# Disability Preparedness:

## Availability of ADA Compliant Emergency Shelters across Pennsylvania

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**Executive Summary**

Since the events of September 11th and Hurricane Katrina, the field and research associated with emergency preparedness have grown substantially. Despite the positive contributions of research, problems relating to the use of emergency shelters during the disasters have surfaced. Through anecdotal evidence and subsequent research, it was soon discovered that the needs of those with disabilities were not adequately addressed at many sites. Many potential residents were turned away at shelters due to their disability, or if allowed in, were forced to live in sites with barriers that could hinder activities of daily living.

To address concerns, emergency management officials became proactive in establishing protocol, policy and other initiatives to ensure the safety of residents in their jurisdictions. In an initial step to improve preparedness efforts, officials in many areas collaborated with other stakeholders to establish predetermined emergency shelters which would be open during a disaster. The state of Pennsylvania and its American Red Cross chapters jointly created a database containing over 2,500 predetermined sites that could be used during a disaster. These shelters include schools, community centers, churches and more. Shelter sites were categorized by a multitude of attributes including location, capacity, construction materials, and whether or not they are accessible or compliant with the Americans with Disabilities Act (ADA). Using the number and location of ADA compliant or accessible shelters across the state, this research looks to determine the ability of Pennsylvania American Red Cross chapters to adequately house their disabled residents in this preferred type of preselected emergency shelters.

The current analysis finds that less than 2% of disabled Pennsylvania residents can be housed in an ADA compliant shelter. These shelters, which are highly preferred shelter type, represent only 2.5% of all available shelters. Urban counties housed more than half of all ADA compliant shelters. However, ADA compliant shelters in rural counties offered higher capacity levels. The eastern portion of the state is home to 84% of these shelters. Accessible shelters, which rank below ADA compliant shelters, allow for almost a quarter of the state's disabled residents to be housed. Most are located within rural counties, yet urban counties having these shelter types had a better capacity to house their disabled residents. Shelter locations varied across the state as well. However, twelve counties do not have a single preselected shelter site within their boundaries.

To improve capacity levels, it is recommended that the state of Pennsylvania and its American Red Cross chapters work to increase the total number of available shelters statewide. Specifically the number of ADA compliant shelters must increase considerably. To ensure this increase, collaboration is recommended to support state adoption and enforcement of stricter design standards for newly constructed buildings in order to gain national certification. Finally, it is recommended that those with disabilities be included in the shelter selection process as these individuals can be a valuable asset to ensure all residents are housed in the safest environment possible during an emergency.

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**Introduction**

Across the nation, from the federal level down to the regional and local levels, entities are continuing their focus on emergency preparedness. Every state and numerous local governments have an emergency management office charged with improving the preparedness and response efforts of their communities. Demonstrating the effects Hurricane Katrina had on those with disabilities, a 2006 National Council on Disability report proved the needs of this community must be brought to the forefront to elicit the necessary changes in emergency preparedness for plan inclusion, increased funding, and policy formation to make certain that the importance of their lives is placed at the same priority levels as all others. [1]

During times of emergency and disaster, emergency shelters are now becoming the location of choice as they are usually the only place with electricity, food, medications, and medical staff housed in one stable building. Usually emergency shelters are located in buildings whose everyday purposes vary from schools and community centers to churches and private offices. [2] Often, shelter sites are chosen at the last minute and picked because they are large, in the center of the affected area, allow for access to neighboring residents, and have an owner willing to open their doors. This is often done without prior evaluation to ensure that selected buildings will fit the need to house those who are disabled safely and adequately. Once inside, it becomes obvious that the building's layout can cause more of a hindrance then help to its disabled residents. Door openings may be too narrow, elevators may not be available, and signage may not be properly located; all of which may cause further injuries and increase liabilities for those in charge.[2]

To determine priority of care and preparedness inclusion, the current research looks to determine the availability of accessible or Americans with Disabilities Act (ADA) compliant shelters within a state and to identify capacity disparities between urban or rural counties.

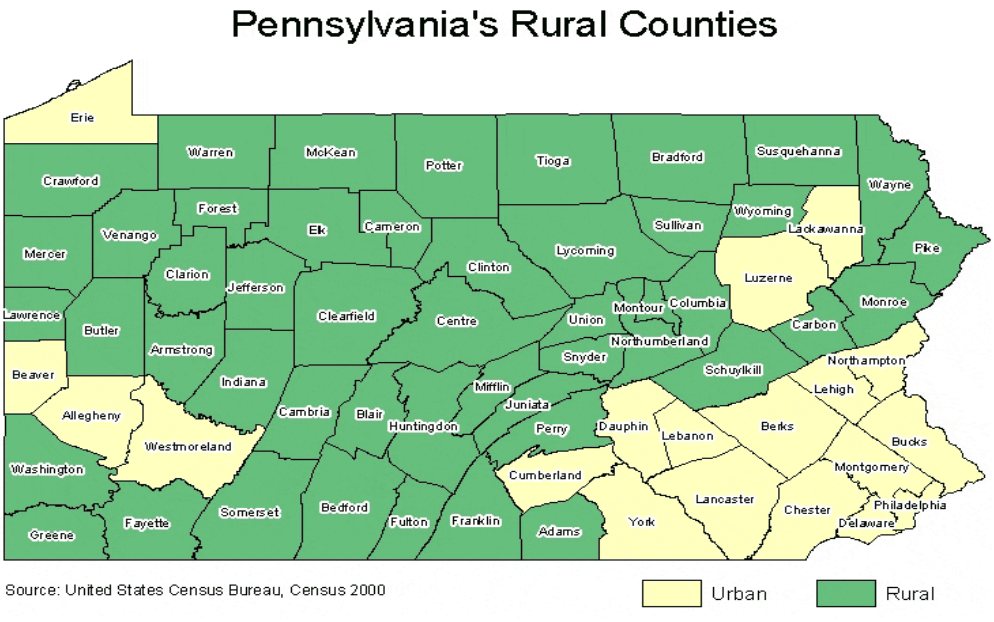
**Problem Statement**

Multiple studies have reviewed the effect disasters have on persons with disabilities and how inadequate preparation can hinder evacuation and decrease the chances of getting to a safer location. Research conducted in 2007 by the University of Kansas's Research and Training Center on Independent Living looked at the impact of Hurricane Katrina on those with disabilities. Nine interviewees with physical disabilities reported mobility difficulties associated with the lack of preparation and building accessibility. The temporary housing they were able to find had physical barriers that made activities of daily living difficult. They reported that in many cases, they could not find or were refused entry into the available accommodations. [3] While many shelter sites are open and run by various organizations during a disaster, the American Red Cross (ARC) is the most widely recognized provider of shelter services. "Under the National Response Plan, [the plan by which our nation prepares for and responds to all-hazard disasters across all levels of government and all sectors of communities], the American Red Cross is responsible for providing temporary mass shelters and food." [1, 4] Yet during Hurricane Katrina a representative from the National Spinal Cord Injury Association discovered that ARC shelters were refusing access to those with disabilities. When placing a call to the national Red Cross headquarters, she was told, "Our shelters are not for them. There are places for them, run by local health departments. We [can] hardly serve the **intact** people." [1] The American Red Cross had implemented a policy to refuse shelter access for people with obvious disabilities. [1] Many with disabilities were then referred to and ultimately turned away from "special need" shelters, which were intended to serve medically fragile individuals. However, "the existence of special needs shelters does not relieve managers of general shelters of their legal obligation to provide reasonable accommodations for people with disabilities in general shelters." [1] In order to prevent situations such as these from arising again, it must be a priority of the emergency management community to have an adequate number of predetermined emergency shelter sites that are fully accessible to those with disabilities.

**Background**

According to the 2000 Census, the Commonwealth of Pennsylvania is home to over 12 million residents.[5] Of that, 3.7 million residents (30.7%) report having a disability. Specifically, 954,934 (7.7%) classify themselves as having a physical disability. [5] 72.3% of the state's total population resides in urban counties. Pennsylvania and its surrounding northeastern states account for the country's lowest percentage of population having a disability, with only 19.2% being afflicted. [6] In comparison, states located in the South carry the highest burden of disability at 38.3%. An individual with a disability is one "who has a physical or mental impairment that substantially limits one or more major life activities, a person who has a history or record of such impairment, or a person who is perceived by others as having such an impairment."[7] The Center for Rural Pennsylvania defines counties within the Commonwealth as being rural or urban on the basis of population density. Counties having a population density of less than 274 people per square mile are classified as being rural. [8] This definition finds that 48 of the state's 67 counties (71%) are rural (Figure 1).

Figure 1



In an effort to determine the number, type and descriptions of available emergency shelter sites in the state of Pennsylvania, a database consisting of all ARC managed or supported emergency shelters within the state was compiled. This database consists of over 2,500 predetermined sites within the state that range from churches and schools to community centers and fire departments. The Federal Emergency Management Agency (FEMA) defines a shelter as "a place of refuge that provides life-sustaining services in a congregate facility for individuals who have been displaced by an emergency or a disaster." [9] Each shelter is categorized based on which county ARC chapter is in charge of its operations. Shelter descriptions include exact location coordinates, materials used in construction of the building, how the building is heated, capacities and ADA compliance or handicap accessibility, and more.

Disability compliance is based on the ADA. This statute, originally enacted in 1990 and amended in 2008, formed a national mandate eliminating discrimination based on disability. The ADA is the leading document regarding the legal requirements of buildings available to those with disabilities, whether used in an emergency or not. Specifically, Title II of the ADA prohibits discrimination due to disability by state and local governments in their attempts to provide services, programs and activities.[10] In efforts to increase knowledge regarding ADA compliance of emergency shelters, the Department of Justice released a 66 page document in 2007 which is to be used as a checklist offering a list of all possible parts of a shelter that should be accessible to be ADA compliant. [2] In comparison to accessibility, which is only determined through a building's availability of accessible entrances and exits, ADA compliance is dependent on a building's accessible drop off areas, measurements of sloped surfaces and door openings, door handles used, toilet and shower dimensions, tabletop heights in eating areas and much more. [2] To further promote ADA compliance, the DOJ also certifies states whose laws or ordinances meet or exceed the ADA Standards for Accessible Design. [11] Currently 6 states, Texas, Maine, Florida, Maryland, Maine, and North Carolina have received certification. [11] Further building

preparation requirements come from the Architectural Barriers Act, which requires buildings financed from funds granted by the federal government to be fully accessible. [12]

There is little information regarding what the appropriate benchmarks should be for shelter capacity of a state. Benchmarking is a tool used to compare peer organizations based on their size, patient mix and other areas of interest. [13] Having benchmarks allows for an organization to compare itself to its industry and primary competitors and focus management attention to areas that need improvement. [14] Currently, Florida is the only state to look at its public shelter deficit and implement a strategy to reduce and eliminate it. The state, following its statutory requirement to have "safe" hurricane shelter space, reduced its deficit through retrofitting existing buildings and construction of new schools following the Department of Education's Public Shelter Design criteria. [15, 16] Florida has been able to reduce its deficit and even create a surplus within 23 of its counties. Studies looking at the percentage of residents who would seek shelter during a disaster have ranged from 15-25% of a vulnerable population.[16]

This current research seeks to answer the following research questions:

- Does Pennsylvania have sufficient capacity to house its *entire population* in an ARC managed emergency shelter during a disaster,
- Does Pennsylvania have sufficient capacity to house its *disabled population* in an ARC managed *handicap accessible* shelter,
- Does Pennsylvania have sufficient capacity to house its disabled population in an ARC managed *ADA compliant* shelter, and
- Between *rural and urban* Pennsylvania counties, which has a superior capacity to care for its disabled residents?

**Literature Review**

*Emergency Preparedness*

Preparedness, along with response, recovery, and mitigation are the four phases of emergency management. [17] It involves many activities such as assessments, drafting response plans, training responders, resource acquisition and conducting drills and exercises. As part of the national strategy for preparedness and response, efforts are to be layered, with local entities expected to care for themselves and to be supplemented with help from state and federal entities only after local resources are fully consumed. [17] The literature on the discipline of emergency preparedness is plentiful and wide. After the events of September 11th and Hurricane Katrina, efforts to prevent and reduce the effects of disaster, whether man-made or natural, increased greatly. A search on EBSCO with the phrase "emergency preparedness" required in the title returned 695 articles alone. In one of the earliest articles on emergency preparedness, authors McEntire, Fuller, Johnston and Weber argue early comprehensive emergency management theory has a weakness in its limited components. To be more holistic, the authors suggest adding the concept of invulnerable development. This new concept was introduced to be a "process that attempts to decrease the quantity and quality of emergencies and disasters through liability reduction and capacity building." [18] Invulnerable development implied altering cultural attitudes toward disasters, linking development practices to vulnerability reduction and building emergency management institutions. [18] Because of the early idea of invulnerable development, research on emergency preparedness has become broad and is being undertaken from multiple angles, with at least two of the three new components being widely practiced today. However, literature on disability preparedness specifically is substantially less robust. Most studies are assessments of the effects Hurricane Katrina had on those with disabilities and progress reports of efforts to improve planning.[19, 20]

*Disability Preparedness Policy*

Before September 11, 2001 there were very few policies in place requiring the protection of the disabled population in emergency preparedness. Since then, there have been significant improvements. Executive Order 13347 was signed by President Bush in 2004 to "ensure that the Federal Government appropriately supports safety and security for individuals with disabilities in situations involving disasters." [21] Executive Order 13347 also brought about the creation of the Interagency Coordinating Council on Emergency Preparedness and Individuals with Disabilities. The council is charged with considering the needs, encouraging assistance, and facilitating cooperation of public and private entities as they relate to individuals with disabilities. Additionally, revisions of the National Incident Management System (NIMS) have suggested the addition of a special needs advisor to command staff. [22] The suggestion of this advisor is another step in having advocates at the federal level for full inclusion practices. The 2006 Department of Homeland Security Appropriations Act called for the appointment of a Disability Coordinator within the Department of Homeland Security. This coordinator assists other federal entities to ensure the needs of individuals with disabilities are included in emergency preparedness and relief plans. Specifically, the act put requirements on emergency shelters and temporary emergency housing. Recommendations requested the setting of national stipulations for shelters after a national study found many were not accessible to the special needs population. [23] On the contrary, there are those who believe developing new laws should not be a priority. Instead, they believe those who are in the positions of making and using pre-existing laws should take it upon themselves to be more familiar with them. [17, 24]

*Legal Requirements/Rulings*

Legal requirements are a major aid to those with disabilities as most are established in an effort to create non-discrimination standards. Under the Constitution, the Equal Protection Clause provides

protection for vulnerable populations. It requires that "no state shall deny to any person within its jurisdiction the equal protection of the laws," by prohibiting group-based discrimination. [25] Together the ADA and the Rehabilitation Act "forbid public and private entities from discriminating against those with disabilities," and suggest that society should provide accommodations for the needs of the disabled. [25] Additionally, all 50 states have some type of statute that addresses disability rights.

With the current increases in liabilities and potential lawsuits, planners must now examine their preparedness efforts for legal adequacy. Legal liabilities include negligence, wrongdoing, torts and a duty to plan. In emergency planning efforts, the tort of negligence can originate from failures to develop a plan and revise it as necessary.[26] A national review of state and urban area emergency plans in 2006 found functional annexes did not adequately address special need populations and recommended states designate a specific agency that is responsible for ensuring shelter operations and providing for those with disabilities. [26] Agencies having knowledge of their shortcomings may be subject to lawsuits and punishment in the event it is found their refusal to correct their inadequacies resulted in injury or even death to an individual. Recently, this has been seen in a case being heard by the Louisiana Supreme Court. The family of a Hurricane Katrina victim sued a New Orleans hospital alleging her death was caused by a lack of emergency preparedness by the hospital. The lawsuit focused on a letter the hospital's former vice president wrote warning the emergency power system of the hospital was susceptible to flooding, yet no changes were made to prevent it. [27, 28] Supreme courts of other states, as well as health care providers and their insurance companies watched the deliberations closely as Louisiana allowed the case to be classified as a general negligence case rather than as medical malpractice, which limited damages to be capped at half a million dollars. [28] The case was later settled between the two parties confidentially, but has left larger issues dealing with negligence liability unresolved. [27]

*Built Environment Theory*

Scholars and practitioners are both looking at the effect the built environment has on emergency evacuation for people with disabilities. In most situations, it is the design of buildings that creates the majority of evacuation barriers. [29] The ultimate role of the built environment should be to reduce the immediate effects of disaster for those within its boundaries, and more specifically, help to reduce the time needed and obstacles to overcome to allow an individual to be removed from a situation. [30] According to Hahn, current thinking on disaster planning focuses on helping individuals adapt to the environment they are in at the time of a disaster, rather than adjusting the environment to better accommodate the individual. [31] Specifically looking at the disciplines of design and architecture, the concept of universal design came into play and has been used to support the importance of adequate emergency evacuation abilities of people with disabilities. Universal design is based on seven design principles which are used to make buildings usable by the broadest group of users possible.[29, 32]

In other theories, the built environment is looked at by its influence on the behavior of individuals with disabilities during an emergency. According to Christensen, the built environment is where behavior occurs. When the built environment adequately accommodates the needs and the behaviors of the evacuating individual, planned avenues of egress may not be needed, as they are thought to be already built. [33] However this approach is relevant when there is sufficient time to evacuate from the area, and that is usually not the case in emergency situations. Other studies have looked at the influence of visual, hearing and mental disabilities on an individual's ability to interpret built environments. [30] All reported that changes to the built environment must be made in order to increase the accessibility of accessible routes of egress.

**Methods**

This research design incorporates a ratio analysis using two databases. Ratio analysis was used because it identifies an organization's operational strengths and weaknesses.[13] Initial information comes from the Centers for Disease Control and Prevention's Snap Shots of State Population Data (SNAPS), Version 1.5 database. This database, which pulls information from the 2000 United States Census, gives the total number of residents and the number with physical disabilities for each county and the state as a whole. Being an aggregate data sample, there are no personal identifiers to allow information to be traced back directly to one or more individuals. The SNAPS database was then compared with a 2008 Pennsylvania database containing over 2,500 pre-selected shelter sites that are managed or supported by a county wide ARC chapter. Pennsylvania shelter listings are a part of the ARC's National Shelter System. Shelter site attributes include location, capacity, construction materials, features inside the facility, ADA compliance, handicap accessibility and more. Due to incomplete records with the shelter database, records for shelters having a capacity fewer than 5 persons as well as those missing ADA compliance classification were excluded, resulting in a useable database of 1,726 shelter sites. Capacities were determined from shelters' available space as being a place of evacuation. Both data sources lack personal identifying information and no human subjects were used directly for this research, so it was determined by a university Institutional Review (IRB) Board Chairman that this project was exempt from IRB review.

The analysis was conducted on multiple levels. The first determined the capacity benchmark of the state of Pennsylvania as a whole using its total number of residents compared to the total capacity of all available shelters. Using research from the state of Florida cited earlier, a sufficient capacity benchmark is the ability to house at least 15% of the applicable population. Subsequent capacities were determined using the number of residents with physical disabilities compared to capacities of either

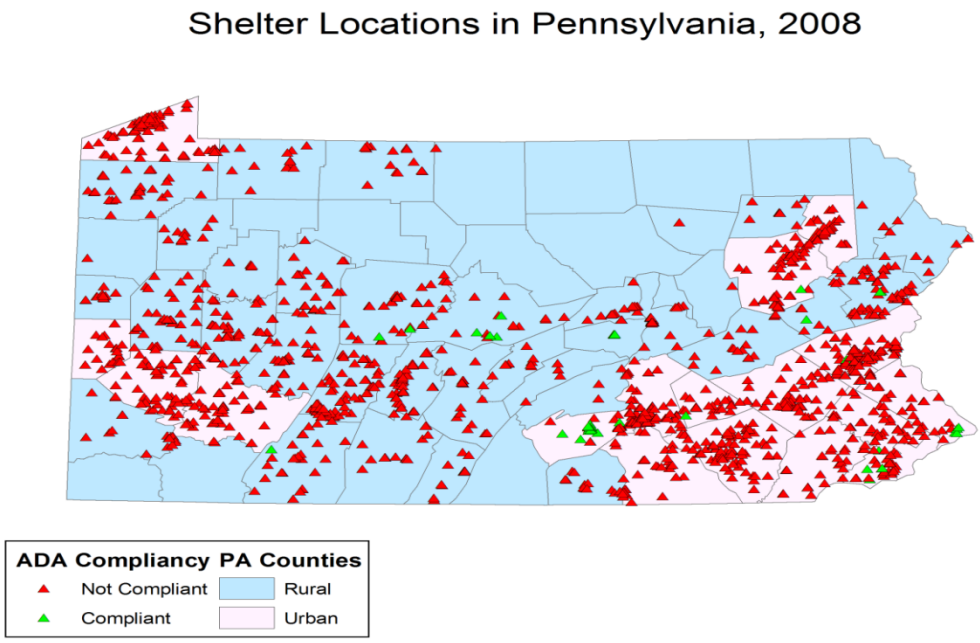
shelter type (ADA compliant or handicap accessible). The final level of analysis used the number of physically disabled residents in either an urban or rural county and compared them to the total shelter capacity in each county type. To determine if a county was classified as being rural or urban, the Center for Rural Pennsylvania's definition was used. The center's definition is based on population density and finds that those counties having a density less than 274 persons per square mile are deemed rural in nature. [8] Applying this definition finds the following counties of Erie, Beaver, Allegheny, Westmoreland, Cumberland, York, Lancaster, Chester, Lebanon, Dauphin, Delaware, Philadelphia, Montgomery, Berks, Bucks, Lehigh, Northampton, Luzerne, and Lackawanna are urban with the remaining 48 counties being rural.

**Results**

*Shelter Sites*

After removing incomplete records, 1,726 shelters were available for analysis (Figure 2). These shelters have the capability to house a total of 1,076,256 individuals during an emergency with an average capacity of 623 persons per shelter. Data analysis found a total of 482 handicap accessible shelters, representing 27.9% of all shelters available for emergency use. These shelters are able to house 233,902 individuals. On average, each site can house 485 residents. However, only 44 shelters of the total 1,726 available shelters met ADA compliance standards. These sites represent only 2.5% of all shelters, with a total capacity for 13,924 individuals. ADA complaint shelters were found to have the lowest average capacity with only 316 persons per shelter. The remaining 1,244 shelters, which make up 72% of all shelters available, lacked ADA compliant or handicap accessible designation. Collectively, these sites have the ability to house 842,354 persons, and have an average capacity of 677.

Figure 2



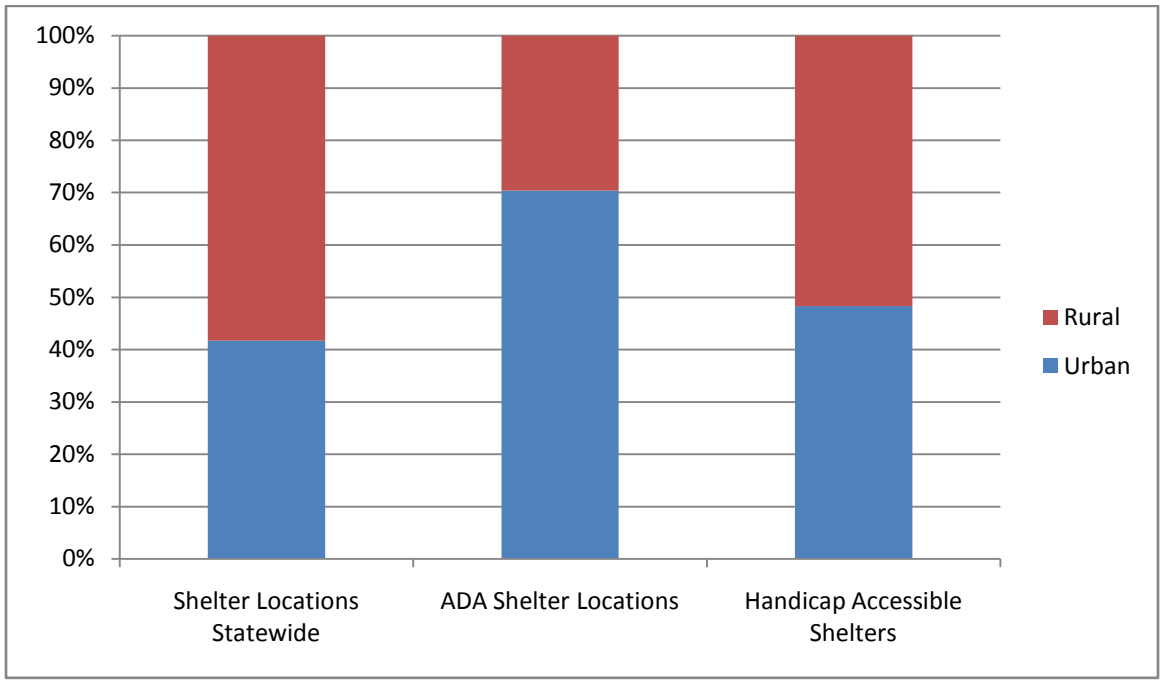

*Shelter Location*

Geographic location of shelters varied (Figure 3). Analysis found 41.7 % (813) of all shelters were located in urban counties. The county of Erie leads the way with 105 sites in its jurisdiction, with Lancaster County coming in second with 96. Allegheny County, home to Pittsburgh, has 50 total shelters in its jurisdiction, yet Philadelphia County, home to the city of Philadelphia, did not have a single ARC preselected shelter site within its boundaries. Other counties lacking shelters included Bradford, Cameron, Clinton, Elk, Forest, Franklin, Greene, Lycoming, Susquehanna, Tioga, and Warren.

Handicap accessible shelters were mostly located within rural counties, with the remaining 13.4% being located in urban counties. Cambria County leads the way with 73 handicap accessible shelters sites. Lancaster and Butler Counties follow behind with 42 and 41 sites in each of their areas. Thirty-one (70.4%) ADA compliant shelters were located in urban counties. Cumberland County led the way with

18 sites in its jurisdiction. Only 5 other urban counties, Delaware, Bucks, Lebanon, Leigh and Luzerne had ADA accessible sites. The remaining 13 ADA compliant shelters are located in 5 rural counties (Carbon, Centre, Monroe, Snyder, and Somerset). It was found that Allegheny and Philadelphia counties, which are home to Pennsylvania's two largest cities, did not have a single ADA compliant shelter within their boundaries. Breaking the state into East and West halves (with the East border of Potter County serving as a dividing line), it was discovered that western half of the state only had 7 ADA compliant shelters with the Eastern portion home to the remaining 37 shelters. Additionally, not a single urban county located in Western Pennsylvania housed an ADA compliant shelter.

Figure 3: Shelter Locations: Rural vs. Urban Counties



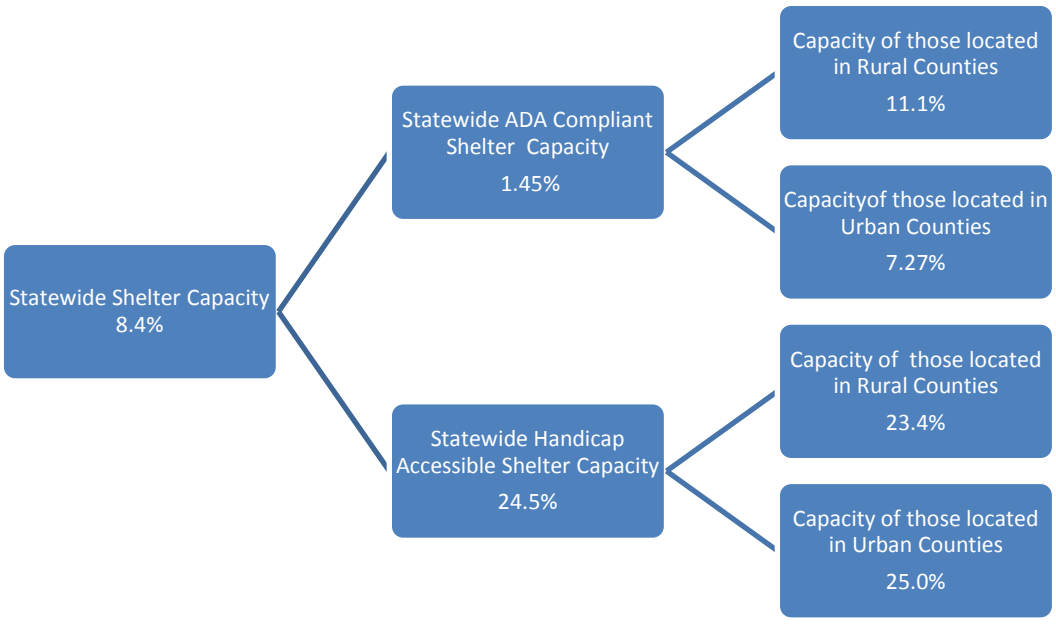

*Capacities*

In total, Pennsylvania was found to have the ability to house 8.4% of its 12.8 million residents in any shelter (Figure 4). However, Pennsylvania did fare better in its ability to house its disabled population within shelters which were handicap accessible. Shelters with this distinction have a total

capacity of 233,902 individuals or 24.5% of disabled Pennsylvania residents. This capacity is almost three times that of the state's ability to shelter its full population. On the other hand, due to the low number of ADA accessible shelters statewide, only 1.45% of disabled residents could be housed in such a shelter. With such a low percentage, this calls for the remaining 941,088 disabled individuals to be housed in facilities with a potentially high number of barriers.

Among all handicap accessible shelters located in rural counties, 23.4 % of disabled residents in these counties can be housed. On the contrary, 25.0 % of disabled residents in all urban counties can be housed in handicap accessible shelters. Further data analysis also provided the ability to compare holding capacities of ADA compliant shelters located in rural and urban counties. Sites in rural counties have the ability to house 11.1% of their disabled population. Urban counties fared less and showed an ability to house only 7.27% of their disabled population in such a shelter. It is interesting to note there are more ADA compliant shelters located in urban counties, yet rural counties have a higher capacity to house disabled residents in these shelter types.

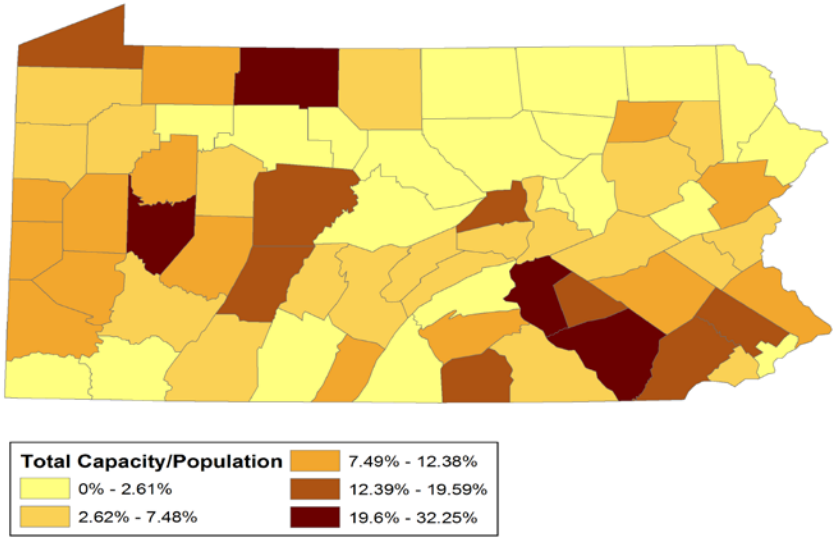
Figure 4: Shelter Location & Type Capacity Levels



Looking at individual counties and their capacity to house their total population, McKean, Armstrong, Dauphin, and Lancaster counties have the highest shelter capacities (Figure 5). Two of these four counties are rural. Seven counties have a county capacity ranging between 12.39% and 19.59%. Finally, 21 counties (31.8 %) have the ability to house less than 3% of their residents in a shelter.

Figure 5: Capacity levels by County

**Capacity Levels by County, 2008**




**Conclusions and Recommendations**

The state of Pennsylvania has varying levels of capacity to care for its residents in an appropriate emergency shelter. Overall, the state has the ability to house less than 10% of its total population in an emergency shelter, yet almost one quarter of disabled residents statewide can be housed in a handicap accessible shelter. Disabled residents living in urban counties have a slight advantage over rural residents in access to a handicap accessible shelter. The most important finding was that Pennsylvania lacks an adequate number of ADA compliant emergency shelters. Statewide, less than 2% of disabled Pennsylvania residents can be housed in fully accessible shelters. Disabled residents living in rural

counties have the best chance of getting to the most appropriate shelter, although distance and other geographic barriers may impede access in some areas.

Based on these findings, the following actions are recommended. Initially, the state must increase its total number and capacity of available shelters. Secondly, the state must increase its number of ADA compliant shelters statewide. To increase the availability of these shelter types, it is recommended that jurisdictions and facility managers apply for available federal funding and tax credits to retrofit existing handicap accessible shelters and make them ADA compliant. Since ADA compliant shelters are at their lowest in Western Pennsylvania, it is recommended that the number and capacity of ADA compliant shelters in this area increase, with urban counties in this half of the state working to gain the most number of shelters.

Looking specifically at urban counties statewide, those housing Pennsylvania's two largest metropolitan areas, Pittsburgh and Philadelphia, must dramatically increase their number of ADA compliant shelters, as neither has any in its jurisdiction. These two counties should work to increase the initial number of ADA complaint shelters in their jurisdictions to allow for a large capacity increase. To ensure the availability of new and adequate shelters, the state should implement an initiative to have all newly constructed buildings follow the DOJ's Standards for Accessible Design and Pennsylvania should achieve DOJ certification within five years for its laws pertaining to accessible design. Moreover, those counties and areas having the highest number of ADA compliant shelters should be studied in efforts to designate them as "best practice" jurisdictions.

Finally, it is recommended that those with disabilities be included in the shelter selection process. These individuals are a valuable asset in shelter site selection process. They will be able to help planners understand the needs of those with disabilities and what parts of a shelter may act as potential barriers. If determined before an event, these barriers may be able to be removed so that all housed in the shelter are housed in the safest environment possible. Even though these findings prove to be

disheartening initially, it is recommended that emergency management officials work to improve the availability of accessible emergency shelters for those in their communities. The findings of this research can be used as a foundation to improve the public's health as evidence for the need for policy initiatives to ensure shelters numbers are increased.

**Limitations and Alternatives**

There are a few limitations to this study. Incomplete data required the removal of 801 sites to be used in the analysis. A future analysis with a more complete shelter database may provide a more accurate account of current state capacity levels. This includes the findings of Philadelphia County not having any shelters within its jurisdiction. This may be due to this county and its ARC chapter not participating in the original database for unknown reasons. A future study may determine and include this county and its correct number of shelters and capacities, or exclude this county as a whole. Secondly, shelter databases from other states were not available for a state-to-state comparison. Further limitation comes from the lack of a defined and nationally agreed upon benchmark for the percentage of its residents a state should be able to house in emergency shelters. To improve on research, any future attempts to replicate this study should work to have these limitations removed.

For any future replication of this study, it is suggested that shelter databases from multiple states be used to make state-to-state capacity comparisons. These states should then be grouped into larger units corresponding to existing FEMA region groupings to allow for comparison on a national level. Finally, a viable alternative would be to look at the economic effect an increase in the number of available shelters have on response and recovery efforts. Specifically, this economic analysis would determine the amount every dollar used to create an appropriate shelter site, would save in response and recovery efforts.

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