**Communicating through Calamity: Rural and Urban Extension Professionals'
Communication during and after a Hurricane**

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Abstract
The purpose of this study was to determine the role urban and rural community status plays in the communication of University of Florida Cooperative Extension faculty and staff during and after a disaster by identifying the extent to which technology was utilized, the communication messages conveyed, and organizational communication versus personal communication. The crisis used for understanding these efforts was Hurricane Irma in 2017. An online survey methodology was used to collect data from Extension personnel across Florida. Results indicate there are differences between how rural and urban Extension faculty and staff communicate during and after a hurricane. The internet was used to a great extent as a communication channel by both rural and urban Extension professionals, but how they used the internet differed. Urban audiences chose more personal mediums when communicating personally about the hurricane, while rural participants used more social media when communicating on personal channels. Implications for this study are an increased need for templates and communication training for Extension personnel. Future research should focus on understanding crisis communication during times of power loss and examine the different roles played by Extension in rural and urban counties.

Introduction

Historically, Florida has been impacted by hurricanes more than any other state (Griggs, 2017). Including Hurricane Irma in 2017 and Hurricane Michael in 2018, Florida has had a direct hit by 118 hurricanes in recorded history. Hurricane Irma made landfall twice on September 10, 2017. First landfall in the Florida Keys as a category 4 hurricane and second landfall in Marco Island as a category 3. It was a huge storm at 650 miles making it the second most powerful storm in both velocity and duration. Hurricane winds covered 80 miles and tropical storm winds covered 400 miles. Of Florida's 67 counties, 54 had evacuation orders and 49 were declared a disaster by the Federal Emergency Management Agency (FEMA). The sheer size and destruction from Hurricane Irma were unlike any other.

The current study is a replication of a study conducted in 2007 after the 2004 and 2005 storms (Telg et al., 2007). The study was conducted again in January 2018, four months following Hurricane Irma. Both studies were interested in learning the steps Extension agents took in preparing for, mitigating, and recovering from the hurricanes. For the purpose of this paper, the focus was on communication efforts and how these may have differed in rural versus urban areas. Of the 49 counties that were declared a disaster after Hurricane Irma, eight of these were rural counties. According to the Fourth National Climate Assessment (2018), new risks of intense extreme weather events will provide additional challenges to vulnerable communities: "[p]eople who are already vulnerable, including lower-income and other marginalized communities, have lower capacity to prepare for and cope with extreme weather and climate-related events and are expected to experience greater impacts. Prioritizing adaptation actions for the most vulnerable populations would

contribute to a more equitable future within and across communities" (p. 555). Rural counties often encounter a longer response and recovery time after disasters due to a lack of resources and decreased capacity.

Communication during a crisis, or crisis communication, is crucial at all levels during a disaster. At a high level, federal and state governments are in constant communication with local government in impacted areas to address needs accordingly. At a local level, communication is essential for first responders and emergency managers to effectively manage a crisis. In addition, during response and recovery, communication with community members that have been impacted is crucial (Steelman et al., 2015). Given the complexity of disasters, the communication system through which information flows during a disaster can be conceived of as a set of relationships among many different senders, messages, and receivers (Fessenden-Raden et. al., 1987; Renn, 1991).

Extension agents in the Cooperative State Research, Education, and Extension Service (CSREES) have a critical role to play within this communication system (Boteler, 2007). Extension often acts as a first responders and/or information first responder within a community in times of disaster, particularly in rural areas where other first responders may be part-time, volunteer, or shared between multiple areas. Because Extension has people already embedded in communities who are prepared and qualified to respond in times of disaster, Extension can be one of the first to arrive and provide aid, assistance, and information to community members (Telg et al., 2007). Extension has resources developed and in place to help communities prepare, mitigate, respond, and recover from a disaster and work closely with established networks and partners (Boeteler, 2007). This communication system also includes other

partners within the Extension Disaster Education Network (EDEN), which is a nationwide network of Extension professionals that provide materials and a system for best management practices during disasters.

Conceptual Framework

The conceptual framework that informed this study was crisis communication with supplemental literature related to communication with rural audiences, Extension communication, and organizational communication. Because of the high level and sheer number of organizations involved in a disaster, coordination and communication can often hinder progress (Vanderford et al., 2007). In addition, disasters can create crisis situations for public and private organizations, forcing them to engage in their own crisis communication (Coombs, 2012). This communication, although rooted from the larger disaster, will be designed to meet the specific needs of the organization and the organization's stakeholders. Crisis communication includes the critical internal collecting and processing information for the crisis team and the developing and dissemination of messages to audiences outside of the organizations (Coombs, 2012). Post-crisis communication provided during the response and recovery phase is often the most crucial through providing necessary information to those impacted. It is at this level that "crisis responses are highly visible to stakeholders and very important to the effectiveness of the crisis management efforts" (Coombs, 2012, p. 20).

Where people live can have an impact on how they communicate. When investigating differences in rural and urban social-media use Gilbert et al. (2008) saw rural users have fewer "friends" on social media than those in urban areas. They also found that rural social-media users were predominantly females who were more cautious than urban users when making decisions related to privacy settings on their accounts. In general, rural users were less trusting of new sources and information they saw on social media (Gilbert et al., 2008), which may indicate reaching rural users on social media from an organizational standpoint is more difficult than reaching their urban counterparts. Rural areas can struggle to keep up with online technology, which has been noted in studies looking at the ability for small, rural agricultural businesses to effectively compete in online marketing and strategy (Baker et al., 2018; Peterson et al., 2018; Stebner et al., 2017a; Stebner et al., 2017b). While it is recommended that Extension use new and social media to communicate with stakeholders about programming, available resources, and contentious issues (King et al., 2017; Rohling et al., 2016), during times of disaster there can be power loss and other challenges for communicating via technology.

Defining rural and urban communities can be done in multiple ways depending on the parameters of interest (Cromartie & Bucholtz, 2008) with the majority of definitions surrounding municipal and jurisdictional lines, population density, and economic influence (Isserman, 2005). However, definitions of rural versus urban can be misleading (Isserman, 2005), thus the USDA/ERS researchers classify conditions as nonmetropolitan (nonmetro) and metropolitan areas (nonmetro) looking at the presence of open countryside, rural towns with fewer than 2,500 people, and urban areas ranging from 2,500 to 49,999 people (Cromartie & Parker, 2013). Specifically, "the rural-urban commuting area (RUCA) codes classify U.S. census tracts using measures of population density,

urbanization, and daily commuting" (USDA/ERS, 2019, para. 1). The RUCA Codes contain two levels and are represented by whole numbers 1 through 10 and are based on the size and direction of the greatest flow of commuters two and from an area.

These 10 codes can be further segmented and grouped other ways to look at specific areas as needed (USDA/ERS, 2019). In Florida, the Economic Research Services categorizes RUCA codes of 4-10 as rural areas of the state and codes 1-3 as urban areas of the state (ERS, 2019). Rural communities tend to be disadvantaged in multiple ways with less access to technology (Malecki, 2003), food (Blanchard & Matthews, 2007), and physical and mental health services (Smith et al., 2008). When looking at how to serve these communities prior to and during a crisis, Extension has been a major player in addressing rural issues and helping communities become more resilient (Coutts et al., 2019).

Organizations and individuals share similar roles and purposes when communicating and engaging with others during a disaster. An organization's focus in the various stages of a disaster involves communicating valuable and accurate information systematically to stakeholders (Seeger, 2006; Seeger & Ulmer, 2001). In addition to sharing information, individuals use various methods of communication to socially support others within their network or community (Shklovski et al., 2008). If an individual is considered a stakeholder of the organization, such as an employee or volunteer with the organization, they may serve as a first information responder (Omilion-Hodges & McClain, 2016). These individuals, while not necessarily charged with communication responsibilities, have experience with the organization and also have potentially developed trust within the organizational and personal networks in which they are a member (Omilion-Hodges & McClain, 2016).

Purpose & Research Objectives

The purpose of this study was to understand the communication of Extension faculty and staff during and after a disaster and the role that urban and rural community status played in response. Specifically, researchers were interested in Extension's communication and use of technology in relation to a hurricane. Hurricane Irma was used as a case study. The specific research questions used to understand how crisis communication during was used during a hurricane were:

RQ1: How does crisis communication efforts of Extension faculty and staff differ based upon rural or urban locations?

RQ2: How does the use of technology for crisis communications differ for Extension faculty and staff in rural and urban locations?

RQ3: Do crisis communication messages developed by Extension faculty and staff differ based upon rural or urban location?

Methods

The data utilized in this paper were gathered using an online survey distributed by Qualtrics. The survey link was distributed to a list of 358 Florida Extension faculty and staff with valid email addresses as of October 2017. A modified version of Dillman et al. (2009) tailored design method was utilized to collect the responses. Potential respondents were given an initial invitation and three follow-up reminders. Of those 358 potential respondents, 129 usable responses were collected from the Extension faculty members for a 36% response rate. The survey instrument was based on a questionnaire developed in a previous study

(Telg et al., 2007). Although both versions of the survey were similar in content, modifications were made to include additional questions that could determine Extension's communication methods such as social media and internet-based communication platforms (Mike et al., 2019). This 15-minute survey was developed to determine the extent of communication efforts, the extent to which technology was utilized, the communication messages conveyed, and organizational communication versus personal communication.

To ensure validity, specific sections of the 2017 questionnaire were used for analysis in this study. The first section concerned the extent to which Extension faculty members made use of select communication methods to communicate to Extension clientele during the 2017 hurricane season. The internal reliability of this scale was $\alpha = .78$. The same items and response scale were used in the next section of the instrument to examine Extension faculty's perceptions of the extent to which the communications were used by their Extension offices to communicate to clientele. The internal reliability of this scale was $\alpha = .79$. The instrument also examined Extension faculty members' perceptions of the extent to which their Extension offices utilized select communication channels to convey information to the general public during the 2017 hurricane season. The internal reliability of this scale was $\alpha = .81$.

Urban and rural designations were based on the zip code of the Extension faculty and staff members. The zip codes were coded into the 10 rural-urban commuting area (RUCA) codes. Those RUCA codes were further divided based on the Economic Research Services categories

RUCA codes of 4-10 as rural areas of the state and codes 1-3 as urban areas of the state (ERS, 2019). Statistics package for social sciences (SPSS version 26) was used to analyze the data using descriptive statistics (means, standard deviations, frequencies, and percentages). Advanced statistics were not able to be run because of the disproportionate size between rural and urban groups.

Results

Crisis Communication Efforts Based Upon Rural or Urban Locations

This research question sought to determine if communication efforts of Extension faculty and staff differ based on rural or urban location. The responses for this series of questions were asked using a four item Likert-type scale, where *1 = not at all; 2 = slight extent; 3 = moderate extent; and 4 = great extent.* Real limits were used for interpretation of the responses: 1.00 to 1.49 = *Not at all,* 1.50 to 2.49 = *Slight extent*, 2.50 to 3.49 = *Moderate extent,* 3.50 to 4.00 = *Great extent.*

Extension faculty and staff members were asked to what extent they and their Extension offices used mass media channels to communicate during the 2017 hurricane season. Urban Extension faculty and staff members indicated they used mass media channels to a slight extent ($M = 1.95$) while rural extension faculty and staff members indicated they used mass media channels to a moderate extent ($M = 2.54$; see Table 1). Regarding the use of mass media communication by their Extension offices, urban Extension faculty and staff members indicated usage was to a slight extent (*M = 2.07)* and rural Extension faculty and staff members indicated usage was to a moderate extent *(M = 2.73; see Table 1).*

Table 1

Extent to which Extension Faculty and Staff Members Used Mass Media Channels to Communicate during the 2017 Hurricane Season

	Urban (n)	M	SD	Rural (n)	M	SD
Mass media channels used for communication during recent hurricanes	103	1.95	1.10	26	2.54	.99
Mass media channels used by Extension office during recent hurricanes	102	2.07	.94	26	2.73	.83

Note: Real Limits: 1.00 to 1.49 = *Not at all,* 1.50 to 2.49 = *Slight extent*, 2.50 to 3.49 = *Moderate extent,* 3.50 to 4.00 = *Great extent.*

Regarding communication sources and channels used by Extension offices to communicate with the general public, both urban and rural Extension faculty and staff members indicated their offices used the internet/web to the greatest extent *(M =* 2.86; *M =* 3.21)*.* The communication sources and channels used to the least extent by both urban and rural Extension offices to communicate with the general public were, live TV interviews (*M =* 1.24; *M =* 1.42) and TV public service announcements (*M =* 1.24; *M =* 1.35). Urban Extension faculty and staff also reported their Extension offices used live radio to the least extent (*M =* 1.39). See Table 2.

Table 2

Extent to which Extension Faculty and Extension Offices used Different Communication Channels to Communicate with the General Public during the 2017 Hurricane Season

	Urban (n)	M	SD	Rural (n)	M	SD
Internet/Web	98	2.86	.95	24	3.21	.83
Flyers, print materials	98	2.09	.93	26	1.88	.82
Newspaper	96	1.70	.91	25	2.12	1.05
Radio public service announcements	95	1.54	.89	26	1.81	1.06
Live Radio	95	1.39	.79	26	1.77	1.14
TV public service announcements	95	1.24	.63	26	1.35	.85
Live TV interviews	95	1.24	.63	26	1.42	.99

Note: Real Limits: 1.00 to 1.49 = *Not at all,* 1.50 to 2.49 = *Slight extent*, 2.50 to 3.49 = *Moderate extent,* 3.50 to 4.00 = *Great extent.*

Regarding communication sources and channels used by Extension offices to communicate with the general public, both urban and rural Extension faculty and staff members indicated their most effective source/channel was the Internet (53%, 69%)

Extension faculty and staff members were asked to what extent they used

different instruments and personal communication methods to convey information to their Extension clientele group during the 2017 hurricane season. Urban Extension faculty and staff reported they used e-mail (*M* = 2.84), phone (*M* = 2.76), and face-to-face (*M* =2.67) to the greatest extent. While rural Extension

faculty and staff reported they used social media (*M* =3.21), Facebook (*M* =3.17), and face to face (*M* = 3.04) to the greatest extent. Both urban and rural Extension faculty and staff reported they used Twitter (*M* = 1.32; *M* = 1.30) and Instagram (*M* = 1.16; *M* = 1.17; See Table 3) to the least extent.

Table 3

Extent to which Extension Faculty/Staff made use of Different Instruments/Personal Communication Methods to Convey Information to their Extension Clientele during the 2017 Hurricane Season

	Urban (n)	M	SD	Rural (n)	M	SD
Electronic mail (e-mail)	90	2.84	1.05	24	2.58	.93
The phone	95	2.76	1.05	24	2.67	.92
Face-to-face	89	2.67	1.02	24	3.04	1.00
Facebook	92	2.42	1.20	24	3.17	1.09
The internet	89	2.42	1.09	24	2.63	1.10
Social Media	91	2.35	1.18	24	3.21	1.02
On-site visits	89	2.27	1.21	24	2.42	1.25
Text messaging	92	2.03	1.22	24	2.58	1.28
Twitter	88	1.32	.80	23	1.30	.77
Instagram	87	1.16	.48	23	1.17	.49

Note: Real Limits: 1.00 to 1.49 = *Not at all,* 1.50 to 2.49 = *Slight extent*, 2.50 to 3.49 = *Moderate extent,* 3.50 to 4.00 = *Great extent.*

Extension faculty and staff members were asked to what extent their Extension offices used different instruments and communication methods to convey information to their Extension clientele group during the 2017 hurricane season. Urban Extension faculty and staff reported they used e-mail (*M* = 2.94), the phone (*M* = 2.84), and face to face (*M* =2.76) to the

greatest extent. While rural Extension faculty and staff reported they used Facebook (*M* =3.27), social media (*M* =3.14), and face to face (*M* = 2.86) to the greatest extent. Both urban and rural Extension faculty and staff reported they used Twitter (*M* = 1.40; *M* = 1.32) and Instagram (*M* = 1.15; *M* = 1.18; See Table 4) to the least extent.

Table 4

Extent to which Extension Faculty and Extension Offices made use of Different Communication Methods to Convey Information to their Extension Clientele during the 2017 Hurricane Season

	Urban (n)	M	SD	Rural (n)	M	SD
Electronic mail (e-mail)	85	2.94	1.00	22	2.55	.91
The phone	86	2.84	.94	22	2.59	1.30
Face to face	84	2.76	.97	22	2.86	1.13
Facebook	86	2.59	1.08	22	3.27	.94
The internet	86	2.58	1.03	22	2.55	1.06
Social Media	86	2.57	1.04	22	3.14	1.04
On-site visits	86	2.41	1.06	22	2.73	1.20
Text messaging	84	1.95	1.05	22	2.32	1.13
Twitter	81	1.40	.82	22	1.32	.78
Instagram	79	1.15	.40	22	1.18	.50

Note: Real Limits: 1.00 to 1.49 = *Not at all,* 1.50 to 2.49 = *Slight extent*, 2.50 to 3.49 = *Moderate extent,* 3.50 to 4.00 = *Great extent.*

Extension faculty and staff members were asked to what extent they believed the general public and their extension clientele group were aware of their efforts during the 2017 hurricane season. Urban Extension faculty and staff members indicated the general public and their clientele were aware of their efforts to a slight extent ($M = 2.01$; $M = 2.49$). Rural Extension faculty and staff members indicated the general public were aware of their efforts to a slight extent ($M = 2.42$) while their clientele to a moderate extent ($M = 2.65$; See Table 5).

Table 5

Extent of Awareness by General Public and Extension Clientele of Extension Efforts during the 2017 Hurricane Season

	Urban (n)	M	SD	Rural (n)	M	SD
General public awareness of Extension efforts during recent hurricanes	102	2.01	.71	26	2.42	.90
Extension clientele group awareness of Extension efforts during recent hurricane	102	2.49	.89	26	2.65	.94

Note: Real Limits: 1.00 to 1.49 = *Not at all,* 1.50 to 2.49 = *Slight extent*, 2.50 to 3.49 = *Moderate extent,* 3.50 to 4.00 = *Great extent.*

Extension faculty and staff were asked if their Extension offices have an internal plan to manage communication efforts in a crisis like hurricanes and other emergency situations. Approximately 80% of urban Extension faculty and staff indicated they have an internal plan to manage communication efforts in a crisis. Approximately 62% percent of rural Extension faculty and staff indicated they have an internal plan to manage communication efforts in a crisis.

Extension faculty and staff were asked if their Extension offices have an external plan to manage communication efforts in a crisis like hurricanes and other emergency situations. Approximately 56% of urban Extension faculty and staff indicated they have an external plan to manage communication efforts in a crisis while approximately 46% of rural Extension faculty and staff indicated they have an external plan to manage communication in a crisis.

Differences in Technology for Disaster Communications in Rural and Urban Locations

This research question sought to determine how the use of technology of Extension faculty and staff during and after a disaster differ based upon rural or urban location. Extension faculty and staff were asked what types of technology they personally used during the 2017 hurricane season. After checking all responses that applied, approximately the same percentage (85%) of urban and rural Extension faculty and staff reported a smart phone as a type of technology they personally used during the 2017 hurricane season. Approximately 57% of urban and 62% of rural Extension faculty and staff also indicated a laptop computer as a type of technology they personally used during the 2017 hurricane season (See Table 6).

Table 6

Types of Technology Personally used by Extension Faculty and Staff during the 2017 Hurricane Season

	Urban (n)	%	Rural (n)	%
Smart phone	87	84.5	22	84.6
Laptop computer	59	57.3	16	61.5
Tablet	31	30.0	4	15.3
Desktop computer	30	29.1	5	19.2
Cell phone (with calling and texting only)	30	29.1	3	11.5
Wireless cellular hotspot	16	15.5	6	23.0
Other	5	4.9	5	19.2
No answer	4	3.9	3	11.5

Extension faculty and staff were asked what types of special software or applications (apps) they personally used during the 2017 hurricane season. This question was asked in an open-ended response format and the responses were then coded into similar categories. Approximately 21% of urban Extension faculty and staff reported they used Facebook/Facebook messenger and 18% of them reported using GroupMe. Approximately 46% of rural Extension faculty and staff reported they used Facebook/Facebook messenger and 19% of them reported they used GroupMe (See Table 7).

Table 7

Types of Special Software or Applications (apps) Personally used by Extension Faculty and Staff during the 2017 Hurricane Season

	Urban (n)	%	Rural (n)	%
Facebook/Facebook messenger	22	21.4	12	46.2
GroupMe	18	17.5	5	19.2
Weather Channel app	4	3.9	-	-
WhatsApp	3	2.9	-	-
Zello	3	2.9	-	-
Weather underground app "Storm"	1	1.0	-	-
GasBuddy	1	1.0	-	-
GIS	-	-	1	3.8
Text message	-	-	1	3.8
Other	6	5.8	-	-
No apps used	6	5.8	-	-
Don't know	2	1.9	-	-
No answer	54	52.4	13	50.0

Extension faculty and staff were asked about whether they loss cellular service during and after the 2017 hurricane season. Approximately 29% of urban Extension faculty and staff reported they lost cellular service while approximately 27% of rural Extension faculty and staff said they lost cellular service during and after the 2017 hurricane season.

Disaster Communication Message Differences Based Upon Rural or Urban Location

This research question sought to determine if communication messages before, during, and after a disaster of Extension faculty and staff differ based upon rural or urban location. This series of questions were asked in an open-ended response format and those responses were then coded into similar categories.

Extension faculty and staff were asked what messages they were trying to get across to the public during the 2017 hurricane season. Urban Extension faculty and staff reported that "hurricane preparedness" (37%), "recovery" (32%), and "availability of Extension services (17%) were the top messages they tried to get across to the public during the 2017 hurricane season. Rural Extension faculty and staff reported that "hurricane preparedness" (42%), "availability of Extension services" (23%), and "safety" (23%) were the top messages they tried to get across to the public during the 2017 hurricane season (see Table 8).

Table 8

Message(s) Extension Faculty/Staff were trying to get Across to the Public during the 2017 Hurricane Season

	Urban (n)	%	Rural (n)	%
General hurricane preparing home/agriculture	38	36.9	11	42.3
General/home/agricultural/natural resource recovery (after)	33	32.0	4	15.4
Extension services/resources/other resources/info	17	16.5	6	23.1
Food safety issues before/after the storm	14	13.6	-	-
Safety/personal/family/friends	10	9.7	6	23.1
Information on shelter availability	6	5.8	1	3.8
Change in location/cancellation/altered schedules of programs	4	3.9	2	7.7
Updates during/after the storm	3	2.9	1	3.8
People/pet/animal evacuation	2	1.9	-	-
How to volunteer/volunteer needs after the storm	1	1.0	-	-
Donations/coordination of donations	1	1.0	1	3.8
Miscellaneous	3	2.9	-	-
Don't know	1	1.0	-	-
No answer	28	27.2	6	23.1

Extension faculty and staff were asked what messages they were trying to get across to their Extension clientele during the 2017 hurricane season. Urban Extension faculty and staff reported that "recovery" (26%), "availability of Extension services (24%), and "hurricane preparedness" (23%) were the top messages they tried to get across to the Extension clientele during the 2017 hurricane season. Rural Extension faculty and staff reported that "recovery" (31%), "hurricane preparedness" (31%), and "availability of Extension services" (27%) were the top messages they tried to get across to their Extension clientele during the 2017 hurricane season (see Table 9).

Table 9

Message(s) Extension Faculty/Staff were trying to get Across to their Extension Clientele after the 2017 Hurricane Season

	Urban (n)	%	Rural (n)	%
Personal and Agricultural recovery/response/damage (after)	27	26.2	8	30.8
Extension services/resources/other resources/info	25	24.3	7	26.9
Hurricane preparation of home/farm/agriculture (before)	24	23.3	8	30.8
General safety	10	9.7	3	11.5
Food safety issues before/after the storm	7	6.8	-	-
Updates during/after the storm	5	4.9	2	7.7
Change in location/cancellation/altered schedules	5	4.9	1	3.8
How to volunteer/volunteer needs after the storm	2	1.9	-	-
Storm impacts on Agriculture quality	2	1.9	-	-
Donations/coordination of donations	1	1.0	1	3.8
No answer	28	27.2	12	46.2

Conclusions & Implications

Both rural and urban areas were actively communicating with their stakeholders with resources and technical and social support during, and after Hurricane Irma, which confirms previous work in crisis communication (Seeger, 2006; Seeger & Ulmer, 2001; Shklovski et al., 2008). Differences in how rural and urban areas communicated during the different stages of the crisis were seen in multiple ways. Rural areas used mass media to a moderate extent while urban areas only reported using mass media to a slight extent. This could be a function of the accessibility of mass media in rural areas versus urban. While there are fewer mass media outlets available in rural areas, Extension agents may have a regular local program on mass media and a connection with station directors that are more difficult to have in an urban area.

The internet was used a great extent by both rural and urban Extension personnel, who acted as first information responders on behalf of the Extension office (Omilion-Hodges & McClain, 2016). The internet was considered the most effective for that use by the largest number of people within this study. However, urban respondents were more likely to use the phone, email, and face-to-face communication when communicating personally during and after the storm while their rural counterparts were more likely to use social media and Facebook. This was also reflected in the types of apps used by participants with almost half of the rural participants using the Facebook app. The higher use of social media by rural participants could be because the people who the rural participants were connected to on social media were the same people who they know in their real life, whereas the urban respondents may have not had real

relationships with those on their social networks (Gilbert et al., 2008). Because of this, the urban respondents may have selected more personal forms of communication like phone and face-to-face when communicating personally about the storm.

The types of messages also differed depending on rural and urban areas. This may be an indication of the types of information stakeholders in these areas needed during time of crisis (Coombs, 2012). The top messages for both rural and urban during the storm were "General hurricane preparing home/agriculture", which is on brand for Extension organizational communication, but other messages differed greatly with urban audiences sharing messages of technical aspects like already discussing what to do after the storm for "General/home/agricultural/natural resource recovery", while the rural areas were sharing more personal messages like "Safety/personal/family/friends", but also sharing more "Extension resources". Interestingly, urban areas' 4th highest messages were "sharing about food safety issues", and this did not appear in the rural messages. This too could be related to the nature of relationships in rural and urban areas (Gilbert et al., 2008), or it could be a function of other people who were or were not sharing this type of information in the specific areas. Less differences in messaging were seen after the storm however, food safety messages still only appeared in the urban communication.

Results of this study do not indicate that rural areas were excessively disadvantaged during Hurricane Irma, which contradicts other research on rural areas (Blanchard & Matthews, 2007; Malecki, 2003; Smith et al., 2008). In fact, in some ways the rural Extension personnel may have been able to have a greater impact in

their communities than those in the urban areas. As indicated, this may be due to the established networks and bonds pre-established within rural areas. Of course, this study is only looking at the perspectives of Extension communication. As a whole, the rural areas may have less services and access to organizations beyond Extension. While in some responses to this survey rural areas appear to be better served, the urban areas are likely to have access to communication and services from more organizations, more emergency managers, and county-level staff outside of the Extension organization.

Limitations

Limitations of this study include looking only at the perspectives of Extension communication at one point in time following a devastating hurricane. A more comprehensive approach could include all Extension services and programs before, during, and after the hurricane. Validity would have increased by including communication efforts during several different hurricane seasons in succession. Other limitations include a small sample size and unbalanced responses from urban versus rural counties.

Recommendations

More research should be conducted to investigate the role of organizations other than Extension in rural and urban communities to understand the communication needs during disaster for rural and urban areas. It is possible Extension's communication efforts are duplicated in some areas (urban) but are the only messages in other areas (rural). Future research could explore the differences in urban and rural use of mass media, personal/in-person choices, and use of social media during a crisis. Additional research should also look at the differences in

messaging in rural and urban crisis communication. With the low numbers in rural areas, future work may need to focus on qualitative methods.

Recommendations for practitioners include the development of a crisis communication plan. A template should be provided to begin the discussion and planning process. While in this study the effect of having a plan was not directly seen, previous work indicates its importance (Fessenden-Raden et al., 1987; Renn 1991). The top messages shared in this study were those readily available resources which Extension had ready to share prior to the hurricane. Extension faculty and staff should also work to identify and establish key networks and partners in the community in order to worker together to disseminate crucial information. Key individuals within Extension or the community should be identified to act as first information responders to share information on behalf of Extension.

While in this study, online communication channels were the most prominent, other tools should be developed and considered for long periods of power and cellular outages including grassroots efforts such as providing paper resources to community members. Practitioners should establish relationships and communication networks during 'blue skies' with other organizations in order to work together after disasters to provide information broadly across communities. Previously established networks could be why rural areas had successful communication efforts and access to mass media within this study.

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