Preparing for the worst:
Lessons for news media after Hurricane Maria in Puerto Rico

ABSTRACT

Hurricane Maria (2017) was the most devastating hurricane in Puerto Rico in the last 90 years. The entire communication system collapsed, including cellular. Media organizations in Puerto Rico, with the exception of one radio station, were unable to transmit much needed information during and immediately after Maria made landfall. This study examines changes in journalistic practices, organizational readiness and disaster coverage plans, and infrastructure preparedness almost 18 months after the event. This study extends the limited research examining long-term changes to news media preparedness plans in the context of disasters, and expands theoretical understandings of media practices in the context of the hierarchy of influences model. The results suggest that infrastructure damage severely hampered the ability of news organizations to perform their work, but solidarity among media was useful in the immediate aftermath of the disaster. Each media played a differentiated and important role after the disaster based on their resources and organizational structure. The study shows that preparedness plans were inadequate and that changes are slowly been implemented to deal with challenges related to infrastructure, electricity, and technology, but with limited focus on the long-term well-being of media workers. Recommendations to improve responses to future natural disasters are presented.

Three Category 4 hurricanes hit Texas, Florida and Puerto Rico in 2017, affecting millions of people in the U.S. and resulting in multiple fatalities and billions of dollars in damages (NOAA, 2017). The aftermath of these disasters is still being felt, but more prominently in Puerto Rico where access to electricity and essential services (e.g. drinking water, medical assistance) has been limited, and the reconstruction process has been very slow.

Hurricane Maria made landfall in Puerto Rico on September 20, 2017, bringing high waves, huge rain, floods and fierce winds while cutting down the power supply across the entire island. It was the most damaging hurricane to hit the island in nearly 90 years (deCórdoba & De Avila, 2017). Hurricane Irma, which had hit Puerto Rico two weeks before, had already caused a minor collapse of the power system (Zorrilla, 2017). Hurricane Maria also caused severe damage to infrastructure such as road system, water supply, tele-communication networks and the medical care system (Kishore et al, 2018). During the landfall of Maria, most of the hospitals in Puerto Rico lacked fuel for generators (Zorrilla, 2017). According to researchers, the interruption of medical care, caused by the damage to the medical system such as the disruption of life-sustaining equipment, was the main contributor to the death toll of Puerto Rico in the months after Maria (Kishore et al, 2018). According to the U.S. Federal Emergency Management Agency (FEMA), it was estimated that the rebuilding of Puerto Rico would cost up to 50 billion dollars (Coto, 2018).

Part of the fragility of communities and response efforts is due to the interruption of reliable information channels. Due to the power outage, the entire communication system of Puerto Rico collapsed, including cellular networks and telephone system (Miller, Chester, & Munoz-Erickson, 2018). Media organizations in Puerto Rico, except for one radio station, were unable to transmit much needed information during and immediately after Maria made landfall.

The slow recovery period represents a challenge to these media as they try to not only rebuild their damaged infrastructure, but also to develop ways to perform their roles given the circumstances.

The aftermath of Hurricane Maria in Puerto Rico represents a unique case study in journalism due to the aforementioned damages (Nieves-Pizarro, Takahashi, & Chavez, 2019). Prior research on disaster reporting has been placed within relatively short-term scenarios, such as the immediate aftermath of an earthquake, floods, or hurricanes (e.g. Usher, 2009). The present study examines changes in journalistic practices, organizational readiness and disaster coverage plans, and infrastructure preparedness almost 18 months after the event. Nieves-Pizarro, Takahashi, & Chavez (2019) explored how media professionals working in Puerto Rican radio stations during Maria had to improvise due to the extreme conditions, but they did not explore in detail the role of preparedness plans and infrastructure in the media's performance. In addition, disaster and crisis communication studies need to consider specific cultural contexts in which the events take place. This study explores a U.S. territory with similarities to other Latin American and Caribbean countries, a cultural context not previously examined in past research. Under this unique scenario, the present study seeks to expand theoretical understandings of media practices in the context of the hierarchy of influences model (Shoemaker and Reese, 2013) and develop practical tools to improve communication responses to future natural disasters, especially in the context of vulnerable populations.

LITERATURE REVIEW

Journalistic practices during and after a disaster

During a disaster, routine practices – and therefore gatekeeping processes – are disrupted as the lack of communication limits on-air access to sources and reporters covering recovery efforts

(Littlefield & Quenette, 2007; Takahashi, Tandoc, & Nieves-Pizarro, 2017). Local journalists, as members of the affected community (Weidmann, Fehm & Fydrich, 2008), bear witness of the unfolding events (Tait, 2011) and have to negotiate and balance their position as professional reporters and affected individuals, which can significantly affect journalistic routines (Himmelstein & Faithorn, 2002). This spontaneous communication dynamic may fill in details of evolving emergency situations or raise important questions about response management. In a context where technologies such as the Internet and wireless communications become unavailable, traditional media, such as radio and television play a unique gatekeeping role.

Journalists play various roles in the coverage of natural disasters (Nieves-Pizarro, Takahashi, & Chavez, 2019; Tandoc & Takahashi, 2018). First, they must complete the journalistic tasks assigned by news organizations. Shortly after learning about the incidents, media will dispatch its journalists to the affected areas in order to gather more information (Scanlon & Alldred, 1982). News organizations may even send journalists to key locations in advance if they have enough knowledge about the incoming disasters, such as typhoons and hurricanes (Nieves-Pizarro et al, 2019; Tandoc & Takahashi, 2018). Second, journalists also become victims of the disasters. Journalists suffer from various forms of hazards when covering natural disasters, such as injury or death brought by the disasters (Giuffrida, 2017; Kindred, 2018), or the fatigue, both physical and psychological (e.g. PTSD) (Weidmann, Fehm, & Fydrich, 2008). Furthermore, journalists are considered and occasionally have to act as first responders. Journalists are among the first group of professionals who reach the disaster-affected areas due to the nature of journalism (Dworznik & Grubb, 2007). Apart from producing news coverage about the natural disasters, some journalists have to improvise in first-aid, search or

rescue teams, and act as leaders for both their teams and local communities (Tandoc & Takahashi, 2018).

Journalistic practices during a disaster also depend on the type of news organization. Different media react differently in natural disasters according to their own characteristics and affordances. Television reporters are required to maintain their presence at the disaster sites, as well as conducting live reporting (Wang, Lee, & Wang, 2013). The emphasis on live reporting on site restricts the journalists' choices of the time and the place of doing their reports (Wang, Lee, & Wang, 2013). However, the live contents produced by television journalists often become merely staged live presentations of what was already known instead of the depictions of ongoing events (Wang, Lee, & Wang, 2013).

Radio is considered capable of serving the public interest, especially by providing important information and comfort for the local communities during the natural disasters (Moody, 2009; Perez-Lugo, 2004). Staff who remain in radio stations often receive calls from listeners who want an update on the newest developments related to the disasters (Moody, 2009). In the case of Hurricane Maria, radio stations played a key role because they were the only media that remained broadcasting during and immediately after the disaster (Nieves-Pizarro, et al., 2019).

In contrast, without the need of showing their presence on air (except for social media streams), print journalists have more autonomy on producing their content, although less control from the newsrooms comes with less assistance from colleagues (Wang, Lee, & Wang, 2013). Print journalists put more emphasis on telling stories from localized perspectives with their own disaster experiences (Wang, Lee, & Wang, 2013).

Solidarity, resilience, and empathy

Journalists can't easily separate the personal experience from their professional practices (Tandoc & Takahashi, 2018). Impacted by tragic scenes, journalists grow empathic towards victims. Journalists not directly impacted by the disasters express their empathy by comparing their status to the ones of the victims (Wang, Lee, & Wang, 2013) and by thinking in the roles of both victims and looters (Puente, Pellegrini, & Grassau, 2013). Being granted some sort of privilege by the nature of their profession, such as witnessing disasters while still being able to escape from them, or financial and physical security that other victims don't have (Cottle, 2013), journalists can feel that they are obligated to give back to the victims not only in the form of accurate reporting, but also by returning to disaster-struck regions to offer help (Tandoc & Takahashi, 2018). Even if some journalists become victims of natural disasters, their professional and moral responsibilities can allow them to overcome difficulties and perform their jobs (Tandoc & Takahashi, 2018).

Besides feelings of empathy, disasters also push individuals to assist each other during dire times (Hajibaba, Karlsson, & Dolnicar, 2017) despite the prevalence of disaster myths such as increased looting and other crimes (Nogami, 2018). The acts of support also occur within and across media organizations. Though most of the collaboration among journalists during natural disasters happens within the same news organization, such as helping their colleagues by searching for their family members after the disasters (Tandoc & Takahashi, 2018) or by improvising as operators of power generators (Nieves-Pizarro, Takahashi, & Chavez, 2019), there are cases of solidarity between journalists from different organizations. For instance, in the chaos and difficulties brought by Typhoon Haiyan, reporters shared shelter and food, and they

shared information about the journalists whose whereabouts were still unknown to their colleagues and families (Tandoc & Takahashi, 2018).

This solidarity and collaboration could be associated to a culture of familism that exists in collectivist societies. García-Preto (1982, p.242) argued: "In times of stress, Puerto Ricans turn to their families for help. Their cultural expectations are that when a family member is in crisis or has a problem, others in the family will help, especially those who are in stable position." Puerto Rican families, as well as other Hispanic and Latin American cultures, are more integrated compared to their White counterparts in the U.S. (Sarkisian, Gerena, & Gerstel, 2006). In a study of managers in 11 Latin American countries and Puerto Rico, Lenartowicz & Johnson (2003) reported that although Puerto Rican managers showed significant differences in their values compared to blocs of other Latin American countries, the differences were smaller than expected considering the influence of the U.S culture (considered among the most individualistic countries in the world). A more recent comparison between U.S. and Puerto Rican professionals revealed that: "…Puerto Rican values are different from U.S. values and they are more aligned with values typically found in Hispanic cultures" (Fok, Payne, & Corey, 2016, p.273). Significant differences were reported between the two groups in the values of individualism, time orientation, and activity orientation. Cultural practices that permeate media practices in Puerto Rico's media system appear to resemble those practiced in other Latin American and Caribbean countries despite U.S. economic and legal structures that govern the system (Artero, 2009; Subervi-Vélez, Hernández-López & Frambes-Buxeda, 1990).

Preparedness plans, infrastructure, and technology

Research on disaster reporting has examined many of the individual challenges outlined above but has omitted to explore a key question about journalistic performance during disasters: how

do news organizations' preparedness plans allow or prevent journalists' work? Studies on preparedness plans have not examined how a crisis or disaster directly affects news performance under extreme working conditions. Sood, Stockdale, & Rogers (1987) studied how new media and local governmental organizations cooperated during a series of natural disasters. The study focused on the types of stories and information sources sought by journalists, but it was done in the context of journalists working without major constraints, which was not the case of Puerto Rico during Maria. Lowrey, Gower, Evans, & Mackay (2006) examined news staff preparedness in covering public health crises among newspapers in southern U.S. The study reported that economic factors, organizational preparedness, and professional orientation were positively related to staff preparedness. On the other hand, studies examining disaster reporting at the individual level (Browne, Evangeli, & Greenberg, 2012) such as war reporting (Feinstein, 2006) have not consider challenges at the organizational level. Hurricane Maria affected news reporting at both levels simultaneously.

Preparedness and news coverage plans are directly related and dependent on the resilience of the existing infrastructure and technological structure of news organizations. Media professionals rely more than ever on reliable communication infrastructure and technology in the news production process during natural disasters. Faced with the challenges, news organizations and journalists use various technologies to overcome the difficulties. These include satellite phones (Nieves-Pizarro et al., 2019) and other satellite transmission equipment (Wang, Lee, & Wang, 2013), and Unmanned Aerial Vehicle (UAV) commonly known as drones (Goldberg, Corcoran, & Picard, 2013; Holton, Lawson, & Love, 2015), which are both effective and inexpensive and can also keep journalists from the dangerous areas. Social media are also considered as key means of emergency communication by journalists (Takahashi, Tandoc, &

Carmichael,2015; Tandoc & Takahashi, 2017). Despite the availability of new technologies, the disruption of communication channels hinders journalists' ability to connect with their colleagues or sources (Sreedharan & Thorsen, 2018; Wang, Lee, & Wang, 2013). During Hurricane Maria, the lack of Internet connectivity, together with the loss of cell phone signal, prevented Puerto Rican journalists from broadcasting their stories, especially from rural areas (Nieves-Pizarro et al., 2019). In addition, disasters sometimes destroy television studios, newsrooms or headquarters of media organizations (Nieves-Pizarro et al, 2019; Sreedharan & Thorsen, 2018). Even if the staff can continue working in temporary sites, those places are usually short of the essential equipment and resources (Nieves-Pizarro et al, 2019; Sreedharan & Thorsen, 2018). Finally, damage to transportation systems makes it difficult for journalists to make their ways to the disaster areas (Puente, Pellegrini, & Grassau, 2013; Sreedharan & Thorsen, 2018; Wang, Lee, & Wang, 2013).

The island's current economic crisis has affected the media industry, with many news organizations closing operations or laying off staff (Subervi-Vélez & Rodríguez-Cotto, 2017). Lack of investment and maintenance was a key reason why the infrastructure of Puerto Rico was vulnerable to Hurricane Maria. For example, before the incident, the Puerto Rico Electric Power Authority, which governs the electricity system of this island, was in a massive debt of 9 billion dollars (Miller, Chester, & Munoz-Erickson, 2018). As the result, it was hardly possible for the agency to maintain the power grid properly or keep backup systems for emergency, especially in the rural areas (Miller, Chester, & Munoz-Erickson, 2018).

Although prepared for Hurricane Maria in advance, Puerto Rican media professionals underestimated the impact of Maria. Flooded studios, scarce resources, together with the failure of communication networks, forced the journalists to improvise, and they had to play some

unfamiliar roles, such as generator operators and engineers, in order to keep the media working (Nieves-Pizarro, Takahashi, & Chavez, 2019).

What remains unclear is what preparations different news media (print, broadcast, television) engaged in prior to Hurricane Maria. More importantly, how are different media outlets dealing with their own recovery efforts pertaining to infrastructure (repairs, connections) and human resources (recruitment and retention of personnel) after the hurricane?

RESEARCH QUESTIONS AND THEORETICAL CONSIDERATIONS

This study examines the effect of preparedness plans on 1) journalistic performance during and after Hurricane Maria, and 2) on the lessons learned both at the individual and organization level. The study is placed within the hierarchy of influences model (Shoemaker & Reese, 2013) applied to a disaster reporting scenario, with particular attention to the routine, organizational, and social systems (ideological) levels. The analysis is based on news media workers' perceptions of factors at each level. Based on this framework and the review of disaster reporting presented above, we propose the following research questions:

RQ1 Routine level: How did infrastructure damage affect the ability of news media to perform their duties? How have routines changed as a result of the disaster?

RQ2 Organizational level: What preparations did the different news media (print, broadcast, radio) engage in prior to the hurricane? How are media outlets dealing with their own recovery efforts pertaining to infrastructure (repairs, connections) and human resources?

RQ3 Social systems level: How do cultural characteristics influence journalistic performance during a disaster?

METHOD

This study is based on a qualitative analysis of 24 interviews with news media workers in newspapers, radio, and television in Puerto Rico. Interviews were conducted face-to-face in February 2019 and conducted in Spanish. The focus on the specific actions during the disaster were secondary to the focus on current changes to routines and preparedness plans, which avoids issues of recall of an event that happened almost 18 months ago.

Interviews lasted between 25 and 65 minutes and were conducted at the news organizations and were audio recorded. Semi-structured interviews followed a script with questions aligned with the research questions and theoretical considerations outlined in the literature review. Interview questions included, among others: What was the everyday operation like before, during, and after Hurricane Maria? In the immediate aftermath of Hurricane Maria, what were the greatest challenges of working without power/limited communications? How did the lack of power and wireless communications affect your ability to communicate information to the audience? What was the dynamic with the audience (in Puerto Rico, in the U.S.) in the immediate aftermath of the storm? How did the emergency affect you personally? What preparedness plans were in place and how have they changed? Hopefully not, but if next year, there is another Hurricane like Maria what would you do differently?

Traditional news organizations with a national (island-wide reach) were included. This includes four newspapers (*El Nuevo Día, Primera Hora,*[i] *Metro*, and *El Vocero*), two radio stations (*Radio Isla* and *NotiUno*), and three television stations (*Telemundo, WAPA TV*, and *WIPR*). Other news organizations were also represented because some interviewees were employed at a different organization during the time of the hurricane (e.g. *WAPA radio*).

Interviewees were selected in coordination with either the producer, news editor, or director at the news organization who served as the point of contact with the authors. We attempted to include reporters, editors, weathercasters, news directors, and news anchors. Nine participants were female and 15 were male. These media workers were included because during a natural disaster, all these individuals take on reporting functions despite their official roles. In addition, these diverse perspectives provide a broad perspective on the complete news operation during the event that allows answering the three research questions.

Data analysis

Audio files were transcribed verbatim by two professional Puerto Rican translators. Transcripts were thematically analyzed (Saldaña, 2015) in Spanish to preserve the cultural meanings that could be misrepresented in a translation. The analysis was done using the application *Dedoose* by the lead author. Only quotes used in the results section to illustrate specific themes were translated to English. The analysis focused on identifying the most frequent themes at the routines, organizational, and social systems levels.

RESULTS

The immediate aftermath of Hurricane Maria and its long-term effects on individuals and media organizations is characterized by varied emotional responses and diverse alterations to journalistic practices and routines. These changes are described in three main themes that emerged from the analysis. First, media workers overcame the physical and emotional challenges of a ravaged island with no power and electricity by becoming a solidary community. Second, news organizations adapted their response and preparedness plans in the form of infrastructure and technology, but with limited attention to the human element and decision-making procedures. Third, as victims of the most devastating hurricane in the last several decades, media

workers demonstrate a remarkable resilience, both as residents and as professionals, which manifests itself in lessons learned 18 months after the disaster.

Preparedness plans and challenges in reporting natural disasters

All news organizations included in this study have experience covering hurricanes but have limited preparedness and coverage plans that lack detailed procedures. Just two weeks before Maria made landfall, these outlets were covering Hurricane Irma. Irma was only a scare and didn't disturb normal news operations for most outlets, so these plans where not significantly altered:

> When the event occurred, it was surprising because Irma had passed two weeks ago and that did not impact us directly because it was diverted at the last minute. It passes, leaves some damage and two weeks later they announce the hurricane, people gave it for ... if Irma did not hit, then this will happen the same way (General Manager at a newspaper).

Some organizations thought of Irma as a test run for Maria and did adjust their plans to cover Maria: "Irma was a great test for Hurricane Maria. If Irma had not arrived, this would have attacked us worse. Why? Because we realized that we could improve some things in the planning that helped us a lot for Maria; and after Maria, now we have enough experience" (Executive producer at a newspaper). Many respondents had also lived and covered hurricanes such as Hugo and Georges. These experiences proved to be both a blessing and a curse. Part of the reason for neglecting to develop comprehensive plans was due to what many respondents referred to as divine intervention. Respondents mentioned that Puerto Ricans in general, particularly those who had not experienced a destructive hurricane, believed that Puerto Rico had been blessed by God and therefore all hurricanes predicted to ravage the island will eventually change direction, which is what happened with Hurricane Irma and others. A reporter from a newspaper who was stranded in the island of Vieques explained this: "…the moment will come when this will change course. It will not impact us directly. I always kept that hope even when that moment was

approaching." Another reporter said: "I had never experienced that context, it was not fresh in my memory beyond what I had seen in St. Thomas that had been devastating (during Hurricane Irma). I did not imagine that the next day of Maria was going to dawn in the middle of so much devastation" (Reporter at a newspaper).

Despite the long history of covering natural disasters, particularly hurricanes, most news outlets, with the exception of the larger newspapers and television stations, did not have a clearly established emergency response plan, or if one was present, the means to implement them were not available: "We do not have a disaster coverage protocol and that was one of the lessons learned" (Editor at a newspaper). Similarly, a multimedia producer at a radio station said:

> We were not prepared. We did not have a contingency plan. We were not prepared to be out of the air, that just happened…the government must already have a plan in case communication stops working, we need such a tool where the media are included. They must make an alliance.

There was no backup plan for a catastrophic event that cut power to the island, shattered the wireless communication system, and made driving around the island an extremely difficult task. Those media with a coverage plan had developed only basic procedures, which in some cases included deploying journalists to areas that are predicted to be heavily affected or to the areas they live in (or had lived in) or are familiar with: "We work that plan automatically and we know what things we should do, what things we should do faster, what things we should have ready" (News director at a TV station).

The coverage plans during the hurricane were executed by editors, producers, directors of media organizations and others in leadership positions. When the electricity went out and the cell phones stopped working, the decision-making chain also broke. Reporters, photojournalists, and every other person covering the hurricane at a remote location or at home waiting for the hurricane to pass, were left with no way to make decisions about what to do next.

At the individual level, none of the respondents had previous formal training in disaster reporting. Those with extensive media experience relied on past experiences covering disasters, including other hurricanes as well as other catastrophic events such as the explosion of a shoe store in *Rios Piedras* and the explosion of gas tanks at the petroleum refinery *Capeco*, all of which left multiple fatalities: “In terms of preparation there is no such thing as a preparation, there is perhaps a measure of knowledge acquired over time” (News anchor at a TV station). Others with more limited experience did not know how to function during extreme circumstances. One radio coordinator explained that he felt the urge to go out to the streets to help people after being told by the National Guard that they didn’t have enough people or resources to assist all the emergency calls they were receiving:

> I picked up the keys of the station’s vehicle at about nine or ten at night and my wife said to me: "where are you going?" I told her that I needed to get people out of there and she told me: "but you cannot do anything". But I told her that people needed to know what was going on and that if we as journalists were not there, who was going to spread it. My wife asked me some basic questions: "Do you know how to swim?" I told her no. "Do you have a large vehicle that can cross a flooded area?" My answer was no. She kept asking questions to which I answered no, and she said: "And why are you going? Are you going to risk your life too?" I said, "If I know they are drowning I cannot let them drown." If I can find some kind of help and take it there ... She tells me: "You have a way to help in your hands. There are people who are listening to you. It's the radio. Stay here." I'm desperate and my fellow producer at the time tells me we're going. But what my wife told me is true, but she tells me in a harsh way and takes me to the room that we had enabled to rest and there she took me and gave me the *'jamaqueón'* (shake up). I told her that she was right and that I believed that going out was dangerous. We're going to stay and we're going to use the radio as a vehicle to help.

This coordinator had to make very difficult decisions under a considerable pressure from his co-workers who also wanted to go out to help. He did not have a protocol or training to follow in this scenario.

Similar responses in regard to lack of or unclear reporting plans were given by several reporters. This respondent was sent to an area expected to be severely hit, but had difficulties accessing locations and sources after landfall:

> Independent of the fact that the eye is going to pass through Humacao, maybe I want to stay in Yabucoa. Because the people who work with the municipality of Yabucoa are perhaps more daring and let me go out with them when they go to rescue 14 municipal police officers who were in the barracks under water with a power generator they could not turn off; they were in danger of getting electrocuted (Photojournalist at a newspaper).

A news anchor at a TV station did not know how to deal with the human tragedy they were witnessing when she visited an affected area looking for stories:

> …it happened many times, we were the first to arrive in that community, nobody had arrived even a month later and you arrived empty-handed. Sometimes you shared if you had two bottles of water, you left one. But I felt bad, I came to my house and said Oh my God. Because the journalist was not prepared, nor the media either for us to assume that role, which does not correspond to us but which came to us at the hands of being the urgency to answer because you were arriving for the first time to a place. And next time we go with what we have, we get ready to go out in the vehicle with materials and provisions.

Similarly, when residents called the landline of one of the radio stations (the day Maria made landfall) asking for help because people were either trapped, or needed assistance, media workers answering the phone did not know what to say. Each one was giving their own answer based on their personal perspectives. Later that night, they collectively decided to address this problem: “It was a decision among colleagues. It was everyone's decision because the anxiety was affecting us all. As a group we basically decided to say the same thing to all the people who were calling to ask about their relatives” (Multimedia producer at a radio station*)*.

Solidarity

Puerto Ricans pride themselves of their solidarity. This became evident in the aftermath of Maria, not only among journalists, but across the island. When asked what the most important lesson learned from Maria was, a news anchor at a public TV station said:

> The solidarity. How disasters and these dramatic situations sometimes bring out the best in the human being. People who did not know each other began to share, to share what little they have and that for me was also beautiful, very beautiful…And we saw that also at the country level, that people were very supportive.

A producer at radio station who worked at *WAPA Radio* during the hurricane explained how the station became a central place for this solidarity to manifest itself:

> It was a brotherhood. Everyone was collaborating selflessly, including doctors who went to offer their help services, consultation, for people ... when they change the blood ... dialysis. They had machines there for people to dialyze. *WAPA Radio* became a service center.

The most important place for journalists during and immediately after the hurricane was The *Centro de Manejo de Emergencias* (Emergency Management Center), which became the gathering place for reporters for two main reasons. First, it became the meeting point for key government officials, which gave reporters a relatively direct access to official sources. Second, it had electricity and Internet connection. Some news media (e.g. *Metro*) lost their offices and had to figure out an alternative location, making the *Centro de Manejo de Emergencias* the most ideal place to move their operations. This daily gathering became an opportunity for journalists to share stories, ideas, and resources. Similarly, reporters who were deployed to areas outside San Juan (e.g. Vieques, Yabucoa) found themselves in difficult situations oftentimes with colleagues from other media. The need for safety and lack of communication technologies made them become a team, traveling and working together, as explained by a news director at a newspaper:

> You realize the solidarity between colleagues. From the desire to go to the street to record this event not only the day before, the moment it occurred and the day after, but months and years later. That requires a lot of energy and enormous wear. Here there are colleagues who believe they have not yet processed what they lived ... that continuous exposure to that extreme landscape in which the country was left. If there is something I preserve a year later is that sense of solidarity, of recognizing the importance of the profession…

This collaboration emerged also because of each media's affordances and resources. Newspapers have larger newsrooms than most radio and television stations. Radio stations, which were the only remaining media broadcasting to Puerto Ricans in the immediate aftermath of the hurricane, were mostly relying on people's calls to the landline, government officials and residents visiting the stations to give their own accounts, or other media. Original reporting was much more limited, as described by a reporter working at *WAPA Radio* at the time of the hurricane:

> ... we had an alliance with *Telenoticias* in *Telemundo*, and *Telenoticias* had its reporters in the street, but once they left the air we were depending on a telephone line and we had Internet… *El Nuevo Día* was transmitting information to outside of Puerto Rico because in Puerto Rico there were very few who could be connected. We then used the information that *El Nuevo Día* reporters collected to broadcast it to the air for the people with radios and transmitters. There was a symbiosis there because they had their reporters in the street, we did not have the capacity to be in the street because we broadcast with antenna and in the middle of the hurricane it was impossible to do that and we fed on that work of the colleagues of *El Nuevo Día*."

This sense of solidarity, expressed by almost all the respondents, emerged because of the severity of the hurricane, but it was also characterized as a quality that Puerto Rican media and news workers have always had, even during non-disaster situations, which was explained by a digital editor and reporter at a newspaper:

> …the culture here of the journalists that cover the street has always been well united. Each one has their agendas and editorial lines but we give ourselves a lot of support and it was not the exception during the hurricane. We stayed together. We knew that we could not be competing for exclusives and that the purpose was to report the emergency in the best possible way.

This dynamic also applied to journalists from mainland U.S. and international media outlets:

> I told you about the things that I liked the most, such as the spirit of solidarity in this and other media. This space hosted journalists from other countries because they knew that there was Internet here, they knew there was water and they could shower. People of the New York Times, Washington Post, BBC. Many colleagues became sort of *lazarillos* (helpers) of other media, taking them out there so they could do their job. The story of Maria was a global story (News director at *El Nuevo Día*).

That is not to say that there was no competition among outlets, as described by a an editor at a newspaper who was working with her team alongside all other media at the Center for Emergency Management: “It was a bit funny because at one point we were all in a hallway in those tables and if we were going to discuss the cover we had to put it in a little corner so that they would not see, so that they would not listen.”

Lessons learned

Most respondents said they feel prepared to cover a similar disaster in the future, but those who did not feel prepared said it was partly because the emotional wounds are deep and will take time to heal. Most interviewees stated that both news organizations and media workers have made significant changes to their preparedness plans. Such changes focus primarily in the areas of infrastructure and energy, and technology, as described by a manager at a newspaper*:* “The first thing was more than anything communication, improvements to the building, and the plan basically if a hurricane comes is not going to change that much...”

Large news organizations such as *GFS Media* (publisher of *El Nuevo Día* and *El Vocero*) and *Telemundo* are located in secure buildings that were not damaged during the hurricane. Electricity loss affected the whole island, but news organizations kept producing content using generators, either via online to the diaspora in the U.S. mainland, AM radio signal (*WAPA Radio*), or print newspapers days after the event. There were some news organizations in leased buildings where the generators failed or suffered structural damaged that flooded offices, forcing them to relocate. The larger news organizations were more preemptive in their preparedness plans post-Maria: “The first thing we did was a hurricane plan like this one in 2018 that is reviewed every month of May” (Executive producer at a newspaper). Electricity is the key resource on which most other technologies rely on: “The fundamental thing for us is the energy

and the rest comes in addition to that, because without energy we have no signal to anything, we do not have access to anything" (Associate director at a newspaper*)*.

Infrastructure changes for broadcasters mostly refers to securing antennas, as explained by the coordinator of operations at a radio station:

> …we have solidified the antennas. The only physical damage we had was to that antenna. Thank God we had nothing to regret. We fixed here and adjusted in the other stations so if we have another one (hurricane) we have solid towers, more powerful transmitters following the regulations of the FCC...

Newspapers had a different problem. They could print the newspaper, but they couldn't distribute it. The four newspaper did not publish the first few days, but as things normalized, they started printing in much smaller quantities than usual. Many people had no access to radio or television, so the days-old newspaper was the first information they would receive: "In the lines at gas stations our distribution partners stopped to distribute newspapers and people fought over the newspaper because it was the only way to know what was happening" (Digital editor and reporter at a newspaper). Even reporters started distributing past and current editions of the newspaper as they started to venture into smaller towns outside San Juan: "I remember when we got to Aguada I stopped in the middle of the road and started distributing it car to car. I got off, I put my ID and began to deliver to each car and people were amazed and asked because people did not know anything" (Reporter at a newspaper). Residents who received the copies later started serving as informal distributors by further sharing their copies to other residents.

Similar changes were made in regard to communication equipment and survival kits: "If we had one GoPro before, we're going to ask for three. If we had a charger, now we have three. That kind of thing to be more prepared" (Content manager a TV station). Satellite phones, which were deemed as obsolete prior to Maria, are now also part of the toolkit in many news organizations: "…we bought satellite phones as well, which was an investment we made to have

that kind of communication with people in different areas. We buy other systems of hotspots to avoid having to depend on electricity…" (Editorial director at a newspaper).

Among the revised plans, there was no mention of plans to deal with the emotional aspect of a disaster. The immediate safety of personnel during a disaster was mentioned as a priority, but not their wellbeing in the long-term, particularly in regard to emotional health. A meteorologist who struggled on air when giving the final forecast of the hurricane as well as off-air explains the emotional aftermath of the disaster:

> After Maria it was hard for me to see a map. I had rebellion, anger and I did not know because if I stopped to think about it, I would not be able to do my job. But to arrive here day after day to do the same, to work with time gave me wrath. I do not even know how to describe it. Wrath with nature, outrage. And now every time the hurricane season begins, and the hurricane season is over again, I hope nothing happens. I already add a stress, emotionally it is not easy (Weathercaster at a TV station).

The hurricane had a significant effect on how reporters and news organizations approach their work, not only related to hurricane coverage, but across all their work, as described by a content manager a TV station: "I can tell you that many of the reporters changed their way of thinking, of seeing things. As I told you, everything was very mechanical, very fast, it was to make the news and now." She also explained that at the television station the relationships between reporters, producers, and others has significantly change to better account for everyone's well-being:

> ... some of them (reporters) did not even go to the newsroom. They came, they called from their cell phones, I'm down, I'm ready, send me to the cameraman and I'm leaving. And we did not see them until the moment of editing their piece. After Maria we started doing what are called postmortem, meetings to discuss how the day went, what they liked, what they did not like, what we can improve. In the early mornings when we already designate what each one is going to cover, we ask them to arrive, come closer, we talk to them. Throughout the day we keep in communication with them. Before María there were times that we did not know about the reporter until the hour that arrived here. Not now. There is more that contact between reporter and the production team (Content manager at a TV station).

In addition, the aftermath of the hurricane brought a renewed sense of skepticism about governmental sources in part as a response to the conflicting information concerning the death toll that was initially reported. This also resulted in a renewed sense of commitment:

> But I think after the Hurricane ... it was a great training on the inefficiency of the government and how important it is for us to be there and question. I don't know ... I think I've lost my fear ... I've always been a very direct person. I am an incisive journalist. I am a journalist who likes precision. I was it before the hurricane and now I think I am more. Now I don't feel any fear in questioning, I am not afraid of whoever is in power. I think that commitment increased. I think it has even helped me cope. We have all been emotionally affected and my work has helped us to channel all those emotions (Digital editor and reporter at a newspaper).

Most newsrooms had to improvise and revert to old ways of doing news and publishing, something the art and multimedia director at a newspaper explained:

> When all the systems failed we reverted back to the analog, we had to evolve many people who never saw this to the newspaper of the past. A trip in time of about 15 years where before the newspaper was made without Internet; without resources the photographer had to get to the newsroom and bring me the elements so I could assemble the pages and make the design and go assembling the newspaper, the same with the reporter.

This was particularly challenging for younger media people who had no experience with hurricane coverage and older technologies. The experience made them realize that the overreliance on modern technologies comes with drawbacks that need to be taken into consideration during dire times: "Maybe now I am more proficient sharing an article, what platforms I will use to share them. I have created the ability to write faster. At that time the computer's battery was well privileged. The line of thought had to be very fast" (Reporter at *Metro*). More experienced news workers seemed more resilient or at least more prepared. A weathercaster at a TV station with decades of experience said that he was not worried about his family's safety because he knew they were in a safe location and therefore could do his work with less emotional concerns: "The house is prepared for hurricanes: hurricane shutters

everywhere, and I knew that the house was not going to have problems because it is in a high place, there are no floods…But my children are adults and they helped their mother and she was calm."

Nonetheless these challenges, respondents overwhelmingly highlighted the strength showcased by the industry and the individuals that are part of it. The vice president at a radio station mentioned that one of things he is most proud of is the industry's resilience: "It is that the industry as such had such a great capacity and resilience of Step Up power at the time of the crisis, in such a way that we could really give a service to the community, a service to the country."

DISCUSSION AND CONCLUSIONS

Hurricane Maria was a deeply transformative event to all Puerto Ricans, one that shook the core foundations and beliefs of most institutions, including media organizations. As one respondent stated: "I believe that in the life of all of us who could live here in the profession as in any other aspect, it is before Maria and after Maria. In fact, in your daily routine, you wonder if it was before or after Maria" (Web editor at a newspaper).

This study examined the ways in which media practices, including journalistic routines and organizational preparedness plans, changed in the immediate aftermath of Hurricane Maria and in the following 18 months since the disaster struck the island. The results of the study highlights opportunities and challenges that news organizations need to address to better prepare to cover natural hazards and related disasters. The study also considered the unique cultural context of Puerto Rico as a factor that could explain some of the practices described by the participants.

Infrastructure damage severely hampered the ability of news organizations to perform their work, forcing them to improvise (Nieves, Takahashi, & Chavez, 2019) (RQ1). Radio stations played a key role the first days/weeks because they were the only media with the ability to keep reporting to residents in the island. However, television and newspapers played an increasingly important role. Newspaper reporters played a more important role in the longer term by digging deeper in some of the stories, such as the claims that the death count was relatively low. They also served as the main content producers for *WAPA Radio* during and after the hurricane. Each media played a differentiated and important role in the aftermath of the disaster based on their resources and organizational structure.

This study extends the limited research examining long-term changes to news media preparedness plans in the context of disasters (e.g. Lowrey, Gower, Evans, & Mackay; 2006; Sood, Stockdale, & Rogers, 1987) (RQ2). The results indicate that news organizations have developed more comprehensive plans as a result of Maria, but some respondents are skeptical of the appropriateness of such plans: "As a company, we lack a lot. Having a plan on paper does not solve anything. If a hurricane came right now, there are certain equipment that would be needed and there are none" (Reporter at a newspaper). All news organizations have implemented some changes, but few have made profound changes to their preparedness plans, despite arguing that they are necessary. A few respondents, including a newspaper director, mentioned that those profound changes have been discussed but not yet fully implemented. No reasons were given to explain the lack of implementation other than saying that it is a work in progress and that they will eventually be implemented.

Although most respondents stated that they feel prepared to cover another major natural disaster, several discussed the emotional costs that they are still paying. Many of the younger

respondents had never covered an event remotely closed to Maria, making the experience extremely challenging and traumatic. The interviewees did not reveal specific steps or solutions being taken or implemented to deal with such problems. They also did not have any formal or informal training in disaster coverage during their time in the university or in their workplace. A respondent said:

> The university teaches you but does not teach you or prepare you for the constraints. The university does not prepare you for the street, that I learned here. That you learn on the road. Next time I would recommend more training on how an atmospheric event works, how communications work (Multimedia producer at a radio station*)*.

This indicates the need for further training, such as the work done by the *Centro de Periodismo Investigativo* (Center for Investigative Journalism), which organized an event called *365 día de María*[ii] (365 days from Maria) to discuss the aftermath of the disaster. Also, news organizations need to implement a mentoring system that allows young reporters to learn from their more experienced colleagues, something that happened sporadically and spontaneously:

> One tries to guide them and explain what we are going to live so that people have an idea… I had the opportunity to go see Andrew two days later to South Florida close to Homestead. We flew to Orlando and got off in a car to see what it looked like. I've never been in a war zone, but this is a bomb. Things had fallen off as if it had been an explosion. And that I did tell them, especially the young reporters who are with us now (Weathercaster at a TV station).

The infrastructure collapse forced media organizations and media workers to weather the storm partly by appealing to the solidarity among colleagues (RQ3). This appears to be a cultural characteristic of Puerto Rico (Fok, Payne, & Corey, 2016; Sarkisian, Gerena, & Gerstel, 2006). This characteristic of news workers and media outlets could and should be harnessed in the development of multi-sectoral preparedness plans between news organizations, governments, industry, and non-governmental organizations. The results suggest that this solidarity is useful in the immediate aftermath of a disaster, but long-term relationships are harder to sustain due to the

nature of the business, even when smaller organizations are still in need of assistance. In this respect, larger news organizations, particularly *Telemundo* had sustaining resources which made them more resilient. A respondent explained that NBC provided with unrestricted support:

> They were even willing to send us a shipment of food and water only for all the television employees. So, we are not alone, and we knew that they were not going to leave us alone. They were quick to move planes, heaven and earth to get here and if they had to get people out of here, they would do it.

From a theoretical perspective, the results allow us to deepen the understanding of the various levels within the hierarchy of influences model (Shoemaker and Reese, 2013) in the context of a severe natural disaster. The results of the study suggest that the influence of the organizational level, and possibly the social institution level (e.g. relationship between media organizations and with other institutions relevant to disaster response), on journalistic practices and therefore content, are magnified in a disaster situation in comparison to non-disaster situations. This seems to be particularly true when these organizations are vulnerable to the disaster. Similarly, the social systems level appears to also play a differentiated role in influencing post-disaster news practices and therefore the content produced. Cultural norms appear to be key in the production of news content when journalists and organizations face with challenging circumstances.

Future research should examine the preparedness plans for other forms of natural hazards besides hurricanes. A couple of respondents mentioned the threat posed by earthquakes to Puerto Rico: “I lived in Los Angeles for seven years, but never during an earthquake and never had to cover an earthquake, and in Puerto Rico it is going to be a big challenge and we are preparing for that. For an earthquake you can have a plan, but it is another type of plan. I think that is the next big challenge here in Puerto Rico” (Editorial director at a newspaper). Also, Latin American and Caribbean countries should be examined to determine whether similar responses to disaster

coverage are present based on cultural similarities. Finally, younger reporters appear to be more affected by these types of events. The more senior respondents didn't think they had changed much after the disaster, but it might also be due to personalities. More research is needed to explore how these events shape the job performance of young reporters in the long-term.

This study is not exempt of limitations. Although many respondents worked or lived around the island, they were all based in San Juan, which concentrates all the national media. The experiences of media workers in other locations around the island could be different, so we are careful in generalizing the results presented. In addition, the study did not examine the preparedness plans before and after Hurricane Maria to triangulate with the responses provided by the interviewees. Such task will be conducted in a follow-up study.

REFERENCES

Artero, J. P. (2009). The media in Cuba, the Dominican Republic and Puerto Rico. In A. Albarran (Ed.), *The Handbook of Spanish Language Media*. New York, NY: Routledge.

Browne, T., Evangeli, M., & Greenberg, N. (2012). Trauma-related guilt and posttraumatic stress among journalists. *Journal of Traumatic Stress*, *25*(2), 207-210.

Coto, D. "FEMA: Puerto Rico running out of time as storm season nears," Associated Press, Apr. 6, 2018, https://www.apnews.com/7c238de9e23a4c41b2f557e671e5a12d/FEMA:-Puerto-Ricorunning-out-of-time-as-storm-season-nears.

Cottle, S. (2013). Journalists witnessing disaster: From the calculus of death to the injunction to care. *Journalism Studies*, *14*(2), 232-248.

deCórdoba, J., & De Avila, J. "Hurricane Maria slams into Puerto Rico; Storm is the most powerful to make landfall on the island since 1928." *Wall Street Journal (Online),* Sep. 20, 2017, *ProQuest.*

Dworznik, G., & Grubb, M. (2007). Preparing for the worst: Making a case for trauma training in the journalism classroom. *Journalism & Mass Communication Educator*, *62*(2), 190-210.

Feinstein, A. (2006). *Journalists under fire: The psychological hazards of covering war*. JHU Press.

Fok, L. Y., Payne, D. M., & Corey, C. M. (2016). Cultural values, utilitarian orientation, and ethical decision making: A comparison of US and Puerto Rican professionals. *Journal of Business ethics*, *134*(2), 263-279.

García-Preto, N. (2005). Puerto Rican families. In McGoldrick, M., Giordano, J., & Garcia-Preto, N. (Eds.). *Ethnicity and family therapy*, *3rd Edition,* New York: NY, The Guildford Press.

Giuffrida, A. "BBC crew and tourists injured in lava explosion on Mount Etna", *The Guardian (Online)*, March. 16, 2017, https://www.theguardian.com/world/2017/mar/16/bbc-crew-among-those-injured-in-explosion-eruption-on-mount-etna

Goldberg, D., Corcoran, M., & Picard, R. G. (2013). Remotely piloted aircraft systems and journalism: Opportunities and challenges of drones in news gathering.

Hajibaba, H., Karlsson, L., & Dolnicar, S. (2017). Residents open their homes to tourists when disaster strikes. *Journal of Travel Research*, *56*(8), 1065-1078.

Himmelstein, H. & Faithorn, E. P. (2002) Eyewitness to disaster: How journalists cope with the psychological stress inherent in reporting traumatic events. *Journalism Studies 3*(4), 537–555.

Holton, A. E., Lawson, S., & Love, C. (2015). Unmanned Aerial Vehicles: Opportunities, barriers, and the future of "drone journalism." *Journalism Practice, 9*(5), 634-650.

Kindred, A. "Incredible moment brave Fox News reporter dodges exploding electricity transmitter while being battered by 90mph Hurricane Florence," *The Sun (Online)*, Sept. 14, 2018, https://www.thesun.co.uk/news/7262217/hurricane-florence-fox-news/

Kishore, N., Marqués, D., Mahmud, A., Kiang, M. V., Rodriguez, I., Fuller, A., ... & Maas, L. (2018). Mortality in Puerto Rico after Hurricane Maria. *New England Journal of Medicine*, *379*(2), 162-170.

Lenartowicz, T., & Johnson, J. P. (2003). A cross-national assessment of the values of Latin America managers: contrasting hues or shades of gray? *Journal of International Business Studies*, *34*(3), 266-281.

Littlefield, R. S., & Quenette, A.M. (2007) Crisis leadership and Hurricane Katrina: The portrayal of authority by the media in natural disasters. *Journal of Applied Communication Research, 35*: 26–47.

Lowrey, W., Gower, K., Evans, W., & Mackay, J. (2006). Assessing newspaper preparedness for public health emergencies. *Journalism & Mass Communication Quarterly*, *83*(2), 362-380.

Miller, T. R., Chester, M., & Munoz-Erickson, T. A. (2018). Rethinking infrastructure in an era of unprecedented weather events. *Issues in Science and technology*, 47-58.

Moody, R. F. (2009). Radio's role during Hurricane Katrina: A case study of WWL Radio and the United Radio Broadcasters of New Orleans. *Journal of Radio & Audio Media*, *16*(2), 160-180.

Nogami, T. (2018). What Behaviors We Think We Do When a Disaster Strikes: Misconceptions and Realities of Human Disaster Behavior. In Samui, P., Kim, D., & Ghosh, C. (Eds). *Integrating Disaster Science and Management* (pp. 343-362).

Nieves-Pizarro, Y., Takahashi, B., & Chavez, M. (2019). When everything else fails: radio journalism during Hurricane Maria in Puerto Rico. *Journalism Practice*, 1-18.

NOAA (2017). Billion-dollar weather and climate disasters: Table of Events. Accessed: https://www.ncdc.noaa.gov/billions/events/US/2017

Perez-Lugo, M. (2004). Media uses in disaster situations: A new focus on the impact phase. *Sociological inquiry*, *74*(2), 210-225.

Puente, S., Pellegrini, S., & Grassau, D. (2013). Journalistic challenges in television coverage of disasters: lessons from the February 27, 2010, earthquake in Chile. *Communication & Society, 26*(4), 103-125.

Saldaña, J. (2015). *The coding manual for qualitative researchers*. Thousand Oaks, CA: Sage.

Sarkisian, N., Gerena, M., & Gerstel, N. (2006). Extended family ties among Mexicans, Puerto Ricans, and Whites: Superintegration or disintegration? *Family Relations*, *55*(3), 331-344.

Scanlon, J., & Alldred, S. (1982). Media coverage of disasters: The same old story. *Emergency Planning Digest, (9)*4, 363-375.

Shoemaker, P. J., & Reese, S. D. (2013). *Mediating the message in the 21st century: A media sociology perspective*. New York, NY: Routledge.

Sreedharan, C., & Thorsen, E. (2018). Voices from Nepal: Lessons in Post-Disaster Journalism. Retrieved from: http://eprints.bournemouth.ac.uk/31242/1/Voices%20from%20Nepal%202018.pdf

Subervi-Vélez, F., Hernández-López, N., & Frambes-Buxeda, A. (1990). Mass media in Puerto Rico. In S.H. Surlin and W.S. Soderlund (Eds.), *Mass media and the Caribbean* (pp. 149-176). New York, NY: Gordon & Breach.

Takahashi, B., Tandoc Jr, E. C., & Carmichael, C. (2015). Communicating on Twitter during a disaster: An analysis of tweets during Typhoon Haiyan in the Philippines. *Computers in Human Behavior*, *50*, 392-398.

Tandoc Jr, E. C., & Takahashi, B. (2017). Log in if you survived: Collective coping on social media in the aftermath of Typhoon Haiyan in the Philippines. *New Media & Society*, *19*(11), 1778-1793.

Tandoc Jr, E. C., & Takahashi, B. (2018). Journalists are Humans, Too: a Phenomenology of covering the strongest storm on Earth. *Journalism*, *19*(7), 917-933.

Usher N (2009) Recovery from disaster: How journalists at the New Orleans Times-Picayune understand the role of a post-Katrina newspaper. *Journalism Practice 3*: 216–232.

Wang, B. Y., Lee, F. L., & Wang, H. (2013). Technological practices, news production processes and journalistic witnessing: Hong Kong journalists in the 2011 Japan earthquake. *Journalism Studies*, *14*(4), 491-506.

Weidmann, A., Fehm, L., & Fydrich, T. (2008). Covering the tsunami disaster: subsequent post-traumatic and depressive symptoms and associated social factors. *Stress and Health: Journal of the International Society for the Investigation of Stress*, *24*(2), 129-135.

Zorrilla, C. D. (2017). The view from Puerto Rico—Hurricane Maria and its aftermath. *New England Journal of Medicine*, *377*(19), 1801-1803.

[i] *El Nuevo Día* and *Primera Hora* are owned by the *GFS media group*. The newspapers share the same newsroom.

[ii] http://periodismoinvestigativo.com/2018/09/145027/