Weather Awareness among Hispanics in Oklahoma City, Oklahoma

Student:
Aisha S. Muhammad
University of Oklahoma

Mentors:
David L. Andra, Jr.
Richard Smith
Mike Foster
National Weather Service Forecast Office
Norman,OK

Abstract

This study investigates public weather awareness within the Hispanic population of Oklahoma City by gathering information on how, when and where hazardous weather information is received, understood and acted upon by the Spanish-speaking community. In evaluating and assessing the credibility and availability of Spanish weather information, this study will attempt to uphold a null hypothesis which states that there is a significant difference in the availability and perception of hazardous weather information based upon the Spanish-speaking demographics of age, gender, education, time of residency and primary language spoken at home. A survey was publicized by radio, online and distributed in person at a local community center. Statistical models were intended to show the distribution of Spanish-speaking demographics in relation to knowledge of weather awareness. At the end of a two-week period, 35 surveys were completed and an assessment was performed. Results suggest that a larger sample size and an unbiased, random systematic test would be required to perform a statistical analysis; however, the descriptive results given provide insight to weather awareness and Hispanic communications.

1. Introduction

In 2003, the U.S. Census Bureau reported Hispanics constituted one-seventh of all people in the United States, the majority of whom lived in Florida and the states bordering Mexico (USA Today, 2005). The growing Hispanic population in the United States has brought about the necessity to convey weather and other public safety information in Spanish. According to the 2000 U.S. Census Bureau, the state of Oklahoma's Hispanic population more than doubled in the last decade from 1990-2000. The Hispanic population growth was roughly 108%, raising the Hispanic population to approximately 179,000 individuals. Overall this population growth accounted for 9.6% of the state's population growth (USA Today, 2005). Nationally, there were many other states that are not usually considered of high Hispanic concentration with notable Hispanic population growths. Over the decade of 1990-2000, Arkansas had a Hispanic population growth of 344%; Nevada – 225%; Iowa – 169%; Mississippi – 168%; Indiana – 125%; and Oklahoma at 108% (Crouch 2005). With such a rapid Hispanic population increase nationally, there is an equal increasing need to relay important weather information in Spanish to all parts of the nation.

In Oklahoma City, Oklahoma, there are also Hispanic demographics that warrant hazardous weather information to the Spanish speaking public. The Hispanic population in Oklahoma accounts for about 10.1% of the total population, roughly 51,000 individuals. Of those 51,000, 71.8% reported that Spanish was the primary language spoken at home (~37,000). More interestedly, of the population 44.3% reported that they spoke English less than "very well" (~23,000) (US Census Bureau, 2003, 2005).

Until relatively recently, commercial Spanish language radio and television broadcasting stations (including Telemundo and Univision) were the nearly exclusive sources for direct translations and broadcast of day to day weather forecasts and hazardous weather information in the U.S. Only a handful of National Oceanic and Atmospheric Administration (NOAA) Weather Radio stations broadcast in Spanish and then only a few southern cities. Much more recently, the National Weather Service (NWS) Weather Forecast Offices (WFOs) within the Southern Region of the NWS developed Spanish language forecasts, watches, warnings, advisories and hazardous weather outlooks and distributed the information via internet web pages. These experimental, literal automated translations are now operational for the 32 Weather Forecast Offices in 10 southern states from New Mexico to Georgia and Florida, plus Puerto Rico and the U.S. Virgin Islands (Trumbla 2005).

While technology has yielded improvements in the communication of hazardous weather information, little research has been performed to assess the availability of these resources and their effects on Hispanic individuals. Although these resources to create automated voice and text-translations were made available, the lack of research into their credibility and effectiveness is probably the result of many factors. First, automated translations that appear on television broadcasts (on both English and Spanish networks), radio and the Internet are still relatively new and in some cases still experimental.

Second, dissemination resources are concentrated in areas with dense Hispanic population; therefore, areas that are more prone to severe weather but have a smaller Hispanic population are less likely to receive this technology. For example, Oklahoma City with a 10.1% Hispanic population (US Census 2000, 2005) and known for its

frequency of hazardous weather events has just recently updated its NWS websites for experimental Spanish-translations whereas San Diego, California, with a 25.4% (US Census 2000, 2005) Hispanic population and a prone impact site for earthquakes has been operating an experimental translated Spanish NWS website for several months prior. Third, validation and effectiveness cannot be judged based on the population as a whole. Different cultural demographics such as age, gender, education, etc., can determine how information is received or interpreted.

This study investigates public weather awareness within the Hispanic population of Oklahoma City by gathering information on how, when and where hazardous weather information is received, understood and acted upon by the Spanish-speaking community. In evaluating and assessing the credibility and availability of Spanish weather information, this study will attempt to confirm a null hypothesis which contends that there is a significant difference in hazardous weather information based upon the Spanish-speaking demographics of age, gender, education, time of residency and primary language spoken at home. A survey focusing on severe weather terminology and common information was publicized via a radio public service announcement (PSA), made available on the internet and distributed at a Hispanic community center for completion.

The methodology involving the production of the survey and ways in which data was collected and analyzed is included in Section 2. Section 3 summarizes the results. Discussion of the limitations, recommendations, validations, and future works is then presented in Section 4.

2. Methodologies and Data Collection

This study required the collection and analysis of surveys completed by Hispanic individuals in Oklahoma City. The survey was modeled after previous weather awareness surveys conducted by Dr. Eve Gruntfest of the University of Colorado, Colorado Springs. Her work involving flash flood events and public awareness served as the basis for the Oklahoma City survey (Gruntfest 1998). The Gruntfest survey was modified to achieve a severe convective weather focus and assess the knowledge of weather information sources and their use. The survey also aimed to discover opinions involving factors of severe weather and misconceptions about meteorological terminology, such as the use of severe weather watches and warnings.

Dr. Wilson Gonzalez-Espada of the Arkansas Tech University assisted in the translation of the survey from English to Spanish. Automated translated texts would have been of assistance; however, literally translated words and phrases from one language to another misinterpret significant meanings and are often inaccurate and imprecise. For example, the term *severe weather* in English is synonymous with the term *mal tiempo* in Spanish, however, literally translated, these phrases do not carry the same meaning. *Severe weather* literally translated in Spanish is *tiempo severo*, but this is not an idiomatic term conducive to convective weather in the Spanish language. The term for *severe weather* in Spanish is *mal tiempo*; however, literally translated in English, its meaning is *bad weather* (Appendix B) (Espada, W., personal communication).

KTUZ television and radio advertised the survey on their website (www.ktuz.com), and KTUZ radio broadcast a public service announcement (PSA) to promote the survey from July 18 – July 29, 2005. The PSA was transmitted on KTUZ

radio to Hispanic listeners that directed them to either the Latino Community and Development Agency to complete a survey in-person or to visit ktuz.com to complete a survey online. Surveys were conducted in-person (face-to-face) at the Latino Community and Development Agency of Oklahoma City from 9 a.m. to 5 p.m. Monday through Friday from July 18 – July 29, 2005. Surveys completed online after July 29, 2005, will not be used in this study but will be considered in future work.

The surveys gathered and completed on-site and online within the two-week period were sorted and cataloged according to gender, age, education, time of residency, and primary language spoken at home. Using an Excel spreadsheet, these demographics were analyzed against the responses to the questions in order to use statistical models.

The method of analysis had several limitations: (1) Individuals who completed the surveys may have provided false information or completed the survey incorrectly, both of which were grounds for rejection. (2) Without a minimum sample size, statistics could not be performed. (3) If the distribution among the demographics of the sample size and the answers were not significant, statistics could not be used. However, if accurate surveys were completed, a minimum sample size could be achieved and if distributions were significant within Hispanic demographics, these limitations should not interfere with observing differences for a statistical study.

3. Results

From the surveys that were completed online at the KTUZ website and face-to-face at the Latino Community and Development Agency, 37 total surveys were completed. A total of 35 valid surveys were obtained for analysis, all of which were from the community center. The two surveys that were completed online were disregarded because they were incomplete and frivolous. Statistical analysis was attempted; however, could not be performed. The remainder of this section examines various relationships within different questions based on significant and notable findings.

3a. Interpretations of Severe Weather Watches and Warning

Basic familiarity with meteorological terminology is essential to understand important information in times of severe weather. Knowing the correct definitions and correct safety precautions to take during the issue of a severe weather watch or warning could be crucial to protecting one's life or property. In question 6 of the survey, participants were asked to identify the correct definition of a Severe Weather Watch and Warning. Given the opportunity to choose the incorrect answer, the correct answer, and an answer choice of "I don't know," an overwhelming majority choose the last answer (Fig 1). When also asked in questions 7 and 8 (Appendix A) about which NWS facilities office issued a watch and a warning, the majority of the individuals also answered that they did not know. In fact, little knew of which facility who issued a severe weather warning (Fig 2b) and no one know of which facility was responsible for severe weather watches (Fig 2a). The lack of knowledge for the relative threat levels of severe weather watches and warnings was also notable. Questions 11 and 12 (Appendix A) from the survey asked of possible actions that would be taken during a severe weather watch and

warning. The two questions yielded the same response. The highest percentage of 35 individuals would take the same action of "looking outside" rather than verifying this information with another source or seeking shelter (Fig 3 (a-b)). Despite the misinterpretations of definitions, survey respondents seemed to be content with the frequency and lead time for watches and warnings during times of severe weather (Fig 4 (a-b)).

3b. Important Sources of Weather Information

Prior to the analysis of the data, it was assumed that sample size, the 35 individuals, primarily speaking Spanish, would prefer Spanish weather sources over English sources that could otherwise not be understood. However, when asked in question 2 (Appendix A) to respond to all sources of weather information, the majority found that television in English was superior to television in Spanish, the Weather Channel and NOAA weather radio or local radio stations (Fig 5). The same findings were apparent in question 5 (Appendix A) when asked of the most important source of weather information. The majority again preferred television in English to any other source (Fig 6).

3c. Factors that Constitute Severe Weather

There are many definitions and interpretations of what constitutes severe weather. Location is a key factor in establishing a definition of severe weather. Oklahoma City, Oklahoma, has notable convective severe weather. When asked in questions 16 and 17 (Appendix A) whether individuals lived in an area of severe weather or if they had experienced severe weather in their lives, the majority of the 35 participants agreed (Fig 7). When later asked what factors they believed constituted severe weather, there were

an array of answers (Fig 8). The high percentages were heavy rain, tornados, varying sizes of hail, and 70 mph winds.

3d. Distribution Inconsistencies

There were a series of questions or statements in the survey which asked the individuals to rank their agreement or disagreement to the statement based on a scale of 1 to 9, 1 categorized as Strongly Agree and 9 as Strongly Disagree. A discrepancy in satisfaction arose when asked two particular questions. In question 25 (Appendix A), the statement of "I know how to prevent my family and myself from harm during severe weather" was given (Fig 9a). When asked about agreement, most people answered that they were quite knowledgeable in this subject. In the following statement, question 26 (Appendix A), the statement "I think I would have been better prepared for severe weather if I had received more information in Spanish" was also given (Fig 9b). Similarly, respondents also strongly agreed. These results are not consistent with one another and contrast in the issue of what the respondent "assumes" that they know and what they believe they need.

4. Conclusion

While the above results suggest that the null hypothesis was upheld the lack of statistical measures leaves doubt. However, based upon these particular results, there is not a significant difference in hazardous weather information based upon the Spanish-speaking demographics of age, gender, education, time of residency and primary language spoken at home. It is possible, however, that if the sample size were larger, the null hypothesis may have been rejected. Nevertheless, descriptive analysis did provide

insight in how a limited size of the Hispanic population is interpreting the available weather information which can help in improving communications by clarity and understanding.

In addition, the sampling of the population was not random which introduced bias and likely skewed results. The Latino Community and Development Agency of Oklahoma City is available for low-income families to receive free health care, free prenatal care, free child assistance, and help with living accommodations and expenses. Therefore, the sample size and results likely are skewed toward a particular demographic.

There are a variety of ways in which this project could be improved upon and continued if time permitted. As noted earlier, the sample size was small and likely biased because of the locations used to gather survey responses. With more time and a wider range of locations within Oklahoma City that account for a wider range of demographics, a systematic randomized trial could be conducted and more surveys could be collected to add for more distributions for a statistical analysis. Also, a shorter survey should be drafted that is less reliant on meteorological terminology and more focused on the cultural idiosyncrasies of the Spanish language in relation to weather. The terms and phrases used in meteorology constitute a language of its own. When critical weather information is presented in a foreign language to a population that has a low literacy rate in its own language, barriers exist alone. Informational brochures could also be used to inform the Hispanic public of weather information, especially severe weather information that could save lives and property.

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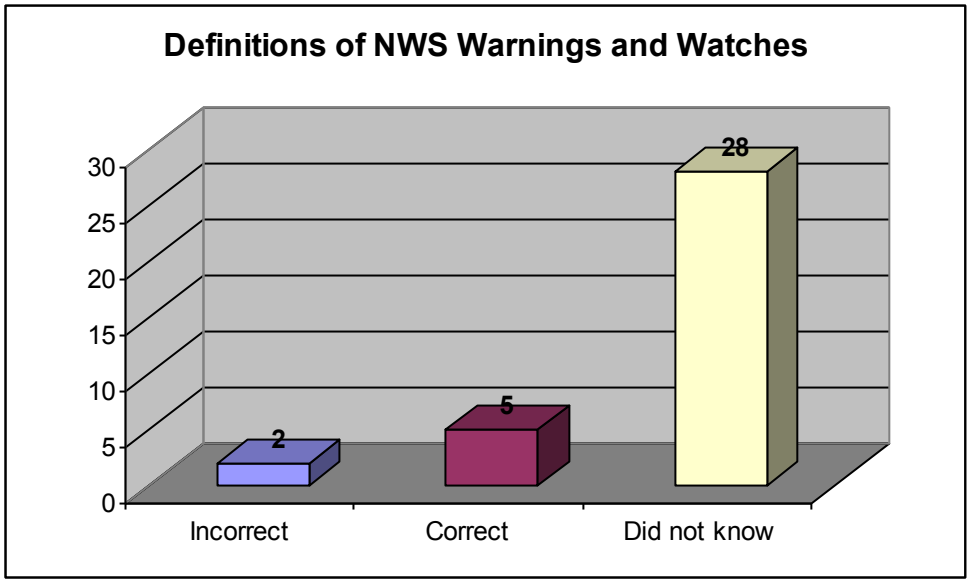


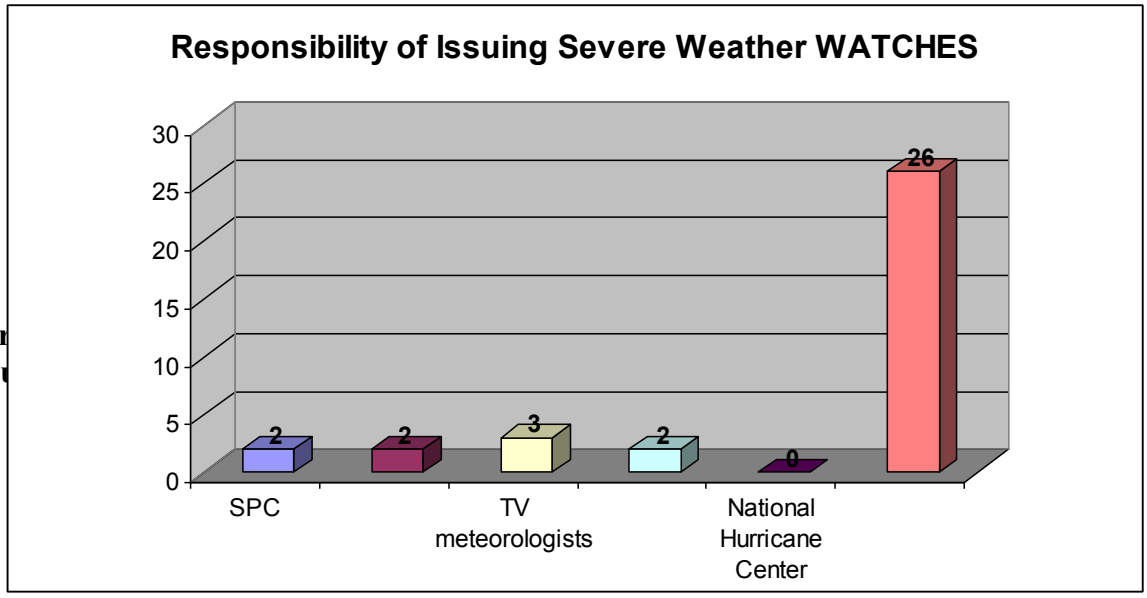
Figure 1: Number of individuals who answered the question: "What is the correction definition of an NWS Watch and Warning?" Total number of participants was 35.

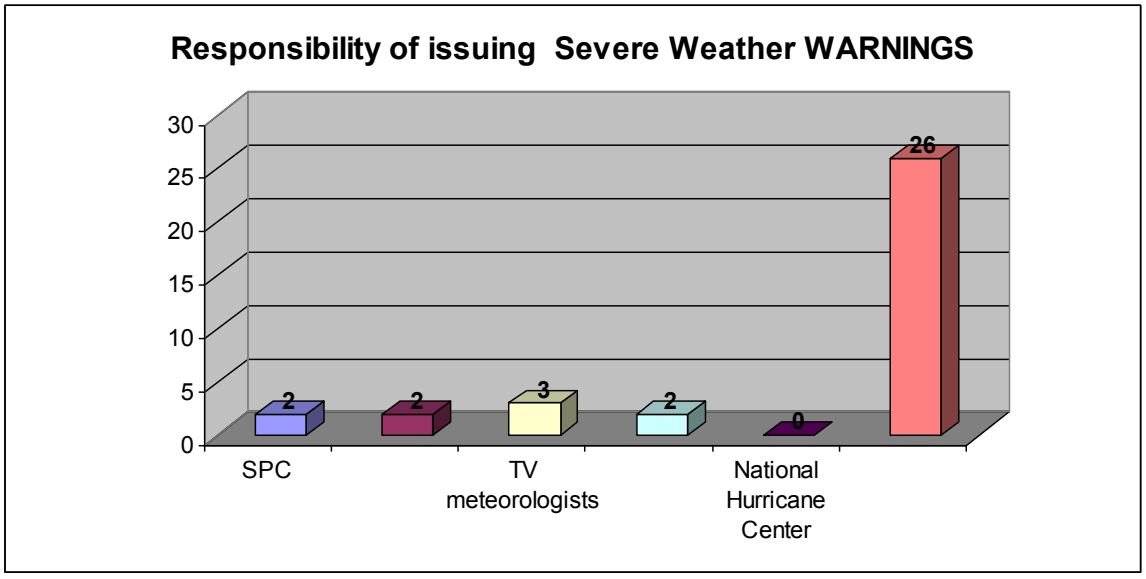
gure 2b. Histogram showing the distributions of responses when asked "Who is sponsible for issuing severe weather WARNINGS?" Total participant number was 35.

NWS WC Did not know

Figure 2 (a-b) Responses of individuals when asked the responsibility of who issues NWS severe weather Warnings and Watches

Figure 2a. Histogr
esponsible for issu





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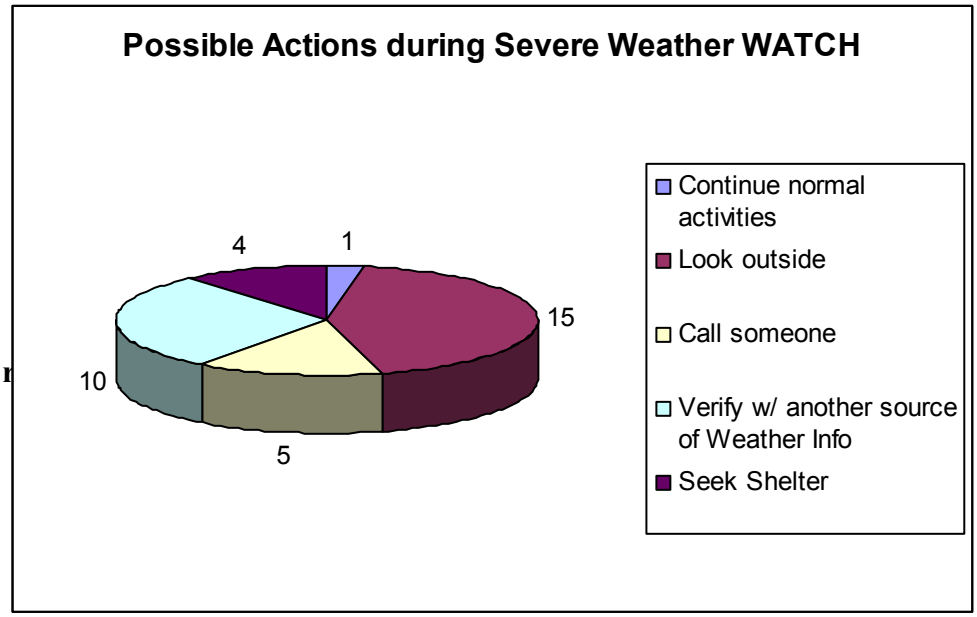

ıre 3a. Distribution of r
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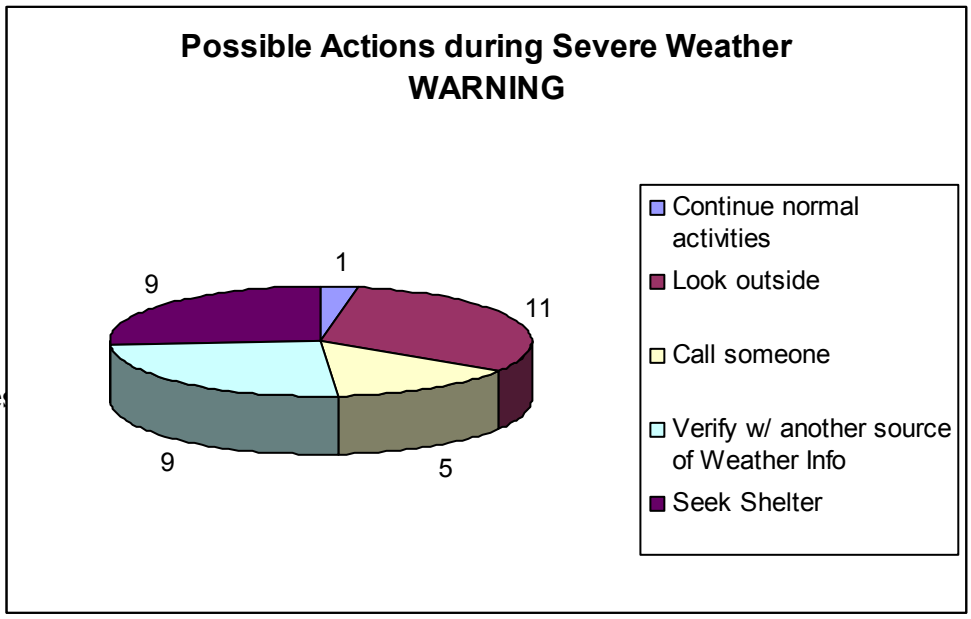

e 3b. Distribution of res
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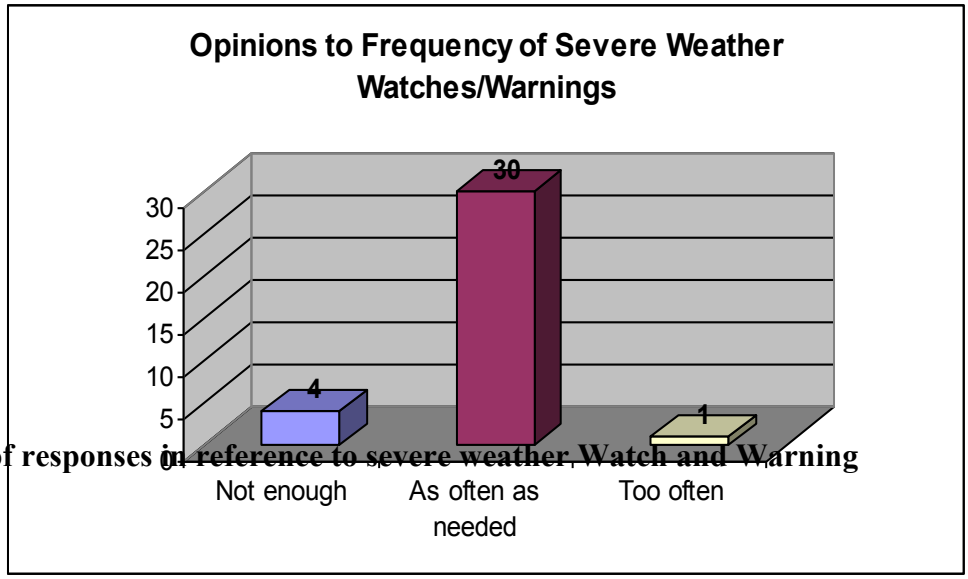
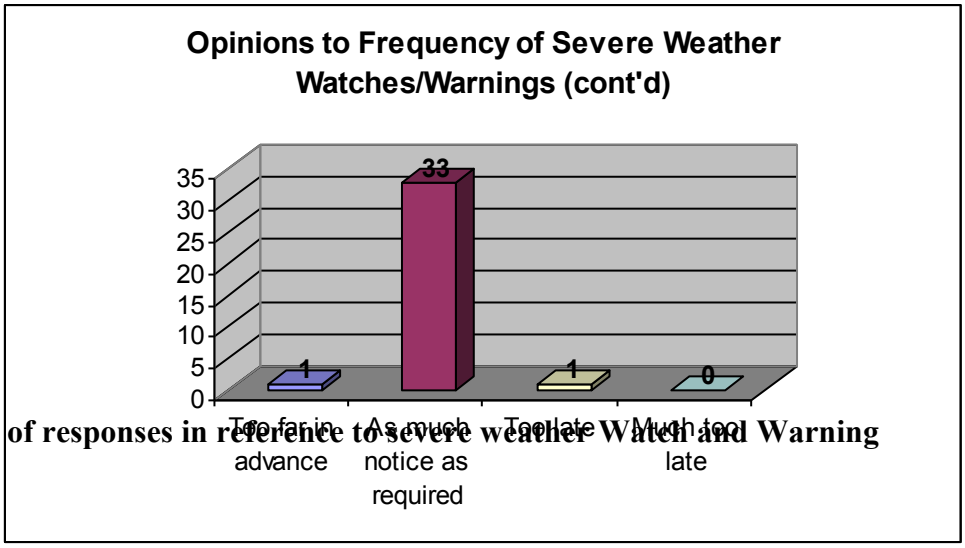
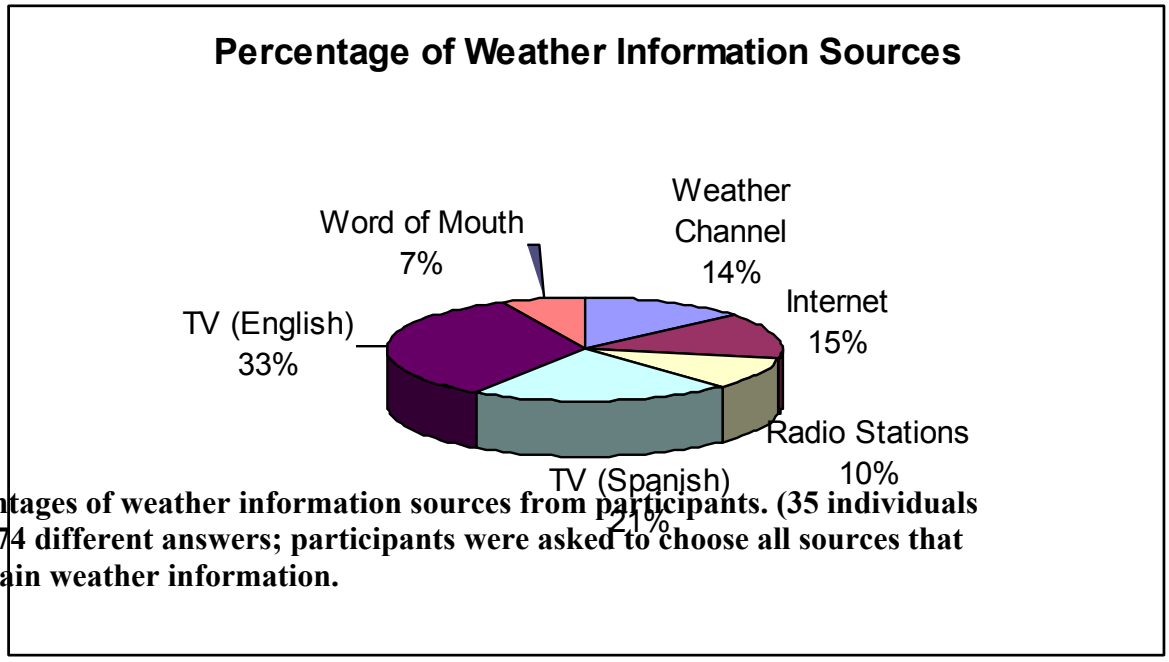
: weather watches and warnings.



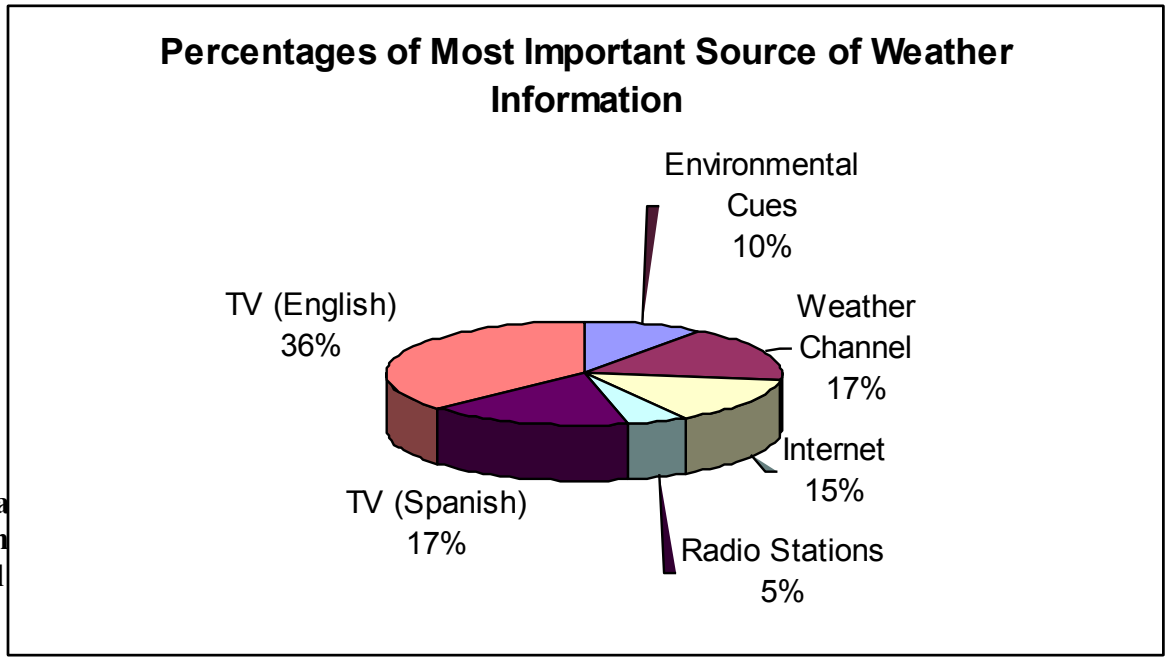
ıre 4a. Distribution of responses in reference to severe weather Watch and Warning uency.



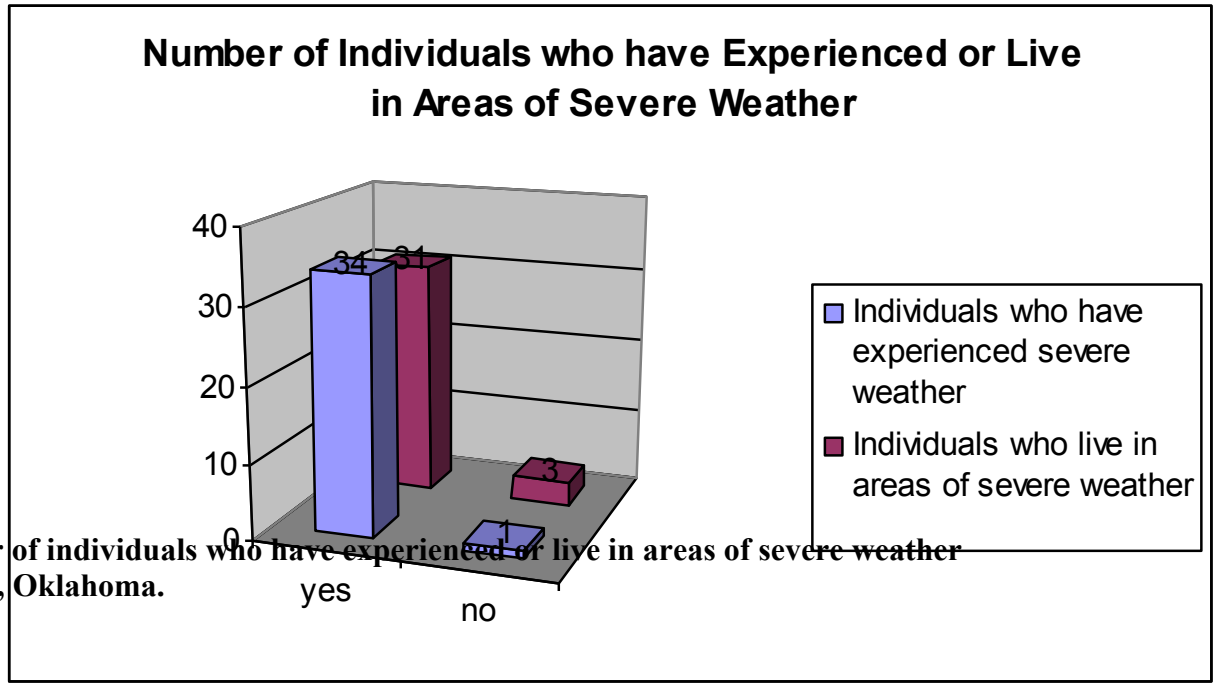
gure 4a. Distribution of responses in reference to severe weather Watch and Warning ıd time.



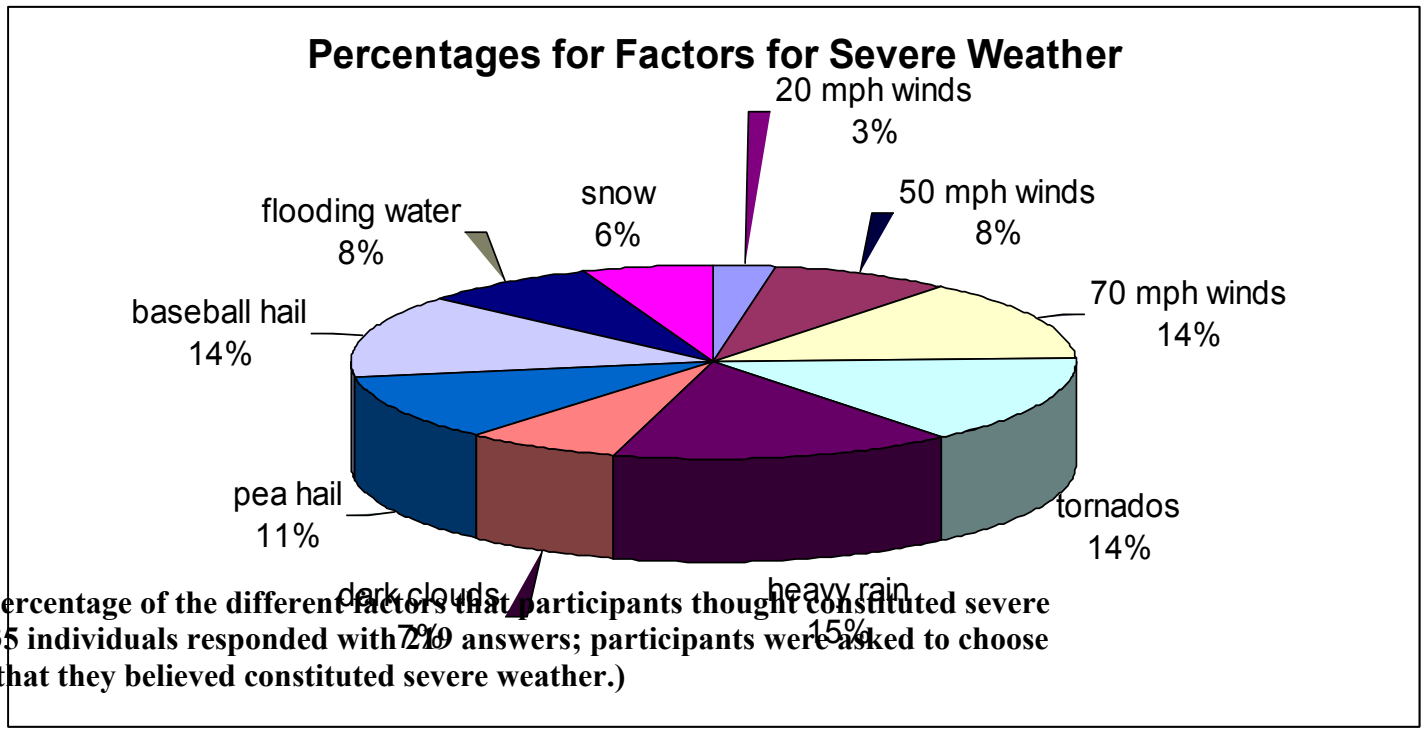
ıre 5. Percentages of weather information sources from participants. (35 individuals onded with 74 different answers; participants were asked to choose all sources that e used to obtain weather information.



ıre 6. Percenta icipants. (35 in d to choose all



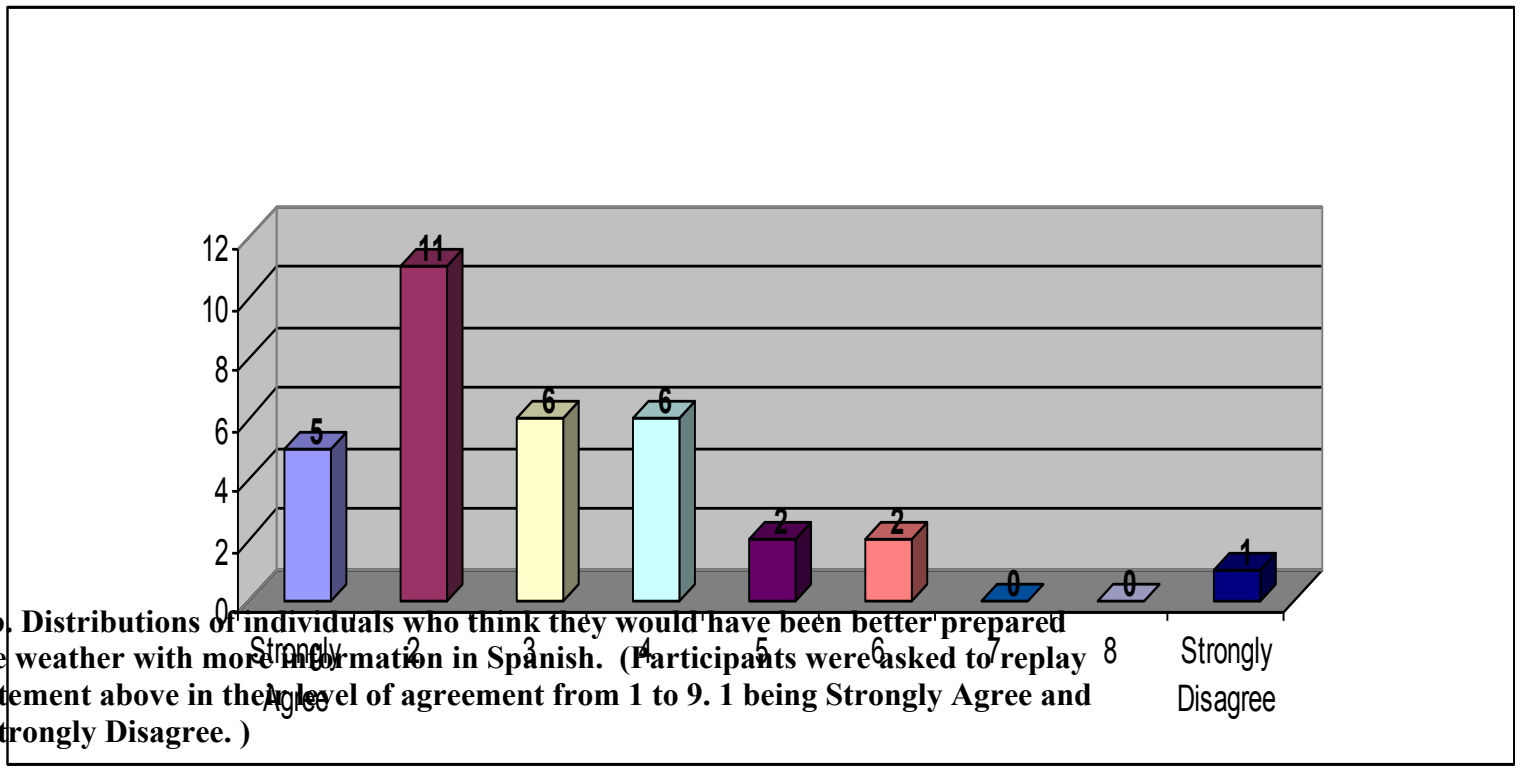
e 7. Number of individuals who have experienced or live in areas of severe weather lahoma City, Oklahoma.



e 8. Percentage of the different factors that participants thought constituted severe er. (35 individuals responded with 210 answers; participants were asked to choose tors that they believed constituted severe weather.)

I know how to prevent my family and myself from harm during severe weather.

hink I would have been better prepared for severe weather if I had received more information in Spanish.



)b. Distributions of individuals who think they would have been better prepared re weather with more information in Spanish. (Participants were asked to replay :atement above in the level of agreement from 1 to 9. 1 being Strongly Agree and Strongly Disagree.)

Appendix A

Weather Awareness Survey in English

Appendix B

Weather Awareness Survey in Spanish