

10-2016

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Recommended Citation

LaForce, Salimah; Bennett, DeeDee M.; Linden, Maureen; Touzet, Christina; and Mitchell, Helena, "Optimizing Accessibility of Wireless Emergency Alerts: 2015 Survey Findings" (2016). *Public Administration Faculty Publications*. 78.

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THE JOURNAL ON
TECHNOLOGY AND
PERSONS WITH
DISABILITIES

Optimizing Accessibility of Wireless Emergency Alerts: 2015 Survey Findings

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Abstract

The Wireless Emergency Alert (WEA) system is a free, opt-out, national emergency alerting service that was deployed in 2012 as one component of the Integrated Public Alert and Warning Systems (IPAWS). Since 2012 over 10,000 WEA messages have been transmitted to mobile phones in the U.S. In 2015, a national online survey on WEAs (2015 WEA Survey) was conducted to understand the effectiveness of WEA messages for people with disabilities. The survey collected data on availability, awareness and accessibility of WEA messages, as well as actions taken by the recipient upon receipt. The survey also takes into consideration the type of mobile device used by the respondents. Project researchers hypothesized that greater awareness and exposure to WEA alerts would increase trust and appropriateness of individual responses to alerts. The analysis of the survey data supports the hypothesis. The 2015 WEA national online survey results provided policy and practice insights to improve the intended impact of WEA messages for people with disabilities.

Keywords

Wireless Emergency Alerts, Accessibility, Emergency Communications,
Behavioral Response.

Introduction

Historically, people with disabilities, older adults, the economically disadvantaged, women, children and immigrants have been disproportionately affected during disasters. In many instances an individual's social and economic vulnerability can seriously impair his or her ability to prepare for a disaster, cope with the aftereffects, and fully recover from the disaster (Tierney 110; Wisner et al. 11). Previous research on support for older adults and people with disabilities in the Southeast United States (with the exception of Florida) has shown that many states' emergency plans do not explicitly include these demographics and the requisite mitigation, preparedness, response and recovery measures that could reduce the impact of their socioeconomic vulnerability (Bennett n.p.). One result of this gap is that communications to people with disabilities are insufficient.

Executive branch and federal agency concern regarding the modernization of the nation's emergency alerting capabilities, and ensuring equal access to emergency alerts and warnings, catalyzed a massive effort to integrate multiple infrastructures and methods used for emergency alerting (broadcast, cellular, internet protocol) into one unified system, the Integrated Public Alert and Warning System (Exec. Order No. 13407 1226, Federal Communications Commission 6), of which Wireless Emergency Alerts (WEAs) are a component. Mandated by Congressional statute (109th Congress, Pub.L. 109-347 n.p), the Federal Communications Commission (FCC) outlined technology neutral rules governing wireless service providers who elect to transmit WEA messages to their subscribers (FCC n.p). WEA represents the first national emergency notification system that was mandated by law to be proactively inclusive of people with disabilities (109th Congress 153), as people with disabilities rely on their mobile devices to receive and to send critical information. Despite the cost, 90% of people with disabilities buy mobile phones to stay informed and connected (Wireless RERC 2). According to a survey of user needs, 82% of 1600 respondents with disabilities stated that wireless devices were increasingly important to them, while 72% of respondents stated that wireless devices were especially important during emergencies (Mueller et al. 45). In light of these observations, the implementation of the WEA service in 2012 necessitated research on how tenets of Pub.L. 109-347 were being applied, with specific inquiry into the use of mobile phones by people with disabilities during emergencies, identifying the device specifications and user needs

requirements for effectively alerting this population, and protective actions taken in response to emergency messages.

In 2015, Georgia Institute of Technology researchers conducted a national online survey (2015 WEA Survey) to identify how people with disabilities respond to WEA messages. Project researchers hypothesized that greater awareness and exposure to WEA alerts would increase trust and appropriateness of individual responses to alerts. The analysis of the survey data supports the hypothesis. The 2015 WEA survey collected data on WEA awareness, accessibility, trust and validation of message content, frequency of receipt of WEA messages, actions taken upon receipt, and expectations for future features for the next-generation of WEA (NG-WEA).

Methodology: Development and Deployment of the 2015 WEA Survey

The project team conducted evidence-based research on user experiences with actual WEA messages. To accomplish this task, focus group methodology was employed to inform the design of the survey instrument. Using a purposeful sample of individuals belonging to specific disability groups, focus group moderators explored the level of WEA availability, awareness and trust amongst the participants in their use of these tools for receiving emergency alerts, and behavioral responses upon message receipt. The project conducted focus groups composed of people with hearing, vision, mobility/dexterity, and cognitive disabilities. Focus group findings were used to fine tune the on-line survey instrument originally developed by the Wireless RERC in 2012 (the Wireless RERC collected WEA survey November 2013 through March 2014. Updating the 2012 survey allows for some longitudinal comparisons with data collected in the 2015 WEA Survey) and collect data on factors that may impact the effectiveness of WEA messages.

Sampling

The survey used convenience sampling to specifically target respondents with a declared disability. Convenience sampling versus fully random sampling was necessary because of the difficulty and cost of selecting individuals with disabilities from the general population. No large, publicly-available databases of people with disabilities and their contact information exist. Consequently, it would be necessary to draw a very large random sample of the general population (at least 20,000) to generate a random subsample of Americans with disabilities. The

survey was offered online using Survey Gizmo, over the telephone, and in paper format to people with disabilities, including people who are deaf, hard-of-hearing, blind or had low vision. The survey was also administered using American Sign Language (ASL) for people who are Deaf and primarily conversant in ASL. Deaf Link, Inc., created an ASL video to recruit individuals that primarily communicate via ASL to ensure there was no language barrier in reaching the desired population.

Analysis

The results of the survey were analyzed using IBM SPSS, statistical software. This report presents the findings from our initial univariate analysis. We expanded our analysis by closely examining the relationship between two or more variables such as disability, WEA awareness, and behavioral response to WEA in order to understand if greater awareness and exposure to WEA alerts would increase trust and appropriateness of individual responses to alerts. These relationships were examined using Chi-squared analyses of the relative distribution of values between and among discrete variables. Since a model has yet to be generated for how all contributing variables might relate to specific behavioral outcomes, multiple independent testing was used. As a result, significance values reported herein are indications of strengths of relationships, rather than absolute statistical significance. All Chi-squared distribution analyses employed Yates correction for continuity.

Demographic Profile of Survey Respondents

To maintain consistency with previous surveys conducted by project personnel, respondents are always asked to self-identify for all categories of disability as identified through the US Census Questionnaire: sensory, speaking, dexterity, mobility and cognitive. The Census questions are, for example, worded “I have difficulty with hearing.” In doing so, we also acknowledge that some respondents have more than one disability to report. One thousand three hundred thirty four (1334) people completed the survey; 55% reported having a disability and 45% indicated that they did not have a disability. Figure 1 portrays the type of disability by percentage. The most represented disability amongst survey respondents was hearing (28%). Eighteen percent (18%) self-identified as having a mobility disability; 15% indicated difficulty

seeing; 11% reported anxiety; reach and dexterity together represent 11% of respondents; and 4% self-identified as having difficulty speaking.

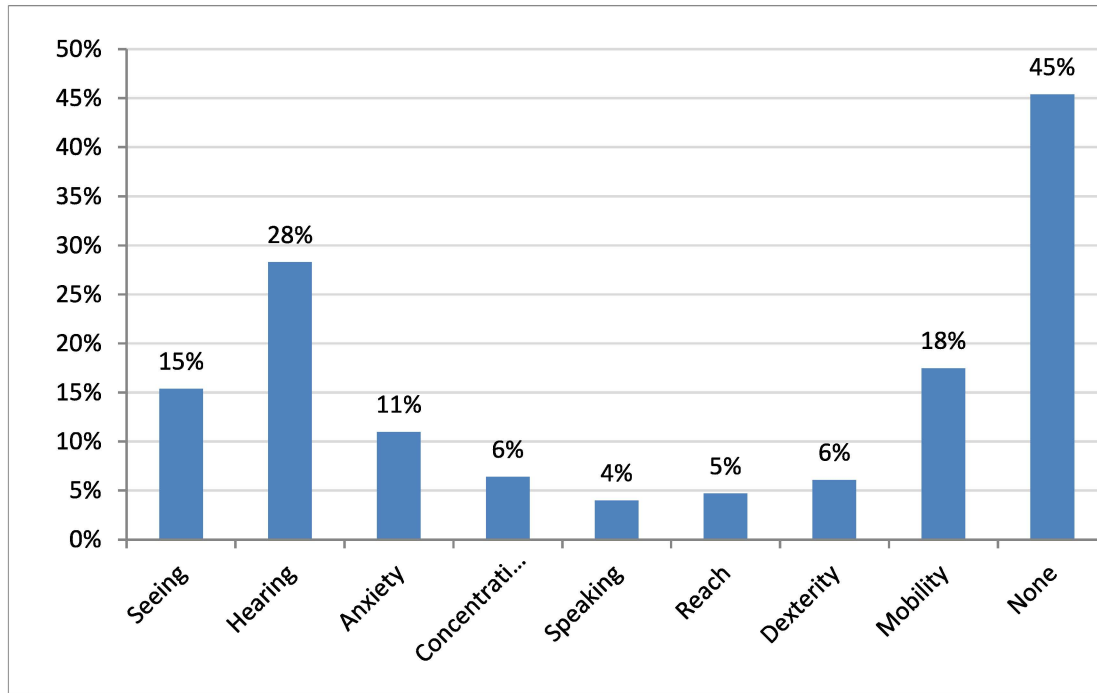


Fig. 1. Type of Disability.

With regard to hearing and vision disabilities, separate questions were asked to determine level of hearing (deaf, hard of hearing, hearing) and level of vision (blind, low vision or sighted). Four percent (4%) of respondents reported being blind, 9% low vision, 10% specified that they were Deaf and 16% hard of hearing (HoH). These numbers include 4% of those not reporting that they had “vision difficulty”(41 respondents) indicating that they were blind or had low vision, as well as 6% of those not reporting “hearing difficulty”, (35 respondents), reporting that they were Deaf or hard of hearing (HOH). In addition, 38% (78 respondents) who reported difficulty with vision, answered that they were “sighted”, while 17% (64 respondents) indicated difficulty with hearing yet were “Hearing.” This indicates confusion with the manner in which the Census questions are worded.

The average age of survey respondents was 51 years old; the oldest was 94 and the youngest was 19 years old. Two percent (2%) of respondents fell in the 18-24 age group; 26% in the 25-43 age group; 49% in the 44-62 age group; and 18% in the 63+ age group (5% of

respondents did not answer the question). Sixty one percent (61%) were female and 37% male (2% of respondents did not answer the question).

Caregivers of people with disabilities may face unique challenges during an emergency. There may be issues including egress from the home, sheltering in place, or evacuation. This may be particularly true for families that include persons with severe mobility disabilities. Hence, questions about caregivers and independent living were included in the demographics section of the survey. Sixteen percent (16%) of all respondents indicated they were a caregiver to a person with a disability. Another motivation for including these questions was to collect data on the percentage of respondents with disabilities that live independently. The vast majority of respondents with disabilities (83%) indicated that they do not require caregiver assistance; and in fact 18% of survey respondents with disabilities are caregivers to other persons with disabilities.

Discussion

As stated, project researchers hypothesized that greater awareness and exposure to WEA alerts would increase trust and appropriateness of individual responses to alerts. The analysis of the survey data showed this to be true. Individuals who were familiar with WEA were more likely to act immediately, less likely to be unsure of what action to take, and less likely to make judgements about whether the emergency alert applied to them.

WEA Availability

Availability of WEA messages depends, in part, on an individual's access to WEA – capable devices. To assess WEA availability to people with disabilities, questions were asked concerning mobile phone ownership in general and the make and model of the respondents' phones, specifically. We found that the vast majority of all respondents (98%) own a mobile phone. Descriptive analysis revealed that respondents with disabilities own mobile phones at a similar rate to their non-disabled cohorts; 96% and 99%, respectively. Chi-square distribution comparison between these rates, however, showed that people without disabilities were 7 times more likely to own a cell phone than people with disabilities ($p < 0.001$). When the data was analyzed by income level there is also some discrepancy. As income increased, so too did the likelihood of mobile phone ownership, with the exception of those in the lower middle-income

bracket (Figure 2). People with household incomes between \$25,000 and \$34,999 were 3.2 times less likely to have a cell phone ($p < 0.05$).

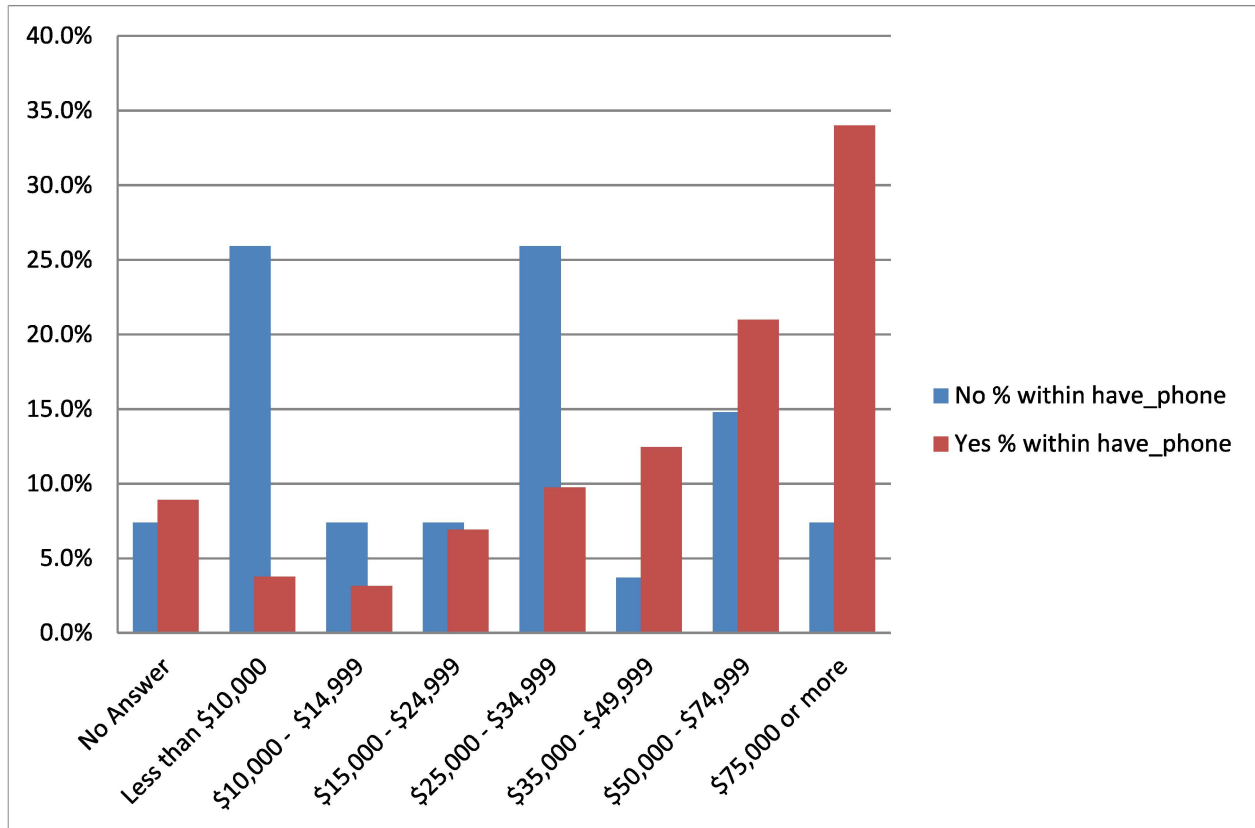


Fig. 2. Mobile Phone Ownership by Income.

An overwhelming majority (82%) of respondents use a touchscreen mobile phone, and a small but significant percentage (9%) use the mobile phone with the most basic numeric keyboard. Respondents, with and without disability, overwhelmingly use the mobile phone products manufactured by Apple, Inc. The reported top four manufacturers: Apple, Samsung, LG and Motorola account for 83% (1,111 respondents) of the total reported mobile products, with the remaining 17% (181 respondents) listing 15 manufacturers, including “other” and “I don’t know.” With the exception of the iPhone 4, the top ten identifiable (reported accurately to reflect make and model) phone models in use by respondents with and without disabilities are all WEA-capable. People with disabilities reported higher ownership of the iPhone 5, 5c, 6Plus and

Samsung Galaxy 4 than did respondents without disabilities. This may indicate that those phone models have the preferred accessibility features for those respondents.

A comparison of respondents with disabilities, compared to those without, revealed a 2% percentage point difference (34% and 36% respectively) in ownership of WEA-capable iPhone models. These data, taken together, indicate that for mobile phone owners, WEA-capable devices, and hence WEA messages, are available to both people with and without disabilities at similar rates. However, since people with disabilities were seven times less likely to own a mobile phone than people without disabilities, there still may be a gap in WEA availability based on the covariates of mobile phone ownership and disability status.

WEA Awareness

A majority of all respondents (60%) had heard of WEA prior to this survey. In the 2013-2014 WEA survey data, 59% of all respondents had heard of WEA. This indicates that despite increased WEA-capable phone penetration, WEA awareness levels have remained flat. Figure 3 shows WEA awareness based on disability status. Respondents without disability were twice as likely to report having heard of WEA (69%) than those respondents with disability (53%) ($p < 0.01$). Variations in level of WEA awareness by the disability category is as follows: Blind/Low Vision (56%), Anxiety (52%), Mobility (52%), Speaking (51%), Deaf/Hard of Hearing (49%), Concentration (49%), Dexterity (44%), Reach/using hands and arms (41%). These data suggest that there is significant room for growth regarding educating people with disabilities on the availability of WEA. Further, due to the differing awareness levels based on disability type, targeted outreach may be necessary, as well as ensuring that outreach materials and methods are appropriate and accessible to the target population.

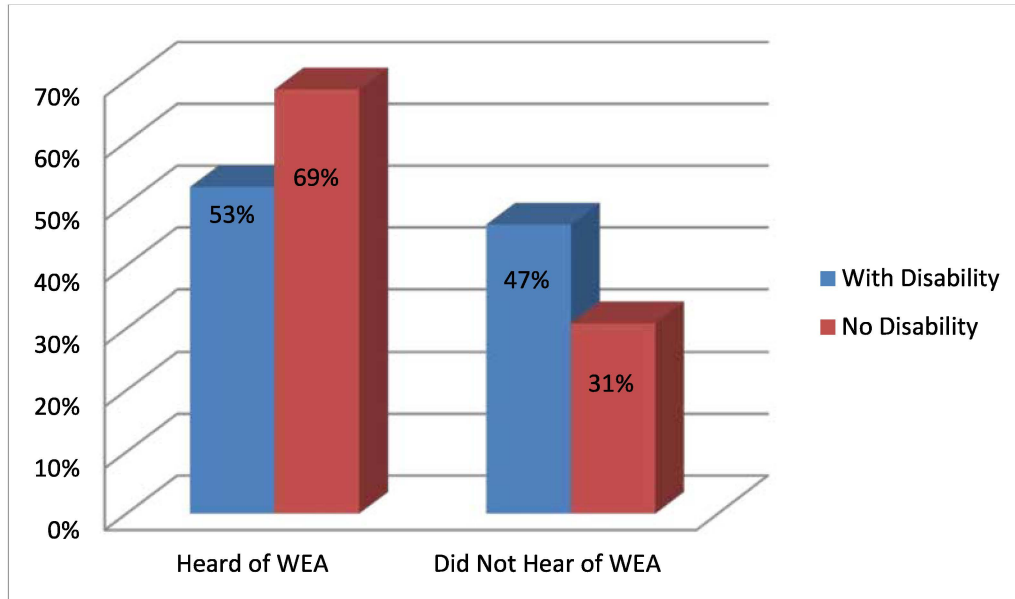


Fig. 3. Prior WEA Knowledge.

WEA Response

Behavioral responses were examined based on whether the respondent had been aware of WEA prior to taking the survey. Relative responses to each action are presented below.

The results to the statement, “*I took action immediately based on the information in the alert.*” indicated that those who were previously aware of WEA were slightly more likely to take immediate action after receipt of a WEA message than respondents who were unaware of WEA ($p < 0.01$). Figure 4 shows that 56% of respondents with prior WEA knowledge indicated that they agree or strongly agree with the above quoted statement, while 39% of respondents without prior WEA knowledge agree or strongly agree.

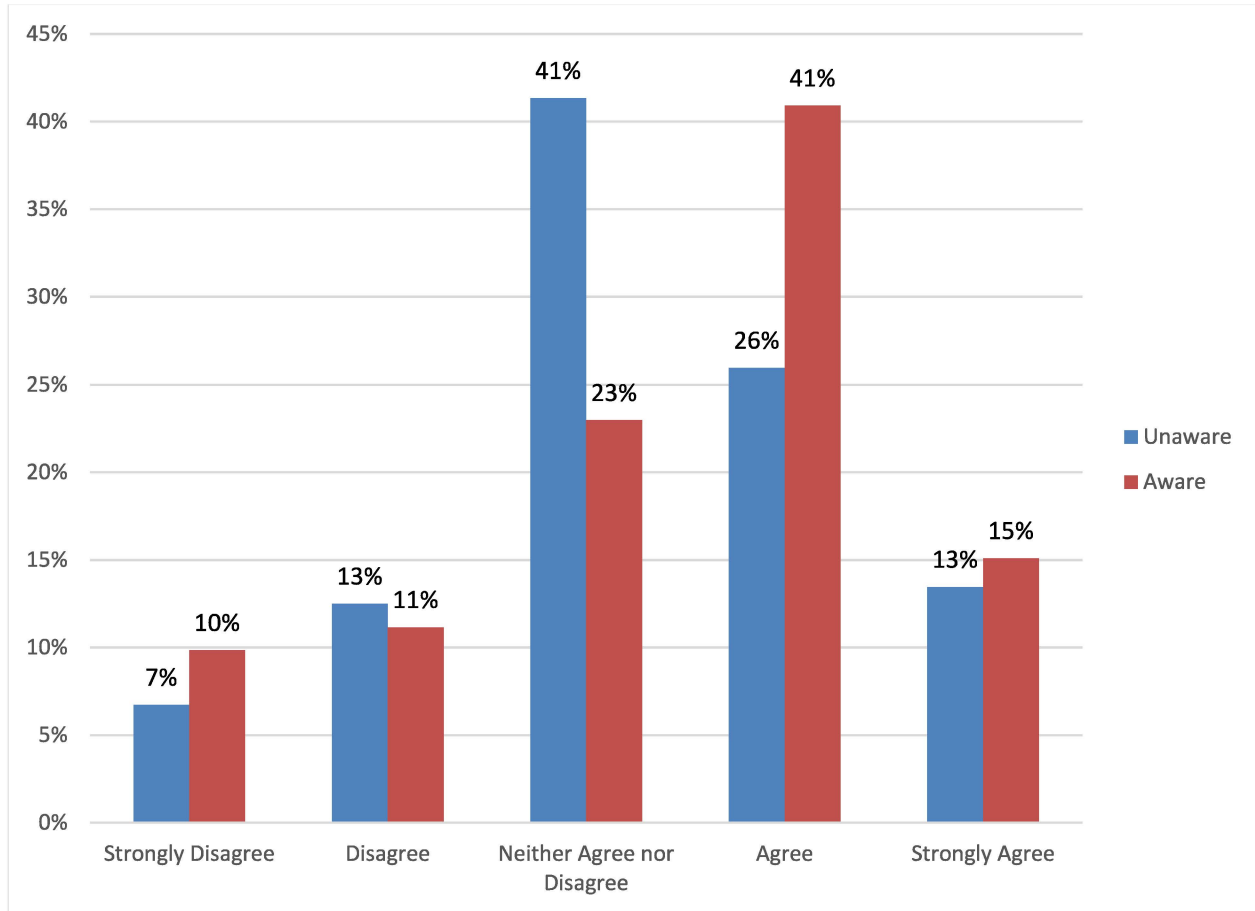


Fig. 4. Took Immediate Action (by awareness of WEA).

Whether respondents believed that the nearest emergency was near them varied based on whether they had prior knowledge of WEA ($p < .01$). Forty-eight percent (48%) of those who had prior knowledge of WEA strongly agree or agree that they did not take action because the emergency was not near them. This compares to 55% of respondents who did not have prior knowledge of WEA. Similarly, 33% of respondents who had prior knowledge of WEA disagreed or strongly disagreed with this statement, while only 21% who were not aware of WEA did. This is significant as it indicates that individuals make more of their own judgement call about a pending emergency when they are unfamiliar with the mechanism that notifies them.

Regarding the content of the message, respondents who were not familiar with WEA were more likely to be uncertain of what action should be taken. Ten percent (10%) of those familiar with WEA strongly agreed or agreed with the statement that “I did not take action because I was unsure of what action I should take;” while 16% without WEA knowledge agreed

or strongly agreed with the statement. Sixty-seven percent (67%) of those with prior WEA knowledge indicated that they were more comfortable by disagreeing or strongly disagreeing with the statement, as compared to 51% of those without prior WEA knowledge.

Conclusions

Project researchers hypothesized that greater awareness and exposure to WEA alerts would increase trust and appropriateness of individual responses to alerts. The analysis of the survey data confirmed the hypothesis. Individuals who were familiar with WEA were more likely to act immediately, less likely to be unsure of what action to take, and less likely to make judgements about whether the emergency alert applied to them. As a result, federal government stakeholders, such as the FCC, FEMA and DHS, should increase efforts to educate the public on WEA. The recommended interventions to improve awareness of and response to WEA messages can be measured by the level of awareness of the availability of WEA, the extent to which WEA-enabled devices are diffused amongst the population of people with disabilities and behavioral response to the messages is favorable. It is thus imperative that WEA messages and the devices on which they are received be optimized for accessibility. Finally, analysis of the demographic data showed that the majority of respondents with disabilities are able to live independently. Emergency managers need to anticipate that people with disabilities will likely not have caregivers assisting them in their response to emergencies. Thus the content of their preparedness and response materials should not only be accessible, but include disability specific directions that will enable people with differing capabilities to independently take protective actions for themselves and their families.

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