Understanding the Disparities of Citizen Health Preparedness – Can Providers Help Close the Gaps?

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Health equity means everyone has an equal opportunity to take advantage of resources that will help them live a long, healthy life.[1] Health security is a state in which a community and its people are prepared for, protected from, and resilient in the face of incidents with health consequences.[2] The two are intrinsically linked.

Disparities in health outcomes are commonly explored with respect to traditional public health prevention and promotion programs and result in a more insightful understanding of the burden of infant mortality rates, complications from diabetes, and hospitalization rates.[3] More uncommon, however, is the application of such analysis to determine potential outcomes and indicators of public health preparedness. Such application may further define a given subset of the community's vulnerability to an emergency or large-scale disaster. With a renewed focus in Rhode Island on achieving health equity and reducing the inequities caused by social and environmental determinants of health, dialogue between the public health and healthcare sectors about addressing the gaps in health preparedness can be catalyzed. Access to adequate food, water, shelter, clothing, and proper medical care are often noted by the world community as basic human rights (i.e., decent standard of living) and therefore, also as elements needed to ensure health equity.[4] Should this same concept not apply during emergency times as well?

Public health preparedness is a relatively new discipline, with a generally limited evidence base.[5] Unlike other health promotion programs, health preparedness lacks best practices pertaining to the provider-patient role. According to a Federal Emergency Management Agency study, only 19% of American families reported being very prepared for an emergency.[6] In essence, 81% of American families lack essential components to being prepared, such as a three-day supply of food, water, and medications or plans for appropriate sheltering.

METHODS

The Behavioral Risk Factor Surveillance System (BRFSS) is a national telephone survey of randomly selected adults ages 18 and older. The surveillance system monitors behavioral health risks, access to health care, and health conditions that contribute to the leading causes of disease and death among adults in the United States. From January through December 2013, the RI BRFSS conducted random-digit dialed telephone interviews with 6,531 non-institutional adults in Rhode Island. An eight-question module was developed by the CDC and asked within the 2013 RI BRFSS. Four of the eight emergency preparedness questions are reported in **Table 1**. Two measures each were used to create combined indicators for "Being Prepared" and "Willingness to Follow Orders." Respondents were defined as "being prepared" if they answered "yes" to both questions (1) and (2). Respondents were defined as "willing to follow orders" if they answered "yes" to both questions (3) and (4). Respondents answered "yes", "no", "don't know", or "refused" to these four questions:

Having a disability was defined as described in Table 1. Health behaviors and health conditions were used as variables to identify the role, if any, that health status might have in citizen health preparedness. Optimal health behaviors (i.e., always wearing a seatbelt, obtaining influenza vaccination) were chosen from BRFSS data with high sample size. Having been diagnosed with diabetes was selected to compare individuals with a pre-existing health condition to those without using this same selection method. Having social support was analyzed by grouping always/usually

Table 1. Emergency Preparedness Indicators and Questions

INDICATOR	QUESTIONS MEASURED
"Being Prepared"	(1) Does your household have a written disaster evacuation plan for how you will leave your home and communicate with your family in the case of a large-scale disaster or emergency that requires evacuation?
	(2) Does your household have a 3-day supply of water, nonperishable food, and 3-day supply of prescription medication for everyone who lives there? A 3-day supply of water is 1 gallon of water per person per day.
"Willingness to Follow Orders"	(3) If public authorities announced a mandatory evacuation from your community due to a large-scale disaster or emergency, would you evacuate?
	(4) Some emergencies could be due to an infectious disease. If you were instructed to go to a public facility, such as a school, to get medication to fight a very infectious disease, would you go?
Note – Having a disability was defined by respondents answering yes to either of the following questions: Are you limited in any way in any activities because of physical, mental, or emotional problems? and/or Do you now have any health problem that requires you to use special equipment?	

having sufficient social support versus less than always/usually having sufficient social support. This variable was chosen to explore the relationship of social cohesion within citizen preparedness. When the two preparedness indicators were examined using income as a variable, a total of 30.2% and 29.0% of missing observations were present. No other variable had more than 20.1% missing observations. Bivariate analyses were conducted and confidence intervals (CI) were reviewed. A 95% CI reflects the stability of an estimate of prevalence. If the 95% CI do not overlap, a statistically significant difference between groups exists. To account for the complex sampling design, data were analyzed using SAS ® 9.3.

Figure 1. Disparities Observed with "Being Prepared" among Rhode Island Adults, 2013

"BEING PREPARED"		Met NEITHER Measure		Met BOTH Measures	
		Wght %	(95% CI)	Wght %	(95% CI)
Overall Prevalence	N=5289	25.6	23.9-27.2	19.9	18.4-21.4
Age	18-45	32.0	28.8-35.2	16.4	13.7-19.1
	45-64	24.3	22.1-26.6	18.2	16.2-20.2
	65 and Older	14.8	12.7-16.8	29.9	27.0-32.8
Sex	Male	23.2	20.7-25.6*	19.8	17.4-22.2
	Female	27.8	25.5-30.0*	19.9	18.0-21.7
Income Level	Less than $25,000	26.1	22.4-29.8	27.4	23.9-30.9
	$25,000-$49,999	24.3	20.9-27.6	21.7	18.5-24.9
	$50,000-$74,999	26.1	21.8-30.3	15.9	12.0-19.7
	$75,000 and Greater	26.2	23.2-29.2	13.4	11.0-15.7
Housing Type	Own	23.6	21.8-25.5	18.4	16.7-20.1
	Rent/Other	29.8	26.6-33.1	22.9	19.9-25.9
Marital Status	Married/Coupled	25.0	23.0-27.0	17.5	15.8-19.2
	Not Married/Coupled	26.2	23.5-29.0	22.6	20.0-25.1
Social Support	Always/Usually	23.5	21.7-25.3	20.0	18.3-21.6
	Some/Rare/Never	32.4	28.6-36.2	19.7	16.3-23.0
Disability	Yes	25.7	22.5-29.0	25.1	22.1-28.2
	No	25.4	23.5-27.3	18.3	16.6-20.0
Diabetes	Yes	19.7	15.1-24.2	26.2	21.8-30.7
	No	26.2	24.4-27.9	19.2	17.6-20.8
Flu Vaccine	Yes	22.8	20.7-24.9	20.6	18.6-22.6
	No	28.0	25.5-30.4	19.1	16.9-21.2
Seatbelt Use (Always)	Yes	24.5	22.8-26.2	20.7	19.1-22.3
	No	32.2	26.5-37.9	14.6	10.6-18.7

Wght %: weighted percent; CI: confidence interval
*CI overlap exaggerated due to rounding convention.

RESULTS

Figure 1 illustrates the disparities associated with being prepared. Overall, only 19.9% of the population met both measures associated with being prepared while 25.6% met neither measure. Of the two measures associated with being prepared, 23% of households had a written evacuation plan and 72% of households reported having a three-day supply of water, food, and medication for the household (data not shown). Age was identified as a predominant factor in determining one's level of being prepared. Older adults (ages 65 or older) were the most prepared (29.9% met both measures) with a significant disparity seen between this group and both categories under 65 years of age. Sex was observed, given very small CI overlap, to be a factor in the disparity seen among those being unprepared, with females reporting to have not met either measure more frequently (27.8%) compared to males (23.2%).

Having a disability resulted in a higher proportion of individuals meeting both measures of being prepared (25.1%) compared to those without (18.3%); however, all groups were similarly unprepared. Individuals who reported being diagnosed with diabetes were seen to be both less likely to be unprepared (19.7%) and more likely to meet both measures of being prepared (26.2%). This same trend was also observed with individuals who received an influenza vaccine and individuals who always wear a seatbelt. Individuals who were not married/coupled (e.g., widowed, separated, divorced, or never married) were more likely (22.6%) to meet both measures of being prepared. Individuals who reported not having social support available were more likely (32.4%) to have not met either measure of being prepared. Two observations can be made about housing type and income. Those reporting the smallest household income were the most prepared while those who rent or have another arrangement were the most unprepared.

Figure 2 depicts results of the population's willingness to follow orders. A total of 78.3% of the population met both measures of willingness to follow orders with 21.7% having not met both measures. When looking at the specific questions associated with willingness to follow orders, 93% of households would evacuate if public authorities mandated evacuation during an emergency. Similarly, 92% of households reported that in the event of an emergency due to an infectious disease, the household would go to a public facility to get treatment (data not shown). Figure 2 showed that sex was again a factor, with males more likely (25.3%) to not or to be unsure if they would follow orders. Similarly, the same disparity was observed between those who did not practice optimal health behaviors, those who were not married/coupled, and those with suboptimal social support. Income varied significantly only between the two bipolar groups. No difference was observed by age, disability, health condition, or housing type.

Figure 2. Disparities Observed with "Willingness to Follow Orders" among Rhode Island Adults, 2013

"WILLINGNESS TO FOLLOW ORDERS"		DID NOT Meet BOTH Measures		Met BOTH Measures	
		Wght %	(95% CI)	Wght %	(95% CI)
Overall Prevalence	N=5409	21.7	20.1-23.3	78.3	76.7-79.9
Age	18-45	21.7	18.7-24.7	78.3	75.3-81.3
	45-64	21.4	19.2-23.6	78.6	76.4-80.8
	65 and Older	21.7	19.2-24.1	78.3	75.9-80.8
Sex	Male	25.3	22.6-27.9	74.7	72.1-77.4
	Female	18.5	16.6-20.3	81.5	79.7-83.4
Income Level	Less than $25,000	25.4	21.8-28.9	74.6	71.1-78.2
	$25,000-$49,999	18.7	15.5-21.8	81.3	78.2-84.5
	$50,000-$74,999	21.9	17.8-25.9	78.1	74.1-82.2
	$75,000 and Greater	18.2	15.4-21.0	81.8	79.0-84.6
Housing Type	Own	21.1	19.2-22.9	78.9	77.1-80.8
	Rent/Other	23.1	20.1-26.2	76.9	73.8-79.9
Marital Status	Married/Coupled	19.4	17.5-21.2	80.6	78.8-82.5
	Not Married/Coupled	24.2	21.6-26.9	75.8	73.1-78.4
Social Support	Always/Usually	18.7	17.1-20.4	81.3	79.6-82.9
	Some/Rare/Never	29.4	25.6-33.3	70.6	66.7-74.4
Disability	Yes	24.2	21.1-27.3	75.8	72.7-78.9
	No	20.8	19.0-22.7	79.2	77.3-81.0
Diabetes	Yes	23.2	18.6-27.7	76.8	72.3-81.4
	No	21.6	19.9-23.3	78.4	76.7-80.1
Flu Vaccine	Yes	18.4	16.4-20.4	81.6	79.6-83.6
	No	24.3	22.0-26.7	75.7	73.3-78.0
Seatbelt Use (Always)	Yes	20.5	18.8-22.1	79.5	77.9-81.2
	No	29.2	23.6-34.8	70.8	65.2-76.4

Wght %: weighted percent; CI: confidence interval

DISCUSSION

Age was observed to have a significant role in health preparedness when both measures of the "Being Prepared" indicator were met, congruent with previous findings.[7,8] The data illustrated that while age is a driver, life stages do not correlate with one's level of preparedness. Uncertainty remains as to whether or not today's disaster experiences influence tomorrow's preparedness, indicative of the life-course approach.[1] Whether or not an individual's innate awareness of the risks of being caught unprepared is linked to age remains to be seen.[9] Perhaps messaging shifts linking preparedness to common, relatable experiences are needed to engage younger generations.

Gender was observed to also have a role in health preparedness,[7] with females more likely to be unprepared (i.e., met neither measure) and males less likely to follow orders. With respect to the social and environmental determinants of health, neither metropolitan area of residence nor education were observed to have led to any distinct disparities within the population's levels of being prepared or willingness to follow orders. Geographic location has previously been identified as having a limited role in personal preparedness,[10] while education has been cited as having a role previously, despite this study's findings[7,8] to the contrary. Understanding the roles of income (i.e., why less money resulted in an increased frequency of being prepared but decreased willingness to follow orders) and housing type[8] (i.e., why home ownership alone resulted in decreased frequency of being unprepared) remains important. Exploring how socio-economic status and the housing environment might influence household preparedness requires further study.

Inadequate social support may influence the frequency of both being unprepared and unwilling to follow orders compared to adequate support. Social connectedness has been identified as a core component to community preparedness, from both a self-sufficiency and resident safety perspective.[11] These results highlight an opportunity for the healthcare sector to intervene as service-providing organizations within the community, particularly for those with health conditions. While those with diabetes were more likely to be prepared, the fact remains that only 26.2% of diabetics met both measures, increasing the vulnerability of an already at-risk population during an emergency.[12]

There are a few study limitations. The survey questions used in this study were state-added, and therefore subjected to end of survey drop-off. Using only one year of available data from a self-report survey resulted in limitations on sample size. Race/ethnicity was not examined for this reason. The number of children per household was excluded due to limitations with this variable, as it was only available on landline surveys. Despite these limitations, the study provides baseline data to better understand populations at-risk of being caught unprepared and to refine studies on the barriers associated with preparedness behavior.

Moving Forward

Reducing the age, gender, and housing disparities seen with citizen preparedness levels remains a future focus at the Rhode Island Department of Health (RIDOH). More research is needed through surveys, focus groups, or based on data from clinician-initiated conversations to further understand the age-preparedness level relationship. Factors to explore with greater sample size and with age include race/ethnicity[13] and religion. Once these relationships are defined, personal preparedness programs can be reframed or redesigned, especially if life experience is the predominant factor for the age disparity and whether or not aspects of culture play an equal or greater role.[12,13]

The Community Health Resilience Project at RIDOH is examining how community-clinical linkages lacking within health preparedness can be built. Inviting the healthcare community to help drive these conversations is critical. While differences in emergency kits for a child versus an adult have been promoted by a variety of audiences (e.g., community leaders), those for individuals with specific health needs have not. Success in increasing the overall population's level of preparedness, especially for those with disabilities, health conditions (e.g., diabetes, cardiovascular disease,[9] general health status[10]), and other risk factors is a shared role between community sectors.

The healthcare and public health systems ultimately maintain responsibility for assuring an individuals' or families' preparedness level is high enough before an emergency at least to have basic nutritional, medical, and sheltering needs met. How might the public health and medical communities learn from each other to collectively define roles for the assurance of basic needs, regardless of a routine or emergent situation?

For example, diabetes maintenance recommends insulin be used if refrigerated properly with the use of a clean needle (e.g., good health behavior). Before an emergency happens, who is telling the individual with diabetes that using unrefrigerated insulin (and, in some cases, that using the same, unshared needle) is okay to do when displaced or isolated during an emergency? Who should that messenger be? How about nutritional alterations needed for emergency food kits or receiving an extra three-day prescription supply? If general guidance pertaining to the needs of a diabetic patient is primarily addressed by providers, should the community deviate from this approach for emergency preparations? Should current infrastructure be expanded to address patient-specific preparations before an emergency?

These questions need answers, and getting answers necessitates community consensus. RIDOH has begun to explore the intricacies of preparedness behaviors in an attempt to illustrate the disparities of citizen health preparedness and engage the provider community in helping assure a basic level of preparedness among the patient community. Increased integration with academia is needed to explore the relationship between attitudes, perceptions, knowledge, and beliefs to both personal health preparedness and overall health-seeking/health risk-taking behaviors on an iterative basis. Doing this can inform strategies aimed to promote health equity and health security by identifying root causes of preparedness inequities within the Rhode Island population.

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