



ANNOTATED BIBLIOGRAPHY

Emergency Alerts and Language Access



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Overview

This annotated bibliography includes resources focused on linguistically diverse populations and language access in emergency alert systems. This bibliography includes references published in the last 20 years (2003-2023), in English, and focused on the United States. This bibliography supports the State of Colorado’s Inclusive Language Bill HB23-1237. These references were compiled through searching Web of Science, EBSCOhost, ProQuest, Google Scholar databases, and agency websites. Contact melissa.villarreal-1@outlook.com with questions.

ACADEMIC JOURNAL ARTICLES AND MASTER’S THESES	3
AGENCY REPORTS AND STATEMENTS	19
NEWS REPORTS	20



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Citation

Abukhalaf, A. H. I., and J. Von Meding. (2021). Integrating international linguistic minorities in emergency planning at institutions of higher education. *Natural Hazards*, 109(1), 845–869. <https://doi.org/10.1007/s11069-021-04859-7>

Abstract

Research concerning the behavior of international linguistic minorities at institutions of higher education during disasters is very limited. Many international groups suffer from discrimination based on language (linguicism) during disasters—their stories are not being told, and their voices are not being heard. The main objective of our study is to develop new knowledge about disaster-related behaviors of international linguistic minorities at institutions of higher education with a view toward enhancing overall campus emergency planning. Qualitative and quantitative methods were used to collect and analyze data; 62 subjects from the international community at University of Florida (UF), including foreign employees, international students, and foreign dependents, were surveyed shortly after the hurricane Dorian alert on campus. Additionally, 10 subjects from the UF international community were interviewed. The data analysis sought to provide insights into one main question: What were the key challenges facing international linguistic minorities at UF campus during the hurricane Dorian alert? Three comprehensive groups of challenges were found; disaster knowledge deficit and false perceptions, generic emergency communication, and inadequate disaster preparedness. The research findings provide insight into the experience of culturally different groups and offer practical and critical policy insights that help in developing more efficient disaster mitigation plans, and disaster risk-reduction strategies.

Citation

Abukhalaf, A. H. I., and J. Von Meding. (2021). Psycholinguistics and emergency communication: a qualitative descriptive study. *International Journal of Disaster Risk Reduction*, 55, 1-9. <https://doi.org/10.1016/j.ijdrr.2021.102061>

Abstract

Psycholinguistics is a field in behaviorism science that was established by George Miller to study the psychological impact of languages on the human mind. Specific research and application of psycholinguistics in emergency communication are limited, where it is often purely analyzed under language barriers. The main objective of this study is to develop new knowledge about Psycholinguistic in emergency communication through highlighting some of the communication gaps that are usually overlooked in emergency planning, and provide some recommendations in order to improve the overall emergency communication systems by reconsidering the way we look at language as an important psychosocial factor that impacts vulnerable communities.

Previous research studies in psychology, linguistics, and emergency communication were critically analyzed, and a qualitative methodology, involving semi-structured interviews with ten subjects from Gainesville, Florida, who speak English as a second language, was chosen in order to provide a flexible approach to broadly explore the phenomenon that is being studied. This study provided insights into one main research question: how can different languages influence our understanding of emergency notification? 5 main themes were found; gaps in direct translation, variations in emotional impact, variations in grammatical language structure, fusion attitudes, and lack of technical terminology.

Citation

Ahlborn, L., Franc, J.M., and Sports Med, D. (2012). Tornado hazard communication disparities among Spanish-speaking individuals in an English-speaking community. *Prehospital and Disaster Medicine*, 27(1), 98-102. <https://doi.org/10.1017/S1049023X12000015>

Abstract

Background: The state of Oklahoma, known for destructive tornados, has a native Spanish-speaking (NSS) population of approximately 180,241, of which 50% report being able to speak English “very well” (US Census Bureau). With almost 50% of these native Spanish-speaking persons being limited English proficient (LEP), their reception of tornado hazard communications may be restricted. This study conducted in northeast Oklahoma (USA) evaluates the association between native language and receiving tornado hazard communications.

Methods: This study was a cross-sectional survey conducted among a convenience sample of NSS and native English-speaking (NES) adults at Xavier Clinic and St. Francis Trauma Emergency Center in Tulsa, OK, USA from September 2009 through December 2009. Of the 82 surveys administered, 80 were returned, with 40 NES and 40 NSS participants. A scoring system (Severe Weather Information Reception (SWIR)) was developed to quantify reception of hazard information among the study participants (1–3 points = *poor* reception, 4–5 = *adequate* reception, 6–8 = *excellent* reception). Pearson’s chi-squared test was used to calculate differences between groups with Yates’ continuity correction applied where appropriate, and SWIR scores were analyzed using ANOVA. *P*-values <.05 were considered significant.

Results: NSS fluency in English was 25.6%. No significant association was found between native language and those who watch television, listen to radio, have a National Oceanic and Atmospheric Administration (NOAA) All Hazards radio or telephone, or are in audible range of a tornado siren. NSS were less likely to have Internet access (*P* < .004), and less likely to know of local telephone warning programs (*P* < .03). The mean NSS SWIR score was 3.2 (95% CI, 2.8-3.7) while LEP NSS averaged 2.8 (95% CI, 2.4-3.2). The mean NES SWIR score was 4.5 (95% CI, 4.1-5.0).

Conclusion: Results demonstrate a disparity in tornado warning reception between NSS and NES. Poor English proficiency was noted to be 75% among NSS, which is approximately 25% more than estimated by the US Census Bureau. This study demonstrates a need for emergency

managers to recognize when appropriate and overcome communication disparities among limited English proficient populations.

Citation

Arlikatti, S., Taibah, H.A., and Andrew, S.A. (2014). How do you warn them if they don't speak Spanish? Challenges for organizations in communicating risk to Colonias residents in Texas, USA. *Disaster Prevention and Management*, 23(5), 533-550. <https://doi.org/10.1108/DPM-02-2014-0022>

Abstract

Purpose: The purpose of this paper is to examine the information channels used by public and nonprofit organizations to communicate disaster risk information to *Colonias* residents in Hidalgo County, Texas. It seeks to find creative and proactive solutions for organizations to improve risk education to these constituents.

Design/methodology/approach: Initially a snowball sampling technique was used to conduct six face-to-face interviews. This was followed by an online survey sent to 64 reputational referrals, of which 23 completed the survey, generating a response rate of 34 percent. A comparative analysis between public and nonprofit organizations and the Fischer's exact test were employed to analyze the data.

Findings: Channel preferences for providing risk information varied with public organizations using the television (TV) and the nonprofit organizations using bilingual staff for outreach. The television, radio, public events, and bilingual staff were considered to be the most effective while social media (Facebook, Twitter, and city web sites) was not considered at all by both groups. Lack of funding and staffing problems were identified as the primary challenges.

Research limitations/implications: One limitation is that the paper focusses on organizations serving Spanish speakers in the Texas *Colonias*. Future research needs to investigate how other localities at border sites where culturally and linguistically diverse groups might reside, receive and understand risk information. The role of cross-national organizations in creating internationally coordinated plans for disaster communication should also be explored.

Originality/value: It highlights the challenges faced by organizations in communicating risk, especially in border communities where culturally and linguistically diverse groups reside.

Citation

Benavides, A. and Arlikatti, S. (2010). The role of the Spanish-language media in disaster warning dissemination: an examination of the Emergency Alert System. *Journal of Spanish Language Media*, 3, 41-58. ISSN: 1940-0810.

Abstract

The Hispanic community is the fastest growing ethnic group in the U.S and is currently the largest minority group with tremendous buying power. This trend has seen a significant growth in the Spanish-language media in recent years. Along with the media's ability to entertain, comes the responsibility to educate and warn its audiences of eminent threats and disasters. This paper looks at the Spanish-language media's efforts to warn and prepare its listeners for local and national emergencies. The primary question examined is to see how prepared and equipped the Spanish-language media is to transmit disaster information and emergency weather announcements to the non-English speaking public. Current Federal Communication Commission regulations regarding the Emergency Alert System (EAS) and its ability to transmit multilingual alerts are examined. Suggestions are made for improving the EAS to accommodate non-English speaking population needs.

Citation

Benavides, A.D., Nukpezah, J. Keyes, L.M., and Soujaa, I. (2020). Adoption of multilingual state emergency management websites: responsiveness to the risk communication needs of a multilingual society. *International Journal of Public Administration*, 44(5), 409-419.
<https://doi.org/10.1080/01900692.2020.1728549>

Abstract

This article draws on the risk communication and responsiveness literature for theoretical context to investigate the adoption of multilingual websites at state emergency management agencies. It analyzes the 50 state websites on their multilingual presence of emergency-related information available to the public. It uses a binary logistic regression to model the determinants of their multilingual e-government usage for risk communication. The study reveals that state emergency management agencies adopt multilingual websites (1) to be responsive to the needs of populations who may not speak English, (2) to reduce state and immigrant vulnerability to disasters through effective risk communication, and finally (3) when better economic conditions prevail in their states. The study also supports the idea that public administrators are not driven by prevailing political and ideological sentiments in the states when making policies to communicate risk. By adopting multilingual websites, states are demonstrating that a multilingual society constitutes an important collective voice.

Citation

Bitterman, A., Krocak, M.J., Ripberger, J.T., Ernst, S., Trujillo-Falcón, J.E., Gaviria Pabón, A., Silva, C., and Jenkins-Smith, H. (2023). Assessing public interpretation of original and linguist-suggested SPC risk categories in Spanish. *American Meteorological Society*, 38(7), 1095-1106. <https://doi.org/10.1175/WAF-D-22-0110.1>

Abstract

Recent work has shown that the words used in the Storm Prediction Center's convective outlook are not easily understood by members of the public. Furthermore, Spanish translations of the outlook information have also been shown to have interpretation challenges. This study uses survey data collected from the Severe Weather and Society Spanish Survey, a survey of Spanish speakers across the United States, to evaluate how U.S. residents receive, understand, and respond to weather forecasts and warnings. For this experiment, respondents were tasked with ranking the words and colors used in the SPC's convective outlook. They were randomly assigned either 1) the words originally used by the SPC for Spanish translations or 2) a set of words suggested by linguistic experts familiar with Spanish dialects in the United States. We find Spanish speakers have similar challenges to English speakers when ordering the words the SPC uses. When using the translations proposed by the linguistic experts, we find the majority of Spanish speakers ranked the words in the intended order of associated risk. Spanish speakers also displayed similar ranking distributions for the colors in the outlook as English speakers, where both groups ranked red as the highest level of risk. These findings suggest the original translations used by the SPC convective outlook create barriers for Spanish speakers and that the expert translations more effectively communicate severe weather hazards to Spanish-speaking members of the public.

Citation

Carter-Pokras, O., Zambrana, R.E., Mora, S.E., and Aaby, K.A. (2007). Emergency preparedness: knowledge and perceptions of Latin American immigrants. *Journal of Health Care for the Poor and Underserved*, 18, 465-481. [10.1353/hpu.2007.0026](https://doi.org/10.1353/hpu.2007.0026)

Abstract

This paper describes the level of public emergency knowledge and perceptions of risks among Latin American immigrants, and their preferred and actual sources of emergency preparedness information (including warning signals). Five Latino community member focus groups, and one focus group of community health workers, were conducted in a suburban county of Washington D.C. (N=51). Participants came from 13 Latin American countries, and 64.7% immigrated during the previous five years. Participants had difficulty defining emergency and reported a wide range of perceived personal emergency risks: immigration problems; crime, personal insecurity, gangs; home/traffic accidents; home fires; environmental problems; and snipers. As in previous studies, few participants had received information on emergency

preparedness, and most did not have an emergency plan. Findings regarding key messages and motivating factors can be used to develop clear, prioritized messages for communication regarding emergencies and emergency preparedness for Latin American immigrant communities in the U.S.

Citation

de Onís, C.M., Cubelos, E., and Ortiz Chavarria, M.D.R. (2020). "No había humanidad": critiquing English monolingualism and other entwined systems of white supremacy in local emergency management responses. *Social Justice*, 47(1/2), 135-170. ISSN: 10431578

Abstract

In 2018, the City of Salem issued drinking water advisories for "vulnerable populations," after detecting cyanotoxins in the water supply. Informed by Spanish-speaking, Latinx community member testimonials and the authors' lived experiences, as well as drawing connections between other crisis contexts in Puerto Rico and Flint, Michigan, this essay details several communication problems involving English monolingualism and intersecting injustices. To do so, this article triangulates scholarship on disaster capitalism, risk communication, and border rhetorics to comprehend and challenge the dominant assumptions and practices shaping city-level responses in crisis situations. The conclusion suggests several interventions to transform oppressive emergency management ideologies and communication for more equitable, culturally and linguistically adapted alternatives.

Citation

Federici, F.M. (2022). Translating hazards: multilingual concerns in risk and emergency communication. *The Translator*, 28(4), 375-398.

<https://doi.org/10.1080/13556509.2023.2203998>

Abstract

Communicating the potential impact of local hazards in multilingual contexts reduces risks. Drawing the readers' attention to the terminology shaping the global disaster risk reduction agenda and underpinning many activities in the international humanitarian sector, the article introduces multiple facets of multilingual risk communication about hazards. Subdivided into three sections, the article presents factors that influence current studies and may advance future research into translating information concerning hazards and the risks they pose, as part of disaster reduction practices. The first section considers relationships between key terms influencing disaster risk reduction practices, as these terms create terminological barriers to enabling a broader understanding of local hazards among at-risk multilingual communities. The second section reflects on risk communication practices around education on hazards in relation to linguistic preparedness. The third section illustrates how key grey literature deems multilingual risk communication important while it struggles to reconcile the need to exploit

existing technologies to enhance resources for multilingual communication, with the absolute need for trust in the information. The conclusions map the field and the Special Issue, supported by a References list intended to draw the readers' attention to key perspectives that may stimulate and encourage future research focused on translating hazards.

Citation

Gaviria Pabón, A. (2022). *The role of disaster subcultures in Spanish speaking Hispanic/Latino immigrants in the United States* [Master's thesis, University of Oklahoma]. The University of Oklahoma OU-Theses. <https://hdl.handle.net/11244/336948>

Abstract

Having a diversity of climatic zones, the United States experiences different weather hazards and risks such as winter storms, tornados, droughts, hurricanes, among others depending on the geographic location. With Americans having a culture geared towards becoming a weather-ready nation, they may be more familiar with their emergency system than other communities living in the United States. According to the U.S. 2020 Census, Hispanics in the U.S. account for 18.9% of the total population, making them the second largest ethnic group. Coming from different places and having a diverse cultural background, the Hispanic/Latino community may be more vulnerable towards these hazards and disasters due to their lack of experience with such events in their country of origin and other factors such as language barriers. Hispanic/Latino Spanish speaking communities in the U.S. come from different places and depending from where one comes, some people may have different cultures of disaster response, or disaster subcultures. When it comes to understanding, interpreting, and acting on different information regarding weather and climate threats these factors can play a significant role. Additionally, inequities in weather risk communication such as translations from English to Spanish may also increase the vulnerability and challenges that this community faces when it comes to weather hazards. This research analyzes how cultural background and experiences or disaster subcultures from Hispanic/Latino immigrants in the United States affects the way they perceive, understand and act on severe weather risks. Using data from the Severe Weather and Society Survey 2022 Spanish version we analyze the differences between people who lived outside the U.S. versus people who did not and their perceptions, behaviors, and reporting understanding of severe weather risks. When doing the analysis, language barriers will also be taken into consideration. In addition, we also perform a qualitative analysis using data from interviews held after the December 10th, 2021, tornado outbreak within the Guatemalan community of Mayfield, KY. These results are presented and discussed using a disaster subcultures frame. When communicating different weather risks and threats, the weather enterprise needs to consider factors such as culture and experience to effectively communicate and transmit their weather risk information to diverse communities such as Spanish speaking Hispanic/Latinos.

Citation

Johnson, T.C. (2014). International students' perceptions of shelter-in-place notifications: implications for university officials. *Journal of International Students*, 4(3), 247-261. <https://doi.org/10.32674/jis.v4i3.465>

Abstract

Emergency notifications and shelter-in-place warnings on college and university campuses are generally issued in English and presuppose either a common shared language and culture or the adaptation of the warning system to a multilingual and multicultural social structure. This study examined the roles that language, culture, and emergency literacy played in international students' perceptions of shelter-in-place notifications on a college campus. Students from Sweden, Bulgaria, and Kenya were recruited to participate in a focus group shortly after they had experienced shelter-in-place warnings after an armed robbery occurred near their campus. These students were interviewed about their perceptions of emergency notification and shelter-in-place warnings. The study's results suggest that, while an international student may be proficient in the English language, cultural issues, local practices and customs, and emergency illiteracy may hinder international students from understanding and appreciating the need to shelter-in-place or engage in self-protecting actions during a violent crime.

Citation

Jung, A.R., Kristovski, K.D., Ulrich, J.W., and Brown, A.F. (2015). Understanding comprehension levels of emergency notifications by limited English proficient U.S. residents: case study of Korean-Americans in New York City. *Journal of Homeland Security and Emergency Management*, 12(4), 845-859. <https://doi.org/10.1515/jhsem-2014-0063>

Abstract

The overall goal of this study was to examine any validity of emerging concerns about the effectiveness and usefulness of a single language public messaging system in a linguistically diverse environment by evaluating the level of understanding of Notify NYC messages among Korean LEP residents of New York City. Three task oriented objectives were completed to address the goal of this study: (1) using past Notify NYC messages, a survey to test comprehension levels among Korean LEP residents was created; (2) the survey was administered among two population samples, Korean LEP and native English speaking (NES); and (3) statistical analysis was employed to correlate the data, conduct testing of three hypotheses, and develop appropriate conclusions. The results demonstrate that primary challenges with effective use of a single-language system in providing emergency communication to LEP residents stem from the language barriers that exist for this population category in the US. The positive pattern correlation and high coefficient of determination imply that improving the clarity of the emergency messages could enhance the overall message comprehension among the LEP US residents.

Citation

Kozo, J., Wooten, W., Porter, H., and Gaida, E. (2020). The partner relay communication network: sharing information during emergencies with limited English proficient populations. *Health Security*, 18(1), 49-56. [10.1089/hs.2019.0144](https://doi.org/10.1089/hs.2019.0144)

Abstract

Sharing information with people with limited English proficiency is a universal challenge. The County of San Diego has a diverse population and, as a result, language and access barriers present serious risks when communicating disaster and public health emergency information. In support of the “Live Well San Diego” vision of a county that is healthy, safe, and thriving, the County of San Diego Office of Emergency Services and Health and Human Services Agency, Public Health Services, worked to design a community-based program to address this critical issue. Program development included a literature review of existing strategies as well as gathering community input. Documented promising practices included: (1) community engagement during planning, design, and implementation of communication plans to create buy-in and a sense of ownership; (2) dissemination of translated messages; and (3) communication through culturally appropriate and trusted channels, including individuals, community groups, and organizations. Using a systematic approach, the program engaged leaders and community representatives of the top 6 languages spoken in San Diego (following English)—Spanish, Tagalog, Chinese, Arabic, Korean, and Vietnamese—and 2 recently arrived refugee groups, Karen and Somali. Community input was gathered through focus groups, feedback sessions, training sessions, and drills. The community’s recommendations mirrored the existing promising practices, and a program strategy was adopted.

Citation

Liu, B.F. (2007). Communicating with Hispanics about crises: how counties produce and provide Spanish-language disaster information. *Public Relations Review*, 33(3), 330-333. <https://doi.org/10.1016/j.pubrev.2007.04.001>

Abstract

Through a national survey of counties ($n = 435$) this study benchmarks how counties communicate disaster information to Spanish-speaking Hispanics. The study found that most counties employ at least one channel to communicate Spanish-language disaster information. Counties, however, believe that the Federal Emergency Management Agency and state emergency management agencies are most responsible and capable of developing and providing Spanish-language disaster information.

Citation

Nelson, J.E. (2015). *The effects of severe weather warnings on limited english proficient (LEP) Hispanics/Latinos in rural Nebraska* [Master's thesis, University of Nebraska Medical Center]. University of Nebraska Medical Center Digitalcommons@UNMC. <https://digitalcommons.unmc.edu/etd/62>

Abstract

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.

Citation

O'Brien, S. and Federici, F.M. (2019). Crisis translation: considering language needs in multilingual disaster settings. *Disaster Prevention and Management*, 29(2), 129-143. [10.1108/DPM-11-2018-0373](https://doi.org/10.1108/DPM-11-2018-0373)

Abstract

Purpose: The purpose of this paper is to highlight the role that language translation can play in disaster prevention and management and to make the case for increased attention to language translation in crisis communication.

Design/methodology/approach: The paper draws on literature relating to disaster management to suggest that translation is a perennial issue in crisis communication.

Findings: Although communication with multicultural and multilingual communities is seen as being in urgent need of attention, the authors find that the role of translation in enabling this is underestimated, if not unrecognized.

Originality/value: This paper raises awareness of the need for urgent attention to be given by scholars and practitioners to the role of translation in crisis communication.

Citation

Ogie, R., Rho, J.C., Clarke, R.J., and Moore, A. (2018). Disaster risk communication in culturally and linguistically diverse communities: the role of technology. *Proceedings*, 2(19), 1-7.
<https://doi.org/10.3390/proceedings2191256>

Abstract

Migrants, ethnic minorities and people from culturally and linguistically diverse (CALD) communities are often more vulnerable to natural disasters due to cultural barriers and limited proficiency in the dominant language, which sometimes undermine their ability to access, interpret and respond to warnings. Technology can assist in engendering culturally and linguistically appropriate communication with CALD communities if key challenges are identified. This study contributes by reviewing relevant literature with the aim of ascertaining the most pressing challenges requiring technological interventions. Three broad issues (i.e., trust, message tailoring, and message translation) are identified and discussed, and potential solutions for addressing these issues are recommended.

Citation

Peha, J.M. and Yu, M.S. (2017). "Broadcasting emergency information to non-English speakers." *IEEE International Symposium on Technologies for Homeland Security (HST)*, 1-6.
[10.1109/THS.2017.7943497](https://doi.org/10.1109/THS.2017.7943497)

Abstract

Television and radio have been the primary means of communicating emergency information in the U.S, following a natural disaster or a terrorist attack. However, this system does not always reach individuals with limited English proficiency (LEP). This paper uses TV and radio data, census data, and disaster risk data to estimate that over two million LEP individuals are not served by broadcasters in their native language. While many focus on Spanish-speakers, a large number of the unserved speak other languages, such as Korean and Vietnamese, with less access to broadcasts in their language. Geographically, many live outside of the cities with the largest concentrations of immigrants. Additionally, while AM radio and full-power TV are the most important media, on the order of 100 thousand individuals are served by low-power TV (LPTV) alone, and risk losing access to broadcasts in their own language if LPTV stations were to cease operation. These findings suggest the importance of supplementing traditional broadcast solutions with new technologies, including smart phones and social media.

Citation

Sadiq, A.-A., Okhai, R., Tyler, J., & Entress, R. (2023). Public alert and warning system literature review in the USA: Identifying research gaps and lessons for practice. *Natural Hazards*, 117(2), 1711–1744. <https://doi.org/10.1007/s11069-023-05926-x>

Abstract

As emergencies continue to impact communities in the USA on an unprecedented scale, it is imperative for communities to look for effective ways to keep people safe and reduce future impacts. Public alert and warning systems are an effective means of accomplishing these goals. As such, researchers have studied public alert and warning systems extensively in the USA. Due to the plethora of studies on public alert and warning systems, a systematic and comprehensive synthesize is needed to understand what has been studied and their major findings and identify practical lessons that can be used to further improve public alert and warning systems. Hence, the goal of this study is to answer the following two questions: (1) What are the major findings from public alert and warning system research? (2) What policy and practical lessons can be gleaned from public alert and warning system research to improve public alert and warning system research and practice? We answer these questions by conducting a systematic and comprehensive review of the public alert and warning system literature, starting with a keyword search. The search produced 1737 studies, and we applied six criteria (e.g., the study has to be a peer-reviewed article, dissertation, or conference paper), which narrowed the number of studies to 100. After a reverse citation search, that number increased to 156 studies. Analysis of the 156 studies, the results reveal 12 emergent themes regarding the major findings from public alert and warning system research. The results also reveal eight emergent themes related to the policy and practical lessons. We then offer recommended topics for future research as well as outline some policy and practical recommendations. We conclude by summarizing the findings and discussing the limitations of the study.

Citation

Steelfisher, G.K., Caporello, H.L., Lubell, K.M., Ben-Porath, E.N., Green, A.R., Luo, F., Briseño, L., Lane, L., Sheff, S.E., Taillepierre, J.D., Espino, L., and Boyea, A. (2022). Getting critical information during the COVID-19 pandemic: experiences of Spanish and Chinese speakers with limited English proficiency. *Health Security*, 20(4), 273-285. <https://doi.org/10.1089/hs.2021.0218>

Abstract

People with limited English proficiency in the United States have suffered disproportionate negative health outcomes during the COVID-19 pandemic. Effective communications are critical tools in addressing inequities insofar as they can motivate adoption of protective behaviors and reduce incidence of disease; however, little is known about experiences of communities with limited English proficiency receiving relevant information during COVID-19 or other outbreaks.

To address this gap and provide inputs for communication strategies, we completed a study based on 2 novel and nationally representative surveys conducted between June and August 2020 among Spanish and Chinese speakers with limited English proficiency (n = 764 and n = 355, respectively). Results first showed that Spanish and Chinese speakers did not consistently receive information about protective behaviors from key public health and government institutions early in the pandemic. Second, for such information, Spanish and Chinese speakers used a diverse set of information resources that included family and friends, social media, and traditional media from both inside and outside the United States. Third, Spanish and Chinese speakers faced challenges getting COVID-19 information, including receiving media messages that felt discriminatory toward Latinx or Chinese people. Together, these findings suggest gaps in effectively reaching Spanish and Chinese speakers. Data highlight the important role of bilingual materials to support sharing of information between Spanish or Chinese speakers and English speakers within their social networks, and the need for digital news content for traditional and social media. Finally, efforts are needed to address discriminatory messaging in media and to actively counter it in public health communications.

Citation

Stewart, A.E., Capielo, C., and Ocampo, P. (2014, February 2-6). Sources, perceptions, and needs for weather information by Spanish-speaking residents in Georgia [Conference presentation]. *American Meteorological Society*, Atlanta, Georgia, United States.
<https://ams.confex.com/ams/94Annual/webprogram/Paper236423.html>

Abstract

Following the 2011 tornado outbreak in Georgia and Alabama, the National Weather Service and various local media outlets focused upon the extent to which Spanish-speaking residents in the affected area received adequate information and warnings about the outbreak. Along these same lines, a Youtube video was posted shortly after the outbreak in which a tornado passed very close by and people could be heard asking in Spanish, “What is that?” Because many Spanish-speaking residents of Georgia have their origins in Central or South America, they may be unaccustomed to the routine and extreme features of the weather in the southeastern United States (e. g., winter storms, hurricanes, and tornadoes). Thus the researchers undertook a survey project to assess where Spanish speakers received their weather information, their perceptions about that information, and their needs for weather data and forecasts. In addition, a Spanish translation of the short form of the Weather Salience Questionnaire also was administered. Data were gathered during 2012 and 2013 from over 200 Spanish-speaking residents in three different parts of Georgia (Athens, Macon, and Savannah). The majority of respondents were women (70%). The respondents indicated they received most of their weather information from Spanish language radio or television (e. g., Univision), or via their mobile phones. They also indicated that they desired more weather forecast information than was currently available to them. There was evidence that the respondents either did not know of other (available Spanish-language products) or did not have access to these services (i. e.,

cable or internet subscription). Two findings were most noteworthy: 1. Most of the respondents were unsure how to respond to severe weather in the southeast such as winter/ice storms and tornadoes and 2. Most respondents also were unaware of how or where to take shelter if they were required to do so by either a short-fused event like a tornado or a more protracted event like a hurricane or flood. The results of this survey underscore the needs for providing additional weather data and forecast information to Spanish speakers, perhaps in a wider variety of formats that are accessible to them. Further, from an emergency planning and management perspective, efforts should be made to disseminate preparedness, evacuation, and sheltering information to Spanish-speaking communities. This will help ensure that all residents become more WeatherReady.

Citation

Trujillo-Falcón, J.E., Bermúdez, O., Negrón-Hernández, K., Lipski, J., Leitman, E., and Berry, K. (2021). Hazardous weather communication en Español: challenges, current resources, and future practices. *American Meteorological Society*, 102(4), E765-E773.

<https://doi.org/10.1175/BAMS-D-20-0249.1>

Abstract

According to recent Census data, the Hispanic or Latino population represents nearly 1 in 5 Americans today, where 71.1% of these individuals speak Spanish at home. Despite increased efforts among the weather enterprise, establishing effective risk communication strategies for Spanish-speaking populations has been an uphill battle. No frameworks exist for translating weather information into the Spanish language, nor are there collective solutions that address this problem within the weather world. The objective of this article is threefold. First, the current translation issue in Spanish is highlighted. Through research conducted at the NOAA/NWS Storm Prediction Center, situations are revealed where regional varieties of Spanish contributed to inconsistent risk messaging across the bilingual weather community. Second, existing resources are featured so that interested readers are aware of ongoing efforts to translate weather information into Spanish. Organizations within the weather service, like the NWS Multimedia Assistance in Spanish Team and the NWS Spanish Outreach Team, are highlighted for their pioneer work on Spanish weather communication. Last, a framework for translation standardization in the atmospheric sciences is introduced, along with future initiatives that are being sought by NWS and AMS to enhance Spanish hazardous weather communication.

Citation

Trujillo-Falcón, J.E., Gavia Pabón, A.R, Reedy, J., and Klockow-McClain, K.E. (2023). Systemic vulnerabilities in Hispanic and Latinx immigrant communities led to the reliance on an informal warning system in the December 10-11, 2021 tornado outbreak. *Natural Hazards Review* 25(2). <https://doi.org/10.1061/NHREFO.NHENG-1755>

Abstract

On December 10-11, 2021, the deadliest December tornado outbreak on record affected communities in Arkansas, Kentucky, Missouri, and Tennessee. With television programming only available in English, there was limited knowledge in how immigrant communities responded to the event. To examine systemic vulnerabilities experienced by Hispanic and Latinx immigrant populations, our team conducted a week-long field study in areas directly impacted by tornadoes. Connecting with local organizations, we interviewed 25 immigrants and community leaders in Arkansas and Kentucky. Social and systemic vulnerabilities, such as English proficiency, immigration status, and varying cultures of disaster preparedness, are examined as potential blockades to inclusive disaster response. Themes are contextualized into Mileti and Sorensen's warning response model. Findings indicate that U.S. Hispanic and Latinx immigrants relied mainly on unofficial sources that had no expertise in severe weather forecasting and communication, prolonging their time to effectively respond to tornadoes and make proper protective actions. We conclude with practical recommendations for developing a multilingual emergency alert system that integrates community leaders and underserved groups.

Citation

Trujillo-Falcón, J.E., Gaviria Pabón, A.R., Ripberger, J.T., Bitterman, A. Thornton, J.B., Krocak, M.J., Ernst, S.R., Obeso, E.C., and Lipski, J. (2022). ¿Aviso o alerta? Developing effective, inclusive, and consistent watch and warning translations for U.S. Spanish speakers. *American Meteorological Society*, 103(12), E2791-E2803. <https://doi.org/10.1175/BAMS-D-22-0050.1>

Abstract

Spanish-speaking populations in the United States are more vulnerable in disaster contexts due to inequities, such as language barriers, that prevent them from receiving life-saving information. For the past couple of decades, governmental organizations have addressed these issues by translating weather watches, warnings, and advisories into Spanish. Previous studies suggest that these Spanish translations do not communicate the same level of urgency as their English counterparts. To identify whether these translated products result in inequities between English and Spanish speaker reception and comprehension of forecast information, we asked a representative sample of U.S. English ($n = 1,550$) and Spanish ($n = 1,050$) speakers to correctly identify the translations of weather watches and warnings and found significant language inequities. Additionally, we asked U.S. Spanish speakers to indicate the urgency they felt when shown different Spanish words used in weather watch and warning translations. When presented with various translations for watch and warning terminology, respondents consistently rated *aviso*, the current translation of warning by the NWS and FEMA, as less urgent than many other alternatives. Additionally, the current translation of *advisory*,

advertencia, communicated more urgency than both existing watch and warning translations in Spanish. To increase the effectiveness of severe weather messaging in multilingual contexts, translations should take into consideration factors such as culture and dialects of Spanish speakers in the United States and focus on translating the meaning, not the words, of key risk statements in weather products. We recommend *vigilancia* for “watch” and *alerta* for “warning” as research-supported terminologies to communicate urgency in Spanish.

Citation

VanderMolen, K., Kimutis, N., and Hatchett, B.J. (2022). Recommendations for increasing the reach and effectiveness of heat risk education and warning messaging. *International Journal of Disaster Risk Reduction*, 82, 1-11. <https://doi.org/10.1016/j.ijdrr.2022.103288>

Abstract

A growing number of national, state, and local governments are developing heat health warning systems and emergency preparedness plans to support the public in protecting against extreme heat. However, concern remains about the reach and effectiveness of these interventions in supporting protective action specifically among those individuals and communities most at-risk. We conducted four focus groups during spring and summer 2021 with 43 individuals who represent, serve, and/or are part of heat-vulnerable communities in San Diego County, California, to elicit recommendations for increasing the reach and effectiveness of heat risk education and warning messaging. Key recommendations include: (1) diversification of communication channels, (2) specification of content, and (3) development of formally coordinated campaigns. Grounded in local knowledge and experience, these recommendations align with evidence-based support for successful hazard risk communication as well as the increasing valorization of dialogic models of communication. In doing so, they highlight the need for heat-vulnerable communities to be involved in the planning and implementation of interventions meant specifically to support them in taking protective action. Here, we provide a detailed description of those recommendations so that they may be implemented and evaluated in future work and their transferability may be explored across other regions characterized by extreme heat.

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