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Prevention Practices and West Nile Virus Infection Among Ethnic Minorities, Texas

Bayabel Debebe Mengistu
Walden University

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Walden University

College of Health Sciences

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Bayabel D. Mengistu

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Review Committee

Dr. Hadi Danawi, Committee Chairperson, Public Health Faculty
Dr. Leah Miller, Committee Member, Public Health Faculty
Dr. James Rohrer, University Reviewer, Public Health Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

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by

Bayabel D. Mengistu

MPH, Walden University 2011

BS, Langston University, 1995

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

May 2020

Abstract

West Nile virus (WNV) is a major public health problem and the cause of nearly 25% of world economic burden of disease. While the risk factors for developing West Nile fever and West Nile disease from WNV infection have been identified, it is not known how knowledge, attitude, behavior (KAB), access to health care (AHC), and comorbidities are associated with prevention practices of WNV infection among ethnic minorities. The aim of this study was to examine the association between KAB, AHC, comorbidities, and prevention practices of WNV infection among ethnic minorities in Texas. KAB, AHC, Comorbidities were used as independent variables and prevention practices were the dependent variables. A cross-sectional quantitative research method within the theoretical framework of the Health belief model was used. Based on sample size computations, 434 for the main study and 20 participants for pilot study were selected using a convenience sampling method. A linear regression was used for modeling and used a summary index for the dependent variables. Pilot study was used to confirm the feasibility of the main study. Ethnic minorities who speak English and are 18 years and older were surveyed using a pre and self-developed survey instruments. Findings of the analyses indicated that there were major associations between knowledge ($r=.38, p < .001$), attitude ($r=.26, p < .001$) and behavior ($r=.34, p < .001$), but not for AHC and comorbidities ($p>0.005$). The 2 major findings are that AHC and comorbidities are not associated with prevention practices of WNV infection and the current prevention practices are not appropriate for a Texas climate. These findings will allow scientific scholars designing and developing educational materials and create a more acceptable and environmentally adaptable prevention practices. The result of this dissertation may lead to targeted education programs and policy changes, which can lead to positive social change.

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Dedication

I dedicate my dissertation first and foremost to God almighty, who gave me the strength and patience to start and complete this millstone. Secondly, to my father Priest Mengistu, Debebe and my mother Emohaye Tinawu, Azalech. Including my family Maria, Alem, Holly, and Joshua, love, support, encouragement and prayers were crucial to the completion of my dissertation. I also wish to dedicate this dissertation to the United Nation High Commissioners for the Refugee (UNCHR) and International Red Cross worker's (women and men) who are dedicating their life to save other life. I would not be here today without their support.

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Chapter 1: Introduction to the Study

In 2013, almost 780,000 illnesses globally were attributed to West Nile Virus (WNV) infection since its discovery in 1999. WNV is an epidemic disease in USA (Centers for Disease Control [CDC], 2013; Hayes et al., 2002; Petersen, Brail, & Nasci, 2013). A dramatic increase in WNV infections in the United States has also affected wildlife, such as birds and horses (Petersen et al., 2013). Mosquitoes are the most common vector for WNV; the likelihood of infection increases for people is now an epidemic in the United States who frequently participate in outdoor activities (Ceccaldi, Lucas, & Despres, 2004; CDC, 2013; Hinckley, O'Leary, & Hayes, 2007; Lazquez & Saiz, 2010).

WNV is the leading cause of severe cases of West Nile Fever (WNF), which if left untreated can result in West Nile Virus Disease (WNVD). WNV has been associated with other diseases, such as meningitis, encephalitis, and acute flaccid paralysis (CDC, 2013). Well-documented scientific evidence has indicated that the virus has the capability of crossing the blood-brain barrier and may cause West Nile Neuroinvasive Disease (WNND) which can be fatal (Ceccaldi, Lucas, & Despres, 2004).

For individuals with complex and severe medical issues, WNND has a fatality rate of approximately 10% (Lindsey et al., 2010; Petersen et al., 2013). Because of the severity and complications extending from WNV, elderly individuals and individuals who are immunocompromised and develop WNV are at high risk of WNV infection, meningitis, and death (CDC, 2013). In North America, WNV is the most critical public

health threat among ethnic minorities, especially the African American community (Murray et al., 2013; Petersen, Brail, & Nasci, 2013).

The aim of this study was to examine whether knowledge, attitude, and behavior (KAB), AHC, and comorbidities were associated with WNV infection prevention practice among ethnic minorities (African Americans and Hispanics) in the state of Texas. Prevention practice such as eliminate standing water near to the home in order to decrease mosquitoes, use of insecticide sprays to reduce mosquitoes, use windows screen to decrease mosquitoes, avoiding outdoor activities during mosquito feeding hour, and wearing long sleeves and long pants during mosquito feeding hour. Currently, this prevention practice is the only treatment available for WNV infection. Texas (e.g., African Americans and Hispanics).

In this chapter, I presented the background of WNV with a brief historical overview of the disease and its spread throughout the world. The current research problems with WNV, the gap in the literature surrounding WNV, and the intent to perform a quantitative comparative study are described by the problem statement and aim of the study. I then present the five research questions with their associated hypotheses that guide the analysis of collected data. These questions were founded upon the theoretical framework, the Health Belief Model (HBM; Rosenstock, 1974a) that underpins this study. I also described the structure of the study and provided a rationalization for the study outline. The definitions section presents concise definitions for terms used throughout the study, which was helped to eliminate ambiguity. Limitations, scope, and delimitations describe the sample population and effects of the

study design on the target population. I discussed the importance of the study, its findings, and the potential for positive social change in detailed in the body of this dissertation

Background

The first time WNV was identified in 1937 in Uganda at West Nile District from a febrile patient (Smithburn, Hughes, & Burke, 1940). Globally, the prevalence of WNV is high, and it is the most comprehensive arbovirus in the world (Kramer, Styer, & Ebel, 2008). In 1999 WNV first detected in USA, the mechanism of the introduction of the virus into USA remains unknown (Murray et al., 2014). Murray et al.'s historic overview of WNV in the United States described a rise in the frequency and severity of WNV since 1999, although associated risk factors of the spread of WNV remain unclear. However, environmental and global climate changes have intensified outbreaks of WNV infections across the USA in recent years (Environmental and Health Perspective, 2014).

WNV infection continues rapidly spreading and transformation into an epidemic throughout in the USA, especially Oklahoma, South Dakota, Texas, Mississippi, Michigan, and Louisiana have experienced substantially greater occurrences of infection (CDC 2012; Katus, 2012). In 2012, there were 5,674 cases of WNV disease in people and 286 deaths reported in 48 states; but, 33% of them were from Texas. Based on this, I have chosen to conduct my study in Houston, Texas (CDC, 2012).

Even though the WNV is an epidemic in the United States, there is a low level of ethnic minority cases in Texas. (Murray et al., 2006). Murray, Hesalroad, Fonken, and Nolan (2012) confirmed the CDC's findings and identified the at-risk population for

WNV was primarily in the elderly and immunocompromised populace but it is not clear how KAB associated to prevention practice of WNV among ethnic minorities in Texas which has low level of diagnosis but high level of mortality. Understanding KAB and prevention practices of WNV infection and examining the association between knowledge, attitudes and behaviors as well as AHC and comorbidities and prevention practice after stratification for ethnicities will allow me to determine if a significance difference in practices exist.

Problem Statement

WNV is a global lethal infectious disease and a major public health threat. Because of the vast spread of WNV infection in the United States, it is now an epidemic (CDC, 2012, 2013; Murray et al., 2014; Petersen et al., 2013). WNV progresses to WNF then to WNND. For the past 13 years, starting in 1999, the WNV infections accounts for 16,196 cases and 1,549 deaths in the USA (Murray et al., 2014) Modifications of the world's environment due to climate change, the disorder of urban growth, and globalization of international exchange might have a significant role in the outbreak of WNV and increases the comorbidities and mortality associated with it (Murray et al., 2014).

Another issue associated with increased prevalence of WNV is the lack of treatment to treat or vaccines to cure WNV (CDC, 2018). Given that it is important to reduce the environmental risk of exposure by the widespread adoption of preventive behaviors to prevent WNV infection. Both reducing environmental risk of exposure and increasing adoption of preventive behaviors depend on knowledge of the disease and

acceptance of the seriousness of its sequel (Hongoh, 2016). These factors differ among varied ethnic populations.

The result of this literature reviewed revealed the presence of a literature gap regarding KAB, AHC, and comorbid conditions and prevention practices of WNV infection. Understanding the KAB toward WNV may significant role in of WNV prevention. This result will contribute to a positive social transformation.

Purpose of the Study

I examined whether KAB, AHC, and comorbidities were associated with WNV prevention practices among ethnic minorities (e.g., African Americans and Hispanics). I determined the association between the independent variables knowledge, attitude, and behavior as well as AHC and comorbidities of ethnic minorities and the dependent variable prevention practices of WNV infection. The outcome of this study was an examination of whether there was an association between the knowledge, attitude, behavior, as well as AHC and comorbidities and prevention practice between ethnic minorities (African American and Hispanic) regarding of WNV infection. I identified the major challenges that are facing the health practitioner today relating to the reasons why ethnic minorities (African American and Hispanic) were less likely to be diagnosed but more likely to die due to WNV.

Hypotheses and Research Questions

Within this quantitative study, I examined the following research questions.

RQ1. What is the association between knowledge and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_01 : There is no association between Knowledge and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A1 : There is an association between Knowledge and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

RQ2. What is the association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_02 : There is no association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A2 : There is an association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

RQ3. What is the association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_03 : There is no association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A3 : There is an association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

RQ4: What is the association between AHC and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_04 : There is no association between AHC and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A4 : There is an association between AHC and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX

RQ5: What is the association between the presence of comorbid conditions and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_05 : There is no association between the presence of comorbid conditions and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A5 : There is an association between the presence of comorbid conditions and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

Theoretical Framework

This dissertation followed the health believes model (HBM). The HBM was developed by Rosenstock (1966) to describe the elements of an individual's understanding and motivations toward health care services, as well as a general awareness of health threats. According to Rosenstock et al. (1988), the HBM measures the association between one's action and the consequence that is associated with health

outcomes. Researchers have used the HBM to study the behavior, knowledge, and attitude of individuals regarding mosquitoes-borne diseases such as Dengue fever, malaria and WNV (Aquino et al., 2004; Bitto et al., 2005; Herrington et al., 2003). Mitchell (2014) directed a study to validate the use of HBM for mosquito-borne diseases. Researchers have also used the HBM for assessing knowledge, attitude, and behaviors, including Herrington (2003), Aquino et al. (2004), Bitto et al., (2005), Yerby, (2007), and Eichler, (2011).

According to Jones, Smith, and Llewellyn (2014), HBM was intended to measure the KAB result of the population, The HBM principle five perception factor and one cue to action. The HBM is based on five principals: perceived susceptibility (individuals' consideration of being at risk for infection), perceived severity (individuals' perceptions of the seriousness of infection), perceived benefit (individuals' beliefs about positive outcomes from preventative actions), and perceived barriers (individuals' perceptions of challenges to taking preventative action; Rosenstock et al., 1988). Motivation to take preventive action is the result of perceived susceptibility and perceived benefits which result perceived threat (Janz & Becker, 1984; Murray-Johnson et al., 2006). Health education can empower individuals with necessary knowledge to develop one's perception to health. With the introduction of health belief and self-efficacy, many researchers have shown the positive influence of knowledge on health behavior (Chang, 2008; Sedlak, Doheny, & Jones, 2000)

Murray et al. (2013); Petersen, Brail, and Nasci (2013) revealed three major gaps regarding WNV prevention practice among ethnic minorities. First, were the significant

differences in sex, age, and race of patients? High vulnerability for WNND contraction was found for the minority populace (OR 1.9, 95% CI 1.6–2.4, $p < 0.001$; Murray et al., 2013). Statistically, this study showed that 68% Caucasians, 6.3% African Americans, and 17% Hispanics indicated a low of diagnosis. When comparisons were made of the WNV diagnosis among other races, ethnic minorities have been diagnosed at the low rate (6.3% African American and 17% of Hispanic concerning 68% Caucasian). When the researchers compared progression rates, they showed that ethnic minorities suffer more WNV infection progression than other races; however, they did not explain how KAB, AHC, and comorbidities contribute to this low level of diagnosis among ethnic and high rate of progression form of WNV infection become a gap this dissertation pursue.

According to Petersen et al. (2012), it is impossible to judge when and how (timing and intensity) WNV will cause an international disaster like the human immunodeficiency disease (HIV). Knowing the unpredictable nature of the WNV occurrences, and in the absence of effective treatment, prevention practice has become the only means of reducing human WNV epidemics (Mitchell, 2009). As there are limited data for examining the KAB, AHC and prevention practice of WNV among ethnic minorities would be very important.

There are multiple challenges that face the health practitioner today. Kollars (2017) examined prevention practice in ethnic minorities low-income neighborhoods area in Chatham County, GA. The result of this study highlighted a significant outcome due to the death of minorities from WNV infection, which is the one of the reasons for study. The result indicated that African Americans are less likely to receive medical care

when compared to Caucasians and the wealthy population.

Understanding the KAB toward WNV may significant role in WNV prevention. According to Becker and Maiman (1975), knowledgeable health behavior includes a readiness to take action; an individual's readiness is determined by their perceptions of illness or disease severity and susceptibility. According to a University of Maryland report (2016), these actions include (a) staying inside in the morning and night, (b) when going outside wear protective clothing, (c) use mosquito spray to protect from a bite, (d) remove standing water, (e) get WNV vaccines, and (f) participate in mosquito control programs. Figure 1 depicts the basic concept of HBM. Table 1 includes the applications of HBM and the six perceptions of HBM principles. These six factors play a significant role when the person has enough knowledge to implement prevention practice. When people have a positive attitude, they more will work to practice prevention and exhibit the prevention practice behavior.

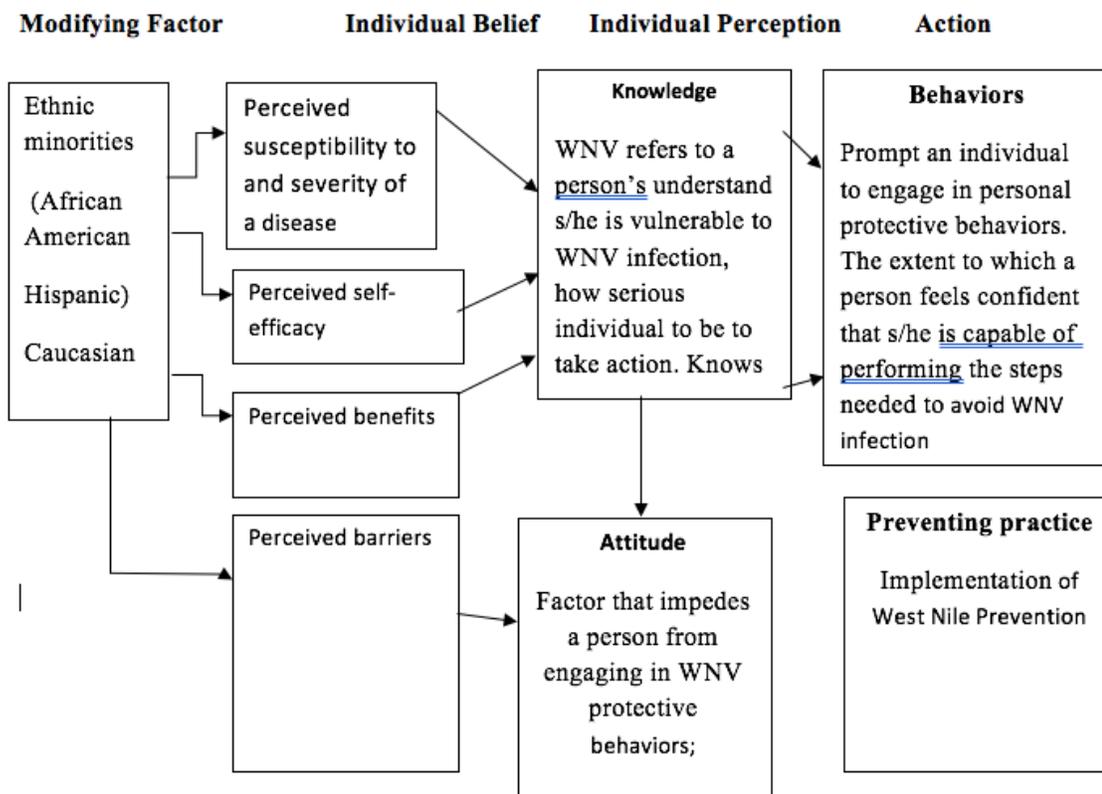


Figure 1. The HBM (Source modified from Glanz, Rimer, & Viswanath, 2008).

Table 1

The Health Belief Model Application Based on Akompab et al., 2013.

Theory	Description/ prevention practice	Implementation/ WNV/WNF/WNND (WNVD)
Susceptibility	When individuals believes that they may have been exposed to Mosquito bite	Based on personal believes, Subject believes they have to exposed to WNV/WNF/WNND (WNVD)
Severity	In individual believes on the consequence of Mosquito bite thus they will implement WNV privations methods this is significant enough try to avoid these. Subject believes WNV prevention practice will limit the exposure to	Subjects believe these activities will lead them expose to WNV/WNF/WNND (WNVD) and try to avoid these activities.
Benefits	WNVD (WNVD). Even if they believe they could not afford it or it is not the primary needs instead they focus on primary needs. Strategies to activate	Action taken based on the environment and positive effect is expected.
Barriers	WNVD (WNVD). Even if they believe they could not afford it or it is not the primary needs instead they focus on primary needs. Strategies to activate	Barriers reduction through reassurance, incentives, assistance. Providing the subject with prevention protective will reduce WNV/WNF/WNND (WNVD)
Cues to Action	Subjects are confident to use "readiness" Subjects will implement prevention practice	Promote awareness, and reminders.
Self-Efficacy	Assurance on individuals ability to take action	Provide training, guidance in acting action.

According to Becker and Maiman (1975), the following three factors within HBM explain preventative health behavior: readiness to take action, evaluation of the health behavior, and a resolution toward action. An individual's readiness is determined by their prescribed health behaviors that inhibit action, again, because of an individual's perceptions. The behavior must be perceived as feasible and efficacious to be weighed against the possible physical and psychosocial barriers that surround an individual. Finally, an individual must be resolute and enact upon internal or external forces that can trigger a health behavior. Physical perceptions of personal health and well-being, a doctor, or a public health campaign may affect an individual enough to utilize or perform a certain health behavior for their benefit such as prevention practice. Each factor describes personal perceptions and the ability to act upon those perceptions that may bring about awareness; HBM is a reflective action and not reflexive because it represents a conscious assessment of health behavior, cost-benefit analysis, and whether action or inaction is needed.

Nature of the Study

African American and Hispanics who were residents in Houston, TX were served using a quantitative cross-selection research format and data were collected. The rational selection of this design was that the quantitative cross-sectional study tests for significance within the variables and discovery of any and all associations, it allows enhance the generalization, and it allows to replicated with standard research procedure while ensuring validity and reliability of the research (Creswell, 2014).

In this study, KAB, AHC, and comorbidities were the independent variables and prevention practice of WNV was the dependent variable. Both variables were measured using questionnaire items that were unique to the participant mosquito or bird protection practice. Frequently asking the study participants the why, when, and what type of prevention practices of WNV used allowed me to conclude the participant's KAB, perceptions, and idea of WNV prevention, as well as the effectiveness of the practice. I collected data from ethnic minorities (African American and Hispanic) and analyzed it using the SPSS version 22.0 of Windows version. A descriptive statistics and linear regression were performed.

Definitions

Arbovirus: Arthropod-borne virus; any of a group of viruses transmitted by mosquitoes, ticks, and other arthropods

Attitude: Attitude is an expression of one's feeling. in this study it is a way of thinking and behaving that people regard as (Webster's New World Dictionary, 2003, p. 41).

Behavior: Behavior is a response of an individual's towards the stimuli in its own environment (Schreuder, Erp, Toet, & Kallen, 2016)

Comorbidities: Comorbidities are conditions that exist at the same time and independently of other medication conditions (Webster Dictionary, 2016).

Encephalitis: Encephalitis is swelling of the brain due to infectious disease (CDC, 2016)

Knowledge: Knowledge is a level of understanding information gained throughout life and response from those experiences (Webster Dictionary, 2016, p. 360).

Meningitis: inflammation of the meninges of the lining of the brain and spinal cord (CDC, 2016).

Neuroinvasive: Neuroinvasive is an altered level of consciousness, confusion, agitation, or lethargy and other cortical signs (Louisiana Office of Public Health – Infectious Disease Epidemiology Section, 2012).

Perceived barriers: Perceived barriers are obstacles that prevent individuals from practicing prevention practice for example, perceiving WNV as it is not a priority, basic needs, or chronic disease take priorities over WNV prevention practice such as buying insect repellent or mosquito net or staying inside in the peak mosquito season (Hochbaum, Rosenstock, and Kegels, (1952)

Perceived benefit: Implementing a new healthy behavior with the belief that it will reduce the chances of having WNV infection Hochbaum, Rosenstock, and Kegels, (1952)

Perceived severity: When individuals take action to prevent illness knowing the seriousness that the disease may cause (Hochbaum, Rosenstock, and Kegels, (1952)

Perceived susceptibility: Perceived susceptibility means individuals believe that obtaining the disease is inevitable thus they will practice WNV prevention practice (McCormick-Brown, 1999).

Prevention practice behaviors: The behaviors and actions that ethnic minorities engage in that may reduce their risk of having WNV. Self-perception of risk and take the following measures According to a University of Maryland report (2016), these actions include: (a) stay inside in the morning and night, (b) when going outside were protective clothing, (c) use mosquito spray to protect from a bite, (d) remove standing water, (e) get WNV vaccines, and (f) participate in mosquito control programs.

West Nile Virus (WNV): is a viral illness transmitted by mosquitoes, birds, and horses that causes febrile illness, encephalitis, or meningitis (CDC, 2016).

West Nile Fever (WNF): The progressive stage of West Nile virus infection that manifests high fever (CDC, 2016).

West Nile Neuroinvasive Disease (WNND): The critical stages of the WNV infection with resemblance of brain and spinal cord syndromes (Davis et al., 2006).

West Nile Virus Disease (WNVD): WNV infection used to accommodate for all the three stage of WNV/WNF/WNND of WNV infection

Validity and Reliability

I used the questionnaires that were already tested for validity and reliability; however, there were few general questions about access to health and comorbidities not included in the original instruments. A pilot study was used in this dissertation. The validity and reliability of the questionnaires aligns with the factors of KAB, AHC, comorbidities, and prevention practice. The questions also aligned with the HBM, specifically perceived benefits, and cues to action, perceived barriers, perceived susceptibility, and perceived severity. This theoretical grouping verified for

validity/reliability was already established with high intrafactor correlation, signifying instrument reliability and the meaning that the questions truly measure the WNV knowledge, attitudes, or PPB they were intended to measure not purely by chance.

Assumptions

The assumptions for this study relayed upon the perceptions of the participants and their practices of prevention. The first assumption was that participants completed the survey instruments in an honest and forthright manner due to the anonymity of their answers and awareness of the benefits that their participation brings into the area of public health and epidemiology. The second assumption was that the research performed by Murray et al. (2013) and Nolan et al. (2012) was conducted in a thorough manner such that the researchers offer guidance regarding the significance of this study, because minority populations are underserved populations within the health care system, due to socioeconomic or geographical location (Abayasekara, 2015). The third assumption was that the participants would comprise a representative sample that can be extrapolated to the entire minority population within the United States. Many of the perceptions and barriers to preventative health behaviors were representative of cultural differences.

Scope and Delimitations

In quantitative studies, large sample sizes are required to justify empirical validity. Collecting a large sample that covers the world population is beyond the scope of this dissertation. The scopes of ethnic minorities that were sampled include African Americans and Hispanics. I used a quantitative methodology in order to answer the

search questions using a linear logistic regression method that trade the degree of richness present this study were not created by pure chance (see Pagano, 2009).

Limitations

There were three major limitations to this study. I relayed on participants to respond truthfully and accurately to the survey questions. Participants may have lacked knowledge and experiences about prevention practices. Because mosquito breeding time is seasonal, a recall bias may exist in that KAB with participants. There is no a system to check whether the participants implemented prevention practices or not.

Significance

This study is unique because I identified the two significant problems of WNV. It was the first study to compare ethnic minorities' populations (African American and Hispanic). This study will add to the literature by providing information about KAB among WNV infection prevention practice among ethnic minorities. This study is critical because African Americans were significantly more susceptible than all other races studied (Murray et al., 2013; Nolan et al., 2012). I found the missing gap in understanding of KAB, AHC, comorbidities, and prevention practice of WNV among ethnic minorities.

Murray et al. (2006) found that the percent of WNV cases for African Americans were not indicative of the general populace when compared with the entire sample population. A significant change may occur through promoting a higher level of awareness of WNV and AHC when symptoms are present. The results from this study

may provide much-needed insight regarding prevention practice of infectious diseases among African American and Hispanic populations.

In conjunction with distribution of WNV awareness educational materials, promotion of quality clinical care may influence health literacy on treatments and establish a surveillance system to monitor WNV awareness prevention practices (Mitchell, 2014; Pugh 2009; Sixsmith, Doyle, & D'Eath 2014; WHO 2012). As several researchers have indicated, currently, there are no other means of treatment for the WNV infection except implementing protection practice of WNV. Examining KAB of WNV among African American and Hispanic populations is essential for understanding the prevention practices of WNV infection among these communities (Campbell, Marfin, Lanciotti, & Gubler, 2002).

Summary

I examined whether KAB, AHC, and comorbidities were associated with WNV prevention practices among ethnic minorities in Houston, TX. The spread of WNV in the United States has continuously increased since its discovery in 1999. For people who become infected with WNV, many never show any signs or symptoms of having the virus. However, WNV can be a deadly disease for infected people who have symptoms of WNF that progress to WNND.

Clinicians can treat WNND; but, long-term complications may occur. A general lack of knowledge about WNV infection and AHC may contribute to the awareness of WNV among ethnic minorities (African American and Hispanic), especially for African Americans who were significantly more susceptible than all other races studied who are

high risks. This quantitative cross-sectional design determined the association between KAB, access of health care, and comorbidities as independent variables and prevention practice for West Nile Virus infection as dependent variable among ethnic minorities (African Americans and Hispanics). The conclusion of this study will help scientific scholar to designs a new prevention practice of WNV infection that will benefits ethnic minorities (African American and Hispanic).

Chapter 2: Literature Review

Introduction

This chapter WNV/WNF/WNND literature review strategy, introduction, epidemiology, diagnosis, treatment, disease burden, outcome, and disease severity of WNV. This chapter also includes a discussion on the covariant of WNV, theoretical framework with cross ponds to research question and previous and current research result to explain the need of this study. This literature review discusses and introduces WNV/WNF/WNND, the existing literature regarding their association, as well as the KAB and prevention practices of ethnicities. The first section of this literature review compares primary risk factors that may contribute to WNV prevention practices between ethnic minorities (African Americans and Hispanics), including WNV knowledge awareness, attitude toward WNV infection, behavior modification, AHC, and the preexisting health condition or chronic disease. The second section compares the current and the past studies on WNV infection with respect to this dissertation.

I examined the association between KAB, AHC, comorbidities, and prevention practice of WNV among ethnic minorities in Texas. WNV infection spread quickly throughout North America and become an endemic (CDC, 2013, 2012; Murray et al., 2014; Petersen et al., 2013). WNV infection has three stage of progression. WNV infection will progress to WNF then WNF will progress to WNND.

Literature Search Strategies

This literature review includes multiple resources: books, data from public health institutions, and organizations. Organizations include Texas Surveillance Data for the WNV, used for indication of the distribution of WNV at the state and national level, the Public Health Department, the CDC, National Institute of Health (NIH), and TXDSHS for surveillance data. The following databases were searched: CINAHL, DynaMed, EMBASE, MEDLINE, PubMed, Scopus, Google Scholar, BiblioScape, EndNote, and Scholar Aid. The following terms are used in this literature review: *WNV epidemiology, signs and symptoms, diagnosis, treatment, prevention practices, an association between AHC, comorbidities, knowledge, attitude, behavior, mosquito vector-borne disease, WNV transmission, and spread in the USA, particularly in Texas.*

This literature review was based on Hewitt's (2007) evaluation methods, which help to identify and characterized the important point from the unnecessary point, outline the strengths and weaknesses, the usefulness of a report and its limitations. This literature review explains the methods of research, how were the researches were conducted, what method used to report the results, that identified the limitations of the study, outline the key findings, and make out the future corrective recommendations for further research.

The literature search produced 27 studies about knowledge, attitude-behavior of WNV infection. Of these 27 articles, I have chosen 11 articles that are best suited to this review with HBM theoretical framework for WNV. These are as follows: Averett et al., 2005; Butterworth, 2010; Eicher, 2011; Elliot et al., 2008; Frizzell et al., 2016; Fox et al., 2006; Mitchell, 2016; Mitchell, 2014; Trumbo and Harper, 2015; Yerby, 2007) There

was not a single study designed to address whether KAB, AHC, Comorbidities and preventions practice among ethnic minorities are associated with the WNF and WNND. This study also used 157 articles for references.

Rationale for the Study

From 1999 to 2012, there were 780,000 WNV cases of those 78,000; cases 16,196 cases were WNND cases, caused 1,549 deaths (Barrett 2014, CDC 2012) in the US. This aggressive progression and spread of the disease WNV infection throughout United states may international disaster like Human Immune Virus (Lindsey, Staples, Lehman, & Fischer, 2010; Murray et al., 2014; Petersen et al., 2013). Even though WNV spread in most of United States, the numbers of reported cases of ethnic minorities remain low for unknown reasons. However, when it comes to comparing different races regarding risk factor and progression of three various stages of WNV infection as well as dying due to infection African Americans are the first in line (Murray et al., 2014). According to Nolan et al. (2012), 75% of the African Americans and other minority groups who were examined were affected by WNND.

According to Petersen et al. (2013), from the entire cases of WNV infection only 25% of the cases showed WNV infection (because most of the WNV infections are asymptomatic). Out of this 25% that showed WNV infection, 24% of them were ethnic minorities. These 24% of ethnic minorities that were affected by WNV infection and almost all of them, advanced to the next stage of the disease and died when comparing to among races (Marry et al, 2012, Petersen et al., 2013). For example, 1868 WNV cases were reported to the Texas Department State Health Services (TXDSHS) in 2012. Out of

the 844 cases that were reported, 48% were WNND cases, and there were 89 deaths (Murray et al., 2012).

According to Murray et al. (2012), there were 1873 cases of WNV infection in Texas in 2012. There were 1273 Caucasians, 117 African Americans, and 318 Hispanics. Of these, 738 Caucasians (72.1%), 43 African Americans (4.2%), and 134 Hispanics (13.1%) were affected by WNF (Murray et al., 2012). Out of the 1848 cases of WNV, 535 Caucasians (63.4%), 74 African Americans (8.8%), and 184 Hispanics (21.8%) were affected by WNND. All the 117 cases of WNV, which were reported, were affected by either WNF or WNND (Murray et al., 2012). Even though Murray et al. (2014) and Nolan et al. (2012) the high risk populace, they fail short identifying why African Americans, experience greater complications when it come to WNV infection, because WNV is not inherited in nature when compare to other races in the same environment remains unanswered. From these findings, a gap appears in the literature concerning the prevention practices of WNV among the ethnic minorities, regarding their knowledge, attitude, behavior and their prevention practice.

The rationale for undertaking this dissertation study was five-fold. WNV has the potential to create an international disaster, given the unpredictable nature of the virus. The unpredictability of this virus is due to the multiple factors that promote the spread of the virus, such as climate, vector biology, human behavior patterns, and host migration (Mitchell, 2013). According to Petersen et al. (2012), it is impossible to judge when and how (timing and intensity) WNV will cause an international disaster like the HIV. Knowing the unpredictable nature of the WNV occurrences, and in the absence of

effective treatment, prevention practice has become the only means of reducing human WNV epidemics (Mitchell, 2009). As there are limited data for examining the KAB, AHC and prevention practice of WNV among ethnic minorities would be very important.

Previous researchers have indicated that the WNV infection has detrimental effects which are linked to gender, age, and race. Examining the races with high morbidity and mortality is essential to address the WNV epidemic. From May 30, 2012 to December, 3 2012, Murray et al. (2013) conducted parallel surveillance research, using data from the public health surveillance of Dallas County instead of nation wide. They identified 1888 WNV positive cases and 844 of them were fetal cases. The researchers concluded that there were substantial contrasts between sex, age, and race of patients. The percentage of medium-aged males was 55, and this study signified that the ethnic minorities were affected with high chances of contracting WNV (OR 1.9, 95% CI 1.6–2.4, $p < 0.001$). Statistically, this study showed that 68% Caucasians, 6.3% African-Americans, and 17% Hispanics indicated the low-level diagnosis. I will examine how KAB, as well as AHC and comorbidities, play a role in prevention practice among ethnic minorities (African-American and Hispanic) regarding WNV infection.

My aim was to identify the major challenges that face the health practitioner today, examining prevention practice in ethnic minorities (African-American and Hispanic) in minority and low-income neighborhoods area in Houston TX. The result of this study highlighted a significant outcome due to death of minorities from WNV infection. Results did not indicate that African American are less likely to receive medical care when compared to Caucasians and the wealthy population.

AHC did not have a major role in underreporting minority cases of WNV (Kollers, 2012). In addition to Kollers's (2012) conclusions, it was also recommended that public health officials increase different methods of accessing and implementing in poor and minorities communities. These findings can be used as the bases for this dissertation to examine whether KAB, and AHC and comorbidities play a role in prevention practice among ethnic minorities (African-American and Hispanic) regarding WNV infection.

The economic burden of WNV infection in the United States between 1999 through 2012 was \$778 million (Barrett, 2014). Eighteen thousand patients were hospitalized and over 1,654 deaths were reported to the CDC. In Texas, in the year 2012 alone, 1,848 cases were reported, and 48% of the cases reported their economic cost as greater than \$47.6 million (Barrett, 2014; Murray, 2012). According to Doucleff (2014), WNV is the most costly diseases in Texas. Examining the lowest socioeconomic class of the WNV prevention practice of ethnic minorities (African-American and Hispanic) in KAB can contribute to a major reduction in the economic burden of WNV.

The most critical, life-threatening issue without an answer and associated with increased prevalence of WNV is the lack of treatment to treat WNV. Given that it is crucial to reduce the environmental risk of exposure by the widespread adoption of preventive behaviors to prevent WNV infection, both reducing ecological risk of exposure and increasing adoption of preventive practices depend on knowledge of the disease and acceptance of the seriousness of its sequel (Hongoh, 2016). These factors differ among varied ethnic populations. Understanding the KAB toward WNV may play

a significant role in WNV prevention. According to Becker and Maiman (1975), knowledgeable health behavior includes a readiness to take action; an individual's willingness is determined by their perceptions of illness or disease severity and susceptibility. I focused on examining KAB, AHC, and comorbidities regarding prevention practice for WNV infection among ethnic minorities (African-American and Hispanic).

Epidemiology of West Nile Virus

The mosquito is the primary vector that is capable of transmitting WNV and both giving and taking malaria to humans. WNV is categorized by family, flaviviridae genus flavivirus (CDC, 2013, Martín-Acebes & Saiz, 2012). It is a, ssRNA positive single-stranded RNA virus, subdivided into 10 serological complexes. This virus belongs to Japanese encephalitis, with 50nm diameter enveloped particles protein. The ability to cause disease on numerous mosquitos, birds, and horses allows WNV to be epidemic in the world (Peterson et al., 2013).

WNV affecting the body begins with a mosquito salivary component introduced at the bite site. Then keratinocytes and skin dendritic cells draining lymph node, then it infected the spleen and kidney cells and central nervous system (CNS). The four mechanisms WNV enter to the brain in the following four methods of transmissions. First through a direct crossing blood-brain barrier (BBB); second, via endothelium blood-brain barrier passage; third by means of a Trojan horse mechanism, and lastly by the means of retrograde axonal transport of the virus.

WNV in the United States

According to Peterson and Roehring (2001), the epidemic of WNV in the United States has followed three epidemiologic trends. First, an increased frequency of outbreaks and human and hours, for example, United States in 1999 and 2000, Romania 1996, Morocco 1996, Tunisia 1997, Italy 1998, and in Russia and Israel in 1999. An infectious disease specialist from New York presented cases to the Department of Health with reference to encephalitis in North Queens. (Nash et al., 2001). In the same week, six additional cases of encephalitis presented with fever, mental change, muscle weakness, flaccid paralysis and viral infection and were confirmed in laboratory diagnosis. At the same time, the number of birds that cause epizootic infection were high in same area. In an investigation of this dead birds with veterinarians and wildlife specialist resulted the cause of the death's of this bird was encephalitis which is associated with an outbreak in human and identified as WNV. WNV lineage 1A was identified in New York City (Lanciotti et al., 1999).

WNV in the USA with lineage 1A has three trends of epidemic. First, human beings increase the frequency of outbreaks in New York City. Second, the United States and Israel outbreak's of WNV coincides with a high case of fatality rate in birds.. The Genetic make up of the WNV that are found in Israel and New York have a association, and similarly, the high number of Avian deaths (American Crows) and the first human epidemic of WNV were associated (Peterson & Roehring, 2001). Third, an increase of neuroinvasiveness in human yield and high mortality rate of 5 to 14% among person with the WNV neurologic symptom (Peterson, & Roehring, 2001). Both

1999 and 2000 , WNV outbreak of WNV in New York city indicated sever neurologic illness

According to Peterson et al. (2013), WNV has been detected in 65 different mosquitoes and 326 bird species in the United States. However, only Culex mosquitoes, through passerine birds, drive transmission and transmit the virus to humans (Peterson et al., 2013). Humans are a dead-end host because of a low level of viremia in their serum, which is unlikely to infect mosquitoes (Peterson et al., 2013; Zou et al., 2010). The best ecology for the amplification of WNV includes an incubation time shortened by warm temperature, agricultural land, irrigated rural landscapes, and an increase in rainfall. In addition to these, old age homes, community drainage pattern, and a poorly maintained swimming pools.

According to Brault (2009), conclusion that the risk of WNV is due to global commercial travel, climate change, the emergence of novel viral genotypes, and ecological factors, Its capacity for rapidly adapting to both vertebrate hosts and invertebrate vectors contributes to its rise. The CDC confirmed the same conclusion by stating, as of September 24, 2013, 48 nations and the District of Columbia have diagnosed cases of WNV.

WNV in Texas

The state of Texas has a high prevalence of WNV; it is a reasonable setting choice for the research. According to the United States Census (2012), Texas had a population of 25,674,681. Out of this, there were 1866 cases of WNV in the state, followed by 183 cases in 2013, and 379 cases in 2014 (Texas Department of State Health Services

[TDSHS], 2015). The local public health organizations and community services are major recruitment areas.

In collecting primary data to reach a generalization about the population, it is essential that the population is defined regarding content, extent, and time (Frankfort-Nachmia & Nachmia, 2008). In this case, small samples of 395 participants from the ethnic minorities were randomly chosen to participate in an online survey civic and public gathering, and religious meeting.

Based on a report from the Texas Health and Human Services, between 2002 and 2014, 4,632 cases of WNV disease were reported in Texas (annual median=195 cases, range: 27–1868 cases). In 2012, there was a record high of 1,868 reported cases (TSHDS, 2017). In 2015, WNV infection was reported in 1,565 mosquito pools, 14 birds, 31 horses, and one sentinel chicken. Jefferson County reported the highest number of WNV infected horses. In humans, a total of 32 presumptive viremic blood donors (PVDs) were reported by blood collection agencies from 18 counties (7%). Additionally, 275 human WNV disease cases were reported (Texas Health and Human Services, 2017).

The Mechanism of Transmission and Clinical Presentation of WNV

Today, the WNV infection is transmitted by two methods; a vector-borne transmission and a non-vector transmission. Any person exposed to infected mosquitoes, birds, and horses are at risk of developing WNV infection through vector-borne methods. However, several patients are infected through non-vector transmissions. These include (a) through the placenta and brain barrier, (b) direct transmission among turkey farmers (CDC, 2003), (c) cannibal ingestion (CDC, 2002a), (d) organ transplant recipients

(Hinckley, O’Leary, & Hayes, 2007), (f) Transfusion-associated blood product (CDC, 2004), (g) laboratory-acquired, (h) breastfeeding (Doyle, 2005; Lazquez, & Saiz, 2010), (i) a woman claimed to get WNV via sex. (Freifeld, Meza, Schweitzer, Shafer, Kalil, & Sambol, 2010), and (j) Through WNV transmission routes in the murine model: intrauterine, after cannibal ingestion (CDC, 2002a).

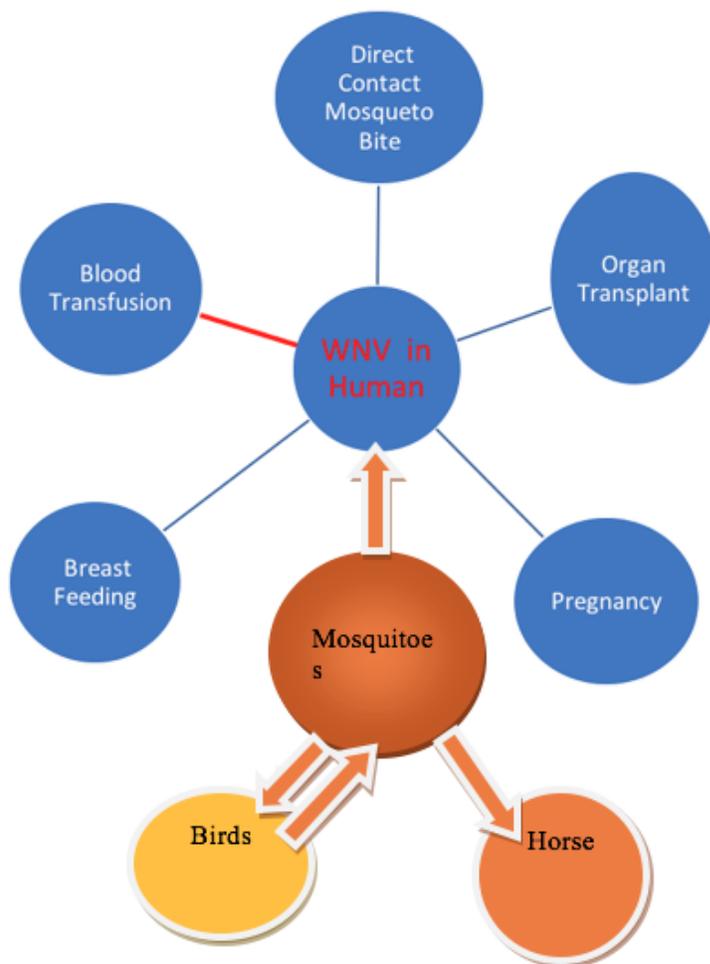


Figure 2. WNV transmission and risk population.

Disease Manifestation

According to CDC (2017), the percentage of WNV-infected patients who are asymptomatic is 80%. The remaining 20% of them present signs and symptoms associated with WNF such as: (a) headache, (b) high fever, (c) influenza-like-illness, (d) sore throat, (e) backache, (f) myalgia, (g) arthralgia, (h) mild transient rash, (i) lymphadenopathy, and (j) fatigue (CDC, 2001, Marka, 2013). The progression of WNF leads to WNND which has a long term effect on patients. The following are characteristics of WNND: (a) encephalitis, (b) altered mental status, (c) parkinsonian symptoms, (d) cortical signs, and (e) flaccid paralysis (Davis et al. , 2006. Examples of the long term effects of the WNV are (a) depression at 38 %, (b) muscle weakness 44 %, (c) difficulty walking 49 %, (d) memory loss 50 %, and (e) fatigue 12 months after diagnosis and treatment 67% (Davis et al. , 2006).

Theoretical Framework

The HBM is a theoretical framework that frequently used by researchers to examine health related issues. The principle of this theoretical frameworks is based on an assumption of a prevention of infectious diseases that requires behavior change to get the desired outcome (Janz, Champion, & Strecher, 2002; Janz & Becker, 1984; Rosenstock, 1974). This theory will help to explain why people do or do not change their behavior toward their desired behavior (Janz et al., 2002). According to Rosenstock et al. (1988), the HBM measures the association between behaviors and risk factors associated with health outcomes. Researchers have used the HBM to study the behavior, knowledge, and

attitude of individuals regarding mosquito-borne diseases, such as WNV and Dengue fever (Aquino et al., 2004; Bitto et al., 2005; Herrington et al., 2003).

History of Health Belief Model

The health officer in the 1950s noticed that people were not participating in the free tuberculosis program (Janz & Becker, 1984, Zanz, Champion, & Strecher, 2002). To engage individuals, the public health official created the HBM to explain individual behavior change or action based on a perception of risks and the benefits associated with the treatment. The HBM was used by Rosenstock (1966) to describe the elements of an individual's understanding and motivations toward health care services, as well as a general awareness of health threats. According to Becker and Maiman (1975), the following three factors within HBM explain preventative health behavior: a readiness to take action, an evaluation of health behavior, and a resolution to take action. An individual's willingness is determined by their perceptions of illness or diseases severity and susceptibility. Barriers may arise about the prescribed health behaviors that inhibit action, again, because of an individual's perceptions. The behavior must be perceived as feasible and efficacious to be weighed against the possible physical and psychosocial barriers that surround an individual. Finally, an individual must be resolute and act upon internal or external forces that can trigger a health behavior. Physical perceptions of personal health and well-being, as well as a doctor, or a public health campaign may affect an individual enough to utilize or perform a specific health behavior for their benefit, such as prevention practice. Each factor describes personal perceptions and the ability to act upon those perceptions that may bring about awareness. HBM is a reflective

action and not reflexive because it represents a conscious assessment of health behavior, cost-benefit analysis, and whether action or inaction is needed.

Rationale of the Choice of HBM

Kasl and Cobb (1966) defined health behaviors as activities undertaken by a person for a healthy purpose and for the prevention of diseases or detecting it an asymptomatic stage. After I have looked at several theoretical frameworks (social cognition model, relapse prevention model, theory of interpersonal behavior, theory of planned behavior, prediction and changing health behavior, and protection motivation theory) about a performance of health behavior and a variety of health outcomes, I agreed with scientific scholars that HBM predicts the individual behavior of disease prevention outcomes.

I have chosen HBM as a theoretical frame work for the following four major reasons. HBM allows researcher to predict the performance of health behaviors that means it can help to targets for intervention designed to change health behaviors (Conner & Norman, 2014). In this case, choosing HBM allows the researchers to predict individual performance of health behavior (Blaxter 1990; Glanz, Rimer, & Viswanath, 2008; Janz & Becker, 1984; Whitehead, 1998; Zanz, Champion, & Strecher, 2002). Even if this behavior might be affected by many factors such as AHC services, knowledge about the disease, attitude towards benefits and prioritization, perception of disease threat, and comorbidities are the dependent variables that will be examines in this dissertation. Because current treatment of WNV infection is prevention practice, implementing HBM to predict the health behavior outcome is the ideal theoretical frame

work in this dissertation.

HBM allows researcher to predict and understand who performs health behavior (Conner & Norman, 2014). Choosing the theoretical frame work of HBM allows researchers to compare, predict, and understand the health practice of ethnic minorities. The most common of all theoretical frame work that researchers used for striving to explain behavior change in prevention of infectious disease (Yerby, 2007). The HBM theoretical frame work is the guide for this dissertation that will allow me to examine the prevention practice of ethnic minorities.

Because I examined ethnic minorities of KAB, AHC, comorbidities, and prevention, HBM theoretical framework allowed me two examine aspects of the prevention practice in response of WNV infection in two aspects. The perceptions of susceptibility to WNV infection and perceptions of severity of WNV infection consequences are were the two aspects of HBM (Conner & Norman, 2014).

The theoretical concept of HBM is based on health behaviors and an individual's representations of health (Rosenstock, 1974). Threat perception has two characteristics of health behavior beliefs: perceived susceptibility and 2 anticipated severity of the consequences of illness progression (Rosenstock, 1974). Whereas, the behaviors evaluation consists of two beliefs, first, opinions concerning benefits and efficacy of the given health prevention and second, beliefs concerning costs and barriers to prevention measures (Rosenstock, 1974).

Behavior evaluation consists of two beliefs that concern benefits and efficacy of the given health prevention beliefs, involving costs and barriers to preventative measures

(Rosenstock, 1974). Even if HBM model is a widely model that used for psychological indicators to predict health behaviour and public action, there are some disadvantage . The HBM model felt short for people who think exceptional, which means this model can not explain why some people engage in high risk behaviour such as knowing the consequence of smoking and continued smoking.

Application of HBM in Previous Research

The HBM is used to examine an individual's will to take steps to prevent, screen for, or control disease based on six perceived principles: (a) benefit, (b) barriers, (c) cue to action, (d) self-efficacy, (e) severity and (f) susceptibility (Glanz et al., 2008). For WNV, perceived susceptibility refers to the belief that one is vulnerable to WNV infection as well as knowledge of the impact of WNV disease. Perceived severity indicates the extent to which a person believes WNV to be a severe illness that can cause morbidity and death. Cues to action refer to specific triggers that prompt a person to engage in protection preventive behavior (PPBs). Self-efficacy is the belief that one is capable of avoiding WNV infection through an enactment of PPBs (Glanz et al., 2008).

Table 2

Summary of Studies Using the HBM to Examine WNV Personal Protective Behaviors

Author/ Date Title	Theoretical/ Conceptual Framework	Research Question(s)/ Hypotheses	Methodology	Analysis & Results	Results	Implications for Future research
Trumbo and Harper, 2015 Perceptual influence on self-protective behavior for WNV, A survey in Colorado USA	HBM Cognitive, effective, ecological and proximity Risk perception	Examine self-protective behavior	Cross-sectional Quantitative 384 participants Hispanic / Colorado	Standard descriptive statistics	Increase awareness and add a research gap by revealing the newer risk perception (cognitive and affective)	The Psychometric measure of risk perception
Liu et al. 2014 Community Knowledge and Experience of Mosquitoes	Knowledge Experience Practice of WNV protection	KEP was applied to predict the knowledge, experiences and practice of WNV protection	Cross-sectional questionnaires to 629 participants in Lhasa, Tibet	Descriptive statistics is used. Univariate analysis of variance linear models, Pearson correlation analysis	Result indicated a major positive linear correlation among knowledge, experience, and practice score	Focus of health education to whole population about Protection
Butterworth 2009 Knowledge, Perceptions, and Practices: Mosquito-borne Disease Transmission in Virginia	HBM& diseases ecology Perceived susceptibility severity, benefits, barriers, cues to action, self-efficacy	Examined individual and community level geographic dimensions of disease emergence etymology	Cross-Sectional Quantitative Cross-sectional; in-person survey; short survey administered in-person at local post offices	Cross-sectional Descriptive statistics and logistic regression	Gender predicted knowledge; perceived hazards of repellent major barrier; removing standing	Useful guide for local health departments to local campaign about rising awareness of mosquitoes understanding the general population and prevention hindrances
Silk, B. et al. (2010). Differential West Nile Fever Ascertainment in the United States: A Multilevel Analysis. The American Journal of Tropical Medicine and Hygiene, 83(4), 795–802. http://doi.org/10.4269/ajtmh.2010.10-0161	Survey questionnaires' assessment of WNF/WNVD in different racial population United States, 2003–2005	scientific surveillance policies and practices for WNV testing and West Nile fever ascertainment	Survey questionnaires' of the WNV without neuroinvasive disease) or neuroinvasive disease	when conducting ≥ 4 activities to enhance reporting (OR = 9.3, 95% CI = 1.6–54.8), and when ≥ 5.0 staff per million residents were dedicated to arboviral surveillance (OR = 6.4, 95% CI = 1.0–40.3).	Ascertainment of WNF was less likely among Blacks (OR = 0.56, 95% CI = 0.31–0.99) and Hispanics (OR = 0.69, 95% CI = 0.48–0.98) than among Whites	. It is required further study is required to complete the ascertainment

HBM Concept on This Study and Research Questions

Perceived sensibility means a person's belief that s/he is vulnerable to WNV infection; then s/he can work on taking action to prevent getting infected with the WNV. Perceived severity defines one's understanding of the weightiness of the WNV that can cause a neurologic disease that results in significant morbidity and death; this may lead them to take action to prevent it. Perceived benefit is when people understand and try to avoid the disease and practice the prevention mechanism; knowing the advantage of prevention practice will benefit by helping them avoid the disease. Perceived barriers mean that when a person is not practicing prevention of the WNV due to any factor that impedes a person from engaging in WNV protective behaviors. A cue to action is some occurrences that prompt an individual to engage in personal protective behaviors. Lastly, self-efficacy is when a person feels confident that s/he is capable of practicing preventive measures needed to avoid WNV infection (Yerby, 2007). These six factors play a significant role when the person has enough knowledge to implement prevention practice. When people have a positive attitude, they more will work to practice prevention and exhibit the prevention practice behavior. Several researchers have used HBM as a predictor of personal protective behaviors for the study of the WNV (MacDougall & Remple, 2004).

Study Population

According to the Texas Health and Human Services of 2017 report, between 2002 and 2014, cases of WNV disease reported in Texas were 4,632 in total. Especially in 2012, a record high number of 1,868 cases was reported (TSHDS, 2017). TSHDS (2017)

also reported 1,565 mosquito pools, 14 birds, 31 horses and one sentinel chicken. In the same year, Jefferson County reported the highest number of WNV infected horses. Based on TSHDS's 2017 report, 32 presumptive viremia blood donors (PVDs) were reported by blood collection agencies from 18 counties (7%). Human WNV disease cases reported were 275. In 2015, evidence of WNV activity (human, horse, bird, mosquito, or Sentinel) was reported in 103 (41%) of the 254 Texas counties (Figure 2). Twenty-six counties (10%) reported WNV-positive mosquito pools, 78 (31%) reported human WNV disease cases, and 25 (10%) reported WNV-infected (TSHDS, 2017). Thus choosing Texas for WNV study site is appropriate for this dissertation. Because 107 counties of Texas have isolated WNV infection it is reasonable to choose the study population in high prevalence state Figure 3 below showed these counties that positive for WNV infection (TDSHS, 2015).

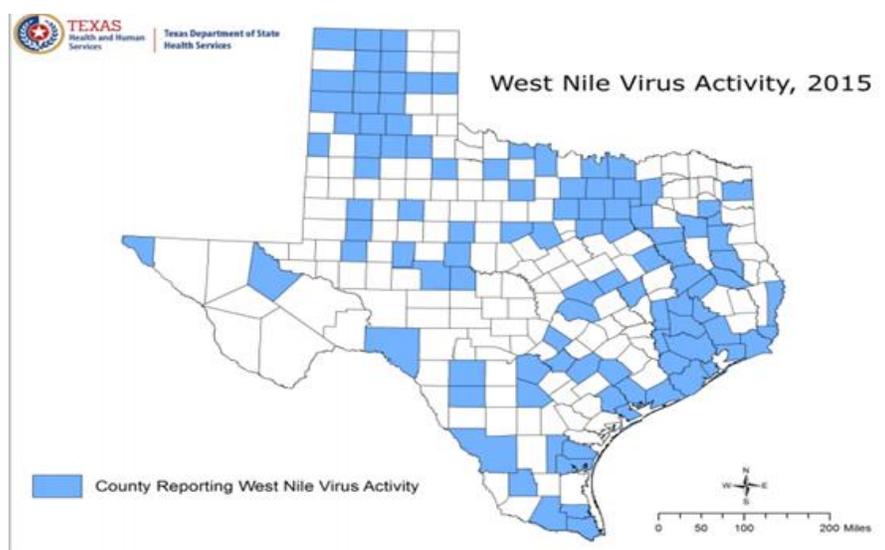


Figure 3. Texas counties reporting WNV activities (TDSHS, 2015).

WNV Among Ethnic Minorities

Demonstrating the efficacy of WNV prevention practice in the health promotion is the greatest challenge in today's society. Several researchers demonstrated that the greatest a complement in the health care promotion is leading the public to change to positive direction so that the public will progress to positive health behavior change. Immunization polio vaccine, pap smears, seat belt are some of the accomplishment that changes the public behavior. In the examination of a variable that potential changing to behavior researchers (Appleton & Lange, 1987, Galloway, 2003, Janz & Becker, 1984) reviewed 46 studies of HBM for analysis of health behavior frame work. This reviewed concluded perceived susceptibility was strongly associated with understanding the preventive health behavior. Thus examining the behavior of the ethnic minor regarding of WNV prevention practice is an essential reduction of WNV infection.

Likewise, in May 2014, a cross-sectional survey was administered to 1462 student's participants in a survey that helped to characterize the public apprehension of several vectors born disease, New French Guinea. The survey was conducted among high school students to study experiences, perception, mosquito-borne disease, and to identify cognitive, environmental factor at he is associated to cognitive, environmental factors that are associated to implement protective behavior. On this study participate were divided into three clusters such as low moderate and high. Survey questionnaires were distributed with evaluation of environmental and espouse variables, cognitive and perceptual variable and behavioral variables. The result of the study indicated only 54% indicated practicing to reduce mosquito bite and also concluded prevention practice is

depending on socio-cultural and cognitive factors. Based on this conclusion knowing the KAB of ethnic minorities and accessing the impact of AHC as well as comorbidities will play a major role in the implementation of protection behavior for ethnic minorities to reduce the WNV infection.

Independent and Dependent Variables

Dependent Variable

In this study, prevention practice of WNV was the dependent variable. It was measured using questionnaire items that are were unique to the participant mosquito or bird protection practice. Frequently asking the study participants that why, when, and what type of prevention practices of WNV used allowed researchers to conclude the participant's KAB, perceptions, and idea of WNV prevention, as well as the effectiveness of the practice. Currently, there is no cure for WNV. However, the CDC (2010) recommended the following three disease prevention methods that will help to reduce the WNV infection. First, community-level mosquito control- which means the reduction of mosquito breeding sites, larvae and adult mosquitoes using anti mosquito spray. Second, ensuring all doors and windows are properly installed. Third, taking individual protection measures by wearing long sleeves and applying insect repellent when going outside during mosquitoes breeding seasons (DeBate et al., 2006; Mitchell, 2014; Swaim et al., 2008).

In 2015, Trumbo and Harper did a questionnaire-based research using HBM and examined the perceptual influences on self-protective behavior for WNV in Colorado, USA. In this study, researcher was able to investigate the protective behavior of 384

Colorado residents. Data was collected using self-administrated survey questions with 49% completion rate. They found that the most significant part of the research was that mosquito protection was a silent topic for public communication issue. They also discovered that change in the global climate might contribute significantly to bring an increase in vector diseases.

Liu et al. (2014) performed a similar study of community-wide mosquito prevention control practice in Lhasa, Tibet. On this study 150 eligible residents were participate in four regions with a total of 629 participants. Out of the 629 participants, 531 responded to the survey, 77% of the participants have the potential means of controlling mosquitoes. The results also concluded that health education should research low socioeconomic population. This study also recommended surveillance for control and prevention of mosquito-borne diseases.

Likewise, Tuiten et al. (2009) investigated a research of knowledge, attitude, and practices through survey questionnaires in New York regions. The study was based on 47% of surveying resident population which was intended for 237; however, 97 of them were willing to participate. They divided the prevention practice of WNV into two tactics, mosquito-breeding prevention versus bite reduction practice. They examined the hypothesis that residents with more knowledge and perception about WNV would be more inclined to take preventive measures to minimize mosquito exposure. The result revealed that relatively half of the respondents were apprehensive about the toxicity of DEET. In this case, the perceived of DEET toxicity was more threatening than the WNV.

They also demonstrated that perception of WNV was highly related to prevention practice.

Similarly, Shuaib et al. (2010) examined 192 Jamaican residents using a cross-sectional study and determined the knowledge, attitudes, and practice regarding Dengue fever, which belongs to a similar virus group of WNV that is transmitted by mosquitoes. The results showed that more than 77 % of them did not use preventive measures. According to their suggestion, the public health officer has to design better means of educating the public with cheaper preventive action. However, the study had several limitations, which include, being a cross-sectional survey, it can only be accessed only one point at a time, the study was based on interviews in which might be biased towards the socially desirable responses to the questionnaires, and being small, it might lack precision.

According to Nolan et al. (2012), 75% of the African Americans who were studied were affected by neuroinvasive disease from WNV infection. This result is not clear whether this was due to the poor practice of prevention practice of WNV or due to lack of KAB. The most recent outbreak of WNV infection was in the year 2012. Just in this year alone there were 5674 cases of WNV, 2873 case of WNND, and 286 deaths. Even if the number of cases and fatality of WNV infection increases, scientific scholars did to find a treatment or prevention of WNV/WNND (Bruno et al., 2004; Guharoy et al., 2004; Hayes & O'Leary, 2004; Hongoh et al., 2016; Mackenzie, 2003; Marfin & Gubler, 2001). The only available means of treatment currently is prevention practice and ethnic minorities practice. According to Lindsey et al.'s (2010) suggestion a detail research

study is required to examine the root cause of high mortality among ethnic minorities especially African American and Hispanic. This data may be used to report race and ethnicity data that could reveal discrepancies that may be addressed by targeting education programs in public health. That is why this dissertation will focus on ethnic minority's prevention practice of WNV.

Independent Variables

Knowledge. In this study, KAB, AHC, and comorbidities are the independent variables. KAB play a major part in the execution of prevention practice. Frotzell et al. (2016) examined 1462 students for the knowledge attitude and practice of vector-borne disease. This study was a cross-sectional survey with random sampling. Their research questions were designed to address environmental exposure variables, cognitive and perception variables and behavioral variables. The participants were asked to identify the diseases transmitted by mosquitoes to examine their knowledge of the vector-borne disease. Perceived threat associated with vector-borne disease was examined, and attitude and behavior were measured using prevention practice. The result showed that prevention practice is a multi-factorial that depending on environmental, so economical, and cognitive factors.

Similarly, Tuiten et al. (2009) also examined the effect of WNV perception and knowledge on protective behavior combined with an entomological survey in upstate New York, 2009. The KAP survey focused on what participants used to practice, to prevent mosquito-breeding site. Their study concluded that knowledge alone does not

bring change instead a change in perceptions and attitudes were keys to practice prevention.

Likewise, Tuiten et al. (2001) examined the effect of WNV perception and knowledge protective behavior on 645 Connecticut households, who participated in a WNV sero-survey and complete a standardized questionnaire on virus knowledge, attitudes, and behaviors WNV had spread in the Connecticut avian population, but were yet to cause neurological illness in the human population. Almost every participant was aware of WNV (99%), and none of the participants submitted a WNV positive blood sample. Just over half (58%), of those surveyed, expressed worry about contracting the virus, and 48% were worried about getting sick from pesticide exposure

According to Bethel and Waterman (2010), WNV infection rate 2003 to 2008, increased by 0.18% 100,000 to 1.12 % in Santiago, CA. Community-based mosquito control, an adaption of personal protective behavior, and implementation of public education were the three prevention services that were implemented in these communities. This county public health organization implemented three primary prevention mechanisms. The researcher also examined whether language and culture play significant risk interfering WNV infection prevention practice. The researcher's study designed was a survey format to evaluate KAB with a comparison of prevention practice in a Hispanic population. The estimated population size of this study was 226; however, the researchers only approached 53% of them using door-to-door approach. According to the researcher's conclusion, participants who stayed long in USA and speak English well responded 66.6% were aware of the consequences of WNV infection among. While a

similar study was done by Averett, Neuberger, Hansen, and Fox (2005) who indicated 41% of the Hispanic speakers are aware of WNV.

A similar study was done Southwest Ohio to examine the health literacy of Latino in Ohio In order to investigate any access barriers to gain the sources of health information (Bririgan, Murnan, & Rojas-Guyler 2009). The result of this study provided answers for an existing literature gap for the Hispanic populace in southwest Ohio. However, the result should be looked on causations due to the study examine only just the Hispanic ethical group in a particular location. The result was significant on understanding the barrier of WNV infection prevention. The result of this study concluded that two-thirds had low levels of acculturation in the US, which became a significant barrier to access health information. The result was promising for improving the health care practitioners as well as health educators understanding of the healthcare needs of the Latino community.

Several scientific scholars and researchers have used knowledge, attitude and behavior as associated with WNV prevention practices (Adams et al., 2003; Butterworth, 2009; Henry et al., 2004; Kiehn et al., 2008; Leguen, 2003). Knowledge is characterized as a justified true belief. Scientific scholars and researchers have used KAB as associated with WNV prevention practices (Adams et al., 2003; Butterworth, 2009; Henry et al., 2004; Kiehn et al., 2008; Leguen, 2003). According to Henriques (2013), knowledge has three elements: (a) a human belief or mental representation about a state of affairs that represents, (b) accurately corresponds to the actual state of affairs and the description, and (c) legitimized by logical and empirical factors. The justification of knowledge is a

central tendency that follows three prominent approaches of belief is formed: (a) foundationally true belief true beliefs which leads other conclusions, (b) coherencies and reliably. In this dissertation, knowledge is interpreted understanding of WNV, sign and symptoms, and prevention measure to avoid WNV infection. That includes individual knowing WNV infection will have high susceptibility, perceived severity and understand the benefits of practicing WNV prevention.

Eichler (2011) surveyed the Delaware county residences in Pennsylvania. This study examined knowledge of the public about WNV facts, spread, and risks of WNV as a predictor of Prevision Practice to support pesticide use. Eichler concluded that there was an association of high level of knowledge and high level of personal protective usages. This study also found that 60.9% of participate were not aware of the county WNV surveillance program. Finally, Eichler recommended a new educational campaign and future survey of knowledge regarding WNV should reach more diverse population. This dissertation examination will examine whether knowledge, attitude, behavior, as well as AHC and comorbidities, play a role in prevention practice among ethnic minorities (African American and Hispanic) regarding of WNV infection while it contributes for the answer to this existing knowledge gap.

Similarly, Bethel and Waterman, (2010) conducted research WNV knowledge among Hispanics, San Diego County, CA in 2006. Their study was based on a survey questions to assess knowledge, attitudes, and practices regarding WNV among Hispanics. Researchers used eight survey questions to measure KAP (four questions for knowledge, one question for attitude, and three questions for practice). Questions that are used in

previous WNV prevention studies. The results were found a low level of awareness and application of prevention practice. Researchers assumed that this might be due to set other priorities than WNV and low level of WNV occurrences in San Diego County, CA. The researcher suggested varied educational tactics are needed to inform this population. I also examined this knowledge gap of addressing prevention practice versus another confounding by addressing the KAB, as well as AHC and comorbidities.

Macoupin et al. (2003) examined whether or not an education intervention associated to LD knowledge with prevention practice of tick. In 2003, an education programmed was developed for the prevention of tick bite by delivering to the community in Baltimore County MD. This intervention successfully resulted from increased LD knowledge which was also associated with an increase of repellent use and self-reported practice of tick bite prevention behavior. Similarly, I have examined the factor that associated between KAB among ethnic minorities regarding of WNV prevention protection.

In 2009, Mitchell examined knowledge using the HBM theoretical model. Mitchell examined the participant knowledge using survey questions. These knowledge survey questions were about the vector that transmits the WNV and risk groups for WNV severe disease. It was based on questions about what age group is most likely to get seriously ill with WNV and identifying the transmission mode of WNV. It was also about knowledge of awareness of mosquito feeding time, outdoor clothing type, and specific habit to protect their home and families. The perceived knowledge also associated with susceptibility, and severity equal to benefits and susceptibility. The result of the research

found that 75% knew about WNV vector; however, only 25% provided the correct answer about a risk of WNV. This result would be an indication of a shortage of knowledge about WNV infection even if 79% of the participants were White compared to other races. In contrast, I addressed the ethnic minorities (African American and Hispanic) while examining their KAB, AHC, comorbidities, and prevention practice with an assumption of good understanding the WNV infection would precedes the implementation of WNV prevention practice.

Attitude. In this study, attitude was measured based on the probability of a person willing to accept WNV vaccine, contribute to fund or support for WNV vaccine recovery, mosquito control program, or belief WNV can cause severe disease according to her or his perception. This perception was associated with attitude. The first perception based protection practice that was done in United States was risk perceptions reading ticks and lime diseases (LD). Herrington et al. (2004) examined knowledge regarding the prevention of tick bite and LD. The study was conducted from 48 states including District of Columbia, the result concluded knowing someone diagnosed with LD, knowing the severity of the LD, and being concern about how it would associate prevention practice of tick bite. Similarly, I will examine the attitude of ethnic minorities towards WNV prevention practice.

In 2005, Wilson, Varia, and Lior examined WNV awareness, attitudes, and practice on Ottawa residents in Canada. Four hundred ninety-one households were completed the survey result indicated 58.3% believed WNV was an important issue, and mosquito repellent was an important preventive measure, and willing to use DEET

product. However, the general result concluded the need of public education for WNV prevention practice. This study was not specific towards race and ethnic challenge. I have a conflicting interest; in contrast, I examined the KAB of ethnical minorities while supporting the idea more public education regarding WNV protection.

In 2014 A similar studies was conducted in Nepal about arbovirus using KAP regarding Dengue fever virus (DENV) among health population. Five hundred eighty-nine participants were interviewed with an aim to examine the spreading of Dengue vector as well as accessing DENV infection risk factors among Central Nepal residence. The researcher used understanding of signs, symptoms, and transmissions modes of DENV infection to examine knowledge and used the mosquito vector reduction plan as a measure of attitude. The researcher found the significant positive correlation among KAP ($p < 0.001$). This finding was only 12% of the participants had good knowledge. The researcher proposed an urgent prevention practice program. Even though eighty three percent of the participants had a good mindset and thirty seven percent had implemented the practice, the researcher concluded that knowledge of DENV of participants was essential to limit the spreading of DENV.

Behavior. Sets (2005) used behavior as a better understanding of health, and a basis upon which interventions to improve the public health of individuals. Behavior was defined with assumption of individual perception of vulnerability to contracting a disease with the combination of perception of seriousness produced the desire behavior in this case the prevention practice of WNV (Galloway, 2003). Glanz et al. (2008) outlined the HBM model by concluding that individual beliefs, such as perceived susceptibility,

severity of a disease with perceived benefits, barriers, and self-efficacy, would bring perceived threats. Those threats, with a combination of cue to action, will incite individuals to actively demonstrate prevention practice.

Similarly, individuals with adequate knowledge of a threat and have a good perception of understanding of the consequences of that threat will practice the desired behavior which is the protection from the threat. These are the principles that will be examined in this dissertation, whether that knowledge of a threat with good perception will lead to prevention practice.

AHC Among Ethnic Minorities

A literature search about AHC and WNV in PubMed and SAGE found nothing. The assumption is that 82% of WNV signs and symptoms are not known to the population, and even if they know or are sick, they cannot afford treatment due to lack of insurance. This may lead to a minimal level of diagnosis and a maximum level of WNV transmission to the next stage to ethnic minorities.

This literature review was focused on AHC, which plays a significant role in the progression of diseases among ethnic minorities. The existence of the barrier to access health and health information is evident, and it is a statistical truth. However, the association between access to health and health information with WNV is a literature gap that I have examined.

Hayes, Riley, Radley, and McCarthy (2015) investigated the average working age group's (18-64 years) AHC. Based on this investigation, using data from United Bureau Community Population (USCP) survey of 2014, 22% of African Americans and 33% of

the Hispanics were uninsured compared to 14 % of the Caucasians. The USCP also reported that ethnic minorities (African American and Hispanic) have higher chances than other races not have health coverage's due unaffordable insurance 2012 through 2013; this was the year an epidemic spread occurred in Dallas.

There were 26% of uninsured working age groups (18 to 64 years) in 2012, 21%; Whites, 27% of African-Americans, and 43 % of Hispanics were uninsured rate. In contrast to 19% of total 18 to 64 working adults without health care coverage because of cost 15% were Whites, 24% of African-American and 29 % of Hispanics

According to Ayanian et al. (1999) and Epatein et al. (2000), ethnic minorities were less treated and referred for treatment. For example, the researchers compared patients with end-stage renal diseases that were referred for a kidney transplant and dialysis program. There was a significant difference between Caucasian and ethnic minorities even though both have Medicare.

In this study, of the 98% of Caucasian patients who were referred to renal transplant, 52% of them received kidney transplants, while of the 90% of African American who were assigned to kidney transplant only 18% received the kidney transplant. This study conclusively demonstrated the disparities and the chance having AHC gap that exists. It was essential to investigate the treatment of WNV infection which is prevention practice among ethnic's minorities. It was this gap that needs to examine WNV infection prevention practice for ethnic minorities whether this difference is due to health care disparities or KAB, AHC, and comorbidities and prevention awareness that is the primary purpose of this dissertation.

Comorbidities and Ethnic Minorities

Comorbidities are the occurrence of one or more additional illness. This may contribute to the progression of diseases. Currently, 45% of USA residences have one or more chronic illness (Price, Khubchandani, McKinney, & Braun, 2013. Price et al. (2013) also confirmed that comorbidities and AHC played a major effect in minorities who are 1.5 to 2.0 times to have the chronic illness than the Whites and 7 in 10 deaths

Chen et al. (2018) investigated whether comorbidities condition alter the risk of mortality rate. Chen et al. used a weighted index determine the seriousness of the comorbidities of 559 cases prospective studies for 10 years. The result indicated the attributed factor towards mortality was $X^2=165$, $P<0.0001$. Even if the result is significant, Chen et al. recommended further large population size study.

Lindsey, Singh, Siahpush, and Kogan, (2010) examined the difference between race and ethnicity. Their finding revealed almost two folds to ethnic minorities compare to White youths, such as 24% of African-American youths, and 23% of Hispanic vs. white 13% regarding obesity as comorbidities. When comparing the youth among race they find that almost a correlation result which is forty one percent of African-American and Hispanic youths were overweight with respect to 27 percent white youth. Based on this, a research gap between other chronic and infectious diseases exists that may have contributed to the disease advancement of WNV infection from WNV to WNF. WNND is a momentous risk signal that requires immediate answers.

Conclusion

Today, in the 21st century, scientific scholars or holistic medicine practices

cannot correctly indicate the risk of WNV outbreak; scholar scientist could not predict the ability of WNV becoming an international disaster nor found prevention methods and control WNV transmission. Currently, very little is known about how, when, and from where will the next WNV victims emerge. There is no clue about the WNV virus amplification and spread of WNV or there are no key factors that are associated to treatment of this life threatening WNV infection. Even identification of WNV in the laboratory becomes difficult because it has many strains and newly arising strains of WNV causes a knowledge gap.

This literature gap is beyond this study. Instead, I have focused on examining one gap that was the association of KAB and AHC, co-morbidities, and prevention practices among ethnic minorities (African Americans and Hispanics). This study answered some of the literature gaps. Researchers concluded the significant differences in sex, age, and race of patients. High vulnerability for WNV contraction was found for the minority populace (Odd Ratio 1.9, 95% Confidence Interval 1.6–2.4, $p < 0.001$; Murray et al., 2013). Statistically, this study showed that 68% Caucasians, 6.3% African-Americans, and 17% Hispanics indicated a low of diagnosis. When comparison made of the WNV diagnosis among other races, ethnic minorities have been the diagnosis at the low rate (6.3% African American and 17% of Hispanic concerning 68 % Caucasian). It is now known KAB, is associated to WNV prevention practice while AHC, and comorbidities did not contribute to this low level of diagnosis among ethnic and high rate of progression form of WNV infection become a gap this dissertation pursue.

According to Petersen et al. (2012), it is impossible to judge when and how

(timing and intensity) WNV will cause an international disaster like HIV. Knowing the unpredictable nature of the WNV occurrences, and in the absence of effective treatment, prevention practice has become the only means of reducing human WNV epidemics (Mitchell, 2009). As there are limited data for examining KAB, AHC and prevention practice of WNV among ethnic minorities would be very important.

There are many identify major challenges that face the health practitioner today. Kollars (2017) examined prevention practice in ethnic minorities low-income neighborhoods area in Chatham County, GA. The result of this study highlihtrd a significant outcome due to death of minorities from WNV infection, which is the one of the reasons for study. The results indicated that African Americans are less likely to recieve medical care when compared to Cacuasians and a wealthy population. This was the one of the factors I have examined

The clinical treatment and literature gap of the WNV was due to the advancement of rate of WNV stages among various ethnic groups. WNV infection do not have cure except prevention practice (integrated pest management approaches), that was why the prevention practice was the focus of this dissertation. That was what this dissertation measures this understanding using KAB and examines why ethnic minorities have the low diagnosis, but high mortality rate, which became the literature gap.

Researcher recommended future study to include race and ethnicity data that could reveal discrepancies that may be addressed by targeting education programs in public health.

WNV infection has no cure, only prevention (integrated pest management approaches).

Efforts have been made to solve this problem. However, there was no one has studied the

cause of low disease diagnosis of WNV and high rate of transmission to the next stage of WNV among ethnic minorities.

Chapter 3: Research Method

Introduction

This dissertation objective was to discern the correlation between KAB, AHC, comorbidities, and prevention practice of WNV infection among ethnic minorities in Texas. KAB, AHC, and comorbidities statuses were used as independent variables, while prevention practices of WNV infection among ethnic minorities was the dependent variable. KAB forms a basis for the development of a survey instrument, while the HBM helps in predicting the ethnic minorities' prevention practice.

I used a cross-sectional quantitative method within the conjectural configuration of the HBM. Convenience sampling is the ideal method to obtain a probability sample. A stratified sample system allows researchers to select randomly and independently participants from each stratum of a given population (Frankfort-Nachmia & Nachmia, 2008). Based on sample size computations, the sample comprise 395 participants, identified using a convenience sampling method. Research questions were analyzed using linear logistic regressions.

At present, first hand preventative actions are the chief method of curbing human sickness due to WNV infection; examining KAB, AHC, comorbidities, and their association with prevention practice may lead to targeted education programs and policy changes, which in turn can lead to positive social change. In this chapter, I discussed in detail study of research design, rational of study and the design and methodology, which includes the sample set, sampling methods, recruitment, participation, data collection,

ethical considerations, instruments and materials, independent and dependent variable definitions, and identification of threats to validity.

Rationale for Research Study and Design

Research Designs

Research design was the guide researchers used in their study of planning, implementation and evaluation of their study. It was designed solution to their research question and hypothesis (Sousa et al., 2007). Study designs can be quantitative, qualitative, and mix methods. A quantitative research design examines deterministic philosophy, deductive resealing, and postpositivist paradigm (Creswell, 2013; Sousa, 2007). In contrast, qualitative research designs are based on the naturalist paradigm, inductive resealing, and assumption of reality is subjective (Sousa, 2007).

I used a quantitative cross-sectional study design. A quantitative study design allowed researchers to generalize a finding, and reduce and restructure as well as compile the problem to a limited number of variables. A quantitative study can also facilitate the testing of theories and research questions. It allows researchers to standardize the process of quantitative data and to replicate different areas or overtime to reach the comparable finding (Frankfort-Nachmias & Nachmias, 2008). Using quantities research designs is clear, precise, and specifies independent and dependent variable. It allows a researcher to quantify the association between dependent and independent variable. I designed a systematic investigation of association between how changes in one variable are related to change in other variables.

I planned a nonexperimental design and examined the independent variables (KAB, AHC, comorbidities) whether associated with dependent variable (prevention practice of WNV infection). I used a descriptive question to answer in different scale and this scale measures a prediction factor that individual practicing such as the dependent variable based on research questions and hypothesis (Sousa et al., 2014). In quantitative research, it is easy to follow the original set of research goal that allows the researcher to achieve their objective of conclusions. It also allows researchers to achieve a high level of reliability of obtained figures, pass few subjective judgments, and promote longitudinal measures of performances (Balsley, 1970; Frankfort-Nachmias & Nachmias, 1992; Kealey & Protheroe, 1996).

The cross-sectional study design was intended to attain intelligence, based on statistics acquired for a particular period of time (Epidemiologic Research and Information Center, 2014). This model was useful in proving or disproving assumptions, gathering data at a certain points in time, reducing the study overheads regarding cost, and time, enabling the usability of data in several research types, and aiding the use of the findings to formulate new theories for future studies. Texas population e reached out during mass public gathering, institutional and organization meeting, church services, and communities' events. Mitchell (2009) produced the HBM instrument for assessing knowledge, attitude, and behavior towards WNV prevention amidst individuals 60 years or older in Maryland. Permission was guaranteed to use this instrument (survey questionnaires) from Mitchell, This survey questionnaires were provided during in these events. No door to door data collection methods. Questionnaires can be answered at that

time of social gathering, community activities and public gathering and completed online on the site that created just for this purpose. Permission of to collect data on these sites was approved by the institutional organization, church, and communities leaders and participants consents were received before survey questionnaires answered This design was selected for its two unique characteristics of answering the study research question. First was its ability to allow the study of multiple variables at the time of the data snapshot. It allows the researcher to determine whether prevention practice related to WNV infection was implemented or based on the research questions and outcomes. This quantitative cross-sectional study design was used to examine KAB, health care accessibility, chronic disease, and WNV infection prevention awareness of ethnic minorities and included investigation based on the following research questions.

Researcher's Research Questions and Hypothesis

RQ1. What is the association between knowledge and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_0 1: There is no association between Knowledge and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A 1: There is an association between Knowledge and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

RQ2. What is the association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_02 : There is no association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A2 : There is an association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

RQ3: What is the association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_03 : There is no association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A3 : There is an association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

RQ4: What is the association between AHC and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_04 : There is no association between AHC and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A4 : There is an association between AHC and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX

RQ5: What is the association between the presence of comorbid conditions and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H₀5: There is no association between the presence of comorbid conditions and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A5: There is an association between the presence of comorbid conditions and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

To address research question one through five, a researcher utilized multiple linear regression that functions to examine the predictive connection linking knowledge and prevention practice for WNVD among minorities. When assessing the predictive connection between independent variables and a dichotomous outcome variable a linear logistic regression was used to give appropriate statistical breakdown (Stevens, 2009). The overall model was evaluated for statistical significance through use of a χ^2 coefficient. The Wald statistic was used to evaluate the significance of each predictor variable on its own. The Nagelkerke R^2 was used to identify the amount of variance in the outcome variable that can be explained by the predictor variable. In this cross-sectional quantitative study, I had sought to answer these questions with data from instruments, and by examining the feelings and perceptions of WNV infection among ethnic minorities (African American and Hispanic).

Methodology

Setting and Sample

Because the state of Texas has a high prevalence of WNV, it is a reasonable setting choice for the research. According to United States Census (2012), Texas then had

a population of 25,674,681. In 2012, there were 1,866 cases of WNV in the state, followed by 183 cases in 2013, and 379 cases in 2014 (Texas Department of State Health Services, 2015). Table 3 is an annual indicator of WNV infection, WNV Fever and Encephalitis. Figure 4 indicated the 2016 Texas counties that were positive for WNV infection which also most the same as 2015. This indicates that the WNV infection is here to stay and there is no cure for treatment. Figure 5 shows the distribution of the worst epidemic in one Harris county in 2012. As the color get darker, the number of WNV infection increased.

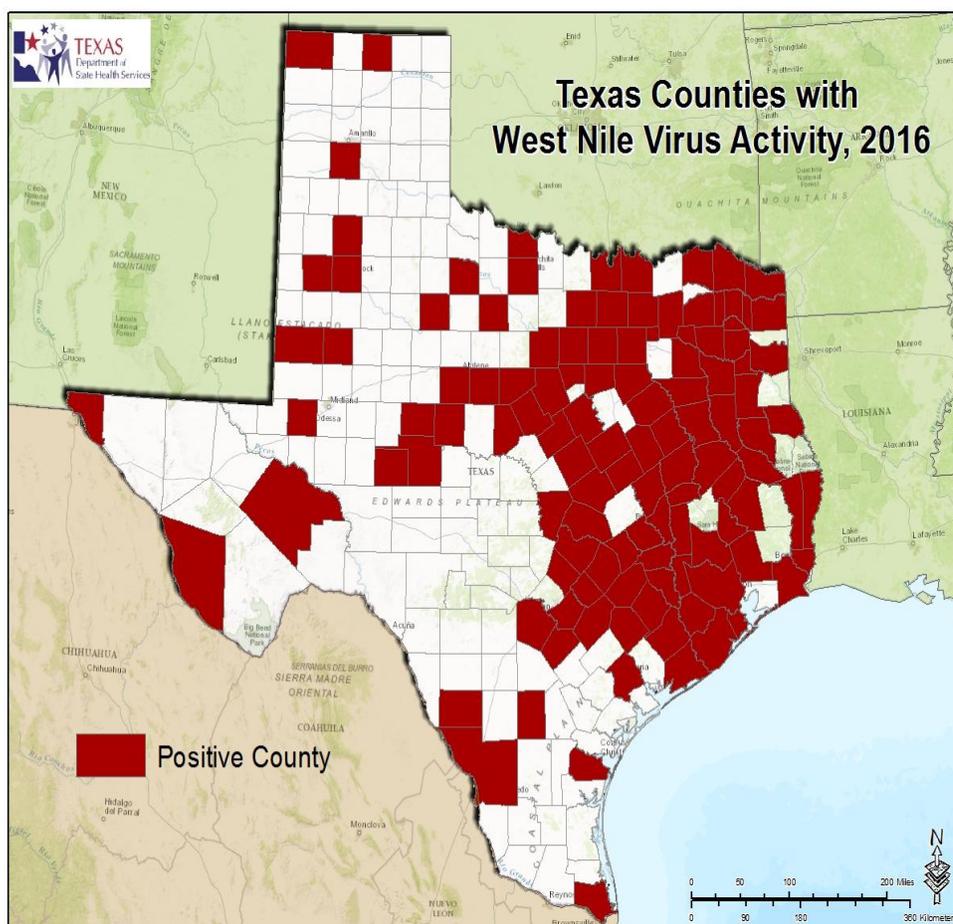


Figure 4. State of Texas positive WNV infections in 2016 (Source: TDSHS, 2016).

West Nile in Harris County

The number of ZIP codes where the West Nile virus has been confirmed in mosquito samples has jumped significantly in the past two months.

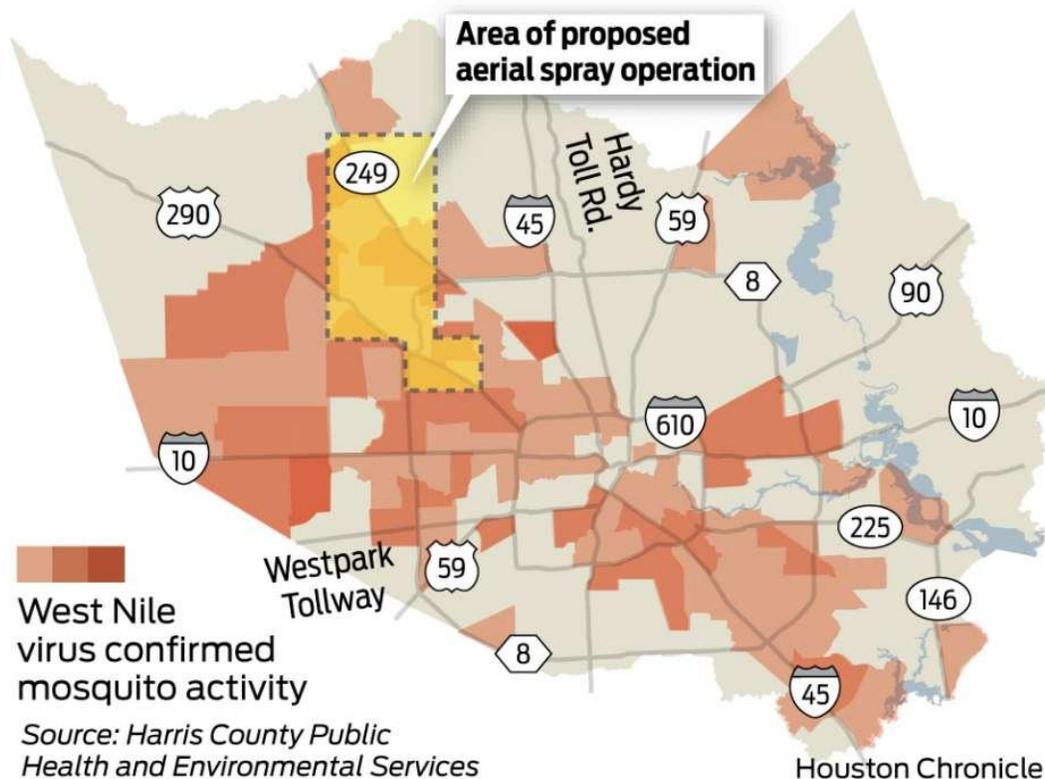


Figure 5. Confirmed WNV positive area in Harris County in 2012. (Source Harris county Public Health and Environmental Services, 2012).

Table 3

WNV Infection Rate Annually

Disease Name	2004	2005	2006	2008	2007	2009	2010	2011	2012	2013	2014	2015	195Total
WNV	176	195	354	64	260	115	89	27	1868	183	379	275	3,606
WNE	119	128	233	40	190	93	77	20	844	113	253	196	2,286
WNF	57	67	121	24	70	22	12	7	1024	70	126	79	1,699

Study Population Risk

According to the Texas Health and Human Services of 2017 report, between 2002 and 2014, cases of WNV disease reported in Texas were 4,632 in total. Especially in 2012, a record high number of 1,868 cases was reported (TSHDS, 2017). TSHDS (2017) also reported 1,565 mosquito pools, 14 birds, 31 horses, and one sentinel chicken. In the same year, Jefferson County reported the highest number of WNV infected horses.

Based on TSHDS's 2017 report, 32 presumptive viremia blood donors (PVDs) were reported by blood collection agencies from 18 counties (7%). Human WNV disease cases reported were 275. In 2015, evidence of WNV activity (human, horse, bird, mosquito, or Sentinel) was reported in 103 (41%) of the 254 Texas counties (Figure 2). Twenty-six counties (10%) reported WNV-positive mosquito pools, 78 (31%) reported human WNV disease cases, and 25 (10%) reported WNV-infected (TSHDS, 2017). Choosing Texas for WNV study site is appropriate for this dissertation.

Table 4

Population of Texas

Area Name	Total	Anglo	Black	Hispanic	Other
Texas	28,797,290	11,779,132	3,289,228	11,804,795	1,924,135
Metropolitan**	25,566,822	9,982,423	3,039,757	10,693,926	1,850,716
Nonmetropolitan	3,230,468	1,796,709	249,471	1,110,869	73,419

Study Population

According to the TSHDS of 2017 report, between 2002 and 2014, cases of WNV disease reported in Texas were 4,632 in total. Especially in 2012, a record high number of 1,868 cases was reported. TSHDS also reported 1,565 mosquito pools, 14 birds, 31 horses and one sentinel chicken. In the same year, Jefferson County reported the highest number of WNV infected horses. Based on the data that are indicated in Table 6 and literature gathering residence of Texas is the ideal candidate for examining WNV infection among ethnic minorities. So this study will examine the residence of Texas.

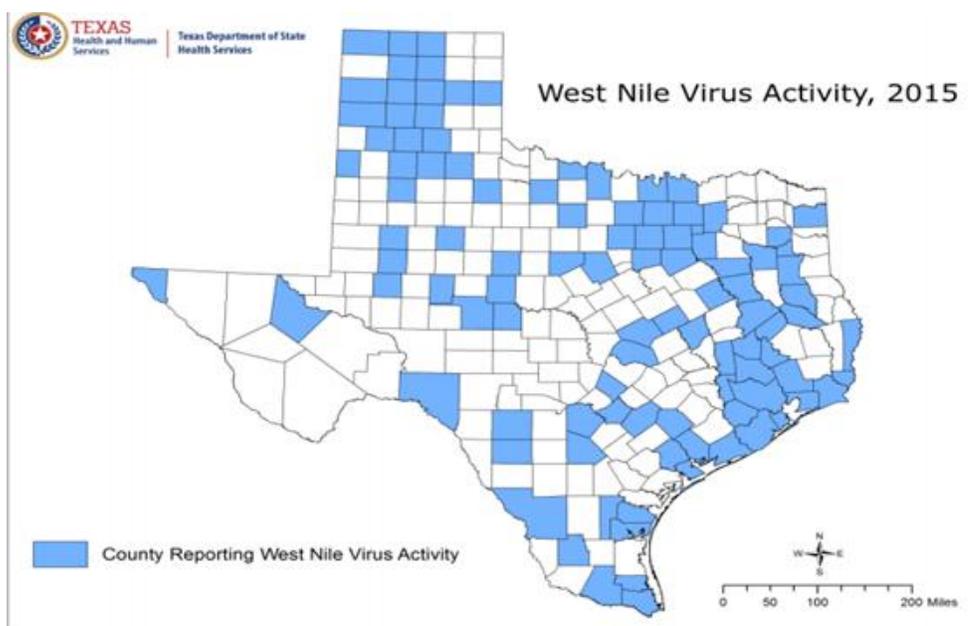


Figure 6. Texas counties reporting WNV activities (TDSHS, 2015).

Sample and Sampling Procedures

In collecting primary data to reach a generalization of the population, it is essential that the population is defining regarding content, extent, and time (Frankfort-Nachmia & Nachmia, 2008). Convenience sampling method was the ideal choice for this study to accommodate ethnic minorities' population during social gathering events such community gathering religious celebration public health services events and volunteered Catholic, Orthodox, and Protestant church members were surveyed. Methods of dissemination of the survey question was discussion with leaders of the communities and pastors to speak 5 minutes of explanation about the study and provide the survey question right at the site or provide the online website and link. This method was fast, easy, readily available, and cost-effective for a large data size of 395, and was useful to achieve the desired number of participants, to be drawn from the nearby population. The advantage of using a convenience sampling in this study allowed the researcher to choose different statistical data gathered from a specific group of people. These groups were ethnic minorities, namely African Americans and Hispanics; also, I finished collecting data in a matter of hours, as these data are readily available and are of good quality, especially because most convenience sampling was collected from the populations on hand.

Sampling is a selection procedure that deals with a subset of members within the population that represents traits of the general populace of ethnic minorities. It is cost effective, ensures efficient data gathering, and allows the improvement of the quality and accuracy of the data due to its size. Probability and non-probability sampling are the two kinds of sampling that are mostly in scientific research (Frankfort-Nachmia and

Nachmia (2008). Using probability sampling, four categories of samples can be drawn: (a) simple random samples, (b) systemic samples, (c) stratified samples, and (d) cluster samples. Meanwhile, a nonprobability sampling form is the basis for drawing samples for this study. There are three types nonprobable sampling: (a) convenience samples, (b) purposive samples, and (c) quota samples. The nonprobability and convince sampling methods have been chosen for this study.

Sample Size Determination

This dissertation followed conditional probability, that is, “an event B is the probability that the event will occur given the knowledge that an event A has already occurred” (Yale University, 2017). In this study, sample size determination was based on an analysis of the combination of the HBM model with the KAP model, that the response of a person willing to accept WNV vaccine according to her or his perception of the seriousness of the WNV disease. Mitchell (2013) compared the HBM model with the KAP model, and found that individuals with greater perceived severity tend to use prevention protection more than those with high knowledge attitudes and behaviors toward WNV (Yerby, 2007) to determine this conclusion I will examine with appropriate sample size.

The effects of the alpha level, effect size, and sample size were considered to ensure statistical power, such that the statistical tests have a fair chance of detecting a real effect or mean difference. G*Power Version 3.1.7 was implemented to elect an acceptable sample size for this study. In this dissertation, the estimated sample size

provided was the greatest of the required sample sizes given by the G*Power software; the multivariate analysis of variance used to established the necessary sample size.

Factors relating to the effects of the alpha level, effect size, and sample size was considered to ensure statistical power, such that the statistical tests have a fair chance of detecting a real effect or mean difference. G*Power Version 3.1.7 was utilized to determine an acceptable sample size for the analyses. The sample size estimate provided was the greatest of the required sample sizes given by the G*Power software. In addition the multivariate analysis of variance also is utilized to determine the necessary sample size. Assuming a medium effect size, an accepted power of .80, and a 95% confidence level ($\alpha = .05$), the suggested sample size to achieve empirical validity is 395 participants.

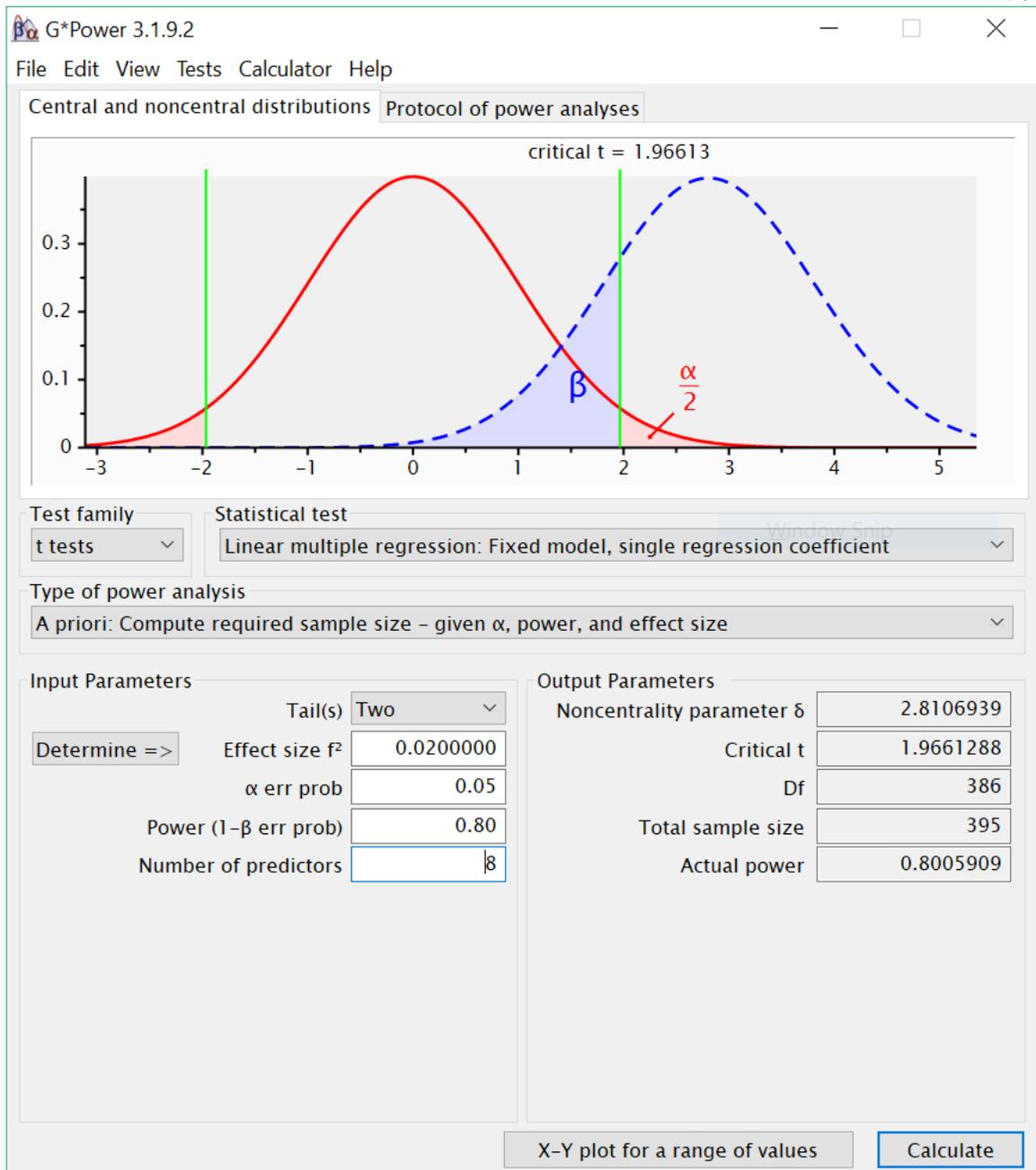


Figure 7 G Power data.

Exclusion and Inclusion Criteria

HBM and KAB survey questionnaires were used to collect quantitative information from participants with aims of gathering unbiased, valid, and reliable data. Both instruments were validated and reliable. However, these data can be subject to error and bias. There was one exclusion criterion for this study. Ethnic minorities must speak and be literate in either English or Spanish. An eligibility criterion includes the following:

- African American or Hispanic
- Age \geq 18
- Healthy adults over 18 years who are ambulatory and independent living

An exclusion criterion includes the following:

- Non-English and non-Spanish speaking
- Non-African American or Non-Hispanic

Data Collection

Direct recruitment of potential study participants was the ideal method among the known participant recruitment methods. Participants were instructed not to write their name or any identification so that they can maintain their anonymity. This direct recruitment method was multistage steps. First, questionnaires were distributed during public and community gathering, church services and public places after their primary events completed for example after meeting or church services. Questionnaires were administered in a paper-and-pencil format quantitative data were collected. The advantages of this technique include a large number of participants, a high likelihood that participants were truthful regarding a controversial issue, and the ability to reach out to

participants that do not have a computer and Internet access (Leedy & Ormrod, 2001; Fink, 2006).

The participants were recruited in the following methods (a) public gathering , (b) e-mail, provided by institution and community leader permission (c) web-based, specifically designs for this purpose (d) social gathering, (e) religious gathering, and (f) institutional organization and social media. Steps that required towards recurrent include IRB approval, completed informed consent, letter to permission to the institution and organization for authorization to advertise in their camps, and letter of asking public health worker to involve on a requirement of participants.

The method of data collection used here is a web-based questionnaire such as the use of social networks and survey monkey. A secure website will be developed in which the participants, who will be contacted by e-mail, will be able to fill out the questionnaires. Advertisements will be distributed in public and social gathering institution compass and public health office with permission of the institution were the participants work. I am also working with the conjunction of Baylor University and Harris County Public Health and Environmental and Safety. The advantage of this type of research is that it is quick and inexpensive, while its disadvantage is the exclusion of participants who do not have computers and internet access. In this case; however, the latter issue was compensated for by the pencil-and-paper questionnaires. Questionnaires will be received at the centralized location called the management center, (I will be contacted a data management team such as eBook, Paper SAS, Microsoft Azura, I also plan to keep a copy with me) where these were digitalized and stored. Every

questionnaire was scanned for legibility and checked for storage. Data were recorded into the SPSS system. Then quality control and quality checking were done on the data to make sure appropriate data were collected.

At the study management center, compiled information entry will be scrutinized for accuracy by fully examining 5% sample (12 questionnaires). The social and demographic factors such as country of birth, date of birth, gender, ethnicity, employment, education, financial status, housing, religion, and were collected in a similar manner. Relevant medical history including diagnosed high blood pressure, diabetes, diagnosed Hepatitis C, cardiac conditions, any chronic disease, treatment for depression, treatment for other mental health issues, and pregnancy status for women were collected to weigh the effect of the comorbid situation. Once the participants signed consent, they were assigned a unique number each to ensure their confidentiality.

Instrumentation and Materials

The instrument of this dissertation is unique. It is a variation of a previously published instrument, which is researcher produced and researcher, developed, to accommodate the research questions of the association between knowledge, attitude, behavior, and AHC, Comorbidities and prevention awareness; 40-item questionnaires are included in this dissertation. These questionnaires were used from Mitchell (2014), Tuiten et al. (2009), Yerby, 2008), and Aquino et al. (2004) and were chosen to capture respondent theoretical framework of HBM and KAB, access health care as well as comorbidities and prevention practice. Likert five-point scale survey was used with a convenience sampling methods be used among ethnic minorities.

I have modified Mitchell's questionnaires from Likert scale to yes/no format to fit this dissertation data analysis. In addition, health care accessibility (what is the association between health care access and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX), and comorbidities (What is the association between the presence of comorbid conditions and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?) were added. Due to these modifications and additional of the research questionnaires a pilot study is required.

A volunteer survey measured knowledge, attitude, behavior, barriers, perceived susceptibility, benefits, health motivation, seriousness, and confidence on 5-point Likert-type scales, using open-ended as well as yes/no questions that have previously been developed by Champion (1993). Several researches by Aquino et al. (2004) and Tuiten et al. (2009) form the basis for KAB studies. Individuals were examined on their understanding of WNV infection and whether they have been taken personal prevention protection or not. Co relational statistics were used to determine associations. These instruments were a pilot test for validity and reliability.

According to Porta (2008) a test of the procedures and methods used on a larger scale is a pilot test. The main reason researcher used a pilot testing was examining the practicality of a large-scale study and to determine the efficacy of the instrument. This pilot study was distributed via online and pen and pencil format; it was tested with 10 individuals both female and male of ethnic minorities. The literature review revealed only one theoretical framework used in WNV prevention practice, that is, KAP, until Yerby

(2007) validated the HBM model for the WNV prevention practice theoretical framework. Aquino, Fyfe, MacDougall, and Remple (2004) designed the HBM instrument for a study investigating the determining factors of partaking in WNV protective actions among persons living in British Columbia. Permission for use in this dissertation has been requested.

The theoretical framework of HBM was modified and used in the validation of HBM (Yerby, 2007). Yerby granted permission to Mitchell (2009) for the utilization of this modified instrument in this dissertation. I have also requested the authorization to use this validate and reliable instrument. Yerby (2007) validated the HBM WNV instrument in five process methods. These methods include instrument pilot study, literature review, expert panel review, focus group, face-to-face interviews, and central location intercept interviews.

Mitchell (2009) produced the HBM instrument for assessing KAB towards WNV prevention amidst individuals 60 years or older in Maryland; the researcher developed the HBM WNV instrument in which the concept of perceived threat is associated with the predictor of prevention practice or reflection of personal behaviors. Perceived susceptibility X perceived Severity = Perceived threat (Glanz, 2008). According to Yerby (2007), the three main reasons for utilization of HBM WNV instrument are as follows: it is a valid and reliable tool for determining WNV knowledge, attitude, and personal protection information; the HBM constructs measures are predictive of WNV prevention protective behaviors; and it is a useful tool for conceptualizations of effective WNV health education.

Linear logistic regression was used to examine perceived benefits, health motivation and confidence. It affected a positive or negative correlation with the frequency of utilization of prevention. Perceived barriers and susceptibility were examined relative to knowledge and frequency using the Spearman correlation. I addressed the research questions with a number of independent sample t-tests to deduce whether major distinctions exist in prevention practice of WNV among ethnic minorities.

HBMS was used to examine the misconceptions or misinterpretations that might symbolize obstacles to the activities that I aim to incorporate and potential hindrances to behavioral changes of ethnic minorities. The emphasis was on examining the contribution of knowledge, attitude, behavior, AHC, and secondary diseases towards prevention practice, and how these factors contribute to low diagnosis and high disease development of WNF and WNND among the ethnic minorities. According to Rosenstock, Strecher, and Becker (1988), because HBMS measures the extent of a known situation, it can test hypotheses such as the assumption that WNV disease is related to low socioeconomic standing, or complications of chorionic disease to low knowledge awareness or health disparities. It can also provide new tangents of a situation's reality, such as whether the knowledge awareness and protection were distributed equally, or whether media-led public education or announcement times accommodated ethnic minorities. A list of variables measured, their operational definitions, corresponding survey questions, measurement level, and role in the analysis are presented below.

The instruments that were used in this research are the HBMS questionnaires, which are used as standard knowledge, attitude-behavior, and AHC, comorbidities and

prevention practice questionnaires designed by the World Health Organization online, door-to-door trained personal questionnaire distribution, data analysis software, and data storage instruments. There are 10 demographic questions, four questions in each regarding KAB AHC, chronic diseases, 10 questions on HBM framework and two media questions regarding health information communication. The survey instruments were included in the appendix.

Champion (1993) developed the HBMS. The KAB question, AHC, comorbidities and prevention HBM survey consisted of 60 questions. There were 10 questions each, for perceived predisposed, seriousness, and benefits; five questions each, regarding perceived barriers and confidence; and seven inquiries on health motivation. All items for the six scales were the structure with a 5–16 Likert-type scale (1) *be strongly agrees* and (0) *being strongly disagrees*. The scales are designed so a higher score equates to higher perceived susceptibility, seriousness, benefits, health motivation, barriers, or confidence. The reliability and validity of the survey questions will be tested with a pilot study after IRB approval. Please see Appendix C.

Summary of Variables, Operational Definitions, and Survey Questions

The variable survey questions are related to the instrument I used with Mitchell (2013). Mitchell gave authorization of using this instrument. See appendix B for the authorization permission.

Table 5

Demographic Variables

Variable	Operational Definition	Example of Survey Question	Measurement Level	Coding scheme	Role
Age	age in years	Please tell me your age	Ratio	18-28 = 1 29-39 =2 40-50=3 51-60=4 61-71=5	Control
Gender	gender (male or female)	Please list your gender Male/Female	Nominal	Male=1 Female=2	IV
Race	race or ancestry	How would you describe your race? Black or African American Hispanic	Nominal	AA=1 Hispanic=2	Control
Ethnicity	As being of Hispanic or non-Hispanic origin As being of African American	Are you Hispanic or Latino or Of Spanish origin? Yes/No Are you African American? Yes / No	Nominal	Yes =1 No=2 Yes =1 No=2	IV
Language	primary language spoken at home	What is the primary language Spoken in your home? English /Spanish	Nominal	English=1 Hispanic =2	IV
Education	The highest year or level of education completed by respondent	What is the highest level of Education you have completed. <ul style="list-style-type: none"> • less than high school • -HS diploma or GED -Some college, include Associate-Bachelor's degree <ul style="list-style-type: none"> • -Some graduate school • Graduate or 	Ordinal	< grammar school =1 High School and GED =2 Vocational tech school (2year) =3 Some College 4 Bachelor'sDeg.4 Master Deg.5 Doctoral dig=7 Professional (MD JD) = 7 Other=8	IV

Income	annual household income	Which category best describes Your total household annual income? <input type="checkbox"/> <\$20,000 <input type="checkbox"/> \$20,001-\$30,000 <input type="checkbox"/> \$30,001-\$40,000 <input type="checkbox"/> \$40,001-\$50,000 <input type="checkbox"/> \$50,001-\$60,000 <input type="checkbox"/> \$60,001-\$70,000 <input type="checkbox"/> >\$70,000	Interval	<\$100,000 \$10,001-\$19,000 \$20,001-\$29,000 \$30,001-\$39,000 \$40,001-\$49,000 \$50,001-\$74,000 75,000 - *99,000= 100,000-150,000 =8 Over 150.000	1 2 3 4 5 6 7 8	IV
Marital status	marital status (married, single, divorced, separated, widowed, domestic partnership)	Marital status: ▪ Single ▪ Married ▪ Separated ▪ Divorced ▪ Widowed	Nominal	Single Married Separated Divorced Widowed	1 2 3 4 5	IV
Employment status	employment status	Employment Status: ▪ Full-time ▪ Part-time ▪ Retired ▪ Unemployed ▪ Other	Nominal	Full-time Part-time Retired Other Unemployed 1 through 4 is Yes =1 5 is No = 0	1 2 3 4 5	IV

Table 6

Demographic Variables

Variable	Operational Definition	Example of Survey Question	Measurement Level	Coding scheme	Role
1. Knowledge of WNV infection	Knowledge of the vector that transmits WNV to humans	How do you think people get WNV? <ul style="list-style-type: none"> • From bug bites • From birds • C o n t 	Nominal	From bug bites From birds Contact with Sick people 1=Yes Eating or drinking contaminated food or water= No =0	IV
2. Knowledge of WNV infection	Knowledge of likely getting sick on WNV Or confident to have Prevention Practice in place	You will get sick from West Nile virus in the next year or a close family	Nominal	No=0 Yes=1	IV
3. Knowledge of WNV infection	Knowledge of likely getting serious on outcome of WNV	Person who has become infected with West Nile virus will become very ill and die	Nominal	No=0 Yes=1	IV
Knowledge of WNV infection	Knowledge of WNV treatment	Is an effective treatment for WNV?	Nominal	No=0 Yes=1	IV

5. Knowledge of WNV infection	Knowledge of WNV who is at risk	Who is at most risk of becoming very ill or dying when infected with West Nile virus? a. Children 0-02 b. Teenager s ages13- 19 c. Adults ages 20 - 49 d. Adults age 50	Nominal	No=0 Yes=1	IV
6. Knowledge of WNV infection	Knowledge of WNV means of transmission	Do you agree that you can get the West Nile virus in the following ways? Please circle the number at the end of each sentence that best fits your answer. Whether you 1=Strongly Agree, 2=Agree , 3=Unsure, and4= Disagree You can get West Nile virus from: 1. Blood transfusions 2 .Pregnant mothers passing it to their fetus 3 .Mosquito bites 4 .Drinking infected water 5. Contact with dead birds 6 .Shaking hands with 7. someone who has the virus 8.Mother- to-child through breast milk	Ratio	No=0 Yes=1 Unsure and disagree as = No =0 Strongly agree, agree are Yes =1	IV

1 Attitude of WNV infection	Individual's perception of the seriousness of WNV	Do you think WNV can cause /Little/Somewhat/ Very	Nominal	No=0 Yes=1	IV
4.Attitude of WNV infection	Attitude supporting the Prevention program	Willingness to support mosquito control efforts Are or would you be in favor of a mosquito control program like that?	Nominal	No=0 Yes=1	IV
3 Attitude of WNV infection	Individual's perception of the mosquito repellent it	What do you think WNV of Mosquito repellent a. Bad for environment b. Expensive compare to it function c. Un- pleasant	Nominal	No=0 Yes=1	IV
4.Attitude of WNV infection	Individual's perception of the mosquito repellent functions	Mosquito repellent protects me & my family from insects		No=0 Yes=1	IV
Variable	Operational Definition	Example of Survey Question	Measurement Level	Coding scheme	Role
1. Behavior	One's belief In the efficacy of the recommended behavior to decrease the risk of contracting WNV? Individual perception of infected by WNV, seriousness	Would you be interested in a Community program to help old repair their damaged window screens and dump standing water in their yard?	Nominal	No=0 Yes=1	IV

3 Behavior	Individual's belief in the efficacy of the recommended	Are you be willing to pay for a WNV vaccine?	Nominal	No=0 Yes=1	IV
4. Behavior	One's belief In the efficacy of the recommended behavior to decrease the risk of contracting WNV? Individual perception of infected by WNV, seriousness	Would you be in favor of a mosquito control program?	Nominal	No=0 Yes=1	IV
Support for mosquito control programs	Self-reported willingness to support mosquito control efforts	Would you be in favor of a mosquito control program?	Nominal	No=0 Yes=1	DV
Comorbidities	Self-reported Secondary disease Heart Disease Cancer Diabetic	Do you have problem Do you received treatment for it Does it limit your activities	Nominal	No=0 Yes=1	IV

Table 7

Independent Variables

AHC	Insurance	Do you currently have health insurance	Nominal	No =0 Yes=1	
	Types of insurance	Which of the following do you obtain your health insurance? Employer Self-Employer-Medicare Medicaid Both Medicare and Medicaid Insurance purchased Other	Nominal	Employer =1 Self Employer-2 Medicare=3 Medicaid=4 Both Medicare and Medicare 5 Insurance purchased =6 Other =7 I do not have = 8 1-7 Yes =1 8 is No = 0	
Types of enrollment	Enrollment Obama care or managed care	Are you currently enrolled in a Obama care or Managed Care	Nominal	Obama care = 1 Managed care = 2 I do not have = 3 1&2 = Yes=1 3 is No = 0	IV
Comorbidities	Types of Comorbidities	Please indicate below which chronic conation you have: Diabetes Asthma Respiratory or COPD Lung Disease Heart disease Arthritis and other rheumatic disease Cancer Obesity High blood pressure Ulcer stomach Disease Liver Disease Anemia Other blood disease	nominal	No=0 Yes=1	IV
Health	Health conditions	In General what would you say about your health condition Excellent =1 Very good=2 Good=3 Poor=4	nominal	Very Poor=5 1,2 &3 = Yes=1 4&5 =No=0	IV
prioritizations	Prevention practice and Comorbidities	Do you think the chronic condition limit form practicing West Nile Virus Protection	Nominal	No=1 Yes=0	IV

Table 8

Dependent Variables WNV Infection

Dependent variables: WNV infection Prevention					
variable	Operational definition	Example of Survey Question	Measurement Level	Coding scheme	Role
Prevention Practice	Prevention methods	<p>Do you agree that the following actions will prevent West Nile virus infection?</p> <ul style="list-style-type: none"> • Eliminate standing water around the house to reduce mosquitoes • Use insecticide sprays to reduce mosquitoes • Avoiding outdoor activities, • Wearing Long selves and long pants, • Use screen windows to reduce mosquitoes • How confident are you that you can protect yourself and your house hold member from getting WNV infection 	Ordinal	No=0 Yes=1	DV
Use of insect repellent in last 90 days	Self-reported frequency of insect repellent use	Last year did you Always, sometimes, rarely, or never use insect repellent on your skin when you went outdoors?	ordinal	No=0 Yes=1	DV
Drainin g of standing water	Self-reported frequency of draining standing water around the home	Since the start of this past summer (2016), did someone you asked or hired drain water from items around the outside of your home	Nominal	No=0 Yes=1	DV
Dressin g in long clothing	Self-reported frequency of dressing in long-sleeved and long pants to avoid mosquito bites	When you go outdoors in the summer, do you wear long-sleeved shirts and/or long pants?	Nominal	No=0 Yes=1	DV

Avoid outdoor s during mosquit o feeding hour	Self- reporte d frequen cy of avoidin g outdoor s during mosquit o feeding hours (dusk & dawn)	When you go outdoors is it usually: 1. At the dusk 2. At the middle of the day 3. At dawn 1.	Nominal	No=0 Yes=1	DV
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Data Analysis Plan

I examined the association between KAB, AHC, comorbidities, and preventative practices related to WNV infection between ethnic minorities (African American and Hispanic) in Houston, TX. One aspect of quantitative cross-sectional study methods is the testing for significance within the variables and discovery of any and all associations (Creswell, 2014). For descriptive statistics, a SPSS version 22.0 and linear regression was used for data entry and analysis, (Howell, 2010). I used linear multiple logistic regression for dependent variable analysis.

The data were examined for the data for accuracy, missing data, and outliers. Using a standardized value, the presence of outliers was tested. That represents the number of standard deviations the value was from the mean. Standardized values were created by z-scores, and values extraneous of the range $z = \pm 3.29$ SD away from were categorized as out of range and excluded from the data set (Tabachnick & Fidell, 2012). Nonrandom patterns were used for missing data and participants who did not complete major portions of the survey were excluded. Before to inferential analyses, the assumption of normality were assessed with a Kolmogorov-Smirnov test (Howell, 2010).

I used a linear regression to discover the association of independent and dependent variables. A point-biserial correlation is appropriate when examining the two-way association between a dichotomous variable and a second variable (Pagano, 2009). To analyze the assumption normality of the variable, I used Kolmogorov-Smirnov tests and Levene's test for homogeneity of the variables. Each research question was be analyzed with a linear multiple logistic regression

The outcome of this dissertation analysis was binary and dichotomous, and I used a linear regression to answer all research questions in this dissertation. I have also outlined the survey questionnaires towards yes/ no answer only. I have examined the association between AHC and co-morbidities of disease and prevention practice of WNV using a linear logic regression. According to Pagano, 2009, when research aiming to assess for differences in a continuous dependent variable corresponding to changes in a dichotomous independent variable linear regression is the ideal statistical analysis. The dichotomous independent variables in this analysis were correspond to ethnicities (African-American and Hispanic), AHC (yes or no), and chronic disease (yes or no). The continuous independent variables were corresponding to KAB, AHC, comorbidities prevention practice of WNV infections and as WNV infection prevention practice as the outcome of a dependent variable. Before analysis, the assumptions of homogeneity of variance and normality evaluated with Kolmogorov-Smirnov tests and Levine's tests, respectively. The independent grouping variable was corresponding to ethnicity (Hispanic and African-American). The continuous independent variables were corresponding to knowledge, attitude, and behavior, AHC, comorbidities, and prevention practice of WNV infection. The covariates in this analysis were gender and socioeconomic status. Gender was a dichotomous variable, and socioeconomic statuses were an ordinal variable. I plan to develop statistical data that were binary and dichotomous in nature and perform a linear regression data analysis. Each research question was analyzed with ad linear regression, and then I had predicted the model with all variables using multiple variable linear regressions.

Data was scanned for missing data, outliers, and accuracy. To test for outliers, the amount of standard deviations from the mean will be examined; any data points that fall outside the range $z = + 3.29$ was removed (Tabachnick & Fidell, 2012). Instances of missing information were be investigated for nonrandom patterns, and data from subjects who left a significant amount of sections incomplete was excluded. Standardized values were examined to look for outliers.). Nonrandom patterns were used to find cases with missing data. Before inferential analyses, the assumption of normality assessed with a Kolmogorov-Smirnov test (Howell, 2010).

The research questions were examined with a linear regression that was examine the association between each independent and dependent variable. The sample was determined based on G-power calculations the researcher determined the effect size of $|\rho|0.3$, α err prob = 0.05, Power (1- β err prob) 0.95, resulting in a sample size of 395 participants being involved. I have used linear regressions. Each research question was analyzed with a linear logistic regression, and then I predicted the most parsimonious model with the use of logistic regressions.

Protection of Human Subjects and Researcher Responsibilities

According to Resnik (2011), ethical principles are rules which distinguish wrong from right or norms that distinguish acceptable from unacceptable behavior. Human subject protection (HSP) is a principle that minimizes harm, decreases risks, and maximizes benefits (Rosnik, 2011). HSP also emphasizes respect for individual privacy, autonomy, and dignity, while taking precautions with vulnerable populations; it aims to split the burdens and benefits of research equally (Shamoo & Resnik, 2009). The ethical

objective of the Walden University IRB is safety. Privacy risks are minimal; risks were logical regarding foreseen gains; subjects were chosen without bias; and signed informed consent forms were obtained from all participants before data collection (Walden University, 2011). The methodology of the dissertation has been devised to meet the terms and objectives of Walden University.

The individual participant's name, education, economic status, and any other personal information will remain confidential and will not be revealed in any or all documentation. The American Psychological Association (APA) code of conduct and Declaration of Helsinki IV will be strictly implemented. There were no risks involved for the participants, nor were the participants subjected to psychological stress, unwanted solicitation, the intrusion of privacy, or economic loss. Both the digital and physical data, that is, the data from the online and paper-and-pencil questionnaires will be kept confidential in locked files for 5 years. A researcher had extensive knowledge and experience in clinical and epidemiological research at the University of Texas MD Anderson Cancer Center. I oversee 321 active protocols. Therefore, this researcher fully understands the ethical application of researches.

Summary

In Chapter 3, the study's goals and objectives were established. The purpose of this dissertation was to investigate prevention practice of WNV by ethnicity and examine whether an association exists between knowledge, prevention practice of WNV infection, attitude, chronic disease, behavior, and health care accessibility, amidst ethnic minorities. I explored the effect of prevention and awareness campaigns, which target WNV within

minority populations. This chapter also presented an analysis of the rationale for the study and study design. Explain the theoretical foundation of the research methods of the data collection, methods of selection of the instruments, study population characteristics, and location. Sample size determination, means of data collection, dependent and independent variables and their operational definitions were included in this chapter. I also summarized research questions, measurement level, and protection of human subject in this chapter.

Chapter 4: Results

Introduction

I examined the level of prevention practice of WNV by ethnicity and investigated whether there is an association between knowledge, attitude, behavior, and AHC, comorbidities as independent variables, and prevention practice of WNV, as the outcome among ethnic minorities. The emergence of infectious diseases is a critical public health, humanitarian and national security concern. Coordinated efforts, such as those initiated by the CDC and the HH&S aim to protect people across the nation and around the world.

The survey I used in this study evaluated the level of knowledge, attitude, and behavior, AHC, comorbidities, as independent variables and prevention practice of WNV, as the outcome. Murray (2022) revealed that ethnic minorities are less likely to be diagnosed with WNV infection but more likely to die due to WNV infection. It is the hope that this study provided critical information for regulatory agencies to draw upon and develop policies and assure that these policies are in place, attending to the core functions of public health of assessment, assurance and policy development, to ultimately create positive social change.

Pilot Study

According to Porta (2008), a test of the procedures and methods, on a small-scale, that can then be used on a larger scale is a pilot study. The main reason for pilot testing is to examine the practicality of a large-scale study and to test the validity and reliability of the instrument. I have modified some aspects of the original questionnaire called West

Nile Virus Survey Questionnaires or survey instrument validated by Mitchell. Please see Appendix C for her authorization use as well as the survey instruments in Appendix A.

I added questions relating to two independent variables, AHC, and comorbidities. Because of those modifications, a pilot study was required.

1. Do you currently have medical care coverage (insurance)?
 - Yes
 - No

2. Do you have a personal doctor who regularly cares for you?
 - Yes
 - No

3. Are you currently enrolled in a “managed or Obama care” type of healthcare plan?
 - Yes
 - No

4. During the past year, have you had difficulty getting medical treatment?
 - Yes
 - No

E. Comorbidities

1. In general, would you say your health is
 - Excellent
 - Very good
 - Good
 - Fair
 - Poor

2. Please indicate below which chronic condition you have:
 - a. Diabetes
 - Yes
 - No

- b. Asthma
 - Yes
 - No
 - c. Respiratory or COPD
 - Yes
 - No
 - d. Lung Disease
 - Yes
 - No
 - e. Heart disease
 - Yes
 - No
 - f. Arthritis and other rheumatic disease
 - Yes
 - No
 - g. Cancer
 - Yes
 - No
 - h. Obesity
 - Yes
 - No
3. Having chronic diseases (comorbidities), are the barriers for minorities for practicing West Nile Infection prevention.
- Strongly Agree
 - Agree
 - Disagree
 - Strongly Disagree

I implemented a direct recruitment of potential study participants in this pilot study. This is because direct recruitment is the ideal method among the known participant recruitment methods. This pilot study implemented exactly the same format as the large scale study. The participants were given a paper and pencil methods of the research

questions and had a chance also to complete online if they prefer to do so. Ten out of four 434 participants completed the online survey and 424 completed paper and pencil survey. Participants were instructed not to write their name or any identification so that they could maintain their anonymity. None of the pilot study participants participated in the large study.

There were 20 participants that took part of this pilot study. G*Power Version 3.1.7 was utilized to determine that an acceptable participants number for the multiple linear regression analysis in the main study. The sample size estimate provided was the greatest of the required participants given by the G*Power software. The minimum requirement of assumed a medium effect size ($f^2 = 0.15$), an accepted power of .80, and an 80% confidence level ($\alpha = .05$), and five predictor variables, the suggested sample size to achieve empirical /statistical or predictive validity is 92 participants (Cohen's Standard, 1998). However, this study utilized the effect size of $|\rho|0.020000$, α err prob = 0.05, Power (1- β err prob) 0.95, resulting in a sample size of 395 participants being involved.

Texas Medical center in Houston was the ideal recruitment site for the pilot study due to accessibility issues and availability within a short period of time. The participants were given a survey question with consent forms. They were instructed to keep the informed consent forms and return the completed survey question on the assigned box. I created a website and potential participants were informed about the website. Participants also were instructed and provided the link to visit the web site and complete the survey on the web. Then, the completed data were sent directly to a database; the data were then used for statistical analysis. Even if the research showed the number of studies conducted

on the Internet is more than doubling each year (Azar, 2000), participation on the online survey in this study was much lower than the paper and pencil format. The online survey had the same format, with the consent form appearing first and asking the question if they understand the process and then they can be proceeding to complete the survey.

Results of the Pilot Study

The following tables and figures are the result of the pilot study. There were a total of 13 females and seven males. Age was distributed between 18-24 and 55-64 years. All 20 participants were either African American, Hispanic, or Both. Primary language of participants was English ($n=13$, 65.0%), Spanish ($n=4$, 20.0%), or Other ($n=3$, 15.0%). Level of education was distributed between high school and master's degree. Income varied widely among the different groups. Table 9 presents the findings of the pilot study demographics.

Table 9 To Tabel 15

Frequencies and Percentages for Pilot Study Demographics

Variable	<i>n</i>	%
Gender		
Female	13	65.0
Male	7	35.0
Age		
18-24	3	15.0
25-34	4	20.0
35-44	4	20.0
45-54	3	15.0
55-64	6	30.0
Ethnicity: Are you African American, Hispanic or Both?		
Yes	20	100.0
No	0	0.0
Primary language		
English	13	65.0
Spanish	4	20.0
Other	3	15.0
Level of education		
High school	3	15.0
Some college	8	40.0
Bachelor	2	10.0
Master	7	35.0
Income		
<10K	2	10.0
10-19K	4	20.0
20-29K	2	10.0
30-39K	1	5.0
40-49K	5	25.0
50-74K	6	30.0
Total	20	100

Composite scores for the variables of interest were generated through a sum of the dichotomous items. Cronbach alpha was examined to test the reliability of the scales.

Many of the scales fell below the acceptable threshold for internal consistency. This can be attributed to the low sample size or the dichotomous nature of the survey items.

Table 16
Descriptive Statistics for Pilot Study

Variable	Min	Max	<i>M</i>	<i>SD</i>	Number of items	α
Knowledge	2.00	7.00	5.05	1.85	7	.70
Attitude	3.00	12.00	7.55	2.21	12	.54
Behavior	1.00	5.00	2.90	1.33	5	.48
AHC	.00	3.00	1.90	.72	4	-.01
Co-morbidities	.00	4.00	1.95	0.89	10	.07
Prevention practice	1.00	7.00	4.95	2.01	7	.78

The regression analysis was conducted for the pilot study. The overall findings of the multiple regression and the individual predictors were not statistically significant.

Table 17 presents the findings of the regression analysis for the pilot data.

Table 17

Pilot Results for Regression Between Knowledge, Attitude, Behavior, AHC, Comorbidities, and Prevention Practice

Source	<i>B</i>	<i>SE</i>	β	<i>T</i>	<i>p</i>
Knowledge	0.24	0.30	.22	0.83	.423
Attitude	0.35	0.25	.38	1.41	.181
Behavior	0.53	0.31	.35	1.70	.112
AHC	-0.41	0.55	-.15	-0.75	.468
Comorbidity	0.76	0.60	.33	1.25	.232

Note. $F(5, 14) = 2.82, p = .058, R^2 = .502$.

Summary of Pilot Study

In this research, the pilot study was utilized as a test run for the main study. It allowed researcher to check the applicability of research procedures, survey distribution, and understand the steps used for answering research questions. In addition, the result from the pilot study was utilized to refine the methods for the larger study. I did correct the survey questions for minor spelling and grammar mistakes; however, this change did not affect the overall concepts previously approved by IRB. Some implantation strategies were adjusted, but no data analysis strategies changed. Please see Appendix G for detail information.

Data Collection for Main Study

First, Walden University IRB approved the study on December 17, 2018. The pilot study started December 27, 2018 and ended on January 27, 2019. Main data collection began on February 10, 2019 and concluded July 24 2019.

The only difference between the final data collection and Chapter 3 was the expected time frame. The pilot study allowed me to understand that the initial accrual frequency was too slow to achieve the desired sample size. Consequently, the allotted time for the survey had to be extended.

The collected data were uploaded into SPSS and used the descriptive statistics to examine the trends of the sample. To address the research questions, a series of Pearson correlations and a regression analysis were utilized. All the variables were computed through a sum of dichotomous survey items: knowledge (seven items), attitude (12 items), behavior (five items), AHC (four items), comorbidities (10 items), and prevention

practice (seven items). After the summation of the dichotomous items, each variable became a continuous-level variable. When two or more Likert or ordinal items are combined, it is standard practice to treat the composite scores as continuous variables (Zumbo & Zimmerman, 1993). Possible scores for the variables corresponded to: 0-7 (knowledge), 0-12 (attitude), 0-5 (behavior), 0-4 (AHC), 0-10 (co-morbidities), and 0-7 (prevention practice). The predictor variables corresponded to knowledge, attitude, awareness, AHC, and comorbidities. The dependent variable corresponded to prevention practice. Prior to analysis, the assumptions of a Pearson correlation and a linear regression were tested: absence of multicollinearity, assumption of normality, and homoscedasticity were tested prior to analysis.

Results

The purpose of this dissertation was to evaluate whether KAB, AHC, and comorbidities are associated with WNV prevention practices ethnic among ethnic minorities (e.g., African Americans and Hispanics). The aim was also to evaluate the correlation between the independent variables knowledge, attitude, and behavior as well as AHC and comorbidities of ethnic minorities and the dependent variable prevention practices of WNV infection. In this chapter, the findings of the data analyses are presented. To address the proposed research questions, Pearson correlations and a multiple linear regression were utilized. Statistical significance for the inferential statistical analyses was examined at the conventional alpha level, $\alpha = .05$.

Descriptive Statistics for Main Study

A total of 434 individuals responded to the questionnaire. The gender of the sample was distributed among 256 females (59.0%) and 178 males (41.0%). Age was predominantly distributed in the younger age categories: 18-24 ($n = 207$, 47.7%) and 25-34 ($n = 84$, 19.4%). The ethnicity of the sample was distributed among African Americans ($n = 360$, 82.9%), Hispanic ($n = 44$, 10.1%), and other ($n = 30$, 7.0%). A majority of the sample spoke English ($n = 375$, 86.4%). Most participants had obtained some college experience ($n = 178$, 41.0%) or a Bachelor's degree ($n = 97$, 22.4%). Income was widely distributed among all the levels. Table 12 displayed the percentages and the frequency of the data.

Table 18

Frequency Table for Nominal Variables

Variable	<i>n</i>	%
Gender		
Female	256	59.0
Male	178	41.0
Age		
18-24	207	47.7
25-34	84	19.4
35-44	40	9.2
45-54	58	13.4
55-64	29	6.7
65+	16	3.7
Ethnicity		
African American	360	82.9
Hispanic	44	10.1
Other	30	7.0
Primary language		
English	375	86.4
Spanish	47	10.8
Other	12	2.8
Level of education		
Grammar school	5	1.2
High school	82	18.9
Vocational/technical school	24	5.5
Some college	178	41.0
Bachelor	97	22.4
Master	43	9.9
Doctorate	1	0.2
Professional degree	2	0.5
No response	2	0.5
Income		
<10K	88	20.3
10-19K	53	12.2
20-29K	38	8.8
30-39K	54	12.4
40-49K	87	20.0
50-74K	53	12.2
75-99K	25	5.8
100-150K	19	4.4
>150K	12	2.8
No response	5	1.2
Total	434	100

Interval-level variables. All of the variables in this study were computed through a sum of dichotomous survey items: knowledge (7 items), attitude (12 items), behavior (5 items), AHC (4 items), and comorbidities (12 items), and prevention practice (7 items). After the summation of the dichotomous items, every variable was changed to a continuous measurement variable.

This dissertation survey was not like a Likert-scale that have one through five scales in chronological order such as: *strongly disagree*, *disagree*, *neutral*, *agree*, *strongly agree*. The items on the survey were measured as frequency of experiences, so there is not an optimal test to assess reliability or internal consistency. For example, with comorbidities – if someone responds yes to lung disease, there should not be an assumption that they will respond yes to arthritis. Through use of Cronbach alpha, the reliability of the scales fell below the acceptable threshold ($\alpha = .70$). Therefore, the findings of the scales will be interpreted with a level of caution.

Descriptive statistics of the scales were first examined. Outliers were examined through calculation of standardized values, ± 3.29 further from the mean. There was no indication of out of range values for knowledge, attitude, behavior, AHC, and prevention to care. There were six outliers identified for co-morbidities. However, these cases were kept in the study to maintain a realistic depiction of the data. The range for knowledge scores was 0.00 to 7.00, with $M = 4.81$ and $SD = 1.69$. The range for attitude scores was 0.00 to 12.00, with $M = 7.07$ and $SD = 2.49$. The range for behavior scores was 0.00 to 5.00, with $M = 2.46$ and $SD = 1.22$. The range for AHC scores was 0.00 to 4.00, with $M = 1.75$ and $SD = 0.93$. The range for co-morbidities scores was 0.00 to 6.00, with $M =$

1.84 and $SD = 1.05$. The range for prevention practice scores was 0.00 to 7.00, with $M = 4.38$ and $SD = 1.86$. The summary statistics can be found in Table 13.

Table 19

Summary Statistics Table for Continuous Variables

Variable	Min	Max	M	SD	Number of items	α
Knowledge	0.00	7.00	4.81	1.69	7	.62
Attitude	0.00	12.00	7.07	2.49	12	.65
Behavior	0.00	5.00	2.46	1.22	5	.37
AHC	0.00	4.00	1.75	0.93	4	.20
Co-morbidities	0.00	6.00	1.84	1.05	10	.66
Prevention practice	0.00	7.00	4.38	1.86	7	.67

Research Questions and Hypothesis

To address the research questions, Pearson correlations and multiple linear regressions were conducted to examine the relationship between knowledge, attitude, behavior, access to care, comorbidity, and prevention practice. The predictor variables corresponded to knowledge, attitude, behavior, access to care, and comorbidity. The dependent variable corresponded to prevention practice. A Pearson's correlation is appropriate when assessing the strength of the association between continuous level variables. A multiple linear regression is appropriate when testing the predictive relationship between a series of independent variables and a continuous dependent variable. First, the Pearson's correlations were conducted for each research question. The multiple linear regression was conducted as a post-hoc test to assess the predictive relationship.

RQ1. What is the association between knowledge and prevention practice for WNV infection among minorities (African and Hispanics) in Houston, TX?

H_01 : There is no association between Knowledge and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_a1 : There is an association between Knowledge and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

Results of the Pearson correlation were statistically significant between knowledge with prevention practice ($r = .39, p < .001$). The relationship was positive, suggesting that as knowledge scores increased, prevention practice scores also increased. The null hypothesis for research question one (H_01) was rejected, indicating that there is an association between knowledge and prevention practice of WNV. Table 14 presents the findings of the Pearson correlation.

Table 20

Pearson Correlation Between Knowledge and Prevention Practice

Variable	Prevention Practice	
	r	p
Knowledge	.39	<.001

RQ2. What is the association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_02 : There is no association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A2 : There is an association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

Results of the Pearson correlation were statistically significant between attitude with prevention practice ($r = .26, p < .001$). The relationship was positive, suggesting that as attitude scores increased, prevention practice scores also increased. The null hypothesis for research question two (H_02) was rejected, indicating that there is an association between attitude and prevention practice of WNV. Table 15 presents the findings of the Pearson correlation.

Table 21

Pearson Correlation Between Attitude and Prevention Practice

Variable	Prevention Practice	
	<i>r</i>	<i>p</i>
Attitude	.26	<.001

RQ3: What is the association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_03 : There is no association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A3 : There is an association between behavior and prevention practice for WNV infection among minorities (African and Hispanics) in Houston, TX.

Results of the Pearson correlation were statistically significant between behavior with prevention practice ($r = .34, p < .001$). The relationship was positive, suggesting that as behavior scores increased, prevention practice scores also increased. The null hypothesis for research question three (H_03) was rejected, indicating that there is an association between behavior and prevention practice of WNV. Table 16 presents the findings of the Pearson correlation.

Table 22

Pearson Correlation between Behavior and Prevention Practice

Variable	Prevention Practice	
	<i>r</i>	<i>p</i>
Behavior	.34	<.001

RQ4: What is the association between AHC and prevention practice for WNV I infection among minorities (African Americans and Hispanics) in Houston, TX?

H_04 : There is no association between AHC and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A4 : There is an association between AHC and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX

Results of the Pearson correlation were statistically significant between access to care with prevention practice ($r = .39, p < .001$). The relationship was positive, suggesting that as access to care scores increased, prevention practice scores also increased. The null hypothesis for research question four (H_04) was rejected, indicating that there is an association between access to care and prevention practice of WNV.

Table 17 presents the findings of the Pearson correlation.

Table 23

Pearson Correlation between Access to Care and Prevention Practice

Variable	Prevention Practice	
	<i>r</i>	<i>p</i>
Access to care	.09	.066

RQ5: What is the association between the presence of comorbid conditions and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX?

H_05 : There is no association between the presence of comorbid conditions and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

H_A5 : There is an association between the presence of comorbid conditions and prevention practice for WNV infection minorities (African Americans and Hispanics) in Houston, TX.

Results of the Pearson correlation were statistically significant between comorbidity with prevention practice ($r = .39, p < .001$). The relationship was positive, suggesting that as comorbidity scores increased, prevention practice scores also increased. The null hypothesis for research question five (H_05) was rejected, indicating that there is an association between comorbidity and prevention practice of WNV. Table 18 presents the findings of the Pearson correlation.

Table 24

Pearson Correlation between Comorbidity and Prevention Practice

Variable	Prevention Practice	
	<i>r</i>	<i>p</i>

Post-hoc Analysis

A multiple linear regression was conducted as a post-hoc examination to determine the significant predictors of prevention practice. Utilizing the findings of the Pearson correlations, the three significant independent variables were knowledge, attitude, and awareness. These three predictors will be utilized as predictors in the regression analysis. Prevention practice served as the dependent variable.

Prior to the regression analysis, the assumptions of normality, homoscedasticity, and absence of multicollinearity were tested. The normality assumption was assessed through visual examination of a P-P scatterplot developed between the observed cumulative probability and the expected cumulative probability. The raw data in the scatterplot closely mirrored the normality trend line, suggesting that the assumption of normality was met.

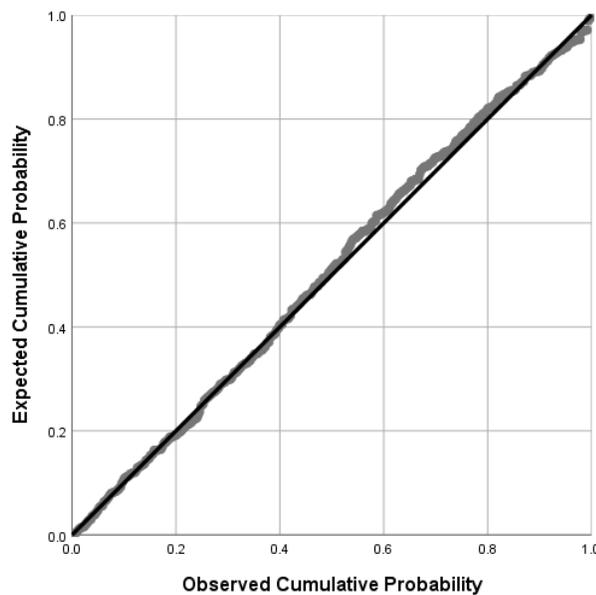


Figure 8. Normal P-P plot for regression on prevention practice.

Homoscedasticity was visually assessed through development of a residuals scatterplot, and the assumption was met due to a non-recurring pattern in the data.

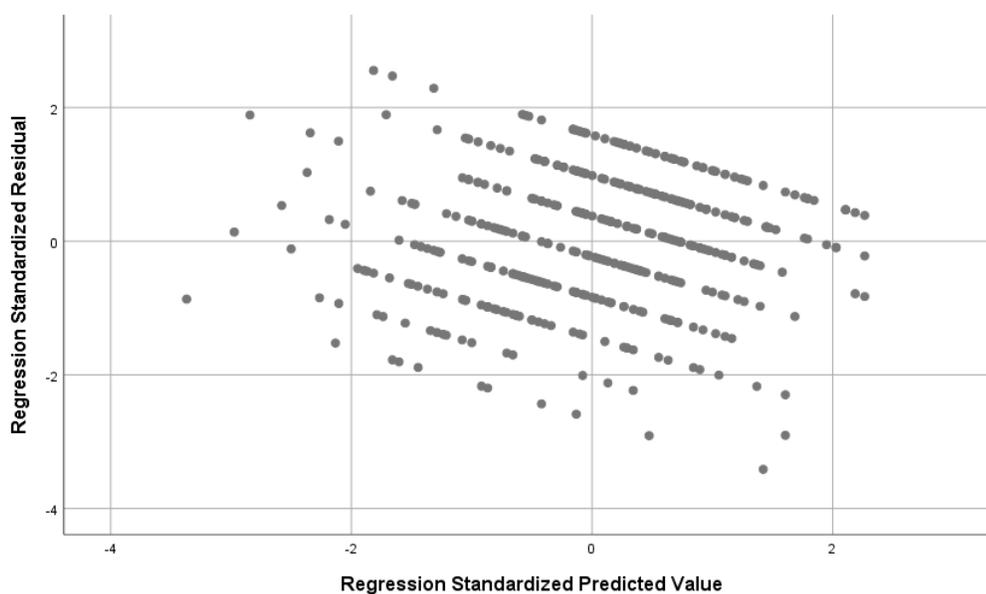


Figure 9. Standardized predicted values versus standardized residuals for the regression on prevention practice.

Absence of multicollinearity was verified through use of variance inflation factors (VIFs). The VIFs were all below the value of 10, suggesting that the assumption for absence of multicollinearity was met. Table 19 presents the VIFs for the predictors.

Table 25

Results for Variance Inflation Factors (VIFs)

Source	VIF
Knowledge	1.20
Attitude	1.18
Behavior	1.11

Results of the overall model of the multiple linear regression were statistically significant, ($F(3, 430) = 40.78, p < .001, R^2 = .222$), suggesting that there was a

significant collective, predictive relationship between knowledge, attitude, behavior, and prevention practice. The R^2 value suggests that approximately 22.2% of the variance in prevention practice can be explained by knowledge, attitude, and behavior,

Knowledge ($t = 6.27, p < .001$) was a significant predictor in the model, suggesting that as knowledge scores increase by one-unit, scores for prevention practice increased by 0.32 units. One more point on the knowledge questionnaire was associated with approximately a third of a point higher in terms of prevention practice scores.

Attitude ($t = 2.01, p = .045$) was a significant predictor in the model, suggesting that as attitude scores increase by one-unit, scores for prevention practice increased by 0.07 units. One more point on the attitude questionnaire was associated with a slightly higher prevention practice score.

Behavior ($t = 5.42, p < .001$) was a significant predictor in the model, suggesting that as behavior scores increase by one-unit, scores for prevention practice increased by 0.37 units. One more point on the behavior questionnaire was associated with approximately a third of a point higher in terms of prevention practice scores.

Based on the findings of the regression analyses, the findings of the correlations were further supported. Knowledge, attitude, and behavior were collectively and individually significant predictors of prevention practice. The results of the multiple linear regression are presented in Table 20.

Table 26

Results for Regression with Knowledge, Attitude, Behavior, and Prevention Practice

Source	B	SE	β	t	p
--------	-----	------	---------	-----	-----

Knowledge	0.32	0.05	.29	6.27	<.001
Attitude	0.07	0.05	.09	2.01	.045
Behavior	0.37	0.07	.24	5.42	<.001

Note. $F(3, 430) = 40.78, p < .001, R^2 = .222.$

Overall, the findings of the research questions and hypotheses are summarized in Table 21. The null hypotheses were rejected for research questions one through three. Knowledge, attitude, and behavior were significantly related to prevention practice.

Table 27

Research Question and Hypothesis

Research Question	Variable	Null Hypothesis
RQ1	Knowledge	Rejected
RQ2	Attitude	Rejected
RQ3	Behavior	Rejected
RQ4	AHC	Fail to Reject
RQ5	Comorbidities	Fail to Reject

Summary

The intent of the study was to examine whether KAB, AHC, and comorbidities are associated with WNV prevention practices ethnic among ethnic minorities (e.g., African Americans and Hispanics). The aim was also to examine the association between the independent variables knowledge, attitude, and behavior as well as AHC and comorbidities of ethnic minorities and the dependent variable prevention practices of WNV infection. Findings of the analyses indicated that there was a major association

between knowledge, attitude, and behavior on prevention practice. AHC and co-morbidities were not significantly related to prevention practice. The null hypotheses for Research Questions 1 through 3 (H_{01} - H_{03}) were rejected in favor of the alternative. The null hypotheses for Research Questions 4 and 5 (H_{04} and H_{05}) failed to be rejected. In the next chapter, the findings will continue to be explored in connection with the literature

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The target of this study was to determine whether KAB, AHC, and comorbidities were associated with WNV infection prevention practice among ethnic minorities (African Americans and Hispanics) in the state of Texas. Prevention practice such as eliminate standing water near to the home in order to decrease mosquitoes, use of insecticide sprays to reduce mosquitoes, use windows screen to decrease mosquitoes, avoiding outdoor activities during mosquito feeding hour, and wearing long sleeves and long pants during mosquito feeding hour. Currently, this prevention practice is the only treatment available for WNV infection Texas (e.g. African Americans and Hispanics).

A cross-sectional quantitative research method within the theoretical framework of the HBM was used. Based on sample size computations, 434 participants were selected using a convenience sampling method. Research questions will be analyzed using linear logistic regressions. Linear regression was used for modeling using a summary index for the dependent variable. Chapter 4 includes the study results. In Chapter 5, I will summarize the research study. The finding determined the three of the independent variables out of five variables had a significant association with dependent variable. This an indication of an increase knowledge of WNV as more chance of to implement prevention practice. The same was true for attitude and behavior, however, the study clearly indicated AHC and comorbidities were not associated to prevention practice of WNV. In general this study revealed six major discoveries which will be discussed in details.

Purpose and Nature of the Study

WNV is the leading cause of severe cases of WNF, which if left untreated can result in WNVD. WNV has been associated with other diseases, such as meningitis, encephalitis, and acute flaccid paralysis (CDC, 2013). Well-documented scientific evidence has indicated that the virus has the capability of crossing the blood-brain barrier, and may cause WNND which can be fatal (Ceccaldi, Lucas, & Despres, 2004).

For individuals with complex and severe medical issues, WNND has a fatality rate of approximately 10% (Lindsey et al., 2010; Petersen et al., 2013). Because of the severity and complications extending from WNV, elderly individuals and individuals who are immunocompromised and develop WNV are at high risk of WNV infection, meningitis, and death (CDC, 2013). In North America, WNV is a significant public health problem among ethnic minorities, especially the African American community (Murray et al., 2013; Petersen et al., 2013).

From 1999 to 2012, there were 780,000 WNV cases of those 78,000; cases 16,196 cases were WNND cases, caused 1,549 deaths (Barrett 2014, CDC, 2012) in the USA. This aggressive progression and spread of the disease WNV infection throughout United states may international disaster like HIV (Lindsey et al., 2010; Murray et al., 2014; Petersen et al., 2013). Even though WNV spread in most of United States, the numbers of reported cases of ethnic minorities remain low for unknown reasons. However, when it comes to comparing different races regarding risk factor and progression of three various stages of WNV infection as well as dying due to infection African Americans are the first

in line (Murray et al., 2014). According to Nolan et al. (2012), 75% of the African Americans and other minority groups who were examined were affected by WNND.

According to Petersen et al. (2013), from the entire cases of WNV infection only 25% of the cases showed WNV infection (because most of the WNV infections are asymptomatic). Out of this 25% that showed WNV infection, 24% of them were ethnic minorities. These 24% of ethnic minorities that were affected by WNV infection and almost all of them, advanced to the next stage of the disease and died when comparing to among races (Marry et al, 2012, Petersen et al., 2013). For example, 1868 WNV cases were submitted to the TXDSHS in 2012. Out of the 844 cases that were reported, 48% were WNND cases, and there were 89 deaths (Murray et al., 2012).

According to Murray et al. (2012), there were 1873 cases of WNV infection in Texas in 2012. There were 1273 Caucasians, 117 African Americans, and 318 Hispanics. Of these, 738 Caucasians (72.1%), 43 African Americans (4.2%), and 134 Hispanics (13.1%) were affected by WNF (Murray et al., 2012). Out of the 1848 cases of WNV, 535 Caucasians (63.4%), 74 African Americans (8.8%), and 184 Hispanics (21.8%) were affected by WNND. All the 117 cases of WNV, which were reported, were affected by either WNF or WNND (Murray et al., 2012). Even though Murray et al. and Nolan et al. (2012) the high-risk populace, they fail short identifying why African Americans, experience greater complications when it come to WNV infection, because WNV is not inherited in nature when compare to other races in the same environment remains unanswered. From these findings, a gap appears in the literature relating to the prevention

practices of WNV among the ethnic minorities, regarding their knowledge, attitude, behavior, and their prevention practice.

Rationale for the Study

The rationale for undertaking this dissertation study was five-fold. WNV has the potential to create an international disaster, given the unpredictable nature of the virus. The unpredictability of this virus is due to the multiple factors that promote the spread of the virus, such as climate, vector biology, human behavior patterns, and host migration (Mitchell, 2013). According to Petersen et al. (2012), it is impossible to judge when and how (timing and intensity) WNV will cause an international disaster like the HIV. Knowing the unpredictable nature of the WNV occurrences, and in the absence of effective treatment, prevention practice has become the only means of reducing human WNV epidemics (Mitchell, 2009). As there are limited data for examining the KAB, AHC and prevention practice of WNV among ethnic minorities would be very important.

Previous researcher have indicated that the WNV infection has detrimental effects which are linked to gender, age, and race. Examining the races with high morbidity and mortality is essential to address the WNV epidemic. From May 30, 2012 to December 3, 2012, Murray et al. (2013) conducted parallel surveillance research, using data from the public health surveillance of Dallas County instead of nation wide. They identified 1888 WNV positive cases and 844 of them were fetal cases. I concluded that there were a concrete discrepancies between sex, age, and race of patients. The percentage of medium-aged males was 55, and this study signified that the ethnic minorities were affected with high chances of contracting WNV (*OR* 1.9, 95% *CI* 1.6–

2.4, $p < 0.001$). Statistically, this study showed that 68% Caucasians, 6.3% African-Americans, and 17% Hispanics indicated the low-level diagnosis. I examined how KAB, as well as AHC and comorbidities, play a role in prevention practice among ethnic minorities (African-American and Hispanic) regarding WNV infection.

My aim was to identify the major challenges that face the health practitioner today, examining prevention practice in ethnic minorities (African-American and Hispanic) in minority and low-income in Houston, TX. The result of this study may highlight a significant outcome due to death of minorities from WNV infection. Results may indicate that African American are less likely to receive medical care when compared to Caucasians and the wealthy population.

AHC may contribute a major part in underreporting minority cases of WNV (Kollers, 2012). In addition to Kollers's (2012) conclusions, it was also recommended that public health officials increase different methods of accessing and implementing in low socioeconomic and minorities communities. These findings can be used as the bases for this dissertation to examine whether KAB, and AHC and comorbidities play a role in prevention practice among ethnic minorities (African-American and Hispanic) regarding WNV infection. My understanding before the this dissertation, however after the dissertation results clearly indicated AHC and comorbidities do not show statistically significant for WNV infection prevention.

The economic burden of WNV infection in the United States between 1999 through 2012 was \$778 million (Barrett, 2014). Eighteen thousand patients were hospitalized and over 1,654 deaths were reported to the CDC. In Texas, in the year 2012

alone, 1,848 cases were reported, and 48% of the cases reported their economic cost as greater than \$47.6 million (Barrett, 2014; Murray, 2012). According to Doucleff (2014), WNV is the most costly diseases in Texas. Examining the lowest socioeconomic class of the WNV prevention practice of ethnic minorities (African-American and Hispanic) in KAB can contribute to a major reduction in the economic burden of WNV.

The most critical, life-threatening issue without an answer and associated with increased prevalence of WNV is the lack of treatment to treat or vaccines to prevent WNV. Given that it is crucial to reduce the environmental risk of exposure by the widespread adoption of preventive behaviors to prevent WNV infection, both reducing ecological risk of exposure and increasing adoption of preventive practices depend on knowledge of the disease and acceptance of the seriousness of its sequel (Hongoh, 2016). These factors differ among varied ethnic populations.

Understanding the KAB toward WNV may play a significant role in WNV prevention. According to Becker and Maiman (1975), knowledgeable health behavior includes a readiness to take action; an individual's willingness is determined by their perceptions of illness or disease severity and susceptibility. I focused on examining KAB, AHC, and comorbidities regarding prevention practice for WNV infection among ethnic minorities (African-American and Hispanic).

Interpretation of the Findings Summary

Findings of the analyses indicated that there was a strong association between knowledge, attitude and behavior on prevention practice of WNV. AHC and comorbidities were not significantly related to prevention practice. The null hypotheses

for Research Questions 1 through 3 (H_{01} and H_{03}) were rejected in favor of the alternative. The null hypotheses for Research Questions 4 and 5 (H_{04} and H_{05}) were not rejected. The findings confirmed that there is an association between three independent variables and there were no significant on two independent variables compare to dependent variable.

Overall the result of the multiple linear regression analysis indicated it was statistically significant ($F(5, 422) = 23.58, p < .001, R^2 = .218$). The result confirms that there was a major collective correlation between knowledge, attitude, behavior, and prevention practice. The R^2 value indicated 21.8% of the variance in prevention practice which means KAB, AHC, and comorbidities. Knowledge ($t = 6.09, p < .001$) was a significant predictor in the model, suggesting that as knowledge scores increase by one-unit, scores for prevention practice increased by 0.32 units. Attitude ($t = 2.05, p = .041$) was a significant predictor in the model, suggesting that as attitude scores increase by one-unit, scores for prevention practice increased by 0.07 units. Behavior ($t=5.33, p<.001$) was a significant predictor in the model, suggesting that as behavior scores increase by one-unit, scores for prevention practice increased by 0.37 units. The null hypotheses for Research Questions 1 through 3 ($H_{01} - H_{03}$) were rejected in favor of the alternative. The null hypotheses for Research Questions 4 and 5 (H_{04} and H_{05}) were not rejected. See Table 51.

Comparison of Literature and Theoretical Before and After Study

The study result highlights six major discoveries. Results indicated the significance of KAB plays a major role in implementation of WNV prevention practice.

Results showed that AHC and comorbidities are not significant on WNV prevention practice. Results confirmed that the previous result on KAB significance on prevention practice of WNV. This study added the prevention practice of WNV infection among ethnic minorities in the literature. I recommend that prevention practice methods need to be modified in order to be implemented or to get acceptance by the population. Which means the prevention practice that states wear long sleeves and long pants when the outside temperature is 100 degrees centigrade may not be implemented. So the scientific scholars need to design better prevention practices. Lastly, the media and the current awareness of WNV is not reaching out to ethnic minorities so alternative means need to be implemented such as grassroots movements of awareness and curriculum-based education in order to reach ethnic minorities.

Research Question 1

Research Question 1, whether there is an association between knowledge and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston was answered with the presence of a significant association with a P value of $<.001$. Using Mitchell's (2014) survey instruments, knowledge was assessed with seven questions. This included knowledge about WNV, the cause of transmission, and knowledge of prevention of WNV. When participants were asked whether WNV is a virus capable of causing disease in humans or not, 90% of the participants answered yes and 10% answered no or I do not know. I then asked about the acute phase of WNV signs and symptoms; 86% of the participants responded with yes and 14% of them did not know the signs and symptoms. When they were asked about severe symptoms such as stiff neck, sleepiness,

disorientation, coma, tremors, convulsions, and paralysis, 41% of them answered yes and 59% answered no. When I asked the participants about the mode of transmission other than mosquitos, such as the most likely means of becoming infected with WNV is blood and tissue transfusion, 49% said yes and 51% said no. Based on these answers and knowledge questions, health scholars need a better means of disseminating knowledge about WNV for the public.

Research Question 2

In this study, attitude was measured based on the probability of a person willing to accept WNV vaccine, contribute to fund or support for WNV vaccine recovery, mosquito control program, or belief WNV can cause severe disease according to her or his perception. Perception is associated with attitude towards the WNV prevention. In order to examine this research question, there were 10 survey questions designed to answer whether there is association between attitude and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX. This dissertation proved there were a significant association between attitude and prevention practice, The P values of this variable $P < .001$.

I asked the participant how worried they were that they might get sick with WNV; 74% stated that they are worried and 26% were not worried. When I compared this answer with the responses to the question asking if the participants were in favor of tax money being used to support mosquito control programs in their community, 79% replied that they were in favor of spending the tax money for a vaccine. Participants were questioned to see if they would be willing to pay for a WNV vaccine; 60% were willing

and 40% were not willing to pay for a vaccine. When I asked about the prevention practice of using mosquito repellents and whether the use of such repellents was unpleasant, 59% said no. Finally, participants were asked whether mosquito repellents were expensive compared to the function, 32% agreed that they are more expensive than their function, while 68% said the use or repellent was not expensive when compared to the life-saving function.

Research Questions 3

Behavior was defined with assumption of individual perception of vulnerability to contracting a disease with the combination of perception of seriousness produced the desire behavior in this case the prevention practice of WNV (Galloway, 2003). I examined the association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX and determined whether there was an association between behavior and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX. The p value of behavior was <001 . In order to evaluate the association, I asked several questions. Fifty-four percent did not want wear long sleeved shirts and 46% of them were wear long sleeved. Even if 74% worried about WNV infection, 54% did not wear long sleeved. Similarly, when asked if last year the participants used insect repellent on their skin when outdoors, the responses were 41% did not use insect repellent, while 59% use insect repellent. I looked at the behavior of prevention practice and asked the participants “Since the start of this past summer (2018), did someone you asked or hired drain water

from items around the outside of your home?” There response was 79% where did not drain water around the outside of their home.

Research Questions 4 and 5

The result of linear regression and Pearson’s correlation analysis failed to demonstrate a significant relation among AHC, comorbidities, and prevention practice. There is no association between AHC, comorbidities, and prevention practice for WNV infection among minorities (African Americans and Hispanics) in Houston, TX.

Findings of the analyses indicated that there was a major association between knowledge, attitude, and behavior on prevention practice. AHC and comorbidities were not significantly related to prevention practice. AHC may contribute a major part in underreporting minority cases of WNV (Kollers, 2012). In addition to Kollers’s (2012) conclusions, it was also recommended that public health officials increase different methods of accessing and implementing in poor and minorities communities. These findings can be used as the bases for this dissertation to examine whether KAB, and AHC and comorbidities play a role in prevention practice among ethnic minorities (African-American and Hispanic) regarding WNV infection.

Previous researchers have identified the most critical, life-threatening issue without an answer and associated with increased prevalence of WNV is the lack of treatment to treat or vaccines to prevent WNV. Given that it is crucial to reduce the environmental risk of exposure by the widespread adoption of preventive behaviors to prevent WNV infection, both reducing ecological risk of exposure and increasing adoption of preventive practices depend on knowledge of the disease and acceptance of

the seriousness of its sequel (Hongoh, 2016). These factors differ among varied ethnic populations. Likewise this study also added the new discovery of not only the environmental risk of exposure by the widespread adoption of preventive behaviors, but also the type of prevention practice played a major role in reduction of WNV infection.

This study confirmed many previous WNV infection study that is understanding the KAB toward WNV play a significant role in WNV prevention. According to Becker and Maiman (1975), knowledgeable health behavior includes a readiness to take action; an individual's willingness is determined by their perceptions of illness or disease severity and susceptibility. In addition what this study revealed that prevention practice awareness is required major action in KAB. AHC and comorbidities are not significant, This study result rules out the assumption of AHC and comorbidities being factors that increase WNV infection.

Limitations

There four major limitations to this study includes: first, I relied on participants to respond truthfully and accurately to the survey questions. Participants may have lacked knowledge and experiences about prevention practices. Second, because mosquito breeding time is seasonal, a recall bias may exist in that KAB with participants. Third there is no a system to check whether the participants implemented prevention practices or not. Lastly, determining validity and reliability of this study is based on the dichotomous data their value of Cronbach's alpha, and this was not the ideal calculation. It was not ruled out and it is still an indicator.

In this study, all the variables were computed through a sum of dichotomous survey items: knowledge (seven items), attitude (12 items), behavior (five items), AHC (four items), and co-morbidities (12 items), and prevention practice (seven items). After the summation of the dichotomous items, every variable as a continuous measurement.

My survey was not like a Likert-scale: *strongly disagree*, *disagree*, *neutral*, *agree*, and *strongly agree*. Because of the nature of the survey as a frequencies of experiences, there was not a good reliability/validity test. I used summative index for determining reliability. In this case there were seven knowledge questions so the range of knowledge scores were 0.00 to 7.00, with $M=4.81$ and $SD=1.69$. There were 12 attitude questions so the range of attitude scores were 0.00 to 12.00, with $M=7.07$ and $SD=2.49$. There were 5 questions for behavior therefore the range of behavior scores were 0.00 to 5.00, with $M=2.46$ and $SD=1.22$. There were 4 access of care questions so the ranged scores of AHC was 0.00 to 4.00, with $M=1.75$ and $SD=0.93$. There were six questions of comorbidities so the ranged scores of comorbidities were from 0.00 to 6.00, with $M=1.84$ and $SD=1.05$. Finally, there were seven question of prevention practice so the ranged scores of prevention practice were 0.00 to 7.00, with $M=4.38$ and $SD=1.86$.

The summary statistics can be found in Table 17.

Recommendations

Study results led to multiple recommendations for action. First this study needs to be done on a large scale, comparing all races and all languages. Secondly, the scientific scholar design resulted in awareness about WNV, not just regular advertisement but also grassroots movements of WNV awareness campaigns in order to educate more about WNV.

Third, results revealed that the current prevention practice that was recommended by the CDC is not achievable. The prevention practice such as wearing long-sleeved shirts and long pants does not work in the state Texas where the temperature is 100 degrees.

Even if the above-mentioned reasons are the strength of this study, the assumptions of this study were the limitation factors. For instance, the assumptions for this study relied heavily upon the perceptions of the participants and their practice habit of prevention. First the participants were assumed to answer the survey instruments in an honest and accurate manner, because they were assured of complete anonymity and made aware of the benefits that their participation brings affects public health and epidemiology. The second assumption was that the research performed by Murray et al. (2013) and Nolan et al. (2012) was conducted in a thorough manner and that the researcher offered guidance with regard to the significance of this study, because minority populations are underserved populations within the health care system, due to socioeconomic or geographical location (Abayasekara, 2015). The third assumption was based on participants' prevention practice that enough knowledge is gain to taken/WNF/WNND prevention practice. The fourth assumption was that the participants' would describe a representative sample that could be extrapolated for the entire minority population within the United States. Many of the perceptions and barriers to preventative health behaviors are representative of cultural differences.

Positive Social Change

The results from this study provided much needed insight for scientific scholars to aid in decreasing the gap in literature that currently exists concerning ethnic minority

awareness of infectious disease. In conjunction with distribution of WNV awareness education materials, promotion of quality clinical care may influence health literacy on treatments and establish a surveillance system to monitor WNV disease progression. As several research studies have indicated, preventive practice is the first means of preventing human illness from WNV infection and disease progression (Campbell et al., 2002).

Demonstrating the efficacy of WNV prevention practice in the health promotion is the greatest challenge in today's society. Several researcher demonstrated that the greatest a complement in the health care promotion is leading the public to change to positive direction so that the public will progress to positive health behavior change. Immunization polio vaccine, pap smears, and seat belts are some of the accomplishment that changes the public behavior. Researcher concluded that susceptibility was strongly associated with understanding the preventive health behavior. Examining the behavior of the ethnic minor regarding of WNV prevention practice is an essential reduction of WNV infection. The results of this study confirm the existence of association between KAB and prevention practice of WNV. This means that scientific scholars have to raise the WNV awareness at the grassroots level and need to design a better means of education methods that will reach out public. The educational institutes have to incorporate a course that will raise awareness of WNV, especially their physical exercise course. Doctors need to dedicate time to patient education in their daily practice, especially when they visit new patients. Because avoiding outdoor activity and wearing long sleeves and pants are not

the ideal prevention practice in hot environment, health institutions need to design workable prevention practices that will be accepted by the public

Conclusion

In the 21st century, scientific scholars or holistic medicine practitioners can not properly forecast the risk of WNV outbreak, prevention methods, and control WNV transmission. Currently, very little is known how, when, and from where will be the next WNV victims. These and several literature gaps, such as the introduction and spread of WNV, what are the key factors that lead to virus amplification, and the impact of the presence of another flavivirus on WNV epidemiology is still unclear. The rationale for undertaking this dissertation study was five-fold. WNV has the potential to create an international disaster, given the unpredictable nature of the virus. The unpredictability of this virus is due to the multiple factors that promote the spread of the virus, such as climate, vector biology, human behavior patterns, and host migration. It is impossible to judge when and how (timing and intensity) WNV will cause an international disaster like the human immunodeficiency disease (HIV). Knowing the unpredictable nature of the WNV occurrences, and in the absence of effective treatment, prevention practice has become the only means of reducing human WNV epidemics (Mitchell, 2009). As there are limited data for examining the KAB, AHC and prevention practice of WNV among ethnic minorities very important.

Given consideration to all literature gaps, and because prevention practice is the current treatment for WNV infection, Researcher focused on KAB, AHC, and comorbidities with respect to prevention practice. Because deep knowledge of WNV is

essential for prevention of WNV, having a positive attitude towards WNV prevention practice plays a major role in preventing it. Adapting prevention practice behavior is crucial to reducing the WNV infection. Future researchers should consider these factors.

Results of this study revealed that both reducing ecological risk of exposure and increasing adoption of preventive practices depend on KAB. KAB was a significant factor compared to health care access and comorbidities. Based on the degree of KAB of the disease and acceptance of the seriousness of its results, the public may implement prevention practice behaviour. The health belief model that was used in this study indicated the significance of the results that KAB may play a significant role in WNV prevention. Knowledgeable health behavior includes a readiness to take action; an individual's willingness is determined by their perceptions of illness or disease severity and susceptibility. This study also revealed the ineffectiveness of winning the public of the preventive practices, such as avoiding outdoor activity and wearing long sleeves and pants in a hot weather environment. Finally, I recommend that the health institutions, scientific scholars, and state and federal health organizations need to come out with better prevention methods that work better and are accepted by the public, before an international disaster occurs, like the HIV/AIDS virus.

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Appendix A: T Questionnaire

West Nile Virus Survey Questionnaires**A Demographic questionnaire**

1. What is your age?
 - Under 18 years
 - 18 to 24 Years
 - 25 to 34 years
 - 35 to 44years
 - 45 to 54 years
 - 55 to 64 years
 - 65 or older

2. What is your gender?
 - Male
 - Female

3. Are you African American, Hispanic or Both?
 - Yes
 - No

4. What is your primary language?
 - English
 - Spanish
 - Arabic
 - Other

5. What is the highest level of education you have completed?
 - Grammar school
 - High school or equivalent
 - Vocational/technical school (2 years)
 - Some college
 - Bachelor's degree
 - Master's degree
 - Doctoral degree
 - Professional degree (MD, JD, etc.)

6. What is your current household income in U.S. dollars?

- Under \$10,000
- \$10,000 - \$19,999
- \$20,000 - \$29,999
- \$30,000 - \$39,999
- \$40,000 - \$49,999
- \$50,000 - \$74,999
- \$75,000 - \$99,999
- \$100,000 - \$150,000
- Over \$150,000

B. Knowledge assessment

1. West Nile is a virus capable of causing disease in humans.

- Strongly Agree
- Agree
- I do not know
- Disagree
- Strongly Disagree

2. West Nile Virus symptoms and signs include fever, headache, body aches, skin rash, and swollen lymph glands.

- Strongly Agree
- Agree
- I do not know
- Disagree
- Strongly Disagree

3. A key feature of neuroinvasive West Nile virus disease is an inflammation of the brain

- Strongly Agree
- Agree
- I do not know
- Disagree
- Strongly Disagree

4. Severe symptoms may include stiff neck, sleepiness, disorientation, coma, tremors, convulsions, and paralysis.

- Strongly Agree
- Agree
- I do not know
- Disagree
- Strongly Disagree

05. The most likely means of becoming infected with WNV is a mosquito bite.

- Strongly Agree
- Agree
- I do not know
- Disagree
- Strongly Disagree

6. The most likely means of becoming infected with WNV is blood and tissue transfusion?

- Extremely familiar
- Very familiar
- Moderately familiar
- Slightly familiar
- Not at all familiar

7. Do you agree that the following actions will prevent West Nile virus infection?
Eliminate standing water around the house to reduce mosquitoes

- Yes
- No

C: Attitude

1. How worried are you that you might get sick with West Nile virus?

- Extremely worried
- Very worried
- Somewhat worried
- Little worried
- Not at all worried

2. If very worried or somewhat worried: can you tell me why you are worried about getting sick with WNV?
- I heard about on the TV News
 - I know someone who had it
 - I am not worried at all
3. Do you think West Nile virus can cause serious illness?
- Yes
 - No
4. Are you in favor of tax money being used to support mosquito control programs in your community?
- Yes
 - No
6. Are you willing to support mosquito control efforts or would you be in favor of a mosquito control program?
- Yes
 - No
7. Are you be willing to pay for a WNV vaccine?
- Yes
 - No
8. What do you think about using a mosquito repellent to prevent WNV infection?
- a. Using mosquito repellents are bad for environment.
 - Yes
 - No
 - b. Using mosquito repellents are expensive compared to its function.
 - Yes
 - No
 - c. Using mosquito repellents are unpleasant when applied.
 - Yes
 - No
 - d. Using mosquito repellent irritates my skin.
 - Yes

No

e. Mosquito repellent protects me and my family.

Yes

No

9. Do you think West Nile virus can cause serious illness?

Yes

No

D. Behavior

1 Would you be interested in a community program to help the elderly repair their damaged window screens and dump standing water in their yard?

Yes

No

2 When you go outdoors in the summer, do you wear long-sleeved shirts and/or long pants?

Yes

No

3 Last year did you use insect repellent on your skin when you went outdoors?

Always

Sometimes

Rarely

Never

4 Since the start of this past summer (2018), did someone you asked or hired drain water from items around the outside of your home?

Yes

No

5 How likely is it that you would contract with West Nile Virus?

Most likely

Very likely

- Likely
- Not likely
- Not likely at all

E. Access to health care

5. Do you currently have medical care coverage (insurance)?
- Yes
 - No
6. Do you have a personal doctor who regularly cares for you?
- Yes
 - No
7. Are you currently enrolled in a “managed or Obama care” type of healthcare plan?
- Yes
 - No
8. During the past year, have you had difficulty getting medical treatment?
- Yes
 - No

E. Comorbidities

4. In general, would you say your health is
- Excellent
 - Very good
 - Good
 - Fair
 - Poor
5. Please indicate below which chronic condition you have:
- i. Diabetes
 - Yes
 - No
 - j. Asthma
 - Yes

- No
 - k. Respiratory or COPD
 - Yes
 - No
 - l. Lung Disease
 - Yes
 - No
 - m. Heart disease
 - Yes
 - No
 - n. Arthritis and other rheumatic disease
 - Yes
 - No
 - o. Cancer
 - Yes
 - No
 - p. Obesity
 - Yes
 - No
6. Having chronic diseases (comorbidities), are the barriers for minorities for practicing West Nile Infection prevention.
- Strongly Agree
 - Agree
 - Disagree
 - Strongly Disagree

E. Preventions Practice

1. Use insecticide sprays to reduce mosquitoes
 - Yes
 - No
2. Avoiding outdoor activities,
 - Yes
 - No

3. Wearing Long sleeves and long pants,
- Yes
 - No
4. Use screen windows to reduce mosquitoes
- Yes
 - No
5. Are you confident that you can protect yourself and your household members from getting WNV?
- Yes
 - No
6. What precautions, if any, have you taken to protect yourself and/or your family against West Nile Virus?
- Drainage of standing water
 - Closing all window
 - Used insect repellent
 - Avoid mosquito-infested area
 - Not at all
7. Which of the following WNV prevention methods do you practice?
- Repair failed septic systems
 - Keep grass cut short and shrubbery trimmed
 - Dispose of old material other unused containers that can hold water out door
 - Keep drains, ditches, and, water will drain properly
 - I am practicing none of these methods

Thank you for your time and participation

Appendix B: Sample Letter Requesting Cooperation

Invitation to participate in research

Administrative Committee

West Nile Virus Prevention Practice Study

My Name is Bayabel Mengistu and I am a student at Walden University. I am writing this letter to request cooperation regarding recruiting participants in West Nile Survey

Thank you for your time and consideration to participate in this survey. Your input is significant to the understanding of the West Nile Virus (WNV) and plays a major role in future research towards the prevention of the virus among ethnic minorities.

What is the purpose of this study?

This study will examine the level of prevention practice of West Nile virus by ethnicity and investigate whether there is an association between knowledge, attitude, behavior, access to health care, chronic disease, and prevention practice of WNV among ethnic minorities. Furthermore, the purpose of this study is to explore the effect of prevention and awareness campaigns for WNV within minority populations, specifically the African American and Hispanic populace. The emergence of infectious diseases is a critical public health, humanitarian and national security concern. Coordinated efforts, such as the CDC and Department of Health and Human Services protect people across the nation and around the world. This knowledge survey evaluates the level of knowledge, attitude, and

behavior, access to health care, comorbidities and prevention practice of the public WNV with Four fold effects. First, it will evaluate how much of the public is aware of WNV infection and practice prevention methods. Second, the study can serve as a assessment and informative tools ethnic minorities between knowledge, attitude, behavior, access to health care, chronic disease, and preventive to improve their practice towards ethnic minorities. Third, 2012 the WNV research study (Murray , 2012) reveal that ethnic minorities are less likely to diagnosis with WNV infection but, more likely to die due to WNV infection , thus the question why ethnic minorities are less likely to be diagnosed but more like to due to WNV infection of a disease that is not inherited while living the same area where other race live is remain answer and this study will examine this question, and lastly, this study provides crucial information to the government to explore new methods of a regulatory and preventative policies.

Appendix C: Sample Letter of Cooperation

Letter of Cooperation from a Research Partner

Date _____

Dear Mengistu,

Based on my review of your research proposal, I give permission for you to conduct the study entitled Prevention Practices and West Nile Virus infection Among Ethnic Minorities, Texas.

_____ as part of this study, I authorize you to survey participants recruitment, data collection, and results dissemination activities. Individuals' participation will be voluntary and at their own discretion. Our site will be assisting the researcher with announcing that there is a WNV survey being conducted, and encourage members to participate as volunteer. Provide a time and space after our services completed.

We understand that our organization's responsibilities include: volunteer participant. We reserve the right to withdraw from the study at any time if our circumstances change.

The researcher will be responsible for complying with our site's research policies and a requirement, including participation on this study is completely voluntarily. I understand that the student will not be naming our organization in the doctoral project report that is published in ProQuest.

I confirm that I am authorized to approve research in this setting and that this plan complies with the organization's policies.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the researchers's supervising faculty/staff without permission from the Walden University IRB.

Sincerely,

Regards,

Signature

Date Signed

Full Name

Job Title

Appendix D:Walden University IRB Approval Letter

Mon 17/12/2018 3:28 PM

- Bayabel Mengistu;
- IRB;
- Hadi Danawi

□

Mengistu Consent Form.pdf

142 KB

Dear Mr. Mengistu,

This email is to notify you that the Institutional Review Board (IRB) has approved your application for the study entitled, "**Prevention Practices and West Nile Virus Infection Among Ethnic Minorities, Texas.**"

Your approval # is 12-17-18-0138986. You will need to reference this number in your dissertation and in any future funding or publication submissions. Also attached to this e-mail is the IRB approved consent form. Please note, if this is already in an on-line format, you will need to update that consent document to include the IRB approval number and expiration date.

Please note that this approval is specific to Pleasant Hill Church of Deliverance, Christian Home Missionary Baptist Church, Holy Trinity and Saint Mary Ethiopian Orthodox Tewahedo Church, and Deeper Life Bible Church. Documentation of approval from other partner organizations will need to be submitted to and confirmed by the Walden IRB before you can conduct your study with them.

Your IRB approval expires on December 16th, 2019. One month before this expiration date, you will be sent a Continuing Review Form, which must be submitted if you wish to collect data beyond the approval expiration date.

Your IRB approval is contingent upon your adherence to the exact procedures described in the final version of the IRB application document that has been submitted as of this date. This includes maintaining your current status with the university.

Your IRB approval is only valid while you are an actively enrolled student at Walden University. If you need to take a leave of absence or are otherwise unable to remain actively enrolled, your IRB approval is suspended. Absolutely NO participant recruitment or data collection may occur while a student is not actively enrolled.

If you need to make any changes to your research staff or procedures, you must obtain IRB approval by submitting the IRB Request for Change in Procedures Form. You

will receive confirmation with a status update of the request within 1 week of submitting the change request form and are not permitted to implement changes prior to receiving approval. Please note that Walden University does not accept responsibility or liability for research activities conducted without the IRB's approval, and the University will not accept or grant credit for student work that fails to comply with the policies and procedures related to ethical standards in research.

When you submitted your IRB application, you made a commitment to communicate both discrete adverse events and general problems to the IRB within 1 week of their occurrence/realization. Failure to do so may result in invalidation of data, loss of academic credit, and/or loss of legal protections otherwise available to the researcher.

Both the Adverse Event Reporting form and Request for Change in Procedures form can be obtained at the Documents & FAQs section of the Walden web site: <http://academicguides.waldenu.edu/researchcenter/orec>

Researchers are expected to keep detailed records of their research activities (i.e., participant log sheets, completed consent forms, etc.) for the same period of time they retain the original data. If, in the future, you require copies of the originally submitted IRB materials, you may request them from Institutional Review Board.

Both students and faculty are invited to provide feedback on this IRB experience at the link below:

http://www.surveymonkey.com/s.aspx?sm=qHBJzkJMUx43pZegKlmdiQ_3d_3d

Congratulations!
Bryn Saunders
Research Ethics Support Specialist
Office of Research Ethics and Compliance
Email: irb@mail.waldenu.edu
Phone: (612-)312-1336
Fax: (626-)605-0472

Walden University
100 Washington Ave. S, Suite 900
Minneapolis, MN 55401

Information about the Walden University Institutional Review Board, including instructions for application, may be found at this link: <http://academicguides.waldenu.edu/researchcenter/orec>

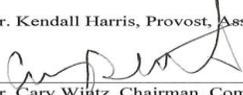
Appendix E: Texas Southern University IRB Approval Letter



TEXAS SOUTHERN UNIVERSITY
3100 CLEBURNE STREET • HOUSTON, TEXAS 77004
713-313-7011

OFFICE OF RESEARCH
OFFICE: 713-313-4245; FAX: 713-313-7598

MEMORANDUM

TO: Dr. Kendall Harris, Provost, Associate Vice President for Academic Affairs
FROM: 
Dr. Cary Wiltz, Chairman, Committee for the Protection of Human Subjects
DATE: February 20, 2019
SUBJECT: External Protocol Approval Recommended and Requested
Bayabel Mengistu, Walden University

The protocol entitled, "*Prevention Practices and West Nile Virus Infection Among Ethnic Minorities, Texas*", by principal investigator Mengistu (Walden University), was brought before the Committee for the Protection of Human Subjects. After reviewing the protocol and supporting documents, approval is recommended by the Committee. The Committee is therefore requesting your approval of this protocol. Supporting documentation is attached to this memorandum. If you have any questions, please contact Ms. Rhonni E. Dixon at 713-313-4301. Thank you.

After review, the protocol is:

Approved Denied

Comments: _____


Signature

2/28/19
Date

Appendix F: Consent

CONSENT FORM FOR RESEARCH PARTICIPATION**West Nile Virus Prevention Practice Study**

You are invited to take part in a research study about West Nile Virus infection. The researcher is inviting ethnic minorities especially African American and Hispanic (ethnic minorities) to be the part of the study. This study is being conducted by a researcher named Bayabel Mengistu a doctoral student at Walden University, in the School of public health, Department of Health Science. I am planning to conduct a research study, which I invite you to take part in. I am doing this study and Dr. Danwi is the supervisor of this study from Walden University. This form is a part of a process called consent form and to allow you to understand this study before deciding whether to take part. This consent form has important information about the reason for doing this study and what I will ask you to do if you decide to be in this study.

1. The survey may take 10 minutes
2. Please take as much time as you want to review the information.
3. You can only take the survey one time
4. You will be provided the consent form and
5. You may keep the consent form.
6. Upon completion of the survey please drop your response in the lockbox located in the center of the room.
7. If you prefer to take the survey online please print or save this consent form for your records.

What is the purpose of this study?

The purpose of this study is to examine the level of prevention practice of West Nile virus (WNV) by ethnic minorities (African American and Hispanic) and investigate whether there is an association between knowledge, attitude, behavior,

access to health care, chronic disease, and prevention practice of WNV among ethnic minorities(African American and Hispanic).

The emergence of infectious diseases is a critical public health, humanitarian and national security concern. Coordinated efforts, such as the CDC and Department of Health and Human Services protect people across the nation and around the world. This knowledge survey evaluates the level of knowledge, attitude, and behavior, access to health care, comorbidities, and prevention practice of the public WNV with three major benefits. First, it will evaluate how much of the public is aware of WNV infection and practice prevention methods. Second, the study can serve as an assessment and informative for ethnic minorities their association between knowledge, attitude, behavior, access to health care, chronic disease, and preventive to improve their practice towards ethnic minorities and lastly, it provides crucial information to the government to explore new methods of regulatory and preventative policies.

Are my responses confidential?

Your responses will be entirely confidential. This study does not ask your identification so please do not write your name or any identifying information. No one sees your answers except the researcher of this study. Reports coming out of this study will not share the identities of individual participants even the location of the study, your completed questionnaire will be placed in the lock box. Data will be kept secure by password protection and data encryption. This data will be kept for a period of at least 5 years, as required by the university.

Why I have been asked to take part in this study?

In the 2012 study conducted by Dr. Murray with 1873 cases of WNV infection in Texas. There were 72.1% Caucasian 4.2% African American, 13.1% Hispanic were affected by WN and almost all of the ethnic minorities developed to the second and third stage of the West Nile virus. For unknown reasons, there was a low diagnosis but high disease progress for ethnic minorities that is why this study is asking participants to examine this unworn reason. Since this deadly disease does not have a cure yet and the only cure is prevention practice mostly

individuals who are exposed in outside environment who can actively participate with prevention and follow prevention practice instructions in English that do not mean another language did not practice English languages prefer just for this study. Ultimately this study is to examine why ethnic minorities, experience greater complications when it comes to WNV infection because WNV is not inherited in nature when to compare to other races in the same environment remains unanswered. In order to examine this question participants have to be African American or Hispanic, and Healthy adults over 18 years

Do I have to take part?

This study is a voluntary study for volunteers wishing to contribute to the prevention of the West Nile Virus. It is up to the individual to decide whether to take part or not

Obtaining your consent

If you feel you understand the study well enough to make a decision about it, please indicate your consent by returning a completed survey. To protect your privacy, no consent signature is requested. You prefer to take the survey online please click Yes I consent.

What is the Risks Being in the Study:

Being in this type of study involves minimal risk of the minor discomforts that can be encountered in daily life, such as the time you take to complete the surveys fatigue, stress or becoming upset other than this being in this study would not pose risk to your safety or wellbeing

How long do I have to complete the questionnaire?

Ideally, you can complete the questionnaire on the first day and it takes a maximum of 10 minutes. However, if time does not permit, I would like you to complete the survey at your convenient time. This can be before or after meeting or service. To complete the survey now there is a private space available for you.

Please complete today if you can; otherwise you can complete on line.

Can I complete this survey online?"

1. Yes, this survey can be also completed on line, To obtain access to the online survey question you can simply follow the following steps:
2. Double click this link <https://www.surveymonkey.com/dashboard/>
3. Cut and paste this link <https://www.surveymonkey.com/dashboard/> onto the address bar or.
4. Enter the username: WestNile and Password Virus123.
5. Read the consent form and click yes to continue the survey.

Please read the consent form and checks yes if you're taking the survey. You remember your responses are anonymous and will not be identified with you in any way and that you are at least 18 years old. You may skip any question that you find intrusive or offensive, but it will help me if you respond to as many questions as you feel comfortable with. For any assistance of log in online or if you have any question please call 281-975-8891 or email me bayabel.mengistu@waldenu.edu

Any questions about your rights as a participant you can contact the university's Research Participant Advocate? (1-800-925-3368 ext. 312-1210 from within the USA, 001-612-312-1210 from outside the USA, or email addresses irb@mail.waldenu.edu).

Are there any risks to taking part?

There is minimal risk to participating in the study. If you have any questions or concerns, please contact the researcher before completing the questionnaire.

Who is leading this research?

I am leading the research with my supervisor professor Danawi, statistician and research assistance. This study is reviewed and approved by a research ethics committee.

Will I be paid expenses for taking part?

There will be no reimbursement of expenses for participants.

Is there any additional contact information?

For more information please see the following links:

<https://www.cdc.gov/westnile/index.html>

<https://well.blogs.nytimes.com/2012/08/23/q-and-a-on-west-nile-virus/>
<https://www.health.ny.gov/publications/2746/> or call the West Nile Virus Dead
Bird Hotline at 877-WNV-BIRD (877-968-2473)

Acknowledgment

I have understood the nature and purpose of this research the researcher has been sufficiently explained to me. I do not have any question at this moments I want to participate in this study and to answer the research questionnaires. I understand that I am free to withdraw at any time without incurring any penalty. Yes, I understand I will participants in this study

Appendix G: Permission to Use Instruments

I am seeking permission to use the 2014 survey/questionnaire instrument included in your dissertation titled "Assessing Knowledge, Attitudes, and Behaviors Toward West Nile virus Prevention ... Maryland: an application of the health belief model".

I would like to use the questionnaires and print your instrument under the following conditions:

1. The survey instrument will be used for this research study
2. I will include the copyright statement on all copies of the questionnaires.
3. After the completion of the study, I will send a copy of my research result to your attention.

At your convenience time please complete a release from below. If these are acceptable terms and conditions, please indicate so by replying to me through Bayabel.mengistu@waldenu.edu or Bdmengis@mdanderson.org.

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:

By: Kimberly C. Mitchell Kimberly C. Mitchell 10/19/17
Printed name Signature

Title: Chief, Rabies and Vector-borne Diseases, Maryland Department of Health
PhD Graduate, University of Maryland School of Public Health, 2014

Date: October 19, 2017