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Assessing Mental Health Effects of Eastern Kentucky Households After the State's Deadliest Flood: Using a Community Assessment for Public Health Emergency Response (CASPER)

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Original Research

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* Angela Raleigh passed away peacefully after this manuscript was submitted. During the CASPER surveys serving as Breathitt County's Health Department Director, Mrs. Raleigh was committed to learning about her communities' mental health experiences and needs after surviving the floods. We acknowledge her contributions to this manuscript and her work on improving public health in her community.

Abstract

Objectives: On July 28, 2022, eastern Kentucky experienced the state's deadliest flood in recorded history. In response to ongoing mental health concerns from community members who survived the flood, local health department directors in affected communities requested technical assistance from the Kentucky Department for Public Health and the Centers for Disease Control and Prevention.

Methods: Two simultaneous Community Assessments for Public Health Emergency Response (CASPERs) were conducted 6 weeks after the flood. Four counties were assessed in each CASPER. EpiInfo7 was used to calculate the unweighted and weighted frequencies and percentages to estimate the number and percentage of households with a particular response in each CASPER.

Results: Approximately a third (30.5%) of households in CASPER 1 and approximately 40% of households in CASPER 2 reported experiencing ≥1 mental health problems. Individual-level mental health questions from a modified 3-stage CASPER found approximately 15% of persons in both CASPERs reported a Patient Health Questionnaire-2 (PHQ-2) score ≥3 and approximately 20% of persons in both CASPERs reported Generalized Anxiety Disorder-2 (GAD-2) score ≥3.

Conclusions: These findings indicated households experienced mental health problems after the flood. Depression and anxiety were prevalent among persons living in flood-affected areas. If ever needed, households preferred to receive mental health services in-person and locally.

Heavy overnight rains led to record-breaking flash flooding in eastern Kentucky on July 28, 2022, and the deadliest flood in state history in which 45 persons lost their lives.[1] The flood left approximately 600 persons displaced in emergency shelters, state parks, and travel trailers; 100 bridges were damaged or destroyed; 600 homes were destroyed and thousands more severely damaged.[2,3] Kentucky Governor Andy Beshear issued an executive order declaring a state of emergency and President Joe Biden approved a disaster declaration for Kentucky.[3,4] Among the hardest hit areas included 4 counties in the Kentucky River District (Letcher, Knott, Perry, and Owsley) and 4 surrounding counties (Floyd, Pike, Breathitt, and Clay).

Floods are the most frequent natural disaster and the leading cause of death from natural disasters worldwide.[5] Floods can damage or destroy homes, displace families, and disrupt public health.[5–8] Beyond physical effects on survivors, the stress and psychological effects after flooding can affect persons of all ages and elicit or exacerbate mental health problems.[6] Posttraumatic stress disorder (PTSD), generalized anxiety disorder (GAD), and major depressive episodes are common mental health outcomes after natural disasters.[7,9,10] A systematic review found persons living in flood-affected areas showed a higher prevalence of subsequent PTSD, anxiety, and depression.[10] Research conducted in England found persons experiencing flooding had greater chances of PTSD, depression, and anxiety symptoms from 6 months to 3 years after a flood.[8,9] A study conducted in Texas after Hurricane Ike in September 2008, also found these mental health problems to be prevalent.[10]

Data from 2021 showed that approximately 8.6 million adults living in nonmetropolitan areas in the U.S. reported having any mental illness, accounting for approximately a fifth of adults residing in nonmetropolitan areas.[11] Although prevalence of mental illness is similar among rural and urban residents, mental health services can drastically differ between the 2 areas. This is partly because of the challenges that come with providing mental health services in rural communities.[11] Many rural communities experience lower socioeconomic status compared with urban communities, and the National Rural Health Association describes accessibility, availability, affordability, and acceptability of mental health services in rural communities as unique challenges their residents experience.[12,13] Persons living in rural areas might have to drive further to get services, are less likely to have insurance covering mental health services, and might be unable to afford care. Stigma is another barrier that decreases mental health services use and is especially salient in rural communities.[14] Additionally, persons living in rural areas experience shortages of mental health providers, have less anonymity when they do receive services, and exhibit a greater reliance on family, friends, and religious leaders.[12]

During the immediate recovery efforts after the eastern Kentucky flood, local health department directors in flood-affected counties expressed concern about mental health effects among community members and a potential lack of adequate mental health services. Community members who survived the floods expressed their mental health concerns while visiting their local disaster recovery centers for additional support. Some community members described feelings of anxiety, depression, and inability to sleep. Addressing these concerns and a lack of real-time data regarding the depth of environmental damage and ongoing displacement from the flood, several local health department directors requested assistance from the Kentucky Department for Public Health (KDPH) to conduct a rapid needs assessment. The assessment purpose was to identify mental health status and needs of affected communities, document household experiences and physical health effects, and assess recovery needs. This paper focuses on the mental health status and needs of the affected communities.

Methods

In consultation with eastern Kentucky local health departments and the National Center for Environmental Health (NCEH) at the Centers for Disease Control and Prevention (CDC), KDPH selected CDC's Community Assessment of Public Health Emergency Response (CASPER) methodology [15] to conduct the community assessments. Local, state, and CDC staff collaboratively developed an approximately 20-minute, 2-page questionnaire that collected data regarding household demographic characteristics, experiences during the flood, housing status, communications, recovery status after the flood, physical health status, mental health status and needs, and individual-level mental health status (Appendix A).

Two simultaneous CASPERs were conducted across 8 counties during September 6-9, 2022, to adequately assess the populations in the large geographic area affected by flooding. CASPER 1 was conducted in Kentucky River District, which included all occupied households within Letcher, Knott, and Perry counties and the flood-affected area of Owsley (n = 15 848 households). CASPER 2 included all occupied households within the flood-affected areas of Breathitt, Floyd, Pike, and Clay counties (n = 10 841 households) (Appendix B). Local health department directors provided postal codes of the flood-affected areas through geographic information system (GIS) shapefiles to help detect which geographic areas within these counties to select for interviews.

Because the questionnaire included a limited set of individual-level questions, a modified 3-stage CASPER sampling methodology was applied to select a representative sample of households and then persons to interview.[15] In the first stage, 30 clusters (census blocks) were selected for each CASPER with a probability proportional to the number of occupied households within the clusters. In the second stage, interview teams used systematic random sampling to select 7 households from each of the selected clusters for a goal of 210 household-level interviews in each CASPER. Persons interviewed answered these questions for the entire household; therefore, the results are at the household level. In this paper, "household" is used to designate responses that represent all people living in a household. For the third stage, interview teams asked the final 5 questions of the survey to only 1 adult in the household who resided in the home before the flooding. This person was randomly selected (i.e., adult with the next birthday) to complete each individual-level survey questions.[15]

The survey was conducted through door-to-door in-person interviews. Interview staff consisted of local and state health department volunteers, University of Kentucky College of Public Health students, University of Michigan Public Health Assistance and Support Team (PHAST), New Vista staff, and University of the Cumberlands students. Interview teams composed of 2 or 3 persons were each assigned 1-3 clusters within a CASPER, depending on location and driving times. Teams were provided detailed maps, driving instructions, and instructed how to randomly select a beginning household within an assigned cluster and then approach every nth household (where n was the total number of occupied households in the cluster divided by 7) to select persons from the 7 households per cluster to interview. Teams made 3 attempts at each selected household before replacement. Replacement selection consisted of counting another 7 houses past the de-selected house to attempt another interview.

Prior to conducting interviews, a 4-hour just-in-time training course regarding the purpose of CASPER, household selection methods, questionnaire content and interview techniques, safety, and logistics was given. Teams conducted interviews during approximately 10:30 am and 6:30 pm Eastern Time on all days except the first day, when teams worked from 3:30 pm to 6:30 pm. Each team used 2 data collection instruments, a paper questionnaire and an electronic tablet with an Epi Info database installed for direct data entry in the field. Each day, interview teams reconciled their completed paper surveys with their tablet data entry to ensure accuracy of data being uploaded into the database. Before data were uploaded digitally to a combined Epi Info database, all electronic surveys were cross-checked with paper forms to account for any missing data or errors in the data entry process.

Data Analysis

All CASPER analyses include weighting to account for the probability that the responding household was selected so results can be extrapolated to the entire sampling frame.[16] The goal of a completed CASPER is to interview 210 households; reaching 80% completion allows for weighted analyses to be conducted. Both unweighted and weighted frequencies were calculated using Epi

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Table 1. Household demographic characteristics — eastern Kentucky flooding 2022

	CASPER 1 (*N* = 193)				CASPER 2 (*N* = 194)			
	Frequency	Estimate	% of HH	95% CI	Frequency	Estimate	% of HH	95% CI
Type of structure								
Single family home	144	11,968	76.2	66.6–85.9	137	7,404	68.3	58.9–77.7
Multiple unit	11	893	5.7	0.0–13.8	1	--	--	--
Mobile home	34	2,685	17.1	10.6–23.6	55	3,325	30.7	21.2–40.2
Other*	2	--	--	--	1	--	--	--
Number of HH with members in each age category**								
Less than 2 years	9	791	5.0	1.7–8.3	14	740	6.8	3.3–10.3
2–17 years	59	4,759	30.0	22.6–37.5	51	2,852	26.3	19.7–33.0
18–64 years	145	11,968	75.5	68.8–82.2	141	7,769	71.7	63.5–79.9
≤65 years	86	7,104	44.8	35.0–54.6	85	4,827	44.5	37.2–51.8
Own or rent HH								
Own	163	13,466	85.0	76.1–93.8	173	9,748	89.9	84.8–95.0
Rent	29	2,307	14.6	5.8–23.3	20	1,041	9.6	4.5–14.7
Other***	1	--	--	--	1	--	--	--

-- Indicates cell size less than 5.
*Other includes Apartment.
**Households could choose more than 1 response, thus, frequencies might equal more than the total number of households interviewed in the CASPER and percentages might be more than 100%.
***Other includes rents land, owns house.
HH, households.

Info 7, with weighted analysis presented for all responses with ≥5 households completing the question. For all results, unless otherwise stated, percentages in the text represent weighted percentages.

The mental health assessment also included questions for individual respondents. The first 2 sets of questions were taken from the Patient Health Questionnaire-2 (PHQ-2), a screening tool for depressive moods, and the Generalized Anxiety Disorder-2 (GAD-2), a screening tool for generalized anxiety. Responses for both the PHQ-2 and GAD-2 are scored from 0 (not at all) to 3 (nearly every day) during the past 2 weeks, and a combined score is calculated by using the 2 questions within each module. Scores >3 indicate depression or anxiety is likely and warrants further evaluation.[16,17] The final mental health assessment question was taken from CDC's Behavioral Risk Factor Surveillance System (BRFSS) Quality-of-life question, which assesses how many days during the past 30 days the persons' mental health was not good. For these questions, an individual weight was calculated to account for the probability that the person was selected within the household.

Ethics

This study was reviewed by CDC and was conducted consistent with federal law and CDC policy (*45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq). Interview teams provided all potential respondents with a copy of the consent sheet (Appendix C). Teams provided public health informational materials (e.g., mold cleanup, suicide crisis hotline, and local mental health resources) to respondents. Eligible respondents were aged ≥18 years. The interviewers completed confidential referral forms whenever they encountered urgent physical or mental health needs.

Results

Response Rates and Demographics

After systematic random sampling, a total of 367 households in CASPER 1 and 296 households in CASPER 2 were selected for interviews.[1] Of those, 239 households in CASPER 1 and 223 households in CASPER 2 were eligible and willing to participate in interviews. Interview teams completed 193 (80.8%) and 194 (87.0%) interviews in CASPER 1 and CASPER 2, respectively.[2] Given the goal of a CASPER is to interview 210 households, by completing 91.9% and 92.4% of interviews, the 80% threshold was met to conduct a weighted analysis. Most households (76.2% and 68.3%, respectively) were single-family homes, with 17.1% of respondents living in mobile homes in CASPER 1 and 30.7% in CASPER 2 (Table 1). Approximately 30% of households in CASPER 1 and 26.3% in CASPER 2 had ≥1 children aged 2–17 years. Most households (75.5% and 71.7%, respectively) had ≥1 persons aged 18–64 years, and approximately 45% of households in each CASPER had ≥1 persons aged ≥65 years. The average number of household members was 2.7 persons in CASPER 1 and 2.6 persons in CASPER 2. In both CASPERs, most households owned their property (85% and 89.9%, respectively).

Household Mental Health

Households were asked how the flood affected their behavioral or mental health (Table 2). Since the flood, 12% of households in

[1]In the description of results, CASPER 1 results will always be presented before CASPER 2 results. All results represent weighted percentages.

[2]These percentages represent the cooperation rate, which is the percent of surveys completed compared with the total number of contacted households that were eligible and willing to participate in interviews.

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Table 2. Household health status since the flood — eastern Kentucky flooding 2022

	CASPER 1 (*N* = 193)				CASPER 2 (*N* = 194)			
	Frequency	Estimate	% of HH	95% CI	Frequency	Estimate	% of HH	95% CI
Overall health								
Better	2	--	--	--	2	--	--	–
Same	165	13,641	86.1	80.8–91.4	155	8,453	78.0	69.8–86.1
Worse	24	1,906	12.0	7.6–16.4	35	2,134	19.7	11.6–27.8
Exacerbation of emotional and mental health*								
Experienced 1+	60	4,836	30.5	22.5–38.5	77	4,435	41.1	29.0–53.2
Trouble sleeping or nightmares	42	3,346	21.1	13.5–28.7	58	3,446	31.8	22.0–41.6
Difficulty concentrating	31	2,402	15.2	8.9–21.5	43	2,323	21.4	13.5–29.3
Agitated behavior	24	1,906	12.0	6.2–17.9	51	2,745	25.3	16.0–34.6
Loss of appetite	20	1,635	10.3	5.2–15.5	31	1,695	15.6	8.6–22.6
Witnessed violent behavior	3	–	–	–	3	–	–	–
Suicidal ideation	2	–	–	–	0	–	–	–

*Households could identify more than one.
Abbreviation: HH, households.

Table 3. Household source of behavioral health services — eastern Kentucky flooding 2022

	CASPER 1 (*N* = 193)				CASPER 2 (*N* = 194)			
	Frequency	Estimate	% of HH	95% CI	Frequency	Estimate	% of HH	95% CI
Received any behavioral or mental health counseling since flood*[i]								
Yes	17	1,296	8.2	3.4–13.0	15	839	7.7	3.8–11.7
No need	175	14,477	91.3	86.0-96.7	176	9,847	90.8	86.9–94.7
Behavioral health concerns*								
Yes	6	453	2.9	0.3–5.4	8	430	4.0	1.5–6.5
No need	185	15,244	96.2	92.8–99.6	182	10,204	94.6	92.0–97.3
Could not get	1	–	–	–	0	–	–	–
Do not know or refused	1	–	–	–	3	–	–	–
Grief counseling*								
Yes	5	377	2.4	0.0–5.2	7	379	3.6	0.6–6.4
No need	187	15,395	97.1	93.6–100.7	183	10,256	95.1	–
Could not get	0	–	–	–	0	–	–	–
Do not know or refused	1	–	–	–	3	–	–	–
Source of counseling*								
Pastor	7	528	46.2	12.4–80.0	6	357	42.6	15.2–70.0
Counselor or Licensed therapist	6	465	43.5	9.1–78.0	4	–	–	–
Other**	3	–	–	–	5	267	31.8	2.4–61.3
Preferred method for behavioral or mental health assistance*								
In person — Local	130	10,850	68.5	62.0–74.9	123	6,763	62.4	54.2–70.6
In person — Out of town	12	1,000	6.3	3.0–9.6	22	1,144	10.6	6.4–14.8
Telehealth (online, phone)	43	3,596	22.7	16.6–28.8	44	2,383	22.0	14.7–29.3
In a group	4	–	–	–	7	370	3.4	0.7–6.2
Other**	7	528	3.3	0.0–6.7	8	723	6.7	–0.3–13.6

*Households could identify more than 1 response.
**Other includes church group, doctor, friends, and hospital.
HH, households.
[i]In CASPER 1, 3 households reported receiving behavioral health counseling for substance abuse treatment and 1 household for suicidal ideation.

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Table 4. Individual behavioral health status — eastern Kentucky flooding 2022

	CASPER 1 (*N* = 193)				CASPER 2 (*N* = 194)			
	Frequency	Estimate	%*	95% CI	Frequency	Estimate	% *	95% CI
Patient Health Questionnaire (PHQ)–2 Score								
Less than 3	167	27,794	85.9	80.1–91.7	163	18,146	82.8	75.4–90.3
3 or more	26	4,566	14.1	8.3–19.9	28	3,089	14.1	7.5–20.7
Do not know or Refused	0	–	–	–	3	–	–	–
Generalized Anxiety Disorder (GAD)–2 Score								
Less than 3	156	26,134	80.8	73.8–87.8	156	17,475	79.8	72.3–87.3
3 or more	37	6,226	19.2	12.2–26.2	37	4,328	19.8	12.2–27.3
Do not know or Refused	0	–	–		1	–	–	–
Mental health in past 30 days								
<14 days "not good"	154	25,769	80.0	73.8–86.2	145	16,502	75.4	67.5–83.3
≥14 days "not good"	37	6,364	19.8	13.6–25.9	45	4,990	23.1	14.1–32.1
Don't know or Refused	1	–	–	–	4	–	–	–

*Percentage of individual respondents.
HH, households.

CASPER 1 and approximately 20% (19.7%) of households in CASPER 2 reported their overall health was worse. Approximately a third (30.5%) of households in CASPER 1 and 41.1% of households in CASPER 2 reported having experienced ≥1 emotional or mental health problems since the flood. Trouble sleeping or nightmares were the most common emotional or mental health problems reported by households with 21.1% in CASPER 1 and 31.8% in CASPER 2, followed by difficulty concentrating (15.2% and 21.4%, respectively), agitated behavior (12% and 25.3%, respectively), and loss of appetite (10.3% and 15.6%, respectively).

Approximately 8.2% of households in CASPER 1 and 7.7% in CASPER 2 reported receiving any type of behavioral or mental health counseling from sources such as a counselor, pastor or clergy member, therapist, case worker, or social workers since the flood. However, most households in both CASPERs reported that counseling services were not needed (91.3% and 90.8%, respectively) (Table 3). Among households that reported receiving counseling services, 46.2% of households in CASPER 1 and 42.6% in CASPER 2 reported receiving this counseling from a pastor or clergy member. Over 40% of households in CASPER 1 (43.5%) reported receiving counseling from a counselor or licensed therapist.[3] Approximately 2.9% of households in CASPER 1 and 4.0% in CASPER 2 reported receiving behavioral or mental health counseling for behavioral health concerns and grief counseling (3.6%) in CASPER 2.

If ever needed, approximately two-thirds of households in both CASPERs reported they would prefer to receive behavioral or mental health assistance in person and locally (68.5% and 62.4%, respectively); 6.3% of households in CASPER 1 and 10.6% of households in CASPER 2 reported they would prefer to receive this form of service in-person and out of town. Approximately a quarter of households in both CASPERs reported they would prefer to receive behavioral or mental health assistance by telehealth (online or by telephone) (22.7% and 22.0%, respectively).

[3]Less than 5 households answered this question in CASPER 2; therefore, we do not provide results for this response.

Individual Mental Health

In both CASPERs, 14.1% of respondents had a score of ≥3 on the PHQ-2 depression scale, and approximately 20% of respondents in both CASPERs had a score of ≥3 on the GAD-2 anxiety scale (19.2% and 19.8%, respectively) (Table 4). Respondents were asked about their mental health, including stress, depression, and problems with emotions; 19.8% of CASPER 1 and 23.1% of CASPER respondents reported their mental health was "not good" for ≥14 days during the past month.

Discussion

This paper describes the mental health effects on households and persons living in 8 flood-affected counties in eastern Kentucky after the state's deadliest flood. Although eastern Kentuckians are familiar with flash flooding, areas that were historically safe from severe flooding experienced unprecedented levels of flooding and damage during this flood in July 2022. This assessment found approximately a third of households in CASPER 1 and approximately 40% of households in CASPER 2 experienced ≥1 mental or behavioral health problems approximately 6 weeks after the flood. These findings are like other U.S. and international studies that reported populations experience anxiety and depression after a flood [7–9,27] and reveal ongoing mental health effects on eastern Kentucky residents after this flood. The individual-level findings are relevant as research shows experiencing ≥1 mental health problem, depression, and stigma associated with mental illness are risk factors for suicide.[18]

The findings indicated that despite reporting mental health problems, less than 10% of households in each CASPER reported receiving any behavioral health services since the flood. This lack of mental healthcare receipt could be because of stigma surrounding mental health and seeking care, reduced access to mental healthcare services such as transportation or scheduling challenges, lower availability of providers in rural areas, and the costs associated with mental healthcare.[12,14] Among households that reported receiving counseling, these services were primarily provided by a pastor,

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therapist, or counselor. Although mental health care services were rarely accessed, households preferred to receive mental health services in-person and locally, followed by telehealth services, and in-person and out of town. Some research describes advantages and barriers to providing telehealth for mental health care treatment in rural areas, with 1 advantage being the ability to alleviate the shortage of providers in rural communities by connecting persons to providers by virtual video conference visits.[19] Overall, these findings reveal a lack of persons receiving mental health care services, yet a need for services and willingness to participate if services were available locally or through the internet.

This assessment found unique demographics in eastern Kentucky that should be considered when planning support after a natural disaster. This investigation showed a substantial older adult population and a high percentage of homeowners in this region.[20] Persons aged 65 years and over comprise approximately 17% of the total population in Kentucky, yet results showed approximately 45% of households in each CASPER reported at least 1 person aged ≥65 years, revealing a potential overrepresentation of this age group in eastern Kentucky.[21] Persons aged >60 years experienced physical health problems such as less mobility, chronic pain, and frailty, which can be associated with mental health problems (and vice versa).[22] For example, 7% of the older population (aged ≥60 years) are diagnosed with depression, a disorder that is often underdiagnosed and undertreated in this age group.[22] Despite eastern Kentucky having a lower socioeconomic status (SES) than other parts of the state, at least 85% of the population are homeowners, in part because of the lower median property value in the region and lower availability of apartment complexes.[21,24] Lower socioeconomic status among residents of this area might increase their susceptibility to mental health effects after a natural disaster.[25] Understanding the unique population demographics, existing mental health problems, and social determinants of health can provide public health leaders and emergency responders with evidence-based information during disaster situations to supply these populations with the most appropriate resources to meet their needs.

Limitations

This CASPER survey has limitations. The age distribution of the sample population in this CASPER is skewed toward persons aged ≥65 years, which is a greater proportion than reported by the U.S. Census Bureau, suggesting responses might not be fully representative of the sampling frame. Although 2020 U.S. Census Bureau data were used for selecting clusters, these household estimates might not be representative of the entire eastern Kentucky region. As with all CASPERs, these results are self-reported by 1 (or more) person(s) representing an entire household; therefore, results could be biased because the interviewee might not be aware of the concerns of each household member they are representing.

Conclusion

These two CASPERs were a successful collaboration among 5 eastern Kentucky local health departments, KDPH, CDC, and university and community partners who were all responsive to assessing the community needs and status of flood-affected areas following the historic and devastating flood in eastern Kentucky. Although prior studies describe mental health effects after flooding,[7-11] this rapid needs assessment adds to a line of work using a CASPER population-based survey methodology and highlighting the mental health effects after a natural disaster (i.e., flood) in several rural communities in eastern Kentucky. Six weeks after the flood, the CASPER data pointed to households experiencing worsening overall health and emotional and mental health concerns, and a strong preference for in-person local mental health and telehealth counseling. As flooding and other natural disasters affect communities, households, and persons year-round, and are predicted to increase because of the possible effects of climate change,[26] the findings from these CASPERs could be useful after future natural disasters in Kentucky and for other jurisdictions responding and recovering from natural disasters. Based on the results, mental health services should be considered when developing emergency preparedness and response plans. Through increased promotion, affordability, accessibility, and availability of these services, eastern Kentucky residents might be willing to access these services more often, which could decrease local stigmatization of mental health care.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/dmp.2024.137.

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Author contribution. *Oshea Johnson* served as the incident commander for these 2 CASPER surveys, helped develop the questionnaire used in these CASPERs, conducted interviews in the field, conducted data cleaning and analysis, and served as the lead author of this manuscript.

Lilanthi Balasuriya conducted interviews in the field for these 2 CASPER surveys and reviewed and revised the manuscript significantly.

Tammy Riley serves as a local health department director for one of the flood-affected counties included in CASPER 2 (Pike County). Ms. Riley helped develop the questionnaire used in these CASPERs, conducted interviews in the field for these 2 CASPER surveys, and reviewed and revised the manuscript significantly.

Scott Lockard serves as one of the local health department director for the 4 flood-affected counties included in CASPER 1 (Kentucky River District). Mr. Lockard helped develop the questionnaire used in these CASPERs, conducted interviews in the field for these 2 CASPER surveys, and reviewed and revised the manuscript significantly.

Angela Raleigh served as a local health department director for one of the flood-affected counties included in CASPER 2 (Breathitt County). Ms. Raleigh helped develop the questionnaire used in these CASPERs, conducted interviews in the field for these 2 CASPER surveys, and reviewed and revised the manuscript significantly.

Martha Ellis serves as a local health department director for one of the flood-affected counties included in CASPER 2 (Floyd County). Ms. Ellis helped develop the questionnaire used in these CASPERs, conducted interviews in the field for these 2 CASPER surveys, and reviewed and revised the manuscript significantly.

Amy Schnall serves as a CASPER subject matter expert at the Centers for Disease Control and Prevention and consulted the CASPER team on how to best develop the questionnaire, used GIS to choose the sampling frame and 30 clusters for interviews in each sampling frame, worked in the operations section within the incident command system, and reviewed and revised the manuscript significantly.

Arianna Hanchey serves as a CASPER subject matter expert at the Centers for Disease Control and Prevention and consulted the CASPER team on how to best develop the questionnaire, assigned all interview teams their clusters to

interview in each sampling frame and collected data from all teams after each day of data collection, conducted data cleaning and analysis, worked in the operations section within the incident command system, and reviewed and revised the manuscript significantly.

Doug Thoroughman served as the scientific manager within the incident command system, worked as a liaison between Kentucky Department of Public Health staff, Kentucky's local health department directors, and Centers for Disease Control and Prevention staff to coordinate the approval of the CASPER surveys, helped develop the questionnaire used in these CASPERs, conducted interviews in the field for these 2 CASPER surveys, and reviewed and revised the manuscript significantly.

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