

**NIST Data Collection Instruments 002**

**Eliciting Lessons from  
Small- and Medium-Sized Enterprises  
(SMEs) for Natural Disaster Resilience  
Planning and Recovery During the  
COVID-19 Pandemic:**

**SME Complex Event Resilience**

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**NIST**  
**National Institute of  
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## Abstract

Small and medium-sized enterprises (SMEs) make up 44 % of U.S. economic activities and are the lifeline for many local economies, employing 59 million people in 2018 (SBA 2018, 2019). In the wake of the COVID-19 pandemic, SMEs are greatly impacted through supply- and demand-side difficulties, such as limiting customer interactions, employee availability, as well as larger supply chain issues. The numbers are quickly evolving, but early predictions estimate 15 000 retail store closures and 3 million jobs lost (Bivens, 2020; Thomas, 2020) with minority and immigrant-owned businesses disproportionately affected (Fairlie, 2020). As COVID-19 conditions persist, the chances are high that populations around the U.S. and the world will experience natural disasters (e.g., heat waves, floods, hurricanes, fire, and drought) during the period of virus transmission and into the period of recovery (e.g., Phillips et al., 2020). Small and medium-sized enterprises in areas vulnerable to these natural disasters and other extreme weather events (EWEs) are particularly noteworthy in the context of COVID-19.

This Special Publication Report presents a mixed-method research approach to study the impact of COVID-19 on SMEs and a subset thereof that had experienced a natural disaster or EWE pre- or during the COVID-19 transmission period. The survey also gauges the concern that such events may affect SMEs as the effects of COVID-19 persist in the future and during a future recovery phase. The presented survey was conducted online and combines closed- and open-ended questions to document: 1. the novel resilience-based mitigation actions employed during the COVID-19 pandemic by SMEs, 2. challenges in implementing resilience-based mitigation actions, 3. use of past strategies and approaches to provide assistance to the current situation, and 4. planned resilience actions and strategies. As such, the questions are framed specific to COVID-19 pandemic conditions; however, many are generalizable to SMEs facing compound risks that may create complex events.

## Key words

Adaptive capacity; built infrastructure; business recovery; business resilience; community resilience; coping; extreme weather events; Micro-, Small-, and Medium-sized Enterprises (MSMEs); mitigation; resilience planning; Small- and Medium-sized Enterprises (SMEs); survey instrument.

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## Glossary

AEO	Applied Economics Office
CISA	Carolinas Integrated Science and Assessment
CNAP	California-Nevada Applications Program
COVID-19	coronavirus disease 2019
EIDL	Economic Injury Disaster Loan
EWE	Extreme Weather Event
IRB	Institutional Review Board
MBDA	Minority Business Development Agency
NAICS	North American Industry Classification System
NOAA	National Oceanic and Atmospheric Administration
PRA	Paperwork Reduction Act
POC	point of contact
RISA	Regional Integrated Sciences and Assessments
SBA	Small Business Administration
SBPS	Small Business Pulse Survey
SCIPP	Southern Climate Impacts Planning Program
SIC	Standard Industrial Classification
SME	Small- and medium-sized enterprise
WRN	Weather Ready Nation

## 1. Motivation and Background

Small and medium-sized enterprises (SMEs) make up 44 % of U.S. economic activities and are the lifeline for many local economies, employing 59 million people in 2018 (SBA [2018](#), [2019](#)). In the wake of the COVID-19 pandemic, SMEs are greatly impacted through supply- and demand-side difficulties, such as limiting customer interactions, employee availability, as well as larger supply chain issues. Furthermore, microbusiness employers (i.e., those with fewer than nine employees) made up almost 75 % of all private-sector employers in 2016 and provided 10.3 % of private-sector jobs (BLS, 2018). Thus, the survey effort described herein intentionally strives to capture data from micro-sized businesses in addition to the general definition of SMEs to cover micro-, small-, and medium-sized enterprises (MSMEs)<sup>1</sup>.

The numbers are quickly evolving, but early predictions estimate that 30 million of the most vulnerable jobs are at an SME (Dua et al., 2020), with 7.5 million small businesses in danger of closing permanently (Powe and Wagner, 2020). Minority and immigrant-owned businesses are disproportionately affected (Fairlie, 2020). As COVID-19 conditions persist, the chances are high that populations around the U.S. will experience natural disasters (e.g., heat waves, floods, hurricanes, fire, and drought) during the period of virus transmission and into the period of recovery (e.g., Phillips et al., 2020). Small and medium-sized enterprises in areas vulnerable to these natural disasters and other extreme weather events (EWEs) are particularly noteworthy in the context of COVID-19.

Small and medium-sized enterprises benefit their local communities by providing local jobs, increasing the tax base, fostering community involvement, and providing diverse, locally sourced/made products and services. The COVID-19 pandemic has shone a spotlight on the economic importance of SMEs and their impact on communities across the U.S., from large cities to more remote areas. It has also highlighted their precariousness.

Although there are significant limitations posed by and devastating impacts of COVID-19 that will affect the U.S. and world economies for many years to come, the pandemic presents opportunities for research concerning complex event research. Researchers and practitioners have long advocated for multi-hazard planning solutions and the value of anticipatory adaptation (e.g., Grimm, 2013; Linnenluecke et al., 2012; Sahebjamnia et al., 2015; Spillan and Hough, 2003). Studying SMEs in areas prone to natural disasters and EWEs offers a chance to understand whether planning for one type of hazard may influence preparedness for a significantly different hazard: in this case, COVID-19. It also provides an opportunity to understand how impacts of one event compound with those of additional events to create different challenges and potential opportunities for resilience and recovery.

Despite the significance of SMEs to the U.S. economy, there is little information on how they plan for, respond to, or learn from pandemics (Burton et al., 2011; R. E. Watkins et al., 2008; R. J. Watkins et al., 2008). Existing research documents extremely low rates of preparation

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<sup>1</sup> Micro-sized businesses are covered under the SME definition by employee numbers. However, small businesses tend to have less difficulty than their micro business counterparts securing capital loans or credit lines as well as recruiting labor, as these firms tend to be seen as more financially solvent.

and response for previous pandemics (e.g., Rebmann et al., 2013; Terry, 2020; R. E. Watkins et al., 2008). Research focused upon SME resilience to natural disasters tends to be better established in the literature and offers relevant insights as to the response to and recovery of SMEs (e.g., Runyan, 2006; Torres et al., 2019). This research rarely differentiates micro-enterprises, which face unique challenges as a sub-set of small enterprises.

At the time of writing the researchers are not aware of any U.S. survey-based research with a focus on the experiences of SMEs dealing with complex events that arise from concurrent risks of natural hazards and pandemic conditions to date.

## 2. Relevance

There is a 99.9 % likelihood that 2020 will be among the five warmest years on record (NOAA, 2020a); May 2020 was the warmest May on record (since records began in 1880). This record-breaking level of heat is likely to place significant burdens on social and economic functions already highly affected by the COVID-19 pandemic. Additionally, NOAA forecasted an above-average Atlantic hurricane this season (NOAA, 2020b). Since COVID-19 was declared a National Emergency on March 13, 2020, there have been at least 18 natural disasters around the United States.<sup>2</sup> Furthermore, the alphabetical list of 21 Atlantic tropical storm names for 2020 was reached on September 18, 2020 (NOAA, 2020c).

Previous work on multi-hazard planning, generally, and for SMEs, in particular, has focused on the existence of a plan, opposed to the result of planning. This focus has led to limited understanding of how hazard planning and experience may influence a new hazard experience, either of the same hazard type or a different hazard type. In addition, this presents a potential opportunity to study complex hazard impacts of EWEs and a pandemic, in instances where: 1. SMEs are still recovering from past natural disasters, 2. SMEs experience a natural disaster during the pandemic impact phase; and/or 3. SMEs experience a natural disaster during the recovery pandemic recovery phase. This is important from the perspective of SME survival specifically, but also affects the recovery of the community of which the SME is a part.

There is utility in understanding multi-hazards that manifest as complex events from the concurrent pandemic and natural disasters. It should be noted that COVID-19 is characterized as a highly contagious virus and has become the source of a global pandemic (Indranil and Prasenjit, 2020). COVID-19 is the sixth global pandemic to occur since 2000; it is preceded by H1N1 in 2009, polio in 2014, Ebola in 2014, Zika in 2016, and Ebola 2019 (ibid.).<sup>3</sup>

As COVID-19 is unprecedented, even existing pandemic recommendations for SMEs may not have been enough to prepare for this particular event (Agility Recovery, 2019; CDC, 2017). Preparation recommendations reflect one set of social norms existing before the current pandemic while social media, news articles, and responses from local, state and federal governments demonstrate the varying pressures of businesses, schools, health officials, healthcare workers, and the general public. Businesses are adapting with new practices (e.g., moving retail online, changing to take-out dining), employee support (e.g.,

<sup>2</sup> This value is based on Presidentially Declared Disasters March 13-September 14, 2020.

<sup>3</sup> The WHO provides a disease outbreak news collection; the outbreaks relevant to the U.S. and U.S. territories is found here: <https://www.who.int/csr/don/archive/country/usa/en/>

advanced pay, unemployment application support), and responding to shifting norms in their local communities (e.g., closing without government prompting to prevent spread) (Huddleston Jr., 2020; Levenson, 2020).

## 2.1. Relevant Partnerships and Cooperation

The main audience for the survey results was envisioned to be federal partners and other entities that provide resilience-based assistance and guidance to SMEs. Data collected through this survey are meant to provide a basis for lessons learned for counterparts at appropriate federal agencies for them to frame and distribute SME-relevant guidance.

Data garnered via this survey instrument will also be used as baseline information for follow-up longitudinal data collection. It is extremely rare to study a disaster event during the impact period and to trace recovery on the individual entity level, especially in the face of compound risks.

To achieve this goal, counterparts at NOAA and other agencies reviewed the tool ahead of finalization. Additionally, a number of entities assisted in dissemination of the instrument to potential respondents. This is discussed in greater detail in Section 4.

There has been a great deal of Federal response to and tracking of business health since the start of the COVID-19 pandemic. In response, the U.S. Census Bureau developed the Small Business Pulse Survey (SBPS),<sup>4</sup> which ran weekly from April 26 to June 27, 2020. However, to the best of the authors' knowledge, there is not a national survey data collection based on the SME level that addresses planning for and response to complex events, especially those that arise from the intersection of natural disasters and COVID-19 effects.

Assistance efforts have come in the form of financial and technical support from entities such as the SBA, MBDA, the NYC office of Small Business Services, and the U.S. Chamber of Commerce Foundation. However, many entities that provide assistance ultimately do not have access to data on the types of actions a given SME may ultimately take and the extent to which this affects disaster impacts and recovery trajectories.

The current effort reported in this Special Publication was inspired by a NIST-NOAA collaboration started in late 2018 on a series of collaborative place-based interdisciplinary regional research survey efforts to assess the impact to SMEs and their recovery from natural disasters. These projects were developed collaboratively between NIST and NOAA's Regional Integrated Science and Assessment (RISA) Program and utilized in-person survey efforts, among other methods. -The RISA program supports regionally based, interdisciplinary science teams, that build knowledge, expertise and ability to plan and prepare for climate variability and change. The three main regional SME survey efforts include: 1. greater Charleston, South Carolina area conducted with the Carolinas Regional Integrated Science and Assessment (CISA), based in Columbia, South Carolina (see: Helgeson et al., 2020b); 2. the western Gulf Coast, with the Southern Climate Impacts Planning Program (SCIPP) and Texas Sea Grant, and 3. wildfire risk in the West with the

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<sup>4</sup> For more information on the SBPS, see: <https://www.census.gov/library/working-papers/2020/adrm/CES-WP-20-16.html>

California-Nevada Applications Program (CNAP). The efforts of the three teams were largely interrupted by the COVID-19 pandemic. As a result, these three longitudinal efforts continue at a regional level with changes made to the instruments and mode of data collection due to the complex events posed by the COVID-19 pandemic.

The survey presented in this report fills the need for a national-level snapshot of SMEs' responses to COVID-19 and the potential complex events posed by the combination of the pandemic and natural disasters.

## **2.2. Objectives**

This survey data collection is the first part of a planned longitudinal effort to address SME Complex Event Resilience. There are four interconnected objectives of the long-term effort. To document:

1. Novel resilience-based mitigation actions employed during the COVID-19 pandemic by SMEs,
2. Challenges in implementing resilience-based mitigation actions,
3. Use of past strategies and approaches to mitigate risks and adapt to the current situation, and
4. Planned resilience actions and strategies in the case of a complex event during the COVID-19 pandemic.

The effort is aimed at delivering relevant data to federal partners and other entities in providing guidance to SMEs on: 1. mitigation planning for natural disasters during the pandemic and 2. disaster readiness strategies to cope with disruptions from the pandemic.

An additional research goal is to advance best practices in data collection for SME resilience related to compound risks and complex events, especially under deep uncertainty.

## **3. Scope and Framing**

This first mixed-methods online survey addresses the following specific themes: 1. Past SME experience with natural disasters; 2. Current SME experience with COVID-19; 3. Current SME experience with natural disasters during the COVID-19 pandemic; and 4. Future plans to cope with COVID-19 and natural disasters.

The potential scope is broad given the extent of issues SMEs face in addition to addressing COVID-19 and/or natural disasters. This section describes the conceptual framing of the survey's assessment of complex events and provides background on terminology used to describe hazard types. It also provides an introduction to research surrounding SME mitigation and complex event planning to date.

### **3.1. Hazard Types**

Hazards are roughly classified as either natural disasters or human-caused disasters. Additionally, it is useful to differentiate between acute and chronic shocks and stressors, which can be associated with either a natural or human-caused disaster. Chronic events are recurring and often can be expected; they may include events such as seasonal flooding and the influenza season. Acute risks are associated with less predictable hazard events that occur less frequently. In some literature acute events are referred to as shocks (e.g., Marques, 2003; Kozel et al., 2008) and chronic events are referred to as stressors; however, for our framing, chronic events can manifest as a series of shocks that cause long-term stress. Furthermore, covariate events directly affect large numbers of SMEs in a given geographic region, while idiosyncratic events affect specific SMEs within a community. Though covariate shocks may be experienced broadly by a community, they may still be highly localized (e.g., depth of flooding at a given SME post-hurricane). COVID-19 is a unique covariate event because it has impacted the entire U.S. and the global business landscape; however, impacts and experiences of the pandemic vary greatly across regions and individual SMEs, e.g., due to background wellbeing circumstances, localized infection rates.

Table 1. Examples of covariate/idiosyncratic and acute/chronic shocks and stresses relevant to SMEs (*by source, not impacts or effects*)

	<b>Idiosyncratic</b>	<b>Covariate</b>
<b>Acute</b>	<ul style="list-style-type: none"> <li>● Death of a family member / employee</li> <li>● Illness</li> <li>● Loss of supplier(s)</li> <li>● Social exclusion/ discrimination</li> <li>● Crime/ violence</li> <li>● Theft</li> </ul>	<ul style="list-style-type: none"> <li>● Earthquake</li> <li>● Hurricane</li> <li>● Tornado</li> <li>● Dry spells/erratic rain</li> <li>● Market shock (price volatility)</li> <li>● Disease outbreak</li> </ul>
<b>Chronic</b>	<ul style="list-style-type: none"> <li>● Social exclusion/ discrimination</li> <li>● Long-term illnesses</li> </ul>	<ul style="list-style-type: none"> <li>● Drought</li> <li>● Climate change/variability</li> <li>● Land degradation</li> <li>● Community long-term health and economic wellbeing</li> </ul>

Natural disasters are naturally occurring physical phenomena caused by rapid or slow onset precipitating events that have the potential to cause loss of life and assets (Bokwa, 2016).

These type of events can be broken down as:

- a. Geophysical (e.g., Earthquakes, Landslides, Tsunamis and Volcanic Activity)
- b. Hydrological (e.g., Avalanches and Floods)
- c. Climatological (e.g., Extreme Temperatures, Drought and Wildfires)
- d. Meteorological (e.g., Cyclones and Storms/Wave Surges)
- e. Biological (e.g., Disease Epidemics and Insect/Animal Plagues)

Severe storms and floods are the most common types of natural disasters reported in the United States. These meteorological events are occasionally preceded by presidential “emergency declarations” requiring state and local planning prior to the event, such as evacuations and protection of public assets; however, these declarations typically occur post-event.

Human-caused disasters include events caused by humans and are often results of environmental or technological emergencies, which may occur along various temporal scales. These types of events tend to be broken down as:

- a. Environmental degradation (e.g., Pollution)
- b. Accidents (e.g., Industrial, Technological, and Transport)
- c. Acts of terrorism (e.g., Breaches of cybersecurity)
- d. Incidents of mass violence

As with natural disasters, these types of traumatic events may also cause loss of life and property at the individual and community scales. Additionally, human-caused disasters may prompt evacuations in the affected communities.

Infectious disease disasters are events that involve a biological agent/disease and that result in mass casualties, such as a bioterrorism attack, a pandemic, or an outbreak of an emerging infectious disease. A pandemic is an epidemic of infectious disease that has spread across a large region (CDC, 2012), which can occur in a human and/or animal population and may affect public health and disrupt services, leading to social and economic costs. Pandemic emergencies tend to share components of both natural and human-caused disasters (Rebmann et al., 2013).

For the purposes of this survey the researchers focus upon natural disasters and the COVID-19 pandemic.

### **3.2. Complex Events and Associated Risk Types**

The impacts of COVID-19 will affect the ability of practitioners and communities to prepare for, cope with, and respond to natural disasters, including EWEs. In particular, in many ways



COVID-19 may amplify or exacerbate risks to SMEs associated with a wide range of natural hazard types, as well as affect SMEs owner/managers' option set of practical strategies to mitigate associated risks. Complex events can result from multiple hazards, often through a complex combination of both natural and human-made causes.

Pescaroli and Alexander (2018) propose a holistic framework that highlights the complementarities of four risk types (i.e., compound, interacting, interconnected and cascading risks). Herein, we are interested in complex events precipitated by compound and/or cascading risks; we take concurrent risks to be a subset of compound risks. Operating in a multi-risk environment with slow- and rapid-onset disasters, persistent stressors, and economic shocks requires taking a whole-system approach to analyzing complex events that arise from compound and/or cascading risks.

Compound risks describe combinations of multiple drivers and/or hazards that contribute to societal, ecological, and economic risks. Compound risks materialize in concurrent or successive extreme events. Compound weather and climate risks describe combinations of multiple climate drivers and/or hazards that contribute to societal and/or environmental risk (Zscheischler et al., 2020) and tend to have a multiplier effect on the risk posed to society, infrastructure, and the environment. Concurrent events occur simultaneously, i.e., on the same day and in the same region (Leonard et al., 2014; Liu and Huang, 2015). Whereas successive events occur in succession; in particular successive events might include occurrence of a natural disaster during the recovery phase related to another unrelated event.

Concurrent and successive events can be disentangled in terms of their initial spatial or temporal characteristics. However, concurrent events likely converge at a point spatially or temporally, to create disruption that may be greater than the sum of its parts. For example, we posit that concurrent events are often realized when there is an ongoing adverse stressor, which is then met by a more acute shock to the system. By this definition, an SME dealing with medium- or long-term COVID-19 effects that experiences a natural disaster would experience a concurrent extreme event.

Hazards that are sourced from, triggered by, and/or influenced by preceding hazards are defined by cascading risks. Complex events arising from cascading extreme weather risks, such as droughts and heatwaves, are becoming increasingly common; Mazdiyasni and AghaKouchak (2015) found that in the U.S., week-long heatwaves that set-off a cascading period of drought are twice as likely at present than in the 1970s.

For this survey we focus upon complex events and the effects that arise from natural disaster occurrence(s) during SMEs responses to the COVID-19 transmission period.

Although COVID-19 and potential natural disasters originate from separate causes, their impacts may coincide spatially and temporally adding an additional layer to current theorizing around preparation, response, and recovery in this category of spatially concurrent (related or unrelated) hazards. It is very likely that a number of natural disasters will continue to occur during the period of virus transmission and into the period of recovery (Phillips et al., 2020), resulting in complex events. Many of these natural disasters and EWEs will arise from cascading risks as well. Consideration for the potential for complex events is made in the survey. Additionally, the survey recognizes deep uncertainty around the probability distributions and how to weigh and value desirable alternative outcomes.

### 3.3. SME Mitigation and Planning

Most studies of SMEs observe heterogeneity across small businesses, across sectors without consideration for the structural financial background of a community. Farrell et al. (2019) found that small business cash liquidity and profitability were correlated with other community-level indicators. Furthermore, 47 % of their urban sample had two weeks or less of cash liquidity in the case of an emergency (ibid.).

Previous research on SME preparation and mitigation has largely focused on outcomes post-event impact and recovery from natural hazards (Runyan, 2006; Torres et al., 2019). Helgeson et al. (2020b) provides a brief review of the literature related to factors studied in relationship to business recovery following natural hazards. Despite the significance of SMEs to the communities of which they are a part and the U.S. economy at large, there is little information on how they plan for, respond to, or learn from pandemics (Burton et al., 2011; R. E. Watkins et al., 2008; R. J. Watkins et al., 2008). Existing research documents extremely low rates of preparation and response for previous pandemics (Rebmann et al., 2013; Terry, 2020; R. E. Watkins et al., 2008). Related research on SMEs and natural hazards is better established and offers insight into preparation, recovery, and social learning. However, it remains unclear the extent to which lessons learned from past planning and experience with past events may translate across domain types (i.e., natural hazards and pandemics). Furthermore, tactics that address a single event may not work in an environment of complex events.

Risk mitigation strategies are actions that SMEs plan/take to reduce or eliminate adverse impacts of known or perceived risks; a risk contingency plan gets an SME “up and running” if a disaster event comes to pass. In order to minimize the effects of potential disruptions, businesses need to implement actions that enable them to sustain operations during and after disasters (Tang, 2006). These mitigation strategies are pre-disaster proactive planning actions that aim to build resilience capacity so that business interruption can be avoided or minimized (Chopra and Sodhi, 2004; Tang, 2006). Ideally, mitigation strategy planning should be complemented with an analysis of short-run cost savings and long-run profitability (Chopra and Sodhi, 2004; Manuj and Mentzer, 2008).

The option set of potential mitigation strategies relevant to a given SME depends on the type of risk involved, e.g., acute or chronic, singular or complex. For example, Wedawatta and Ingirige (2012) observed that in the context of persistent flooding, SMEs implement different property-level mitigation measures as well as more generic business continuity/risk reduction measures to achieve a desired protection level (e.g., delaying supply orders, increased insurance). However, many measures that are relevant to flood mitigation are not relevant to SME COVID-19 response (e.g., CDC, 2020), but adopting more generic business continuity tactics already in place may help in the context of COVID-19.

While the primary motive of SMEs may be to keep down costs, minimize disruptions, or increase sales, there are a number of additional factors that influence relevant decisions. These may be categorized as firm-internal factors and business-external factors. Examples of internal factors include, but are not limited to: salience of the risk(s) and potential outcome(s), business management structure, business capacity, and information availability.

External factors include: market drivers, business drivers, policies, availability of assistance. In the case of COVID-19, the designation of some businesses as non-essential and the limits placed on them is an example of a highly limiting external factor.

Generally, a natural disaster onset period lasts for a finite period, from a few minutes in the case of earthquakes to days for wildfires and hurricanes, or weeks for acute flooding. It is not clear as to whether or not the COVID-19 pandemic is categorized as an acute shock or a chronic stressor. It shares attributes of both types, as it largely began as a shock and has become a stressor and additionally has largely redefined social norms that affect the context in which SMEs operate (e.g., social distancing).

As the COVID-19 transmission period continues, SMEs will likely employ a variety of coping strategies, from reducing current consumption to disposing of productive assets. These latter strategies are especially worrisome, as they may reduce the capacity of the SME to generate income in the future, possibly leading to non-resilience. The concepts of sustainable and unsustainable adaptation decisions are relevant (e.g., Crick et al, 2018). Sustainable adaptation is aimed at business preservation and does not preempt full recovery in the future. Unsustainable adaptation results in temporary (and sometimes permanent) contraction in business activity. To the best of the researchers' knowledge, SMEs' coping capacity—planned and actualized – against complex events is little researched.

Previous work on multi-hazard planning has generally focused on the existence of a plan and not on the result of planning. This focus has led to limited understanding of how hazard planning and experience may influence a new hazard experience. In addition, this presents a potential opportunity to study complex event impacts of a natural disaster and pandemic. Literature has discussed the need to address compound and cascading natural and technological hazard risks with effects or causes originating from an initial hazard (Cutter, 2018). There may also be multiple overlapping stressors that do not originate from the same hazard (Clarke et al., 2018). Although COVID-19 and natural hazards originate from separate causes, their impacts could coincide spatially and temporally adding an additional layer to current theorizing around preparation, response, and recovery in this category of spatially concurrent (related or unrelated) hazards and SME coping decisions. A post-event analysis cannot capture the impact of chronic exposure to catastrophic events in that area. Absent adaptive behavior, each disaster can render the SME more vulnerable to the next.

#### **4. Sampling Procedures**

Due to the common constraints of SME disaster research, such as demise and difficulties tracking businesses, previous studies that looked at business and disaster recovery took place in-person and tended to use convenience or representative samples, as opposed to a randomized sampling strategy (e.g., Corey and Deitch, 2011; Lam et al., 2012; LeSage et al., 2011). The longitudinal recovery business survey conducted in Lumberton, NC (Xiao et al., 2020) and the SME business survey post-Hurricane Irma, accounting for covariate high-tide flood events (Helgeson et al., 2020b) provide two examples of business studies that follow a random sampling approach.

#### 4.1. Sampling Unit and survey respondents

Respondents to the survey include owners, managers, or other senior business staff of a business<sup>5</sup> at a single, given geographic location. Previous research suggests that interviewing owners and managers provides the appropriate level of analysis to understand business culture; however, selecting this group of respondents relies upon the belief that there is reasonable interorganizational communication (e.g. knowledge of employees missing work due to flood impacts) (Augier and Teece, 2009; Grinyer and Spender, 1979; Schindehutte and Morris, 2001).

#### 4.2. Survey Mode

Given the limitations faced due to the social distancing requirements of COVID-19, the survey was conducted entirely online using an internet-based survey instrument. Internet-based surveys are one of the most predominant survey types due to ease of use, cost, and rapid response times (Lavrakas, 2008). This choice of mode directed the sampling approaches employed. It should be noted that internet-based surveys can be subject to significant bias resulting from under coverage and nonresponse. Not all SMEs have access to the internet, and there tends to be significant demographic difference between those who do and do not. The online survey was scripted in a manner that made it accessible (i.e., readable) on computers, tablets, and smartphones.

There were two complementary sampling approaches undertaken to obtain the total sample for this survey. A random sampling technique was used for the initial sample selection and convenience sampling was used to augment the initial sample. Office of Management and Budget (OMB) clearance was provided for up to 1500 complete responses<sup>6</sup> to be collected through the survey with the average time estimated to complete the survey set at 15 minutes.

#### 4.3. Random Sample: Sectors and Locations

The sampling frame<sup>7</sup> for this initial collection was SMEs in counties prone to natural hazards in 28 U.S. states. These states were selected by researchers in collaboration with federal partners as representatives of the U.S. census regions, NOAA climate regions, and FEMA disaster regions.<sup>8</sup>

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<sup>5</sup> Although a firm is usually referred to in the literature as a corporation or large enterprise with multiple business locations, here we use the terms “firm”, “business,” and “organization” as synonymous.

<sup>6</sup> A complete response is defined as at least half the questions answered in the survey.

<sup>7</sup> The frame population is that portion of the target population which the survey materials or devices delimit, identify, and subsequently allow access to (Wright and Tsao, 1983).

<sup>8</sup> U.S. census regions: [https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us\\_regdiv.pdf](https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf)  
NOAA regions: <https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-regions.php>  
FEMA regions: <https://www.fema.gov/about/organization/regions>

The contact information for U.S. businesses was obtained from USBizData™. Each record in this list provided information on a business name, business physical address, a specific contact at the business, role of the contact within the business, business email address specific to the identified contact, Standard Industrial Classification (SIC) code and other business characteristics (e.g., number of employees).

Email addresses were verified independently using the MillionVerifier Tool™.<sup>9</sup> The data was then filtered by number of employees, counties, Standard Industrial Classification (SIC) code, and the position of contacts. The geographic regions of interest were initially determined through an attempt to obtain data for all FEMA Emergency regions and NOAA climate regions. The four high-level Census geographic regions were ultimately used given common use of Census level data to pair with data obtained through surveys. Table 2 provides the states included in the sample by region area.

Table 2. Sampled states by Census, NOAA, and FEMA regions

State	Census region	NOAA region	FEMA region	Natural hazard types <sup>a</sup>
AK	West	Not classified	10	Severe storm, flood, earthquake
AL	South	Southeast	4	Severe storm, hurricane
AZ	West	Southwest	9	Flood, fire
CA	West	West	9	Flood, fire, severe storm
DE	South	Northeast	3	Hurricane
FL	South	Southeast	4	Hurricane, severe storm
GA	South	Southeast	4	Hurricane, severe storm
IA	Midwest	East north central	7	Flood, severe storm
ID	West	Northwest	10	Flood, fire, severe storm
IL	Midwest	Central	5	Flood, severe storm, freeze
IN	Midwest	Central	5	Severe storm
LA	South	South	6	Hurricane
MA	Northeast	Northeast	1	Hurricane, snow
MD	South	Northeast	3	Hurricane, severe storm
MI	Midwest	East north central	5	Snow, flood, drought, severe storm
MO	Midwest	Central	7	Severe storm

<sup>9</sup> MillionVerifier™ is an online email verification tool that checks email syntaxes and servers DNS and creates an SMTP connection with the recipients' server to find out if the email accounts exist. The tool is accessible from <https://www.millionverifier.com/>

MS	South	South	4	Severe storm, hurricane
NC	South	Southeast	4	Hurricane
NM	West	Southwest	6	Fire, flood, severe storm
NV	West	West	9	Fire, severe storm, snow, flood
NY	Northeast	Northeast	2	Severe storm, snow, flood
OR	West	Northwest	10	Severe storm, costal storm, fire, flood
SC	South	Southeast	4	Hurricane
TN	South	Central	4	Severe storm
TX	South	South	6	Hurricane, severe storm, fire
UT	West	Southwest	8	Flood
VA	South	Southeast	3	Hurricane, flood
VT	Northeast	Northeast	1	Severe storm, snow

<sup>a</sup> Source: <https://www.adt.com/natural-disasters/declaration-analysis>

Counties prone to natural hazards within 28 identified states across the U.S. were identified using the SHELDUS<sup>TM</sup> database, which lists counties for each state that suffered losses due to thunderstorms, hurricanes, floods, wildfires, and tornados from 1960 to the present. All counties that experienced a natural disaster at least once since 1960 were selected. As is the case with covariate disasters, though a county is prone to a natural disaster, the relative impact at a given SME location may differ from business to business. However, it is assumed that a given SME in a location prone to a natural hazard or EWE will be more likely to have an emergency plan or have considered business interruption mitigation options. In this survey we are interested in SMEs that have actively planned for resilience in the past and those that have experienced a natural hazard, as well as the intersection of these two sets.

Raw data SIC codes provided by USBizData<sup>TM</sup> were translated to corresponding North American Industrial Classification System (NAICS) codes. SMEs focused in the construction, manufacturing, and retail industries were targeted, for which the six-number NAICS codes begin with the following two-digit codes: 23, 31-33, and 44-45, respectively. Additionally, the NAICS sector 56, Administrative and Support and Waste Management and Remediation Services, was sampled to account for SMEs that support routine operation activities of other organizations.

A point of contact (POC) was identified for each company, at a given locations. Records with the same parent company with multiple locations listed were treated as individual entities. For SMEs with multiple record contacts at a given location, high priority was given to business owners and then presidents, vice presidents, executive officers, directors, and managers. Small and medium-sized enterprises with no more than 100 employees at a single site were selected to be contacted initially, as the researchers sought to maintain a focus on small and micro-sized businesses in this research. The researchers then drew a random sample of approximately 1000 SMEs per state to contact.

An introductory email letter was sent to the determined POC for each SME location in the sample. The letter was directed to the individual with the unique SME name and the POC’s name used. This cover letter invited participation in the survey and described the goals of the research, described consent (and its revocation process), how collected data will be used, and promised anonymity. Additionally, the OMB clearance statement was presented. A sample of this letter is provided in Appendix B. The presented letter differed across states; each state was provided a unique survey link. In this manner when later clean collected data that state could be replaced if it was not initially provided.

#### 4.4. Convenience Sample

A non-probability (i.e., convenience) sample was used as a secondary source of data collection; these respondents answered an identical survey. However, this approach expanded responses to the same overall geographic regions as those used in the random sample, but respondents could also be from states that were not explicitly targeted in the initial sample. Additional sectors were also covered. This information (i.e., state and sector) was collected in the survey itself and provides a more robust understanding of patterns by region and sector.

Furthermore, this supplemental sampling allowed for leveraging the networks of other federal agencies and entities that were specifically interested in survey findings. Networks were selected because of their specific interested in the confluence of EWEs, climate, and resilience, and include relationships with SMEs. Twitter messages and Facebook posts were the main methods of dissemination. Direct emails and newsletters were also used for dissemination of the survey links. For this sub-sample survey links were provided specific to the entity by which the survey was disseminated. Thus, the researchers could trace the source of a response, but not assume the location (i.e., state) of respondents. Additionally, a single use Spanish language direct translation was provided at the request of the U.S. Minority Business Development Agency (MBDA); this version is available in Appendix C. Table 3 provides an overview of the networks leveraged for outreach to potential SME owner/manager respondents. This list accounts for those of which the researchers are aware, but is likely not exhaustive. Additionally, local Chambers of Commerce were made aware of the survey effort and asked to consider promoting to their constituents.

Table 3. Networks and the associated methods of dissemination

Network	Method of dissemination
Minority Business Development Agency	Email communication
NIST	Twitter / Facebook
NOAA Sea Grant Network	Email communication

NYC Department of Small Business Services	Twitter
RISA Network, NOAA	Email communication
U.S. Chamber of Commerce Foundation	Email newsletter
U.S. Small Business Administration	Twitter / Facebook
Weather Ready Nation, NOAA	Email communication

#### 4.5. Caveats

It is not ideal to depend upon different sampling strategies; however, the expected benefits outweigh the potential negatives. Surveys conducted online tend to have well known limitations regardless of sampling strategy. Conducting surveys, as in all forms of data collection, requires making compromises. Specifically, there are almost always trade-offs to be made between the amount of data that can be collected and the accuracy of the data collected.

In particular, in the survey protocol described here, surveys were subject to the relationship between the sample and the population being unknown. For example, there is constant attrition of SMEs and some researchers suggest that checking social media, such as Yelp, is the most precise way to determine SMEs the go out-of-business, especially during COVID-19. As such, there is no theoretical basis for computing (or reporting) a margin of sampling error and thus for estimating how representativeness of the sample.

The researchers designed the data collection using various weblinks to the same survey, as to control for the source of respondents to the extent possible. Thus, in future analysis the researchers can make statistical checks as to whether the data collected through a probabilistic sample differs from that collected via the convenience sample method.

The relative benefits of a large opt-in sample was important for this work in particular as it is meant to form the baseline for a longitudinal series of data collection from those who continue to opt in to future potential data collections, both quantitative and qualitative in nature. Furthermore, by including both sampling strategies, the project is able to address broader SME trends, while ensuring that reflections from stakeholders of federal and other partners are represented to the extent possible.

### 5. Survey Sections and Data Types

Survey sections were not titled/named in the survey viewed by respondents online, but are used for reference purposes in this discussion and between researchers during the survey development and data analysis. At the start of each section, there is a brief description in each



section for the respondent to understand the type of questions to follow. For the most part question responses are close-ended; however, in a number of places there is space for open-ended responses, especially when the option “other” is chosen.

Below a brief description of each specific survey section is provided in the order they appear in the survey along with the questions within the given section. The full survey is provided in Appendix A.

All questions on the survey were optional; the respondent could skip any single or combination of questions. Additionally, there was some skip-logic incorporated within the survey. Thus, not all respondents were asked to answer all questions.

## **5.1. Type of Data Collected**

Measuring resilience often relies on both objective and subjective measures. Objective measures are directly observable data related to a shock or stressor. Some examples include rainfall data and infrastructure/assets lost; generally, they can be standardized and are widely acceptable.

Small and medium-sized enterprises and communities experience shocks and stresses differently; subjective measures capture these unique perceptions and experiences. Additionally, at the individual entity level, objective measures can be challenging to obtain during and immediately following a disaster, acute or chronic. Subjective measures depend upon self-reported qualitative and quantitative survey data. These tend to be less standardized than objective measures, but focus on events experiences, perceived severity, recovery ability, and coping strategies. Through development of scales and detailed response guidance subjective questions (e.g., close-ended questions) can be increasingly standardized.

Subjective measures can be used as substitutes for objective measures or as complements to objective measures as a means to provide an alternative perspective. Typically, subjective measures may include more bias, but they capture unique personal experience and perceptions that may provide insights into subsequent behavior.

There is data collected that is objective in nature throughout the survey, such as the types of natural hazards the business has experienced in the past. However, these data are all subjective in the sense that they are subject to self-reporting. In the case of the randomly sampled sub-sample certain characteristics, such as geographic region can be independently objectively confirmed.

The measures presented were developed by the research team to address the stated research objectives (Section 2.2), leveraging best practices in the literature and past survey efforts to address natural disaster resilience and recovery (e.g., Helgeson et al., 2020b; Xiao et al., 2020).

## **5.2. Opening Screen**

The opening screen of the survey reiterates information that was provided in the Invitation to participate for the randomly selected subsample, discussed in Section X. Since the subsample garnered using convenience sampling did not receive a personal invitation to participate, it is

important that all relevant information about what is being requested of the respondent and participation consent is fully understood. This front matter provides an overview of the data collection goals and indicates how the respondents' information will be used.

Furthermore, it is good practice to acknowledge the challenges COVID-19 and response is hoisting upon SMEs. Furthermore, as with most events that affect not only the SME, but also potentially the household of the owner/manager and the wider community at large, COVID-19 is no doubt creating worry for the respondent in many realms of their life, both professional and personal. Thus, the researchers were certain to acknowledge the value of the respondents' time and acknowledge their potential concerns for their business.

This front matter provides some directions for how the respondent should interact with the survey should they opt to participate, with a reminder that participation is voluntary. For example, it indicates that the respondent should answer from the perspective of only one business location (i.e., street address location), should their firm have multiple. The OMB Control number is clearly provided. The researchers provide a clear point of contact (POC) at NIST should the respondent need additional clarification or have questions or concerns. The screen reads as though it is a letter from the NIST POC which makes it a more genuine invitation for the respondent to engage.

### 5.3. Opening Section

The opening survey section has two questions. These questions serve as scanning questions. First, the researchers control for the role of the respondent in the business for which they are providing information. Secondly, the size of the business, as measured by the number of employees at the location for which the respondent is answering, is recorded.

1. What is your role with the organization? (check all that apply)

- Owner
- Manager
- Assistant manager
- Senior employee (5+ years at the business)
- Employee
- I do not have a formal role
- Other [please specify]

2. How many full-time AND part-time individuals did your business employ at this location at this time last year?

- 1-5
- 6-10
- 11-20
- 21-50
- 51-100
- 101-150
- 151-200
- 201-250
- More than 250

#### 5.4. COVID-19 Impact and Adaptation Section

This is the first substantive section of the survey which asks the respondent to reflect on the situation of the SME, which they are representing, specific to experiences with COVID-19 to date. Since respondents were a broad set of SMEs from around the U.S. and faced different background risks and past disaster experiences, the brief directions in this section provides broad framing for the COVID-19. The respondent is reminded of the date that COVID-19 was declared a National Emergency and directed to answer for the period since that date. In this section the number of options that a respondent may select for a given close-ended question is not limited since they are not mutually exclusive option sets.

As a control for later analysis, the respondent is asked as to whether their SME is classified as essential or not. They are asked about changes to daily operations that are primarily related to the goods and services provided by the SME. They are furthermore asked to assess impacts on operations that may or may not be related to the daily operational changes (or lack thereof), on both the supply- and demand-sides. The decision-making process is traced by asking about how the SME made any decisions to (temporarily) close, change hours, or make staffing changes, in particular. This is focused upon a set of answer options that cover both internal and external factors from the perspective of the SME. The respondent is asked to indicate their trusted sources of information about COVID-19. The sources of external support (e.g., funding sources) sought by the SME are asked. Answer options include the SBA's Economic Injury Disaster Loan (EIDL) (SBA, 2020a), designed to help businesses cover operating expenses (e.g., rent and health care benefits) and the Paycheck Protection Program (PPP) (SBA, 2020b), which incentivized businesses to keep employees on staff by turning loans into grants if most of the money went to payroll.

Finally, the respondent is presented with a set of adaptation/coping strategies that may have been enacted since the pandemic began and asked to indicate if their SME has used any.

*This survey section asks about direct effects of COVID-19 (coronavirus) on your business.*

*The COVID-19 Pandemic was declared a National Emergency on March 13, 2020. Please answer the following questions considering the period since then.*

3. If there were any public health restrictions (e.g., stay-at-home orders, movement limitations, limits on public gatherings, or requirements for social distancing), is/was your organization designated as:
  - Essential
  - Non-essential
  - Some segments were essential, some were not
  - Not sure/don't know
  
4. How has the COVID-19 pandemic impacted the *continuity/stability* of your day-to-day operations?  
*Please check all that apply*
  - a. Closed to the public
    - i. Less than 1 week
    - ii. 1-2 weeks
    - iii. 2-4 weeks
    - iv. 4 weeks or longer
  - b. On-site operations ceased (or were greatly reduced), but remaining staff teleworked

- c. Reduced days/hours of operation
- d. Increased e-commerce
- e. All staff worked from home
- f. Remained fully open to the public
- g. Added services to business (e.g. contactless pick-up, delivery, etc.)
- h. Other (please specify) \_\_\_\_\_

5. How has the COVID-19 pandemic impacted the *operations* of your organization since March 13<sup>th</sup>?

	For one week or less	For 1-4 weeks	For more than 4 weeks
Stopped operations due to external mandate			
Stopped operations due to financial issues			
Decrease in revenue			
Increase in revenue			
Problems with my supply chain/receiving or shipping inventory			
Issues with delivery of products to customers			
Decrease in customers			
Increase in customers			
Other			

6. What are the most important factors that influenced the choice to temporarily close, change hours, or staffing changes? (Please select no more than 5)

- National State of Emergency
- Stay/Local stay-at-home orders
- Restricted access to the business – by local order
- Employee safety
- Lack of customers
- Disruption to supply/inventory delivery
- Universities and school closings
- Nearby businesses closed
- Local government information/suggestion
- Fear/concerns of infection (self, employees, customers, and/or suppliers)
- Lack of personal protective equipment and/or cleaning supplies
- Staff's unwillingness to report for work
- Media coverage
- Tight business margins
- N/A
- Other (please specify) \_\_\_\_\_

7. Please select your most trusted sources of information for COVID-19 (Please select no more than 5)

- Local TV news
- National TV news
- Internet-based news media
- Local government (state or municipal)
- Community leaders
- Radio
- Internet sources (outside of news outlets)
- Faith-Based community
- Friends/family
- Social Media
- Cellphone apps
- Center for Disease Control and Prevention (CDC)
- Sectoral/Trade news
- Other Federal Government sources
- Other (please specify) \_\_\_\_\_

8. Since March 13, 2020 has your business REQUESTED/PLANNED use of any of the following financial assistance? (check ALL that apply)

- SBA Paycheck Protection Program (PPP)
- SBA Economic Injury Disaster Loans (EIDL)
- SBA Debt Relief
- USDA Loan Programs
- Other Federal Programs
- State and Local Government grants/loans
- Banks (commercial loan)
- Banks (e.g., existing debt flexibility – payment deferments)
- Personal liquidity (savings)
- Family and Friends
- Crowd-funding
- Postponement in payment (rent, utilities)
- Faith-based group support
- Non-profit organization support
- Insurance (for business interruption)
- Direct lending (e.g., Venture capital, angel investors, Fintech)
- This business has not sought financial assistance from any source
- Unsure
- N/A (19)
- Other (please specify) \_\_\_\_\_ (20)

9. Please describe any changes your organization has made to adapt during the COVID-19 pandemics since March 13th. Please check all that apply.

- Changed products produced/offered to consumers
- Offered contactless pick-up or delivery
- Increased e-commerce
- Curb-side pick-up made available
- Prioritized inventories to some customers
- Reallocated products based on inventory levels
- Increased staff

- Reduced staff
- Allowed employees (some or all) to work remotely
- Negotiated longer payment terms for suppliers so the company can keep its cash longer
- Collected money owed from customers as early as possible
- Renegotiated current and future prices with my suppliers
- Exchanged resources or information with other organizations
- Implemented short-term alliances with my suppliers and/or competition
- Other (please specify): \_\_\_\_\_

## 5.5. Natural Hazard Section

This section asks the respondent to indicate past experiences that the SME may have with natural hazards; the respondent may select multiple hazard types. These experiences may include thinking about these types of events without direct experience, i.e., experience with considering perceived risks. List of event types are consistent with those identified by NOAA's Weather Ready Nation (WRN). Mitigation and preparedness actions that relate to the types of natural hazards indicated in the survey are presented and the respondent is asked to indicate all they have taken in the past. The respondent is asked whether any such actions have been useful in the context of addressing COVID-19 to date. Finally, the respondent is asked to indicate if they expect COVID-19 to impact future planning for natural hazards.

The researchers control for those SMEs that may have experienced a natural disaster since the start of the COVID-19 pandemic using skip-logic to understand response to such an event.

This section asks you about risks from natural hazards that your organization faces. We are interested in your organization's experience in the past and planning for them in the future.

10. What natural hazard(s) is/are of greatest concern for your organization's location? (select all that apply)

- Coastal storms
- Drought/water scarcity
- Earthquake
- Extreme cold
- Extreme heat/heat waves
- Flooding
- Hurricane
- Storm surge
- Tornado
- Tsunami
- Wildfire
- Winter storms
- None
- Other (please specify): \_\_\_\_\_

11. Since March 13th, 2020 has this/these event type(s) occurred at your location?

- Yes, with severe impacts
- Yes, with minor impacts
- No
- Don't know

o N/A

12. [if 11=yes] Was your organization's response to this event affected by COVID-19?

- o Yes,
- o No
- o Don't know

13. How many of these natural hazard events have affected\* your organization in the **past 10 years**? An estimate is fine [slide bar answer response] \*caused at least a one-day closure

14. What type of mitigation/preparedness actions have you taken in the past (before COVID-19) to prepare your organization against natural hazards?

- o Floodproof building(s) - permanent (e.g., flood gate)
- o Floodproof building(s) – temporary (e.g., sand bags, boarding doors)
- o Secure a secondary storage location
- o Assess building to ensure construction meets building code standards
- o Perform risk assessment to identify business vulnerabilities (to specific hazards)
- o Adopt strategies to stay informed of weather watches and warnings (e.g., NOAA Weather Radio, commercial apps)
- o Assigned disaster responsibilities (i.e., emergency management function) to specific employees
- o Perform safety drills regularly (e.g., shelter-in-place, evacuations, telephone tree)
- o Develop a written emergency action plan/checklist
- o Back-up all important documents (digitally or stored at secondary location)
- o Lift inventory and other supplies off the ground to prevent water exposure
- o Perform an insurance check-up to ensure adequate insurance coverage
- o Increase insurance coverage, if needed
- o Develop/update telework plans
- o Establish or increase remote/online sales capacity
- o Social media account use to provide operations information to the public (e.g., closings)
- o Minimize supply chain vulnerability through multiple source strategies
- o Develop a connection to local emergency management officials
- o Clear debris/dry vegetation away from structures
- o Back-up power generation
- o Maintain/tune-up equipment for debris/snow removal
- o Keeping an emergency fund ("rainy day" money on-hand)
- o None
- o N/A
- o Other (please specify): \_\_\_\_\_

15. Have actions taken by your organization to prepare for natural disasters in the past helped prepare/cope with the impacts of COVID-19?

- o No
- o Do not know
- o N/A
- o Yes, please specify (e.g., insurance purchases, teleworking experience, emergency supplies or finances, etc.) \_\_\_\_\_

16. Will your planning for these types of natural hazards change in the future due to the COVID-19 pandemic?

- o No
- o Do not know
- o N/A
- o Yes (please specify): \_\_\_\_\_

## 5.6. Attitudes Section

This section asks the respondent to consider their SME's future plans, in the context of COVID-19 response, as well as short-, medium-, and longer-term concerns that may combine with COVID-19 impacts to create a complex event. In the first question in this section a number of detailed categories are listed under the following broad categories: compound events, financial and market concerns, COVID-19 specific concerns, workforce concerns, consumer concerns, and global concerns. These category titles are indicated for the ease of the survey developers and researchers, but are not provided to respondents. Respondents are asked to indicate if their SME has taken steps to address these concerns and if they feel that they have the resources (both financial and nonfinancial) to do so.

Respondents are asked to estimate the amount of time that will pass before the SME returns to pre-COVID operations.

This section asks about your organization's future plans.

17. Please select your organization's top concerns regarding the impact of and recovery from COVID-19. (Please select up to 5, below)

**o Compound Events**

- o Hurricane risk and potential impacts
- o Flood risk and potential impacts
- o Earthquake risk and potential impacts
- o Wildfire risk and potential impacts
- o Tornado risk and potential impacts
- o Other natural hazard risk and potential impacts

**o Business Financial, Market Concerns**

- o Financial impact on operations, and/or liquidity, capital
- o Going out of business
- o Lower productivity
- o Domestic supply chain disruption
- o Loss of funding (governmental and non-profit organizations)
- o Operational issues associated with restarting
- o Loss of market share
- o International supply chain disruptions

**o COVID-19 Specific Concerns**

- o The duration of lock-down and quarantine period
- o Uncertainty over recurring COVID-19 outbreaks in the future
- o Safety/contamination issues from shutdown infrastructure (e.g., water sitting in pipes)
- o Safety/contamination issues from working with reopening during social distancing

**o Workforce Concerns**

- o Workforce safety to protect employees from infection
- o Workforce reduction concerns
- o Rehiring, replacing, and retraining workforce upon reopening

**o Consumer Concern**



- Decreased consumer confidence and spending
- Global Concerns**
  - Global recession
  - Impacts on tariff and trade issues
  - Increased international political controversy
- None
- Other (please specify): \_\_\_\_\_

18. Have you implemented steps to reduce your risks to the issues you indicated above? If yes, how?

- \_\_\_\_\_
- Yes, already implemented
  - Yes, in the process of implementation
  - Yes, planning to implement
  - No, but would like to learn more
  - No, do not plan to do so
  - Unsure

19. Do you feel you have the resources you need to protect your business against the risks you identified above?

- Yes
- No
- Unsure

20. [if 19=no] What resources, knowledge, or support do you feel you need to be better protected against the risks you identified ?

21. How much time do you think will pass before this business returns to its pre-COVID conditions(e.g., operations)? [slide bar or multichoice?]

- 1 month or less
- 2-3 months
- 4-6 months
- 6-12 months
- 12-18 months
- More than 18 months
- Unlikely to resume operations at that level
- Unlikely to reopen at all
- Do not know
- Other (please specify): \_\_\_\_\_

## 5.7. Business Information Section

This section asks the respondent to provide more detailed information about the SME on whose behalf they have responded to the survey. In particular, the business sector, founding year, geographic location, and ownership structure are asked. The importance of particular groups to SME recovery is asked as a way to provide insight as to the connection to different groups and the community embeddedness.

Four attitudinal questions are posed about COVID-19 and its relative impact on the SME, asking for levels of agreement. Finally, to control for experience, the respondent is asked to indicate the number of years they have acted as a business owner or manager.

This section asks you to provide some details about your organization and yourself.

22. Which sector best describes your business?

- Construction
- Manufacturing
- Retail trade
- Accommodation and Food Services
- Wholesale trade
- Transportation and Warehousing
- Finance and Insurance
- Information (e.g. radio, newspaper, television, telecommunications)
- Real estate, rentals, and leasing
- Professional, scientific, and technical services
- Health and medical services
- Arts, Entertainment, and Recreation
- Food processing, agriculture
- Natural resource management
- Fuel production
- Fishing/aquaculture
- Other (please specify) \_\_\_\_\_

23. When was your organization founded at this location? [dropdown]

24. In which state is your organization located? [dropdown]

If not within the US, please specify: \_\_\_\_\_

25. In which ZIP code is your organization located? [type in]

26. How would you describe this organization? Check ALL options that describe the business:

- Woman-owned business \* (the business need not be Federally registered as such)
- Minority-owned \* (the business need not be Federally registered as such)
- Veteran-owned \* (the business need not be Federally registered as such)
- Family-owned \* (the business need not be Federally registered as such)
- Single owner
- Partnership
- Corporation
- Franchise
- Cooperative
- Multi-location
- For-profit
- Non-profit
- Other (please specify): \_\_\_\_\_

27. How important is each group to your organization's recovery from COVID-19?

<b>Group</b>	<b>Importance to Organization 1= Least Important 5= Most Important</b>
Your neighbors	1 2 3 4 5
Friends and family	1 2 3 4 5
Neighborhood organization(s)	1 2 3 4 5
Suppliers	1 2 3 4 5
Customers	1 2 3 4 5
Business Groups (e.g. Chamber of Commerce)	1 2 3 4 5
State Organization(s)	1 2 3 4 5
Federal Organization(s)	1 2 3 4 5
NOAA Sea Grant	1 2 3 4 5
NOAA Weather Ready Nation	1 2 3 4 5
Manufacturing Extension Partnership Center	1 2 3 4 5
Faith-based organization(s)	1 2 3 4 5

28. Please indicate your level of agreement with the following statements:

<b>Group</b>	<b>Importance to Organization 1= Least Important 5= Most Important</b>
COVID-19 did not impact my business in any significant manner	1 2 3 4 5
COVID-19 posed the greatest risk yet to my organization's survival	1 2 3 4 5
The impacts of COVID-19 will leave my organization unable to cope with a natural disaster, should one occur, in the next year	1 2 3 4 5
I am not concerned about a second wave of COVID-19 and the potential effects on my organization	1 2 3 4 5

29. How many years have you worked as a business owner/manager? \_\_\_\_\_ (years)

## 5.8. Closing Section

The closing section of the survey asks whether the respondent would like to be considered for follow-up on their responses and/or be provided with a summary report of responses to the survey. Finally, the respondent is asked to provide any additional information of which they would like the survey team to be aware.

30. Please consider providing your first name and the best business email address, below. We'd like to follow-up with you on your responses and send a report of the findings.

E-mail address: \_\_\_\_\_

FIRST name: \_\_\_\_\_

31. Is there anything else you would like to share? \_\_\_\_\_

## 5.9. Survey Approvals

The final survey instrument went through the review process for the Paperwork Reduction Act (PRA) (1995. Pub. L. No. 104-13, 109 Stat 163) under the NIST Generic Clearance for Community Resilience Data Collections. The purpose of this review is to: “ensure the greatest possible public benefit from and maximize the utility of information created, collected, maintained, used, shared, and disseminated by or for the Federal Government; and to “improve the quality and use of federal information to strengthen decision making, accountability, and openness in Government and society.” The survey “SME Recovery from a Pandemic in the Face of Natural Hazard Risks” is approved by the under OMB CONTROL NO. 0693-0078 Expiration Date 07/31/2022.

The instrument and data collection methodology were also approved by the Institutional Review Board (IRB) at NIST, which oversees human subjects research.

The PRA and IRB approvals are available by request.

## 6. Summary and Future Efforts

At the time of writing, SMEs are largely facing a clash of crises around the U.S. Wildfires, poor air quality, and the COVID-19 pandemic combining to strain public health in the U.S. West. Hurricane Laura’s extreme winds and catastrophic storm surge in part of Texas and Louisiana left communities evacuated and SMEs already stressed by COVID-19 with extreme damage to infrastructure and contents. The August 2020 Midwest derecho caused capital damage. This is against a backdrop of additional anticipated natural disasters and EWEs in the coming months throughout the U.S. (e.g., Phillips et al., 2020).

This survey lays the groundwork for a generalized application in other circumstances to understand planning for complex events across sectors and past experience profiles. Furthermore, elements of the survey may apply to both for-profit and non-profit enterprises in other data collections.

As the researchers undertake the next phase of the SME Complex Event Resilience data collection effort focused around COVID-19 effects, the potential for complex events to occur from natural disasters is considerable (e.g., Phillips et al., 2020). SMEs are inextricably linked to the communities in which they exist. They provide necessary goods and services,

but they often depend upon customers from the surrounding community. Furthermore, those they employ locally make up a part of the community's tax base.

It is anticipated that lessons learned from this initial data collection and subsequent data collections will assist federal partners and other entities in providing new knowledge about complex events, which might assist them in providing guidance to SMEs on: 1. mitigation planning for natural disasters during the pandemic and 2. disaster readiness strategies to cope with the disruptions from the pandemic. Initial findings from this survey effort are available in Helgeson et al. (2020a).

Furthermore, the novel circumstances around the COVID-19 pandemic may provide additional insight into how SME senior leadership make mitigation, adaptation, and coping decisions, and which attributes of SMEs are correlated with vulnerability to complex events.

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## Appendix A: Complete Survey (English)

We understand that the COVID-19 pandemic is disrupting your business. We hope to learn how businesses like yours are adapting to the circumstances and how this may or may not be connected to broader weather-related stressors your business may face.

Both your perspective and time are exceptionally precious, especially during these uncertain times. Our efforts will be greatly enhanced if you can spend a few minutes filling out this survey. We ask for no sensitive information and we will not identify you or your business. If your business has more than one location, please answer for only one location.

The purpose of this survey is to understand what support businesses like yours need and to communicate those to those who may be able to provide assistance. We'd like to learn about practices taken that have helped reduce the impact of COVID-19, especially in the face of future hazard events.

If you feel uncomfortable answering any of the questions, you can skip them, or exit the survey at any time.

This survey should take less than 15 minutes to complete. You may opt to receive aggregate results of the survey (at the end).

Thank you for your time and participation.

Jennifer

Applied Economics Office, National Institute of Standards and Technology

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### Opening Section

1. What is your role with the organization? (check all that apply)
  - Owner
  - Manager
  - Assistant manager
  - Senior employee (5+ years at the business)
  - Employee
  - I do not have a formal role
  - Other [please specify]
  
2. How many full-time AND part-time individuals did your business employ at this location at this time last year?
  - 1-5
  - 6-10
  - 11-20
  - 21-50
  - 51-100
  - 101-150

- 151-200
- 201-250
- More than 250

### **COVID-19 Impact and Adaptation Section**

*This survey section asks about direct effects of COVID-19 (coronavirus) on your business.*

*The COVID-19 Pandemic was declared a National Emergency on March 13, 2020. Please answer the following questions considering the period since then.*

3. If there were any public health restrictions (e.g., stay-at-home orders, movement limitations, limits on public gatherings, or requirements for social distancing), is/was your organization designated as:
  - Essential
  - Non-essential
  - Some segments were essential, some were not
  - Not sure/don't know
  
4. How has the COVID-19 pandemic impacted the *continuity/stability* of your day-to-day operations? *Please check all that apply*
  - a. Closed to the public
    - i. Less than 1 week
    - ii. 1-2 weeks
    - iii. 2-4 weeks
    - iv. 4 weeks or longer
  - b. On-site operations ceased (or were greatly reduced), but remaining staff teleworked
  - c. Reduced days/hours of operation
  - d. Increased e-commerce
  - e. All staff worked from home
  - f. Remained fully open to the public
  - g. Added services to business (e.g. contactless pick-up, delivery, etc.)
  - h. Other (please specify)\_\_\_\_\_

5. How has the COVID-19 pandemic impacted the *operations* of your organization since March 13<sup>th</sup>?

	For one week or less	For 1-4 weeks	For more than 4 weeks
Stopped operations due to external mandate			
Stopped operations due to financial issues			
Decrease in revenue			
Increase in revenue			
Problems with my supply chain/receiving or shipping inventory			
Issues with delivery of products to customers			
Decrease in customers			
Increase in customers			
Other			

6. What are the most important factors that influenced the choice to temporarily close, change hours, or staffing changes? (Please select no more than 5)

- National State of Emergency (1)
- Stay/Local stay-at-home orders (2)
- Restricted access to the business – by local order (3)
- Employee safety (4)
- Lack of customers (5)
- Disruption to supply/inventory delivery (6)
- Universities and school closings (7)
- Nearby businesses closed (8)
- Local government information/suggestion (9)
- Fear/concerns of infection (self, employees, customers, and/or suppliers) (10)
- Lack of personal protective equipment and/or cleaning supplies (11)
- Staff’s unwillingness to report for work (12)
- Media coverage (13)
- Tight business margins (14)
- N/A (15)
- Other (please specify) (16) \_\_\_\_\_

7. Please select your most trusted sources of information for COVID-19 (Please select no more than 5)

- Local TV news
- National TV news
- Internet-based news media
- Local government (state or municipal)
- Community leaders
- Radio
- Internet sources (outside of news outlets)
- Faith-Based community
- Friends/family
- Social Media
- Cellphone apps
- Center for Disease Control and Prevention (CDC)
- Sectoral/Trade news
- Other Federal Government sources
- Other (please specify) \_\_\_\_\_

8. Since March 13, 2020 has your business REQUESTED/PLANNED use of any of the following financial assistance? (check ALL that apply)

- SBA Paycheck Protection Program (PPP)
- SBA Economic Injury Disaster Loans (EIDL)
- SBA Debt Relief
- USDA Loan Programs
- Other Federal Programs
- State and Local Government grants/loans
- Banks (commercial loan)
- Banks (e.g., existing debt flexibility – payment deferments)
- Personal liquidity (savings)
- Family and Friends
- Crowd-funding
- Postponement in payment (rent, utilities)
- Faith-based group support
- Non-profit organization support
- Insurance (for business interruption)
- Direct lending (e.g., Venture capital, angel investors, Fintech)
- This business has not sought financial assistance from any source
- Unsure
- N/A
- Other (please specify) \_\_\_\_\_

9. Please describe any changes your organization has made to adapt during the COVID-19 pandemic since March 13th. Please check all that apply.

- Changed products produced/offered to consumers
- Offered contactless pick-up or delivery
- Increased e-commerce
- Curb-side pick-up made available
- Prioritized inventories to some customers
- Reallocated products based on inventory levels
- Increased staff
- Reduced staff
- Allowed employees (some or all) to work remotely
- Negotiated longer payment terms for suppliers so the company can keep its cash longer
- Collected money owed from customers as early as possible
- Renegotiated current and future prices with my suppliers
- Exchanged resources or information with other organizations
- Implemented short-term alliances with my suppliers and/or competition
- Other (please specify): \_\_\_\_\_

#### **Natural Hazard Section**

This section asks you about risks from natural hazards that your organization faces. We are interested in your organization's experience in the past and planning for them in the future.

10. What natural hazard(s) is/are of greatest concern for your organization's location? (select all that apply)

- Coastal storms
- Drought/water scarcity
- Earthquake
- Extreme cold
- Extreme heat/heat waves
- Flooding
- Hurricane
- Storm surge
- Tornado
- Tsunami
- Wildfire
- Winter storms
- None
- Other (please specify): \_\_\_\_\_

11. Since March 13th, 2020 has this/these event type(s) occurred at your location?



- Yes, with severe impacts
- Yes, with minor impacts
- No
- Don't know
- N/A

12. [if 11=yes] Was your organization's response to this event affected by COVID-19?

- Yes
- No
- Don't know

13. How many of these natural hazard events have affected\* your organization in the **past 10 years**? An estimate is fine [slide bar answer response] \*caused at least a one-day closure

14. What type of mitigation/preparedness actions have you taken in the past (before COVID-19) to prepare your organization against natural hazards?

- Floodproof building(s) - permanent (e.g., flood gate)
- Floodproof building(s) – temporary (e.g., sand bags, boarding doors)
- Secure a secondary storage location
- Assess building to ensure construction meets building code standards
- Perform risk assessment to identify business vulnerabilities (to specific hazards)
- Adopt strategies to stay informed of weather watches and warnings (e.g., NOAA Weather Radio, commercial apps)
- Assigned disaster responsibilities (i.e., emergency management function) to specific employees
- Perform safety drills regularly (e.g., shelter-in-place, evacuations, telephone tree)
- Develop a written emergency action plan/checklist
- Back-up all important documents (digitally or stored at secondary location)
- Lift inventory and other supplies off the ground to prevent water exposure
- Perform an insurance check-up to ensure adequate insurance coverage
- Increase insurance coverage, if needed
- Develop/update telework plans
- Establish or increase remote/online sales capacity
- Social media account use to provide operations information to the public (e.g., closings)
- Minimize supply chain vulnerability through multiple source strategies
- Develop a connection to local emergency management officials
- Clear debris/dry vegetation away from structures
- Back-up power generation
- Maintain/tune-up equipment for debris/snow removal

- Keeping an emergency fund (“rainy day” money on-hand)
- None
- N/A
- Other (please specify): \_\_\_\_\_

15. Have actions taken by your organization to prepare for natural disasters in the past helped prepare/cope with the impacts of COVID-19?

- No
- Do not know
- N/A
- Yes, please specify (e.g., insurance purchases, teleworking experience, emergency supplies or finances, etc.)  
\_\_\_\_\_

16. Will your planning for these types of natural hazards change in the future due to the COVID-19 pandemic?

- No
- Do not know
- N/A
- Yes (please specify): \_\_\_\_\_

**Attitudes Section**

This section asks about your organization’s future plans.

17. Please select your organization’s top concerns regarding the impact of and recovery from COVID-19. (Please select up to 5, below)

- Compound Events**
  - Hurricane risk and potential impacts
  - Flood risk and potential impacts
  - Earthquake risk and potential impacts
  - Wildfire risk and potential impacts
  - Tornado risk and potential impacts
  - Other natural hazard risk and potential impacts
- Business Financial, Market Concerns**
  - Financial impact on operations, and/or liquidity, capital
  - Going out of business
  - Lower productivity
  - Domestic supply chain disruption

- Loss of funding (governmental and non-profit organizations)
- Operational issues associated with restarting
- Loss of market share
- International supply chain disruptions
- COVID-19 Specific Concerns**
  - The duration of lock-down and quarantine period
  - Uncertainty over recurring Covid-19 outbreaks in the future
  - Safety/contamination issues from shutdown infrastructure (e.g., water sitting in pipes)
  - Safety/contamination issues from working with reopening during social distancing
- Workforce Concerns**
  - Workforce safety to protect employees from infection
  - Workforce reduction concerns
  - Rehiring, replacing, and retraining workforce upon reopening
- Consumer Concern**
  - Decreased consumer confidence and spending
- Global Concerns**
  - Global recession
  - Impacts on tariff and trade issues
  - Increased international political controversy
- None
- Other (please specify): \_\_\_\_\_

18. Have you implemented steps to reduce your risks to the issues you indicated above? If yes, how? \_\_\_\_\_

- Yes, already implemented
- Yes, in the process of implementation
- Yes, planning to implement
- No, but would like to learn more
- No, do not plan to do so
- Unsure

19. Do you feel you have the resources you need to protect your business against the risks you identified above?

- Yes
- No
- Unsure

20. [if 19=no] What resources, knowledge, or support do you feel you need to be better protected against the risks you identified ?

21. How much time do you think will pass before this business returns to its pre-COVID conditions (e.g., operations)? [slide bar or multichoice?]

- 1 month or less
- 2-3 months
- 4-6 months
- 6-12 months
- 12-18 months
- More than 18 months
- Unlikely to resume operations at that level
- Unlikely to reopen at all
- Do not know
- Other (please specify): \_\_\_\_\_

### **BUSINESS INFORMATION SECTION**

This section asks you to provide some details about your organization and yourself.

22. Which sector best describes your business?

- Construction
- Manufacturing
- Retail trade
- Accommodation and Food Services
- Wholesale trade
- Transportation and Warehousing
- Finance and Insurance
- Information (e.g. radio, newspaper, television, telecommunications)
- Real estate, rentals, and leasing
- Professional, scientific, and technical services
- Health and medical services
- Arts, Entertainment, and Recreation
- Food processing, agriculture
- Natural resource management
- Fuel production
- Fishing/aquaculture
- Other (please specify) \_\_\_\_\_

23. When was your organization founded at this location? [dropdown]

24. In which state is your organization located? [dropdown]

If not within the US, please specify: \_\_\_\_\_

25. In which ZIP code is your organization located? [type in]

26. How would you describe this organization? Check ALL options that describe the business:

- Woman-owned business \* (the business need not be Federally registered as such)
- Minority-owned \* (the business need not be Federally registered as such)
- Veteran-owned \* (the business need not be Federally registered as such)
- Family-owned \* (the business need not be Federally registered as such)
- Single owner
- Partnership
- Corporation
- Franchise
- Cooperative
- Multi-location
- For-profit
- Non-profit
- Other (please specify) : \_\_\_\_\_

27. How important is each group to your organization’s recovery from COVID-19?

Group	Importance to Organization 1= Least Important 5= Most Important
Your neighbors	1 2 3 4 5
Friends and family	1 2 3 4 5
Neighborhood organization(s)	1 2 3 4 5
Suppliers	1 2 3 4 5
Customers	1 2 3 4 5
Business Groups (e.g. Chamber of Commerce)	1 2 3 4 5
State Organization(s)	1 2 3 4 5
Federal Organization(s)	1 2 3 4 5
NOAA Sea Grant	1 2 3 4 5
NOAA Weather Ready Nation	1 2 3 4 5
Manufacturing Extension Partnership Center	1 2 3 4 5
Faith-based organization(s)	1 2 3 4 5

28. Please indicate your level of agreement with the following statements:

Group	Importance to Organization 1= Least Important 5= Most Important
COVID-19 did not impact my business in any significant manner	1 2 3 4 5
COVID-19 posed the greatest risk yet to my organization's survival	1 2 3 4 5
The impacts of COVID-19 will leave my organization unable to cope with a natural disaster, should one occur, in the next year	1 2 3 4 5
I am not concerned about a second wave of COVID-19 and the potential effects on my organization	1 2 3 4 5

29. How many years have you worked as a business owner/manager? \_\_\_\_\_ (years)

**Closing Section**

30. Please consider providing your first name and the best business email address, below. We'd like to follow-up with you on your responses and send a report of the findings.

E-mail address: \_\_\_\_\_

FIRST name: \_\_\_\_\_

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31. Is there anything else you would like to share? \_\_\_\_\_

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**THANK YOU VERY MUCH FOR COMPLETING THE SURVEY!**

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A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995 unless the information collection has a currently valid OMB Control Number. The approved OMB Control Number for this information collection is 0693 0078 . Without this approval, we could not conduct this survey/information collection. Public reporting for this information collection is estimated to be approximately 15 minutes per response, including the time for reviewing instructions, searching existing data sources,

gathering and maintaining the data needed, and completing and reviewing the information collection. All responses to this information collection are voluntary. **Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the National Institute of Standards and Technology (NIST). Attn: Dr. Jennifer Helgeson, NIST, 100 Bureau Drive, MS 8603, Gaithersburg, MD 20899-1710, telephone 301-975-6133, or via email: [jennifer.helgeson@nist.gov](mailto:jennifer.helgeson@nist.gov)**

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## Appendix B: Invitation Letter

# COVID-19 Business Information

Dear [Contact Name],

We understand that the COVID-19 pandemic is disrupting your business. We hope to learn how businesses like your company are adapting to the circumstances and how this may or may not be connected to broader weather-related stressors your business may face. Both your perspective and time are exceptionally precious, especially during these uncertain times. Our efforts will be greatly enhanced if you can spend a few minutes filling out this survey: <https://www.surveymonkey.com/r/SG8WHCB>

A Spanish version of the survey is available here: <https://www.surveymonkey.com/r/327B72I>

We ask for no sensitive information and we will not identify you or your business. If your business has more than one location, please answer for only one location. The purpose of this survey is to understand what support businesses like yours need and to communicate those to those who may be able to provide assistance. We'd like to learn about practices taken that have helped reduce the impact of COVID-19, especially in the face of future hazard events. If you feel uncomfortable answering any of the questions, you can skip them, or exit the survey at any time. This survey should take less than 15 minutes to complete. You may opt to receive the aggregate results of the survey (at the end).

Thank you for your time and participation.

Jennifer  
Applied Economics Office  
National Institute of Standards and Technology  
[Jennifer.helgeson@nist.gov](mailto:Jennifer.helgeson@nist.gov)

*OMB Notice: A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995 unless the information collection has a currently valid OMB Control Number. The approved OMB Control Number for this information collection is 0693-0078. Without this approval, we could not conduct this survey/information collection. Public reporting for this information collection is estimated to be approximately 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. All responses to this information collection are voluntary. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the National Institute of Standards and Technology (NIST). Attn: Dr. Jennifer Helgeson,*



NIST, 100 Bureau Drive, MS 8603, Gaithersburg, MD 20899-1710, telephone 301-975-6133, or via email: [jennifer.helgeson@nist.gov](mailto:jennifer.helgeson@nist.gov)

## Appendix C: Complete Survey (Spanish)

Entendemos que la pandemia de COVID-19 está interrumpiendo las operaciones en su negocio. Con esta encuesta, esperamos saber cómo las empresas como la suya se están adaptando a las circunstancias y cómo esto puede o no estar relacionado con factores climáticos estresantes más generales que su empresa puede enfrentar.

Tanto su perspectiva como su tiempo son excepcionalmente valiosos, especialmente durante estos tiempos inciertos. Nuestros esfuerzos mejorarán enormemente si puede dedicar unos minutos completando esta encuesta. No solicitamos información confidencial y no lo identificaremos a usted ni a su empresa. Si su empresa tiene más de una ubicación, responda solo por una.

El propósito de esta encuesta es comprender qué apoyo necesitan las empresas como la suya y comunicar éstas necesidades a quienes puedan brindar asistencia. Nos gustaría conocer las prácticas tomadas que han ayudado a reducir el impacto de COVID-19, especialmente frente a eventos de riesgo futuros.

Si se siente incómodo respondiendo alguna de las preguntas, puede omitirlas o salir de la encuesta en cualquier momento.

Esta encuesta debería tomar menos de 15 minutos para completar. Puede optar por recibir resultados agregados (al final).

Gracias por su tiempo y participación.

Jennifer

Oficina de Economía Aplicada, Instituto Nacional de Estándares y Tecnología

### **Sección Inicial**

1. ¿Cuál es su papel en la organización? (marque todas las opciones que correspondan)

- Propietario
- Gerente
- Subgerente
- Empleado senior (más de 5 años en el negocio)
- Empleado
- No tengo un rol formal

o Otro [por favor especifique]

2. ¿Cuántas personas en total (tiempo completo y tiempo parcial) trabajaban en este mismo establecimiento comercial el año pasado para esta misma fecha?

- o 1-5
- o 6-10
- o 11-20
- o 21-50
- o 51-100
- o 101-150
- o 151-200
- o 201-250
- o Más de 250

### **Sección de Impacto y Adaptación al COVID-19**

*Esta sección de la encuesta pregunta sobre los efectos directos del COVID-19 (coronavirus) en su negocio.*

*La pandemia COVID-19 fue declarada emergencia nacional el 13 de marzo de 2020.*

*Responda las siguientes preguntas considerando el período transcurrido desde entonces.*

3. Si hubo alguna restricción de salud pública (por ejemplo, órdenes de quedarse en casa, limitaciones de movimiento, límites en reuniones públicas o requisitos de distanciamiento social), ¿su organización es / fue designada como:

- o esencial
- o no esencial
- o Algunos segmentos eran esenciales, otros no.
- o No estoy seguro / no lo sé

4. ¿Cómo ha afectado la pandemia de COVID-19 a la *continuidad /estabilidad* de sus operaciones diarias? Por favor marque todas las opciones que apliquen

a. Cerrado al público

- i) Menos de 1 semana
- ii) 1-2 semanas
- iii) 2-4 semanas
- iv) 4 semanas o más

b. Las operaciones en el sitio se suspendieron (o se redujeron en gran medida), pero el personal restante continúa en teletrabajo

- c. Se redujeron los días / horas de operación
- d. Se incrementó el comercio electrónico
- e. Se habilitó el teletrabajo para todo el personal
- f. El sitio permaneció completamente abierto al público
- g. Se agregaron servicios a la empresa (por ejemplo, recogida sin contacto, entrega, etc.)
- h. Otros (especificar) \_\_\_\_\_

5. ¿Cómo ha afectado la pandemia de COVID-19 a las operaciones de su organización desde el 13 de marzo?

	Por una semana o menos	De 1 a 4 semanas	Por más de 4 semanas
Interrupción de operaciones por mandato externo			
Interrupción de operaciones por problemas financieros			
Disminuyeron los ingresos			
Aumentaron los ingresos			
Problemas con mi cadena de suministro / recepción o envío de inventario			
Problemas con la entrega de productos a los clientes			
Disminución de clientes			
Aumento de clientes			
Otro			

6. ¿Cuáles son los factores más importantes que influyeron en la elección de cerrar temporalmente, cambios en las horas de trabajo, o cambios de personal? (Seleccione no más de 5)

- Estado Nacional de Emergencia (1)
- Órdenes de quedarse en casa (2)
- Acceso restringido a la empresa - por orden local (3)
- Seguridad del empleado (4)
- Falta de clientes (5)
- Interrupción en el suministro / entrega de inventario (6)
- Cierre de universidades y escuelas (7)
- Empresas cercanas cerradas (8)
- Información / sugerencia del gobierno local (9)

- Miedo / preocupaciones de infección (yo mismo, empleados, clientes y / o proveedores) (10)
- Falta de equipo de protección personal y / o artículos de limpieza (11)
- Falta de voluntad del personal para reportarse al trabajo (12)
- Cobertura de los medios de comunicación (13)
- Estrechos márgenes de rentabilidad (14)
- No Aplica (15)
- Otro (especifique) (16) \_\_\_\_\_

7. Por favor, seleccione sus fuentes de información más confiables para COVID-19 (Seleccione hasta 5 de las siguientes opciones)

- Noticias de televisión locales
- Noticias de televisión nacional
- Medios de comunicación de noticias en Internet
- Gobierno local (estatal o municipal)
- Líderes de la comunidad
- Radio
- Fuentes de Internet (fuera de los medios de comunicación)
- Comunidad religiosa
- Amigos / familia
- Redes sociales
- Aplicaciones en los celulares
- Centro para el Control y Prevención de Enfermedades (CDC)
- Noticias sectoriales / comerciales
- Otras fuentes del Gobierno Federal
- Otra (favor especificar) \_\_\_\_\_

8. ¿Ha SOLICITADO/PLANEADO su negocio el uso de alguna de las siguientes ayudas financieras desde el 13 de marzo de 2020? (marque todas las opciones que correspondan)

- Programa de Protección de Cheques de Pago de SBA (SBA Paycheck Protection Program PPP) (1)
- Préstamos de Daño Económico por Desastres de SBA (SBA Economic Injury Disaster Loans) (2)
- Alivio de la Deuda de SBA (3)
- Programas de Préstamos del USDA (4)
- Otros Programas Federales (5)
- Subvenciones / préstamos del Gobierno Estatal y Local (6)
- Bancos (préstamo comercial) (7)
- Bancos (por ejemplo, flexibilidad de deuda existente - aplazamientos de pago) (8)
- Liquidez personal (ahorro) (9)
- Familia y amigos (10)
- Financiación colectiva (Crowdfunding) (11)
- Aplazamiento de pagos (alquiler, servicios públicos) (12)
- Apoyo de grupos religiosos (13)

- Apoyo de? organizaciones sin fines de lucro (14)
- Seguro (por Interrupción del Negocio) (15)
- Préstamo directo (por ejemplo, capital de riesgo, inversionistas ángeles, Fintech) (16)
- Este negocio no ha buscado asistencia financiera de ninguna fuente (17)
- No estoy seguro (18)
- No Aplica (19)
- Otro (especifique) \_\_\_\_\_ (20)

9. Describa cualquier cambio que su organización haya realizado desde el 13 de marzo para adaptarse durante la pandemia COVID-19. Por favor marque todas las opciones que apliquen.

- Modifiqué productos manufacturados / ofrecidos a los consumidores
- Ofrecí recogida o entrega sin contacto
- Incrementé el comercio electrónico
- Habilité el servicio para recoger el producto fuera del local
- Prioricé inventarios para algunos clientes
- Reasigné productos basados en niveles de inventario
- Incrementé el personal
- Reduje el personal
- Permití a los empleados (algunos o todos) trabajar de forma remota
- Negocié plazos de pago más largos para los proveedores para que la compañía pueda mantener su efectivo por más tiempo
- Recaudé dinero de los clientes lo antes posible
- Renegocié los precios actuales y futuros con mis proveedores
- Intercambié recursos o información con otras organizaciones
- Implementé alianzas a corto plazo con mis proveedores y / o competencia.
- Otro (especifique): \_\_\_\_\_

### **Sección de Peligros Naturales**

*Esta sección le pregunta sobre los riesgos que enfrenta su organización a los peligros naturales. Estamos interesados en la experiencia pasada de su organización y la planificación de los riesgos hacia el futuro.*

10. ¿Qué evento(s) natural(es) es(son) de mayor preocupación para la localización de su organización? (seleccione todas las opciones que correspondan)

- Tormentas costeras
- Sequía / Escasez de agua
- Terremoto
- Frío extremo
- Calor extremo / Olas de calor
- Inundaciones

- Huracanes
- Marejadas ciclónicas
- Tornados
- Tsunamis
- Incendios forestales
- Tormentas de invierno
- Ninguno
- Otro (especifique): \_\_\_\_\_

11. ¿Ha ocurrido alguno(s) de los eventos anteriores en su ubicación desde el 13 de marzo de 2020?

- Sí, con impactos severos
- Sí, con impactos menores
- No
- No sé
- No Aplica

12. [Si 11 = Sí] ¿La respuesta de su organización a este evento se vio afectada por COVID-19?

- Sí
- No
- No sé

13. ¿Cuántos de estos eventos de peligro natural han afectado\* a su organización en los últimos 10 años? Un valor estimado es suficiente [respuesta de barra deslizante] \*afectado = su establecimiento comercial tuvo al menos un día de cierre.

14. ¿Qué tipo de medidas de mitigación / preparación ha tomado en el pasado (antes de COVID-19) para preparar su organización contra los peligros naturales?

- Edificio(s) a prueba de inundaciones - permanente (por ejemplo, compuerta de inundación)
- Edificio(s) a prueba de inundaciones - temporal (por ejemplo, bolsas de arena, puertas de embarque)
- Asegurar una ubicación de almacenamiento alterna o secundaria
- Evaluar el edificio para garantizar que la construcción cumpla con los estándares de los códigos de construcción
- Realizar una evaluación de riesgos para identificar vulnerabilidades en el negocio (ante peligros específicos)
- Adoptar estrategias para mantenerme informado sobre las alertas y advertencias meteorológicas (por ejemplo, NOAA Weather Radio, aplicaciones comerciales)
- Asignar responsabilidades por desastre (es decir, función de gestión de emergencias) a empleados específicos

- Realizar simulacros de seguridad regularmente (por ejemplo, refugio en el lugar, evacuaciones, árbol telefónico)
- Desarrollar un plan de acción de emergencia / lista de verificación por escrito
- Hacer una copia de seguridad de todos los documentos importantes (digitalmente o almacenados en una ubicación secundaria)
- Levantar el inventario y otros suministros del suelo para evitar la exposición al agua
- Realizar un chequeo del seguro para asegurar una cobertura de seguro adecuada
- Aumentar la cobertura del seguro, si es necesario
- Desarrollar / actualizar planes de teletrabajo
- Establecer o aumentar la capacidad de ventas remotas / en línea
- Usar cuentas de redes sociales para proporcionar información de operaciones al público (por ejemplo, cierres)
- Minimizar la vulnerabilidad de la cadena de suministro a través de múltiples estrategias de abastecimiento
- Desarrollar una conexión con los funcionarios locales de gestión de emergencias
- Remover los escombros y quitar la vegetación seca lejos de las estructuras
- Tener un respaldo en la generación de energía
- Mantener / armonizar el equipo para remover escombros / nieve
- Mantener un fondo de emergencia (dinero disponible para "días lluviosos")
- Ninguno
- No disponible
- Otro (especifique): \_\_\_\_\_

15. ¿Las acciones tomadas por su organización para prepararse contra los desastres naturales en el pasado ayudaron a preparar / enfrentar los impactos de COVID-19?

- No
  - No sé
  - No Aplica
  - Sí, especifique (por ejemplo, compra de seguros, experiencia de teletrabajo, suministros de emergencia, fondos financieros de emergencia, etc.)
- \_\_\_\_\_

16. ¿Ha pensado usted cambiar su planificación futura para este tipo de riesgos naturales debido a la pandemia de COVID-19?

- No
- No sé
- No Aplica
- Sí (especifique): \_\_\_\_\_

### **Sección de Actitudes**

*Esta sección pregunta sobre los planes futuros de su organización.*

17. Seleccione las principales preocupaciones de su organización con respecto al impacto y la recuperación de COVID-19. (Seleccione hasta 5 de las opciones proporcionadas a continuación)

**o Eventos compuestos**

- o Riesgo de huracán e impactos potenciales
- o Riesgo de inundación e impactos potenciales
- o Riesgo de terremoto e impactos potenciales
- o Riesgo de incendios forestales e impactos potenciales
- o Riesgo de tornado e impactos potenciales
- o Otros riesgos de peligros naturales e impactos potenciales

**o Negocios financieros, Preocupaciones de mercado**

- o Impacto financiero en las operaciones, y / o liquidez, capital
- o Quiebra del negocio
- o Menor productividad
- o Interrupción de la cadena de suministro local o nacional
- o Pérdida de fondeo (organizaciones gubernamentales y sin fines de lucro)
- o Problemas operativos asociados con la reapertura
- o Pérdida de cuota de mercado
- o Interrupciones de la cadena de suministro internacional

**o COVID-19 Preocupaciones específicas**

- o Duración del período de cierre y cuarentena
- o Incertidumbre sobre brotes recurrentes de Covid-19 en el futuro
- o Problemas de seguridad / contaminación por cierre de la infraestructura (por ejemplo, agua en tuberías)
- o Problemas de seguridad / contaminación por trabajar con reapertura durante el distanciamiento social

**o Preocupaciones de la fuerza laboral**

- o Seguridad laboral para proteger a los empleados de infecciones
- o Preocupaciones sobre reducción de la fuerza laboral
- o Recontratar, reemplazar y volver a capacitar a la fuerza laboral al reabrir

**o Preocupación del consumidor**

- o Disminución de la confianza y el gasto del consumidor.

**o Preocupaciones globales**

- o Recesión global
- o Impactos en cuestiones arancelarias y comerciales
- o Aumento de la controversia en política internacional.

o Ninguno

o Otro (por favor especifique): \_\_\_\_\_

18. ¿Ha implementado su organización medidas para reducir sus riesgos a los problemas potenciales que indicó anteriormente?

- o Sí, ya implementado
- o Sí, en proceso de implementación
- o Sí, planeo implementar



- No, pero me gustaría aprender más
- No, no planeo hacerlo
- No estoy seguro

19. ¿Siente que tiene los recursos que necesita para proteger su negocio contra los riesgos que identificó anteriormente?

- Sí
- No
- No estoy seguro

20. [Si 19 = No] ¿Qué recursos, conocimientos o apoyo cree que necesita para estar mejor protegido contra los riesgos que identificó anteriormente?

21. ¿Cuánto tiempo cree que pasará antes de que este negocio regrese a sus condiciones previas a COVID-19 (por ejemplo, en operaciones)? [barra deslizante o multiple?]

- 1 mes o menos
- 2-3 meses
- 4-6 meses
- 6-12 meses
- 12-18 meses
- Más de 18 meses
- Es poco probable que reanude las operaciones a ese nivel
- Es poco probable que se vuelva a abrir
- No sé
- Otro (por favor especifique): \_\_\_\_\_

### **Sección de Información del Negocio**

*Esta sección le pide que proporcione algunos detalles sobre usted y su organización.*

22. ¿Qué sector describe mejor su negocio?

- Construcción
- Manufactura
- Comercio al por menor
- Servicios de alojamiento y alimentación
- Comercio al por mayor
- Transporte y almacenamiento
- Finanzas y seguros
- Información (por ejemplo, radio, periódico, televisión, telecomunicaciones)
- Bienes inmuebles, alquileres y arrendamientos
- Servicios profesionales, científicos y técnicos
- Servicios médicos y de salud

- o Arte, entretenimiento y recreación
- o Procesamiento de alimentos, agricultura
- o Gestión de recursos naturales
- o Producción de combustible
- o Pesca / acuicultura
- o Otro (especifique) \_\_\_\_\_

23. ¿Cuándo se creó su organización en este lugar? [desplegable]

24. ¿En qué estado se encuentra localizada su organización? [desplegable]  
Si no está dentro de los EE. UU., Especifique: \_\_\_\_\_

25. ¿En qué código postal se encuentra localizada su organización? [escribir]

26. ¿Cómo describiría esta organización? Escoja TODAS las opciones que describen el negocio:

- o Negocio propiedad de una mujer \*(el negocio no necesita estar registrado federalmente como tal)
- o Propiedad de minorías \*(el negocio no necesita estar registrado federalmente como tal)
- o Propiedad de veteranos \*(el negocio no necesita estar registrado federalmente como tal)
- o De propiedad familiar \*(el negocio no necesita estar registrado federalmente como tal)
- o Propietario único
- o Asociación
- o Corporación
- o Franquicia
- o Cooperativa
- o Múltiple-ubicación
- o Con fines de lucro
- o Sin ánimo de lucro
- o Otro (especifique): \_\_\_\_\_

27. ¿Qué tan importante es cada uno de los siguientes grupos para la recuperación de su organización de COVID-19?

<b>Grupo</b>	<b>Importancia para la Organización</b> 1= Poco Importante 5= Muy Importante
Vecinos	1 2 3 4 5
Amigos y familia	1 2 3 4 5
Organizaciones o empresas vecinas	1 2 3 4 5
Proveedores	1 2 3 4 5

Clientes	1 2 3 4 5
Grupos empresariales (por ejemplo, Cámaras de Comercio)	1 2 3 4 5
Organizaciones Estatales	1 2 3 4 5
Organizaciones Federales	1 2 3 4 5
NOAA Sea Grant	1 2 3 4 5
NOAA Weather Ready Nation	1 2 3 4 5
Manufacturing Extension Partnership Center	1 2 3 4 5
Organizaciones Religiosas	1 2 3 4 5

28. Indique qué tanto usted está o no de acuerdo con las siguientes afirmaciones:

Afirmación	Nivel de Acuerdo 1= Muy en Desacuerdo 5= Muy de Acuerdo
COVID-19 no impactó mi negocio de manera significativa	1 2 3 4 5
COVID-19 planteó el mayor riesgo hasta la fecha para la supervivencia de mi organización	1 2 3 4 5
Los impactos de COVID-19 dejarán a mi organización incapaz de hacer frente a un desastre natural de aquí a un año, en caso de que ocurra	1 2 3 4 5
No me preocupa una segunda ola de COVID-19 y los posibles efectos en mi organización	1 2 3 4 5

29. ¿Cuántos años ha trabajado como propietario / gerente de un negocio? \_\_\_\_\_  
(años)

**Sección de Cierre**

30. Considere proporcionar su primer nombre y una dirección confiable de correo electrónico empresarial. Nos gustaría hacer un seguimiento con usted de sus respuestas y enviarle un informe de los resultados.

Dirección de correo electrónico: \_\_\_\_\_

PRIMER Nombre: \_\_\_\_\_

31. ¿Hay algo más que le gustaría compartir? \_\_\_\_\_

**¡MUCHAS GRACIAS POR COMPLETAR LA ENCUESTA!**

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