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The Effects of Severe Weather Warnings on Limited English Proficient (LEP) Hispanics/Latinos in Rural Nebraska

Joan E. Nelson
University of Nebraska Medical Center

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**THE EFFECTS OF SEVERE WEATHER WARNINGS ON LIMITED ENGLISH
PROFICIENT (LEP) HISPANICS/LATINOS IN RURAL NEBRASKA**

by

Joan E. Nelson

A THESIS

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Graduate Program

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University of Nebraska Medical Center
Omaha, Nebraska

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Advisory Committee:

Sharon Medcalf, PhD Phillip W. Smith, MD

John C. Adams, PhD Nizar Wehbi, PhD

**THE EFFECTS OF SEVERE WEATHER WARNINGS ON LIMITED ENGLISH
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Joan E. Nelson, MS

University of Nebraska, 2015

Advisor: Sharon Medcalf, PhD

The language barrier may severely restrict how severe weather warnings are received and responded to by Hispanics/Latinos in rural Nebraska, a state well known for frequent, volatile weather patterns. Nearly 50% of Spanish speaking Nebraskans rated their English abilities as “less than very well” (US Census Bureau, 2013). The estimated number of Hispanics/Latinos with limited English proficiency (LEP) in Nebraska equates to approximately 57,000 people. This thesis attempted to assess English ability and how severe weather warnings were received and responded to by LEP Hispanics/Latinos in rural Nebraska. This was accomplished by analysis of data from completed optional Spanish or English surveys. This study was exploratory in nature and conducted among a convenience sample of Hispanics/Latinos from five rural health departments across Nebraska. The effects of limited English proficiency revealed multiple modes of media were utilized to confirm severe weather warnings.

The results of this study support the notion of needed language and culturally specific severe weather warnings for non-English speaking, or limited English proficient residents. The use of multiple modes of media to confirm severe weather in this study, may in fact delay response times for mitigating actions, which could result in potentially disastrous situations. This study demonstrates a need for more robust research on how non-English speaking residents in Nebraska receive risk communications, not only for severe weather, but all emergent notifications.

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CHAPTER 1 - INTRODUCTION

Introduction

Each year, tornadic activity in the United States elicits numerous and vast responses from people. These responses may include apathy, denial, fear and euphoria, all of which may result in questionable, and or extreme behaviors. Severe weather extremes are common in Nebraska throughout the year. Severe weather hazards threaten 100% of Nebraska's population.

According to the U.S. Census Bureau in the 2009-2013 5-year American Community Survey (ACS), an estimated 47.9% of approximately 119,000 Hispanics/Latinos in Nebraska reportedly spoke English "less than very well". This translates to approximately 57,000 Hispanics/Latinos who may not understand the severe weather warnings, broadcast only in the English language via local radio and television media in Nebraska. The majority of the state of Nebraska lies within what is referred to as "Tornado Alley", a nickname given to regions of the United States that consistently experience frequent yearly tornados. "Tornado Alley" as portrayed by Concannon et al (2000), in conjunction with The National Severe Storms Laboratory in Norman Oklahoma, includes parts of Texas, Oklahoma, Kansas, Nebraska, South Dakota and western Iowa. Seasonal consistency for this area includes an increased frequency of strong and violent tornados year after year, with almost 25% of all significant tornados occurring in the "Tornado Alley" region (Concannon et al, 2000).

Severe weather disasters have exhibited a heavy toll on Nebraska in the recent past, which resulted in millions of dollars in damages and loss of life. There has also been significant financial impact from these storms with the loss of homes, businesses, schools, crops and livestock. April, May and June 2014, saw volatile weather patterns, which resulted in many tornado watches, warnings, impact zones, wide destructive paths, two deaths and numerous injuries. These storms also resulted in three major disaster declarations in Nebraska between June 17th and July 28th by the Federal Government. Total public assistance grants during this time were listed at over \$18 million dollars for recovery efforts (FEMA, 2014).

The National Oceanic & Atmospheric Administration's Storm Prediction Center (NOAA-SPC, 2014) preliminary Annual Severe Weather Report Summary indicated, that May and June 2014 were very active severe weather months in Nebraska. As of August 18th 2014, NOAA-SPC (2014) indicated there had been 945 reports of severe weather for Nebraska. Of the reported storms, 854 occurred during the months of May, June and July. The NOAA SPC (2014) report also indicated there had been 87 tornadoes, 540 reports of hail, and 318 wind reports. In the month of June alone, NOAA SPC (2014) reported 586 severe weather events. These events produced tornadic activity during many of the storms and included monster twin tornados, which devastated Pilger Nebraska. The NOAA SPC (2014) report also indicated these storms produced hail in 51% of the events, and wind damage in 38%.

Multicultural communities present unique challenges and vulnerabilities during severe weather events. Passel, Cohn, & Lopez (2011) of the Pew Hispanic Center indicated, that the 2010 U.S. Census identified 50.5 million Hispanics, which represented 16.3% of the total population in the United States, or 56% of the nation's growth between 2000 and 2010.

Nebraska is no exception to having multicultural communities, and has experienced a large, rapid influx of Hispanic/Latino population in the recent past. The Mexican American Commission Report (M. Needham, 2007) identified a Latino population surge in Nebraska for the previous 15 years. This was due in large part to industry recruitment of immigrants. The report also indicated that the manufacturing industry in Nebraska had a 17% Latino workforce. Employment opportunities noted for this population group in the same report (Needham, 2007) included construction, meat packing plants and seasonal agricultural work (farms, vineyards, and orchards), as well as service-oriented work.

Ramos et al (2013) reported in Health Profile of Nebraska's Latino Population, the Latinos are the fastest growing population, both in the United States and Nebraska. The report by Ramos et al (2013) also included Latino percentages by county, which was obtained through the

2010 U.S. Census Bureau data. The data indicated that six of ninety-three counties in Nebraska had Hispanic/Latino populations at 20% or greater and eight counties with 10-19.9%.

The infusion of ethnic and cultural differences has brought much diversity and new culture to Nebraska. Along with diversity, challenges have presented in the form of cultural barriers and disparities, some of which are related to the language barrier. A report prepared for the Nebraska Health and Human Services by M. Kenny (2008) from the Center for Transcultural Learning at the College of Saint Mary, indicated Nebraska's foreign-born population is growing faster than 43 of 49 other states. The report also included data from Nebraska's Department of Education, which indicated that 76 different languages were spoken in the Omaha public schools and 48 different languages were identified in the Lincoln public schools.

The (2010) Census Summary File 1, from the U.S. Census Bureau for Nebraska was accessed, in order to determine counties with higher percentages of Hispanics, Latinos, or any other Spanish origin groups. Nine public health departments were identified, based on counties with higher percentages of this population group. An introductory e-mail was sent to the Emergency Response Coordinator (ERC), director or manager of each of the nine health departments identified. Explanation for purpose of this study was given to the health departments. Focus was placed on assessment of English proficiency for the Hispanics/Latinos and evaluation on how severe weather warnings were obtained and responded to by those with Limited English Proficiency (LEP). Inquiries were made to these health departments to determine interest in study participation with this population group. Of the nine public health departments, five responded with great interest in the study. The health departments who expressed interest in participation included: Dakota County Health Department, Northeast Nebraska Public Health Department, Public Health Solutions District Health Department, Two Rivers Health Department and Scottsbluff County Health Department. Feedback received from these five health departments indicated, the data from this study would potentially identify gaps in the severe weather warning systems for their counties. Primary interest from the five health departments focused on how their

individual communities could improve severe weather warnings and disaster preparedness for the LEP Hispanic/Latino population group. Concerns voiced from these health departments were that Nebraska's Hispanic/Latino population numbers were not accurate, due to large numbers of undocumented and/or illegal immigrants who resided in their communities, and that Nebraska's statistics were not reflective of this.

An Omaha World Herald report by Joe Dejka (January 18, 2015) indicated, "Nebraska schools are challenged to meet the needs of growing minorities, and by the year 2040, achievement gap, language barrier and poverty, will be key issues with the new majority". The Nebraska map included in Dejka's (Jan., 2015) article indicates current minority student enrollment by county.

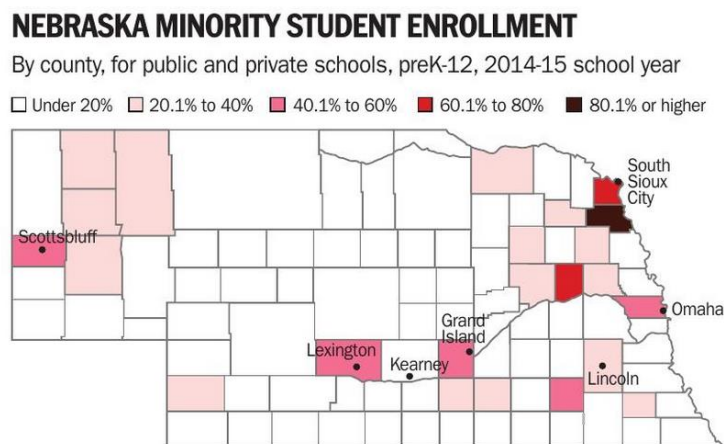


Figure 1: Minority Student Enrollment - THE WORLD-HERALD

Counties on the map display increased percentages of minority student enrollments. These counties aligned with the five public health departments who committed to participate in this study.

Race	% Increase	% of Total Enrollment
White	0.57	68.2
Hispanic	4.00	17.7
Asian	6.76	2.4
Black	2.28	6.7

Figure 2: Changing Demographics in Nebraska Schools (2014-2015 School Year)

The changing demographics included in Dejka’s report (Omaha World Herald Jan. 18, 2015) indicated racial demographics with changes in student enrollment.

<u>DISTRICT</u>	<u>%WHITE</u>	<u>COUNTY</u>
Schuyler	15.40	Colfax
South Sioux City	23.00	Dakota
Lexington	16.20	Dawson
Omaha	30.00	Douglas
Grand Island	44.40	Hall
Santee	0.55	Knox
Niobrara	32.80	Knox
Madison	25.50	Madison
Crete	39.30	Saline
Scottsbluff	48.70	Scotts Bluff
Walthill	0.72	Thurston
Umo N Ho N (Omaha) Nation	0.20	Thurston
Winnebago	1.20	Thurston

Figure 3: School Districts where minorities are the majority

The highlighted Majority-Minority school districts in Dejka’s report (Jan.18, 2015) are within counties seeking health care from the five health departments who participated in this study. These districts include fewer White students than Hispanic, Black, Asian, Native American, native Alaskan, native Hawaiian, Pacific Islander or mixed race students.

Research conducted by F. Subervi (2010), was based on the assumption that “safety of communities was contingent on well informed citizens, regardless of what language they spoke or understood.” It would be in the best interest of communities, if language appropriate severe weather warnings were provided to LEP minority populations, in order to facilitate increased safety to those vulnerable population groups during severe weather events.

Ahlborn et al (2012) demonstrated disparities in tornado warning reception, between Native Spanish Speaking (NSS) and Native English Speaking (NES) persons in Oklahoma. Ahlborn et al (2012) research also demonstrated, a need for emergency managers to recognize when appropriate and overcome communication disparities among limited English proficient populations.

This study focused on English proficiency and the effects of severe weather warnings for Limited English Proficient (LEP) Hispanics/Latinos in rural Nebraska, where tornados are common during spring and summer months.

Statement of The Problem

Little was known regarding how LEP Hispanics/Latinos received and responded to severe weather warnings provided in English, as research was lacking in this area. Understanding that there is a language barrier for approximately 57,000 Hispanics/Latinos in Nebraska, the lack of language specific risk communication for severe weather warnings presents a potential for disastrous situations in many communities.

Severe weather warnings in Nebraska are provided through local “English” radio and television media. The National Weather Service breaks into local television programs with loud audible alerts. Severe weather warnings are then announced for identified counties in English. The National Weather Service also provides printed English and Spanish warning messages on television screens, but only for a few seconds. There are no verbal warnings provided in Spanish. The National Weather Service also breaks into local Spanish radio programming to provide warning information, however, the warnings are provided in English. Again, no verbal warnings are provided in Spanish, even though all broadcasting is in Spanish. Additionally, local weather alerts and warning information are provided continuously via scrolled messages across the bottom of television screens, however, these messages are provided in English only. Non-English

language alerts and warnings are not provided via scrolled messages on the bottom of television screens.

Nebraskans could find themselves unprepared for severe weather events, as sudden, drastic changes in weather do occur, especially during spring and summer months. Language barriers potentially prevent knowledge of approaching storms and forecasted paths, as well as severity of storms in a timely manner. Past experiences with severe weather warnings and events may play a key role in a person's timely response to warnings. Some LEP Hispanics/Latinos, who experienced severe weather events for the first time, were unsure of what the sirens meant. Complacency, or what appeared to be complacency from study participants, might have been a result of previous false alarms, not understanding the warnings, or incorrect warning information. Many respondents delayed seeking shelter following sirens, while they sought confirmation of the warnings from someone else. This may have resulted in misinformation or misinterpretation of the warnings. These scenarios could have resulted in disastrous outcomes for some Nebraska residents. Appropriate responses to severe weather warnings are dependent upon receiving and interpreting the warnings correctly.

Communication with multi-cultural population groups, are now daily challenges for emergency coordinators and responders, especially in metropolitan areas. Severe weather warnings are crucial, in order to mitigate numbers of severely injured or killed within tornado impact areas. Failure to communicate language specific severe weather warnings not only endangers LEP groups, but also places first responders in harms way when tasked with rescuing people (Blazer and Murphy, 2008). Language specific, severe weather warnings are needed in order to facilitate life-saving decisions in a timely manner, by those in direct paths of storms. Kapur and Smith (2011) stress the importance of attempts at balancing the number of warnings with actual threats of severe weather, as this could limit the number of false alarms.

My interest and the purpose of this study arose after a salvo of volatile weather patterns continued throughout the months of May, June and July 2014 in Nebraska. With frequent weather

alerts and warnings, it was noted that none of the local English media provided alerts or warnings in any language other than English. Understanding that disaster preparedness and response is largely dependent on correct interpretation of the warning systems, I was most concerned with the Hispanic/Latino population of approximately 57,000 who reported English proficiency as “less than very well” (U.S. Census Bureau 2009-2013 5-year ACS). Those are large numbers of vulnerable persons in a state that frequently is at high risk for severe weather events.

Significance of The Study

Gambino et al (2014) in the American Community Survey Reports, found that English-speaking ability of the foreign-born population in the United States influenced greater earning potential and occupational mobility, and that persons with Limited English Proficiency (LEP) required costly state and local government assistance. This was evident in the form of English as second language courses, translation services, as well as multiple forms in multiple languages. It was also noted by Gambino et al (2014), that there are considerable differences in English language use and English-speaking ability among foreign-born persons. It was indicated that educational attainment played a critical role in how well English was spoken, as did time spent living in the United States. The ACS Report by Gambino et al (2014) indicated six states where the percent of foreign-born population spoke a non-English language at home was significantly higher than the national percentage and included Texas, California, Illinois, Nebraska, New Mexico, and Nevada. This report also indicated that among states with the highest proportions of foreign-born who spoke English “less than very well”, Nebraska and Texas reported 59%, and California 57%, compared to the national percentage of 50%.

The American Community Survey (ACS) data regarding English proficiency represents an individual’s self-rated English abilities. The self-analysis on the ACS for a person’s English abilities includes, “Very well”, “Well”, “Not Well” and “Not at All”. The usefulness of the self-rated English ability question on the ACS was established in the 1980s and research conducted by the Department of Education (1987) confirmed, a strong correlation between self-rated English

ability and separate tests of ability to perform tasks in English. As a result, the self-rated analysis was adopted for the American Community Survey.

The data presented in the American Community Survey 5-year estimates (2009-2013) for Nebraska, indicated a language barrier for approximately 57,000 Hispanic/Latino individuals. This presents a potential for disastrous outcomes for many individuals within an impact zone during severe weather. For approximately 57,000 LEP Hispanics/Latinos, the need for language specific warnings is crucial. Language specific warnings in Nebraska could potentially facilitate best possible outcomes for communities with increased percentages of LEP individuals during severe weather events.

Data collected from surveys for this study utilized “Very well” and “Less than very well”, to determine English proficiency among the participants from the five health departments in Nebraska. This study could potentially increase community awareness regarding the large numbers of LEP Hispanics/Latinos for the identified Nebraska health departments, and a need for language specific severe weather warnings. Prioritization of the cultural vulnerabilities in the five health departments is warranted and thus, would potentially contribute to more effective emergency preparedness plans.

Ahlborn et al (2012) concluded in their study, a demonstrated need for emergency managers to recognize when appropriate, and overcome communication disparities among limited English proficient populations. Also noted by Ahlborn et al (2012), that in the process of improving hazard communication among LEP populations, it is necessary to work with existing television channels and radio stations, to evaluate the possibility of broadcasting messages in appropriate native languages. In communities where established non-English mass communication modes do not exist, Ahlborn et al (2012) suggest, emergency managers and community stakeholders consider sending language specific messages through English-speaking modes.

Purpose of the Study

The purpose of this study was to identify the magnitude of vulnerability for LEP Hispanics/Latinos in rural Nebraska during severe weather events. This study focused on the self-assessment of English proficiency and effects of severe weather warnings by LEP Hispanics/Latinos in rural Nebraska. This study also considered a potential deficiency of local English radio and television media, in which language specific weather warnings are not provided to LEP Hispanics/Latinos in Nebraska. Not all survey respondents had a radio, phone, or television to receive weather information. Still others did not hear the sirens, as they were indoors and sirens were for workers outdoors, and a number of participants did not know what the sirens meant. Survey data analysis will be provided to the five health departments who participated in this study.

The language statistics provided by the U.S. Census Bureau 2009-2013 5-Year American Community Survey for Nebraska, prompt questions of how warning messages are received by an estimated 47.9%, or approximately 57,000 Hispanics/Latinos who speak English “less than very well”. Are nearly 57,000 LEP Hispanics/Latinos able to interpret severe weather warnings correctly, when provided in English only via local radio and television stations?

The deficiency in risk communication of language specific, severe weather warnings is a hazard vulnerability for what Nebraska census data identified as approximately 57,000 LEP Hispanics/Latinos in Nebraska. Emergency response coordinators, directors and managers from the participating health departments eagerly await the data analysis, with plans to utilize data and improve warning delivery systems to the LEP Hispanics/Latinos residing in those communities.

Research Questions

The focus of this study was on the self-assessment of English proficiency and effects of severe weather warnings by LEP Hispanics/Latinos in rural Nebraska. This study was guided by two research questions:

1. What is the self-rated English proficiency for Hispanics/Latinos in rural Nebraska?
2. What are the effects of severe weather warnings on Limited English Proficient (LEP) Hispanics/Latinos in rural Nebraska?

No specific hypotheses were developed, as this study was exploratory in nature. Communication with the five participating health departments prior to initiation of this study, as well as observations by researcher during severe weather events in the past, prompted concerns of deficiencies, or gaps in the delivery systems which provide severe weather alerts and warnings in Nebraska.

Expected Findings

It was expected that data analysis from the five participating health departments would indicate risk communication deficiencies were common, not the exception for LEP Hispanics/Latinos in rural Nebraska. It was also expected that this would be the norm of other heavily populated LEP Hispanic/Latino locations in Nebraska, although this was not tested. Finally, it was expected that unauthorized immigrants would participate in this study, due to anonymity. Information provided by Krogstad and Passel (2014) of the Pew Research Center indicated seven states in which the unauthorized immigrant population had increased. Nebraska was identified as one of the seven states.

With a lack of language specific severe weather warnings, large segments of the Spanish-speaking population in Nebraska are at increased risk during severe weather events. This is based on the US Census Bureau data 2009-2013 5-Year American Community Survey results that LEP Hispanics/Latinos in Nebraska are numbered at approximately 57,000. Data analysis from this study suggests there are needed improvements for securing the safety of LEP Hispanic/Latino

communities in Nebraska. The safety and security of communities are dependent on timely risk communication and understanding of warnings, regardless of the primary language spoken.

Ramos et al (2013) recommended, “data be collected on an individual’s assessment of English proficiency, as well as the preferred spoken and written language”.

A perceived threat of impending risk or danger must be felt by individuals, before mitigation actions occur. Accurate perception of severe weather events is crucial, in order to facilitate best possible outcomes during and following tornadic activity. Gaps in risk communication of severe weather warnings for LEP Hispanics/Latinos in their native language must be resolved. Understanding warning systems directly relates to potential lives saved during disasters.

Definition of Terms

Hispanics/Latinos - Those persons who classified themselves as Hispanic, Latino, or any other Spanish origin.

Undocumented/Illegal immigrants – Persons who entered country illegally and without valid documents, or those who entered country with valid visas, and stayed after expiration of visas (Passel, 2006). Numbers of undocumented immigrants will be unknown, but will be included in the overall data numbers of those identifying as Hispanic, Latino, or of any other Spanish origin.

LEP – The term "Limited English Proficient" refers to any person five years of age and older, who reported English abilities as "not at all," "not well," or "well" on the American Community survey questionnaire. “Very well” on the survey indicates proficiency of the English language.

NSS – Native Spanish Speaking

ERC – Emergency Response Coordinator

EM – Emergency Manager

NOAA – National Oceanic & Atmospheric Administration

Assumptions

1. It was assumed that documented and undocumented or illegal residents would participate in the study.
2. It was assumed that a majority of respondents would prefer survey questions in Spanish and for this study, the survey was provided in both Spanish and English.
3. It was assumed that a greater percentage of persons would indicate English abilities as “less than very well”, compared to what was reported by the state of Nebraska.
4. It was assumed that education level would affect self-rated English abilities.

Limitations

There were numerous limitations to this study. The most important limitation was related to the large geographic area in Nebraska covered by the five health departments participating. As a result, control and oversight of the survey distribution and location, was not done by the researcher, but by the health departments.

Survey design limitations included a lack of questions regarding English speaking persons in the home, who may translate for others living there. There were no questions related to how many elderly, young children, or disabled persons lived in one dwelling. This has a potential to severely impact safe evacuation for those in the path of a storm. No questions were asked regarding available transportation, again, a potential impact on evacuation to safety. Pets were not considered in the survey and for many, a pet’s safety may be chosen over one’s own. Mobile home residents face safety challenges as well during severe weather events and the nearest shelter may be too far away to reach, before the storm arrives.

Another limitation was the response rate of the survey questions. The majority of surveys had missing data and some surveys returned, were missing an entire page of data. Thirty participants indicated they were not of Hispanic, Latino or other Spanish origin and therefore, were not included in the data for analysis. Another eighty surveys from one health department contained inconsistencies and validity of the surveys was questioned. After consultation with

advisor, those surveys were also not included in the data for analysis. This resulted in a much smaller sample size than was desired for the final data analysis.

The number of survey participants by gender was unbalanced as a result of survey distribution locations. The majority of surveys were distributed at health departments or Women, Infant and Children (WIC) and Immunization clinics, areas that may have more women seeking services.

Yet another limitation of this study is the focus on one population group only. The data collected on Hispanics and Latinos was not reflective of Nebraska's population. The population group studied was also not representative of the "Tornado Alley" population. The data results could potentially be generalized to a larger Hispanic/Latino population in Nebraska and "Tornado Alley", but not to the general population of Nebraska and "Tornado Alley".

Delimitations

The findings of this study may only apply to the health departments in Nebraska who participated and not representative of those from other health departments in Nebraska. Another delimitation of this study was not surveying White English-speaking persons and how well the severe weather warning system is understood and responded to.

After experiencing many tornado watches and warnings in the spring and summer of 2014, a realization was made that not once, were emergency warnings communicated in any language other than English. The exception to this was a printed warning in English and Spanish delivered by the National Weather Service, when breaking into local television programming. A decision was made to research how LEP Hispanics/Latinos who live in areas prone to frequent severe weather events, received and responded to severe weather warnings communicated in English.

A literature search was conducted using resources at the University of Nebraska's Medical Center Library, setting up Google Scholar Alerts, utilizing Disaster Outreach Library at the National Institutes of Health (NIH) provided by the Disaster Information Management Research Center, U.S. National Library of Medicine, the U.S. Census Bureau, the Nebraska Census Bureau and the Internet. Google Scholar Alerts were set up using the key words Hispanics, Latinos, surveys, disaster preparedness, disaster responses, vulnerable populations, emergency preparedness, risk communication and severe weather warnings.

Most Americans are unprepared to cope with disasters, according to survey data from the Federal Emergency Management Agency (FEMA) and as a result, FEMA launched a new ad campaign in August 2014 and designated September as preparedness month (Leger, 2014). The new ad campaign focused on family communication plans, specifically for location of family members following disasters. Leger (2014) also reported that FEMA's survey indicated less than 40% of all Americans have emergency plans and only 29% updated their emergency supplies in the past year. Personal emergency preparedness has long been promoted by government and non-government entities and agencies. The tragedy that occurred along the Gulf Coast during, and following Hurricane Katrina, provided a grim view of the relationship between a lack of disaster preparedness and subsequent outcomes. This was especially true for vulnerable population groups along the coast. Recovery efforts following the aftermath of Hurricane Katrina, and still today, continue to be hampered greatly by cultural disparities. It has been identified that racial and

ethnic minorities suffer worse outcomes than the general population during every phase of a disaster (Morrow 1999; Flanagan et al 2011; Riley-Jacome, Parker, and Waltz 2014). This is most likely due to multiple disparities, which may include language barriers, age, access to or limited resources, as well as economic hardships and perhaps, limited family support systems. Citing Oklahoma's census data, Ahlborn et al (2012) indicated language and cultural isolation in Oklahoma may limit tornado hazard communications received, as a result of nearly 50% of the Native Spanish-Speaking (NSS) population considered to be limited English proficient (LEP). Blazer and Murphy (2008) emphasized, partnerships between government agencies, disaster relief agencies, and immigrant-serving organizations at community and national levels, were key to effective preparedness and response.

As previously mentioned, the U.S. Census Bureau's 2009-2013 5-Year American Community Survey indicated, approximately 10.5% of Nebraska's population reported speaking a language other than English at home. The ACS survey indicated that of Nebraska's population, 7% reported the other language as Spanish or Spanish Creole, the second largest language spoken in Nebraska. The estimated total number of persons in Nebraska who spoke Spanish at home was approximately 119,506. Of those persons who spoke Spanish at home, 52.1% reported they spoke English "very well", while 47.9% reported speaking English "less than very well", or having limited English proficiency (U.S Census Bureau, 2013).

S. Kuo, (2007) reported in the Washington and Lee Journal of Civil Rights and Social Justice, the Federal Communications Commission (FCC) had been working on the best method to provide emergency alerts to language minorities, but as of 2007, the matter was still not resolved. In the aftermath of Katrina, an organization of independent Spanish language broadcasters and two civil rights organizations, demanded that the FCC modify the Emergency Alert System (EAS) rules, and adopt policies providing non-English speaking persons access to emergency information (Kuo, 2007). Comments from the National Association of Broadcasters (NAB)

assured the FCC in May 2014, that radio and television broadcasters supported improved multilingual access to EAS alerts and non-EAS emergency information (Mago et al, 2014). Radio, television, computer and downloadable applications, as well as social media, are integral in alerting the public of emergent situations. Participants in the EAS have delivered messages created by government entities such as the National Weather Service (NWS), which automatically relays messages to the public (Mago et al, 2014). Benavides and Arlikatti (2010) reported, many Spanish language speakers were more comfortable receiving emergency alerts in their native language, therefore recommended that Spanish language media provide the alerts.

Communication effectiveness is somewhat contingent on pre-existing values, risk perceptions and previous trust in leaders (Peguero, 2006; Vaughan et al 2012). Malizia et al (2010) reported, emergency notification was challenging as a result of diversity and disparity, yet critical when disaster events are imminent. Elder et al (2009), citing data from the U.S. Census Bureau described how more than half of the minority population in the United States (U.S.) are classified as functionally, or marginally illiterate, mostly due to recent immigrants arriving in the U.S. with little, or no English language understanding. Thomas Drabek (2001) concluded, denial of emergent threats was a consistent response to initial warnings among business employees, regardless of the source, and two out of three persons reported consulting four or more sources before evacuation occurred. Colleges and Universities have recently implemented emergency alert messaging systems to notify students and faculty of potential disasters, although cell phone numbers must be registered with facilities to receive the messages. Andrulis, Siddiqui, and Gantner (2007) identified in their literature review, increased numbers of government and private organizations such as FEMA, the CDC, American Red Cross, as well as state and local emergency management agencies, had disseminated translated preparedness and response information to minorities. Andrulis et al (2007) also found that it may not be possible to translate American culture English words and concepts directly to other languages. In a White Paper prepared for the Hurricane Forecast Socio-Economic Workshop, Phillips and Morrow

(2005) concluded, “effective messages containing forecasts, watches and warnings, must be considered within social contexts and cultures of targeted populations”. In 2006, President G.W. Bush carried out an executive order for Public Alerts and Warning Systems. The policy was initiated with the capability to alert and warn all Americans, including those with disabilities and those not understanding the English language. With advancements in all modes of communication, especially smart phones, the availability of downloadable free alert systems and apps, have improved the means of communication, especially to LEP Hispanics/Latinos. Ahlborn et al (2012) described limitations of their study as not being able to capture all modes of communication on the survey used. This included such things as smart phones and unofficial sources of hazard warnings, identified as personal verbal communication. Improvements in how NSS and LEP populations receive hazard communication will require collaboration among existing television and radio media, broadcasting messages in appropriate native languages (Ahlborn et al, 2012).

The ultimate outcome of severe weather warnings is to promote appropriate mitigation by individuals. This involves a multi-stage decision-making process. Researchers have identified components involved in decision-making as comprehension of risk, confirmation of risk and personalization, or risk to self (Phillips & Morrow, 2007). Data provided by Donner, Rodriguez and Diaz (2012) revealed, varied social factors influenced community responses to warnings. These factors included social networks, language, comprehension, siren ambivalence, false alarms, tornado tracking, local business behaviors, warning specificity, and cultural myths.

Perry, Lindell and Green (1982) reported findings that were statistically reliable of an increased belief in warnings, as the message specificity increased. In the same study, Perry et al (1982) identified substantial differences by race, even though the same warning message was given. This leads one to believe risk communication is not necessarily interpreted the same, by different racial or ethnic groups within the same community. Inconsistencies or no responses to severe weather were perhaps related to confusion regarding “watch” and “warning” messages.

Dash and Gladwin (2007) indicated, warning information and risk of impending danger must be translated and understood. Brotzge and Donner (2013) concluded, warning the public of impending severe weather remains a challenge, due to a population largely diverse in education, physical abilities and family support, as well as situational awareness. Honoré (2008) maintained, population groups already suffering from disparities were more likely to be economically poor, thereby less able to evacuate on short notice. Hammer and Schmidlin (2002) reported, residents who remained in their homes during the tornado in Oklahoma City in May of 1999, did so for two primary reasons. They either believed the storm would not directly hit, or realized too late the storm would hit, and consequently, it was too late to evacuate. Delays in response to warnings may be related to confirmation of risk from several sources before mitigating actions were taken. Hammer and Schmidlin (2002) indicated residents in Oklahoma City received long warning lead times, had intense use of television warning information and consulted multiple sources for weather information, all of which led to rational and deliberate mitigation decisions. Also noted by Hammer and Schmidlin (2002), people often waited until the risk appeared very high, before mitigating actions were initiated.

The literature supports this researcher's notion of a need for language specific severe weather warnings for LEP Hispanics/Latinos.

CHAPTER 3 - RESEARCH METHODS AND DESIGN

This study was designed to answer whether Hispanics/Latinos in rural Nebraska with self-rated English abilities at “less than very well”, corresponded to the data provided by the U.S. Census Bureau’s American Community Survey results. This study was also designed to explore which modes of media were utilized most often by LEP Hispanics/Latinos for the purpose of obtaining severe weather information, as well as what actions followed those warnings.

The study design was exploratory in nature and analyzed self-rated English proficiency among respondents, as well as explored how severe weather warnings were received and responded to by LEP Hispanics/Latinos in rural Nebraska communities. The design used a non-experimental, quantitative, cross-sectional survey methodology. A convenience sample of Hispanics/Latinos, were recruited from five rural Nebraska health departments. This study examined self-rated English ability, as well as explored how Hispanics/Latinos received and responded to severe weather warnings. The sampling frame was identified as the five rural health departments who participated in the study. Permission to conduct a research study was granted by either the health director, or emergency response coordinator (ERC) from each of the health departments. A slightly revised survey tool was used to obtain data for analysis. The independent variables included Hispanics/Latinos in rural Nebraska. The dependent variables were:

- (a) demographics - age, gender and educational attainment, (b) self-rated English ability,
- (c) modes of media utilized for severe weather warnings, and (d) responses following severe weather warnings.

Sample Population

The population group of interest included respondents from Northeast Nebraska Public Health Department, Dakota County Health Department, Public Health Solutions District Health Department, Two Rivers Public Health Department and Scotts Bluff County Health Department. Those who indicated they were of Hispanic, Latino, or any other Spanish origin and 19 years of

age and older, were included in the study. Of the health departments participating in the study, some counties that spoke English “less than very well” included two with 61% - 66%, four counties had 40% - 51%, two counties indicated 21% - 36%, and two other counties indicated 10% - 16% (U.S. Census Bureau 2009-2013 American Community Survey 5-year estimates). No other racial or ethnic population groups were included in this study, as the intent was to assess the adult Hispanic/Latino population only. Inclusion criteria for the study, were persons identifying as Hispanic/Latino or other Spanish origin, adults, nineteen years of age and older. Exclusion criteria were Hispanic/Latino parents under the age of nineteen, children, and all other racial/ethnic population groups.

Sample Size

The final sample size included for data analysis was one hundred and two (102) surveys from a total of two hundred and twelve (212) surveys returned, from respondents at five health departments. Thirty surveys were disqualified, as they did not meet the criteria for Hispanic, Latino, or other Spanish descent and after review of eighty other surveys from one health department, questions arose in regard to validity. After consulting with advisor regarding concerns about the 80 surveys, a joint decision was made not to include the surveys for data analysis.

Data Collection Methods

This study utilized a culturally distinct approach with a survey in Spanish and English, to examine and identify cultural practices of Hispanics/Latinos during severe weather events in Nebraska. Utilizing the most current census data for Nebraska, counties and health departments with increased percentages of Hispanics/Latinos were identified. Nine health department Emergency Response Coordinators (ERCs) and or Health Directors were sent introductory e-mails, soliciting interest in collaboration on a research project. Five of the nine health

departments responded and expressed interest in this study. Emergency response coordinators identified that many Hispanics/Latinos in the communities had limited English abilities, and expressed concern for their safety during severe weather events. A second e-mail was sent to the health department directors and ERCs to review survey questions and provide feedback. A timeline for survey distribution and collection was discussed with the interested health departments. The health departments that expressed interest in a collaborative research project were: Northeast Nebraska Public Health Department, Two Rivers Public Health Department, Public Health Solutions District Health Department, Dakota County Health Department and Scottsbluff County Health Department. Preliminary logistics for the study were discussed via phone conversations. Road trips were made to Northeast Nebraska Public Health Department and Dakota County Health Department to meet with the health director, ERCs and Hispanic health department assistants, to discuss logistics of the research project. Several meetings were attempted with Public Health Solutions District Health Department, but to no avail. A convenience sample of surveys were completed by Hispanics/Latinos and were derived from locations such as health departments, social groups, restaurants, churches, English as second language classes, and WIC and immunization clinics. A total of one hundred and two (102) surveys from five health departments were completed for data analysis.

Self-Rated English Ability

The “Fact Finder” section of the United States Census Bureau provided the statistical information for each of the counties within health departments represented in this study. Language data was obtained by using the Google search option for American Fact Finder. The home page provided several options for obtaining community facts and data, which included the “Guided Search”, “Advanced Search” and “Download Center”. The “Advanced Search” was utilized to navigate the American Fact Finder site, which contained several main categories. The search was initiated by selecting the category “Topics”, which provided options for “People”,

“Language”, and “Language Spoken at Home”. The second category, “Geographies” provided options for geographic types. This included state and county selections. The third category identified “Race and Ethnic Groups” from which Hispanic and Latino were selected. The search was further refined, by adding “Language” in the search box. This produced several language data options. The document title selected was “Language Spoken at Home”. The data set chosen was 2013 ACS 5-year estimates. Estimates for the “Language Spoken at Home” statistical analysis was obtained for the state of Nebraska, as well as each county within the five health departments who participated.

Survey Data Collection

The survey questionnaire contained twenty-nine (29) questions and was available in both Spanish and English. One hundred and two (102) surveys were obtained for data analysis from the five participating health departments. Eighty-eight (88) surveys were completed in Spanish and the remaining fourteen surveys were in English. Data collection was obtained from surveys only. No open-ended questions were used on the survey. The survey tool identified Hispanic/Latino demographics, self-rated English abilities, media sources used for how severe weather warnings were received, and responses to those warnings. A convenience sample of participants were recruited from the WIC and Immunization clinics, as well as social groups, health departments, restaurants, churches, English as second language classes and grocery stores. Health department personnel facilitated access to the population group of interest for survey distribution. Emergency response coordinators (ERCs) from interested health departments offered insight and suggestions for survey design and distribution. Suggestions were made based on community partners and logistics for individual communities. Suggestions were made to distribute surveys at the health departments, clinics that provided immunizations and Women, Infant, & Children (WIC) services. Other recommendations included trusted sources such as social groups, churches, English as second language classes, grocery stores and restaurants.

Unbalanced gender numbers were noted on returned surveys, with more female respondents, however, it is not known if this was due to survey distribution sites.

Health department directors and ERCs suggested Hispanics/Latinos would be more apt to complete surveys, if they understood how data collection would benefit them. The health departments provided educational information routinely in the past, so this provided a safe venue for survey distribution and completion. Hispanic public health aides in Northeast Nebraska's Public Health Department were available at survey distribution sites, to answer questions and assist with completion of surveys as needed. Completion of survey questionnaires was coordinated by the health departments that participated in the study and mailed back to the primary investigator in a sealed, self addressed and pre-paid envelope to the College of Public Health at the University of Nebraska Medical Center (UNMC). Surveys were stored in a secure location for protection of the respondents.

Type of Data

Quantitative Data was obtained using a non-experimental, anonymous, convenience sampling of Hispanics/Latinos, 19 years of age and older, which answered the following research questions:

1. What were the self-rated English abilities for Hispanics/Latinos in rural Nebraska?
2. What were the effects of severe weather warnings and the responses to those warnings, by Limited English Proficient (LEP) Hispanics/Latinos in rural Nebraska?

This study design utilized a slightly revised survey instrument tool, and assessed Hispanic/Latino self-rated English abilities, how severe weather warnings are received and response to those warnings, in different geographic regions of Nebraska. Spanish and English language surveys were available as an option for participants. Quantitative data was obtained for demographics, self-rated English abilities, how severe weather warnings were received, and response to those warnings. Survey questions 1-6 include basic demographic information of

ethnicity, gender, age, education, and county of residence. Survey questions 7, 8, and 9 examined how well respondents understood, spoke and read English. Data results from these questions answered the research question of self-rated English abilities. Survey questions 10-26 examined modes of media utilized and answered the research question how severe weather warnings were received. The final survey questions 27-29 related to actions taken following severe weather warnings. These survey questions answered, “what were the responses of LEP Hispanics/Latinos to severe weather warnings in rural Nebraska”?

Instrumentation (Validity and Reliability)

The survey tool was developed and validated for clarity in English, then translated to Spanish by Leslie Ahlborn, PA-C and Jeffrey Franc, MD, with editing and clarification provided by Samuel Stratton, MD, MPH. Native Spanish-speakers fluent in English reviewed the survey for post-translation validity (Ahlborn et al, 2012). The survey was then piloted among native English-speakers and native Spanish-speakers with further revisions made prior to distribution, and after Institutional Review Board (IRB) approval.

Survey Questionnaire Design

This study used a non-experimental, quantitative, cross-sectional survey methodology. A convenience sample of Hispanics/Latinos, were recruited from health departments in rural Nebraska. This study assessed self-rated English ability and explored how LEP Hispanics/Latinos receive severe weather warnings and how those warnings are responded to. Quantitative data for descriptive statistical analysis was obtained with a slightly revised, previously validated survey questionnaire tool. Participants were provided an option to complete surveys in English or Spanish.

Permission to use the survey tool was granted by the author and researcher of the original survey design, Leslie Ahlborn, PA-C. The survey tool was modified slightly, after discussion and

recommendations from advisory committee, who suggested more consistent wording throughout. The survey was also shortened from thirty-eight (38) to twenty-nine (29) questions, to facilitate ease in survey completion by respondents. Open-ended questions were removed from the revised survey, which eliminated potential for vague and ambiguous responses. After slight survey revisions were made, Google Translate was utilized to translate survey from English to Spanish. The Spanish survey was then reviewed and further refined by the translator for Community Action Partnership of Mid-Nebraska in Kearney Nebraska. Translation services were offered by the ERC for Two Rivers Health Department in gratitude for conducting this research project for the Hispanics/Latinos in that area. The survey design looked at nominal and ordinal data, which were then quantitatively measured. The survey focused on assessment of the following key items:

1. Demographics (age, gender and educational attainment).
2. Self-rated English abilities.
3. Modes of media used for severe weather warnings.
4. Responses to, or actions taken following severe weather warnings.

Survey Implementation

With the assistance of the participating health departments: Dakota County Public Health Department, Northeast Nebraska Public Health Department, Public Health Solutions District Health Department, Two Rivers Public Health Department and Scotts Bluff County Health Department, survey distribution occurred through coordinated efforts of staff at the health departments, during social events, at churches, restaurants, English as second language classes, and WIC and immunization clinics. A cover letter in Spanish and English was included with each of the Spanish and English surveys for distribution. The cover letter indicated the respondent's passive consent to participate in the study with completion of the survey. The Northeast Nebraska Public Health Department handed out emergency preparedness information to respondents along with each survey. Coincidentally, survey distribution was initiated during National Severe

Weather Awareness Week in March. The survey implementation was conducted in a manner that facilitated anonymity of the respondents. All participants were instructed through cover letter instructions not to include any personal identifying information on the survey. No personal information was included on any of the returned surveys.

It was expected that a majority of the respondents would have limited English proficiency (LEP) and would fill out the Spanish survey provided, not the English survey. This proved to be the case with eighty-eight (88) of one hundred and two (102) respondents completing the Spanish survey. It was also expected that a large percentage of Hispanics/Latinos in Nebraska have experienced a tornadic event in the past and that warning information was validated through several trusted sources before decisions for safety were made.

Ethical Considerations

The University of Nebraska Medical Center's Office of Regulatory Affairs Institutional Review Board (IRB) reviewed and approved this research application. It was determined the study protocol adhered to ethical principles in which to carry out this research study.

Data Analysis Methods

Descriptive Statistics using frequency tables and cross-tabulation were used to summarize data regarding Hispanics/Latinos in the identified rural health departments in Nebraska. The SPSS (Statistical Package for the Social Sciences) Analysis Version 22 was used to provide tables, charts and summaries for the survey data in this study. Frequency tables were used to summarize all the variable data. Cross-tabulation comparisons were performed on the categorical data. Upon recommendation from the data analyst and after conferring with advisor, statistical *P*-values were not used due to the small sample size.

Statistical Tests

SPSS software Version 22 was utilized for basic descriptive statistics using frequency tables. Variable data were analyzed and compared using cross-tabulation and descriptive group comparisons. *P*-values were not used due to the small sample size following recommendation of the data analyst and agreement from advisor.

CHAPTER 4 - RESULTS

Results provided in this section begin with demographic information for the respondents. Ages were grouped into four different categories. Educational attainment was divided between those who had less than a high school diploma and those who had achieved high school graduate status, as well as those who pursued some higher education, or were college graduates. Gender numbers were obtained, but not used for data analysis due to numbers heavily biased toward women, as a result of survey distribution locations.

Demographic results will be followed by the respondents' self-rated English assessment. The self-rated assessment was used to evaluate limited English proficiency (LEP) status among the survey respondents. Data analysis then looked for a relationship between educational attainment and LEP status of respondents.

Finally, results will look at respondents' previous experience with tornados, modes of media utilized for severe weather warnings and responses to those warnings. The data analysis obtained will answer these research study questions:

1. What is the self-rated English proficiency for Hispanics/Latinos in rural Nebraska?
2. What are the effects of severe weather warnings on Limited English Proficient (LEP) Hispanics/Latinos in rural Nebraska?

A combination of tables and figures will be used in presenting data to answer the study questions. All data variables from collected surveys were entered into SPSS Version 22 software for data analysis. Frequency tables and Cross-Tabulation were used to summarize all the variable data. A detailed presentation of the data analysis and results will be summarized, and findings presented in relation to the research questions posed, in the discussion section.

Of the surveys returned, one hundred and two (102) were included from five health departments for data analysis in this study. Distribution of respondents was fairly similar between the age groups, with the exception of the > 65 category. Only one respondent identified with this

age category. Surveys were provided in both Spanish and English, with the majority of surveys completed in Spanish.

	Frequency	Percent
Spanish	88	86.3%
English	14	13.7%
Total	102	100 %

Table 1: Respondents who completed language specific surveys.

The Spanish survey was completed by eighty-eight (88) persons and represented 86.3% of the respondents, while the English survey was completed by fourteen (14) and represented 13.7% of the respondents. Of the fourteen English surveys completed, eleven (11) respondents indicated their English-speaking, understanding and reading abilities, were “less than very good”.

Seventy-six (76) or 74.5% of one hundred and two (102) respondents indicated they were female and twenty-two (22) or 21.6% indicated male status. Four respondents did not indicate a gender on the survey.

Age	No Education, Primary, or some Secondary	HS Grad, some College or College Grad	English Very Good	English Less than Very Good	Total
19 - 30	18	14	7	25	
31 - 45	15	21	10	26	
46 – 65	18	10	5	23	
> 65	1	0	1	0	
Total	52	45	23	74	97

Table 2: English Speaking Ability by Age and Educational Level

Descriptive statistics were obtained using cross-tabulation in reviewing data between age groups and educational attainment. Table 2 represents respondents by age group who indicated self-rated English speaking ability as “less than very good”. The numbers were distributed fairly equal among age groups, with the exception of > 65 years. There was only one respondent from this age group. Of the ninety-seven (97) respondents, seventy-four (74) or 76% indicated

English speaking abilities as “less than very good”, while only 23.7% indicated English abilities as “very good”. Over 50% of the respondents had no education, some primary or secondary education and were not high school graduates. Even though 46% of the respondents were high school graduates, had some college courses, or were college graduates, it was indicated on the surveys that English abilities were “less than very good”.

Age	Tornado-yes	Tornado-No	Total
19-30	20	9	29
31-45	19	14	33
46-65	17	8	25
> 65	0	1	1
Total	56	32	88

Table 3: Previous Tornado Experience

Table 3 indicates by age group those who had weathered a tornado in the past. Fifty-six (56) or approximately 64% of those who responded had previously experienced a tornado, while thirty-two (32), or approximately 36% had no previous experience.

Age (n)	Radio	TV	Internet	Cell Phone	Tornado Sirens	NOAA Weather Radio
19 – 30 (32)	24	28	22	23	26	3
31 – 45 (37)	22	28	24	19	32	4
46 – 65 (27)	14	19	16	16	24	2
> 65 (1)	0	0	0	0	1	0
Total	60	75	62	58	83	9

Table 4: Media Sources for Severe Weather Information by Age Groups.

Data was analyzed for modes of media alerts used by respondents from different age groups using descriptive statistics and cross-tabulation. Table 4 provides data for the modes of media used by respondents for reception of severe weather warnings. Of importance to note, the fact that multiple media sources were used by each age group to obtain severe weather information, with the exception of the one respondent in the greater than sixty-five age group.

Tornado sirens, followed by television and the Internet, were the primary three media sources utilized by respondents for severe weather warning information in this study.

Age	Find Safety	Seek More Info	Cont. Activities	Other	Total
19-30	10	8	2	7	27
31-45	16	9	1	9	35
46-65	17	5	0	3	25
> 65	1	0	0	0	1
Total	44	22	3	19	88

Table 5: Actions Taken following Tornado Sirens

Table 5 indicates actions taken by different age groups following tornado sirens, using multiple media sources for severe weather information. Of the eighty-eight (88) persons who answered this question, only forty-four (44) or 50% sought safety. Twenty-two (22), or 25% sought more information. Several persons continued with current activities, while the “Other” category was comprised of a combination of choices and written in comments. Combination of actions and comments included:

- “No information on tornados until someone alerts you to seek refuge, as live outside of town and do not hear the sirens”.
- “Do not know what the sirens mean”.
- Found safety and sought more information
- Sought more information and continued with current activities.
- “Not always able to hear sirens”.
- “Too far out in the country”.
- “Sirens sound outside only, not inside buildings. Not able to hear inside while at work”.

Age	Find Safety	Seek More Info	Cont. Activities	Other	Total
19-30	19	3	2	2	26
31-45	23	1	0	3	27
46-65	18	1	0	2	21
> 65	0	0	0	0	0
Total	60	5	2	7	74

Table 6: Actions Taken following Tornado Warnings from Media Sources (excluding sirens)

Table 6 indicates actions following tornado warnings received from multiple media sources, excluding the tornado sirens. Utilizing multiple media sources for weather information, sixty of seventy-four (74) respondents, or 81% of those who answered the question found safety. Five persons sought more information, while only two persons continued with current activities. The “Other” category was again comprised of a combination of actions and written in comments which included:

- Sought safety and sought more information.
- Sought more information and continued with current activities.
- “Se busca pero abeses no entodas la viviendas no hay sotano”. (“Seeks but sometimes not all households have basements”).

CHAPTER 5 - DISCUSSION

This study was done as a result of a noticeable lack of severe weather warnings in any language other than English for the Omaha metropolitan area of Nebraska, after particularly volatile weather patterns in the spring and summer of 2014. With the understanding that Hispanics/Latinos were ranked second in numbers as far as race or ethnicity in Nebraska, and many of these speaking only Spanish, questions were raised as to how this vulnerable population group, as well as other non-English speaking groups, understood the English severe weather warnings. A decision was made to study how LEP Hispanics/Latinos in rural Nebraska receive and respond to risk communications provided in English only, when living in areas prone to frequent and sudden severe weather events.

Unexpected and not anticipated with this study, were participants from a non-participating health department. Interesting to note, this health department (from an area with some of the largest numbers of Hispanics/Latinos in Nebraska) was contacted during the initial stages of communication regarding collaboration on this study. The ERC commented, “the interpreter was responsible for the Hispanic population in that health department” and “tornado messages were not in the ERC realm”! “The ERC is not responsible for anything except health, and then only during the aftermath of a tornado disaster, in which Tetanus would be provided to health care workers only”. The ERC was able to hand out preparedness information, but “someone else provided weather stuff”, which was not in Spanish. Was also informed, “the National Weather Service provides warnings to someone, who then disseminates the information.” “The ERC’s responsibility is only to write disaster plans, not worry about communication of disaster related information to those who do not speak English”. WIC and immunization clinics were not provided at this health department and perhaps that would explain why several respondents for this study drove 30-50 miles to another health department to receive services. A voice mail was received several days later from this ERC reiterating that disaster communications and warnings for non-English speaking persons were the responsibility of

interpreters and fell under Emergency Support Function (ESF) #13 - Public Safety and Security (May 2013), not under Emergency Support Function (ESF) ESF #8 - Public Health and Medical Services (May, 2013). I was encouraged to look more into ESF #13 and or contact the Emergency Manager (EM) for each county within that health department.

Questions certainly arose as to how accurate disaster plans were for this health department, when taking into account the ERC had little or no contact with this vulnerable population group. The information provided by this ERC was found to be quite interesting, considering the primary agency for ESF #8, is the Department of Health and Human Services (HHS) with a Core capability that clearly states, “Provides public health, behavioral health, disease and injury prevention information, which can be transmitted to members of the general public and responders who are located in, or near affected areas, in languages and formats that are understandable to individuals with limited English proficiency, individuals with disabilities and others with access and functional needs” (May, 2013). ESF #13 if understood correctly, has as its primary agency, the Department of Justice/Bureau of Alcohol, Tobacco, Firearms and Explosives and focuses on Federal law enforcement departments or agencies, who assist after an event or terrorist act, although this agency may assist in prevention activities if requested (May, 2013). Needless to say, this health department was not interested in study participation.

The five health departments who participated in this study reviewed the initial survey and offered valuable feedback, which was taken under advisement and included:

- “Survey too long and wordy”
- “Survey too lengthy, but questions seem to be written at a level appropriate for the population group”
- “Have 3 – 4 reviewers from population group make recommendations for survey”
- “Include in cover letter how survey will benefit respondents”
- “Words too big in survey”

- “Eliminate open-ended survey questions”
- “Provide multiple choice survey questions to mark, rather than fill in”
- “Write out NOAA so respondents know what it is”
- “Include state and county on survey, as respondents may cross state borders for health care”.

Feedback from participating health departments was provided to the advisory committee and it was agreed to revise survey somewhat. The survey was shortened by elimination of open-ended questions and similar wording was provided for other questions to minimize or eliminate confusion for participants.

Trusted, local community health care providers assisted in coordination of this study and participants were assured of anonymity. It was anticipated and somewhat assumed, there would be undocumented immigrants who participated in the study, due to survey anonymity. In previous disasters, it has been noted that immigrants were reluctant to seek even basic services such as food, water and shelter, due to fear of immigration enforcement (Blazer and Murphy, 2008). Fear of repercussion persists for undocumented residents and may prevent participation in studies, which may in fact be an attempt at process improvement, rather than government entities searching for undocumented immigrants.

Not taken into consideration, health departments do not provide the same services and consequently, some study participants travelled outside of non-participating health departments for needed services at participating health departments where surveys were completed.

Numerous logistical challenges were experienced while the study was conducted.

1. The primary challenge experienced was the travel distance for the five health departments. Distances covered for the study included east to west borders of Nebraska, as well as north to south borders. It was not logistically possible to travel individually to all of the health departments.

2. Each of the health departments received the same instructions for study participation. Specific instructions were that study would include only Hispanics/Latinos or those of other Spanish descent, yet thirty surveys were received from one health department not meeting the criteria. Those surveys were not included in the data analysis.
3. Health Department changes occurred in which the director and emergency response coordinator (ERC) for one health department both resigned during the study period, after commitment to participate. The interpreter for the region volunteered to distribute surveys at clinics she visited, in order to provide data from that health department's region. The interpreter also translated the survey from English to Spanish for this study, as data analysis could provide important information to move forward on recommendations in disaster preparedness for those communities.
4. Challenges presented to the researcher included: no environmental control, how instructions were delivered, study participants, survey distribution, or distribution locations. Survey distribution locations included: churches, restaurants, grocery stores, women, infant and children (WIC) and immunization clinics, community action groups, Spanish to English classes and health departments. There was no consistency for selection of distribution sites among health departments, only that the study population of choice was targeted. This resulted in a heavily gender biased survey return, as many women frequented the WIC and immunization clinics, as well as the health departments for health care services. Disaster Preparedness information was provided at some locations when the survey was distributed. There was no consistency between the sites.

One hundred and two (102) surveys were included for data analysis from a total of two hundred and twelve (212) surveys returned. Thirty surveys were disqualified, as they did not meet the criteria for Hispanic, Latino, or other Spanish descent. Eighty other surveys were highly questionable in regard to validity of the survey responses. After consulting with advisor regarding

concerns about the 80 surveys, the decision was made not to include those surveys in the data analysis.

After meeting with a data analyst, it was recommended to initiate a plan on how data analysis would be portrayed and what results would be important for this study. After all survey questions were reviewed, it was decided to group results by demographics (gender, age and education), English ability, past tornado experience, media sources available for severe weather warnings and what were responses to, or actions taken by respondents following the warnings provided.

Demographics

Anticipated were unbalanced gender numbers due to immunization and WIC clinics for survey distribution sites and it was assumed that more women would bring self and or children for services, therefore, gender numbers were not used in the data analysis.

Age groups for this study did not correlate with the ACS 5 year estimates. Age groups used in this study were 19-30, 31-45, 46-65, and > 65. Participants under 19 years of age were not included in this study, as parental permission would have been required. Only one participant identified with the category > 65 years of age. This researcher was most concerned only one person in this age group completed a survey, even with the one hundred and ten surveys not included for data analysis. Are the elderly not going in for any health services? I understand perhaps the WIC and immunization clinics most likely would not have the elderly present, but that does not explain why the other distribution location sites did not have any elderly respondents. I question how many elderly with limited English proficiency are also medically or physically disabled, have behavioral health issues and/or need assistance with transportation in getting to shelter areas. This poor representation of the elderly Hispanics and Latinos causes great concern with regard to disaster preparedness and response.

Self-rated English Ability

The data for this study did not demonstrate a clear relationship between educational attainment and English ability for Hispanics and Latinos. It was anticipated that the majority of surveys would be completed on the Spanish form, which did hold true. Eighty-eight of the one hundred and two surveys were completed on Spanish forms, while fourteen surveys were completed on the English version. Eleven of the fourteen English surveys indicated self-rated English speaking ability as “less than very well”. It was speculated that these eleven surveys were not completed by respondents, but perhaps by the bilingual health aids assisting at the clinics. In total, 76% of the respondents in this study indicated English speaking ability as “less than very well”.

The ACS Report by Gambino et al (2014), indicated that educational attainment played a critical role in how well English was spoken, and at higher levels of educational attainment, the foreign born were more likely to have higher English-speaking ability, as did time spent living in the United States. The data analysis obtained for this study indicated fifty-two (52) of ninety-seven (97) respondents, or approximately 54% had no education, some primary or secondary education and were not high school graduates. Seventy-four of the ninety-seven respondents indicated they spoke English “less than very well”, even though forty-five of these respondents were high school graduates or had at least some higher education. It was erroneously assumed the educational level would impact the self-rated English ability in this study. These findings were similar to what Ahlborn et al (2012) reported in their study, which implied the LEP population might have actually approached 75% compared to 50% calculated by the ACS. The data analysis for this study did answer the research question of self-rated English proficiency among Hispanics/Latinos in rural Nebraska. In total, 76% of the respondents in this study indicated English speaking ability as “less than very well”.

Incongruent with the findings of this study, the U.S. Census Bureau in the 2009-2013 5-year American Community Survey (ACS) estimated 47.9% of Hispanics/Latinos in Nebraska reportedly spoke English “less than very well”. Gambino et al (2014) indicated that among the foreign born with less than a high school education, 36% reported speaking English “less than very well”. The data reported by Gambino et al (2014) were indicative of national data, where as Ahlborn et al (2012) reported only Oklahoma data and this study included only Nebraska data. The ACS Report by Gambino et al (2014) also indicated, Nebraska was one of two states with the highest proportions of foreign-born who spoke English “less than very well” and that was 59%. Even though this study sample was small, the data analysis indicated a much larger number of respondents who spoke English “less than very well”, than the ACS Report for Nebraska indicated. The difference between the ACS Report and this study are the unknown numbers of foreign-born Hispanics/Latinos who responded on the survey. This survey only inquired about Hispanic, Latino, or other Spanish descent, not whether the respondents were foreign-born.

Previous Tornado Experience

In view of the fact that previous tornado experience was felt to be one of the most important survey questions, it was quite disappointing to note that only eighty-eight (88) of one hundred and two (102) respondents answered this question. There was concern about the poor response to this question, as well as uncertainty as to whether the question was placed too close to the end of the survey, placement on the page had an impact on response, or it was placed too close to the next question and looked to be part of that question. Of respondents who did answer the question, 64% had previously experienced a tornado, while 36% had no previous experience with tornadic activity. Those respondents with no previous tornado experience spanned all age groups, including the one respondent > 65 years of age. There are noted opportunities for disaster preparedness across the life span for all of the health departments.

Media Sources Available For Severe Weather Warnings

Multiple media sources were utilized in obtaining severe weather information and warnings by each age group, with the exception of the > 65 year old category. Of noted importance, the top three modes of communication most common were, tornado sirens as the most frequently used mode of communication, followed by television and the Internet. Hammer et al. (2002) survey respondents cited television as the most common source of tornado warning information, followed by phone calls and tornado sirens. Ahlborn et al. (2012) survey results indicated, tornado sirens were the most common mode of alert followed by television and local radio stations. Ahlborn et al. (2012) also suggested promotion of additional, other less common media sources, which would allow for redundancy of alerts communicated. Data analysis for this study indicated LEP Hispanics/Latinos used multiple media sources for confirmation of severe weather warnings. Whether this was by design or through educational efforts remains to be seen. Tornado sirens were indicated as the most common media source used for notification of severe weather. This could potentially be problematic in certain areas, such as Northeast Nebraska Public Health Department. Sirens were designed for persons working outdoors only, consequently, people working indoors do not hear the sirens. Even more problematic is the fact that some tornados occur during the night when most are asleep. It would be beneficial to have more than one alert system available. Data analysis for this study indicated LEP Hispanics/Latinos used multiple media sources for confirmation of severe weather warnings. Whether this was by design or through educational efforts remains to be seen.

The Internet when used for weather warnings has the capability to provide warnings in multiple languages. This may explain why it has become one of the most frequent modes used for severe weather alerts. Free downloadable applications (apps) have become quite popular on the Internet, as well as on mobile phone devices. Local TV stations, weather apps, radar apps, Red Cross apps and NOAA weather apps are just a few of the sources for weather information now available on mobile devices. The Red Cross provides free emergency information apps in Spanish

or English language and can be selected for how information is received. Radar apps would not necessarily need to be language specific, if one understands the color significance.

Responses To Warnings

The data analysis obtained did answer the research question of the effects of severe weather warnings on Limited English Proficient (LEP) Hispanics/Latinos in rural Nebraska. There appeared to be an overall theme of multiple media source usage by all age groups, with the exception of the > 65 group, to confirm severe weather events. The use of multiple media sources provided much needed information, crucial for timely, decision-making during severe weather events for LEP Hispanics/Latinos in rural Nebraska.

Comments written on the surveys suggested there were issues regarding the sirens, which seemed to be a common theme as well. It was indicated on surveys, the sirens were not understood, were not always heard, were located outside only, and or homes were located too far outside of town to hear the sirens. Some respondents indicated they must rely on others for notification during severe weather events, as they live too great a distance from the sirens to hear them. The comment that really resonated was, “Se busca pero abeses no entodas la viviendas no hay sotano”. (“Seeks but sometimes not all households have basements”). In other words, shelters in homes were not always an option for respondents.

Conclusions

Although this study was not a true research experiment and given the small sample size, a need for language specific, severe weather warnings was demonstrated by the data analysis. The majority of respondents completed Spanish language surveys and the study data indicated a self-rated LEP for Hispanics/Latinos at 76%, a notable difference from the American Community Survey of 47.9%. It was important to stress anonymity of the survey in order to include potential undocumented immigrants in the study as well. Data was analyzed to determine if there was a

strong relationship between educational attainment and English proficiency. Contrary to The ACS Report by Gambino et al (2014), educational attainment did not play a critical role in how well English was spoken in this study. Educational attainment had no bearing on improved English ability. In fact, forty-five of the seventy-four respondents who indicated they spoke English “less than very well”, were high school graduates or had at least some higher education. That translates to 61% of those who rated their English abilities as less than very good, had actually been educated. One might question where this education occurred, or whether respondents were overly critical of their English abilities. It was erroneously assumed that education level would improve the self-rated English ability in this study.

Past tornado experiences played a role in how persons responded to severe weather events. It appeared as though tornado sirens crossed the language barrier, as indicated by the percentage of respondents who used this mode of warning for severe weather. Of importance to note was the response to sirens, primarily, multiple media sources were used to confirm severe weather warnings. This might lead to the assumption that confirmation with real time weather information was made on the Internet or television following the sirens, which ultimately lead to safety actions taken.

I would concur with Ahlborn et al (2012) who suggested, in communities where established non-English mass communication modes are not present, emergency managers and community stakeholders should consider sending language specific messages through English-speaking modes. As noted earlier, risk communication will continue to be a challenge with educational and culturally diverse communities. Radio, television, computer, universities, downloadable applications and social media, will continue to be an essential component in alerting the public of emergent situations, however, research literature does support the notion of a need for language specific, severe weather warnings to LEP persons. Nebraska will continue to be at high-risk for severe weather events with more frequency during certain times of the year and in multicultural communities. It is critical that consideration be given to language specific, severe

weather warnings for LEP populations. This could improve the safety for many Nebraska communities affected during severe weather events.

Gaps in Literature

The most notable gap in the research literature was a lack of data specific to the elderly, or greater than 65 years of age. In view of the fact that only one person in the study identified with this age group, I am most concerned, considering the American Community survey estimates for Nebraska indicated approximately 4,300 Hispanics/Latinos are > 65 and of this number, over 55% speak English less than very well. This particular age group has the potential for many issues, whether it is medical, physical, behavioral health, or transportation related which, are only compounded by the language barrier. This poor representation of the elderly Hispanics and Latinos causes great concern with regard to disaster preparedness and response.

There was also a notable lack of literature regarding language specific alert systems, as well as education of LEP groups for methods of accessing those alert systems, especially in native languages.

Recommendations

Challenges will continue for all communities in the delivery of risk communication. A review of the local media's current practice in providing English only alerts during severe weather indicates, a need for process improvement in the delivery of risk communication. Most metropolitan communities and many smaller communities are now comprised of persons with very diverse cultural backgrounds and languages. Local legislative and policy changes may be warranted in order to accomplish a change in this outdated practice of delivering English only risk communication to LEP population groups. In the mean time, educating LEP Hispanics/Latinos in how to access free weather alert systems in their native language, will be of

key importance and we must consider sending language specific messages through English-speaking modes. Appropriate risk communication is critical when disaster events are imminent.

A more robust research study is needed in regard to the elderly LEP population groups. The poor representation of the elderly Hispanics and Latinos for this study causes great concern in regard to disaster preparedness and response. A multitude of factors for the elderly may affect timely evacuation to shelter areas. Of key importance, how do the elderly LEP Hispanics/Latinos receive severe weather information and how do they respond, or can they respond to the warnings? Are there multiple generations living in one home? Must they rely on family members for severe weather alert information, as well as assistance with evacuation if needed?

There are future opportunities to expand on this study by developing a more inclusive, in depth survey tool, that assesses home environments. The survey tool might consider English-speaking persons who are able to translate, elderly, young children or disabled living in one dwelling, with a consideration for pets. Available transportation, mobile home residents and the nearest shelters, also need to be considered in the study, in an effort to assess ability of all persons living in the home to respond safely and in a timely manner.

Lastly, comments provided on the survey warrant further review and education regarding community sirens and getting to a safe shelter. Comments included:

- “Se busca pero abeses no entodas la viviendas no hay sotano”. (“Seeks but sometimes not all households have basements”).
- “No information on tornados until someone alerts you to seek refuge, as live outside of town and do not hear the sirens”.
- “Do not know what the sirens mean”.
- “Not always able to hear sirens”.
- “Too far out in the country”.
- “Sirens sound outside only, not inside buildings. Not able to hear inside while at work”.

A wider community of interest for this study on severe weather warnings would be to include all health departments in Nebraska. There are definite educational opportunities regarding severe weather preparedness across the life span, for all communities. This study focused on Hispanics and Latinos in Nebraska, however, results from this study could transfer to other LEP population groups who reside in Nebraska as well. It will be key in providing language appropriate weather warnings to all population groups, not just English-speaking groups. It will be especially important to educate LEP groups for methods in accessing alert systems, especially in native languages.

Witnessing the destructive power and fury of a tornado is a very humbling experience. Lives are forever changed in a matter of moments. Timely, accurate, language and culturally specific severe weather warnings are imperative, for the safety of many limited English proficient communities.

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APPENDIX – A
COVER LETTER

The Health Department in cooperation with the University of Nebraska Medical Center (UNMC) is conducting a research project. The purpose of this study is to identify how severe weather warnings are received and responded to. I am inviting you to participate in the study by completing this survey. This is a voluntary and confidential survey and no personal identifying information will be requested. The survey will take approximately 5 minutes to complete. **DO NOT WRITE YOUR NAME OR ANY PERSONAL INFORMATION ON THIS FORM.** Please, complete survey one time only.

For additional information, questions, or concerns, please contact me at:
joan.nelson@unmc.edu

Thank you for your participation.
Joan Nelson BSN, RN

APPENDIX – B**SEVERE WEATHER WARNING SURVEY**

1. Are you of Hispanic, Latino or Spanish origin? (Yes/ No)
2. What County do you live in? _____
3. What is your age? 19 – 30
31 – 45
46 – 65
Over 65
4. What is your gender? (Male/ Female)
5. What is your highest level of education?
Elementary School
Some High School
High School Graduate
Some college courses
College Graduate
6. What is your Native language? _____
7. How well do you speak English? (Very Well/ Less than Very Well)
8. How well do you understand spoken English? (Very Well/ Less than Very Well)
9. How well do you read English? (Very Well/ Less than Very Well)
10. Do you listen to the radio? (Yes/ No)
11. Where do you listen to the radio?
 - At home
 - At work
 - In the car
 - Other _____
12. Do you listen to the radio in:
Spanish?
English?
Both?
13. Have you ever heard severe weather announcements on the radio that warned of dangerous weather conditions and helped you decide actions to take during severe weather in your area? (Yes/ No)
14. Do you watch television? (Yes/ No)

15. Where do you watch television?
- At home
 - At work
 - Other _____
16. Have you ever heard or seen information on television that warned you of dangerous weather conditions and helped you decide actions to take during severe weather in your area? (Yes/ No)
17. Do you have a landline telephone? (Yes/ No)
18. Do you have a mobile telephone? (Yes/No)
19. Do you have Internet access for a computer or mobile phone? (Yes / No)
20. Where do you use the Internet?
- At home
 - At work
 - Other _____
21. Have you ever heard or seen information on a computer or mobile phone that warned you of dangerous weather conditions and helped you decide actions to take during severe weather in your area? (Yes/ No)
22. Have you ever received weather warnings on your phone during severe weather in your area? (Yes/ No)
23. Do you have a National Oceanographic and Atmospheric Administration (NOAA) weather radio? (Yes/ No)
24. Have you ever received, weather warnings on a (NOAA) weather radio to help you decide actions to take during severe weather in your area? (Yes/ No)
25. Do you hear severe weather sirens in your area? (Yes/ No)
26. Have you ever been warned of possible tornados by severe weather sirens in your area? (Yes/ No)
27. If severe weather sirens were heard, what actions did you take?
- Seek shelter
 - Seek further information regarding alert/warning
 - Continue with activities you were doing prior to alert/warning
28. Have you ever experienced a tornado event? (Yes/ No)
29. If you have experienced a tornado event in the past, what actions did you take to protect yourself and your family?
- Seek shelter
 - Seek further information regarding alert/warning
 - Continue with activities you were doing prior to alert/warning

****THANK YOU FOR PARTICIPATING IN THIS SURVEY****

APPENDIX – C
CARTA DE PRESENTACIÓN

El Departamento de Salud, en cooperación con la Universidad de Nebraska Medical Center (UNMC) está llevando a cabo un proyecto de investigación. El propósito de este estudio es identificar como son recibidas y respondidas a los avisos de tiempo severo. Le estoy invitando a participar en el estudio completando este cuestionario. Esto es un cuestionario voluntario y confidencial y ninguna información de identificación personal serán solicitadas. El cuestionario le tomará aproximadamente 5 minutos para completar. **NO ESCRIBA SU NOMBRE O CUALQUIER INFORMACIÓN PERSONAL EN ESTE FORMULARIO.** Por favor, complete el cuestionario sólo una vez.

Para información adicional, preguntas o preocupaciones, por favor comuníquese conmigo a: joan.nelson@unmc.edu

Gracias por su participación.
Joan Nelson BSN, RN

APPENDIX – D
CUESTIONARIO DE AVISO DE TIEMPO SEVERO

1. ¿Es de origen Hispano, Latino o Español? (Sí / No)
2. ¿En qué condado vive? _____
3. ¿Cuál es su edad? 19 – 30
 31 – 45
 46 – 65
 Más de 65
4. ¿Cuál es su género? (Masculino / Femenino)
5. ¿Cuál es su nivel más alto de educación?
 Escuela primaria
 Algunos estudios secundarios
 Graduado de escuela secundaria
 Algunos cursos universitarios
 Graduado de la universidad
6. ¿Cuál es su idioma nativo? _____
7. ¿Qué tan bien habla Inglés? (Muy Bueno / Menos que Muy Bueno)
8. ¿Qué tan bien entiende inglés hablado? (Muy Bien / Menos que Muy Bien)
9. ¿Qué tan bien lee inglés? (Muy Bien / Menos que Muy Bien)
10. ¿Escucha la radio? (Sí / No)
11. ¿Dónde escucha la radio?
 - En casa
 - En el trabajo
 - En el coche
 - Otro _____
12. ¿Escucha la radio en:
 - ¿Español?
 - ¿Inglés?
 - ¿Ambos?
13. ¿Alguna vez ha escuchado anuncios de avisos de tiempo severo en la radio, que advirtió de condiciones meteorológicas peligrosas y le ayudó decidir acciones para tomar durante tiempo severo en su área? (Sí / No)
14. ¿Ve la televisión? (Sí / No)

15. ¿Dónde ve televisión?

- En casa
- En el trabajo
- Otro _____

16. ¿Alguna vez ha escuchado o ha visto información en la televisión que le advirtió de condiciones meteorológicas peligrosas y le ayudó decidir acciones para tomar durante tiempo severo en su área? (Sí / No)

17. ¿Tiene un teléfono de línea fija? (Sí / No)

18. ¿Tiene un teléfono celular / móvil? (Sí / No)

19. ¿Tiene acceso a Internet para una computadora o un teléfono móvil? (Sí / No)

20. ¿Dónde se utiliza el Internet?

- En casa
- En el trabajo
- Otro _____

21. ¿Alguna vez ha escuchado o ha visto información en una computadora o teléfono móvil que advirtió de condiciones meteorológicas peligrosas y le ayudó decidir las acciones para tomar durante tiempo severo en su área? (Sí / No)

22. ¿Alguna vez ha recibido avisos en su teléfono durante tiempo severo en su área? (Sí / No)

23. ¿Tiene un radio del tiempo de una Administración Nacional Oceanográfica y Atmosférica (NOAA)? (Sí / No)

24. ¿Alguna vez ha recibido, avisos del tiempo en una radio de tiempo de (NOAA) para ayudarle decidir acciones para tomar durante tiempo severo en su área? (Sí / No)

25. ¿Escucha sirenas de tiempo severo en su área? (Sí / No)

26. ¿Ha sido avisado alguna vez de posibles tornados por sirenas de tiempo severo en su área? (Sí / No)

27. ¿Si sirenas de tiempo severo se han escuchado, qué acciones tomó?

- Buscar refugio
- Buscar más información sobre alerta / aviso
- Continuar con actividades que estuvo haciendo antes de alarma/aviso

28. ¿Alguna vez ha experimentado un acontecimiento de tornado? (Sí / No)

29. ¿Si ha experimentado un acontecimiento de tornado en el pasado, qué acciones tomó usted para protegerse a usted y su familia?

- Buscar refugio
- Buscar más información sobre alerta / aviso
- Continuar con actividades que estuvo haciendo antes de alarma/aviso

****GRACIAS POR PARTICIPAR EN ESTE CUESTIONARIO****