



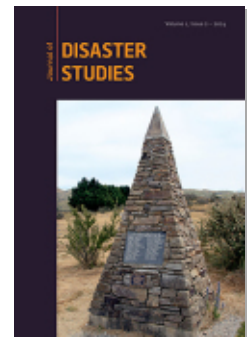
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Bursting Pipes and Boiling Snow: Disaster Impacts and Adaptations in the 2021 Texas Power Crisis from the Lens of Short-Form Social Media Videos

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Bursting Pipes and Boiling Snow

Disaster Impacts and Adaptations in the 2021 Texas Power Crisis from the Lens of Short-Form Social Media Videos

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Abstract: This article explores how short-form social media videos can contribute to the understanding of how people are affected by and adapt to crisis events. Applying a grounded approach, we analyzed 174 crisis-related videos shared by local Twitter users during the 2021 Texas storm and power crisis to determine how crisis impacts and adaptations are documented and portrayed. Our data include fifty-six cross-posted videos from third-party platforms, of which forty-one were from TikTok. We show that short-form

videos are capable of providing wide-ranging insights into the impacts of crisis events and how people adapt to them. We provide examples with rich detail to illustrate how content creators documented the effects of their adaptations and their downstream effects. Our data include various adaptations that address the need for water, food, and shelter/warmth. Furthermore, we identify how people coped with the crisis through entertaining and humorous videos. We discovered that valuable information about crisis impacts and adaptations often appeared in the periphery of the main focus of videos. We also comment on what was missing in the social media record (e.g., more mundane impacts and adaptations), contributing to understandings about the contours and limitations of social media content in a crisis context.

Keywords: *Social media, qualitative methods, crisis informatics, videos, disaster adaptations*

Resumen: *Este artículo explora cómo los videos de redes sociales en formato corto pueden contribuir a la comprensión de cómo las personas son afectadas por y se adaptan a eventos de crisis. Aplicando un enfoque de teoría fundamentada, analizamos 174 videos relacionados con crisis compartidos por usuarios locales de Twitter durante la tormenta y crisis energética de Texas en 2021 para determinar cómo se documentan y retratan los impactos y adaptaciones de las crisis. Nuestros datos incluyen 56 videos compartidos de plataformas de terceros, de los cuales 41 provienen de TikTok. Mostramos que los videos de formato corto son capaces de proporcionar una amplia gama de perspectivas sobre los impactos de los eventos de crisis y cómo las personas se adaptan a esos impactos. Proporcionamos ejemplos con gran detalle para ilustrar la forma en que los creadores de contenido documentaron los impactos de sus adaptaciones a la crisis. Nuestros datos incluyen una variedad de adaptaciones que abordan la necesidad de agua, alimentos y refugio/calor. Además, identificamos cómo las personas enfrentaron la crisis a través de videos entretenidos y humorísticos. Descubrimos que información valiosa sobre los impactos y adaptaciones de la crisis a menudo también aparecía en la periferia del enfoque principal de los videos. Además de enumerar los impactos y adaptaciones que fueron prominentes en nuestros datos, comentamos lo que faltaba en el registro de las redes sociales (por ejemplo, impactos y adaptaciones más mundanos), lo que contribuye a la comprensión de los contornos y limitaciones del contenido de las redes sociales en el contexto de crisis.*

Palabras clave: *Redes sociales, métodos cualitativos, informática de crisis, videos, adaptaciones a desastres*

초록: 본 논문은 짧은 형식의 소셜 미디어 동영상인 사람들이 위기 상황에 어떻게 영향을 받고 적응하는지를 이해하는 데에 어떻게 기여할 수 있는지 살펴본다. 2021년 텍사스 폭풍과

전력 위기 당시 현지 트위터 사용자들이 공유한 위기 관련 동영상 174개를 분석하여 위기의 영향과 적응이 어떻게 문서화되고 묘사되는지 확인했다. 데이터에는 타사 플랫폼에서 교차 게시된 56개의 동영상이 포함되어 있으며, 이 중 41개는 *TikTok*에 게시된 동영상이다. 숏폼 동영상이 위기 상황의 영향과 사람들이 이러한 영향에 적응하는 방식에 대한 폭넓은 통찰을 제공할 수 있음을 보여준다. 콘텐츠 제작자가 위기에 대한 적응의 영향을 기록한 방법을 설명하기 위해 풍부한 세부 정보가 담긴 사례를 제공한다. 데이터에는 물, 식량, 쉼터/보온에 대한 필요성을 해결하기 위한 다양한 적응 사례가 포함되어 있다. 또한, 재미있고 유머러스한 동영상을 통해 사람들이 위기에 어떻게 대처했는지도 확인할 수 있다. 우리는 위기의 영향과 적응에 관한 귀중한 정보가 동영상의 주요 내용 이외에도 종종 나타난다는 사실을 발견했다. 데이터에서 두드러진 영향과 적응을 열거하는 것 외에도 소셜 미디어 기록에서 누락된 내용 (이를테면, 보다 일상적인 영향과 적응)에 대해 언급하여 위기 상황에서 소셜 미디어 콘텐츠의 양상과 한계에 대한 이해에 기여한다.

핵심낱말: 소셜 미디어, 질적 방법, 위기 정보학, 영상, 재난 적응

Introduction

Following a severe winter storm with abnormally cold temperatures in February 2021, Texas residents experienced extended power service disruption with catastrophic impacts including the loss of hundreds of lives, widespread property damage, and shortages of water and food. Turning to the social media record, short-form video content in particular, we construct a methodology to explore how people were impacted by and adapted to that crisis event.

Researchers have repeatedly explored social media use during crises, including natural and technological hazard events (Liu et al. 2008; Vieweg et al. 2010; Starbird and Palen 2011; Soden and Palen 2018). Social media data, acting as a contemporaneous record, have enabled new ways to understand how individuals and communities react during crises (Palen and Anderson 2016). This research has coalesced into the subfield of crisis informatics (Palen et al. 2007, 2009; Hagar 2015; Palen and Anderson 2016). Crisis informatics research to date has predominantly focused on how (1) social media enables new forms of collaboration, and (2) shared information contributes to situational awareness and informs response and research (Reuter and Kaufhold 2018). This article focuses primarily on the second area and proposes paying more attention to understand how individuals and groups adapt to meet existing and emergent needs in response to impacts.

Crisis informatics research has mainly focused on textual content (Palen et al. 2009; Vieweg et al. 2010; Starbird and Palen 2011; Kogan and Palen 2018) and to some extent images (Liu et al. 2008; Bica, Palen, and Bopp 2017). Other work has examined automatic classification of images (Alam et al. 2018; Alam, Ofli, and Imran 2018). Meanwhile, video-based social media, such as TikTok and Instagram, have become increasingly popular, especially among

younger users (“Taking Stock with Teens” 2022) with more content generated, consumed, and cross-posted. Seeking to learn more about how they are used during crisis events, our work focuses on short-form video content created during and about the 2021 Texas storm and power crisis. Our primary research question asks: What can short-form videos posted to social media teach us about how people are impacted by and adapt to crisis events, specifically events that cause service interruptions to system infrastructure and disrupt everyday routines? We use grounded, qualitative methods to analyze a set of 174 videos shared to Twitter by accounts that we determined as “likely local” to the crisis event.

Our analysis shows that short-form videos provide vivid windows into impacts and people’s response to crisis events. We add to the existing knowledge about adaptations, specifically on how people assembled resources and adapted to meet their needs for warmth, water, food, and recreation. We note that adaptations can appear in the focal point and in the background. We categorize videos across different formats and types and note how short-form video culture from TikTok and others shapes the video record of the crisis event on a different platform, Twitter. Our work echoes previous ethical concerns about the shadows and distortions in digital crisis data partially driven by social media dynamics in content production and dissemination (Crawford and Finn 2015).

Background and Related Work

Crisis events, such as hurricanes and earthquakes, can damage infrastructure, cause widespread disruptions to lives and routines, and result in casualties and fatalities. Sociologists of disaster have made them the focus of scientific inquiry, studying how people are affected by and respond to crisis events. Borrowing from that tradition, crisis informatics researchers (Hagar 2015; Palen et al. 2007) have conducted numerous studies on the use of information-communication technologies (ICTs), primarily social media, in the crisis context (Vieweg et al. 2010; Starbird and Palen 2011; Wilensky 2012; Tomlinson et al. 2013; Olteanu, Vieweg, and Castillo 2015; Bica, Palen, and Bopp 2017; Kogan and Palen 2018; Soden and Palen 2018; Zade et al. 2018). We extend that research here with a study on how short-form video content can provide insight into how people are affected by and adapted to crisis-related disruptions.

Adaptations to Crisis-Related Disruptions

Davidson et al. (2022) describe adaptations as “actions taken by the recipient of an infrastructure service to fulfill their needs with methods other than those normally used” (10). This definition draws attention to infrastructure

disruption (e.g., water, electricity, transportation, telecommunication) and human responses to those disruptions to meet their needs (e.g., hygiene, sustenance, warmth, communication). Events with such impacts include New Zealand's Canterbury Earthquake Sequence (2010–2011), which caused extended lifeline service disruptions (He et al. 2021); the California (US) heat wave of 2022, which limited residents' charging of their electric vehicles (Albeck-Ripka 2022); and the 2022 China heat wave, where residents and businesses like restaurants relocated to avoid the heat (Li 2022).

Adaptations have become a growing topic of scholarly inquiry. Considering electricity and water failures specifically, researchers have identified several dozen types of adaptations, ranging from using bottled water, finding old streams (Moreno and Shaw 2019), and in an extreme case after Hurricane Katrina, proposed sedation of a patient who kept demanding water (Fink 2013). Chakalian et al. (2018) document how people responded to blackouts after Hurricane Irma, categorizing adaptations as using intellectual, material, and social resources. Heidenstrøm and Throne-Holst (2020) interviewed people who experienced a crisis event with electricity and ICT infrastructure disruptions and had them recreate adaptations or identify resources required to conduct them. In the crisis informatics literature, Van Wyk and Starbird (2020) describe how local residents in Puerto Rico adapted to telecommunication infrastructure disruptions after Hurricane Maria by traveling to other towns for cell service and "borrowing" Wi-Fi from neighbors, businesses, and libraries. This growing body of research reveals how adaptations combine skills, resources, creative impulses, risk tolerance, and affective qualities, manifesting differently by place, time, season, weather, demographic characteristics, and other local qualities. Davidson et al. (2022) argue that integrating adaptations into models of societal functioning will lead to better understandings of how resilient a community will be (e.g., based on access to resources) and how adaptations may create new issues or shift burdens to other parts of the physical and social infrastructure.

Our work follows a line of inquiry in crisis informatics that explores what can be learned about an unfolding crisis—in real-time to inform response or after the fact for research—from social media. Crisis informatics researchers have looked to the social media record to identify content that could "contribute to situational awareness" (Vieweg et al. 2010) or be "actionable" for responders (Zade et al. 2018). To answer this question, researchers have often used grounded inquiry (often informed by knowledge of emergency response) to identify salient categories of content, producing a range of coding schemes. However, information about how people were adapting to crisis events was often lost in broader categories. For example, Vieweg et al. (2008) identify fourteen content categories to describe wildfire and flood

events, but individual adaptations would have been relegated to one of those broader categories, perhaps located with the related impact or more broadly classified in another category, such as advice, volunteer information, or preparatory activity.

We put adaptations at the center of inquiry, with the aim of using social media to better understand how people respond, both collectively and individually, to unfolding crisis events. Davidson et al. (2022) suggest that understanding these individual adaptations, especially at scale, could improve assessments of how communities respond to an event, informing more efficient responses and provisioning of resources to facilitate future adaptations.

This study builds on Abbou et al. (2022) and Soleimani et al. (2023), which analyzed survey-based data to understand impacts of and adaptations to hypothetical events in Los Angeles and the 2021 Texas storm and power crisis, respectively. Davidson et al. (2023) developed a typology of household adaptations to service interruptions to bring awareness to adaptations as a universal experience for people experiencing crisis events. Soleimani et al. (2023) show that public utility interruptions experienced during this crisis were associated with adaptations, with most individuals implementing at least one adaptation. In this study, we use short-form video data to qualitatively assess adaptations implemented during the 2021 Texas storm and power crisis.

Video as a Source of Qualitative Data about Crisis Events

Much of the crisis informatics research studying social media has focused on text-based data, with a few notable exceptions. Liu et al. (2008) studied images shared on social media, conceptualizing eyewitness photos as a form of citizen journalism, and Bica, Palen, and Bopp (2017) examined photo-sharing practices by locals and nonlocals after the 2015 Nepal earthquakes. Other efforts created annotated data sets of natural disaster-related social media imagery that identify crisis impacts, people affected, and humanitarian efforts (Alam et al. 2018; Alam, Ofli, and Imran 2018). Although these studies do not include adaptations as a dimension, adaptations can be seen in the background, such as people sleeping in tents (Alam, Ofli, and Imran 2018; Ofli, Alam, and Imran 2020). Similarly, Heidenstrøm and Throne-Holst (2020) include images of resources for performing adaptations but do not capture how these are performed in real time. Video content has received less attention from crisis informatics researchers.

As short-form video platforms like TikTok, Instagram Reels, and YouTube Shorts become increasingly popular, they are becoming potentially rich sources of information about unfolding crisis events (Sailunaz and Alhaji 2019). Video content has a greater depth of information and qualitative data compared to static images (Sleigh et al. 2021). Wilensky (2012) looked to

YouTube to understand social media as a tool for emotional support after a crisis event. Slick (2019) analyzed YouTube videos to understand people's lived experiences during the 2016 Fort McMurray fire in Alberta, Canada. With TikTok's increasing popularity, some studies have examined its content in the crisis context. Li et al. (2021) studied videos from the official TikTok COVID-19 information hub to investigate public health messaging online, and Basch, Yalamanchili, and Fera (2022) examined climate change information dissemination by analyzing TikToks with the #ClimateChange hashtag. Our work adds to this growing body of research.

Event Background

The Texas power crisis was set in motion by winter storms sweeping across the southern United States in mid-February 2021. Texas, a state with typically mild winters, experienced abnormally colder temperatures for more than ten days. The state's independent power grid, managed by the Electricity Reliability Council of Texas (ERCOT), was overloaded during the storm. Unable to meet power needs, ERCOT implemented partial, rolling, and in some cases multiday blackouts, with some residents experiencing unusually high energy prices (Busby et al. 2021). At one point, nearly one third of Texas was without power (Flores et al. 2023).

Power outages and low temperatures led to several cascading effects. Cold temperatures created unsafe conditions in homes and caused pipes to freeze or burst, affecting access to running water. People were unable to cook or store perishable foods. Businesses, including grocery stores and restaurants, were forced to close, intensifying food shortages. Meanwhile, snow- and ice-covered roads hindered the ability to relocate or find food and water. The Texas Department of State Health Services attributed 246 deaths to the crisis (Hellerstedt 2021).

A primary criticism framed the problem around the deregulated political grid and targeted politicians who were seen to represent those policies, who, in turn, attempted to deflect criticism. Governor Greg Abbott was quoted blaming ERCOT and renewable energy for the crisis, drawing additional criticism (Mena 2021). Former Texas Governor Rick Perry suggested that the power outages are a sacrifice Texans should be willing to make to "keep the federal government out of their business" (Sabawi 2021). Texas Senator Ted Cruz was widely criticized by constituents after he was photographed flying with his family to Cancún, Mexico (Parker 2021). After returning to Texas, Cruz (2021) tweeted photographs of himself assisting with disaster relief efforts, drawing additional criticism since many viewed these efforts as insincere and self-promoting (Porter 2021).

Methods

We analyzed short-form videos posted to Twitter during the 2021 Texas storm and power crisis. Our methods had four steps: (1) collecting Twitter data and identifying tweets from selected users, (2) identifying unique and relevant videos, (3) developing a coding scheme covering video content and format, and (4) coding the videos.

Initial Data Collection

We used the Twitter Streaming API to collect roughly 91 million tweets and their associated data using storm-related keywords (e.g., “Texas,” “freeze,” “power”) in real time. We filtered posts based on keywords, timestamps, and geographic cues. At the time of data collection, other platforms such as TikTok did not offer a systematic way to collect data. We took several steps to identify Twitter users that were (1) tweeting about the storm, (2) likely located in Texas during the storm, and (3) representative of the varied experiences throughout Texas. We first selected users who had posted at least five original tweets with one of our storm-related keywords to reduce spam and automated accounts. Then we identified “likely local” accounts using their profile location. To create a geographically diverse mix of likely local users throughout Texas, we selected accounts from the fifteen largest Texas cities (one per county) not in the same metropolitan area: Houston, Dallas, San Antonio, Austin, El Paso, Edinburg, Brownsville, Corpus Christi, Belton, Lubbock, Beaumont, Waco, Tyler, and Bryan. Last, we collected all tweets posted by these accounts during the month of February via the Twitter Search API. This created “contextual user streams” of tweets, which include tweets about the event that may or may not contain a related keyword (Palen and Anderson 2016). Our resulting data set included 11,486,519 tweets from 824,617 accounts.

Identifying and Deduplicating Videos

We identified 3,407 tweets from our data set posted before, during, and after the storm (February 1–28) that included an embedded video. We omitted landscape videos to filter out content unlikely to have been made for short-form video platforms and duplicates, resulting in 489 unique videos. We manually reviewed these videos and identified 174 unique, crisis-relevant videos (labeled V1 to V174) from 156 users for further analysis. Using watermarks and platform-exclusive identifiers, we identified forty-one videos from TikTok, twelve from Instagram, and three from Snapchat cross-posted by original creators or downstream viewers. We categorized the remaining 118 videos with no discernible identifiers as “native” Twitter videos.

Developing the Coding Scheme

We used a grounded approach to analyze the video tweets (Charmaz 2014). Our research team performed open coding on a set of sixty videos. Development of the coding scheme was primarily inductive, with some codes and categories shaped through dialogue with crisis informatics researchers. Our codebook included descriptors of storm impacts and adaptations, as well as video characteristics such as the style of filming, elements, themes, purposes, and the emotions of the creators. The codebook consists of 105 individual codes organized into six main categories. We report on a subset of those codes that we find most relevant to the themes of this article.

Qualitative Coding

We performed closed coding with a team of six researchers. Each of the 174 videos, including those used to develop the coding scheme, was coded by a rotating pair of researchers, excluding the final round, which had three coders coding every video. Initial agreement varied by code, with struggles to concur on some dimensions, including fair agreement for “has impact” due to differing understanding for coding snow/ice impacts. We used consensus coding to resolve disagreements and crafted our contribution to highlight qualitative insights over quantitative ones.

Findings

We assigned crisis-related videos to three broad (often overlapping) categories: crisis impacts, adaptations, and political commentary. Of the 174 videos, 147 videos (84.4 percent) documented one or more impacts, 66 (37.9 percent) featured one or more adaptations, and 55 (31.6 percent) featured both. Among the sixty-six adaptations-related videos, seventeen were jokes, skits, or adaptations for recreation (see table 1).

Twenty-seven videos politicized the crisis across multiple subcategories. The majority (seventeen) referenced Cruz’s trip to Cancún, Mexico. Other subcategories included political figures or general politics (eight videos), emergency preparedness (three videos), and climate change (two videos). One video criticized the politicization of the crisis. In twenty-one videos, creators described or showed impacts and adaptations while making a political statement.

Crisis Impacts

Impact-related videos documented direct effects from the storm (e.g., extreme cold) and indirect effects from disrupted infrastructure (e.g., power outages).

Table 1. Summary of Crisis Impacts, Adaptations, and Political Videos.

<i>Category</i>	<i>Subcategories</i>	<i>Number of videos (out of 174 total)</i>
Impacts	All impacts	147
	Water distribution	13
	Housing damage	24
	Power service disruption	37
	Environmental impacts	73
	Food supply impacts	14
Adaptations	All adaptations	66
	Water, food, and shelter adaptations	44
	Recreation and coping adaptations	15
	Joke and dramatized adaptations	14
Political commentary	All political videos	27
	Senator Cruz's Cancún trip	17
	General politics	8
	Emergency preparedness	3
	Climate change	2
	Anti-politicization	1

Note: Videos can appear in multiple subcategories.

Environmental Impacts and Disruptions to Normal Routines

Nearly half (seventy-three) of the “impact” videos captured environmental impacts from the abnormal weather conditions that led to cold temperatures, snow, and ice. Fifteen videos showed snowfall, ice, or hail, sometimes to emphasize the cold temperatures. These impacts were novelties for some but introduced road conditions that complicated travel for others. Five videos demonstrated the effect of ice and snow on walkways and roads. Video V77 showed a semi-trailer truck stuck in a snowbank as the creator drove down a snow-covered highway.

Impacts from Power Infrastructure Service Interruption

The second largest subcategory featured power infrastructure impacts. Three videos documented dark houses and businesses. Videos also discussed the unequal and inefficient distribution of electricity. V126 showed empty brightly lit business buildings and compared them with residential areas experiencing blackouts. With cold temperatures and no electricity access, people were unable to use electric heaters. Creators also discussed impacts on communication infrastructure, which affected their ability to access information or connect with others.

Some creators used video to provide information about power outages. Three videos explained why Texas homes are ill-suited to cold weather events, why the power infrastructure failed to meet residents' needs, and how this resulted in high electricity bills during the crisis. Some videos satirized Texas officials and power companies, who the creators believed were a significant reason for the crisis.

Water Access Impacts and Water-Related Damage

Many people experienced water service disruption and water damage as water mains and other pipes froze and burst. Thirteen videos featured reactions to water shutoffs. Videos also captured damage to businesses and homes due to flooding from burst pipes. In V91, water poured over the balcony of a third-floor apartment. Others captured the aftermath of water damage. V98 showed a car encased in ice, rendering it inaccessible after a pipe burst above it in a parking garage.

Impacts to Food Access

In addition to increased demand for shelf-stable food, the weather conditions impacted supply chain logistics, which in turn affected people's access to food. Five videos showed grocery stores with nearly empty shelves. In three videos, creators stated that their access to food was limited.

Crisis Adaptations

In line with previous findings about novel and mundane improvisations in response to crisis events (Kendra and Wachtendorf 2007), Texas residents adapted to impacts from the crisis in numerous ways. We coded for three adaptation temporalities: reactive, proactive, and both. We found that the majority (fifty-four videos) of adaptations documented were "reactive," i.e., done in response to an impact. Two videos were "proactive" adaptations, i.e., done prior to or in preparation for an impact. The remaining five videos (both reactive and proactive) were from aid organizations.

Many videos (including the two featured in box 1) showcase adaptations as a central focus, often in rich detail. Elsewhere a selection of four videos documents a series of adaptations, with visual content and sometimes explanations, for alternative cooking, heating, shelter, food acquisition, and/or food storage methods. In others cases, the adaptations were used to criticize response efforts or inequitable conditions. In some, adaptations were not a central focus for the creator but appeared in the background or periphery.

In a few videos, adaptations did not appear in the visuals but in the audio. For example, in V34, the creator states (but does not show) that "people are sleeping in their cars for heat" due to power loss. Some adaptations that were

Box 1. Examples of Videos Demonstrating Individual-Level Adaptations

V72 (Vlog-style Video)

The creator is shown walking outside in the snow, in a coat and hiking boots, commenting, "This is what happens when you don't stay in the white part of town." The camera pans to a public charcoal grill, where meat wrapped in aluminum foil is being cooked. They state that they have had no power for thirty-six hours and no cell reception for two days. They then show footage of their homemade heater made with multiple candles and a large cooking pot. They also show how they are keeping their dwindling food supply fresh by storing it in the snow. The video then cuts to indoors, where the creator shows two grocery bags containing shelf-stable snacks and food they purchased, stressing the unusually high price ("over \$200") they paid for the relatively small amount of food, as well as the two-hour trip it took due to adverse road conditions. The video ends with the creator showing their thermostat illuminated by a phone flashlight that reads 47°F indoor temperature, saying that it is going to be another "cold, cold night."

V55 (Vlog-style Video)

The creator initially focuses the camera on a dog lying in the snow. As the creator jokingly accuses their dog of trying to steal their food, they pan to show food sitting in a storage container in the snow. Though not explicitly stated, it can be inferred that the creator likely adapted to power loss by using snow to store food. While power loss is not explicitly mentioned in the video, the creator uses a flashlight to illuminate their surroundings.

previously identified (Davidson et al. 2023; Soleimani et al. 2023) were notably missing from our data. For example, the use of generators, commonly used during power outages, did not appear in the videos.

Here, we organize our presentation of those adaptations found in the videos along two axes (see figure 1): the relevant impact of infrastructure disruption (power service disruption, water service disruption, water-related damage, and environmental impacts) and the human need that an adaptation met (shelter/warmth, water for drinking and hygiene, food acquisition, storage, and cooking, and recreation). We list the adaptation under its primary related impact, although the adaptation may be a result of compounding disruptions. For example, alternative shelter adaptations are caused by a combination of power service disruption and environmental impacts (cold temperatures). Empty cells in the table reflect places where we did not find any adaptations, either because they are missing from our video data or the intersection of the two dimensions is not possible.

Maintaining Shelter and Warmth Staying Warm during the Power Outage

The most prevalent type of adaptations in our data were due to power outages and in particular, efforts to stay warm. Nine videos show people covering themselves with blankets and wearing layers. In V72, the creator created a

Needs Impacts	Shelter/Warmth	Food Acquisition, Storage, and Cooking	Water for Drinking and Hygiene	Recreation
Power Disruption	Using a car for warmth 2 Videos Alternative heating mechanisms 8 Videos Bundling Up 9 Videos Alternative shelter 5 Videos	Storing food in snow 5 Videos Buying ready-to-eat meals 3 Videos Alternative cooking mechanisms 1 Video Food distribution by aid groups 11 Videos	No Videos	Using a car for power 1 Video
Water Access & Water- Related Damage	Cleaning up after burst pipes 3 Videos	No Videos	Melting snow 4 Videos Water distribution by aid groups 6 Videos	No Videos
Environmental Impacts	No Videos	No Videos	No Videos	Hobbies 2 Videos Winter sport activities 11 Videos

Figure 1 Adaptations (joke adaptations excluded) as a response to crisis impacts and human needs.

home-made heater by placing several lit candles underneath a large cooking pot, supported by cinder blocks (figure 2).

Some used their cars for warmth. One creator (V103) said that their girlfriend had to sit in the car “due to her allergies,” and another (V34) mentioned people sleeping in cars. Another video (V56) featured a more humorous adaptation where a person used their car to keep warm and to power their gaming console.

People who could not effectively adapt to the loss of heating sought alternative shelter. In V100, a family that was traveling to stay with relatives after losing power explained that other families with infants were likely also forced to seek alternative shelter. In V126, the creator stayed with a friend after their apartment lost power. V27 documented a business owner who opened their furniture store to provide heat and meals to the community. Videos also documented people who did not have access to alternative shelter. V4 showed someone receiving emergency medical attention, explaining that people sleeping in the cold outside “can’t survive.” In a different video (V47) posted a few

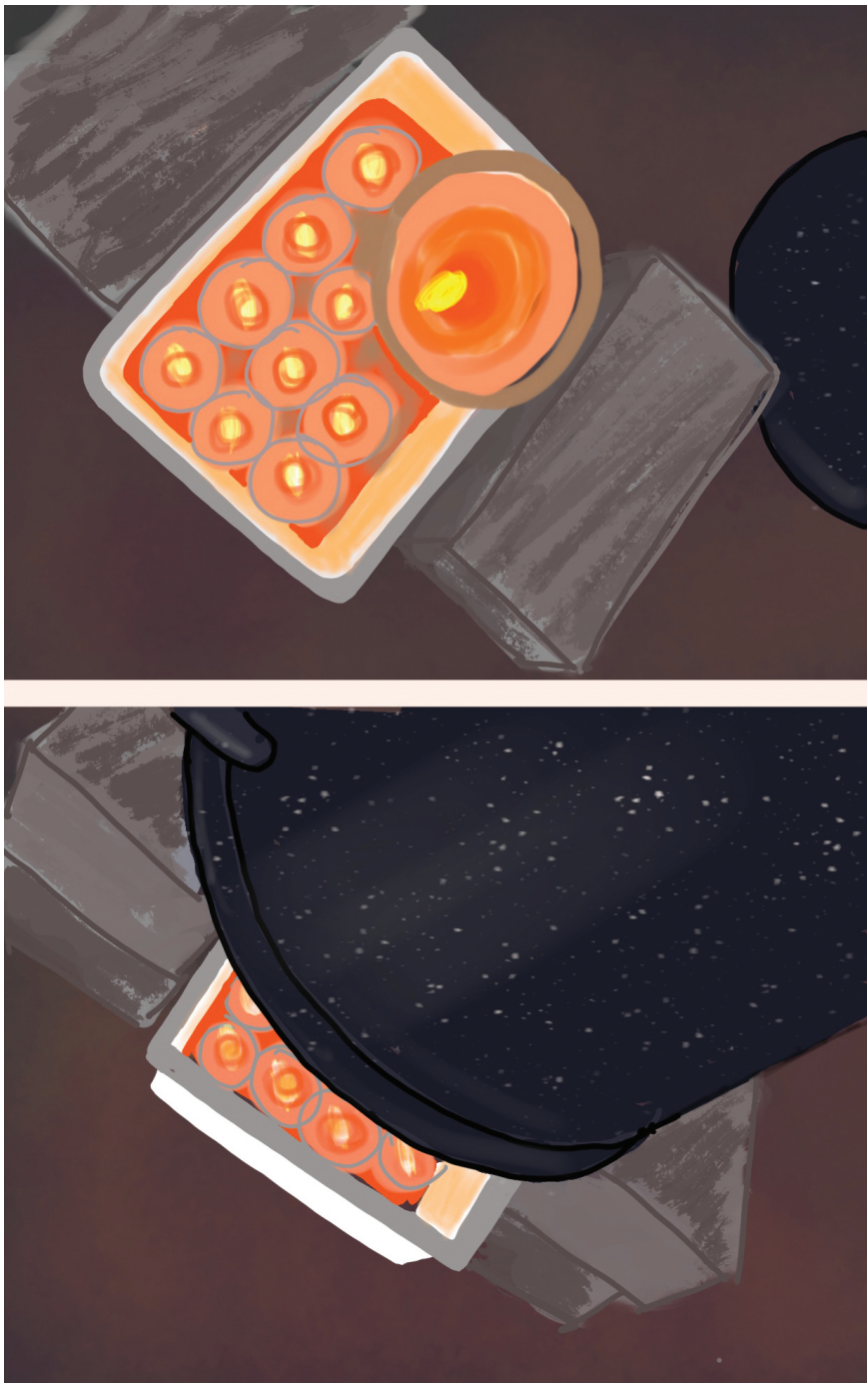


Figure 2 A drawing based on V72 showing a home-made heater.

days later, the same creator explained that public shelters were closing amid rising temperatures and showed supplies and disposable heat packs intended for those returning to living on the streets.

Cleaning Up after Broken Pipes

The cold temperatures and lack of heat led to pipes freezing and bursting, causing damage to people's homes. Two videos documented people adapting to burst pipes by catching leaking water from their ceilings in buckets. In V138, a person used a broom to sweep water out of their apartment and onto their balcony. A full water bucket was also seen in the center of the room, indicating that the creator struggled to contain the leak.

Food/Sustenance Storing and Preparing Food While Experiencing Power Loss

The storm and resulting power outages had multiple and cascading effects on people's ability to store and cook food. With refrigerators inoperable, some turned to storing perishables outdoors or in the snow (three videos). Some videos, such as V148, showed that people were consuming more nonperishable foods such as canned protein and chips.

Because electric stoves were unusable, people turned to alternative means of cooking. Four videos showed food being cooked outdoors using firewood and other fuel in makeshift stoves or public grills. Two videos showed candles being used to cook food or heat up canned food. V175 showed a battery-powered drill used to power a blender.

Food adaptations had cascading effects on food provisioning. Videos showed extremely long lines of people waiting to be admitted into grocery stores. Restaurants were also affected, with V73 showing a long line of cars outside a drive through at a fast food place.

Aid Groups Advertising Efforts and Where to Get Food and Water

Aid groups provided for their communities as food and water supplies became impacted. We identify this as a community-level adaptation. Videos documented volunteers working and/or promoting ways to receive help, donate, or volunteer. This type of content was posted by both individuals and aid organizations (e.g., community food banks). Creators requested coupon donations so they could purchase sandwiches for people with mobility impairments (V12), requested donations to a food-relief organization (V12), and explained how to get free bottled water in Houston (V9). Four videos by community aid organizations documented setting up food and water for donations.

Obtaining Water for Hygiene and Consumption

Four videos featured alternative water sources, with some being informative. V52 explained step by step how to melt snow for flushing a toilet. After water access was restored, videos such as V177 (which showed an official text message regarding safe water consumption) revealed that water needed to be boiled for some to ensure safe consumption.

Recreation and Coping with the Crisis

Some videos documented people coping with the storm and its contingencies (cold, snow, loss of power) by entertaining themselves. In V63, the creator passed time painting and listening to music using light from a camping lantern. Embedded text reads, “About to just vibe out until further notice #HoustonPowerWaterOutage.” Taking advantage of the snow and frozen lakes, people went sledding and snowboarding, made snow angels, and played ice hockey (eleven videos). In V46, a person is snowboarding on a snow-covered interstate in Dallas while hanging on to a rope attached to a car.

Humor and Adaptations

Humor and political themes were widespread in content about the Texas power crisis. Forty-five videos had a humorous quality, eighteen of which also contained adaptations. These adaptations were typically dramatized versions of practical or joke adaptations. In two skit-style videos, the creator raced around their home to cook food and charge their devices when power returned temporarily. In V56, the subject pretended to warm up next to a video of a fireplace on their television. Some joke adaptations also had other purposes, such as political commentary. For example, in V49 the creator pretended to be Senator Cruz providing superficial aid to local residents after his trip by handing out water, Mexican food, and tequila.

Political Commentary

Several videos featured content politicizing the crisis. While many were humorous, others were serious, expressing anger toward Texas government entities, politicians, and power companies. The majority of the politicized content featured skits, humorous reactions, and commentary mocking Senator Cruz, with many explicitly tagging his Twitter account. In V48, the creator performed the part of a receptionist for a Cancún hotel’s lost and found department. The speaker answered an unheard question by Cruz: “So what did you lose? Oh, your integrity. I see.”

In seven videos, creators criticized political figures, effectively blaming them for the crisis. In V103, the speaker expressed anger toward former Texas governor Rick Perry, while the video background showed a tweet from

the *Houston Chronicle* that suggests Perry believes that going days without power is a sacrifice Texans should be willing to make to keep the state's power grid independent. In V34, the creator spoke directly to the camera to criticize politicians in general for their lack of leadership. They went on to say, "The only reason [Cruz] is on his way back home [from Cancún] is because he got caught." Last, the creator called on their audience to tag Cruz and use Twitter and other social media to criticize him.

Some videos explained the political landscape around the crisis, often using an informational or educational format. For example, two described the connections between ERCOT and financial contributions made by private Texas power companies to Texas politicians. V83 argued that the impacts are a result of Texas's lack of a diverse energy portfolio and attributes them to the governor, saying, "People are cold, people are at risk, because Greg Abbott is in the pocket of big oil." V29 gave advice to Texans who were victims of extreme energy bills. Some advocated against politicizing the crisis. V20 attempted to depoliticize the crisis, stating, "don't be a heartless idiot and blame red state voters. It's red states, blue states, purple states, green states. Everywhere is in crisis."

Creators Use Different Video Types for Different Kinds of Content

Different creative production cultures and styles have emerged on video-first platforms (Sun et al. 2020; "Year on TikTok" 2021; Li et al. 2021; Kaye, Zeng, and Wikstrom 2022). In line with this research, we identified several video styles in our analysis. Most (75 percent) of the crisis-related videos were filmed in vlog style, meaning that the creator documented their own or other people's experiences. Creators also used alternative styles such as skits (8 percent), monologues (6 percent), and educational video (8 percent) to convey different messages (table 2). Unlike vlogs (which were primarily native Twitter videos), most of the videos displaying these three alternative styles were cross-posted from TikTok, a reflection of the distinct visual culture developing on that platform.

Discussion

This research expands our understanding of what researchers can learn from social media—in particular, from short-form video content—about crisis impacts and adaptations. We expand on our findings along two dimensions: (1) outlining contributions to work on identifying and classifying adaptations, and (2) discussing some of the challenges and opportunities around using short-form social media videos to study disaster-related impacts and adaptations.

Table 2. Video Types, Definitions, and Number of Videos by Original Social Media Platform

Video Type	Definition	Number of Videos				
		Twitter	TikTok	Instagram	Snapchat	Total
Vlog	A first-person video that documents the creator's activities or experiences	104	14	9	3	104
Skit	A skit where the creator takes on one or more personalities to act out scenarios and make light of the crisis	4	10	0	0	14
Informational/ educational	A video that provides advice or educates its audience on the crisis and its effects	2	9	3	0	14
Monologue/ speech	A video where the content creator speaks directly to the camera to express emotion or to advocate, sometimes using the background to provide pictural or informational context	4	7	0	0	11
Dance	A video that portrays the creator dancing, sometimes with descriptive text overlays that provide more context	2	1	0	0	3
Other	A video that does not fit in any above category	2	0	0	0	2

Classifying Adaptations in Short-Form Videos Posted during Crisis Events

We follow an established line of inquiry by crisis informatics researchers on the use of social media during crisis events (Palen et al. 2007). This work documented group-level responses like emergent online organizing in response to crises that can be conceptualized as adaptations (Sutton, Palen, and Shklovski 2008; Palen et al. 2009; Starbird and Palen 2011;). Individual-level adaptations, however, have received less attention. Schemes for classifying content have often focused on event impacts using broad categories (Vieweg et al. 2010; Olteanu, Vieweg, and Castillo 2015), with less attention spent on how people adapted to crisis impacts and little conceptual work to differentiate between the two.

Building on Davidson et al. (2022, 2023), we highlight the role of individual and collective adaptations in determining the societal impact of a crisis event. Davidson et al.'s approach takes into account the resilience of a community that adjusts the resources and infrastructure to rely on and accounts for the cascading effects. For example, people turning to ready-to-eat foods

can lead to empty shelves and price gouging. Following Van Wyk and Starbird (2020), our research looks to the social media record—in particular, short-form videos—for contemporaneous evidence of people adapting to the 2021 Texas storm and power crisis, and we map crisis impacts to adaptations and human needs. Analyzing short-form videos has allowed us to identify food acquisition and storage as an additional dimension to the typology established by Davidson et al. (2023). Our findings highlight the qualities of short-form video content to study crisis scenarios, such as the rich information on impacts and adaptations seen in both the background and foreground of the content. We believe this can be valuable for future crisis informatics research, including attempts to improve automated classifiers for social media content to inform researchers and real-time responders.

Videos as a Medium to Study Crisis Events

Our findings draw renewed attention to challenges using social media content as a “signal” during crisis response identified by Van Wyk and Starbird (2020). They identify opportunities and risks at the intersection of improvisation and contagion. People can now share widely known and new crisis adaptations and available resources beyond the affected areas. We identified safe and suitable adaptations (e.g., melting snow to flush toilets), and some ill-advised adaptations (e.g., using a drill to power a blender). Because short-form videos can be especially effective in providing easy-to-follow demonstrations, we expect to see widespread diffusion of adaptations during future crises. This has the potential for negative consequences should risky behaviors be adopted or resources called upon en masse and in unexpected ways, creating new impacts. Our work also draws attention to the salience of political commentary in the online discourse around crisis events. Though crisis informatics can be inherently political, less attention has been paid to the political discourse in the content (Soden and Palen 2018). In our analysis, twenty-seven (15 percent) videos had an explicit political message. As social media spaces have become more politically charged (Rogers and Jones 2021) and entangled with engagement online (Aral 2020), we expect conversations about crisis events to have an increasingly significant political dimension.

A Contemporaneous, Detailed Record of Crisis Impacts and Adaptations

One value of social media is its contemporaneous nature—that is, people documenting their activities as they were being affected by and adapting to a crisis event (Palen and Anderson 2016). Unlike surveys and interviews conducted after a crisis, social media, and videos in particular, document the unfolding crisis in that moment, often with rich detail. This perspective can show the physical effects of the crisis on infrastructure and the surrounding

environment, as well as its impacts on people's moods, routines, and lives. Some impacts are shown directly, such as videos featuring the severity of water damage and cold temperatures in people's homes. Others indirectly communicated more nuanced details, including how people adapted to various issues with cascading effects. For example, multiple videos showed empty frozen food sections at grocery stores, providing evidence of supply chain issues and people stocking up on certain foods. Short-form videos also provide visual evidence of the various physical and social resources that people rely on and the creativity they use to adapt—evidence that may get lost in accounts recorded after the event. However, it is often more difficult to understand factors such as the time investment of adaptations documented in short-form videos compared with longer videos on social media.

Impacts and Adaptations in the Background

Some of the more interesting elements in the videos, including content that could help other affected people and crisis responders, appeared in the background, periphery, and unintentionally communicated details. For example, many videos featured a person in an indoor setting using blankets or wearing a lot of clothes. Although the videos focused on other topics, they indirectly communicated that people were feeling cold and adapted by wearing extra layers. In another video featuring a dog, food was shown placed in the snow, which implied an adaptation for alternative refrigeration. Some videos primarily focusing on political criticism revealed adaptations in the background or as supporting evidence for their critiques. Joke and skit videos often revealed adaptations without explicitly focusing on them. In one skit video, a hotel manager offers a guest a bucket of boiled snow. While the gesture is meant to be a joke and was not explicitly explained, it captured a real and common adaptation method of melting snow. Unlike most textual posts, videos often included content that creators did not necessarily intend to share with their audiences that is nonetheless valuable for researchers, crisis responders, and other affected people. Similarly, image-based data sets for studying crisis events, both manually and automatically, can benefit from identifying adaptations both in focus and in the background of an image.

The Shaping Role of Social Media Engagement

There is growing awareness that algorithmic recommendations shape what and when certain content is shown on social media feeds. This is especially true on TikTok and more recently on Instagram where personalized content distribution is dominant (Patel 2022). Many recommendation algorithms are optimized on engagement metrics (i.e., what is most engaging as measured

in likes, comments, reshares, and view time). These recommendations may shape what and how content is shared among users.

We saw these engagement dynamics in our data, where a large proportion of videos contained surprising, disturbing, or shocking content, such as homes flooding due to burst pipes and a car completely covered in ice. On the other hand, potentially common adaptations, such as using a generator, did not make an appearance, perhaps because they garnered less interest. This dynamic privileging engagement over informing is especially visible among humorous/joke TikTok videos, which often appeared in our data when someone other than the original creator cross-posted the video from TikTok to Twitter, implying that algorithmic amplification (on Tiktok) and motivated posting by a downstream user played roles in surfacing that content. Videos that invoked anger (e.g., at political figures) or laughter (making light of lived experiences and issues) were prevalent.

We recognize that as a result of platform- and user-determined virality, adaptations easily learned from widely shared videos could lead to negative consequences or harm. Some social media platforms have features to combat misinformation, such as fact-checking or asking users for feedback on the legitimacy of information. However, it is harder to provide fact checking or additional context for adaptations spread via short-form videos, especially when the adaptation appears in the background. For example, videos demonstrated melting snow for water, presumably to flush a toilet. Someone who watches this video and repeats this adaptation could be at risk if they drank melted snow, which is non-potable.

Social Media Videos Create Shadows and Distortions

Social media engagement dynamics can emphasize certain kinds of adaptations over others based on how compelling the visual components are to the audience. To get a sense of what could be missing in our data, we compared our findings to a survey of residents' adaptations from the same crisis (Davidson et al. 2023; Soleimani et al. 2023). The survey revealed a greater number of adaptations performed and different prevalence of specific adaptations. For example, the most common adaptation for water by survey respondents was purchasing bottled water, which was only present in videos showing aid groups distributing bottled water. This could also point to a difference in positionality—the survey data may have mostly revealed personal adaptations, while our data included adaptations from organizations. Furthermore, while a significant number of survey respondents reported moving to a hotel, the video data did not (although we did see some people traveling to stay with friends and family). On the other hand, our data brought up adaptations that were not part of survey responses in Soleimani et al. (2023) and Davidson et.

al (2023), such as for cooking (i.e., using candles) and recreation (i.e., winter sports), as well as a distinction between proactive and reactive adaptations. This suggests that contemporaneous social media video data can help expand the catalog and typology of crisis-related adaptations.

Ethical and Methodological Concerns with Using Social Media Videos in Research

We echo concerns from previous research noting that relying on social media data to understand crisis events inevitably leads to shadows and distortions due to the demographics of who uses these platforms, their performative nature, and the co-shaping of events, technologies, and emotions (Crawford and Finn 2015), among other factors. We also note that there is potential for biases in the data from political censorship and/or algorithms' tendency to favor advertiser-friendly content (Ma and Kou 2021; Zeng and Kaye 2022).

Crawford and Finn (2015) also stress that data gathered from textual-based social media during a crisis event present ethical concerns, especially when used for research after the event. Video content may intensify these concerns, especially when the creator unintentionally communicates personally identifiable information. It is also important to acknowledge that data used in this research were gathered from people who may have been particularly vulnerable as they experienced a crisis event. We were mindful of the potential implications and sensitivity of the data examined and took precautions to ensure users' anonymity.

The Role of Social Media Videos as a Research Teaching Tool

When we began our research, few published works used qualitative methods to assess visual data from crisis events, let alone adaptations from social media videos. With the increasing popularity of video-based social media content, there is an increasing need to develop methods to analyze short-form videos systematically. The speed and volume of content shared to platforms like TikTok can provide new opportunities for researchers to study crisis events contemporaneously. These data may also provide a —particularly engaging pathway for teaching qualitative methods for disaster research in a classroom setting. Our study serves as a model for a hands-on approach to analyzing social media videos. In addition to better understanding the impacts of disaster events through the lens of adaptations, it can better position students to pay attention to the background and periphery of visual content, identify political messages, attend to emotional undertones, and more.

Limitations

Our work has several limitations related to our data collection method and the underlying data. We began our inquiry with Twitter data because of its public availability, the presence of geographic cues in user profiles, and the ability to capture data in bulk. However, the videos we analyzed are a collection of both native Twitter videos and some cross-posted from other platforms. The dynamics underlying the sharing and uploading of each video are likely very different across platforms. For these reasons, we avoid making strong quantitative claims about the relative frequency of different adaptations. At the time of our collection and analysis, avenues to systematically search and collect similar data were not available on other platforms, including TikTok. As this functionality becomes available, future research could focus on a single video-based platform, which would likely result in a larger and more consistent data set.

Conclusion

In this article, we analyzed short-form video content posted on Twitter to understand how people responded to disruptions from the 2021 Texas storm and power crisis. We contribute to the field of crisis informatics by focusing attention onto adaptations, through the lens of social media. We found that videos contain rich information about both impacts and adaptations, including novel adaptations and those that appear in the background or periphery of videos. Increased knowledge about adaptations can inform a more accurate understanding of the impacts on a community for crisis researchers and real-time responders—i.e., taking into account its potential to meet needs through alternative means and the downstream effects of those activities. This knowledge can also inform messaging and provisioning to support future adaptations. We recommend additional and complementary research, including studies focused on collecting data directly from TikTok, to delve deeper into how social media videos can contribute to our understanding of how people are affected by and adapt to crisis events. Building on this study, future research could also focus on evaluating how users engage with short-form videos, such as comments and sharing, to better understand the discourse generated by the content audience and how it may shape individual-level responses to disaster situations. In addition, while this study focuses on individual-level adaptations to short-term crisis impacts, future research may investigate social media content from people affected by crises with longer-term impacts (e.g., permanent housing loss) to better understand long-term adaptations and how they may evolve over time.

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