Introduction

A common problem emerging from 9/11 and the Katrina disasters is that there is little available empirical data on the safe and efficient evacuation of persons with disabilities in an emergency. As a result, emergency plans place persons with a disability at risk for bad outcomes in times of a disaster or terrorist attack.[1] After the bombing of the World Trade Center's Twin Towers it was reported that only three wheelchair users survived, and after Hurricane Katrina 70% of the deaths were elderly or disabled was reported.[2,3] Statistics such as these have heightened governmental agencies and the public's awareness of the problem with the emergency evacuation plans for one our most vulnerable populations. It is important to determine the needs of these vulnerable populations in times of disaster so as to be fully prepared to ensure their safety in a disaster situation.

The purpose of this study was to assist in the maturation of an existing plan for emergency preparedness for individuals with a disability by establishing the size and dimensions of the needs of this population. Objectives for the study were:

- *Objective 1*: Determine the impact that individuals with a spinal cord injury have on an emergency evacuation plan by assessing their number and density in Cuyahoga, Geauga, Medina, Summit, Portage, Loraine and Lake Counties.
- *Objective 2*: Map 5310 Transportation vehicle availability and Red Cross certified shelters that are accessible.
- *Objective 3*: Describe assistive technology needs for safe evacuation from home, public building, workplace, or neighborhood during natural disasters or terrorist attacks.
- *Objective 4*: Describe whether or not persons with a disability have evacuation plans for home, public building, workplace, or neighborhood.
- *Objective 5*: Determine the perceived reliance on assistive technology and personal assistance in evacuation plans developed for home, public buildings, workplace, or neighborhood.
- *Objective 6*: Determine if disaster evacuation needs differ for groups based on different socio-economic status and urban versus rural areas.

The first approach to meet the objectives of the study was the use of GIS and U.S. Census 2000 data for mapping of the density of persons with a spinal cord injury, location of 5310 Transportation vehicle locations; Red Cross certified accessible shelters and disability related social service agency locations.

Mailed surveys were sent to 1, 250 individuals with spinal cord injury (SCI) who had received acute rehabilitation at MetroHealth Rehabilitation Institute of Ohio from 1990-2008. Out of those sent,

41 persons had died and 209 were sent back with because of wrong address with no forwarding address known. One hundred and fifty-one surveys were completed.

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Executive Summary

Purpose: The purpose of this study was to assist in the maturation of an existing plan for emergency preparedness for individuals with a disability by establishing the size and dimensions of the needs of this population.

- *Objective 1*: Determine the impact that individuals with a spinal cord injury have on an emergency evacuation plan by assessing their number and density in Cuyahoga, Geauga, Medina, Summit, Portage, Loraine and Lake Counties.
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- *Objective 5*: Determine the perceived reliance on assistive technology and personal assistance in evacuation plans developed for home, public buildings, or neighborhood.
- *Objective 6*: Determine if disaster evacuation needs differ for groups based on different socio-economic status and urban versus rural areas.

Sample: One hundred and fifty-one persons living in Northeast Ohio with a spinal cord injury (SCI)

Methods: A non-randomized self-administered mail survey. GIS AND U.S. Census 2000 for mapping of persons with spinal cord injury, location of 5310 transportation vehicle location, and Red Cross facilities.

Analysis: Survey data was analyzed using standard descriptive statistics and Chi-Square analysis for differences among groups.

Results: The average distance from an individual with SCI's home and an accessible shelter varied by county with Summit County residents being the closest to a shelter (mean miles= .45, SD = .22) followed by Lorain County residents (mean miles= .70, SD .97) and Cuyahoga county residents (mean miles= .82, SD = .49). Residents living in Trumble (mean miles= 17.79, SD = 1.88). Ashtabula (mean miles 17.47, SD = 2.92) and Wayne Counties (mean miles= 15.84, SD = .55) were the farthest away from a Red Cross Shelter. Cuyahoga and Lorain counties have the

most 5310 Transportation vehicles availabe than the other counties. Key survey results were that persons with SCI were likely to have evacuations plans for their home (71%), but not for public buildings (37%) or their city/town (23%). In addition, even those with evacuation plans have not practiced their plan for home (23%), public buildings (15%), or city/town evacuation (9%). A key finding for assistive technology was that ramp ownership varied by race. Seventy-two percent of whites and 45% of blacks indicated they needed a ramp for safe evacuation, but only 58% of blacks needing a ramp actually had one; whereas 89% of whites needing a ramp owned a ramp. The results indicated transportation avenues varied significantly by place of residence. Rural residents were less likely than urban residents to have access to Para Transit, a public bus system, rapid transit system, Amtrak, an airport and accessible cabs. Ownership of a back up generator for use in an emergency varied by race and place of residence. Whites tended to have a generator (28%) more than blacks (3%) and rural residents tended to own a generator (37%) more than urban residents (13%). Most respondents had a working smoke detector (98%). Only 29% of respondents had an emergency alert system and only 27% had an emergency kit. Seventy-eight percent owned a cell phone.

For safe evacuation from home, blacks (44%) were less likely to be able to get to a windowless room than whites (76%) and blacks (48%) were less likely to have a plan for a safe place to go to in their home than withes (69%). For safe evacuation from a public place, the findings indicate that having a plan to evacuate varies by race, with whites (43%) being more likely to have a plan than blacks (19%). In addition having someone with them in a public place varied by race with whites more likely to have someone with them to help (63%) all or most of time while blacks (48%) would have someone with them all or most of the time. Differences were found among racial groups for safe evacuation from city/town. Blacks were less likely to

have a plan (9%) compared with whites (27%), less likely to have practiced their plan (0%), feel that they could safely evacuate their city/town (69%), and blacks indicated that they would need help (81%) more than whites (62%) to evacuate their city/town safely.

Conclusion: Persons with SCI living in urban counties live closer to Red Cross shelters and would have 5310 Transportation vehicles available, if necessary, than those living in more rural counties. On an individual level, persons with a spinal cord injury do not seem to be very well prepared for a disaster. This can be seen in the finding that most respondents have not practiced their evacuation plans when they have one; and most only have a plan for home evacuation and not from a public place or their city/town. In addition, minorities seem to be even more vulnerable to adverse outcomes if a disaster were to occur. Low income individuals and blacks are less likely to own a cell phone, which can be an important emergency tool. In addition, persons in the lowest income category needing a ramp to safely evacuate their home are less likely than middle and upper income individuals to own a ramp. Lack of appropriate transportation for those living with a SCI outside of an urban area also indicated the potential for adverse outcomes if a disaster were to occur in those areas which required evacuation of towns.

Recommendations: The State of Ohio should have a registry of all persons with a disability so that Evacuation teams can have the resources available to meet the needs of these individuals. This would also be useful for emergency evacuation planning in counties where accessible public transportation is unavailable and distances from shelters is great and the lack of 5310 Transportation vehicles is limited.

Education for persons with a disability about how to be prepared for an emergency is needed. Although persons with SCI indicate that they have a plan to evacuate their home (71%) , they may have a plan have not practiced that plan (23%). The percentages of persons with SCI who have a plan to evacuate a public building or their city/town are much less than a plan for home (37% and 23%,

respectively) and having practiced either plan is even lower (15% and 9%)it seems that the education of persons with a spinal cord injury is needed.

Given the need for ramps at a home, the State in cooperation with communities should initiate a program, such like ones for fire alarms, that would provide this necessary piece of technology for persons with mobility difficulties. This is especially true for minorities where this study found only 58% of those needing a ramp to evacuate their home had a ramp.

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Review of the Literature/Historical Perspectives

A common problem emerging from 9/11 and the Katrina disasters is that there is little available empirical data on the safe and efficient evacuation of persons with disabilities in an emergency. As a result, emergency plans place persons with a disability at risk for bad outcomes in times of a disaster or terrorist attack.[1] After the bombing of the World Trade Center's Twin Towers it was reported that only three wheelchair users survived, and after Hurricane Katrina 70% of the deaths were elderly or disabled was reported.[2,3] Statistics such as these have heightened governmental agencies and the public's awareness of the problem with the emergency evacuation plans for one our most vulnerable populations.

Emergency response systems and emergency preparedness plans are, for the most part, designed for persons where escape or rescue involves walking, running, driving, seeing, hearing, and quickly responding to directions.[4,5] However, a major segment of every neighborhood, city, county, and state do not meet these criteria. The 2000 U.S. Census reported a total of 67,855,392 persons with a disability who are non-institutionalized live in the United States.[6] Out of these 21,151,506 are persons with a physical disability. The 2006 American Community Survey estimates that 31.6% of persons with a physical disability are employed.[7] In Cuyahoga county and its 6 adjoining counties (Lorain, Lake, Medina, Geauga, Summit, Portage) it is estimated that 286,757 individuals 5 years of age and older have at least one disability.[7] Between 2003 and 2007, 509 new traumatic spinal cord injuries occurred in Cuyahoga, Loraine, Lake, Medina, Summit, Portage and Geauga counties.[8] The data above underline the importance to consider persons with a disability when developing emergency evacuation plans.

In 2007, The Nobody Left Behind (NLB): Disaster Preparedness for Persons with Mobility Impairments project surveyed emergency managers in thirty states around the country that had experienced a recent disaster.[9] The project found:

- 57% of the emergency managers did not know the number of persons with mobility impairments within their jurisdictions.
- Only 27% of the emergency managers took the FEMA Special Needs, G-19.
- 80% did not have guidelines in place to assist people with mobility impairments and only 21% of these had any plans to develop guidelines.
- Only one site had included representatives from the Mayor's office on ADA and the Office of Aging.

The National Organization on Disability conducted a project, The Special Needs Assessment 4 Katrina (SNAKE), through a representative sampling of experience and observation to describe the impact of Katrina on the special needs population. The SNAKE project found that only 50% of those interviewed had policies, plans and guidelines for accommodations in place prior to Katrina and 54% of the respondents did not have a working agreement with disability and organizations.[10]

The Cuyahoga County and the City of Cleveland have an emergency plan,[11] a map of evacuation shelters,[12] and a preparedness guide, "Learn.Prepare.Act".[13] The county and city's plans include the mapping of Red Cross Certified Shelters, hospital and nursing homes, evacuation routes, evacuation route refueling locations, evacuation public transit assets and pickup points. These are all valuable pieces of information; however, important pieces of information are missing when considering the needs for persons with a disability. Enders and Brandt (2007) argue that it is important to include maps on the location of 5310 Transportation vehicle availability and social service agencies that support persons with a disability.[14] In addition, a designation of those Red Cross certified shelters that are wheelchair accessible should be included on maps for emergency planning.

Methods

The first approach to meet the objectives of the study was the use of GIS and U.S. Census 2000 data for mapping of the density of persons with a spinal cord injury, location of 5310 Transportation vehicle locations; Red Cross certified accessible shelters and disability related social service agency locations.

The second approach to accomplishing the study objectives was a self-administered mail surveys to persons with a spinal cord injury (N = 931) living in Northeast Ohio. Respondents were sent a $5.00 CVS Pharmacy gift card for completing their survey. The surveys contained demographic, social characteristic and injury items (e.g. age, race, education, employment status, and injury level), questions about evacuation plans for specific types of buildings (i.e. home, public buildings, work places) and neighborhood. In addition, respondents were asked to indicate what types of assistive technologies they would need if they had to evacuate and which technologies they currently own or would have access. Out

of the 1,200 surveys mailed, 41 persons had died and 209 were returned without a forwarding address. In all 151 completed surveys were returned. This was a much lower response rate than expected. It is unknown how many of those not returned were not due to death or wrong addresses. One of the problems with patient registries is that without continual follow-up to verify addresses it is hard to have the most up-to-date accurate data.

GIS software was used to generate maps for density of persons with SCI, location of 5310 Transportation vehicle locations and disability related social service agency locations. The Census TIGER shapefiles for county boundaries will be used for mapping. Addresses were coded into census tracks, which then will be geocoded for use in mapping.

Survey data analyses included descriptive statistics: frequencies, percents, averages, and standard deviations will be used to describe the study population. Chi-square statistical analysis was conducted to look at group differences between categorical variables (e.g. race by having a plan or not; gender by having assistive technologies for evacuation; rural/urban by needing assistive vehicle transportation).

Results

Mapping

Figure 1 displays the location of persons with SCI in relation to Red Cross Shelters and 5310 Transportation vehicles. The average distance from an individual with SCI's home and an accessible shelter varied by county with Summit County residents being the closest to a shelter (mean miles= .45, SD = .22) followed by Lorain County residents (mean miles= .70, SD .97) and Cuyahoga county residents (mean miles= .82, SD = .49). Residents living in Trumble (mean miles= 17.79, SD = 1.88). Ashtabula (mean miles 17.47, SD = 2.92) and Wayne Counties (mean miles= 15.84, SD = .55) were the farthest away from a Red Cross Shelter.

Survey

Table 1 gives an overview of the study's sample characteristics. Seventy-four percent of the sample were white and 26% were black. Forty-nine percent had a family income of less than $35,000 and

22% were working either part-time or full-time. The injury level of the sample was fairly evenly split between tetraplegia (44%) and paraplegia (52%). Most lived in single family homes; with 45% in a one level home and 38% in a multi-level home. Sixty percent of the sample lived in urban areas compared to 40% in more rural areas. Type of wheelchair used by study participants was mostly divided between power wheelchairs (39%) and manual wheelchairs (41%). About 15% of the sample did not rely on a wheelchair for mobility. The average age of the respondent was 50 ($\pm$ 11.7) and the average number of years injured was 15 ($\pm$ 8.7). On average, participants had 15 hours a day of help at home.

Objective 3 was to describe assistive technology needs for safe evacuation from home, public building, workplace or neighborhood during natural disasters or terrorist attacks. Part of Objective 5 was to look at the perceived reliance on assistive technology for evacuation; therefore, the tables will also include the results for Objective 4. Tables 2 to 4 describes the results of the analysis for Objective 3. Workplace technologies are not listed because the majority of those working (98%) did not indicate any technology needs that weren't being met by their workplace, all the workplaces had a plan to evacuate in case of a disaster and had practiced those plans. The results are reported by level of injury (tetraplegia/paraplegia), race (white/black) and place of residence (urban/rural). Chi-square analyses were utilized to look at the differences between groups and the different assistive technologies.

Looking in the columns indicating Tetraplegia and Paraplegia on Table 2, the results indicate that tetraplegics are more likely to need a ceiling lift (26%) than paraplegics (8%) to safely evacuate their home safely; more likely to need a Hoyer lift (39%) than paraplegics (11%); and more likely to need a door opening device (41%) than paraplegics (20%). The only difference among racial groups was the ability to get to a windowless room.

When looking at the need for assistive technology and whether the respondents owned the technology, we see that whites were more likely to own a home ramp (89%) when they needed one and only 58% blacks who needed a home ramp actually owned one.

Turning attention to Table 3, the results show that for safe evacuation from a public building tetraplegics are more likely to need an evacuation chair (32%) than paraplegics (13%). No differences

were found between groups on other assistive technology needs or ownership of assistive technology. Ramps were the most needed piece of assistive technology needed for the total sample (73%). This piece of equipment was less likely to never be available at a public building followed by door opening devices.

Table 4 shows the results of transportation needs of persons with a spinal cord injury by level of injury, race and place of residents. Results indicate that there are statistically significant differences between racial groups and place of residence on most transportation availability for evacuating a city or town. The exceptions are that there are no differences among racial groups for access to an airport or accessible cabs. Blacks are more likely to have access to all types of public transportation (range from 57% for Amtrak to 97% for bus system) than whites (range from 29% for Amtrak to 75% for Para Transit), urban residents are more likely to have access to public transportation systems (range from 50% for Amtrak to 96% for bus system) than rural residents (range from 8% for Amtrak to 57% for Para Transit).

Objective 4 was to describe whether or not persons with a disability have evacuation plans for their home, public buildings, or their neighborhood. And, Objective 5 was to determine the perceived reliance on assistive technology and personal assistance in evacuation plans developed for home, public buildings, workplace, or neighborhood.

Tables 5 to 7 outline the analysis results for investigating these objectives. The tables are divided by total sample, level of injury, race and place of residence. Looking at Table 5 the columns for racial groups, whites are more likely to have a plan to evacuate their home (76%) than blacks (51%), However, neither whites or blacks have practiced their home evacuation plan (25% and 13% respectively). Further down in the table, 69% of whites have a plan for getting to a safe place within their home and only 48% of blacks have such a plan. However only 46% of whites have practiced their plan compared to only 20% of blacks having practiced their plan. In addition, only 55% of blacks would be able to get to a windowless room if needed; whereas 76% of whites would be able to get to a windowless room.

There were no significant differences between groups on their need for help from another persons to safely evacuate their home. About half of respondents felt they would need help from someone else in

order to evacuate their home if they were in their wheelchair, out of their wheelchair, but not in bed, in bed, or in the bathroom. More than half of respondents felt they would need help evacuating their home safely if the respondent were in bed (58%) or in the shower (56%).

Having a plan for safe evacuation of a public building results are located in Table 6. Thirty-seven percent had a plan to evacuate a public building, and only 15% of those practiced their plan. Fifty-one percent felt that they would need help to evacuate a public building and 60% had someone with them when in a public building. Looking at the differences between persons with tetraplegia and paraplegia, tetraplegics are more likely to need help to evacuate a public building (59%) compared to paraplegics (47%); however, this difference was not statistically significant, but does indicate a great need for help by persons with SCI. Whites are more likely to have a plan for evacuating a public building (43%) compared to blacks (19%). However, for those who have a plan, whites (17%) nor blacks (10%) have practiced their public building evacuation plan.

Half of respondents indicated that they would need help from someone to safely evacuate a public building (51%). Whites were more likely than blacks to have someone with them all or most of the time when in a public building (63% versus 48%). Sixteen percent of blacks indicated that they never had anyone with them when in a public building. In addition, respondents felt that they would be able to give a stranger instructions on how to help them safely evacuate a public building (93%).

In the case for safely evacuating a city or town (Table 7), for the total sample, 23% had a plan for city/town evacuation and only 9% of those had actually practiced the plan. Eighty percent of respondents indicated they could leave their city/town safely in an emergency and 66% would need help to evacuate. Whites were more likely to have a plan (27%) compared to blacks (9%), and more likely to have practiced their plan (11% versus 0%). Blacks were more likely to need help from another person to safely evacuate their city or town (81%) than whites (62%).

Table 8 gives the results for the type of emergency equipment owned by respondents. Seventy-eight percent of respondents own a cell phone, 23% have a back-up generator, 29% have an emergency alert system, 95% have a working smoke detector, and 27% have an emergency kit. Owning a backup

generator significantly differs by level of injury, race and place of residence. Tetraplegics(33%) are more likely to own a back-up generator than paraplegics (15%), whites (28%) are more likely to own a generator than blacks (37%) and rural residents (37%) are more likely to own a generator than urban residents (13%). No significant differences were found in emergency alert systems, smoke detectors or emergency kit ownership among groups.

Table 9 highlights safe evacuation needs by family income level. The only assistive technology for home that showed significant differences between income levels was ramp ownership for those needing a ramp to safely evacuate their home. Fifty-four percent of those respondents in the lowest family income category (less than $15,000) indicated that they needed a ramp, but only 60% of those actually owned a ramp. Whereas, 64% of those in the highest family income category (over $35,000) indicated the need for a ramp, and 97% of those owned a ramp. Persons in the lowest family income category (56%) indicated less need for help to evacuate their home in an emergency compared to the mid (90%) and highest family income groups (78%). The highest income category group indicated a greater ability for leaving their city/town safely (91%) than the other two family income levels (59% and 88% respectively). As far as owning emergency equipment there was a difference with cell phone ownership and income level. Respondents in the over $35,000 group(87%) were more likely to own a cell phone than those with incomes less than $15,000 (67%) and those with family incomes between $16,000 and $35,000 (87%). The mid family income group (42%)was more likely to have an emergency kit available compared to the low (23%) and highest (19%) family income categories.

As with the other tables looking at socio-demographic and injury characteristics, income did not play a role in distinguishing whether respondents had a plan to evacuate their home, public building or neighborhood. Nor, did income distinguish between groups on whether or not evacuation plans were practiced.

Conclusion

Persons with a spinal cord injury do not seem to be very well prepared for a disaster. This can be seen in the finding that most respondents have not practiced their evacuation plans when they have one; and most only have a plan for home evacuation and not from a public place or their city/town. In addition, minorities seem to be even more vulnerable to adverse outcomes if a disaster were to occur. Low income individuals and blacks are less likely to own a cell phone, which can be an important emergency tool. In addition, persons in the lowest income category needing a ramp to safely evacuate their home are less likely than middle and upper income individuals to own a ramp. Lack of appropriate transportation for those living with a SCI outside of an urban area also indicated the potential for adverse outcomes if a disaster were to occur in those areas which required evacuation of towns.

Recommendations

The State of Ohio should have a registry of all persons with a disability so that Evacuation teams can have the resources available to meet the needs of these individuals. This would also be useful for emergency evacuation planning in counties where accessible public transportation is unavailable and distances from shelters is great and the lack of 5310 Transportation vehicles is limited.

Education for persons with a disability about how to be prepared for an emergency is needed. Although persons with SCI indicate that they have a plan to evacuate their home (71%) , they may have a plan have not practiced that plan (23%). The percentages of persons with SCI who have a plan to evacuate a public building or their city/town are much less than a plan for home (37% and 23%, respectively) and having practiced either plan is even lower (15% and 9%) it seems that the education of persons with a spinal cord injury is needed.

Given the need for ramps at a home, the State in cooperation with communities should initiate a program, such like ones for fire alarms, that would provide this necessary piece of technology for persons with mobility difficulties. This is especially true for minorities where this study found only 58% of those needing a ramp to evacuate their home had a ramp.

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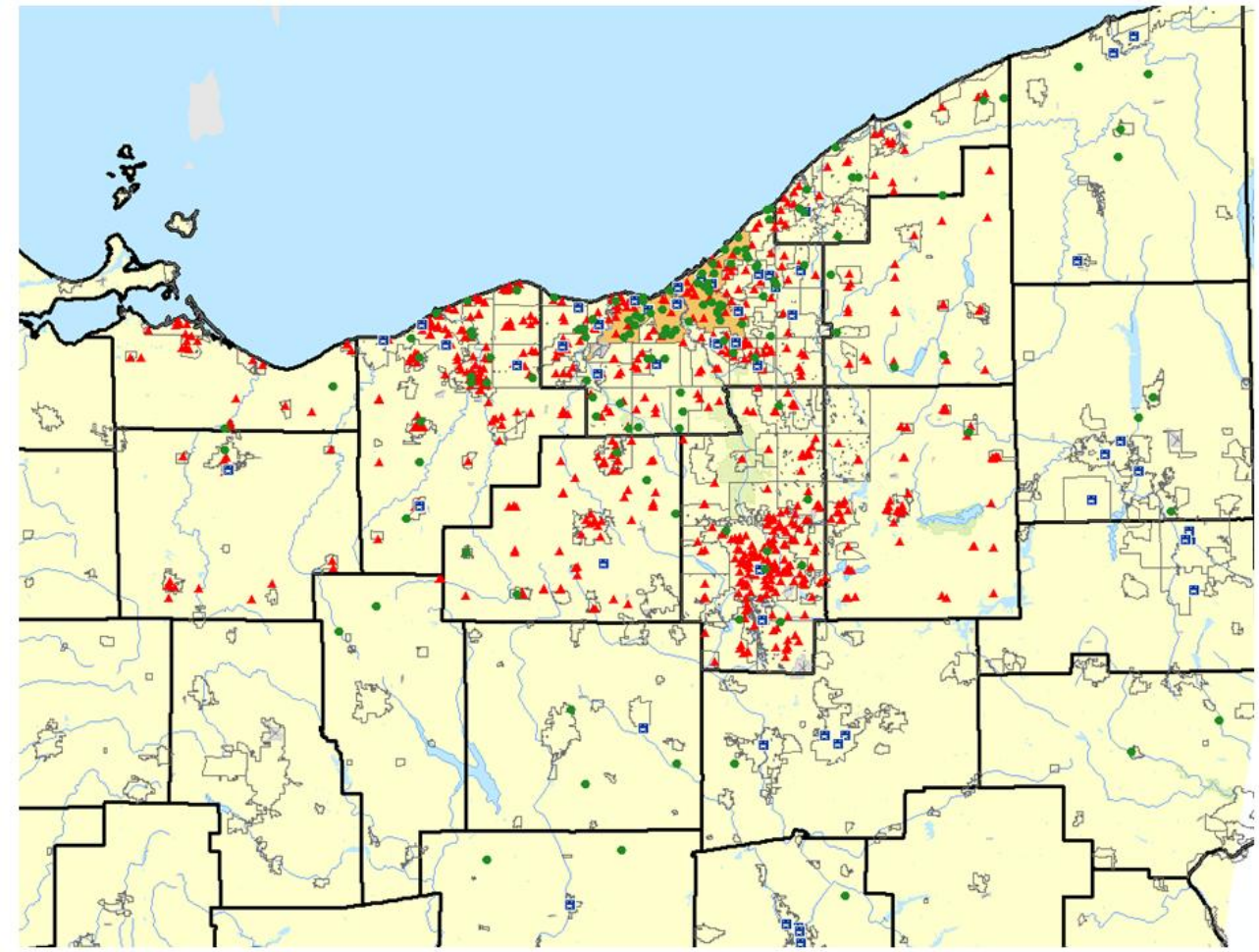
Figure 1. Location of Persons with Sci (Green dots), Accessible Red Cross Shelters (Red triangles) and 5310 Accessible Transportation Vehicles (Blue boxes)



Note: Some respondents lived outside of the counties under study. These are included on the map; however, Red Cross Sheleters are not included for these counties.

Table 1. Sample Descriptive Statistics (N = 151)

Characteristic	n (%)	
Race		
White	111(74.0)	
Black	39(26.0)	
Income		
Less than $15,000	40(27.0)	
$15,000-$35,000	33(22.0)	
$35,000-$50,000	18(12.0)	
Over $50,000	45(30.0)	
Refused	15(9.9)	
Employment Status		
Working	33(21.8)	
Unemployed Not looking	28(18.6)	
Unemployed looking for work	29(19.2)	
Retired	47(31/1)	
Student	11(7.3)	
Injury Level		
Tetraplegia	66(43.7)	
Paraplegia	79(52.3)	
Type of Housing		
One level/Single family	67(45.3)	
Multi-Level/Single family	56(38.0)	
First floor apartment	7(4.7)	
Upper floor apartment	11(7.4)	
Nursing Home	2(1.4)	
Other	83.4)	
Place of Residence		
Urban	91(60.3)	
Rural	60(39.7)	
Type of Wheelchair		
Power	59(39.3)	
Power Assisted	7(4.7)	
Manual	62(41.3)	
Don't use a chair	22(14.7)	
	Mean	**StdDevs.**
Age	50 yrs.	11.7
Years Injured	15 yrs.	11.8
Number of Hours Have Someone to help at home	15 hours	8.7

Table 2. Assistive Technology Needs and Availability to Safely Evacuate Home By Level of Injury, Race and Place of Residence

	Level of Injury				Race				Place of Residence			
	Tetraplegia N =66 n(%)		Paraplegia N =75 n(%)		White N =115 n(%)		Black N = 31 n(%)		Urban N = 90 n(%)		Rural N = 59 n(%)	
	Need n(%)	Own n(%)	Need n(%)	Own n(%)	Need n(%)	Own n(%)	Need n(%)	Own n(%)	Need n(%)	Own n(%)	Need n(%)	Own n(%)
Ceiling Lift*	**17(26)**	6(35)	**6(8)**	2(33)	17(26)	7(41)	6(19)	1(17)	15(17)	5(33)	8(13)	3(38)
Hoyer Lift*	**25(39)**	19(79)	**8(11)**	7(87)	27(23)	22(85)	6(19)	4(68)	20(23)	3(30)	13(22)	8(68)
Sliding Board	15(23)	13(93)	22(29)	20(91)	30(26)	27(93)	7(23)	6(86)	21(24)	20(95)	16(27)	13(87)
Stair Climbing Device`	10(15)	4(40)	15(20)	6(43)	19(16)	9(47)	6(19)	1(20)	16(18)	6(40)	9(15)	4(44)
Ramp*	40(61)	35(90)	45(59)	34(79)	72(62)	**63(89)**	14(45)	**7(58)**	46(67)	36(82)	40(53)	34(87)
Wheelchair Lift	14(21)	9(64)	16(21)	7(53)	23(20)	14(61)	7(22)	2(29)	17(20)	9(53)	13(22)	7(54)
Door Opening Device*	**27(41)**	12(48)	**15(20)**	9(60)	**28(24)**	16(59)	**14(45)**	5(39)	26(30)	8(52)	16(27)	13(53)

*A Pearson Chi-square test showed statistically significant differences between those groups in ‘bold’ type (p <=.01)

Table 3. Assistive Technology Needs and Availability to Safely Evacuate a Public Building by Injury Level, Race and Place of Residence

	Level of Injury				Race				Place of Residence			
	Tetraplegia N = 66 n(%)		Paraplegia N =75 n(%)		White N = 115 n(%)		Black N = 31 n(%)		Urban N =90 n(%)		Rural N = 59 n(%)	
	Need	Never Have	Need	Never Have	Need	Never Have	Need	Never Have	Need	Never Have	Need	Never Have
Evacuation Chair*	**21(32)**	15(79)	**10(13)**	22(73)	28(23)	30(73)	4(13)	7(87)	21(24)	20(74)	11(19)	17(73)
Chutes	13(25)	13(93)	16(17)	26(81)	22(19)	30(86)	7(23)	9(82)	19(22)	24(89)	10(17)	15(79)
Sliding Board	8(12)	16(89)	10(13)	31(91)	13(11)	37(90)	5(16)	10(91)	11(13)	31(91)	7(12)	16(89)
Stair Climbing Device`	17(26)	13(72)	29(38)	25(64)	38(33)	29(63)	10(32)	9(75)	31(36)	24(67)	17(28)	14(64)
Ramp	47(73)	3(8)	53(70)	6(12)	80(69)	6(9)	23(74)	3(16)	60(69)	6(11)	34(72)	3(8)
Wheelchair Lift	34(52)	12(41)	28(37)	15(40)	55(47)	19(36)	8(26)	8(53)	35(40)	16(39)	28(47)	11(41)
Door Opening Device	42(65)	6(15)	30(40)	7(14)	55(47)	9(13)	19(61)	4(21)	43(49)	4(15)	31(52)	5(13)

*A Pearson Chi-square test showed statistically significant differences between those groups in ‘bold’ type (p <=.05)

Table 4. Transportation Available for Evacuation of City or Town by Level of Injury, Race and Place of Residence

		Level of Injury		Race		Place of Residence	
Transportation Type	**Total Sample N = 151**	Tetraplegia n =66	Paraplegia n = 75	White n = 115	Black n =31	Urban n = 90	Rural n = 59
Para Transit*	15%	39(81)	48(80)	**63(75)**	**26(93)**	**68(91)**	**21(57)**
Public Bus System*	65%	45(84)	48(80)	**69(76)**	**29(97)**	**76(96)**	**22(52)**
Rapid Transit/Subway *	34%	19(40)	29(51)	**33(38)**	**18(75)**	**44(63)**	**7(17)**
Amtrak*	23%	17(36)	17(34)	**23(29)**	**12(57)**	**32(50)**	**3(8)**
Airport*	24%	28(56)	31(54)	46(51)	15(68)	**50(71)**	**11(26)**
Accessible Cab*	28%	22(55)	17(36)	32(43)	10(63)	**34(62)**	**8(22)**

*A Pearson Chi-square test showed statistically significant differences between those groups in ‘bold’ type (p <=.05)

Table 5. Safe Evacuation from Home in Case of an Emergency By Injury Level, Race and Place of Residence

		Level of Injury		Race		Place of Residence	
Do you have a plan to leave your home safely in an emergency?	**Total Sample (N =151)**	Tetraplegia N =66 n(%)	Paraplegia N = 75 n (%)	White N = 115 n(%)	Black N =31 n(%)	Urban N = 90 n(%)	Rural N = 59 n(%)
Yes*	71%	50(76)	51(65)	**90(76)**	**17(53)**	65(71)	42(70)
Have you practiced your plan?							
Yes	23%	15(23)	17(22)	30(25)	4(13)	13(23)	21(22)
Would you need help from another person to get out of your home safely if you were…….							
In your wheelchair	27%	49(84)	67(91)	94(87)	23(79)	28(34)	12(22)
Out of your wheelchair, but not in bed	46%	21(53)	40(58)	47(54)	16(59)	44(62)	26(57)
In bed	58%	37(57)	48(61)	68(58)	20(63)	55(61)	32(54)
In the bathroom/shower	56%	32(55)	47(63)	62(56)	18(64)	49(60)	35(61)
If it was not safe to leave your home, would you be able to get to a safety area such as……							
A basement*	**37%**	**21(32)**	**31(41)**	46(40)	10(32)	35(40)	21(36)
A windowless room*	71%	45(68)	57(74)	**90(76)**	**17(55)**	61(69)	46(77)
An upper floor	33%	16(25)	28(37)	39(34)	10(32)	32(37)	17(29)
The roof	11%	7(11)	6(8)	16(14)	1(3)	12(14)	5(8)
Have you planned for a safe place in home?							
Yes*	64%	43(62)	49(64)	**81(69)**	**15(48)**	89(61)	60(70)
Have you practiced your safe place plan?							
Yes	28%	19(44)	19(39)	**37(46)**	**3(20)**	21(39)	19(45)

*A Pearson Chi-square test showed statistically significant differences between those groups in 'bold' type (p <=.05)

Table 6. Safe Evacuation from a Public Building in Case of an Emergency By Injury Level, Race and Place of Residence

		Level of Injury		Race		Place of Residence	
Do you have a plan to safely evacuate a public building?	**Total Sample N = 151**	Tetraplegia N = 66 n(%)	Paraplegia N = 75 n(%)	White N = 115 n(%)	Black N =31 n(%)	Urban N = 90 n(%)	Rural N = 59 n(%)
Yes*	37%	30(46)	25(33)	**50(43)**	**6(19)**	36(41)	20(34)
Have you practiced your plan?							
Yes	15%	13(20)	8(11)	19(17)	3(10)	15(17)	7(12)
Would you need help from someone to evacuate a public building?							
Yes	51%	62(59)	15(47)	62(53)	15(48)	46(52)	31(52)
How often do you have someone in a public place with you to help? *							
Always/Most of the time	60%	45(68)	41(54)	**74(63)**	**15(48)**	51(58)	38(63)
Sometimes	35%	17(26)	31(41)	**40(34)**	**11(35)**	32(64)	19(32)
Never	5%	4(6)	4(5)	**3(3)**	**5(16)**	5(6)	3(5)
Would you be able to give a stranger instructions to help you evacuate a public building safely?							
Yes	93%	61(92)	73(96)	111(95)	29(93)	81(92)	59(98)

*A Pearson Chi-square test showed statistically significant differences between those groups in 'bold' type (p <=.05)

Table 7. Safe Evacuation from City/Town in Case of an Emergency By Injury Level, Race and Place of Residence

		Level of Injury		Race		Place of Residence	
Do you have a plan to leave your city or town safely in an emergency?	**Total Sample N = 151**	Tetraplegia N =66 n(%)	Paraplegia N = 75 n(%)	White N = 115 n(%)	Black N=31 n(%)	Urban N = 90 n(%)	Rural N = 59 n(%)
Yes*	23%	15(23)	20(26)	**32(27)**	**3(9)**	20(22)	15(25)
Have you practiced your plan?							
Yes*	9%	8(12)	5(7)	**8(11)**	**(0)**	9(10)	4(7)
Could you leave your city or town safely in the case of an emergency?							
Yes*	80%	52(79)	66(85)	**99(85)**	**22(69)**	**68(76)**	**53(90)**
Would you need help from another person to get out of your city or town safely if you were?							
Yes*	66%	49(74)	47(60)	**73(62)**	**26(81)**	62(69)	37(63)

*A Pearson Chi-square test showed statistically significant differences between those groups in 'bold' type (p <=.05)

Table 8. Types of Emergency Equipment Owned by Level of Injury, Race and Place of Residence

		Level of Injury		Race		Place of Residence	
Emergency Equipment	**Total Sample N = 151**	Tetraplegia N =66 n(%)	Paraplegia N = 75 n(%)	White N = 115 n(%)	Black N =31 n(%)	Urban N = 90 n(%)	Rural N = 59 n(%)
Cell Phone*	78%	46(70)	68(87)	96(82)	22(69)	69(77)	49(83)
Back Up Generator*	23%	**22(33)**	**12(15)**	**33(28)**	**1(3)**	**90(13)**	**59()37**
Emergency Alert System	29%	20(30)	23(30)	31(27)	12(37)	13(34)	12(20)
Working Smoke Detector	95%	64(97)	74(95)	113(97)	30(94)	87(97)	56(95)
Emergency Kit	27%	19(29)	21(27)	34(29)	7(22)	20(22)	21(36)

*A Pearson Chi-square test showed statistically significant differences between those groups in 'bold' type (p <=.05)

Table 9. Safe Evacuation Needs by Income Levels

	Family Income level					
	>=$15k N = 40 n(%)		$16-$35k N = 33 n(%)		>$35k N = 63 n(%)	
	Need	Own	Need	Own	Needs	Own
Assistive Technology for Home	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Ramp*	21(54)	**12(60)**	21(66)	**16(80)**	39(64)	**37(97)**
Transportation for City/Town						
	n(% Yes)		n(% Yes)		n(% Yes)	
Para Transit	25(89)		19(76)		39(78)	
Public Bus System	30(91)		18(72)		41(77)	
Rapid Transit/Subway	16(59)		10(45)		21(40)	
Amtrak	11(46)		5(25)		17(35)	
Airport	16(64)		8(38)		30(53)	
Accessible Cab	9(53)		10(45)		16(37)	
Have a Plan for Evacuating Home	26(65)		23(70)		47(75)	
Practiced Plan for Home	7(18)		12(36)		13(21)	
Plan to get to a safe place in Home	23(59)		27(82)		38(61)	
Practiced safe place plan	10(27)		14(42)		16(26)	
Have a Plan for Evacuation Public Building	11(28)		13(41)		27(43)	
Practiced Plan for Public Building	4(11)		6(19)		10(16)	
Have a Plan for Evacuation city/town	7(18)		11(33)		16(24)	
Practiced Plan for city/town	2(6)		5(15)		6(10)	
Need help to evacuate…….						
Home*	**22(56)**		**28(90)**		**46(78)**	
Public Building	19(49)		17(51)		32(53)	
City/Town	31(80)		20(61)		37(59)	
Never Have Someone to Help evacuate……..						
Home*	**6(43)**		**4(29)**		**14(10)**	
Public Building	3(8)		1(3)		2(3)	
City/Town	2(5)		1(3)		0(0)	
Can you give a stranger instructions to help you evacuate safely?	36(92)		30(91)		61(97)	
Can you leave your city/town safely*	**23(59)**		**29(88)**		**57(91)**	
	n(% Own)		n(%Own)		n(%Own)	
Emergency Equipment						
Cell Phone*	**26(67)**		**28(85)**		**55(87)**	
Back Up Generator	6(15)		10(30)		15(24)	
Emergency Alert System	15(39)		10(30)		1524)	
Working Smoke Detector	36(92)		33(100)		62(98)	
Emergency Kit*	**9(23)**		**14(42)**		**12(19)**	

*A Pearson Chi-square test showed statistically significant differences between those groups in 'bold' type (p <=.05)