The Outcomes of Natural Disaster Preparedness on Vulnerable Populations in America

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Introduction

Surveys have found that up to 30% of individuals will be exposed to one or more natural disasters within their lifetime (Jacobs et al., 2015). Ritchie et al. analyzed the impacts of natural disasters globally and found that within the past 20 years the United States have had over 7,615 deaths caused by natural disasters (2022). With major spikes in 2005 following Hurricane Katrina, 2011 following Hurricane Irene, earthquake in Washington, and major drought and wildfires in Texas, and in 2021 following Hurricane Ida, the cold wave, and the western wildfires (Ritchie et al., 2022). While natural disaster deaths have declined over the past couple of decades it is still important for individuals to prepare for unforeseen disasters that may occur. Within natural disaster exposure, experts concur that in the first 72 hours following a disaster, it is essential for individuals to have partial or complete self-sufficiency in case emergency responders are unable to send immediate aid (Mishra & Mazumdar, 2015). Researchers have identified that individuals living in low-income communities and older adults have a higher risk of injury or losing their life because they don't have as much power within their communities (Substance Abuse and Mental Health Services Administration, 2017). Hong et al. communicates that emergency preparedness involves multiple components like knowledge, adeptness, resources, and the actions of governments, organizations, and communities that can be used to significantly help individuals prepare, respond, and recover from unforeseen events (2019). In the United States, researchers and emergency management responders have found that accumulating a basic set of emergency supplies and composing a personal preparedness strategy are integral parts of the interwoven framing of personal disaster preparedness (Kohn et al., 2012). In Bechtel and Mannino's research, experts proclaimed that preparing for natural disasters plays a significant role in reducing future economic damage which results from natural disasters, insinuating that it is more cost-effective to invest in disaster preparedness rather than providing disaster relief (2021).

In the U.S., numerous government and nonprofit agencies, like FEMA and American Red Cross, have repeatedly encouraged individuals to develop and create household emergency plans. Regardless, despite the continuous effort, a vast amount of people do not prepare for natural disasters even when they know they should (Rivera, 2020). Because of the unpredictability of natural disasters, it is necessary for individuals and families to develop emergency preparedness plans. This should include a compilation of food, medication, clean

drinking water, power source (generators), and light source (flashlights), as well as having a distinct evacuation plan and knowledge of shelter locations (Burger et al., 2019). An alternate family preparedness plan could include focusing on household discussions and examining hypothetical disaster situations versus investing in physical mitigation strategies, which would increase the accessibility and engagement of preparedness activities at all socioeconomic levels (Rivera, 2020).

Likewise, Mishra and Mazumdar explain that disaster preparedness also has multiple interconnected components which are influenced by individual's behaviors (2015). Individuals' behaviors can be influenced by intrapersonal factors like demographics or interpersonal factors like social support. In Rivera's article, he evaluates how these factors can affect self-efficacy, which is critical as it is the belief you can succeed at a task or situation, greatly improving preparedness amongst communities (2020). Through the study, he found that as self-efficacy increased, so did the probability of developing a household preparedness plan (Rivera, 2020).

The Healthy People objectives of 2030 align with promoting and improving emergency preparedness and response by developing community resilience (Office of Disease Prevention and Health Promotion, 2023). Healthy People incorporate objectives that focus on increasing parent and guardian knowledge of their emergency or evacuation plan of their children's school and increase the proportion of the adults who have emergency plans and how to properly evacuate in the case of natural disasters (Office of Disease Prevention and Health Promotion, 2023). Incorporating these objectives will be an integral part of improving overall preparedness amongst vulnerable populations in America.

Theory Section

Social Cognitive Theory:

The Social Cognitive Theory (SCT) illustrates that behavior is influenced both directly and indirectly by goals, self-efficacy, outcome expectations, and social system factors and helps differentiate between the diverse outcome expectations (Sutton, 2015). These factors can determine the amount of effort individuals devote to modifying their behavior and act as a plan to action (Sutton, 2015). Within the SCT, self-efficacy helps moderate the relationship between perceived threats and enhances emergency preparedness behaviors in vulnerable populations within communities (Maceron et al., 2019). In Sutton's article he describes self-efficacy, belief in the ability to perform an action or in a situation, as an essential characteristic to take into account

when creating effective intervention programs, as it acts as a motivator to amplify risk-reducing behaviors (2015). Individuals who lack self-efficacy are most likely to misperceive potential risks and threats, which hinders their ability to respond properly to natural disasters (Maceron et al., 2019). In a study on household emergency plans, he concluded that individuals within communities with a high sense of self-efficacy in disaster preparedness believe that their actions specifically contribute to reducing their vulnerability and enhancing their recovery in the aftermath of a disaster (Rivera, 2020). In Marceron et al. study on the effects of self-efficacy in emergency preparedness, they found that people who have lower levels of perception of threats are less likely to engage in preparations for natural disasters (2019). Threat perception and outcome expectations allow for a better insight of the positive and negative ramifications of behaviors that affect one's preparedness.

Through Rezabeigi Davarani et al. systematic review, they used all the components of the SCT to analyze the factors associated with earthquake preparedness of households and found that overall individuals with increased levels of social support and connections within their communities were more prepared for disaster-related emergencies (2023). In the systematic review they analyzed a study relating to two clusters, Community-Orientated and Interactive and Games, which identified increased social cognitive factors like self-efficacy, outcome efficacy, and knowledge about disaster preparedness when incorporating interpersonal activities, like attending disaster-planning meetings, and participating in online preparedness games (Rezabrigi Davarani et al., 2023). Incorporating activities similar to the ones in the systematic review would allow vulnerable populations to gain a different perspective of how to prepare for natural disasters. These findings correlate to Abramson et al. article regarding how social support facilitates adaptive behavior and increases self-esteem, which is critical when trying to improve outcomes (2015).

Protection Action Decision Model:

Protective Action Decision Model (PADM) identifies that three core perceptions– risk perception, protective action perceptions, and accumulated perceptions– influence the basis for individuals' decisions on how to respond to an imminent or long-term threat (Lindell et al., 2012). PADM correlates the relationship between sociodemographic factors and preparedness levels, providing a unique understanding of disaster preparedness (Bronfman et al., 2019). Bronfman et al. recognized that preparation is contingent on the behaviors and experiences of

individuals (2019). Studies have found that protective action perceptions tend to be a better indicator of protective health behavior rather than risk perception (Scovell et al., 2022). Terpstra and Lindell study used the PADM to assess whether communities grasped the importance of the hazard- and resource-related attributes and how those attributes could improve their risk perception to become more adaptive (2013). PADM can also be used to examine individuals' preparation behavior as it is associated with mitigation behavior (Scovell et al., 2022). In Scovell et al. article, they found that to influence and develop protective action perceptions people need to be informed that the efficacy of preparedness behavior exceeds the cost of unpreparedness (2022). When analyzing preparedness actions this model helps identify if individuals have inaccurate perceptions of disasters and promptly correct their misperceptions (Lindell et al., 2012).

Corwin et al. found that 23 - 35% of the survey population had hindered preparedness due to four of the most frequent barriers: lack of hazard knowledge, inadequate preparedness knowledge, cost, and time commitment (2017). This model can also be used to distinguish between actual and perceived barriers populations may experience and how it factors into disaster preparation decision making (Corwin et al., 2017). Lindell et al. suggests the use of a risk communication program as an intervention to increase protective action perception as it redirects more resource-intensive towards hazard modifications by increasing self-efficacy (2012). PADM permits professionals to adapt adequate intervention strategies due to it assessing individuals behaviors and the likeness of disaster preparedness (Lindell et al., 2012).

Intrapersonal Factors

Within vulnerable communities, intrapersonal factors such as age, disabilities, and mental health can have a significant impact on natural disaster preparedness. Vulnerable populations that include pregnant and postpartum women, children, and the elderly have an increased risk of experiencing psychological distress after natural disasters (Dodgen, 2019). Age is a major contributor to how one is able to prepare for natural disasters and can greatly affect the outcomes of how an individual responds to natural disasters. In a study conducted by Heid et al., it analyzed the shift from the third-old age of functioning to a fourth-old age and how it can be characterized by an increase in biological and social vulnerability (2017). Older adults who are unable to prepare for natural disasters due to the lack of physical and psychological capacities or resources before a disaster may be exposed to facing greater risks or challenges after a disaster

occurs (Heid et al., 2017). In an article written by Rezabeigi Davarani et al., older populations also experience a reduction in motivation to prepare for disasters due to the feeling of being close to the end of life (2023). Infants through primary-school-aged children often go under-recognized, which can lead to them being underserved. Younger children may experience severe negative emotions associated with disaster trauma due to a lack of coping resources and having to depend on caregivers for protection (Le Brocque et al., 2017). Children are not always able to network outside of inner social circles to whom they are directly exposed, which can contribute to negative outcomes on preparedness due to the lack of control over if their caregivers have adequate disaster preparedness plans set in place (Gibbs et al., 2014). In a study conducted by Esterwood et al. found that children under the age of five who have experienced a natural disaster have a significantly increased risk of developing mental health and substance use disorders (2020). The study also expressed that natural disasters can have a negative outcome on adolescents' sleep behavior after experiencing distress reactions which can also increase the risk of developing mental and physical health problems in the future (Esterwood et al., 2020). Similar results were found in a study done by Maclean et al. that natural disaster exposure experienced in childhood, especially around the age of five, tends to negatively impact health, education, and future experiences like marriage and labor market outcomes, due to encountering natural disasters in this stage being more harmful than encountering it later in life (2016).

Individuals with disabilities are also greatly inhibited in natural disaster preparedness. A study on emergency preparedness among people with disabilities in the United States found that only one-third of people living with disabilities have emergency or evacuation plans (Smith et al., 2015). Correspondingly, Kohn et al. specified respondents with disabilities are intrinsically more likely to report feeling not prepared for disasters compared to the general public (2012). In an article written by Barbato et al., it was found that within physically disadvantaged populations, 40% of individuals considered medically vulnerable expressed a decreased feeling of preparedness compared to individuals without disabilities (2022). The study also concluded that although individuals with compromised health status are associated to have a higher risk of experiencing an increased morbidity risk, research has observed that individuals with compromised health conditions have decreased levels of preparedness (Barbato et al., 2022). Populations who may experience visual, hearing, or intellectual impairment or who may be socially isolated or living in an institution have an increased risk of being unprepared for natural

disasters because of not being able to comprehend what is happening (Smith et al., 2015). Many individuals have a difficult time accessing emergency services, lack transportation, and endure mobility limitations (Al-rousan et al., 2014). Similarly, Smith and Notaro identified people with disabilities may be unable to escape from hazards, lose critical assistive devices, or may be deserted when a community is forced to evacuate (2015).

Smith and Notaro's article eluded that only 29.5% of people with serious mental health illnesses reported having disaster supplies, and 49.2% of people with low to moderate mental illness have supplies (2015). Due to individuals with pre-existing mental health ailments having fragile and purposefully balanced lifestyles tend to lack developed adaptive coping strategies and are at a higher risk of becoming unstable (Esterwood et al., 2020). With natural disasters disrupting social equilibrium, it hinders many individuals with mental disorders from processing and responding due to unforeseen circumstances as a consequence of having insufficient ways of conceptualizing the impacts of said events (Esterwood et al., 2020). An article by Weems et al. predicted a link between existential concerns and mental health problems would be exacerbated depending on the level of disaster an individual is exposed to (2016). Numerous individuals with preexisting mental health problems, like anxiety or depression, reported experiencing elevated existential concerns and psychological symptoms in the aftermath of a natural disaster (Weems et al., 2016). Experiencing elevated existential concerns or becoming mentally unstable may interfere with how individuals prepare and respond to natural disasters in the future, as they may feel compelled to reassess the perceived value of their life at that point and contemplate if it is worth it (Weems et al., 2016). Mishra & Mazumdar found that people with the trait of anxiety tend to have a higher expectation of disasters due to their perception and expectation of unwanted outcomes but have lower levels of preparedness (2016).

Interpersonal Factors

Each individual varies in the level of preparedness that is needed in natural disasters. Education and support offered through social groups like family or community can help improve outcomes within vulnerable populations. In an article written by Ratnayake Mudiyanselage et al., it states communities should have a widely recognized emergency plan that should account for the unique needs of mothers and children due to infants being the most vulnerable to the outcomes of natural disasters (2022). The lack of education, access to resources, and social support can have severe negative impacts on infants and mothers, especially when infants are

unable to provide for themselves (Ratnayake Mudiyanselage et al., 2022). By assessing and being aware of the community needs, would allow for widely recognized emergency plans to be set in place, increasing preparedness within vulnerable populations and decreasing negative outcomes.

Social support is critical to improving the outcomes of natural disasters in susceptible individuals. In an article written by Abramson et al., developing community resilience where resources are readily available in a community and are capable of mitigating any negative impact of a collective shock, such as a disaster, could greatly improve the overall outcomes (2015). Activating community resilience through social support can assist in facilitating adaptive behaviors and navigating the psychological consequences of disasters by focusing on improving self-esteem and optimism. Providing knowledge and assistance to practical needs, as well as cultivating problem-solving and reasoning skills, allows individuals to gain a new perspective and better prepare for unforeseen events that may come (Abramson et al., 2015). It has also been proven that social support from family members or friends during a disaster can also reduce the negative outcomes individuals may face (Rezabrigi Davarani et al., 2023). Rezabrigi Davarani et al. found that individuals within vulnerable populations can have reduced negative associations amidst inadequate self-rated health and preparedness by living in a community with consequential advantages (2023). Whether that social support is tangible or intangible, it can empower vulnerable individuals within communities, making them more resilient and more likely to respond positively to the stressors natural disasters can bring (Heid et al., 2017).

An individual's social capital amongst neighbors can also greatly improve their outcomes (Heid et al., 2017). Social capital is essential as it encourages adaptive capacity within a community, supporting collaboration, shaping change, and ultimately influencing one's preparation behavior (Lawther, 2016). Lawther found that social capital within vulnerable populations helps facilitate unity which can be beneficial when trying to increase community and self resilience in the face of natural disasters (2016).

Organizational, Community, Environment, and Policy Sections

Addressing the need of vulnerable individuals and families throughout the various stages of natural disaster preparedness can reduce the physical and psychological harm in communities. Children, pregnant and postpartum women, and the elderly contribute to the vulnerable populations in communities and are at risk of experiencing higher psychological consequences

after natural disasters (Dodgen, 2019). Physically impaired individuals can also have an increased risk of detrimental outcomes due to the extraordinary challenges they face in emergency situations (Maceron et al., 2019). Al-rousan et al. conducted a nationwide survey on preparedness amongst older US adults and found that two-thirds of their study population had no emergency plan, have never been exposed to disaster preparedness educational programs, and/or had no knowledge of how to access relevant resources (2014). The survey also found that over one-third of the participants did not have a basic supply of food, water, or medical supplies in case an emergency situation arises (Al-rousan et al., 2014). In an article by Kohn et al., researchers analyzed the aftermath of events like Hurricane Katrina, highlighting the importance of individual and community self-reliance within the initial few days until disaster response is able to provide aid and resources to the community (2012). The various phases that are being monitored include but are not limited to community preparedness for a natural disaster, the response to a natural disaster, and how a community recovers from a natural disaster occurrence (Dodgan, 2019).

Al-rousan et al. found that within communities containing vulnerable populations, there is a need for comprehensive emergency preparedness plans during each phase of an emergency through cross-sector collaboration (2014).Cross-sector collaboration would allow various community organizations to come together collectively, sharing their expertise and resources to reduce or eliminate an issue of importance to a community they serve (American Public Health Association, 2020). Increasing community preparedness planning must account for and use complex organizational and socioeconomic factors to encourage community resilience and to equip vulnerable individuals better (Avchen et al., 2019). Encouraging state and local public health officials to invest in community-led approaches, the cross-sectional collaboration will boost the development of community leadership, building social connections, and advocating for an advance in health equity. (Avchen et al., 2019). The use of different organizations resources and advice allow for the opportunity to educate communities and provide assistance to better community members outcomes by improving preparedness.

With the rise of multi-hazard environments, it is critical to ensure and foster community preparedness. Analyzing external and internal factors of preparedness can help mitigate the negative effects both man-made and natural disasters can bring (Bronfman et al., 2019). The indirect effects communities encounter, which result from natural disasters, can contribute to

prolonged exposure to air pollution or contaminated drinking water leading to extensive disaster-induced nutritional deficits (Maclean et al., 2016). The environmental characteristics and attributes individuals are exposed to shape the perception of the surrounding risks and influence their preparedness behaviors (Mishra & Mazumdar, 2015). Mishra & Mazumdar found that people living in hazardous environments like earthquake zones, near riverbanks, vulnerable housing, etc. tend to have a higher risk perception and hazard anticipation due to being aware of their living conditions (2015). It is imperative that individuals have a knowledge of their environment and be aware of the potential risks they're susceptible to in order to prevent negative outcomes from occuring by being prepared.

In an article analyzing natural disaster preparedness investments, Bechtel and Mannino found that disaster policy has a direct and significant impact on various communities as it is meant to help individuals manage events that have caused substantial damage and potentially trigger posttraumatic stress disorders (2021). Between 2007 and 2017, a series of high-profile lawsuits involving the disproportionate impact of disasters on people with disabilities led Congress to implement inclusive planning in the Pandemic and All-Hazards Preparedness Act and the president signed to reauthorize the Advancing Innovation Act of 2019 (Dodgan, 2019). Dodgan expressed that maintaining awareness of various populations and vulnerable members of society has led to the establishment of three federal advisory committees, the National Advisory Committee on Children and Disasters (reinitiated in 2018), the National Advisory Committee on Seniors and Disasters, and the National Advisory Committee on Individuals with Disabilities and Disasters (2019). The U.S. Department of Health & Human Services shares that the purpose of each of these committees is to evaluate and provide information on the medical and public health needs of each targeted population in regard to preparation for, response to, and recovery from all-hazard emergencies to better support the individuals physical, mental, emotional, and behavioral wellbeing (2023). Within these committees and acts, nonfederal experts also have the opportunity to offer advice and consult the targeted communities for preparedness and response activities and assess medical and public health needs (Dodgan, 2019).

Congressional funding is a key contributor to public health preparedness and response at the federal, state, local, and territorial levels. Decreasing overall public health funding has a negative impact on capability functions as well as decreases the availability of resources in numerous local and state preparedness and response programs (Murthy et al., 2017). In Bechtel

and Mannino's article, they included the Consolidated Federal Funds Report from 1985 to 2010 and found that federal authorities spent thirty times the amount of tax dollars on disaster relief rather than investing in preparedness (2021). Bechtel and Mannino incorporated that the cost of Hurricane Katrina could have been reduced from $100 billion to $7 billion if the government invested further in disaster preparedness resources as it cost significantly less than providing disaster relief (2021). Focusing on long-term investment on natural disaster preparedness will greatly reduce the overall economic cost both the individual and the U.S. government (Bechtel & Mannino, 2021).

Interventions

Interventions reduce the negative consequences of unpreparedness in communities by facilitating safety, destigmatizing stress reactions, promoting community resilience, and normalizing seeking aid. Intervention strategies like providing psychoeducation to communities will help address disaster reactions, provide coping and resilience strategies, and will bring awareness to the opportunities to receive disaster assistance and services (Houston et al., 2016). Interventions also allow communities to visualize the benefits of being prepared before, during, and after disasters and promote self-efficacy (Houston et al., 2016).

Dodgan expressed that understanding and identifying populations with a high risk for adverse consequences following a natural disaster creates room for interventions to be implemented (2019). When you recognize populations at risk, it becomes more manageable to provide education to the public as you are aware of the disparities and behaviors associated with those populations. Providing education on disaster prevention and preparedness plans can increase individuals' self-efficacy and risk perception, leading to improved outcomes (Rivera, 2020). Vulnerable populations who lack knowledge of the consequences of natural disasters tend to have a false sense of confidence and lower risk perception. In Rezabrigi Davarani et al. systematic review they identified a significant difference in preparedness behaviors among individuals with varying knowledge levels (2023). The review established that participants who reported having preparation knowledge and social connectedness were associated with being more likely to be prepared for disasters with emergency kits and written plans (Rezabrigi Davarani et al., 2023). By increasing vulnerable populations' education it can lead to reduced disaster-related fears and having an increased perception of disasters causing injury, improving their self-efficacy which will allow for better outcomes (Abramson et al., 2015). In a systematic

review written by Houston et al. they describe that efficient disaster psychoeducation as a strategy to normalize perceptions of disaster reactions, correct misperceptions and reduce the stigma of stress reactions (2016). Psychoeducation, combination cognitive-behavior therapy, group therapy, and education, can offer a more accessible way to receive education to vulnerable populations within communities and provide useful material that can be retrieved anonymously, which would not affect or hinder individuals confidence (Houston et al., 2016).

Response intervention (RI) provides another opportunity for vulnerable populations to adapt and learn disaster preparedness (Lawther, 2016). In Lawther's article which evaluated natural disaster intervention and recovery, he expressed that response intervention was designed to facilitate adaptive capacity that requires both gradual and community participation (2016). Community and social support are key factors in natural disasters amongst vulnerable populations. He suggests adapting a smaller scaled response as it prioritizes community recovery and reduces the detrimental consequences of people within communities who are at risk of becoming more vulnerable following a natural disaster (Lawther, 2016). This correlates to fostering social connections within communities as it promotes preparedness and resilience (Avchen et al., 2019). When individuals gain an adaptive capacity it encourages them to modify negative behaviors in order to support positive outcomes (Ronan et al., 2015).

Encouraging families and individuals to assess their environments and develop a preparedness plan is another critical aspect of decreasing negative outcomes on vulnerable populations in the United States. By taking into account disabilities and mental health it allows vulnerable populations to instill and adopt better preparation which minimizes negative outcomes. In Abramson et al. article, self-efficacy and resilience has been shown to be associated with better post-disaster mental health outcomes (2015). Overall, there are numerous external and internal factors that affect disaster preparedness in vulnerable populations. The most crucial factors that make interventions effective is focusing on improving self-efficacy and on the knowledge of proper disaster preparation (Rezabeigi Davarani et al., 2023). By focusing on vulnerable groups and being aware of their specific barriers, it allows for the use of strategies which makes it easier to connect them to resources and to their communities to boost their sense of efficacy (Rao et al., 2022).

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