

Media Framing and Agenda Setting (Tone) in News Coverage of Hurricane Harvey: A Content Analysis of the *New York Times*, *Wall Street Journal*, and *Houston Chronicle* from 2017 to 2018

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ABSTRACT: Media organizations can quickly disseminate information from official sources to the general population. The media play a vital role before, during, and after a hazard incident or natural disaster by broadcasting early warnings, coordinating emergency management strategies, providing timely updates, and offering advice on protective actions. Therefore, it is important to examine how news media use various framing devices such as story selection, placement, length, and quotations from officials and citizens in their crisis news coverage. We investigate print media coverage of Hurricane Harvey utilizing data from three newspapers: the *New York Times* (online), the *Wall Street Journal* (online), and the *Houston Chronicle*. By examining the use of descriptors, quotes, and wording about Hurricane Harvey, our research explores how media coverage framed and created a tone for the government and private sectors for their roles in response and recovery processes. Findings reveal that the human-interest frame received the most media attention, whereas the morality frame received less attention. For tone, we find that the overall tone for the government response was balanced and less negative. However, the media tone varies among three levels of government: the tone for the federal government was more negative, whereas the tone for the city and state levels of government was slightly positive. For private sectors, we found that the for-profit sector coverage had a strong negative tone, whereas the nonprofit sector received a strong positive tone. By offering a descriptive analysis of framing and tone, our study reveals how print media sources portray actors involved in recovery and rebuilding efforts for Hurricane Harvey.

KEYWORDS: Hurricanes/typhoons; North America; Risk assessment; Social Science

1. Introduction

During a crisis like a hazard incident or disaster, the media act as a channel for emergency management agencies to provide guidance and direction on shelter, evacuation, and disaster assistance (Calabrò et al. 2020; Joseph et al. 2018). By broadcasting early warnings, coordinating emergency management strategies, providing timely updates, and offering advice on protective actions, media organizations have the ability to quickly disseminate information from official sources to the general population (Soltani 2015; Monahan and Ettinger 2018; Joye 2014; Dwight 2015). For example, Dwivedi (2010) found that during the 2004 Indian Ocean earthquake and tsunami, media outlets acted as a medium of an early warning system by synchronizing and communicating important disaster messages to the public. The author suggested that because of the crucial role played by the media, the national press was able to quickly transmit reports to the rest of the world, and governments were able to receive timely disaster aid and more effectively carry out evacuation plans.

Print media such as newspapers provide insights into the dynamics of public discourse and capture interactions in the political arena by presenting contested views from various stakeholders (Freidman 2015; Hedding 2017). As with other topics, news media use various framing devices such as story selection, placement, length, and selected quotations from

officials and citizens to influence public perceptions (Barnes et al. 2008; McCombs and Shaw 2017; Kuppaswamy 2017). However, some studies argue that news media coverage of disaster news often exaggerates the situation, distorts images of disaster behaviors, and provides inaccurate information that can interfere with disaster management processes (Miller and Goidel 2009; Sommers et al. 2006; Stock 2007). Media frames depicting distorted images of disaster behavior such as widespread panic, looting, social disorganization, and deviant behavior perpetuate a widespread “disaster mythology” (Tierney 2003; Dynes and Fischer 1995; Stock 2007; Nogami 2018). For example, Tierney et al. (2006) found that media framing of Hurricane Katrina was dominated by “negative images of the residents of the impact area and constructed disaster victims as lawless, violent, and exploitative. Later the images of lawlessness and civil unrest were substituted by media discourse portraying New Orleans as a “war zone” and framing the challenges faced by emergency responders as not unlike those facing troops battling insurgents in Iraq” (p. 63).

Considering the vital role media play in the disaster management process, several studies (i.e., Azad 2020; Yordán 2020; Miller and Goidel 2009; Tierney et al. 2006; Stock 2007) have explored the role of newspapers in natural disasters, like hurricanes. However, in the context of the United States, most research has been dominated by a focus on Hurricane Katrina (i.e., Brunken 2006; Gill 2007; Zuverink 2012). As a result, there is a lack of literature exploring how print media such as newspapers frame the role of the governments and private sectors in the context of Hurricane Harvey. To fill this

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gap, we investigate print media coverage of Hurricane Harvey using data from three newspapers: the *New York Times* (online), the *Wall Street Journal* (online), and the *Houston Chronicle*. We examine how the media used frames to set an agenda during their coverage of Hurricane Harvey. By examining the use of descriptors, quotes, and wording, our paper explores how media framed and created a tone for government and private sectors for their roles in response and initial recovery processes. Our two primary research questions (RQ) are the following:

- RQ1: Which news frames are most prominent in coverage of Hurricane Harvey, and how does this vary by media outlets?
- RQ2: To what extent does print media coverage offer a positive or negative tone to government and private sector responses to Hurricane Harvey, and how does this vary by media outlets?

2. Framing, agenda setting, and tone in media studies

News media is one of the ways determines which issues receive public attention and how the public thinks about these issues (Chan and Lee 2014; Harbert 2010; Hester and Gibson 2003). Two components that significantly affect media coverage are media framing and agenda setting (McCombs 2005; Ngcamu and Binza 2015; McCombs and Shaw 2017). Kuypers (2009) defines framing as “a process whereby communicators, consciously or unconsciously, act to construct a point of view that encourages the facts of a given situation to be interpreted by others in a particular manner” (p. 190). Zuverink (2012) compares framing analysis with the framing of a picture. For example, if one wants to frame a picture, one needs to select a frame. The chosen frame may improve certain visual components like texture, color, or image within the photograph. However, if one reframes the picture, other elements or colors might become more apparent to the viewer. Just as the picture frame changes how an image is viewed, the frame into which we place events or ideas will have similar effects. Frames influence us to filter our views in a particular way, either enriching or distracting certain elements, ultimately appealing to the situation’s framer’s view.

Previous research on crisis news coverage reveals that stories may be framed in terms of responsibility, human interest, conflict, economic consequences, vulnerability, and morality (Semetko and Valkenburg 2000; Brunken 2006; An and Gower 2009; Harbert 2010; Valentini and Romenti 2011; Poudel et al. 2014; Nijkrake et al. 2015; Bayçu and Kiliç 2017; Parida et al. 2021). The responsibility frame may contain stories that suggest some level of government, individuals, or organizations can diminish the problem or are responsible for the problem (Bayçu and Kiliç 2017). This frame may refer to stories that offer potential solutions and if the problem requires urgent attention (Nijkrake et al. 2015). The human-interest frame illustrates stories that emphasize an emotional angle and may use adjectives or first-person narratives to generate feelings of helplessness, anger, sympathy, or compassion (Semetko and Valkenburg 2000; Brunken 2006). Conflict frames

emphasize disputes between individuals, groups, organizations, and authorities in the crisis (Valentini and Romenti 2011). The economic impact frame represents stories mentioning cost, loss, benefit, and financial implications of involved parties (Nijkrake et al. 2015). The morality frame may include stories containing a moral message as well as references to God and other religious tenets. Stories under the morality frame may present recommendations about proper behavior during a crisis (An and Gower 2009; Bayçu and Kiliç 2017). The vulnerability frame describes how social structural, sociodemographic, economic, and environmental factors contribute to greater threats and damages and reduce the ability of individuals, families, and communities to recover (Cutter et al. 2003; Cutter and Emrich 2006; Poudel et al. 2014; Hossain and Meng 2020). For example, physical proximity (e.g., living in a floodplain), the characteristics of the house (e.g., including construction and ownership), and financial constraints may decrease the capacity of an affected community to successfully recover from a hazard incident or disaster (Curtis et al. 2007; Cutter et al. 2003).

Agenda setting also influences media coverage of crisis events. Takeshita (1997) defines the agenda as “objects accorded saliency in the media content or people’s consciousness” (p. 20). Harbert (2010) identified three components of agenda-setting theory: attention (the amount of space/time devoted to a topic), prominence (placement of the story in the printed text), and valence (whether a story has a mostly positive or negative tone). Multiple events are occurring worldwide simultaneously, and the media must be selective of which ones they cover and which ones are ignored. McCombs and Shaw (2017) argue that when news media make these selections, they exert significant control over which issues will receive attention as well as influence how the public will view these issues.

Advancing agenda setting, some studies (i.e., Hester and Gibson 2003) focused on “attributed agenda setting” and pointed out that while traditional agenda setting is primarily associated with the amount of news coverage, attribute agenda setting goes further to investigate the tone of news coverage. Along with frames, media studies (i.e., Gunther 1998; Kim et al. 2007; Nijkrake et al. 2015) also found that the tone used in coverage affects public opinion. In general, tone can be positive (e.g., local government is praised for its action in relief activities), negative (e.g., a corporation is criticized for environmental contamination), or neutral (e.g., no evaluative modifier is involved in the media coverage). Nijkrake et al. (2015) note that in crisis news coverage, media tone among relevant organizations (e.g., government, corporations, nonprofit organizations, and emergency management) tends to be mainly negative or neutral. However, Valentini and Romenti (2011) contend that media tone varies among concerning parties based on the level of responsibility, involvement, blame, or conflict. For example, the media tone of government was examined in a study of print media coverage of Hurricane Katrina (Brunken 2006). Analysis of the first five weeks of disaster coverage revealed a governmental tone that was relatively neutral. However, the media tone varies between different levels of government. For example, while the federal government received a more positive tone, the

local government received a more negative tone. Although the framing and attribution of responsibility varied with week-to-week coverage, the tone remained the same throughout the analysis period. In summary, in crisis news coverage, the tone of news stories tends to be covered in more negative or neutral ways, although it may vary between different parties.

3. Data and methods

a. Definition and procedure of content analysis

Content analysis is a flexible research method that has been widely utilized in hazard and mass communication studies with varying research goals and objectives (Barnes et al. 2008; Kuttschreuter et al. 2011). Content analysis can be used in quantitative, qualitative, or mixed-method studies with a diverse range of analytical techniques to describe, explain, and materialize information in written or oral communication content (Bayçu and Kilinç 2017). For the purpose of this article, we focus on qualitative content analysis (QCA). Hsieh and Shannon (2005) defined QCA as “a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns” (p. 1277). Cho and Lee (2014) note that QCA is a flexible research method that can incorporate inductive or deductive or combine both approaches in data analysis. Heikkilä and Ekman (2003) find that researchers often utilize QCA to answer questions such as what, why, and how and to identify and organize data using a consistent set of codes or categories. To summarize, QCA is a strategy for descriptive inquiry (Sandelowski 2000) that allows researchers to identify relevant information from selected content and interpret them based on existing theories or practice, the experience or knowledge of the researchers, and previous research findings (Krippendorff 2004; White and Marsh 2006).

We adopt a four-step process of content analysis advocated by Schreier et al. (2019) and Moffett and Weare (2020). These steps are 1) review literature and formulate research questions; 2) select and sample material; 3) segment the material using a preexisting coding frame found in the literature review; 4) analyze the data and communicate findings. Having described step 1 in the introduction section, we describe the following two steps below and step 4 in the results section.

b. Newspaper selection and sampling

We selected two national newspapers, the *New York Times* (*NYT*) and *Wall Street Journal* (*WSJ*), and one local newspaper, the *Houston Chronicle* (*HC*), to obtain different perspectives. These newspapers were selected because of their wide circulation, range of national and regional coverage, and divergent political viewpoints. The *NYT* and the *WSJ* have a broad national circulation and are considered among the top five newspapers in the United States (Barnes et al. 2008). The *HC* is one of the largest daily newspapers and is acknowledged as Houston’s “newspaper of record” and considered the most influential local newspaper (Sullivan 2012). These newspapers have different political leanings in their reporting

and editorials. Both *WSJ* and *HC* are considered to be right-leaning, whereas *NYT* is regarded as left-leaning (Boston University Libraries 2021; Puglisi and Snyder 2015). Our selected newspapers offer local and national coverage, and preliminary searches showed that they contain relevant articles suitable for this project.

We performed a deductive qualitative content analysis from a mini corpus of articles from 17 August 2017 (when the name “Harvey” was given to the tropical storm) through 31 December 2018. Using 17 August 2017, as a starting date, we observed media coverage of preparedness and response activities taken by the government, corporate, and community organizations. We chose the end date based on findings that indicate the average time span of disaster stories reported in media was 12 months (Houston et al. 2012). Although the time span of our data is 16.5 months, we acknowledge that the data period only covered the initial recovery and reconstruction story and missed recovery activities beyond our chosen timeline.

Using “Hurricane Harvey” as the primary term, we searched the ProQuest database and the *Houston Chronicle* archive. Our initial search yielded approximately 9000 articles, with the vast majority appearing in the *Houston Chronicle*. Next, we reduced the number of articles to be analyzed using Boolean operators like “and,” “or,” and keyword search of “relief,” “response,” and “recovery.” This resulted in 97 articles from the *WSJ*, 231 from the *NYT*, and 3259 from the *HC*. Next, we selected all the articles for the *WSJ*, every other article for the *NYT*, and every 15th article for the *HC*, resulting in 81 *WSJ* articles, 122 *NYT* articles, and 208 *HC* articles (411 articles total). Last, we converted the articles into a Microsoft Word database format, assigned a unique identifier to each, then coded and analyzed the articles in NVivo software.

c. Identification of coding categories

Our first research question concerns which frames receiving the attention in media coverage of Hurricane Harvey. We adopt a classification of news framing developed from Semetko and Vaalkenburg (2000) and Harbert (2010) and a coding strategy from Saldaña (2015) to address this question. These frames are human interest, conflict, responsibility, economic consequences, morality, and vulnerability. Our second research question investigates how media assigns tone to government and private sectors for activities related to Hurricane Harvey. We use two phases to address this question. First, we examine how media assigned tones for federal, state, and local government officials based on their involvement in Harvey’s response and recovery process. Our coding identifies positive and negative tones associated with the media coverage of Hurricane Harvey for each level of government. The positive and negative coding uses 11 descriptors adapted from Brunken (2006): prepared/unprepared; effective/ineffective; reliable/unreliable; active/passive; cooperation/lack of cooperation; hopeful/doubtful; and encouraging/discouraging. Below we provide a short description of each coding group.

Hurricanes usually come with warnings. The prepared/unprepared categories explore how federal, state, and city authorities take advanced preparations. Active/passive shows

the promptness or delays in response processes. Effective/ineffective reflects government effectiveness in response and recovery as well as the effectiveness of government programs. Reliable/unreliable shows the consistency, trustworthiness, or preciseness of a government program or activities, such as how accurate FEMA flood maps are or whether the definition of floodplain reflects reality. Cooperation/lack of cooperation measures whether different government officials worked together to implement a program or a lack of collaboration in decision-making. Encouraging/discouraging examine media praise or criticism of government activities. Hope/doubt explores how levels of government are presented represented as either confident or skeptical in the recovery process.

The second coding phase explores how the print-media coverage describes private sectors' role in the response and recovery process. Private sectors are divided into two main sections: for-profit organizations and nonprofit organizations. For-profit organizations are included but not limited to hotels, resorts, industries, retailers, real estate developers, and insurance companies. We adopt favorable/unfavorable descriptors from Harbert (2010). If the news outlet described those sectors as a positive change agent, such as kind, helping hand, and altruistic, it shows a positive tone. Conversely, suppose the news media describe them as a harmful agent of change (e.g., showing signs of blame, describing them as a profit-driven sector, or criticizing them for making money from disaster-stricken populations). In that case, the coverage reflects a negative tone. To calculate the overall positive/negative tone, we combined the value of positive and negative descriptors.

d. Data analysis

We use a qualitative descriptive design to analyze news media articles related Hurricane Harvey (i.e., Poudel et al. 2014) and perform a QCA using a "directed approach." Directed content analysis can be used to validate existing theory or extend "a theoretical framework or theory" (Hsieh and Shannon 2005). This "deductive category application" approach utilizes existing theory or research to formulate research questions and determine the "initial coding scheme or relationships between codes" (Mayring 2000; Hsieh and Shannon 2005; Poudel et al. 2014).

Our content analysis of the 411 articles began with six deductive frames and seven positive and negative tone descriptors. After creating those sections in NVivo, one author with coding experience oversaw the coding of the data. Even though only one author was involved in the data coding process, both authors met biweekly to discuss the coding structure and resolve any issues. For example, the authors decided to adopt frequently used media frames based on the literature but added a "vulnerability" frame after going through the initial coding of 10% of the data (Poudel et al. 2014).

We analyzed the data in three different ways. First, we developed descriptive codes in each article to identify how media use frames and positive and negative descriptors to create tone in their coverage. Second, we prepared frequency tables and graphs based on quantitative percentages to examine

and visualize the prominence, media volume, and coverage span (i.e., number of publications over the study period). Frequency tables helped to identify to what extent the sources of framing and tone varied within three media outlets. Third, we used the word cloud tool and cluster analysis in NVivo software to analyze key codes that generated useful insights, narratives, and discourses related to Hurricane Harvey, disaster policy, and media reporting.

4. Results and discussion

a. Media coverage span, volume, and attention

On 13 August 2017, a tropical wave formed off the African coast, and on 17 August it became a tropical storm moving toward the Caribbean Sea. Named Harvey, the tropical storm lost intensity as it entered the Gulf of Mexico on 22 August, but between 23 and 25 August, it rapidly intensified to a category-4 hurricane. Hurricane Harvey made landfall along the Texas coast on 25 August, bringing massive destruction (Petrun Sayers et al. 2021). At the time, it ranked as the second-costliest disaster after Hurricane Katrina, with damage estimates approximating \$125 billion (Zou et al. 2019).

The *NYT* coverage of Hurricane Harvey began on 23 August 2017, with a headline "Remnants of Tropical Storm Harvey Gain Strength and Hurricane Watch Is Posted." The article stated that the storm could make landfall and affect Corpus Christi and Houston, Texas, and New Orleans, Louisiana (Salam 2017). *NYT* posted tropical storms and storm surge watches from the Rio Grande to Port Mansfield and San Luis Pass to San Luis Pass to 60 mi (~100 km) northeast to High Island, Texas.

The *WSJ* began their coverage on 24 August, with the headline "Hurricane Harvey Threatens South Texas Coast; Storm is supposed to make landfall late Friday or early Saturday, could bring up to 35 inches of rain." The *WSJ* noted that for 30 Texas counties, including densely populated Harris County, Governor Greg Abbott declared a state of disaster (Gold et al. 2017). In addition, they reported the activities of city officials, such as in Corpus Christi, where officials distributed sandbags to residents to safeguard against flooding and Houston's fire department preparing for water rescues and barricading intersections prone to flooding.

The *HC* started their coverage on 24 August 2017, with a title named "Storms grows into Texas threat: Harvey expected to bring heavy rain, then linger, spurring fears of flooding." They warned that Tropical Depression Harvey is coming toward the Texas coast, and it could turn into life-threatening flooding for the Houston area with at least 8 to 12 inches of rain and landfall close to Matagorda Island (Harden and Kadifa 2017). All three selected newspapers continued their coverage of Harvey from 24 August 2017, through 31 December 2018.

Several media studies revealed that triggering events like a natural disaster can increase the amount and intensity of news media reporting (Kuttschreuter et al. 2011). However, the initial onset of media attention decreases as reporters and editors feel readers have lost interest (Houston et al. 2012). To capture how media attention increased or decreased within

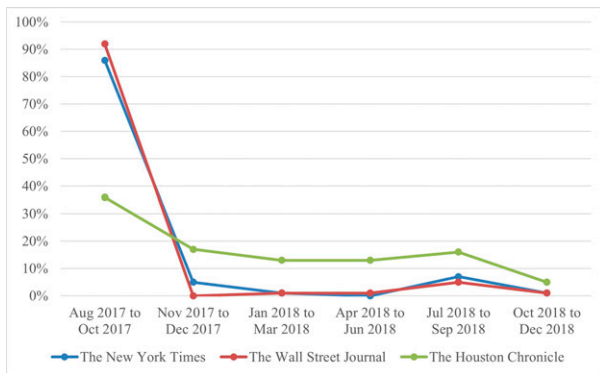


FIG. 1. Distribution of media articles by 3-month period from 17 Aug 2017 to 31 Dec 2018.

the coverages of Hurricane Harvey, we divided the study period into six segments, and each segment was broken out into three months intervals (see Fig. 1). Findings presented in Fig. 1 reveal that coverage decreased with time after the Harvey event, however, the initial coverage varied among media sources, with national papers publishing most articles in the first three months (*NYT* 86% and *WSJ* 92%) while the *HC* published 36% in the first three months with continuing coverage throughout 2018. A rise in counts during July through September 2018 is likely due to articles published in a specific section called “Harvey: One year later.” The *HC* also covered stories related to the recovery process of different counties affected by Harvey. Our data show that Hurricane Harvey news coverage was highest in the first three months; after that it decreased for national newspapers (the *NYT* and the *WSJ*) but remained relatively constant for the *HC*.

b. Prominence

We examined which newspaper sections articles appeared. Most *HC* articles were published in News (18%), City and State (14%), and Editorial and Opinions (10%). The *NYT* published articles in the U.S. News (55%), Opinion (17%), and Business (9%). For the *WSJ*, the percentages were U.S. News (47%), Markets (26%), and Economy (11%). Relative to *NYT* and *WSJ*, coverage of Hurricane Harvey was more diverse in the *HC*.

c. Framing analysis

To address our first research question, we examined the following frames from the coded data: responsibility, human interest, conflict, economic consequences, environmental consequence, vulnerability, and morality. As shown in Fig. 2, the most popular frame was the human-interest frame (29%), followed by responsibility (22%), conflict (19%), vulnerability (14%), and economic consequence (12%) frames. The morality frame (4%) was the least utilized.

As shown in Table 1, our analysis revealed variation with regard to framing among the three media outlets. All newspapers displayed distinct characteristics during their coverage of Hurricane Harvey. For example, the *NYT* emphasized stories related to vulnerability and human interest. Alternatively,

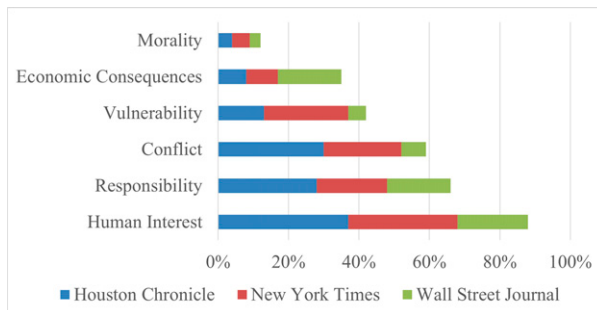


FIG. 2. Media’s framing of Hurricane Harvey news.

the *WSJ* focused on economic consequences, and the *HC* focused more on responsibility, human interest, and conflict.

1) HUMAN-INTEREST FRAME

Nearly (29%) of 441 articles contained human-interest and personal stories. Within this frame, all three newspapers offered information about death and property damages, portrayed tragic tales of disaster survivors, and discussed how lives were affected by the hurricane. The following quotation from a *NYT* article (Fink and Blinder 2017) describes how the rise of floodwater affected the evacuation procedure of the patients located the Ben Taub Hospital in Houston during the post-Harvey period:

Water rose in the basement of Ben Taub Hospital, a major county trauma center in the vast Texas Medical Center campus that had spent billions of dollars on flood protections after being devastated in Tropical Storm Allison in 2001. Officials announced an evacuation Sunday, but hours later, a hospital spokesman said it had not yet begun because the hospital was surrounded by water and rescuers could not reach its 350 patients. On Monday afternoon, a call went out on local radio for a vendor to provide food for the hospital.

In addition, journalists used first-person narratives to portray helplessness and human suffering. For example, a *HC* article (Feuk 2018, p. LH2) reported on the Avant family consisting of four-year-old Maggie, her father Drew, and mother Jaelyn included the following first-person narrative:

Even after the storm had passed, we were still living in a perpetual storm. The girls being in one place and me being in another. Working, going to work on the house while Jaelyn was working and going to the apartment, or going to the hotel and taking our

TABLE 1. A comparison of media framing between the *NYT*, *WSJ*, and *HC*, as percentages of Harvey-related articles with each frame.

Media frame	Newspaper (%)		
	<i>HC</i>	<i>NYT</i>	<i>WSJ</i>
Human interest	37	31	20
Responsibility	28	20	18
Conflict	30	22	7
Vulnerability	13	24	5
Economic consequences	8	9	18
Morality	4	5	3

daughter—it was a vicious cycle. It was like, “Well, I will see you on Facetime, or I will see you this weekend.”

2) CONFLICT FRAME

The conflict frame represented disagreements between or among groups or individuals, such as disputes between city and state authorities about evacuation decisions. For example, a *NYT* article reported a disagreement between Mayor Sylvester Turner and Governor Greg Abbott concerning evacuation orders encouraged by the governor but resisted by the mayor (Fernandez and Panich-Linsman 2018). Another conflict frame involved a U.S. Army Corps of Engineer decision to conduct a controlled release for the Addick and Barker Reservoirs, which caused flooding along Buffalo Bayou and resulted in dozens of lawsuits for damaged homes and property (Snyder 2017).

3) RESPONSIBILITY FRAME

Media articles employed the responsibility frame to illustrate how some actors (e.g., government officials, individuals, or corporations) are held responsible for their roles in the crisis. In a broader context, the three media outlets, especially *HC* and *NYT* articles, used scientific facts to explain how climate change and global warming increased the intensity of natural disasters in recent decades (Kristof 2017; Astor 2017; Schwartz 2018). For example, one *NYT* article (Kristof 2017) discussed how the combination of factors like rising temperature, atmospheric moisture, and sea level rise influenced extreme events in the United States and around the globe. The following quotation from that article described how changes in climatic condition contributed to the intensity of Harvey’s destruction over the Houston area:

First, hurricanes arise from warm waters, and the Gulf of Mexico has warmed by two to four degrees Fahrenheit over the long-term average. The result is more intense storms. Second, as the air warms, it holds more water vapor, so the storms dump more rain. That is why there is a significant increase in heavy downpours. Nine of the top 10 years for heavy downpours in the United States have occurred since 1990. There is also a third way, not yet proven, in which climate change may be implicated: As Arctic Sea ice is lost, wind systems can meander and create blockages—like those that locked Harvey in place over Houston. It was this stalling that led Harvey to be so destructive.

Responsibility frames also offered alternative solutions to issues. For example, a *HC* article showed the vital role played by social media during the evacuation process (Cook 2017). In the aftermath of Harvey, emergency management officials received a massive amount of 911 calls that overwhelmed the system. In addition, many residents requiring urgent rescue shared their information and needs on social media outlets such as Facebook and Twitter resulting in assistance from others.

4) VULNERABILITY FRAME

Approximately (14%) of the articles focused on vulnerability. We observed two primary discourses in this frame. First,

journalists wrote stories about how race, class, income, and ethnicity affected the disaster recovery process and how marginalized populations face hardships in obtaining disaster assistance (i.e., Fernandez and Panich-Linsman 2018; Romero 2018; Turkewitz and Medina 2017; Ackerman 2018). For example, one *NYT* article examined the recovery process based on social inequalities finding that although Houston and other Texas cities made a significant recovery with the help of federal aid and donations, many low-income neighborhoods, especially African American and Hispanic neighborhoods, were still suffering and lagging behind in recovery (Fernandez and Panich-Linsman 2018). Second, media reports focused on geographic and systematic vulnerability (i.e., living closer to the floodplain, segregation, unplanned economic growth, and lack of zoning regulations) and how that worsen disaster impacts (i.e., Fink and Blinder 2017; Schwartz et al. 2017). For example, one *NYT* article explored how the Houston area’s low-lying geography, poor drainage, and old sewage systems made the city more vulnerable in times of flooding (Tabuchi and Kaplan 2017). In summary, the media’s use of vulnerability frames revealed how existing economic, social, and political contexts contributed to explaining death, damage, and destruction.

5) ECONOMIC CONSEQUENCE FRAME

The economic consequences focused on the economic impacts of Harvey, including effects on sectors such as oil refineries, retailers, and the real estate market. For example, one *HC* article reported the decline in home selling prices and discussed how people felt compelled to sell their flooded homes at lower prices (Hunn and Demsey 2018). This frame also reported “exorbitant or excessive price gouging” for necessities like food, fuel, and medicine. The following two quotations from the *HC* report on the price of hotel rooms and gasoline, respectively:

In Corpus Christi, Robstown Enterprises Inc. does business as Best Western Plus Tropic Inn. The average price for a king or queen room before two weeks of Harvey was \$108 per night. However, when the storm surge hit Texas, Austin’s KXAN-TV crew discovered that the rent increased to \$320, which is almost 3 times their average rate [Matos 2017a, p. A4].

The Bains Brothers (owners of Texaco-branded gas station) and Encinal Fuel Stop were charged by the state for gas price hiking. On 31 August, two gas stations owned by the Bains Brothers charged \$6.99 a gallon for regular unleaded gas. Not only that, the state found that their clerk even refused to give a receipt to a customer, and when the customer asked about the receipt, the clerk replied: “it is what it is.” Encinal Fuel Stop was accused of charging \$8.99 to \$9.99 a gallon for gas [Latson 2017, p. A2].

6) MORALITY FRAME

The morality frame (4%) was least utilized. This frame covered examples of a philanthropic community where people, organizations, and strangers provided assistance. One article in *NYT* describes how a volunteer group called the “Cajun Navy” provided emergency rescue support with their fishing boats, airboats, and other recreational vessels (Fountain and Gabriel 2017). Morality frame also reported activities related

TABLE 2. A comparison of media tone between the coverage of the *NYT*, the *WSJ*, and *HC* on government response, as percentages of Harvey-related articles with positive or negative tone for each governance level.

	Tone	Newspapers (%)			Total
		<i>HC</i>	<i>NYT</i>	<i>WSJ</i>	
Federal	Negative	12	11	7	30
	Positive	5	5	12	22
State	Negative	2	1	2	5
	Positive	3	2	1	6
Local	Negative	2	1	2	5
	Positive	5	3	3	11
Overall response	Negative	19	11	13	40
	Positive	13	9	17	39

Harvey's charities by for-profit and nonprofit organizations (i.e., Mahoney 2018; Ackerman 2018; Morago 2017). For example, four *HC* articles and two *NYT* articles discussed Harvey's charities by for-profit and nonprofit organizations. Harvey was considered one of the costliest natural disasters, and it resulted in historic disaster fundraising with foundations, corporations, and individuals donating nearly \$1 billion within the first three months (Ackerman 2018).

d. *Media use of tone for different government levels (federal, state, and local)*

We examined the media's tone for different levels of government (federal, state, and local) responses related to Hurricane Harvey by using a combination of positive and negative descriptors. Overall, we found that the media tone for government responses was balanced: positive (39%) versus negative (40%). However, the tone varied between the three levels of government. The federal government had a more negative tone, while local and state government's responses were more positive. As shown in Table 2, the tone also varied with media sources. The relevant *HC* and the *NYT* articles displayed a more negative tone for the federal government and more positive for local and state governments. Conversely, the *WSJ* had a more positive tone for federal and local government and a more negative tone for state government.

We found the presence of both positive and negative descriptors in the selected media outlets (see Table 3). However, as we mentioned earlier, we performed deductive qualitative content analysis (QCA) and adopted the descriptors from previous literatures; some of the descriptors found to be important in other studies were not observed in our study.

The most common positive descriptor was prepared (14%), and the negative descriptor was ineffective (15%). However, the use of positive and negative descriptors varied between government levels. For example, for the federal government, prepared (8%) was the highest used positive descriptor, followed by active (5%) and encouraging (2%). However, active (5% and 6%) and prepared (3% and 3%) were the most popular positive descriptors for state and local government governments. For negative descriptors, ineffective was the most common one for both federal (10%) and state (5%) governments, while slow (4%) and inappropriate (3%) characterized local government.

All three media outlets used the negative descriptors, "ineffectiveness" and "inaccuracy," to describe FEMA's National Flood Insurance Program (NFIP). Media articles highlighted the shortcomings of NFIP and criticized policies that encourage people to rebuild in the same flood-prone area. For example, one *NYT* article stated, "NFIP often ends up repeatedly paying for damaged properties instead of pressing for mitigation of flood risks and relocation, and thus ends up encouraging people to build—and rebuild—in risky places" (Schwartz et al. 2017, p. 11). This article also criticized the inaccuracies of the 100-yr flood elevation zones and mortgage calculations that did not reflect actual flooding events in the Houston area.

Another negative descriptor, "lack of cooperation," described the lack of collaboration between different government agencies (i.e., Fernandez and Panich-Linsman 2018; Fausset 2017a; Olsen 2018). For example, to assist disaster survivors, FEMA launched several disasters aid programs such as Partial Repair and Essential Power for Sheltering (PREPS) and Direct Assistance for Limited Home Repair (DALHR). The criteria set by FEMA for PREPS and DALHR made it difficult to determine eligibility (Morris 2018). A *HC* article reported that state and city officials had no idea how FEMA routed aid to potential recipients of those programs, particularly in poorer neighborhoods where those who received relief got less than they deserved while other deserving households received nothing (Morris 2018). Although these issues were documented, city officials did not receive better assistance from federal officials. This lack of cooperation was captured in a quotation (Morris 2018) from city housing Director Tom McCasland:

FEMA appeared to be sending families to the \$20,000 program even when they appeared to qualify for the \$60,000 one. City staff sent hundreds of families' files to state and federal officials for a second look in hopes of moving them into the more robust program, McCasland said, with some success. Then, he said, FEMA shut that down.

TABLE 3. Popular positive and negative descriptors for government response.

	Tone	Highest (%)	Second highest (%)	Third highest (%)
Federal	Negative	Ineffective (10)	Inaccuracy (6)	Lack of cooperation (3)
	Positive	Prepared (8)	Active (5)	Encouraging (2)
State	Negative	Ineffective (5)	Lack of cooperation (3)	Discouraging (1)
	Positive	Active (5)	Prepared (3)	Effective (2)
Local	Negative	Slow (4)	Inappropriate (3)	Lack of cooperation (1)
	Positive	Active (6)	Prepared (3)	Encouraging (1)

Three media outlets used the positive descriptors “prepared” and “encouraging” to describe how FEMA learned from its bungled response to Hurricane Katrina and made positive changes in its emergency management policies (i.e., [Philipps 2017](#); [Fausset 2017b](#); [Matos et al. 2017](#); [Snyder 2017](#)). One *NYT* article pointed out that FEMA worked on a disaster preparedness plan after the Katrina disaster and spent more than \$2 billion to train and prepare local authorities. For example, before Harvey made landfall FEMA stored food, water, cots, and blankets in Houston megashelters located throughout the city ([Philipps 2017](#); [Fausset 2017b](#)). FEMA also made changes in their evacuation policy, particularly with regard to pets. For example, in preparation for Harvey, Houston’s main animal center evacuated kennels to make room for animals that may come from flooded homes ([Philipps 2017](#); [Snyder 2017](#)). FEMA also incorporated assistance from citizen volunteers in search and rescue efforts. A quote from the *NYT* by FEMA’s former associate administrator of response and recovery described the changes in FEMA to incorporate the volunteer group: “That is probably the biggest change in recent years. The realization that disaster response is not just a government response; it is a societal response. The federal government has a role, and so does everyone else” ([Philipps 2017](#)).

The media utilized the positive descriptor “prepared” to portray the preparedness activities taken by multiple city authorities throughout the state. For example, a *NYT* article reported that Dallas opened a mega-shelter capable of accommodating up to 5000 evacuees, and San Antonio prepared accommodations for 6400 evacuees from the Houston area ([Fausset 2017b](#)). An example of “prepared” descriptors was visible in the positive description of city and state authorities. For instance, one *NYT* report depicted the state’s preparations to evacuate vulnerable older adults and activate the Texas National Guard ([Morago 2017](#)). Another *NYT* article reported on preemptive measures of evacuating around 3800 residents from 53 nursing homes in the projected impact area and arranging additional safety measures for caregivers ([Turkewitz and Medina 2017](#)).

Journalists used the positive descriptor “active” to highlight how all three levels of government—federal, state, and local—were involved in response and recovery processes. For example, three *HC* articles documented federal, state, and city efforts to prevent looting and other disaster-related predatory crimes (i.e., [Rogers 2017](#); [Matos 2017b](#); [Dempsey and Blakinger 2017](#)). Twelve coordinating agencies, including the Federal Bureau of Investigation (FBI), Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), and Harris County District Attorney’s Office, worked together to prevent violent crimes like looting and armed robbery, as well as white-collar crimes ([Rogers 2017](#)). Mayor Sylvester Turner issued a curfew to avoid crime and looting ([Matos et al. 2017](#)). A *HC* article stated, “during 25–31 August, 40 people were arrested for allegedly looting, aggravated assault, auto theft, burglary, robbery, theft, rape, and murder. However, the reported crime was less than 22% compared to the previous two years” ([Rogers 2017](#), p. A7).

TABLE 4. A comparison of media tone between the coverage of the *NYT*, the *WSJ*, and *HC* (private sector response).

	Tone	Newspapers (%)			Total
		<i>HC</i>	<i>NYT</i>	<i>WSJ</i>	
For-profit organization	Negative	22	4	9	35
	Positive	2	1	4	7
Nonprofit organization	Negative	2	1	1	4
	Positive	5	1	1	7
Overall response	Negative	24	5	10	39
	Positive	7	2	5	14

e. Media use of tone for private sector responses

Analysis of tones applied to private sector responses focused on for-profit and nonprofit organizations. We used “unfavorable” as a negative descriptor and “favorable” as a positive descriptor. As shown in [Table 4](#), our analysis revealed that coverage of the for-profit sector contained a strong negative tone while the nonprofit sector received a strong positive tone. The tone for private sectors differed within media sources, with *WSJ* coverage displaying a highly positive tone when covering for-profit organizations and the *HC* presenting more unfavorable descriptors. In contrast, coverage of nonprofit organizations received positive descriptors. Overall, for coverage of nonprofit organizations, all three media outlets used a more positive tone while a mixed pattern was visible in coverage of for-profit organizations.

The for-profit organizations examined were primarily corporations, retailers, insurance companies, hotels, and resorts. Activities of corporations dominated news articles and received an unfavorable tone for their poor management of toxic releases and chemical spills caused by Hurricane Harvey. The *HC* published a series of articles on the history of hazardous waste sites and chemical spills in the Houston area (i.e., [Olsen 2018](#); [Bajal and Olsen 2018](#)). For example, one article in the *HC* investigated dioxin contamination occurring from 2001 to 2011 ([Olsen 2018](#), A1). The article identified 30 toxic hot spots containing dioxin, most located in the Houston Ship Channel and Galveston Bay and close to the residential communities of Pasadena, Channelview, Baytown, Deer Park, and Highlands. However, state environmental regulators did not provide details about the exact location of these hot spots; thus, it was difficult to pinpoint where toxic contamination from dioxin had been dispersed.

Print media coverage of Hurricane Harvey displayed a positive tone for nonprofit and faith-based organizations. These organizations include the Red Cross, Save the Children, Habitat for Humanity, Houston Food Bank, Cypress Assistance Ministries, and Northwest Assistance Ministries. Analysis of coverage of these organizations revealed two primary discourses: the role of these organizations in response and recovery processes; and the coordination between for-profit and nonprofit organizations.

Several articles discussed positive roles played by nonprofit organizations as evident in headlines such as “Epic response,” “Nonprofit helps Harvey victims,” and “Nonprofit groups

continue to aid in Harvey relief as FEMA funds end.” Five *HC* articles describe how the Houston Food Bank assisted in the response process despite not offering its service until 30 August. After opening, however, they distributed around 28 million pounds of relief supplies. An *HC* article (Morago 2017, p. M30) reporting on the Houston Food Bank stated:

The task of administering to a battered metropolis takes coordinated efforts, which the food bank already had in place in its major disaster plans. The Houston Foodbank opened two new warehouses with 240,000 square feet of space for the onslaught of donations; it welcomed thousands of new volunteers eager to help receive, sort, and package supplies; and it expanded the scope of its service area.

Other articles discussed coordinated efforts between for-profit and nonprofit organizations as part of the recovery process (i.e., George 2017; Ackerman 2018). Corporations used the nonprofit organizations to channel disaster-aid and relief funds. For example, one *HC* article reported that Entergy Texas donated \$400,000 to several nonprofit organizations like Southeast Texas Food Bank in Beaumont, United Way of Beaumont and North Jefferson County, Community Impact Center in Shepherd, and the American Red Cross (Mahoney 2018).

There are some notable limitations of our study. First, our research included a wide variety of variables, including seven frames, three different government levels, and for-profit and nonprofit private sectors. Some of these variables have the potential for separate studies. For example, our findings suggest that vulnerability and economic consequences require more in-depth investigation. Second, although this study looked at the selected newspapers’ sections, quotes, and wording, it did not examine them with an in-depth textual analysis. Third, most of the tone analysis in previous studies (i.e., Ngcamu and Binza 2015; Barnes et al. 2008) used direct categories: either article has a positive or negative tone. Instead, we used different positive and negative descriptors to analyze the tone. Since we used a deductive approach and adopted the descriptors, the selection of our descriptor might affect our results. Future studies can adopt a different approach (i.e., inductive, grounded theory) and may analyze the data differently. Fourth, and final, we had a different sample size for the three media outlets. *WSJ* had the fewest articles, and *HC* had the highest number of articles. It is possible that the different sizes of the media outlets influenced our findings. Future studies may adopt a different strategy and compare to see to what extent the sample size affects crisis news coverages.

5. Summary, discussion, and conclusions

Our research utilizes print-media coverage to examine frames and tones used to describe response and recovery processes related to Hurricane Harvey. Our content analysis of 411 articles from three newspapers: the *New York Times*, the *Wall Street Journal*, and the *Houston Chronicle* explores the coverage span and media attention as well as frames and tones. Our exploratory analysis of media framing and the tone print media attaches to actors involved in recovery and

rebuilding efforts for Hurricane Harvey advances a line of inquiry into sociological dimensions of mass media. Guided by studies of natural disasters, media framing, agenda-setting theory, and media tones, our research contributes to the field of media studies, crisis communication, and the sociology of disaster.

We find that print media coverage of Harvey often referenced disasters like Hurricanes Ike and Katrina to provide a comparison and a broader context for understanding issues such as flood insurance program. This is in contrast to other studies (i.e., Miller and Goidel 2009; Rojecki 2009; Harbert 2010) that argue that news reporting tends to be event-focused or episodic. We identified three reasons of those contrast. First, reference to these previous disasters provided a basis for claiming an increased intensity of hurricanes associated with climate change. Second, news articles revealed how extensive urban growth combined with economic and social inequalities in the Houston area played a significant role in the Hurricane Harvey disaster. This followed a longstanding line of inquiry by the *HC* on these issues. Third, building on a history of coverage of hazard mitigation issues in the Houston area, the media, especially the *HC*, reported on ways of reducing future hurricane risks by improving regulations, implementing updated flood alert technology, reformulating the National Flood Insurance Program, changing the land-use policies, and reducing dependency on federal recovery programs.

Our findings reveal that media framing of overall government and private sectors response to the disaster dealt more with human interest and responsibility than economic consequences and morality. Results are similar to media framings found in Hurricane Katrina coverage (Brunken 2006), coverage of the Sichuan earthquake (Yang 2014), and analysis of Cyclone Vardah (Kuppuswamy 2017). Brunken (2006) finds that the human-interest and conflict frame was the most used ones followed by responsibility and economic consequences. Yang et al. (2014) shows that human-interest and responsibility frames were most frequently used, followed by economic consequences. Kuppuswamy (2017) identifies the responsibility frame as most used, followed by economic consequences and human-interest frames. To summarize, all three studies on media framing of natural disaster pinpoint the human-interest frame as a frequently used frame while the morality frame is used least in crisis news coverage.

We found the overall media tone for government responses was balanced and less negative. However, the tone varied between the three levels of government—the tone for the federal government was slightly negative, while the tone for city and state was slightly positive. This differs from other studies (e.g., Brunken 2006; Ngcamu and Binza 2015). Brunken (2006) found overall media tone for the government was neutral; however, media’s tone for a federal response was slightly more positive, while the local response received a slightly negative tone. Ngcamu and Binza (2015) found a high negative tone for all three levels of government (local, provincial, and national).

Several studies on the Hurricane Katrina coverage showed that government officials received criticism in the media for

their mismanagement in evacuation and response (i.e., Barnes et al. 2008; Stock 2007). Our analysis of news coverage of Hurricane Harvey revealed an overall balanced tone and portrayed both sides of government response. Although the print media's coverage showed the failure of FEMA's flood insurance program, it pointed out several attempts taken by FEMA to reform and improve its management system. In addition, the coverage showed how the city and state were blamed for their reactions to the toxic emissions in Hurricane Harvey's aftermath. Coverage also highlighted strict actions city and state governments took to guard against price gouging, crime, and looting. Such findings showed that, even in a crisis moment, print media offered different critical perspectives in their crisis news coverage.

Our examination revealed that media positively described the preparation taken by federal, state, and local government during response and recovery phases. Our analysis showed that news-related local and state government responses had higher positive tones while the tone for the federal government was more negative. Two main reasons for this outcome were the criticism related to FEMA's flood insurance program and the lack of cooperation between federal, state, and local agencies during recovery. On the other hand, state and local governments received a more positive tone for their active participation in response (i.e., preparing mega-shelter and evacuation plan) and strict action against disaster-related predatory crimes (i.e., price hiking and looting). Three media outlets mainly used two positive descriptors, "prepared" and "active," to represent positive tone federal, state, and local levels of government. However, for negative tone, two common negative descriptors for the federal government were "ineffective and inaccuracy"; for state, "ineffective and lack of cooperation"; and for local, "slow" and "inappropriate."

Crisis news coverage tends to use negative or balanced tones with private sectors (industry, corporation, real estate, etc.; Nijkraak et al. 2015). Our analysis revealed a similar result. We found that the media coverage of private sectors for Harvey's response was more negative, but it varied between for-profit and nonprofit organizations. The media tone associated with for-profit organizations is highly negative and highly positive for nonprofit organizations. Although the overall tone was negative, we found examples of both positive and negative descriptors. The for-profit organizations received praise in the media for their philanthropic activities, such as disaster fundraising and cooperation with nonprofit organizations. However, they were also blamed for failing to control toxic spills and environmental contamination in the aftermath of Hurricane Harvey.

We observed that both frame and tone associated with government and private sector response varied within media sources. For example, with regard to media framing, national newspapers (the *NYT* and *WSJ*) focused more on vulnerability, human interest, and economic consequences. In contrast, local newspapers (the *HC*) focused more on the responsibility and conflict frame. This outcome is somewhat different from Kuppuswamy's (2017) analysis of Cyclone Vardah in which the author found national newspapers (the *Times of India* and the *Hindu*) concentrated more on responsibility and human-interest frames, while regional newspapers (the *Daily Thanthi*

and the *Dinakaran*) covered more news related to a conflict frame. For media tone, the national newspaper (*NYT*) and the local newspaper (*HC*) used a more negative tone toward the federal government but positive tones for local and state governments. However, other national newspapers (the *WSJ*) used a negative tone for state government and a more positive tone for federal and local government. Local newspapers (the *HC*) and one national newspaper (the *NYT*) employed a more negative tone for for-profit organizations for private sector responses. In contrast, the *WSJ* used a more positive tone. Nonprofit organizations received a more positive tone in both national and local newspapers.

Sociological dimensions of mass media, particularly media coverage of crisis events such as disasters, remain an important area of investigation. Our examination of media coverage of Hurricane Harvey reveals that frames like human interest and economic destruction are still widely used and that emerging frames such as vulnerability are becoming increasingly important (i.e., Poudel et al. 2014). This reflects advancement in theorizing about hazards and disasters (e.g., Cutter et al. 2003; Cutter and Emrich 2006) and suggests that resilience may also be an important frame to consider in future studies. Second, along with government response, we explore the media tone of coverage for private sectors. Our study dissects the government into federal, state, and local levels and divides private sectors into for-profit and nonprofit organizations. Analysis discusses how the tone varies within these categories, which reveals a deeper level of understanding of the role of print media. Future studies can build on this framework by including regional sources and other forms of mass media such as radio, television, magazines, online news, blogs, and other social networks to investigate how frame and tone varies with research approaches (i.e., deductive vs inductive) and disaster etiology (i.e., natural or anthropogenic). In addition to exploring new forms of media, especially social media such as Twitter, future research should examine how cultural and political contexts influence framing and tone and how this affects the response, recovery, and mitigation phases of emergency response to crisis events.

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