Community Assessment of Extreme Heat Preparedness in Milwaukee, Wisconsin

Megan L. Christenson, MS, MPH; Colleen E. Moran, MS, MPH; Bria S. Grant, BS; Nicholas C. Tomaro, DVM, MPH; Jon G. Meiman, MD

ABSTRACT

Background: This article describes the first Community Assessment for Public Health Emergency Response (CASPER) rapid needs assessment project to be conducted in Wisconsin. The project focused on extreme heat preparedness.

Methods: Fifteen teams conducted household surveys in 30 census blocks in the city of Milwaukee, Wisconsin.

Results: Survey results indicated that the majority of households were unaware of the location of a nearby cooling center. Although the vast majority of households reported some form of air conditioning in their house, over half felt too hot inside their home sometimes, most of the time, or always.

Discussion: The community partnerships ensured that this project was conducted with local partner input and that the data could be used to inform extreme heat response.

BACKGROUND

Extreme heat can cause negative health impacts, including heat illness, heat-related mortality, and exacerbations of chronic medical conditions.[1,2] The Centers for Disease Control and Prevention (CDC) defines extreme heat as "summertime temperatures that are much hotter and/or humid than average."[3] The Wisconsin Initiative on Climate Change Impacts, a statewide collaboration of scientists and stakeholders, anticipates that Wisconsin will double the number of days above 90 degrees Fahrenheit from 5-12 to 12-25 by mid-century due to climate change.[4] In 2019, over 70 health organizations declared climate change a public health emergency.

Many factors can increase risk for heat illness, including age, exposure to hot weather, lack of air conditioning, certain medications, and underlying medical conditions. The social determinants of health (SDOH)—the conditions in which people are born, grow, live, work, and play[5]—significantly determine people's vulnerability to climate change-related effects. Utilizing data about these risk factors and SDOH, a Wisconsin Heat Vulnerability Index developed by the Wisconsin Division of Public Health (DPH) identified Milwaukee as a location that may be more vulnerable to heat.[6]

To better understand the needs of a community vulnerable to extreme heat, the Climate and Health Program at DPH conducted a Community Assessment for Public Health Emergency Response (CASPER) in the city of Milwaukee. CASPER is a CDC rapid community needs assessment methodology. This project involved engaging with multiple groups, including the City of Milwaukee Health Department (MHD), UniteMKE, Sixteenth Street Community Health Centers, and WestCare. These partners were involved in the planning, survey collection, evaluation, data analysis, and result dissemination. These community partnerships ensured input, participation, and ability to use the findings for local extreme heat planning.

The objective of this project was to assess extreme heat preparedness in Milwaukee households, and this brief report describes the methodology, findings, and lessons learned.

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Author Affiliations: Bureau of Environmental and Occupational Health, Wisconsin Division of Public Health, Madison, Wisconsin (Christenson, Moran, Meiman); UniteMKE, Milwaukee, Wisconsin (Grant); City of Milwaukee Health Department, Milwaukee, Wisconsin (Tomaro).

Corresponding Author: Megan L. Christenson, MS, MPH, Wisconsin Division of Public Health, 1 W Wilson St, Room 150, Madison, WI 53703; phone 608.266.7897; email megan.christenson@wisconsin.gov.

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Table 1. Questionnaire Response Rates

Questionnaire Response	Percent	Rate
Completion Rate[a]	41.9	88/210
Cooperation Rate[b]	47.3	88/186
Contact Rate[c]	21.4	88/412

[a] Percent of surveys completed in relation to the standard goal of 210.
[b] Percent of contacted households that were eligible and willing to participate.
[c] Percent of randomly selected households that completed an interview.

METHODS

The CASPER methodology is a validated, inexpensive, and efficient way to perform a community needs assessment. CASPER utilizes a 2-stage sampling methodology to obtain a fixed target sample size of 210 households as described in CDC's CASPER Toolkit Version 2.0.[7] The sampling frame for the project was defined as the city of Milwaukee. In stage 1 of sampling, 30 census blocks (clusters) were randomly selected using a population-level weighting probability. In stage 2, seven households from each of the 30 clusters were selected using systematic random sampling. The total number of households in each cluster was divided by 7 to calculate N; every Nth household was selected for an interview. This project received approval from the DPH Human Subject Protection Committee; review by an institutional review board was not required because it was determined the project constituted public health practice.

A 2-page paper questionnaire of 40 questions (39 close-ended, 1 open-ended) was developed in English and Spanish. Questions collected household-level information regarding emergency preparedness and readiness for extreme heat. Survey items were adapted from an extreme heat CASPER survey completed by the Maricopa County Department of Public Health in Arizona and were tailored with input from community partners.[8]

Awareness of the project was raised with input from community partners and through public messaging, including flyers, social media, and a press release. Project staff attempted to contact apartment managers to gain access for the survey days but were unsuccessful in reaching all apartments. On Thursday, September 13, 2018, a just-in-time training session was held from 9 AM to 5 PM. The training reviewed household selection methods, questionnaire content, interview techniques, and volunteer safety. Fifteen survey teams of 2 individuals were each assigned 2 clusters. Public health staff from DPH and MHD were paired with community health workers (CHW) from UniteMKE, Sixteenth Street Community Health Centers, and WestCare in Milwaukee. Teams recorded survey responses from an eligible household respondent on a survey form. Any household member at least 18 years of age was eligible to respond. Households that did not respond were approached on 3 occasions before replacement. Data were collected on Friday, September 14, 2018, from

Table 2. Household Demographic Characteristics

	Frequency	Percent
Structure, N = 88		
Single family	43	48.9
Multiple unit	44	50.0
Mobile home	1	1.1
Other	0	0.0
Home ownership, N = 88		
Own	39	44.3
Rent	47	53.4
Don't know/refused	2	2.3
Number in household, N = 88		
1	15	17.0
2-4	55	62.5
5+	17	19.3
Don't know/refused	1	1.1
Age, N = 88[a]		
Less than 2 years	8	9.1
2-17 years	33	37.5
18-44 years	57	64.8
45-64 years	39	44.3
65-84 years	15	17.0
85 years or older	1	1.1
Don't know/refused	3	3.4
Adults in household that don't speak English, N = 88		
Yes	8	9.1
No	79	89.8
Don't know/refused	1	1.1
Race of household members, N = 88		
American Indian/Alaska Native	0	0.0
Asian	2	2.3
Black or African American	44	50.0
Native Hawaiian or Other Pacific Islander	0	0.0
White	21	23.9
Other	19	21.6
Don't know/refused	2	2.3
Ethnicity of household members, N = 88		
Hispanic or Latino	16	18.2
Not Hispanic or Latino	70	79.5
Don't know/refused	2	2.3
Highest level of education of household members, N = 88		
Less than high school	9	10.2
High school or GED	18	20.5
Some college	22	25.0
College graduate or more	34	38.6
Don't know/refused	5	5.7
Any household members that work outdoors, N = 88		
Yes	22	25.0
No	63	71.6
Both indoor and outdoor	2	2.3
Don't know/refused	1	1.1
Any household member that works indoors without air conditioning, N = 88		
Yes	14	15.9
No	73	83.0
Don't know/refused	1	1.1

[a] Respondents could indicate more than one age category for their household, so the percent does not sum to 100 for this measure.

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12 PM to 6 PM and Saturday, September 15, 2018, from 9 AM to 4 PM.

Survey data were entered into Epi Info 7, and tracking form data were entered into Microsoft Excel 2010 (Microsoft Corporation, Redmond, Washington). Weights were not applied to each surveyed household because the sample size was insufficient. Unweighted frequencies were calculated for each question using Epi Info 7 (CDC, Atlanta, Georgia). Respondents who selected no race, other race, or more than 1 race were classified as other.

RESULTS

The survey teams completed 88 interviews, resulting in a completion rate of 41.9% (Table 1). Compared to the 2010 Census, the CASPER survey sample had a higher percentage of African American participants (50.0%) and lower percentage of White participants (23.9%). (Table 2).

Survey questions assessed knowledge of heat stress, experience with extreme heat, coping mechanisms, and access to cooling resources. To stay cool during extreme heat conditions, the majority of households drank water or other liquids (95.5%). Twenty-eight households (31.8%) had symptoms due to heat the past summer. Eight households (9.1%) reported having no air conditioning, which includes central air, window air conditioning, and portable air conditioners. Primary reasons that households didn't use air conditioning included the cost of electricity (26.1%), cost of repairs (8.0%), and nonfunctional air conditioning units (6.8%). The majority of households (62.5%) indicated they did not know where a nearby cooling center was located. Most residents (65.9%) did not leave the home to cool off. Of those who did leave the home (34%), parks (46.7%) and pools/splash pads (46.7%) were the most commonly chosen places. Approximately 38% of households reported at least 1 barrier locating a cooled place; the most common barriers included lack of information (19.3%) and distance from home (13.6%) (Table 3).

Table 3. Knowledge of Heat Stress, Coping Mechanisms, and Access to Resources

	Frequency	Percent
Member of household had symptoms due to heat, N = 88		
Yes	28	31.8
No	60	68.2
Don't know/refused	0	0.0
Household members have felt too hot inside the home, N = 88		
Always	4	4.5
Most of the time, but not always	14	15.9
Sometimes	31	35.2
Rarely	15	17.0
Never	24	27.3
Don't know/refused	0	0.0
How household kept cool, N = 88 [a]		
Central A/C	38	43.2
Window A/C	47	53.4
Portable A/C	14	15.9
Closed shades or blinds	50	56.8
Ceiling fan	46	52.3
Portable fan	63	71.6
Shade trees	36	40.9
Nothing	0	0.0
Other	3	3.4
Don't know/refused	0	0.0
Reasons household would not use A/C, N = 88 [a]		
Don't have A/C	8	9.1
No electricity in home	1	1.1
Cost of electricity	23	26.1
A/C unit does not work	6	6.8
Cost of repairs	7	8.0
Noise	4	4.5
Medical reasons	2	2.3
Safety concerns with window unit	2	2.3
Nothing prevents use	44	50.0
Other	7	8.0
Don't know/refused	0	0.0
Know where a nearby cooling center is located, N = 88		
Yes	29	33.0
No	55	62.5
Don't know/refused	4	4.5
Leave the home to cool off, N=88		
Yes	30	34.1
No	58	65.9
Don't know/refused	0	0.0
Where household goes to cool off, N = 30 [a]		
Mall	9	30.0
Church	2	6.7
Library	9	30.0
Park	14	46.7
Museum	9	30.0
Supermarket	11	36.7
Public bus	3	10.0
Beach	13	43.3
Restaurant	8	26.7
Shelter	2	6.7
Movie theater	7	23.3
Community center	2	6.7
Friends/neighbors	12	40.0
Pool or splash pad	14	46.7
Other	6	20.0
Don't know/refused	0	0.0
Barriers to going to a cooled place, N = 88 [a]		
Hours of operation	10	11.4
Disability	5	5.7
Distance from home	12	13.6
Lack of transportation	10	11.4
Personal safety	10	11.4
Cannot bring pets	7	8.0
Lack of information	17	19.3
Building is not ADA accessible	3	3.4
Never needed to go to a cooled place	21	23.9
No, nothing prevents me	45	51.1
Other	3	3.4
Don't know/refused	4	4.5

Abbreviations: A/C, air conditioner; ADA, Americans with Disabilities Act.

[a] Respondents could select all responses that apply for their household, so the percent does not sum to 100 for these measures.

DISCUSSION

Because the survey completion rate was below 80%, the data collected were not generalizable to the entire city of Milwaukee; however, the findings merit further investigation.

Even though a very high percentage of households (91%) had some form of air conditioning in their home, 56% felt hot in their homes sometimes, most of the time, or always in the summer of 2018. This exploratory finding suggests air conditioning is not being used or is not sufficiently cooling the home. Survey results showed that 49% of households did not use air conditioning for 1 or more reasons. Consistent with other studies, cost was the largest barrier to use.[9,10] These findings suggest the need for further investigation into utility assistance programs and additional barriers to air conditioning use.

Another notable finding was the lack of knowledge among

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surveyed households about the location of a nearby cooling center. When asked about barriers going to a cooled place (eg, a cooling center), half of respondents indicated no barrier, but 20% cited a lack of information as a barrier. Discussions with community partners revealed that the terminology "cooling center" is not effective as residents don't know what this means or have negative preconceptions about it. A qualitative heat study of Detroit residents found that some people perceive that cooling centers are intended for homeless individuals;[9] messaging about the intended audience for cooling centers could clarify this potential misconception.

This project had many strengths and was the first CASPER conducted in the state of Wisconsin. The survey was developed with input from community partners to ensure the data were useful for extreme heat planning and the tool was culturally appropriate. Local partner involvement enhanced the implementation, analysis, and dissemination of results. Local partners recruited CHWs to be on survey teams and provided insight when discussing key survey findings, including on the structure and delivery of the survey questions. While conducting surveys, the local partners shared local resources to support residents' stated needs. Finally, the data has been disseminated to local organizations working on related topics, such as the Branch Out Milwaukee Campaign and Milwaukee Heat Task Force.

There are several important limitations. Most significantly, the low survey response rate prevents generalizing the results to the entire city of Milwaukee. One unique challenge conducting a CASPER in an urban environment is accessing apartment complexes due to locked entrances and difficulties determining the number of households. The fact that this was a prospective and nonemergency CASPER about extreme heat conducted in September presented an additional challenge. A third limitation was DPH staff's lack of cultural diversity and experience working with communities of color. Some limitations related to this issue included inconsistent attendance from CHWs on the survey teams. The CASPER methodology was unfamiliar and contrary to many CHWs' experience engaging with the community; furthermore, extreme heat was not a topic that resonated with most CHWs since they are accustomed to dealing with more immediate community concerns.

CONCLUSION

This project engaged key community stakeholders, ensured that the project was conducted with local input, and provided findings to inform extreme heat planning. While this project did not reach the target number of surveys, the process did elucidate the challenges and benefits involved with a prospective approach, a low salience issue, and an urban setting. These findings can be used to inform planning of future CASPERs.

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