers and family, among others. Factors associated with seeking prescription medications from alternative sources included perceived practical barriers, immigration status, a history of poor treatment due to ethnicity and convenience. (Song *et al*., 2012) Further, health care providers, particularly those in "new settlements" or new regions where Latino immigration has increased significantly over the past decade, may not be able to recognize cultural barriers faced by their ethnic minorities patients. (Gresenz, Derose, Ruder, & Escarce, 2012; Huang, Appel, & Ai, 2011) As such, this unfamiliarity may inadvertently cause health care providers to exhibit manners that may not be culturally acceptable to the Latino patient, thereby impacting the perception of the provider by the Latino patient.

Medical Provider Attitudes and Awareness of Neglected Infections of Poverty Among Latino Immigrants

Neglected infections of poverty (alternately neglected tropical diseases) is an umbrella term for a group of bacterial, viral, fungal and parasitic infections whose prevalence are exacerbated by conditions of poverty. Many of these diseases disproportionately affect Latino immigrants in the United States due to the endemicity of the diseases in Latin America and the impoverished status of many Latino immigrants. In 2009 the Centers for Disease Control and Prevention (CDC) hosted the first ever National Summit on

Neglected Infections of Poverty in the United States in order to raise awareness of the diseases in the United States and identify resources and means by which to address gaps in surveillance and diagnostics. (Hotez 2010) According to the CDC, diseases such as Chagas disease, cysticercosis and leishmaniasis deserve urgent attention for enhanced surveillance and disease impact assessments for affected populations such as Latino immigrants.(P. Hotez, 2009) An estimated 300,00 people in the United States are infected with *Trypanosoma cruzi*, the parasite that causes Chagas disease, nearly all of who contracted the illness while living in endemic regions.(CDC, 2013a) Incidence of cysticercosis cases is approximately 2,000 per year in the United States. While leishmaniasis is not one classified as one of the top five neglected infections of poverty in the United States, its incidence is confined almost entirely to immigrants and travelers from endemic regions such as Latin America, and as such is an important public health concern for medical providers treating new Latino immigrants. (CDC, 2013b)

As mentioned previously, Latino immigrants often refuse to seek treatment, even when resources such as insurance and transportation are available, for reasons associated with the cultural competency of the health care providers. In addition to cultural competency, studies have shown that many medical providers may also lack adequate knowledge of diseases and conditions that disproportionately affect Latino immigrants, such as the neglected infections of poverty. A study conducted by MedscapeCME and the CDC showed that while familiarity with Chagas disease varied by specialty**,** there was an overwhelming lack of awareness of the disease among medical providers. Awareness was greatest among infectious disease physicians and lowest among obstetricians and

gynecologists (OB/GYN). This is notable because Chagas disease can be contracted congenitally. Moreover, this specialty and the majority of others in the study never consider the risk of Chagas disease in their patient population, and most were not confident in the knowledge of the disease even if they could recognize the moniker. (Stimpert & Montgomery, 2010)

The health burden of cysticercosis infection is amplified if the infected is a pregnant woman, and therefore it is imperative that obstetrician/gynecologists can accurately diagnose and treat the infection. Cysticercosis is most commonly diagnosed in immigrants from endemic areas (Latin America, Africa and Southeast Asia) and so it is imperative that OB/GYNs who treat Latino immigrants be particularly aware of the risk associated with this infection. A study performed by the CDC regarding OB/GYN knowledge of common parasitic infections during pregnancy found that providers were able to accurately answer questions regarding toxoplasmosis, but of the remaining six infections tested, including cysticercosis, answers varied widely. Overall, OB/GYN knowledge of parasitic infections during pregnancy was inadequate, and study facilitators suggested further education regarding these diseases would be beneficial. (Jones, Schulkin, & Maguire, 2005)

Leishmaniasis is an important neglected infection of poverty affecting Latino immigrants in the United States, but little research has been conducted addressing medical provider awareness of the disease. However, if a study conducted in India, Nepal and Bangladesh where the disease is endemic is an indicator, it may be assumed that physicians in the

United States may lack general awareness and knowledge of treatment as well. Only approximately half of the physicians surveyed in a study by Kumar *et al*. knew the rapid diagnostic test recommended by an international elimination initiative, and few providers in Bangladesh knew the first-line drug used to treat the infection. (Kumar *et al*., 2011)

Latino Immigration to the Southeastern United States

Over the last decade, immigration from Latin America to the United States has increased rapidly, particularly in the southeastern region. Between 2000 and 2010, the Latino population in the United States grew from 35.3 million to 50.5 million, an increase from 13% of the total population to 16%. This population growth represented by the Latino population accounted for over half of the entire population increase in the United States during that period. Likewise, of the entire foreign-born population in the United States in 2010, 53% were from Latin America. (Cruz, September 2011) More than three-quarters of the entire Latino population in the United States resided in two major regions, with 41% in the West and 36% in the South. In the South, Hispanics accounted for 16% of the total population, mimicking the national level. In the ten-year period between censuses, the Latino population in the South grew 57%, a rate four times the growth of the entire population of the region. (Sharon R. Ennis, May 2011)

In Georgia, the population of Latinos has increased eight-fold since 1990.(Karen L. Andes, 2012) In fact, two counties in Georgia were among the top five fastest growing Latino population counties in the entire United States in 2010. (Sharon R. Ennis, May 2011) According to the 2010 Census, Georgia's naturalized foreign born constitute 2.8% of the entire population over the age of 18. Alternately, 6.1% of the state population older

than 18 is comprised of non-naturalized foreign-born residents. (U.S. Census Bureau, Selected Social Characteristics, 2012). A 62.8% majority of Georgia Latinos are of Mexican origin, followed by 8.6% Puerto Rican and 5% or less of each other Latin American country of origin. The majority of Georgia Latinos are citizens, 50% by birth and an additional 8% naturalized foreign-born citizens. The remaining 42% of Latinos in Georgia are foreign-born, not yet naturalized. This is a decrease from 51% in 2000. (Sharon R. Ennis, May 2011)

An estimated 28.1% of Georgia's Hispanic/Latino population reported living below the poverty level, with over half of those living below poverty being foreign born. The foreign-born Latinos living below poverty were 92.4% non-naturalized residents. (U.S. Census Bureau, Poverty Status, 2012) Over half of Latinos in Georgia work in natural resources, construction, maintenance and service. Only 15% work in higher-level positions such as management, business, science and the arts. A reported 3% of Georgia Latinos work in agriculture, forestry, fishing, hunting and mining, although this figure is likely to be an underestimation due to the migratory and seasonal nature of these positions. (Karen L. Andes, 2012) Over 80% of total Latino households in Georgia are family households, 60% of which are married couple households. In 2010, 47% of Georgia Latinos were uninsured. Among the uninsured, half were under the age of 35 and 72% of the total were foreign-born. A reported 44% of the Georgia Latino population over the age of 25 has less educational attainment than a high school diploma.

Health of Latinos in Georgia

According to the 2010 Behavioral Risk Factor Surveillance System (BRFSS) for Georgia, 76.6% of Latinos report fair or poor health, significantly more than any other racial group surveyed. Approximately 30% of Latinos reported not being able to see a physician because of cost. Latino children in Georgia have poorer access to care than their white and black peers. Oral health is often used as an indicator of overall health status in populations, and consequently Latino children also have poorer oral health than either white or black children in Georgia. Latino children are more likely to be uninsured than other races, and lack of insurance is associated with acculturation and household immigration status (i.e. mixed nativity households tend to have lower rates of insurance). (Karen L. Andes, 2012)

Birth rates for Latinos are higher than any other race/ethnicity nationally and in Georgia. Paradoxically, Latina women in Georgia seek prenatal care at lower rates than other races, but have better birth outcomes. Unfortunately, pregnancy rates for teenage women are also highest among Latinas in Georgia. Rates of sexually transmitted infections are generally high in Georgia. Latinos nationally have higher rates of chlamydia and HIV/AIDS than other races, although in Georgia HIV/AIDS rates for Latinos are more favorable than the national average. (Karen L. Andes, 2012)

Rates of psychiatric, anxiety, mood disorders and suicide may be lower for Georgia Latinos than either blacks or whites, but significant barriers to mental health services

exist for individuals without insurance or low English proficiency, both correlated with being Latino in Georgia. (Karen L. Andes, 2012) Latinos in Georgia are disproportionately at risk for infectious diseases due to a variety of factors. Rates of tuberculosis and pertussis are higher for Georgia Latinos than blacks or whites due to lack of insurance, preventative health barriers and poor vaccination coverage, most notably among non-naturalized foreign-born Latinos. Pregnant Hispanic women also contract H1N1 influenza at higher rates than black or white women. (Karen L. Andes, 2012) Rates of chronic diseases are relatively low for Georgia Latinos, which may be attributed to the overall younger age of this population. Age-specific rates for Latinos indicate that the rate of diabetes may be on the rise for Latinos in Georgia. (Karen L. Andes, 2012)

Study Setting

Both the randomized Latino household survey-interview and the medical provider survey were conducted in the state of Georgia, specifically the metropolitan Atlanta area. Trained field staff conducted interviews in Spanish with Latino immigrants in their homes. Medical provider participants filled out surveys both on paper in clinic settings and through an online format at their convenience.

Public Health Need

Immigration from Latin America to the United States, specifically the South, has increased rapidly in recent years. This represents a growing public health concern, as new immigrants often lack accessibility to healthcare services. The medical and public health communities need to understand factors that attribute to Latino immigrants' utilization of healthcare services in Atlanta in order to adequately provide care for this growing sector of the population. Furthermore, a number of otherwise rare diseases disproportionately affect Latino immigrants due to their endemicity in Central and South America, and are now increasing in prevalence in the United States as a result of rapid immigration. Medical providers who treat this population in Atlanta need to be able to recognize and treat these infectious diseases, as the health burden associated with them increases proportionately as immigration rates continue to increase.

GOALS

The goal of this investigation is to model Latino immigrant health status in metropolitan Atlanta. Health status will be evaluated in the context of Latino immigrant healthcare seeking behavior and medical provider awareness of neglected parasitic infections that disproportionately affect this population.

AIMS

1. Model healthcare seeking behaviors of Latino immigrants in Atlanta based upon demographic factors, such as insurance status, gender, years in Georgia, etc.
2. Determine whether any institutional factors act as barriers or facilitators in influencing Latino immigrant treatment-seeking behavior.
3. Model Georgia medical practitioner knowledge level of neglected parasitic infections which disproportionately affect Latino immigrants

SIGNIFICANCE

The increased immigration of foreign-born Latinos to the metropolitan Atlanta area in recent years has created the need to understand the health seeking behaviors and access to care for this population. Additionally, medical providers in this region are now faced with recognizing and treating parasitic infections previously of little concern in the region. This research will aid in the development of public health resources to improve health-seeking behaviors for Atlanta based Latino immigrants. It will also provide insight into how well prepared medical providers in the Atlanta region are to effectively treat the specific health burdens of this population, and further impact the development of public

health education resources to improve the knowledge gap needs of these medical providers.

INTRODUCTION

Immigration from Latin America to the United States, specifically to the South, has increased rapidly in recent years.(Yesenia D. Acosta, 2011) This represents a growing public health concern, as new immigrants often lack accessibility to healthcare services for a myriad of reasons such as language barriers, cost, no insurance coverage and limited resources such as transportation. (Cusi & Ocampo, 2011) The medical and public health communities need to understand factors that attribute to Latino immigrants' utilization of healthcare services in order to adequately provide care for this growing sector of the population. (Yeh & Sheffield, 2008) Furthermore, due to increased immigration rates of Latinos, a number of diseases that were otherwise rare in the United States (e.g. Chagas disease, cysticercosis, leishmaniasis) are increasing in prevalence as infected individuals immigrate from endemic regions in Central and South America. (Norman, et al., 2010) Medical providers who treat immigrant Latinos need to be able to recognize and treat these infectious diseases, as the health burden associated with them increases as immigration rates increase. (Kirchhoff, 1993)

Newly immigrated Latinos' barriers to care and health seeking behavior

Institutional and cultural barriers, and alternatively facilitators, to health care services directly impact the health seeking behavior of populations. Access to health care services is disproportionately low for Latino immigrants compared to other immigrant groups, thereby negatively impacting the health seeking behavior of this population in the United States. (Waidmann & Rajan, 2000) A number of interrelated factors attribute to barriers

to health care access for this population, in what Heyman *et al.* refer to as a "web of effects" in the breakdown of health seeking behavior for both legal and unauthorized Latino immigrants.(Heyman, et al., 2009) Some barriers include legal denials of insurance for the unauthorized, refusal of services due to nonpayment, fear of detainment when seeking care, institutionalized racism, work and family related inconvenience in seeking care, lack of necessary services available in nearby locations and culturally incompetent or ethnocentric health care providers.(Heyman, et al., 2009; Rogers, 2010) Moreover, factors not specific to Latino immigrants but exacerbated by minority ethnicity and immigrantion status include low socioeconomic status, poor health literacy, lack of transportation and other resources. It should be noted that many of these socioeconomic and cultural factors are specific not only to unauthorized immigrants, but also pertain to legal Latino immigrant residents as well. (Livingston, 2008) The metropolitan Atlanta area represents a "new settlement", as Latino immigrant residency has grown expansively in the last decade.(Gresenz, et al., 2012) Research on the particular health needs of the population in this region is extremely limited, and as such there is a need to explore how and why Latino immigrants are seeking care in this major metropolitan area and the particular barriers to health care access the population may be experiencing in order to improve health outcomes.

Medical Provider Competency in Treating Neglected Parasitic Infections

Latino immigrants often refuse to seek treatment, even when resources such as insurance and transportation are available, for reasons associated with the cultural competency of the health care providers. (Macnaughton, 2008) In addition to cultural competency, studies have shown that many medical providers may also lack adequate knowledge of

diseases and conditions that disproportionately affect Latino immigrants. (Jones, et al., 2005; Kumar, et al., 2011; Stimpert & Montgomery, 2010) Neglected infections of poverty (alternately neglected tropical diseases) is an umbrella term for a group of bacterial, viral, fungal and parasitic infections whose prevalence are exacerbated by conditions of poverty. These diseases disproportionately affect Latino immigrants due to the endemicity of diseases in Central and South America and the impoverished status of many Latino immigrants.(P. Hotez, 2009; P. J. Hotez, 2008) There exists a public health need to understand how well medical providers can recognize neglected infections of poverty in Latino immigrant populations. Three neglected infections of poverty of particular concern for Latino immigrants in the South (Chagas disease, cysticercosis, leishmaniasis) are parasitic, and hereafter will be referred to as neglected parasitic infections in the context of this study's goals and aims.

To address these public health needs, the overall goal of this study was to model health status of Latino immigrants in the metropolitan Atlanta and identify important gaps that may exist in the current US health system that may contribute to poorer health outcomes for Latino immigrants. To meet this goal, two surveys were conducted to understand both Latino immigrant health seeking behavior and medical provider knowledge levels of three important neglected parasitic infections that disproportionately affect Latino immigrants. The metropolitan Atlanta region was selected as the study site due to its increased Latino immigration rates in the past decade and the lack of current data that exists concerning health care seeking behavior and medical provider competency in treating this population in this region.(Hernandez, 2005) Results from these surveys can

be used to develop effective health communication tools for the Latino immigrant community and educational materials for medical providers treating this community in order to improve health outcomes for this vulnerable population.

METHODS

Study Design

The results from two surveys conducted in the Atlanta-Sandy Springs metropolitan statistical area, between March 2012 – October 2012, were analyzed to understand both Latino immigrant health seeking behavior and the capability of medical providers in the region to accurately recognize neglected parasitic infections which disproportionately affect the Latino immigrant population. The following subsections will be categorized by survey instrument.

Study Population

Latino Immigrant Household Survey. Census tract data was acquired from the "American Factfinder 2" database, providing 2010 census tract data.(U.S. Census Bureau, SF1 QT-P10, 2010) Tracts were arranged in descending order based on the both the total numbers and proportions of Hispanics within the tract. The ordered lists were cross-referenced, and the 30 clusters with highest proportions (based on population within tract) of Latino immigrants served as the sampling clusters. Address ranges were randomly generated using available geographic information systems (GIS) street level data for metropolitan Atlanta, and random addresses were selected from within the selected address ranges.

Medical Provider Survey. The first phase of recruitment utilized a two-stage cluster sampling method (Fowler, 2009), wherein specific medical providers and clinics were targeted from responses provided in the previously conducted *Latino Immigrant Household Survey*. Using this method, a total of 48 specific medical providers and 19

clinics or hospitals were contacted for participation recruitment. An initial 51 respondents participated in the study using this sampling method. To improve statistical power, a secondary recruitment strategy was employed, wherein 700 medical providers from a variety of alumni and professional networks, academic institutions and major hospitals were contacted for participation via email using publicly available email address databases.

Sample Size

Latino Immigrant Household Survey. A total of 458 addresses were randomly sampled using GIS data from 14 census tracts in the metropolitan Atlanta area. A total of 114 (25%) addresses were non-residential, 124 (27%) could not be reached after three attempts, 98 (21%) did not meet eligibility criteria and 39 (9%) did not consent to participate. A total of 83 household respondents met eligibility requirements and consented to participate, for a recruitment rate of 18%. The target sample size for each tract was 7 households, as outlined by the WHO 30x7 sampling strategy.(WHO, 2005) Time and resource restraints enabled 14 tracts to be sampled in this manner during the study period. With this sample size, a power of 0.78, alpha of 0.05 was expected to measure prevalence of healthcare seeking behavior among Latino immigrants. Emory IRB00018964 approved this study.

Medical Provider Survey. In all, a total of 110 medical providers were recruited in office, via telephone or via email to participate in the study, for an enrollment rate of approximately 15%. Respondents were eligible to participate if they were older than 18

years and currently practiced medicine or nursing in the state of Georgia. Emory IRB00018964 approved this study.

Survey Instrument

Latino Immigrant Household Survey. The survey instrument consisted of 34 questions regarding demographic characteristics of the respondent, household characteristics, health care seeking history of the respondent and immediate family over the last 2 years, and barriers and facilitators to seeking care.

Medical Provider Survey. The survey instrument consisted of 48 questions designed to measure accurate knowledge levels of endemicity, risk factors, transmission and symptoms of three neglected parasitic infections (Chagas disease, cysticercosis and leishmaniasis) that disproportionately affect Latino immigrants. The survey also included demographic factors and a brief section regarding preferred learning techniques to aid in the development of educational materials targeted at medical providers. Answer choices for the disease portions were multiple choice, many requiring identification of more than one correct answer choice (for example, select all symptoms that apply). The questions were adapted, in collaboration with the CDC, following the structure of a study previously validated by MedscapeCME. (Stimpert & Montgomery, 2010)

Data Collection

Latino Immigrant Household Survey. Households were randomly selected as mentioned previously. Household respondents were eligible to participate if they were older than 18 years, identified as Latino/Hispanic, foreign born and resided in Georgia for more than 1

year. Respondents were chosen as the initially recruited participant in each household, not necessarily a head of the household. Oral consent was documented before administration of the survey. The survey interviews were conducted in Spanish by trained field staff.

Medical Provider Survey. Thirty-three survey questionnaires were administered in-person and entered by research staff into a Microsoft Access database. Using a Google Form, medical providers submitted the remaining 77 surveys electronically prior to data entry by researchers into the database.

Data Entry and Cleaning

Survey data for both studies were double entered into two Microsoft Access databases and checked for consistency of entered responses between databases using a comparison functionality in Microsoft Excel. Inconsistent responses between databases were compared to original surveys and resolved by correcting the final database using the verified response from the original survey. A 10% accuracy check was performed following double data entry comparison to ensure validity between the database and the original survey responses. No discrepancies between the database and the original surveys were found during this check.

Statistical Analysis

Latino Immigrant Household Survey. All analyses were conducted using SAS version 9.3. Descriptive analyses were performed to assess correlations between demographic

characteristics and care seeking. Chi square analysis and Mann-Whitney-Wilcoxon tests were run to determine statistical differences between demographic subgroups such as sex. Logistic regression models of healthcare seeking behavior (outcome variable was ever sought care in the last two years, (binary, yes=1)) were performed using sex (binary, male=1), age (continuous), insurance status at time of visit (binary, yes=1), length of residence in Georgia (continuous), and marital status (binary, spouse lived in residence=1) as predictor variables. Univariate and multivariate analyses were conducted for all variables considered biologically plausible factors. Collinearity was considered influential if any condition index exceeded 30. No influential collinearity was found among any covariates using this criterion.(Kleinbaum, 2007) P-value < 0.05 was considered significant.

Medical Provider Survey. All analyses were conducted using SAS version 9.3. The survey questionnaires consisted of one section for each disease (Chagas disease, cysticercosis, leishmaniasis). Each section consisted of one question worth 30 total points each regarding endemicity, transmission, risk factors and symptoms, with multiple choice answer responses. For questions that had more than one correct answer choice, each correct response was evenly assigned a point total to amount to 30 total points for the question. To assign respondents a point total for each question, the assigned numbers of points for correct responses were added and subsequently 5 points were subtracted for each incorrect response selected by the respondent. A response consisting of no correct answer choices was assigned a score of 0. Examples of the grading scheme are provided in Appendix A. During the analysis phase, total points scored for each question were

considered, as well as binary outcomes of whether the question was answered completely correct or partially correct. Total points for each section and an average total score for the three combined sections were also examined for trends.

Descriptive analyses were conducted to enumerate the overall recognition and knowledge level of the three diseases among medical providers.[1] Non-parametric ANOVA analyses were performed to determine significant differences between medical professions regarding overall knowledge of the three diseases.

Further, data was modeled using univariate and multivariate regression methods to determine independent factors that may influence greater recognition and understanding of these three diseases among medical providers. Independent predictor variables included: age (continuous), number of years practicing clinically (continuous), gender (binary, male=1), provider practiced a specialty (binary, yes=1), clinician type (categorical variables for MD/DO, PA and nurse and medical provider student), patient population characteristics (binary variables, where reported proportion of Hispanic patients greater than proportion in the general population=1, proportion of Spanish speaking only patients greater than proportion in the general population=1), and practice setting (categorical variables for hospital, general clinic and specialty clinic). Univariate logistic regression models were run on all independent variables for each clinical question, where the outcome was at least one correct answer provided. Multivariate linear regression analyses were also performed for each clinical question (dependent variable

[1] Recognition of the disease operationalized in survey instrument as "have you ever heard of Chagas disease?" etc. for each disease.

was total score for each question) as well as regression analysis on total overall score for all disease related survey questions. For linear models, collinearity was considered influential if the variance inflation factor associated with any covariate was greater than 10. For logistic models, collinearity was considered influential if any condition index exceeded 30. No influential collinearity was found among any covariates using this criterion. (Kleinbaum, 2007)

RESULTS

Latino Immigrant Survey

To determine the overall characteristics of the study population, descriptive demographic statistics were examined using frequency analyses. (Table 1) Overall, respondents were predominantly female, originally from Mexico, married, uninsured, Spanish speaking and had at least one child living in the household. Median age of respondents was 32, and the median number of years residing in Georgia was 11 (range 2-37). There were no significant differences between men and women on age, years living in Georgia, or seeking care. (Results not shown) Seeking care was also not significantly associated with years living in Georgia, marital status, or urban setting. (Results not shown)

In order to determine specific facilitators for seeking care and/or barriers to seeking care, a descriptive frequency analysis of two specific survey questions was conducted. Among Latino immigrants who ever reported seeking care (N=55, 66%), the most commonly reported reason for seeking care was gravity of illness (N=48, 87%). Factors such as unknown illness (N=3, 5%), insurance coverage (N=5, 9%), availability of resources (N=5, 9%), existing appointment for any reason (N=3, 5%), confidence in medical provider (N=8, 15%) and prenatal care or other reasons (N=9, 16%) were reported as additional facilitators to seeking care. Among Latino immigrants who reported not receiving medical care even when experiencing a medical need (N=28, 33%), the most common barriers to care included no insurance coverage (N=12, 43%) and lack of

resources (N=12, 43%). Additional barriers to seeking care included gravity of illness (N=7, 25%) and immigration status (N=4, 7%), among others. (Results not shown)

In order to examine possible significant predictors of care seeking among Latino immigrant respondents, a number of variables were modeled using logistic regression analysis. (Table 2) In univariate and adjusted analyses, only age (whether modeled as a continuous variable or a binary variable coded as < than the median of 32=1) was a significant predictor of seeking care. Urban residence, gender and years living in Georgia were not significant in either unadjusted or adjusted analyses. Given these results it can be concluded younger Latino immigrants in Atlanta are more likely to seek care than older Latino immigrants.

Medical Provider Survey Results

To determine the overall characteristics of the study population, descriptive demographic statistics were examined using frequency analyses. (Table 3) The population was predominantly female, practiced clinically for a median of 8 years, practiced as physicians or nurses and were from the United States. The analysis results for scores on each disease section and the total scores achieved by the participants are discussed below.

Chagas Disease Section

All types of medical providers had slightly better recognition and knowledge of Chagas disease than either cysticercosis or leishmaniasis. Eighty participants (N=110, 73%) reported having ever heard of Chagas disease, 44 (55%) of who reported no confidence in

their current knowledge of the disease. Confidence was measured on a 5 point Likert scale ranging from "1 – Not at all confident" to "5 – Confident". Physicians performed best overall on questions regarding Chagas disease, which was the only of the three sections to have any total scores above 90% correct and all of those scores (N=5) were achieved by physicians. Scores for endemicity, transmission and risk factors of Chagas disease were approximately even for physician assistants, with the question regarding symptoms scoring the lowest. Nurses fared worse overall for each question than the other medical profession categories. Among the "Other" category, which consisted predominantly of nursing and physician assistant students, recognition of the three diseases was the lowest of all the medical provider categories. However, for the Chagas questions, the students who did recognize the diseases outperformed nurses and physician assistants in all questions except risk factors.

Endemicity. The question regarding the endemicity of Chagas disease received a higher proportion of correct answers than any other question on the survey (59%, N=63). Physicians (N=39) recognized the correct answer for this question at a proportion of 71%, physician assistants (N=19) 36%, nurses (N=33) 27% and students (N=16) 43%. Partially correct scores for this question were slightly higher.

Transmission. Only 3 physicians (8%) could correctly identify all means of transmission for Chagas disease, while none of the remaining respondents answered correctly. A total of 62% of students, 61% of physicians, 47% of physician assistants and 15% of nurses submitted partially correct answer responses for this category.

Risk Factors. Five physicians, one nurse and one student provided correct risk factors answers. Partially correct answer responses were much higher, with 77% of physicians, 58% of physician assistants, 30% of nurses and 44% of students responding with at least one correct answer.

Symptoms. The question regarding symptoms scored the lowest overall in the Chagas disease section, with only 40% of total participants responding with at least one correct answer choice. Physicians were the only group to answer the question correctly (N=6, 15%), with an additional 50% of physicians answering at least partially correct. Partially correct responses were next highest among students at a proportion of 50%, followed by physician assistants at 32% and nurses at 6%.

To determine whether any participant characteristics were significant predictors of partially correct scores, adjusted logistic regression for questions regarding disease endemic regions, modes of transmission, risk factors and symptoms were modeled with at least one correct answer (from multiple choice responses) as the outcome variable. (Table 4) This outcome was chosen because so few participants provided any fully correct answers for any of the questions, but scores given for partially correct answers provided a better distribution for modeling. Treating a patient population with a greater proportion of Spanish-speaking only individuals than the proportion in the general public was also significantly positively associated with correct answer choices for endemicity and transmission in adjusted analyses.

Cysticercosis Section

Forty-four participants (40%) reported having ever heard of cysticercosis, 41% of who reported being somewhat confident and 39% not at all confident that their knowledge of the disease was up to date. Transmission and risk factors questions for cysticercosis scored the highest among physicians, although the scores for each question were not markedly different between these categories since overall the scores were low across the questions.

Endemicity. Five physicians (13%) and one nurse (3%) answered this question accurately. No students answered even partially correct answers. Physician assistants provided at least one correct response at a proportion of 5%, nurses at 6% and physicians at 69%.

Transmission. Four physicians (10%), two nurses (6%) and one student (6%) answered the question regarding transmission accurately. Partially correct answers provided by physician assistants (10%), nurses (9%) and students (6%) fell far below the physician proportion of 77%.

Risk Factors. Regarding risk factors, three physicians responded correctly. Partially correct responses were submitted by 66% of physicians, but only 9% of nurses, 11% of physician assistants and 6% of students.

Symptoms. The questions regarding symptoms was again the lowest scoring among all medical professions, with only 27% of the total sample providing at least one correct response. Three physicians (8%) and one physician assistant (5%) answered the question

correctly. No students were able to even provide at least a partially correct answer. Two nurses (6%) provided at least one correct answer.

To determine whether any participant characteristics were significant predictors of partially correct scores, unadjusted and adjusted logistic regression for questions regarding disease endemic regions, modes of transmission, risk factors and symptoms were modeled with at least one correct answer (from multiple choice responses) as the outcome variable. (Table 5) In the unadjusted logistic regression analysis, there were significant associations between age, sex, years practicing and medical profession on partially correct answer responses. However, in the adjusted analysis, no significant associations were found for any characteristic.

Leishmaniasis Section

Seventy participants (64%) reported having ever heard of leishmaniasis, though 61% of those reported having no confidence in their up to date knowledge of the disease.

Endemicity. Two physicians (5%) provided correct answers regarding endemicity. This question elicited the highest partially correct response rate, for this disease section with 46% of participants providing at least one correct response. Partially correct responses were submitted by 71% of physicians, 21% of nurses, 47% of physician assistants and 37% of students.

Transmission. The highest numbers of correct responses were submitted regarding transmission; 17 physicians, one nurse, one physician assistant and two students were

able to correctly identify transmission routes. An additional physician, two nurses and one physician provided partially correct answers.

Risk Factors. As a whole, medical providers scored lowest on the risk factors question than any other question in this section. Five physicians and one of each other medical provider category answered the question correctly. Partially correct answers were provided by 22% of physicians, 3% of nurses and 21% of physician assistants.

Symptoms. Nine physicians, three physician assistants and one student submitted correct answers for symptoms of leishmaniasis. An additional 43% of physicians, 6% of nurses and 21% each of physician assistants and students provided partially correct answers.

To determine whether any participant characteristics were significant predictors of partially correct scores, adjusted logistic regression for questions regarding disease endemic regions, modes of transmission, risk factors and symptoms were modeled with at least one correct answer (from multiple choice responses) as the outcome variable. (Table 6) As with the cysticercosis section, in the unadjusted logistic regression analyses, there were significant associations between age, sex, years practicing and medical profession on partially correct answer responses. In the adjusted analysis, only medical profession was significantly associated with correct answer choices for endemicity and symptoms questions.

Total Score Analysis

Further statistical analyses were conducted to enumerate differences in total knowledge levels of the three diseases among the various medical provider professions, measured as

a combined score for all sections. One-way nonparametric analysis of variance tests showed that MD/DO providers had significantly higher total combined score for all disease sections ($p<0.001$) than all other professions. Total score was measured as an average score of the three disease sections. Years practicing and age, which are highly correlated with one another ($rho=0.9$, $p<0.05$), were individually significantly positively associated with combined score. Variables included in the analyses included: age (continuous), gender, years practicing clinically (continuous) and medical profession. (Results not shown)

To determine whether any clinician characteristics were significant predictors of total knowledge of all three diseases, an additional adjusted linear regression model was run with total score as the outcome variable, measured as the average percent correct for all questions. In this analysis, medical profession and male gender were significantly associated with increased total score. (Table 7)

DISCUSSION

The purpose of this investigation was to model Latino immigrant health status in metropolitan Atlanta in the context of Latino immigrant healthcare seeking behavior and medical provider awareness of neglected parasitic infections that disproportionately affect this population. The study results suggested that Latino immigrants in Atlanta seek healthcare predominantly when pain or illness is severe enough to warrant treatment, or when prenatal care and obstetric care is specifically needed among Latinas. In regression analysis, the only significant factor for seeking care was age, although female gender, urban residence and fewer years spent living in Georgia were also correlated with care seeking, though not statistically significant. Among medical professionals in Atlanta, knowledge of Chagas disease, cysticercosis and leishmaniasis were generally low, which may suggest a gap between patient population care needs and the ability of medical providers to adequately meet these needs. Overall physicians performed statistically higher on all disease components, suggesting an educational gap between medical curricula and physician assistant and nursing curricula.

Latino Immigrant Health Care Seeking Indicators

Among Latino immigrants who reported having sought health care in the last two years, gravity of illness was listed as the most important reason for choosing to seek care. These findings parallel Minneman *et al.*, in which Latino immigrants waited to seek care until pain or illness necessitated a visit to a clinic or hospital. (Minneman, 2012) Additionally, when respondents were asked to delineate specific reasons for seeking care, a common

response among women (N=9, 23%) was obstetrics and prenatal care. Prenatal care and delivery has been established as an important factor for care seeking among Latinas in the United States in previous studies.(Berk, Schur, Chavez, & Frankel, 2000) While it is pertinent that Latinas seek care during pregnancy and thereafter, the results of this study suggest that, in general, Atlanta resident Latino immigrants may not be seeking regular physical examinations and other preventative services. This is a major public health concern, as the rate of chronic preventable diseases such as diabetes may be increasing among Latinos in Georgia. (Karen L. Andes, 2012) An additional notable response was that Latino immigrants who sought care also mentioned trust in doctor as a highly associated reason for choosing to seek care. This may imply that not having trust in their doctor may have alternately influenced their care seeking decision, which is supported by previous research. (Brooks, et al., 2007; Uebelacker, et al., 2012)

The only variable significantly negatively associated with health care seeking behavior in regression analysis was age. This may be attributed to women in the sample, who were more likely to seek care, having a slightly younger mean age than males, or that the distribution of age was slightly skewed toward younger age. Previous research from highly Latino populated metropolitan cities, much like Atlanta, suggests that Latinas predominantly access prenatal services, and on average are younger than the general population.(Valdivieso & Davis, 1988) Analogous results are apparent in this study, and as such a similar mechanism in care seeking may be occurring in the growing Atlanta Latina population. Alternately, given these results it is important to delineate factors that may be impeding care seeking among older Latino immigrants, who may be

disproportionately male, in this community. Given these study results, male Latino immigrants in Atlanta may not be seeking care for reasons most associated with lack of resources. However, further quantitative investigation of cultural barriers such as *machismo* should be quantified in this population to determine effective interventions aimed at improving health care seeking in the Latino immigrant community in Atlanta. (Minneman et al., 2012; Villar, Concha, & Zamith, 2012)

Though not statistically significant, there were several interesting trends apparent from the data. Those living in the urban region of Atlanta were twice as likely to seek care than those living in the peri-urban region, which replicates the findings by Berdahl *et al.* (Berdahl, et al., 2007) This could be due to greater number of healthcare facilities and better resources for accessing those facilities, such as metropolitan rapid transportation. Studies do suggest that availability of neighborhood health clinics impacts Latino health seeking behavior. (Alegria, et al., 2012) Among respondents who did not seek care when care was needed, lack of resources such as transportation and insurance coverage were reported as major barriers. This result is supported by previous research. (Castaneda, et al., 2011; Cersosimo & Musi, 2011; Schmalzried & Fallon, 2012) Interestingly those who had lived in Atlanta less than 11 years, representing lower acculturation, were slightly more likely to seek care in this sample than those who had lived in Atlanta longer. This contradicts existing research findings, and as such it was hypothesized that those living in the area for less time would be less likely to seek care, for reasons associated with poor acculturation and the "healthy migrant effect". (Castaneda, et al., 2011; Livingston, 2008) The effect of acculturation in this study may be the result of the distribution of

respondents toward the lower range of years spent living in Georgia. While the trend in this study is interesting to examine, the results are likely influenced by the distribution of women who sought care at the lower end of the acculturation scale. This represents a potential area for further investigation within the Latino immigrant population to determine whether the effect is statistically significant in a larger sample. A future study on acculturation among Atlanta area Latino immigrants and health care seeking behavior should also further investigate particular health outcomes influencing health seeking, such as the burdens associated with chronic disease, infectious disease or other health issues. Further investigation of characteristics such as income and citizenship would also be useful in establishing determinants of healthcare seeking among younger immigrants and those who have lived in the region for a shorter duration than the median. While the aforementioned results may not have resulted in statistically significant model analyses, as a preliminary study of this particular metropolitan Latino immigrant population the apparent trends may warrant further investigation for the development of public health interventions to improve health care access for this community.

Medical Provider Knowledge of Neglected Parasitic Infections

The results from this study reflect the findings from similar studies conducted on knowledge of neglected parasitic infections among medical providers.(Jones, et al., 2005; Kumar, et al., 2011; Stimpert & Montgomery, 2010) Overall recognition and correct identification of endemicity, risk factors, transmission and symptoms of Chagas disease, cysticercosis and leishmaniasis among medical providers surveyed were remarkably low. Possible reasons for poor identification of the diseases and the epidemiological and

clinical factors associated with them may be attributed to gaps in medical and nursing education and historically lower prevalence of these diseases in the region, attributing to the low recognition among medical providers. (P. Hotez, 2010; P. J. Hotez, 2007) This represents an important public health concern as it suggests medical providers in this community may not readily recognize specific Latino immigrant patient care needs, which could lead to poor health outcomes. The burden of Chagas disease, cysticercosis and leishmaniasis are disproportionately high among Latino immigrants in the United States, yet morbidity from these diseases may be diminished if recognized and treated early. (Stimpert & Montgomery, 2010) Inability of medical providers to recognize the symptoms or risk factors that may lead to differential diagnosis of these diseases, as is evidenced by the results of this study, could lead to increased health burdens among Latino immigrants in this community. (P. Hotez, 2009)

The significantly higher scores for physicians is most likely indicative of training differences between physicians, physician assistants and nurses.(Villafuerte-Galvez, Curioso, & Miranda, 2008) For each section, a question regarding where the respondent had learned of the disease revealed that physicians learned of *all* three diseases in medical school. Nurses most reported learning of Chagas disease in nursing school, but very few reported learning of cysticercosis or leishmaniasis in nursing school, consistent with trends in their recognition and knowledge of the diseases. Results were similar for physician assistants. These findings regarding training disparities may explain the substantially lower recognition and understanding of the three diseases among the nursing and physician assistant groups compared to the physicians in the sample. This

finding is particularly troublesome because physician assistants and nurse practitioners are increasingly the first line of diagnosis and treatment for many individuals.(Horrocks, Anderson, & Salisbury, 2002; Riportella-Muller, Libby, & Kindig, 1995) As such, these medical specialties must be as equipped as physicians to recognize, diagnose and treat these particular health concerns.

While educational differences may explain the variation between types of medical providers, identification and knowledge of the diseases were low in general across professions. This is likely due to the historically low prevalence of the diseases in this region of the United States, and as such many medical providers may have no previous experience in recognizing and treating these particular diseases. However as immigration from endemic regions increases so does the prevalence of each of these diseases.(P. J. Hotez, 2008) With this increasing burden medical providers who treat Latino immigrant patients must be conscientious of the special health risks that affect this population. (Yeh & Sheffield, 2008)

Medical providers who treat the growing Latino immigrant community in metropolitan Atlanta could potentially represent a targeted population for health communication and education interventions that aim to improve Latino health outcomes.(P. Hotez, 2009) Interventions such as Continuing Medical Education and Continuing Nursing Education modules focusing on these diseases and their health burden on Latino immigrants represent a means by which this knowledge gap may be lessened. (Davis et al., 1999; Wutoh, Boren, & Balas, 2004)

Strengths, Limitations and Future Research

A notable strength of the Latino immigrant survey was the random household sampling method utilized following a 30x7 design. Although due to resource constraints, only 14 census tracts could be sampled in this manner, power calculations for the population size show that the achieved sample size is reasonable to detect an effect in health care seeking among Latino immigrants in the study region. The initial two-stage sampling strategy for the medical provider enabled preliminary targeted sampling of medical providers and medical facilities reported by the Latino immigrant respondents. However, low response rates using this method necessitated the enactment of a convenience sampling strategy. As such, results are not generalizable to populations outside the metropolitan Atlanta statistical area.

Future studies should include larger sample sizes for both populations to improve estimate precision and better estimate effect size. The Latino immigrant health care seeking behavior study should include questions regarding income, educational attainment and occupation to delineate other potential underlying institutional barriers to seeking care within this community. A quantitative study of cultural barriers impacting health care seeking behavior would also be influential for the development of future interventions. The medical provider study could easily be expanded nationally using the same recruitment strategy utilized in the secondary sampling stage of this study, or alternately using a random sampling strategy if resources such as comprehensive medical provider databases were available.

Conclusions

In summary, the goals of this investigation were to examine factors that attribute to Latino immigrants' utilization of healthcare services in order to adequately provide care for this growing sector of the population and to determine how well the medical community is prepared to recognize and treat diseases of special concern in this population. Though distinct in topic, these survey results reflect similar underlying themes regarding the health of the Latino immigrant community in Atlanta. First, it is evident that barriers to care do exist for at least a marginalized portion of this community, as is evidenced by responses elicited from participants who reported needing care but not being able to access care for various reasons. Trends in health care seeking behavior and access to care among Latino immigrants in this study are similar to findings from previous research. Research specific to the Latino immigrant population in metropolitan Atlanta is lacking, and thus these findings may be beneficial in the development of public health interventions to improve access to care for this population. Secondly, it is suggested from these results that there exists a disparity in care for health burdens that disproportionately affect the Latino immigrant population based on the inability of medical providers to appropriately identify these particular burdens. This is a disconcerting outcome because when Latino immigrants do seek care, the medical providers treating them must be cognizant of the increased risk for the debilitating neglected parasitic infections that disproportionately affect this population. It is clear from the results of this study that there exists a need for public health interventions such as improved medical provider education and reduction of barriers to seeking care for this population.

PUBLIC HEALTH IMPLICATIONS

The results from this study reflect several important public health implications. There exists a marginalized population of Latino immigrants residing in Atlanta who have reduced access to health care due to institutional barriers such as insurance and transportation barriers. The low overall knowledge of Chagas disease, cysticercosis and leishmaniasis among medical providers indicates a gap in medical provider training. There is a need to educate medical providers regarding these diseases.

Latino Immigrant Health Seeking Behavior

- The results of this study suggest Latinas tend to seek prenatal and obstetrics care, but there may exist opportunities to improve preventative care seeking. Public health officials in metropolitan Atlanta should target educational campaigns towards Latinas regarding low cost and free preventative health services. Community organizations in Atlanta may utilize a newly published health resource guide to educate Latinas in the community regarding medical facilities in Atlanta that offer translation services, low cost services and otherwise diminish barriers to care seeking.
- Institutional barriers represent an opportunity to improve health care access among Latino immigrants in Atlanta. Care seeking for severe pain or illness suggests a need to improve access for preventative care and routine ambulatory care. Public health practitioners and policymakers in the metropolitan Atlanta area should work to improve access to ambulatory care facilities for Latino

immigrants, particularly males. Services such as free transportation to clinics and health fairs as well as education regarding preventative services represent some interventions that may be established to improve access to care.

Medical Provider Knowledge of Neglected Parasitic Infections

- Gaps in medical and nursing training represent opportunities for educational interventions. Public health researchers should market a continuing medical education module currently in development regarding Chagas disease, cysticercosis and leishmaniasis to medical providers. Medical providers practicing in dense Latino immigrant neighborhoods or in hospitals with high Latino immigrant traffic may be specifically targeted for continuing medical education on these diseases.
- Low recognition of risk factors and symptoms of Chagas disease, cysticercosis and leishmaniasis indicates potential for missed cases among populations at risk. Improvements in diagnostic and treatment capabilities for each of these diseases in Atlanta area hospitals and clinics should be implemented, particularly in dense Latino immigrant neighborhoods or in hospitals with high Latino immigrant traffic.

TABLES

TABLE 1. SELECTED DEMOGRAPHIC CHARACTERISTICS OF LATINO IMMIGRANT RESPONDENTS

	No.	**%**
Total	**83**	**100.0**
Female	52	63
Mexico Country of Origen	56	69
Insured (Ever Last 2 Years)	13	16
Primary Language Spanish	80	96
Married	58	70
	Median	**95% CI**
Age	32	(30, 35)
Years in Georgia	11	(10,12)
No. Children	1	(1,2)

TABLE 2. LOGISTIC REGRESSION ANALYSIS OF LATINO IMMIGRANT HEALTH CARE SEEKING BEHAVIOR MEASURED AS RESPONDENT EVER SEEKING CARE IN PAST 2 YEARS, BY SELECTED CHARACTERISTICS. (N=83, P<0.05)

	Unadjusted		Adjusted	
Characteristic	**OR**	**95% CI**	**OR**	**95% CI**
Urban Residence	1.9	(0.7, 5.2)	2.2	(0.7, 6.6)
Age	0.9	(0.8,0.9)*	0.9	(0.8, 0.9)*
Male	0.5	(0.2, 1.1)	0.6	(0.2, 1.6)
Years in Georgia	0.8	(0.3, 2.0)	1.0	(0.3, 3.2)

* $p<0.05$

TABLE 3. SELECTED DEMOGRAPHIC CHARACTERISTICS OF MEDICAL PROVIDER RESPONDENTS

	No.	**%**
Total	**110**	**100.0**
Male	80	73
Medical Profession		
MD/DO	39	36
PA	19	18
Nurse	33	31
Other (Student)	16	15
United States Origen	93	87
Language Fluency (Other than English)		
None	67	61
Spanish	36	33
French	3	3
Other	10	9
Specialty		
None	73	66
Emergency Medicine	9	24
OB/GYN	7	19
Other	21	19
Practice Location*		
Hospital	66	61
General Clinic	45	42
Specialty Clinic	49	45
Other	7	6
	Median	**95% CI**
Age	39	(34,44)
Years Practicing	8	(5,13)

* Most providers indicated more than one practice location, thus percentages add to more than 100

TABLE 4. LOGISTIC REGRESSION ANALYSIS OF MEDICAL PROVIDER KNOWLEDGE OF CHAGAS DISEASE EPIDEMIOLOGY

	Multivariate Regression, N=110							
	Endemicity		**Transmission**		**Risk Factors**		**Symptoms**	
Characteristics	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Age	1.0	(0.9,1.1)	1.0	(0.9,1.1)	1.0	(0.9,1.1)	1.1	(1,1.2)*
Male	10.7	(1.9,59.6)*	2.9	(0.9,9.3)	6.3	(1.6,25.0)*	1.3	(0.4,4.1)
Years Practicing	1.0	(0.9,1.1)	1.1	(0.9,1.2)	1.0	(0.9,1.1)	0.9	(0.8,1.0)
Medical Profession								
MD	0.6	(0.11,4)	0.3	(0.1,1.4)	0.8	(0.2,3.9)	0.5	(0.1,2.6)
PA	<0.1	(<0.1,0.3)*	0.1	(<0.1,0.7)*	0.3	(0.1,1.5)	0.2	(<0.1,0.8)*
Nurse	0.1	(<0.1,0.4)*	0.1	(<0.1,0.2)*	0.3	(0.1,1.2)	<0.1	(<0.1,0.2)*
Student	-		-		-		-	
Hispanic Patient Population**	1.1	(0.2,5.0)	0.2	(0.1,1.1)	1.3	(0.3,5.2)	0.6	(0.1,2.4)
Spanish Speaking Patient Population**	9.6	(1.5,62.9)*	7.4	(1.3,41.0)*	4.9	(1.0,24.0)	2.9	(0.6,13.5)
Uninsured Patient Population***	0.4	(0.1,2.0)	1.2	(0.2,6.3)	1.5	(0.3,7.5)	1.3	(0.2,10.1)

* p<0.05
** Greater than proportion in general population
*** Treat uninsured patients (Y/N)

TABLE 5. LOGISTIC REGRESSION ANALYSIS OF MEDICAL PROVIDER KNOWLEDGE OF CYSTICERCOSIS DISEASE EPIDEMIOLOGY

	Multivariate Regression, N=110							
	Endemicity		**Transmission**		**Risk Factors**		**Symptoms**	
Characteristics	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Age	1.1	(0.9,1.2)	1.1	(0.9,1.2)	1.1	(0.9,1.2)	1.1	(0.9,1.2)
Male	1.6	(0.4,6.2)	1.0	(0.9,1.1)	1.0	(0.9,1.1)	3.0	(0.8,10.9)
Years Practicing	1.0	(0.9,1.2)	2.4	(0.6,8.8)	2.9	(0.8,10.6)	1.0	(0.8,1.1)
Medical Profession								
MD	6.1	(0.9,41.6)	5.5	(1.0,31.0)	4.0	(0.7,22.6)	6.6	(1.0,43.9)
PA	0.2	(<0.1,3.8)	0.2	(<0.1,2.1)	0.2	(<0.1,1.7)	0.2	(<0.1,3.2)
Nurse	0.5	(0.1,4.4)	0.4	(0.1,2.4)	0.3	(0.1,2.3)	0.4	(0.1,3.9)
Student	-		-		-		-	
Hispanic Patient Population**	0.4	(0.1,2.5)	0.2	(<0.1,1.5)	0.2	(<0.1,1.6)	0.3	(0.1,1.9)
Spanish Speaking Patient Population**	1.4	(0.2,8.7)	4.8	(0.6,36.7)	5.3	(0.7,39.5)	3.7	(0.5,25.1)
Uninsured Patient Population***	4.2	(0.3,68.8)	0.4	(0.1,3.2)	0.4	(0.1,2.7)	0.6	(0.1,5.2)

* $p<0.05$

** Greater than proportion in general population

*** Treat uninsured patients (Y/N)

TABLE 6. LOGISTIC REGRESSION ANALYSIS OF MEDICAL PROVIDER KNOWLEDGE OF LEISHMANIASIS DISEASE EPIDEMIOLOGY

	Multivariate Regression, N=110							
	Endemicity		**Transmission**		**Risk Factors**		**Symptoms**	
Characteristics	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Age	1.0	(0.9,1.1)	1.0	(0.9,1.2)	1.2	(1.0,1.3)	1.1	(1.0,1.2)
Male	2.4	(0.8,7.5)	1.7	(0.5,5.9)	1.3	(0.4,4.1)	2.2	(0.7,6.7)
Years Practicing	1.0	(0.9,1.1)	1.1	(0.9,1.2)	0.9	(0.8,1.0)	0.9	(0.8,1.1)
Medical Profession								
MD	2.1	(0.5,9.1)	0.7	(0.1,3.7)	6.4	(0.6,68.4)	1.4	(0.3,6.2)
PA	0.5	(0.1,2.4)	0.1	(<0.1,1.4)	3.4	(0.3,42.3)	0.5	(0.1,2.8)
Nurse	0.3	(0.1,0.9)*	0.2	(<0.1,1.5)	0.6	(<0.1,8.5)	<0.1	(<0.1,0.6)*
Student	-		-		-		-	
Hispanic Patient Population**	1.9	(0.5,6.9)	0.4	(0.1,1.9)	1.9	(0.4,9.0)	1.0	(0.3,4.0)
Spanish Speaking Patient Population**	1.0	(0.2,4.0)	1.6	(0.3,8.7)	0.9	(0.2,4.6)	1.2	(0.3,5.3)
Uninsured Patient Population***	0.5	(0.1,2.2)	0.8	(0.1,5.3)	0.3	(<0.1,1.6)	0.6	(0.1,3.9)

* p<0.05

** Greater than proportion in general population

*** Treat uninsured patients (Y/N)

TABLE 7. LINEAR REGRESSION ANALYSIS OF TOTAL SCORE (CONTINUOUS PERCENTAGE) BY SELECTED CHARACTERISTICS (N=110, P<0.05)

Model	Parameter Estimate	Standard Error	Pr > |t|
Intercept	12.5	12.5	0.3
Age	0.4	0.4	0.3
Years Practicing	-0.1	0.4	0.9
Special	4.7	6.0	0.4
Male	13.5	4.7	<0.05*
Medical Profession			
MD	4.5	7.7	0.6
PA	-19.5	7.3	<0.05*
Nurse	-19.8	7.3	<0.05*
Student	-	-	-
Hispanic Population*	-2.8	5.4	0.6
Spanish Speaking Population*	8.6	5.9	0.2
Uninsured Population**	-5.7	6.4	0.4

* p<0.05

** Greater than proportion in general population

*** Treat uninsured patients (Y/N)

Appendix A. Medical Provider Survey Grading Scheme Example

B4	How is Chagas disease transmitted? ***Please select all answers that apply.***	a) Contaminated water/food b) Infected insects c) Vertically (mother to unborn child) d) Blood transfusions/organ transplants e) Airborne transmission f) Unprotected sex g) Skin contact with infected person h) Contact with animal feces i) Other (SPECIFY) _____ j) Don't know

Total points available: 30

Correct answer choices: b,c,d

Response Example 1: b,c,d
Example 1 Score = 30

Response Example 2: b, c, e
Example 2 Score = 20-5 = 15

Response Example 3: a
Example 3 Score = 0

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