

Disaster Mitigation and Preparedness: Comparisons of Nonprofit, Public, and Private Organizations

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Abstract

Few studies have compared the mitigation and preparedness activities adopted by nonprofit, private, and public organizations. This study contributes to this important literature by comparing the adoption of mitigation and preparedness activities by nonprofit, private, and public organizations in Memphis, Tennessee. The findings show that although nonprofit organizations may be more resource-constrained compared with private corporations, they adopt more mitigation and preparedness activities than private corporations. In addition, public organizations adopt more mitigation and preparedness activities than private organizations. The results are inconclusive on the comparison between nonprofits and public agencies.

Disaster Mitigation and Preparedness: Comparisons of Nonprofit, Public, and Private Organizations

Introduction

Disasters usually leave behind a trail marked by death, destruction to property and the natural environment, and disruption to businesses and everyday living. For instance, between 1990 and 1999, an estimated 188 million people were affected by natural disasters annually (Purvis & Busby, 2004). Notable disasters in recent history include the September 11 terrorist attacks, which resulted in 2,973 fatalities (9/11 Commission Report, 2004) and Hurricane Katrina, which killed more than 2,000 people (GAO, 2008) and caused more than US\$200 billion in economic losses (Burby, 2006). Regarding structural damage alone, a 2006 Federal Emergency Management Authority (FEMA) study reported the annual estimated losses to the national building stock at US\$5.3 billion (FEMA, 2007).

Evidence from the disaster literature (e.g., Mileti, 1999) and the insurance community (e.g., Munich Reinsurance Group, 2009) suggests continuing increases in disaster losses. For instance, in 2008, the United States suffered 342 fatalities and about US\$ 67.2 billion in estimated total losses to natural disasters (Munich Reinsurance Group, 2009). Due to the potential future increases in disaster losses, public, private, and nonprofit organizations are under pressure to incorporate disaster mitigation and preparedness measures in an attempt to help organizations reduce their losses from disasters (Dahlhammer & D'Souza, 1997). The degree to which they have adopted such measures, however, remains in question, especially with regard to the nonprofit sector.

As important social service providers, nonprofit organizations are not only a critical link to the nation's welfare state, (Salamon, 1995; 2003; Smith & Lipsky, 1993), they also play key roles in the nation's disaster preparedness and response efforts (Vita & Morley, 2007), especially in view of the public sectors' evolving role and often sluggish involvement in disaster response (Kapucu & Wart, 2006). For example, although the response to Hurricane Katrina was hampered by limitations in "resources, equity, accountability, and coordination," Gajewski, Bell, Lein and Angel (2011) characterized the response by nonprofit and faith-based organizations as "highly motivated, flexible, and creative" (p. 289). To others, the effects of hurricanes Katrina and Rita further demonstrated the importance of nonprofit organizations to communities as they rose to the challenge of not only responding to

flood victims but also providing food and shelter to hurricane victims (Auer & Lampkin, 2006; Vita & Morley, 2007). In light of these supplementary and complementary roles nonprofits play in society (Young, 2006a), as well as the unique challenges they encounter in raising funds to finance their programs, compared with public and private organizations (Young, 2006b); it is important to assess the extent to which they are prepared for disasters. Using a unique data set, we examine the question; Do nonprofit organizations engage in more mitigation and preparedness activities than private and public organizations? To answer this question, we compare nonprofits' disaster mitigation and preparedness strategies with those of public and private organizations.

In the aftermath of hurricanes Katrina and Rita, research has primarily focused on the roles nonprofit organizations played in Hurricane Katrina relief efforts (Pipa, 2006), with an emphasis on the new roles they play as the nature of their services changed in response to emergent needs (Auer & Lampkin, 2006; NCCS, 2005; Vita & Morley, 2007). Additional attention has also been paid to their roles in cross-sector collaborations (Kapucu, 2007; Simo & Bies, 2007; Sylves, 2008-9; Waugh & Streib, 2006), and the nature of volunteering in disaster relief (Rotolo & Berg, 2010). With some exceptions (e.g., Fowler, Kling & Larson, 2007; Gajewski, Bell, Lein & Angel, 2011; Meyer-Emerick & Momen, 2003), very few attempts have been made to assess the extent to which nonprofits adopt disaster mitigation and preparedness measures. This article seeks to make contribution to this literature.

Organizations and Disasters

Organizations face considerable threats from disasters which often result in significant organizational disruptions (Lindell & Perry, 2007), including jeopardizing their ability to provide goods and services, and losses in sales, property taxes (Tierney, 1994), and services. This consequently undermines the economy and the support systems of communities (Lindell & Perry, 2007). For example, the 1994 Northridge earthquake, caused substantial structural damage to businesses in Los Angeles (Tierney, 1997), including the collapse of a 2,500-car parking garage and almost destroying every building at California State University. Although, organizations cannot control the physical characteristics of disasters such as magnitude and frequency (Nigg, 1996); they can, however, reduce disaster impacts by adopting mitigation and preparedness measures (Dahlhamer & D'Souza, 1997).

Given the devastating effects disasters can have on all facets of a community, nonprofits have also fallen victim. For instance, Hurricane Katrina caused extensive damage to colleges and universities in the Gulf Coast area, resulting in temporary closures at Tulane University, Dillard University, and Loyola University, New Orleans. Between 2005 and 2006, Tulane University is reported to have suffered a 10% drop in its total revenues, whereas Xavier University and Loyola University New Orleans lost more than 12% and 26% in revenues, respectively (Weisbrod & Asch, 2010).

To further demonstrate the impact of disasters on organizations, 95% of the 212 health and human service nonprofits that responded to a Louisiana Association of Nonprofit Organizations (LANO) survey reported being directly or indirectly impacted by Hurricane Katrina. Auer and Lampkin (2006) suspected 98 of them to have temporarily or permanently closed. And according to a Mississippi Center for Nonprofits survey, 67% of nonprofit organizations in the Biloxi-Pascagoula metro area suffered losses of paid staff members or volunteer staff, with 77% reporting major building damage or loss, and another 93% reporting losses of programs or services (Pipa, 2006). Overall, Hurricane Katrina devastated an already struggling infrastructure, one that not only delivered essential health and human services to residents in New Orleans, but also provided major educational, cultural, and other societal benefits (NCCS, 2005). Before Hurricane Katrina, there were 3,200 nonprofits in Louisiana, of which 900 were located in New Orleans. Of the 900, 83 provided health and mental health services, while 385 charities provided human services and community improvement programs to New Orleans residents (NCCS, 2005). One key role involves how nonprofits helped communities to respond to and recover from disasters. As demonstrated by their responses to hurricanes Katrina and Rita, in the case of Louisiana and Mississippi, local nonprofits and religious congregations played crucial roles in responding to victims of the hurricanes (Pipa, 2006). And of the 250,000 Gulf Coast evacuees that sought shelter in Texas, nonprofit organizations proved to be key players in responding to their needs for shelter, food, and other necessities (Gajewski, et al., 2011).

Clearly, nonprofits have become a key fixture in American society. Theory suggests that when local, state, and federal governments are overburdened or fall short (Steinberg, 2006; Weisbrod, 1977), nonprofits step in to fill the void by providing much needed goods and services (Salamon, 1995; Steinberg, 2006; Young, 2006a). And as “a major economic force” (Salamon, Anheier, List, Toepler, &

Sokolowski, 1999, p. 8), the importance of the U. S. nonprofit sector is also evident in its contribution to the economy. According to the National Center for Charitable Statistics (NCCS), the sector accounts for a significant share of employment (7% in 2009); representing 9% of the economy's wages and salaries (NCCS, 2012). The sector also contributed US\$779 billion in expenditures—an estimated 5.4% of the nation's gross domestic product (GDP) in 2010 (Urban Institute, 2012). As of November 2011, the Internal Revenue Service (IRS) reported a total of 1.58 million registered nonprofits (including private foundations). Of these, the 1.16 million nonprofits filing 990 forms with the IRS generated a total of US\$1.94 trillion in revenue and US\$6.36 trillion in total assets (NCCS, 2012). The growth rate was 25% between 2001 and 2011, surpassing that of the public and private sectors (Urban Institute, 2012).

In spite of encountering difficulties in mobilizing sufficient resources to sustain their operations (Young, 2006b), compared with government and private organizations, the social and political roles nonprofits play in the United States remain critical, some of which include; service provision, advocacy, community building, and democratization (Salamon, Hems, & Chinnock, 2000). As a result, the question of whether nonprofit organizations adopt disaster preparedness and mitigation measures becomes critical.

Mitigating and Preparing for Disasters: Does Organizational Form Matter?

A number of notable studies focusing on mitigation and preparedness at the organizational level have appeared over the years (e.g., Dahlhamer & D'Souza, 1997; Fowler et al., 2007; Light, 2008; Sadiq, 2010; Sadiq & Weible, 2010; Webb, Tierney, & Dahlhamer, 2000). Despite these efforts and the fact that there are no explicit theories to guide research on the determinants of mitigation and preparedness at the organizational level of analysis (Sadiq, 2010), this line of research could benefit from additional studies, in particular, studies centered on disaster mitigation and preparedness in nonprofit organizations.

At the individual level of analysis, the state of research on mitigation and preparedness is more advanced. The myriad studies focusing on the determinants of mitigation and preparedness measures at the individual level provide insightful theoretical direction. Derived from a long list of disaster studies spanning 25 years, the protective action decision model (PADM) in particular, provides a framework for understanding the determinants of mitigation and preparedness at the household level

(Lindell & Perry, 2004; 2011). Within the context of the PADM, variables such as risk perception, disaster experience, and resource availability have been found to have a significant relationship with household adoption of hazard adjustments. Drawing from this model, our analysis compares the number of mitigation and preparedness measures (hazard adjustments) adopted by nonprofit organizations with those adopted by private corporations and public agencies. Hazard adjustments refer to “. . . actions that intentionally or unintentionally reduce risk from extreme events in the natural environment” (Lindell & Perry, 2000, p. 461-462).

The PADM is useful in that it predicts an expected positive correlation between resource availability and actual hazard adjustments among individuals or households (Lindell & Perry, 2000). Investigating whether nonprofits undertook continuity planning, a process concerned with “the maintenance of critical operational processes” in the face of “natural, anthropogenic, or technological interruptions” (p. 1), MeyerEmerick and Momen (2003) also found a positive correlation between resources and continuity planning adoption. The authors found the lack of fiscal or staff resources among nonprofits to be a key impediment in their ability to undertake continuity planning activities such as backing up data offsite and installing fireproof safes for sensitive and important documents or planning for short or long-term interruptions due to power outages or complete losses in facilities.

Based on the PADM’s prediction and Meyer-Emerick and Momen’s (2003) findings, we expect organizations with more resources to adopt a higher number of mitigation and preparedness measures than those with fewer resources. Extrapolating this relationship to the organizational level also provides an opportunity to implicitly test the PADM by investigating whether nonprofits—as organizations that “often struggle to mobilize sufficient resources” (Young, 2006b, p. xxi)—adopt fewer disaster mitigation and preparedness activities compared with private and public organizations. Relative to public and private organizations, nonprofits not only face financial resource limitations (Gajewski, et al., 2011), but also may face donor-imposed restrictions on how they can allocate those resources. Other researchers have also established the importance of financial and technical resources in the adoption of disaster mitigation activities (Sadiq, 2010), as well as the time and effort it takes to adopt risk-reducing measures (Wyner & Mann, 1986).

Unlike private corporations that depend on the sale of their goods and services for generating revenue and public agencies that depend on tax revenue, nonprofits have a unique access to charitable contributions from individuals and institutional donors, as well as various socially-focused

entrepreneurial strategies (Weisbrod, 1998; Young, 2006b). However, this unique access comes with its unique challenges (e.g., difficulties in raising funds and the restrictions that may be attached to funding), which could negatively influence nonprofits' investments in disaster preparedness and mitigation measures.

The position of nonprofits is further confounded by the increased expectation that the organizations dedicate the majority of their funding toward funding innovative and effective solutions to address various societal ills that the fragile welfare state no longer directly provides. For instance, Sloan (2009) found that fundraising and programming efficiency ratings from watchdog organizations like the Wise Giving Alliance significantly influenced the contributions nonprofit organizations received. This implies that, as long as nonprofits are expected to spend larger proportions of their funding on programming, we would not expect them to have sufficient funds set aside for investing in disaster mitigation and preparedness practices, unless they are larger and more financially stable (Lindenberg & Bryant, 2001) or they possess significant amounts of unrestricted income.

With regard to the level of disaster mitigation and preparedness among the three sectors, research suggests that organizational disaster mitigation and preparedness remains relatively low across all three sectors. A 2002 global survey of corporate preparedness indicated that, whereas 93% of 140 corporate strategists reported their organizations as being surprised by as many as 3 high-impact events that had occurred in the previous 5 years, 97% reported that their companies did not have early warning systems in place (Fuld, 2003). According to a 2007 survey of the top 50% of executives whose organizations had experienced a crisis such as hurricane, the collapse of infrastructures or armed conflicts, only 25% expected such major occurrences in the next 3 years (Nabel, 2007).

In a study of perceived organizational disaster preparedness by Fowler et al. (2007) government organizations expressed the highest levels of perceived disaster preparedness relative to private corporations, which exhibited the lowest perceptions. This finding was contrary to their hypothesis that private companies would have the highest perception of disaster preparedness. Compared with nonprofit organizations, government agencies also expressed higher perceptions of disaster preparedness (mean difference of 3.57). And although nonprofits exhibited slightly higher perceptions of disaster preparedness compared with private businesses (a mean difference of .49), this was not statistically significant.

Other researchers have attempted to identify the core predictors of organizational crisis readiness—a broader concept that encompasses one’s ability to respond to and recover from both external (e.g., natural disasters) and internal (e.g., financial crises) events (Light, 2008). For example, a descriptive study based on a 2006 random survey of 4,000 opinion leaders in state and local governments, businesses, and nonprofit organizations ($N = 468$) conducted by Princeton Survey Research Associates found characteristics such as, external relationships, leadership, and the nature of internal structures to positively influence perceived crisis readiness (Light, 2008). Data limitations prevented Light (2008) from investigating sector differences. Similar to Fowler et al. (2007); however, Light (2008) found that government organizations (51%) were perceived to be more crisis-ready compared with nonprofit (29%) and businesses organizations (20%).

Based on the above surveys, it appears that, in spite of the relative differences in financial resources, nonprofits show higher disaster readiness perceptions than for profit businesses. However, government ranks top in perceived disaster preparedness. These surveys and the PADM, therefore, provide the basis for our hypotheses; although only our first hypothesis is tangentially supported by the PADM.¹

Hypothesis 1: Nonprofit organizations adopt fewer mitigation and preparedness activities than public organizations.

Hypothesis 2: Nonprofit organizations adopt more mitigation and preparedness activities than private organizations.

Although, to our knowledge, no theoretical basis predicts adoption differences among private, nonprofit, and public organizations, it is reasonable to expect differences in missions, social functions, roles, and resource dispositions to influence the number of mitigation and preparedness measures they adopt.

Methods

The Study Setting

Memphis is the largest city in Tennessee with a population of about 650,000. Earthquakes are a major disaster risk in the Memphis area due to the hazard posed by the New Madrid Seismic Zone (NMSZ). According to the U. S. Geological Survey (USGS) (2008a), the three most powerful earthquakes in the United States (magnitude 7.0-8.1)

occurred in the NMSZ between December 16, 1811 and February 7, 1812 (Memphis and Shelby county were not settlements then).

Although many dispute the characterization of the risk, USGS (1998) estimated a more than 90% probability of a moderate earthquake (magnitude 6.7) hitting the NMSZ within the next 50 years. In comparison, the odds of a magnitude 6.7 or larger earthquake in the next 30 years in California are more than 99% (USGS, 2008b). In general, however, the seismic risks from the NMSZ are of low probability and high consequences (Olshansky, 1994). Still, Memphis faces threats from other disasters, such as floods, tornadoes, ice storms, chemical spills, fires, and severe storms.

A study of organizations in Memphis/Shelby county, therefore, makes for an interesting case for several reasons. The rarity of major earthquakes (magnitude 7.0 or greater) in Memphis/Shelby county in recent time poses challenges for organizations in deciding to mitigate and prepare for disasters. The absence of major disasters makes organizations apathetic and reluctant to adopt mitigation and preparedness measures (Lindell & Perry, 2007). And although, a vast majority of disaster studies, especially on earthquakes, have been carried out on the west coast and, in particular, California (e.g., Argothy, 2003; Celsi, Wolfenbarger, & Wald, 2005; Kiecolt & Nigg, 1982; May & Wood, 2003); very few studies have analyzed responses to disaster risks in Memphis (e.g., Edwards, 1993) and few in the NMSZ (e.g., Atwood & Major, 2000; Mushkatel & Nigg, 1987a, 1987b; Olshansky, 1994). Finally, studies on organizational preparedness suggest that organizations in Memphis/Shelby county do little to prepare for disasters (e.g., Dahlhamer & D'Souza, 1997; Webb et al., 2000).

The data gathering procedure occurred in two phases—Interview phase and survey phase, with procedures starting in fall 2005 and ending in spring 2007. Fifteen exploratory interviews were conducted with 15 different organizations in Memphis/Shelby county in the spring and summer of 2006. This consisted of open-ended in-person and telephone interviews with the professional managers of the organizations, addressing attitudes toward hazard risk management and risk information, and organizational actions with respect to risk. The interviews took approximately 30-60 min each. To check for information accuracy, the typed interview transcripts were sent back to the interviewees for review.

The survey phase was administered in fall 2006. With the help of the Memphis Regional Chambers of Commerce, the research team queried an online reference service, *Reference USA* using “number of

employees” as a key index variable. The population of organizations was then stratified by employee size to allow organizations of all sizes in the Memphis metropolitan area to be surveyed and represented in sufficient numbers. There were 11 categories, which ranged from one employee to more than 9,999 employees. These were recategorized into seven categories-(1-9, 10-19, 20-49, 50-99, 100-249, 250-499, and ≥ 500). Of these, 100 organizations were sampled from the first 6 categories, with the entire population of 101 organizations from the seventh category also being sampled. In addition, 32 utility companies were added, resulting in 733 organizations.

After mailing the first batch of surveys, the team followed-up with postcards followed by a final batch of surveys, with surveys addressed to owners and risk managers of the organizations. The most frequent respondents were the manager ($N = 51$), owner ($N = 44$), president ($N = 37$), and chief and executive officer ($N = 34$). Other respondents include vice presidents, executive directors, principals, and a religious leader. Out of the 733 organizations sampled, 227 organizations returned the survey, generating a 31% response rate. Ten organizations declined to participate in the study for various reasons (e.g., “business is not being fully operational” and “due to the private nature of our business”).

The question of nonresponse bias always arises with any survey data (Groves, 2006; Singleton & Straits, 2005). The decision to respond to an organizational survey can be influenced by any number of random factors, including time constraints (Smith, 1997). Organizations that have adopted mitigation and preparedness activities could also have been more inclined to answer our surveys compared with those that have not. However, because of the absence of the information required for comparing response rates across the subgroups and the unavailability of similar estimates from other sources from which to compare (Groves, 2006); we are limited in executing any of the assessment methods recommended. Nonetheless, “valid results can be obtained from organizational surveys with lower response rates” (Smith, 1997, p. 367). Overall, we cannot discount the importance of assessing nonresponse bias; where possible, such assessments should be conducted (Groves, 2006; Smith, 1997).

Data

The data used in this study contain disaster information from a

stratified random sample of public, private, and nonprofit organizations involved in disaster risk issues and organizations that a major disaster may significantly affect. The target organizations included, but were not limited to, utility companies, schools, health facilities, chemical companies, pharmaceutical companies, financial institutions, religious institutions, transportation, and restaurants.

The first part of the survey consisted of questions regarding risk issues in organizations, such as availability of risk managers, amount of resources devoted to disaster planning, level of disaster concern, use of disaster information, impacts of disasters, engagement in mitigation and preparedness activities, sources of disaster information, and obstacles to disaster planning. The second part dealt with demographic information about organizational representatives that answered the surveys, such as age, length of residence in Memphis/Shelby county, duration in present position within the organization, and educational level.

This data set is unique in two ways. First, it contains rare information on reported organizational behaviors toward certain disaster preparedness and mitigation strategies. It is well known that gathering disaster information on organizations is difficult because some organizations are afraid of the potential consequences of divulging such information (Auf der Heide, 1989). Second, the data set also contains information on mitigation and preparedness measures for different types of hazards in an area subject to moderate seismic risk. There is a tendency for researchers investigating disaster preparedness in organizations to focus on specific hazards (Mileti, 1999). With its inclusion of a host of other hazards such as tornadoes and hurricanes, this data set also provides an opportunity to understand the extent to which Memphis/Shelby county organizations are prepared for disasters beyond earthquakes.

Dependent Variable

Our dependent variable—engagement in disaster mitigation and preparedness activities—is measured by the total number of mitigation and preparedness activities organizations adopt (see Table 1). We relied on the question, “Has your organization engaged in any of these activities over the past year?” Respondents answered “yes” or “no” for each of the 10 activities.² To generate an index of organizational disaster mitigation, we summed the responses for each organization to generate the total number of mitigation and preparedness activities. This 10-item index has high reliability (Cronbach’s alpha = .88).

Independent Variables

To capture sector differences, we generated three dummy variables for nonprofit, public, and private organizations. Although the determinants of organizational disaster mitigation and preparedness remain rather ambiguous, a few suggestions can be drawn from the scanty literature. In our exploratory Tobit³ regression model, we therefore control for organizational demographics such as organizational size, whether an organization is a single location or has multiple locations, and organizational service fields. (See the appendices for the distributions and descriptive statistics).

Researchers found firm size (measured as, resources and number of employees) to be an important, consistent, and positive predictor of disaster preparedness (e.g., Dahlhamer & D'Souza, 1997; Drabek, 1991; Quarantelli, Lawrence, Tierney, & Johnson, 1979; Webb et al., 2000). We measure organizational size by the number of full-time employees based on seven employee size categories in our data. We expect larger organizations to adopt more mitigation and preparedness measures than smaller organizations.

Adoption has also been influenced by ownership patterns, that is, whether an organization is single standing or part of a larger chain (e.g., Quarantelli, et al., 1979; Drabek, 1991; Sadiq, 2010). These studies found that single-location organizations are less likely to adopt hazard adjustments. Based on The Memphis Regional Chamber of Commerce categories, organizations identified their business statuses as being either a branch, headquarter, single location, or a subsidiary. We use a dummy variable coded "1" for single-location organizations and "0" for multiple-location organizations and expect the former to adopt fewer mitigation and preparedness measures than the latter.

Research also suggests that the adoption of disaster mitigation and preparedness measures also varies by organizational service fields such as education, health, travel, restaurants, lodging, entertainment, finance, and insurance industries (e.g., Dahlhamer & D'Souza, 1997; Sadiq, 2010; Webb et al., 2000). We therefore control for the organizational service fields using interaction terms for nonprofits that operate in the health or education fields.

Finally, based on the myriad studies done by Lindell and his colleagues, risk perception has also been found to positively influence the adoption of hazard adjustments. We therefore control for risk perception as suggested by the PADM (Lindell & Perry, 2011). Due to a lack of an explicit measure of risk perception in our survey, we rely on responses to the question, "Please indicate the extent to which the

following disaster impacts might adversely affect your organization?” Using a scale ranging from, “1” to indicate *Minor Adverse Impact*—to “5” indicating *major adverse impact*, respondents rated the following 13 disaster impacts: (i) damaged reputation, (ii) disruption in supplies or deliveries, (iii) inability to communicate with employees, (iv) inadequate number of employees, (v) loss of commercial goods, (vi) loss of customers, (vii) loss of data, (viii) loss of life, (ix) loss of life support (e.g., food and water), (x) loss relative to competitor’s loss, (xi) power outage, (xii) structural damage, and (xiii) transportation disruption. We generate a measure of risk perception (mean concern for disaster impact) by calculating the mean response across the 13 disaster impacts (*Cronbach’s alpha* = .81) (see Showalter, 1993; Sadiq, 2010).

Findings

Based on differences of means tests, our findings show that different organizational types engage in different numbers of disaster mitigation and preparedness activities. In addition, these findings are consistent with previous research in some respects, although contradictory in others. Table 2 presents the three differences of means tests.

Model 1 compares the mean mitigation and preparedness activity for public and nonprofit organizations. The result shows that the mean mitigation and preparedness activity for public organizations (7.14) is higher than that of nonprofit organizations (6.36); however, the difference in means between the two groups is not significant. This result is also confirmed by our Tobit regression model (in Table 3), where we control for organizational size, concern for disaster impact, and whether the organization is a single or multiple-location organization. Though the direction of this finding is consistent with Fowler et al.’s (2007) and Light’s (2008) finding that public (government) employees have the highest level of preparedness perception, the lack of statistical significance does not support Hypothesis 1.

Conversely, our findings support Hypothesis 2. With a mean difference of 2.45, Model 2 in Table 2 indicates that nonprofit organizations adopt more mitigation and preparedness activities (6.36) than private organizations (3.91) and this is statistically significant. The Tobit regression results (in Table 3) tell a consistent story. Holding all else constant, the nonprofit organizations in our sample are more likely to adopt more disasters mitigation and preparedness measures compared with private organizations. This result is statistically significant and in line with Fowler et al. (2007) and Light (2008), who found that

nonprofit employees had higher levels of preparedness perception than private sector employees.

Model 3 (in Table 2) also shows that the mean mitigation and preparedness activity for public organizations (7.14) is higher than that of private organizations (3.91). The difference in means between these two groups is 3.23 and is also significant. This result, which is consistent with the Tobit result, is also in line with Fowler et al.'s (2007) and Light's (2008) findings.

The control variables also provide illuminating results. Our regression results (Table 3) show that as the number of employees increase, the adoption of organizational mitigation and preparedness measures also increases. This result is also significant at 1% and suggests that organizations with more employees adopt more mitigation and preparedness measures, compared with those with fewer employees. This result is consistent with previous studies (e.g., Dalhammer & D'Souza, 1997; Drabek, 1991; Lindell & Perry, 2011; Quarantelli et al., 1979; Sadiq, 2010); as Dalhammer and D'Souza (1997) noted, organizations with a large number of employees are more likely to have the resources to adopt mitigation and preparedness measures

Consistent with Drabek's (1991), Quarantelli et al.'s (1979), and Sadiq's (2010) findings, with a predicted value of 2.45 points higher, our results also show that multiple-location organizations adopt more disaster mitigation and preparedness measures than single-location organizations, all else constant. This result is also quite significant the 1% level. However, our measure of risk perception, measured by degree to which an organization is concerned about the impact of disasters, showed a positive but insignificant result.

Recommendations and Conclusions

Overall, our findings suggest that although nonprofit organizations may face more challenges in raising funds, including possible donor-restrictions to their financial resources relative to private and public organizations, nonprofits are not resistant to adapting organizational disaster mitigation and preparedness activities.

Our exploratory qualitative interviews also offered an interesting speculation that, health (hospitals) and education nonprofits may adopt more mitigation and preparedness measures because they are mandated to do so by law because they house vulnerable populations such as, the elderly, the invalid, babies and children. As Aeberhard (2008) observed, "Health is often the most critical issue during the initial emergency

period of a disaster ...” (p. 17S). Hospitals are critical infrastructures that communities depend on for the provision of medical services in the aftermath of disasters. In ensuring that hospitals remain functional after disasters, communities may be able to respond more effectively and recover faster. Our results however, do not support this speculation; nonprofits in the health and education service fields in our sample are not driving the results (see Table 3).

Nonetheless, this study is not without its limitations that highlight the need to advance research in this area. First, there is a preponderance of private organizations ($N = 157$) compared with public ($N = 33$) and nonprofit ($N = 34$) organizations in the sample. Although this is not unusual due to the high number of private organizations relative to public and nonprofit organizations in the United States (Fowler et al., 2007), the small samples may threaten the validity of our findings. As a result, any attempt to apply the findings of this study should proceed with caution.

Second, this study is based on reported behavior of organizational readiness for disasters as opposed to the actual actions of Memphis organizations. As a result, it is difficult to ascertain if the nonprofits that we depend on during disasters would remain functional. In addition, nonprofits’ capacity to remain functional may also be influenced by the type of mitigation and preparedness activities (e.g., investments in structural mitigation activities as opposed to mentioning a potential disaster in an organizational meeting). This too may also vary by organizational size and field. For instance, smaller nonprofits with few staff are less likely to own property in spite of property tax exemptions and are, therefore, more likely to lease compared with larger nonprofits such as, hospitals and retirement homes, which require major investments in real estate property (Cordes, Gantz, & Pollak, 2002).

To be able to fully assess the sector’s preparedness level, more nuanced, nonprofit- centered, national data are needed, which would allow researchers to control for a variety of contextual factors (e.g., total revenues, more service fields, organizational age, and whether nonprofits own or lease facilities). We also recommend that researchers examine the effects of other relevant independent variables (e.g., past disaster experience, risk perception), on the extent to which nonprofit, private, and public organizations adopt different kinds of mitigation and preparedness activities. Relevant to such a study would be to apply and test the usefulness of the PADM in understanding the predictive power of such factors on the adoption of hazard adjustments at the organizational level of analysis.

Finally, this study summed up all 10 mitigation and preparedness activities together to generate a mitigation and preparedness index. This approach assumes and uses equal weighting of the activities. In an effort to understand why organizations adopt the various strategies, we suggest that future research assign different weights to the different activities. Such distinctions will help researchers to assess the extent to which nonprofits are prepared for disasters.

Based on the preceding, it is evident that the nonprofit sector has historically played a significant role in the nation's disaster response, exemplified by its ability to handle large-scale disasters (GAO, 2006, 2008). In addition, both state and local governments have come to rely heavily on the sector for social services provision and other mass care needs in both disaster and nondisaster situations (Smith, 2006; Smith & Lipsky, 1993). Cognizant of these important collaborative, supplementary, and complementary roles (Young, 2006a), we conclude that it is imperative to develop a better and deeper understanding of the extent to which the nonprofit sector itself, is prepared for disasters.

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Notes

1. The PADM generally supports the hypothesis that resource-constrained organizations are less likely to adopt mitigation and preparedness activities. The model also suggests other adoption determinants that are not available in the data set we used for this analysis (e.g., hazard

experience). Although the PADM pertains to household and individual disaster mitigation and preparedness, it does suggest that organizational preparedness may be influenced by a number of factors that are not represented here (e.g., risk perception).

2. Table 1 shows the proportion of organizations in each sector that adopted each of the 10 mitigation and preparedness activities. For example, 82.4% of the nonprofit organizations in our sample (28 of the 34) reported that they “Attended disaster meetings/training courses outside your organization,” compared with 30.6% of the private corporations (48 out of 157), and 87.9% of the public agencies (29 out of 33).
3. Because our dependent variable values are bound between 0 and 10, this indicates both left and right censorship suggesting that we cannot observe organizations that are below the lower bound of “0” (when organizations create a false sense of security), nor the upper bound of “10” (those organizations that are investing in more mitigation and preparedness measures than those covered in the survey; for example, organizations may have flood insurance, a measure that was not included in our survey). In such cases, Wooldridge (2003) suggests Tobit as the appropriate regression model of choice to obtain nonbiased and consistent estimates. Nonetheless, our results are consistent with OLS estimates and with Poisson—which is used for count variables (models not included in this article).

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Table 1. Organizational Adoption of Disaster Mitigation and Preparedness Activities, by Sector

Activity	Nonprofit (N = 34)	Private (N = 157)	Public (N = 33)
1. Attended disaster meetings/training courses outside your organization.	82.4%	30.6%	87.9%
2. Mentioned a potential disaster in an organizational meeting.	76.5%	59.9%	90.9%
3. Held disaster-related workshops/trainings within your organization.	73.5%	32.5%	75.8%
4. Discussed in an organizational meeting short-term responses to disasters.	73.5%	55.4%	90.9%
5. Arranged site visits by consultants or experts to better prepare for disasters.	55.9%	34.4%	66.7%
6. Discussed in an organizational meeting long-term strategies for recovery from disasters.	38.2%	22.9%	42.4%
7. Provided information to customers/members of the community on issues related to disasters.	50.0%	20.4%	60.6%
8. Assessed or evaluated vulnerability to disasters or estimated potential losses from disasters.	70.6%	45.9%	78.8%
9. Engaged in non-structural mitigation measures (e.g., securing computers).	64.7%	52.2%	60.6%
10. Engaged in structural mitigation measures (e.g., strengthening parts of a building).	32.4%	18.5%	39.4%

These figures represent the proportion of organizations, within each sector, that adopted each of the identified mitigation and preparedness activity.

Table 2. Outputs from Three Differences of Means Models.

	N	Mean	SE	t-test	p-value
<i>Model 1</i>					
Public	28	7.14	0.44		
Nonprofit	33	6.36	0.48		
Difference		0.78	0.66	1.18	0.2435
<i>Model 2</i>					
Nonprofit	33	6.36	0.48		
Private	145	3.91	0.26		
Difference		2.45	0.60	4.10***	0.0001
<i>Model 3</i>					
Public	28	7.14	0.44		
Private	145	3.91	0.26		
Difference		3.23	0.63	5.11***	0.0000

***Significant at 1% (two-tailed tests).

Table 3. Output from the Tobit Regression Model.

	Expected adoption of disaster mitigation and preparedness measures
Nonprofit organizations	2.25** (1.05)
Public organizations	3.23*** (-2.14)
Employee size	0.78*** (5.84)
Single location	-2.45*** (-4.32)
Mean concern for disaster impact	0.46 (1.48)
Nonprofit \times health	-1.35 (-1.01)
Nonprofit \times education	1.68 (1.04)
Private organizations (constant)	0.94 (0.69)
Observations	197
Pseudo R^2	0.098
<i>t</i> -statistics in parentheses	

*Significant at 10%. **Significant at 5%. ***Significant at 1%.

Appendix A

Distribution of Employee Size, by Sector.

Employee size	Nonprofit	Private	Public	Total	% of total
1-9	2	34	1	37	17.2
10-19	0	21	1	22	10.2
20-49	4	23	3	30	13.9
50-99	1	22	9	32	14.9
100-249	13	29	5	47	21.9
250-499	5	21	7	33	15.4
≥500	4	5	5	14	6.5
Total	29	155	31	215	100

Appendix B

Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Disaster mitigation and preparedness measures index	206	4.74	3.27	0	10
Public	224	.15	.36	0	1
Private	224	.70	.46	0	1
Nonprofit	224	.15	.36	0	1
Employee size	215	3.86	1.87	1	7
Single-location	218	.78	.42	0	1
Mean concern for disaster impact	220	3.64	.76	1	5
Health×nonprofits	224	.05	.23	0	1
Education×nonprofits	224	.03	.16	0	1
