

# Responsibilities of Healthcare Professionals during Natural Disasters and Mass Casualty Incidents

Haelin Lee<sup>1\*</sup>

<sup>1</sup>Gwinnett School of Mathematics, Science and Technology, Lawrenceville, GA USA

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## Abstract

Disasters and emergencies can strike at any time without leaving any time to prepare. Severe storms, hurricanes, wildfires, tornadoes, and floods are some of the natural disasters that frequently strike Georgia, USA. Many factors influence a community's exposure and vulnerability to disasters, including natural, artificial, and technological dangers. Floods, storms, droughts, and heatwaves are becoming more frequent and intense in Georgia. Climate-related natural disasters are becoming more frequent, as examined in this study, in light of three major disaster risk factors: expanding population exposure, increased population vulnerability, and increasing climate-related hazards. This study addresses the responsibilities of medical doctors with regard to natural disasters and mass casualty incidents.

*Keywords: Natural Disaster, Public Health, Health Care, Mass Casualty Incidents*

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## 1. Introduction

### 1.1 History

The state of Georgia in the United States is prone to a wide range of natural catastrophes including hurricanes, tornadoes, severe thunderstorms, wildfires, and floods. Georgians, and Americans in general, are at risk of disease epidemics (such as pandemic outbreaks) and man-made catastrophes (such as transportation accidents and terrorist attacks involving dangerous chemicals) (USGS, 2017). Disasters and emergencies can strike at any time and there is no time to prepare (Phillips et al., 2015). As a result, being well-prepared is critical at all times.

Throughout Georgia, thunderstorms are the most common form of natural catastrophe. These storms are capable of wreaking havoc and destroying entire towns and cities. Several northern Georgia counties were affected by the 500-year flood in September

2009. The flood caused \$150 million worth of damage and ten fatalities, including 20,000 homes, businesses, and other structures in 23 counties. As a result of this flood, 46 Georgia counties were declared federal disaster areas (Gotvald, 2010).

Hurricanes can strike Georgia from the Atlantic or the Gulf of Mexico, making it vulnerable to storms and hurricanes. Hurricane Katrina landed in Georgia on August 29, 2005, and heavy rain and damaging winds swept across the state's west (Gotvald, 2010). At least two people were killed and scores of homes and businesses were damaged when Katrina's ashes moved across the state. The price of gasoline shot up to \$6 per gallon after oil pumps in the Gulf of Mexico were disrupted, causing panic among consumers (Georgia Disaster History, 2019). As a result of Hurricane Katrina, Georgia received more than 100,000 Gulf Coast evacuees (Georgia Disaster History, 2019).

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\* Corresponding Author  
hhaelinlee@gmail.com

Advisor: Dr. Jay Om  
jo729@nyu.edu

## 1.2 Potential Causes of Natural Disasters in Georgia

Disruptions to a community's ability to function beyond its capacity to handle disasters on its own are known as disasters. Many factors influence a community's exposure to and vulnerability to disasters, including natural, artificial, and technological dangers. Floods, storms, droughts, and heatwaves are becoming more frequent and intense in Georgia. Temperatures are becoming more volatile and intense as a result of the growing levels of greenhouse gases in the atmosphere (Environmental Protection Agency, 2017). Rainfall has also become increasingly erratic and intense. Increasing hydrometeorological and climate phenomena worldwide suggest a possible relationship with human-caused climate change.

This research examines several natural disasters linked to climate change occurring with increasing frequency, in light of three major disaster risk factors: expanding population exposure, increased population vulnerability, and increasing climate-related hazards. Disaster risk models from 1971 to 2013 show that people's socioeconomic vulnerability and population exposure to catastrophes are linked to the frequency of these intense disasters (Environmental Protection Agency, 2017). Precipitation deviations are favorably linked to hydrometeorological events, whereas temperature and precipitation deviations are negatively linked to climatological events. According to this study, global climate change indices show substantial progress in addition to these positive consequences.

As the planet warms, so does our climate. Since the late 1700s, human activity has resulted in a 40 percent increase in atmospheric carbon dioxide concentrations. Increases in other heat-trapping greenhouse gases are also occurring. Gases such as these have warmed the Earth's surface and lowered its atmosphere by about a degree Fahrenheit (F) over the past 50 years (Environmental Protection Agency, 2017). In many places, increased evaporation and humidity and rainfall are benefits of global warming, but in others, it is a cause of drought.

Oceans and ice cover are also being affected by greenhouse gas emissions. Increasing ocean acidity has been linked to increased carbon dioxide-water

reactions, which produce carbonic acid. A one-degree increase in ocean surface temperature has occurred over the past 80 years. Warming hastens the spring thaw and forces mountain glaciers to recede. Even the massive ice sheets of Greenland and Antarctica are receding (Banholzer et al., 2014). Therefore, sea levels are rising at a faster rate because the terrain is sinking, and Georgia's sea level is increasing faster than other shores. Along the Georgian coast, sea levels are expected to increase by one to four feet over the next century if the oceans and atmosphere keep warming.

Wetlands and dry lands are getting submerged by rising sea levels, eroding coastlines, and increasing coastal floods. In the last two decades, hurricanes and tropical storms have become increasingly powerful. Scientists are not sure if the recent strengthening of these storms is a long-term trend despite rising waters. Nevertheless, as climate warms, hurricane winds and rainfall rates are anticipated to increase. It does not matter if the intensity of storms increases; as sea levels rise and storm surges increase, coastal houses and infrastructure are more likely to be flooded. When the water level rises, the frequency of storms can increase, resulting in an increase in the economic burden of house maintenance expenses, including home insurance. The consequence of rising water levels could be more significant along the shore, such as in the Savannah and Brunswick regions.

## 2. Infrastructure Damage and Human Fatalities Caused by Three Major Natural Disaster in Georgia

The most destructive tornadoes form from supercell thunderstorms, which are massive and strong storm systems. Supercells form about once every 1,000 storms and about every fifth or sixth supercell produces a tornado (National Weather Service, 2020). The late afternoon and evening are the most common times when tornadoes originate. Thunderstorms can form now that the sun has sufficiently warmed the land and atmosphere (National Geographic, 2019). Tornadoes arise when humid, warm air meets drier, cold air. A tornado can strike at any time of the year, but it is more likely to

occur in specific seasons or periods within an area. As the jet stream moves northward, the number of tornadoes increases (National Geographic, 2019). While May is the month with the most tornadoes, ferocious twisters in April are not uncommon. Later in summer, tornadoes are more likely in the north.

A whopping \$400 million in damage and 70 deaths are caused annually by tornadoes in the United States (National Geographic, 2019). Mighty winds demolish buildings and homes. A riverbed can be drained of its water by strong winds, which can also demolish bridges, flip trains, send automobiles and trucks flying, and peel the bark off trees. People can be thrown from great heights or killed due to being tossed around by strong winds. Flying shingles, shards of glass, doors, and metal rods strike the majority of individuals killed or injured in a tornado. The average number of deaths per year in the United States was higher before improved forecasting and warning measures were adopted.

Natural catastrophes harm millions of individuals globally annually. At least 100 individuals must be affected for a disaster to qualify as a disaster in the eyes of the International Federation of Red Cross and Red Crescent Societies. Advancements in technology have enabled more people to move to disaster-prone areas. Southern California's change from an agrarian lifestyle has led to population concentration in metropolitan hubs (Thomas et al., 2016). Disasters are predicted to cause greater damage in the future. Disasters deplete the resources of the areas in which they occur. Non-industrialized governments are less prepared to deal with large-scale disasters as they lack financial resources. Hurricane Katrina and other recent events serve as a sobering reminder that even developed countries, such as the United States, are not exempt from natural disasters.

In Georgia, there are usually six days a year when tornadoes are reported. This season is the most likely time for tornadoes to occur, with the peak occurring around April. Mid-afternoon to early evening is when tornadoes are most likely to form, but they can strike at any time or night (National Weather Service, 2022). Tornadoes that are powerful or violent (EF2 or higher on the Enhanced Fujita Scale) account for 37% of all tornadoes, with April being the month most likely to see these storms (National Weather

Service, 2022). Few EF-4 tornadoes have been documented in Georgia, but no EF-5 tornadoes have ever been recorded in the state. Tornadoes in Georgia are typically difficult to observe because of the rain and hail surrounding them, and the mountainous terrain can also hamper a tornado's visibility.

### **3. Post-Disaster Health Problems in Survivors**

Civilization cannot function when a natural disaster occurs. Calamity has ramifications beyond the physical, affecting people psychologically and socially. Many natural disasters occur rapidly and inflict significant damage (Bonanno et al., 2010). Unfortunately, the psychological effects of disasters have proven incredibly difficult to quantify owing to their unplanned and chaotic nature.

The psychological toll of a disaster on survivors has been frequently overestimated in published reports. These reports indicate that many, if not most, survivors would suffer from posttraumatic stress disorder (PTSD). They also underestimate the disasters' more significant impact in other areas. Only a tiny percentage of people exposed to disasters suffer from significant psychological damage (Bonanno et al., 2010). Suicidal ideation, substance abuse, and stress-related health costs are just a few of the many problems associated with poor mental health that disaster survivors experience (Pourhosseini et al., 2016). Only a small percentage of those exposed to high levels of these disorders may have severe symptoms.

Psychological resilience can be observed in the aftermath of a disaster. In addition to chronic dysfunction, there are expected catastrophic outcomes. It can take a few months or more for survivors to regain mental equilibrium (Pourhosseini et al., 2016). More than half of those exposed merely experience brief symptoms of discomfort and continue to maintain a good course of functioning or resilience (Bonanno et al., 2010). Studies employing various strategies, including latent growth mixture modeling and other relatively advanced data analytic tools, have shown that resilient outcomes can be achieved.

#### **4. Health Care Solutions to Support Public Health after Natural Disasters**

Healthcare is one of the most critical aspects of disaster management. Disaster management has a direct impact on the health of disaster victims as well as on the performance of numerous sectors. To enhance and implement reforms in the health care system, it is vital to evaluate programs and highlight their shortcomings. Public health aims to guarantee that individuals live in conditions they need to be healthy (Philipsborn et al., 2020). The three fundamental activities of the public health sector—assessment, policy development, and assurance—are the foundation of a community's ability to respond to human needs, particularly those connected to catastrophes (Ghebreyesus, 2019). It is the responsibility of public health to lead an interdisciplinary and team-based approach to the continuing assessment of the health condition and needs of the public, develop and prioritize plans to address those needs, and assure access to essential health services throughout disaster recovery. The committee's recommendations and report are intertwined because the components of the public health recovery mission cut across all other sectors. Therefore, this study identifies the specific responsibilities of the public health sector.

Health systems have been strengthened, the International Human Rights Code (IHR) has been implemented, and multi-hazard disaster risk management techniques have been developed to better manage health hazards associated with hazardous occurrences. A risk-management approach should be used to develop emergency and disaster preparedness policies and programs (Ghebreyesus, 2019). There is a continuum of measures in which the focus is not just on responding to an incident or crisis, but also on enhancing the resilience of communities and countries against future emergencies and disasters.

Reducing risks, exposure, and vulnerabilities, as well as building the capacity to prevent or mitigate the effects of potentially emergency triggering events, are all tasks that health systems may and should help with. These include disease surveillance, mass casualty management, primary care, pre-hospital

treatment, chemical and radiation safety, mental health, and risk communication (Ghebreyesus, 2019). Emergency preparedness plans, specialized emergency health teams, infrastructure requirements, emergency response plans, and simulation exercises are additional capabilities that health systems have to manage non-routine or emergency hazards.

More healthcare personnel are required to treat patients who have been harmed by disasters in an unlimited variety of ways. Physicians must also know about local hazards, which necessitates the recruitment of extra doctors when a particular talent is needed to deal with calamity. The doctors' responsibility is to be disaster-ready on their own (Pourhosseini et al., 2016), and this involves preparing for the safety of the physician's family.

For disaster recovery to be successful, we will need more highly trained healthcare professionals so that they can care for their loved ones and patients. Survival packs, meeting places, and backup communication lines are only a few examples. Every so often, checking these is a good idea (Pourhosseini et al., 2016). In the case of calamity, physicians should stock their offices with the required supplies. International volunteers should check their travel documents and immunization records and take preventive drugs such as malaria pills and tetracycline.

#### **5. Conclusion**

Disasters and catastrophes can strike at any moment, leaving no time for preparedness. Natural disasters, such as hurricanes, tornadoes, severe storms, wildfires, and floods, are common in Georgia. Furthermore, community exposure and vulnerability to disasters are influenced by several factors, including natural and man-made disasters as well as technological threats. Consequently, disaster management requires a thorough examination of all facets of healthcare in the event of a catastrophe. Additionally, the healthcare department needs potentiality and relationships with other departments before a disaster occurs, which will result in fewer disaster challenges, particularly during the response phase. Therefore, data obtained from the experience and knowledge of disaster managers can be of great

significance during operational planning in disaster healthcare services.

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