WASHINGTON COUNTY TORNADO RECOVERY SURVEY

This report contains a summary of the results from the rapid needs assessment conducted in Washington County, Nebraska in response to the Arbor Day Tornado Outbreak, 2024.

Final Report
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Project Team and volunteers for the Washington County Tornado Response Survey. Image credit: John Keenan, UNMC Strategic Communications

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Executive Summary

Background. On April 26, 2024, Arbor Day, a tornado outbreak occurred across Central Nebraska and Central Iowa. This outbreak produced the strongest tornadoes in eastern Nebraska in a decade. The EF-3 tornado impacting Washington County, Nebraska reached maximum windspeeds of 165 miles per hour and spanned a maximum width of one mile over a path length of more than 31 miles.

Purpose and Objectives. We surveyed Washington County residents within a 2-mile buffer of the Arbor Day tornado storm track using a rapid needs assessment methodology appropriate for this rural community. Several sampling approaches were used to maximize response. We conducted a field assessment, using both one and two stage cluster sampling with random selection of households, May 16-18, 2024. We included a supplementary mail-out with online and telephonic options for survey completion for the most highly affected communities in the assessment area from May 24-June17, 2024. The objectives of the survey were to assess emergency preparedness; physical and mental health and well-being; communications; and experiences during the tornadoes, to determine how public health and other emergency response sectors could better serve affected communities.

Accomplishments. A new method for conducting post-disaster needs assessments in rural and displaced populations was used in the Washington County Tornado Recovery Survey. We staged and implemented the field assessment within three weeks of the tornado, allowing for rapid collection of perishable data close to the event. We effectively utilized an academic-practitioner partnership to accomplish the objectives of this work. Volunteers were from the three main participating organizations – Three Rivers Department of Health the University of Nebraska Medical Center, and Nebraska Department of Health and Human Services – and eight local health departments from across the state of Nebraska, providing post-disaster assessment training and field experience and building public health emergency response capabilities across the state.

Findings. *Households.* In total, 138 households completed the survey (71.8% completion rate). Nearly 97% of surveys were from stand-alone permanent structures, and the average household size was 2.2 persons (range 1-10). Sixty-five percent of households had no or minimal damage, 11% with damage but repairable, 13% with significant damage but were habitable, and 10% destroyed or uninhabitable. All surveys were conducted in English.

Preparedness and communications. Over 88% of households reported knowing where to shelter safely; 79% knew how to receive information such as emergency alerts or warnings. Only 55% of households knew evacuation routes to exit their communities, and 56% knew how to contact family members if not together when a disaster occurs. Less than 30% of households had an emergency supply kit prepared before the tornado. Among those with go-kits, 35% used materials in their kits – mostly common items like water, food, and batteries. Television (65%), text or automated phone notifications (62%), and word-of-mouth (27%) were the most common sources for receiving tornado warnings; importantly, 5% of households reported not receiving the warning at all. Preferred sources were reflective of communication preferences, with TV (81%), text or automated phone notifications (70%), internet/online news (37%), social media (26%), and word-

of mouth (24%) as the top five. Nearly 90% of households were aware of recovery resources and learned of these resources through word-of-mouth (54%), TV (48%), and social media (48%).

Barriers. Complex medical needs – including insulin reliance (13%), assistive mobility device use (9%), and oxygen/ventilation reliance (4%) – and barriers to effective communication – impaired hearing (12%) and impaired vision (4%) – were important underlying concerns affecting participating households.

Health impacts. Few households reported injuries from the tornado (1%) and related clean-up activities (3%). Over 20% of households reported one or more members having trouble sleeping and 14% showing agitated behavior. Worsening allergies and asthma/COPD were reported by 11% and 4% of households, respectively. Among households with children, 62% reported their child(ren)'s health to be excellent, with the remaining households reporting good or very good overall health. About 30% reported children feeling nervous or anxious and 11% having trouble sleeping. For individuals, nearly 11% reported little interest or pleasure in doing things, 13% reported being unable to stop worrying, 17% reported feeling down or depressed, and 21% reported feeling nervous or on edge for at least several days in the previous two weeks.

Open-ended responses. Households were asked to provide any additional information they wanted to share with Three Rivers and Washington County officials. The most frequent responses centered on positive experiences with the acute response, including volunteers, community members, Omaha Public Power District. Households also shared concerns about receiving early warnings and the lack of sirens. Limited communications for recovery and response after the immediate aftermath were commonly discussed, as was the unfeasible timeline for tree and debris removal assistance and continuing need for clean-up supports.

Recommendations. The tornado warnings and alerts issued for this event undoubtedly protected lives and prevented significant injuries. However, it is important to note that the tornado occurred during daylight hours when many individuals were commuting from school or their workplaces, heightening situational awareness. We should engage with community members on the development of more robust warning systems, such as implementation and upkeep of sirens. While the initial response was incredibly strong, the community needs more explicit communication about mid- and long-term recovery resources, including ways of accessing state and federal funds. To that end, identifiable and clear guidance on 1) what funds are available, 2) how, for what, and by whom those funds can be used, and 3) potential non-governmental resources – financial, logistical, or emotional – for additional supports should be made publicly available. Finally, there is a significant amount of debris still present in the community; burning debris poses environmental and safety risks, as does leaving the debris on the roadside or elsewhere on a household's property. County officials should work with the community to find assistance – whether governmental or otherwise – and locations that can accommodate the significant amount of debris that needs to be handled. If burning is deemed the best option for some households, local fire and emergency services should re-emphasize existing guidance on safe burning practices. More broadly, Three Rivers and the University of Nebraska Medical Center teams can provide information and resources to help the community better prepare for future disasters, such as preparing emergency supply kits or accessing weather radios.

Background

Little is known about the immediate needs and health impacts after a tornado. Quick-response research is needed to help public health and emergency management practitioners and decision makers reduce deaths, injuries, and property damage, and improve operational forecasting and messaging. Besides direct impacts (i.e., death and impact-related injuries), many indirect impacts are possible (e.g., carbon monoxide poisoning from the use of generators, food and waterborne illness associated with power outages, and mental health impacts). Post-tornado assessment is primarily focused on structural damage assessment and mortality surveillance. We are aware of only one previous public health-focused rapid needs assessment after a tornado. Laurel County, KY experienced a deadly tornado outbreak from March 2-3, 2012.[1] They used a traditional Community Assessment for Public Health Emergency Response (CASPER) methodology to assess the effectiveness of a pharmaceutical emergency order, the ability for Laurel County residents to obtain needed medications, effectiveness of warnings and messaging, the scope of mental health impacts one-month after the event, and childcare access and child safety concerns. The CASPER methodology, developed by the Centers for Disease Control and Prevention (CDC), is an epidemiologic method that is used to rapidly provide household-level information about the needs of a community throughout the disaster management cycle and in non-disaster settings.[2]

On Friday, April 26, 2024 (Arbor Day) an outbreak of Tornadoes impacted the Midwest from Central Nebraska to Central Iowa in the afternoon and evening hours. In the National Weather Service (NWS) Omaha/Valley coverage area (eastern Nebraska and western Iowa), 19 tornado tracks were identified for a combined track length of 201.7 miles. At least five of these tornadoes were rates as EF-3[3] (Enhanced Fujita Scale rating indicating 3 second wind gusts of 136–165 mph[4]). One tornado impacted Douglas and Washington Counties in Nebraska between 1550 and 1629. According to the NWS damage assessments, this tornado had estimated peak wind speeds of 165mph (EF-3 rating), maximum width of 1 mile, and traveled 31.2 miles from southwest of Elkhorn, NE to northwest of Blair, NE into Iowa. No deaths were reported from this tornado.[3] Governor Jim Pillen issued a post-tornado emergency declaration on April 28, 2024, that allowed the impacted areas (Douglas, Lancaster, Washington) to use state emergency funds established by the Nebraska Emergency Management Agency (NEMA).[5] On May 2, 2024, Governor Pillen requested a federal disaster declaration from President Joe Biden to allow for the use of federal funds to aid these counties in recovery, which was granted on May 3, 2024.[6]

On April 29, 2024, the University of Nebraska Medical Center (UNMC) Water, Climate and Health Program (WCHP) reached out to the Three Rivers Public Health Department (Three Rivers) to offer support for conducting a rapid needs assessment (RNA) to better understand the impacts that this tornado caused to Washington County residents. Planning began on Wednesday, May 1, 2024. As a result of these discussions, a post-tornado rapid needs assessment was planned for Thursday, May 16 through Saturday, May 18, 2024, just three weeks after the tornado outbreak. The objectives of this RNA were to evaluate the NWS early warning system and messaging; evaluate local emergency management response and communications; determine the mental and physical health impacts of those affected; and determine the extent of community needs.

Methods

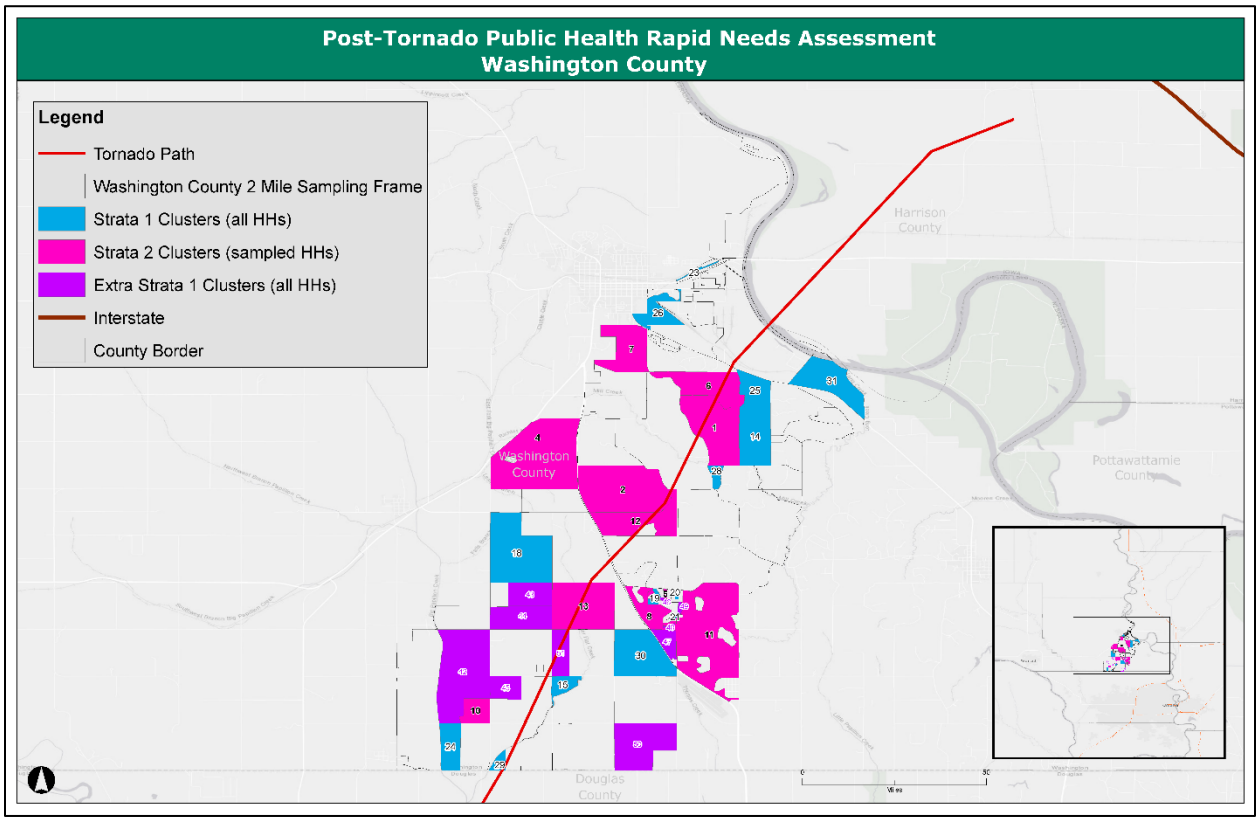
Washington County, Nebraska

According to the U.S. Census Bureau, Washington County has 20,865 residents and 8,577 total housing units. The median age of residents of Washington County is 41.6 years, with 18.4% of the population being 65 years or older. The median household income is $89,671, the proportion of the population living in poverty is 8.0%, and the employment rate is 66.7%. Related to health, 11.9% of the population of Washington County are classified as having some disability (e.g., hearing, vision, ambulatory impairments), and 5.0% do not have health insurance. Finally, 61.7% of the county's population are classified as rural.[7]

Assessment Design

Due to the rural nature of the community, a traditional CASPER was not possible. Therefore, we moved forward with testing an alternative method to the traditional CASPER methodology, specifically a stratified sample using a multi-tiered sampling approach, described below.

Figure 1. Sampling frame, selected clusters, and tornado path in Washington County



Along with Three Rivers, we decided to focus on the most impacted areas of the county. Using the NWS tornado path, we selected all Washington County Census blocks within a 2-mile radius of the tornado path (139 blocks). After removing blocks with 0 households per the 2020 Census,

97 blocks remained for sampling. This sampling frame was split into two strata based on the median number of households in our sampling frame (**Figure 1**).

Stratum 1 included Census blocks classified as more "rural" or blocks with 9 or fewer households. Stratum 1 was sampled using a 1-stage clustering approach, with selection probability being proportional to size and selected without replacement. Clusters were sampled until the total number of HHs was equal to half of the target sample size (at least n = 96 households; see section on Sample Size below), then additional clusters were selected to ensure adequate sample size (up to ~150 households). All households in the selected clusters were interviewed. Sampling without replacement was necessary, as every household was interviewed when a cluster (i.e., Block) was selected. To provided weighted estimates for this assessment, we calculated weights for this stratum as follows. The basic first stage cluster weight for each sampled cluster was calculated as:

$$Stratum\ 1\ Weight = \frac{total\ households\ in\ stratum}{(sampled\ clusters\ \times households\ in\ cluster)}$$

Stratum 2 included Census blocks classified as more "urban" or blocks with 10 or more households. Stratum 2 was sampled using a two-stage clustering approach like a traditional CASPER,[2] with selection probability at the first stage being proportional to size and selected with replacement. Due to the lower number of households in the blocks in this stratum, we decided to use a 20 x 5 sampling approach, where we select 20 clusters and then select 5 households per selected cluster to gain our required sample size in this stratum (n = 96, see section on Sample Size below). Weights for this stratum were calculated per standard CASPER methodology:

$$Stratum\ 2\ Weight = \frac{total\ households\ in\ stratum}{(households\ interviewied\ in\ cluster\ \times\ clusters\ selected)}$$

Sample Size

The required sample size is the number of completed surveys needed to estimate the impacts of the tornado within 10 percentage points of the true population proportion, which is assumed to be 50% as the basis, with 95% confidence from a simple random sample is 96. Selecting a simple random sample from the sampling frame would be resource intensive and not feasible in a short timeframe, so alternative sampling strategies were needed. Therefore, we used a hybrid cluster sampling approach. To consider the design effect of this clustering (i.e., the correlation of responses from within clusters), we multiplied the required simple random sample selection sample size by two to yield an estimated sample size needed of 192. This is the target sample size required.

Survey Development

We used standard CASPER survey questions[2] for many of the household-level questions, including related to household-level preparedness and health and well-being. We used questions developed by the National Oceanic and Atmospheric Administration (NOAA), specifically the NOAA Tornado Post-Event Survey, to evaluate tornado early warning systems.[8] These were adapted to assess household-level information, rather than individual-level information. To

evaluate county-level post-tornado resources and communications, we developed specific questions for this assessment for this purpose. Also, based on anecdotal information, we included questions related to pediatric health and well-being. Finally, we included four standard individual-level questions on health and well-being.

Field Data Collection

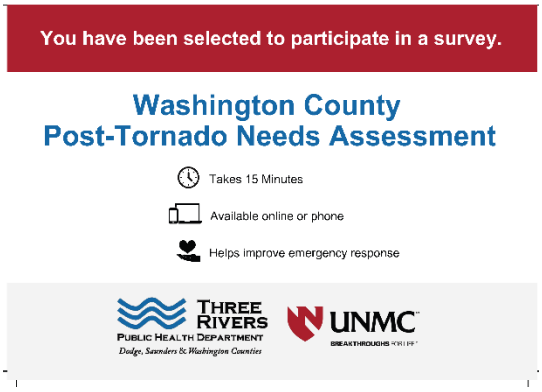
We used standard practices for conducting rapid needs assessments to ensure accuracy of information and safety of our teams.[2] Volunteers went through just-in-time training via Zoom and onsite prior to data collection activities to learn about the purpose and methodology for this RNA; to become familiar with the survey questions, use of tablets, and other field documents; and to be instructed on safety measures. Volunteers from eight local health departments; UNMC faculty, staff, and students; NE Department of Health and Human Services staff; and local community members gathered at the command center each day of data collection (May 16-18, 2024) to receive final instructions and data collection/field materials. Two-person teams collected data from their assigned clusters until the cluster was closed out (obtained all required surveys, visited all accessible households with no response up to three times, or received refusals to participate). All participating households provided verbal consent to participate. All households where contact was made were offered information on the survey and local resources available for recovery.

Volunteers receiving last minute instructions at the command center before going into the field. Image Credit: Christine Allmon, UNMC

Online and Telephone Data Collection

After the field assessment was complete, we decided to include a supplementary mail-out with online and telephone survey options for the most highly affected communities in the assessment area. Several clusters had no surveys collected due to the excessive damage to homes in these areas, making the homes unlivable or inaccessible. We used publicly available tax parcel data

from the Washington County Assessor's Office to identify residential addresses in these clusters. We also used addresses from the damage reports obtained by Three Rivers from their online Washington County Damage Survey. Postcards were mailed to selected addresses on May 24, 2024, with the online and telephone survey open from May 24-June17, 2024.



Postcard used for the online survey.

Analysis

Response rates were calculated to determine the success of the assessment according to the following formulas:

$$Contact\ Rate = \frac{completed\ interviews}{households\ where\ contact\ was\ attempted}$$

$$Cooperation\ Rate = \frac{completed\ interviews}{households\ where\ contact\ was\ made}$$

$$Completion\ Rate = \frac{completed\ interviews}{interviews\ intended\ to\ complete}$$

We conducted basic weighted descriptive analyses, including calculating weighted frequencies and percentages for categorical variables and medians for continuous variables, with associated 95% confidence intervals (CI) around the medians or percentages. Weighted results represent the entire sampling frame, which includes all households and individuals residing in Census blocks within a 2-mile radius around the tornado path through Washington County. We weighted household-level questions based on the household probability of selection to estimate the number and percentage of similar households in the sampling frame. We weighted individual-level health and well-being questions based on the individual probability of selection to estimate the number and percentage of similar individuals within the sampling frame. All results reported below are weighted results.

Software

We used EpiInfo 7.2.6.0 (CDC; Atlanta, GA) to conduct sample size calculations; ArcGIS Pro 3.3.0 and ArcMap 10.8.2 (ESRI; Redlands, CA) for mapping; CASPER GIS Toolkit 2nd ed (CDC; Atlanta, GA) for cluster selection; REDCap 14.4.1 (Vanderbilt University; Nashville, TN) for data entry and online survey collection; and SAS v 9.4 (SAS Institute, Inc; Cary, NC) for statistical analysis.

Results

Cluster Selection

We selected a total of 28 clusters in Stratum 1 and 13 in Stratum 2 (with three clusters being selected more than once). We included one additional cluster in Stratum 1, based on a Three Rivers request and knowledge of need in that area, for a total of 29 clusters in Stratum 1.

Response Rates

For the field assessment, we successfully completed 110 surveys, yielding a completion rate of 57.3%, a contact rate of 27.5%, and a cooperation rate of 50.7%. For the online survey, 28 surveys were successfully completed out of 91 postcards sent, yielding a completion rate of 30.8% (other response rates are not applicable for the online/telephone survey). The final number of households included in the assessment from both the field assessment and the online/telephone survey was 138, yielding an overall completion rate of 71.9%.

Household Characteristics and Demographics

Household sizes ranged from 1 – 10 people, with a median of 2.21 (95% CI: 1.48 – 2.93). Most households spoke English as the main language (100.0%). The majority (96.8%) of residences were classified as stand-alone, detached, permanent structures like a house (Table 1).

Table 1. Household Characteristics

Type of Residence	Percent (n)	95% CI
Stand-alone, detached, permanent structure like a house	96.80% (816)	93.26 – 100.00
Condo, townhouse, or duplex that is attached to another structure	2.53% (21)	0.00 – 5.94
Mobile home (whether placed on permanent foundation or not)	0.45% (-)	0.00 – 1.39
Other	0.26% (-)	0.00 – 0.81

Household Emergency Preparedness

There was a range of preparedness for household-level emergency planning (**Table 2**). Only 56.3% of households reported having means for contacting family members if they were not together when a disaster happened, the least common emergency plan reported. On the other hand, 88.7% of households reported having a safe space to shelter in place, the most common emergency plan reported.

Households shared a range of locations where they typically shelter during a tornado, predominantly basements or designated safe rooms. Among households where one or more household member was home during the Arbor Day tornado, 75.5% sheltered in their basement; 3.9% in a private, designated tornado shelter; and 7.3% in a small interior room without windows, such as a closet, bathroom or tub, laundry room, or stairwell. Other options for sheltering mentioned were a neighbor's house, crawl space, or just did not shelter – preferring to stay in the main part of the house to be able to observe the weather. Most respondents (86.6%; 95% CI: 76.20 – 97.02) felt that sheltering would protect themselves and their family members from physical injury.

Emergency supply kits – or items stored together in containers that can easily be accessed in an emergency – were prepared prior to the tornadoes for 29.3% of households. Most households reported not having an emergency supply kit available (68.4%). Among the households that did have emergency kits, 34.8% (95% CI: 8.03 – 61.64) used them during the tornado. Of those that used items, 82.4% used food, 87.40% used water, 88.3% used batteries, and 46.6% used medical supplies from their kits. Other materials used included baby supplies, flashlights/candles/lanterns, phone charges, and weather radios. Some households noted that they needed materials that were not available in their household or in their emergency supplies kits, such as working sources of light, generators, weather radios, matches or lighters, and water.

Table 2. Household Emergency Preparedness

Emergency Plans	Percent (n)	95% CI
How to contact family members if you are not together when a disaster happens	56.25% (474)	38.51 – 73.99
Routes to exit your community if there is an evacuation	54.57% (460)	35.76 – 73.38
Where to shelter safely if it is safer to shelter in place	88.68% (748)	75.09 – 100.00
How to receive information such as emergency alerts and warnings?	78.56% (663)	64.48 – 92.64
How to get copies of important documents such as insurance records	65.80% (555)	48.95 – 82.66
Shelter Location if at Home	**Percent (n)**	**95% CI**
Basement	75.50% (637)	65.33 – 85.68
Designated tornado shelter (private)	3.21% (27)	0.06 – 6.37

Designated tornado shelter (community/public)	0.11% (-)	0.00 – 0.35
Small interior room without windows (e.g., closet, bathroom/tub, laundry room, stairwell)	7.28% (61)	0.00 – 14.93
Other	9.75% (82)	2.77 – 16.72
Not applicable	5.87% (50)	1.40 – 10.34
Emergency Supply Kit Prior to Tornado	Percent (n)	95% CI
Yes	29.25 (247)	19.46 – 39.04
No	68.38 (577)	58.50 – 78.25
Do not know	0.24 (-)	0.00 – 0.61
Refused	0.49 (-)	0.00 – 1.47
Emergency Supply Kit Items Used for those with a Kit Available	Percent (n)	95% CI
Food	82.39% (71)	61.50 – 100.00
Water	87.40% (75)	70.88 – 100.00
Batteries	88.25% (76)	73.08 – 100.00
Medical Supplies	46.62% (40)	0.00 – 96.88
Other	45.68% (39)	0.00 – 96.02

Household-Adapted NOAA Post-Tornado Survey

Questions from the NOAA Post-Tornado Survey were adapted to the household level to help us better understand household experiences before, during, and immediately following the tornado. Households were asked to identify where members of their household were when the tornado touched down (**Tables 3-5**). The most common locations of family members were at home (85.1%), at work (19.9%), and in a vehicle (8.1%). Other locations mostly included people being out of town at the time of the tornado.

For households with at least one member at home or at school, 52.1% reported feeling very safe. For households with at least one household member at work at the time of the tornado, 70.4% felt very safe and 8.6% felt moderately safe in their workplace structure when the tornado occurred

(**Table 3**). Building/structure type for workplaces included primarily single-story (40.0%) and multi-story (43.3%) buildings. Given the small number of respondents who were at a place of business during the tornado, we did not include further analysis related to type of structure or feelings of safety in the business structure.

For households with members at various locations at time of touchdown, 24.7% reported that this influenced how members took protective actions, while 22.5% reported that it did not (**Table 3**). The majority (52.3%; 95% CI: 36.23 – 68.35) of respondents shared that the location of household members and resources available made it easier to protect themselves and members of their households, 7.1% (95% CI: 2.45 – 11.82) reported these factors making protection more difficult, and 22.4% (12.56 – 32.33) reported no difference.

Table 3. Location and Level of Security at Time of Impact

Location of Respondent and Household Members at Touchdown	Percent* (n)	95% CI
At home	85.11% (718)	73.68 – 94.04
At work	19.93% (168)	8.60 – 32.02
At school	7.32% (62)	0.42 – 9.95
At a business	1.38% (-)	0.00 – 0.47
In a vehicle	8.14% (69)	4.80 – 21.84
Other	10.40% (88)	2.09 – 18.95
Do not recall	0.10% (-)	
Safety in Household or School Structure, Among Those at Home/School	**Percent (n)**	**95% CI**
Not at all safe	2.39% (17)	0.00 – 5.22
Only slightly safe	0.57% (-)	0.00 – 1.69
Somewhat safe	18.77% (137)	2.78 – 34.76
Moderately safe	24.18% (176)	11.34 – 37.01
Very safe	52.09% (380)	35.39 – 68.78
Safety in Workplace Structure, Among Those at Work	**Percent (n)**	**95% CI**

Not at all safe	3.12% (5)	0.00 – 7.58
Only slightly safe	15.59% (26)	0.00 – 35.21
Somewhat safe	2.68% (5)	0.00 – 6.84
Moderately safe	7.57% (13)	0.00 – 21.84
Very safe	70.39% (118)	47.49 – 93.29
Multiple Locations and Protective Action	Percent (n)	95% CI
Yes	24.90% (210)	14.67 – 35.13
No	17.60% (148)	7.99 – 27.22
Not applicable	54.99% (464)	46.14 – 63.84

**Can be over 100% as family members may be at multiple locations.*

The National Weather Service uses a tornado watch to indicate that current weather conditions could produce a tornado (i.e., tornadoes are possible) and that people in the area should be prepared and aware. On the other hand, a tornado warning is used to indicate that a tornado has been sighted or has been indicated as having occurred on radar (i.e., tornadoes are expected) and that people should take immediate action.[9] Most (98.1%) households reported being aware of the difference between a tornado watch and warning prior to the event. Almost 70% (68.9%; 95% CI: 55.85 – 81.97) of households reported at least one member of the household seeing and/or hearing the tornado. Over 80% of households lost power and/or access to information sources during the tornado (80.6%; 95% CI: 69.84 – 91.41).

Additionally, 93.18% of households received a tornado warning related to the April 26 tornado outbreak and received the warning mostly commonly through television (64.6%) or automated text/wireless emergency alerts (62.4%). Other common sources of the warnings were siren or other alarm (26.9%) and word-of-mouth (27.4%). Importantly, 5.1% or 44 households either did not receive the warning or do not recall receiving it. Respondents were generally confident in their ability to act to protect themselves and their household members after receiving a warning, with 5.2% somewhat confident, 20.0% moderately confident, and 62.2% very confident. The actions taken are summarized below (**Table 4**). Only 13.7% (95% CI: 4.52 – 22.88) reported needing to seek additional information on actions to stay safe after receiving a warning.

Table 4. Tornado Warning: Mode of Communication and Protective Actions

Received Tornado Warning	Percent (n)	95% CI

Yes	93.18% (786)	86.27 – 100.00
No	3.20% (27)	0.00 – 6.73
Do not recall	1.97% (17)	0.00 – 4.80
How Warning was Received	Percent (n)	95% CI
Broadcast radio	15.39% (130)	6.99 – 23.80
Weather radio (NWS)	14.54% (123)	4.30 – 24.77
TV	64.63% (545)	54.90 – 74.36
Siren or other alarm	26.87% (227)	12.09 – 41.65
Internet	16.21% (137)	6.84 – 25.57
Social media	6.80% (57)	0.38 – 13.22
Word-of-mouth (including phone or text, email, etc.) from family, friends, neighbors, employers, co-workers, etc.	27.42% (231)	14.85 – 39.99
Automated text or phone notification	62.39% (526)	44.06 – 80.71
Other	4.79% (40)	0.76 – 8.81
Do not recall	1.61% (14)	0.00 – 4.37
Confidence in Protective Action after Warning	Percent (n)	95% CI
Not at all	0.30% (-)	0.00 – 0.93
Only slightly	3.58% (30)	0.00 – 10.41
Somewhat	5.17% (44)	0.00 – 12.05
Moderately	20.01% (169)	6.25 – 33.77
Very	62.17% (524)	45.22 – 79.11
Do not recall	1.73% (15)	0.00 – 5.14
Did not receive warning	0.22% (-)	0.00 – 0.69

Actions after Warning	Percent (n)	95% CI
Nothing, continued daily activities	4.31% (36)	0.00 – 11.17
Monitored the situation, but did not move to shelter	37.56% (317)	46.33 – 52.78
Moved to the most sheltered part of the building, but did not leave the building	61.37% (518)	44.16 – 76.58
Moved family or friends to the most sheltered part of the building, but did not leave the building	26.64% (225)	10.97 – 42.30
Moved to a specially constructed storm shelter in the building	7.11% (60)	2.56 – 11.67
Moved to nearby location/building that provided safer shelter	7.91% (67)	0.48 – 15.33
Left the building and drove from the tornado warning area	0.56% (-)	0.00 – 1.42
Something else	5.26% (44)	0.87 – 9.66

Among responding households, 82.5% received a tornado watch and again, the most common way to receive the alert was through TV (61.1%) and automated text messaging (40.4%), with internet (20.7%) and word-of-mouth (20.0%) coming in next. Actions taken after receiving the watch are included below (**Table 5**).

Table 5. Tornado Watch: Mode of Communication and Protective Actions

Received Watch	Percent (n)	95% CI
Yes	82.50% (696)	74.01 – 91.00
No	9.44% (80)	2.18 – 16.70
Do not recall	7.57% (64)	1.92 – 13.21
How Watch was Received	**Percent (n)**	**95% CI**
Broadcast radio	15.45% (130)	7.18 – 23.72
Weather radio (NWS)	5.18% (44)	0.74 – 9.61

TV	61.13% (516)	48.73 – 73.53
Siren or other alarm	6.20% (52)	0.00 – 12.46
Internet	20.71% (175)	11.13 – 30.30
Social media	6.88% (58)	0.89 –12.88
Word-of-mouth (including phone or text, email, etc.) from family, friends, neighbors, employers, co-workers, etc.	20.01% (169)	10.74 – 29.29
Automated text or phone notification	40.38% (341)	25.53 – 55.23
Other	2.43% (21)	0.00 – 5.50
Actions after Watch	Percent (n)	95% CI
Checked emergency supplies	5.60% (47)	0.00 – 12.62
Bough emergency supplies	0.45% (-)	0.00 – 1.39
Made sure NOAA/NWS radio was on and charged/plugged in	2.94% (25)	0.00 – 6.15
Had local TV news/weather on	56.03% (473)	41.73 – 70.33
Had local radio news/weather on	16.48% (139)	8.37 – 24.58
Checked weather app on phone frequently (NOAA weather radar, etc.)	39.91% (337)	26.04 – 53.78
Called friends and family nearby to warn them	17.16% (145)	7.38 – 26.94
Sought information on tornado safety	5.75% (48)	0.00 – 12.95
Other	6.26% (53)	0.00 – 13.43
Nothing	7.65% (65)	0.32 – 14.98

Household Health and Well-Being

Households were asked about damage to their homes, and 65.6% reported no or minimal damage, while 10.0%% reported that their homes were destroyed or uninhabitable (**Table 6**). Residences were structurally safe to live in at time of interview for 88.1% of households (95% CI: 79.52 – 96.70). Roughly 17.5% (3.56 – 31.45) of households interviewed were displaced; among these,

sheltering locations for these households included with family or friends (9.6%), at hotel or temporary accommodations (5.4%), or other (58.0%), such as motor home/camper.

Table 6. Impacts on Households

Damage to Home	Percent (n)	95% CI
None/minimal	65.59% (553)	47.36 – 83.82
Damaged but repairable	10.73% (91)	3.29 – 18.17
Significant damage but habitable	12.75% (108)	3.39 – 22.10
Destroyed/uninhabitable	9.95% (84)	1.67 – 18.22

Respondents were asked questions about the health and well-being of members of their households. Most households reported all members having health insurance (97.3%; 95% CI: 94.66 – 99.84). Some households reported that one or more member has a complex medical need. Common conditions included having diabetes (12.9%), use of an assistive device for mobility (9.1%), and use of oxygen or a ventilator (4.2%). Among households with complex medical needs, roughly 11% had challenges accessing needs.

Only 1.2%, or approximately 10, households reported injuries resulting from the tornado, and 3.4%, or approximately 30, households reported injuries resulting from cleanup activities. 58.6% (95% CI: 46.97 – 70.16) of all adults in responding households had a tetanus shot within the past 10-years, while 17.9% reported not knowing.

The final portion of this section asked about the worsening of physical and mental health conditions among all members of the household (**Table 7**). The most common symptoms reported as worsening since the tornado include allergies (11.2%) and hypertension (5.2%). The most frequently reported well-being/behavioral factors following the tornado included trouble sleeping or nightmares (22.2%), agitated behavior (14.8%), and difficulty concentrating (11.0%).

Table 7. Health Conditions Since Tornado

Worsening Health Conditions Since Tornado	Percent (n)	95% CI
Asthma/COPD	3.73% (31)	0.00 – 7.47
Allergies	11.18% (94)	3.49 – 18.86
Diabetes	0.45 (-)	0.00 – 1.39
Hypertension	5.16% (44)	0.00 – 12.22

Mental health condition	1.51% (13)	0.00 – 3.61
Other	2.32% (20)	0.00 – 4.82
Health and Well-Being Conditions Since Tornado	Percent (n)	95% CI
Difficulty concentrating	10.95% (92)	0.95 – 20.95
Trouble sleeping/nightmares	22.15% (187)	8.45 – 35.85
Loss of appetite	2.36% (20)	0.00 – 5.25
Agitated behavior	14.83% (125)	4.38 – 25.28
Increased alcohol consumption	0.86% (7)	0.00 – 2.57
Other	3.81% (32)	0.45 – 7.16

Households with Children: Child Well-Being

Households with children aged 2 – 17 years were asked questions about the physical and mental health and well-being of their children. Most households reported child health as excellent (61.5%), very good (17.0%), or good (17.3%). Almost all responding households reported child health was about the same (94.8%), while none reported improvement and less than 5% reported worsened child health. Over 90% of households reported knowing of a healthcare professional to turn to if any children in the household had physical or mental health problems that may be related to the tornado. While the mental health impacts on children was limited, the feeling nervous or afraid was the most frequently reported effect. The prevalence of mental health effects of the tornado on children are summarized below (**Table 8**).

Table 8. Child Health and Well-Being

Mental Health Effects on Children, Among Those with 2-27 Year Olds in Household	Percent (n)	95% CI
Been very sad or depressed	0.00% (0)	–
Felt nervous/afraid	30.29 % (97)	8.09 – 52.50
Had problems sleeping	10.47% (33)	0.00 – 22.41
Had problems getting along with other children	0.00% (0)	–
Experienced concerns for physical safety/well-being	3.34% (10)	0.00 – 8.22

Other	3.03% (10)	0.00 – 9.00

Household Communications and Preferences

Among respondents, 85.7% (95% CI: 76.94 – 94.49) were aware of resources to aid in recovery. The most common form of communication related to post-tornado resources was friends, family, or other word-of-mouth (54.1%); social media (48.5%), and television (47.5%). Households were also asked about their awareness of specific resources available in Washington County to assist in recovery efforts, including the Washington County Damage Survey online form (38.0%), Red Cross and other shelters (82.3%), tetanus vaccine clinics (52.9%), tree limb and debris drop-off locations (71.5%), and others (**Table 9**).

Table 9. Resources: Communication Preferences and Awareness

How Household Received Information on Available Resources	Percent (n)	95% CI
Newspaper	31.18% (263)	16.02 – 46.33
Internet/online news	32.51% (274)	21.22 – 43.81
Social media	48.47% (409)	33.34 – 63.60
TV	47.52% (401)	32.29 – 62.76
Radio	15.21% (128)	5.29 – 25.12
Friends, family, word-of-mouth	54.08% (456)	40.17 – 67.98
Church/place of worship	26.27% (222)	14.62 – 37.92
Other	16.61% (140)	5.98 – 27.25
Aware of Resources	**Percent (n)**	**95% CI**
Washington County Damage Survey online form	37.99% (320)	21.71 – 54.27
Red Cross and other shelters	82.28% (694)	72.09 – 92.46
Tetanus vaccine clinics	52.92% (446)	35.45 – 70.40
Tree limb and debris drop-off locations	71.47% (603)	59.59 – 83.34
Landfill fee waivers	46.41% (392)	34.06 – 58.77

Building permit fee waivers	36.29% (306)	17.70 – 54.88
Other	4.38% (37)	1.03 – 7.73

Households were also asked about their main source of information during the tornado event, along with their top three preferred methods of communication about emergencies (**Table 10**). Households' main source of information about the tornado during the event was television (51.8%), followed by text messages and cell phone notifications (13.5%) and internet/online news (12.5%). Households were asked to identify their three preferred sources of information for receiving emergency communications. The top three responses were TV (81.1%), text message/cell phone (70.1%), and internet/online news (37.0%). Some households reported one or more members having conditions that could be barriers to effective communication during an emergency, including barriers to hearing (12.4%) and vision (4.5%), among others.

Table 10. Emergency Communication Preferences and Potential Barriers

Main source of information about tornado during event	Percent (n)	95% CI
TV	48.14% (406)	30.93 – 65.35
Radio	8.33% (70)	1.09 – 15.58
Internet/online news	11.60% (98)	2.40 – 20.80
Social media	4.31% (36)	0.13 – 8.48
Friends, family, word-of-mouth	6.90% (58)	0.57 – 13.24
Text message/ cell phone	15.21% (128)	5.66 – 24.76
Church/place of worship	0.13% (-)	0.00 – 0.40
Other	2.65% (22)	0.00 – 5.75
None	2.24% (19)	0.00 – 4.98
Preferred sources of information about tornado during event	**Percent* (n)**	**95% CI**
TV	81.12% (684)	70.79 – 91.46
Radio	22.59% (191)	13.74 – 31.43
Internet/online news	37.00% (312)	22.63 – 51.37
Social media	26.36% (222)	15.14 – 37.57

Friends, family, word-of-mouth	23.69% (200)	14.13 – 33.26
Text message/cell phone	70.12% (591)	55.43 – 84.81
Church/place of worship	1.74% (15)	0.00 – 4.15
Other	3.24% (27)	0.10 – 6.38
Barriers to effective communication	Percent (n)	95% CI
Impaired hearing	12.43% (105)	5.28 – 19.57
Impaired vision	4.45% (38)	0.60 – 8.30
Developmental/cognitive disability	0.30% (-)	0.00 – 0.93
Difficulty understanding English	0.82% (7)	0.00 – 1.86
Difficulty understanding written material	1.69% (14)	0.00 – 4.05
Other	3.55% (30)	0.00 – 10.38

**Reported as frequencies of 'yes' for all responses.*

Almost 60% of households (58.0% or 489 households); 95% CI: 40.17 – 75.72) encountered local disaster response teams, with 29.0% of households first encountering teams within two days after the tornado and 12.0% not encountering teams until eight or more days after. There were 41.5% (350 households; 95% CI: 28.41 – 54.59) of households reported a member of the household volunteering to assist in recovery efforts.

Individual Health and Well-Being

Individuals responding on behalf of their households were asked about their individual health and well-being (**Table 11**). Most individuals reported overall that they had not experienced any of the poor mental health outcomes during the previous weeks at time of survey. Feeling nervous or anxious (6.9%) and being unable to stop worrying (5.9%) were the most frequent conditions reported as occurring nearly every day, while feeling down or depressed in the past two weeks was reported as occurring several days by 14.7% (318 individuals).

Table 11. Individual Health and Well-Being

Little Interest or Pleasure in Doing Things in Last 2-Weeks	Percent (n)	95% CI
Not at all	87.30% (1,892)	76.95 – 97.65

Several days	8.23% (178)	0.00 – 17.06
More than half the days	0.70% (15)	0.00 – 2.16
Nearly every day	1.59% (34)	0.00 – 3.31
Feeling Down or Depressed in Last 2-Weeks		
	Percent (n)	95% CI
Not at all	80.97% (1,755)	68.37 – 93.57
Several days	14.66% (318)	2.18 – 27.13
More than half the days	0.417% (9)	0.00 – 1.15
Nearly every day	1.807% (39)	0.00 – 3.98
Felt Nervous, Anxious, or On Edge in Last 2-Weeks		
	Percent (n)	95% CI
Not at all	79.10% (1,714)	67.07 – 91.13
Several days	11.05% (239)	1.83 – 20.27
More than half the days	2.56% (55)	0.00 – 6.36
Nearly every day	6.91% (150)	0.74 – 13.09
Unable to Stop or Control Worrying in Last 2-Weeks		
	Percent (n)	95% CI
Not at all	86.14% (1,867)	77.54 – 94.73
Several days	5.78% (125)	0.46 – 11.10
More than half the days	0.70% (15)	0.00 – 2.16
Nearly every day	5.94% (129)	0.00 – 12.28

Open-Ended Responses

Households were given the opportunity to provide any additional information they wanted to share with Three Rivers and Washington County officials. Most frequently, households shared positive experiences with the emergency responders, including volunteers, community members, Omaha Public Power District, Washington County Sheriff's Office, and local police. Respondents shared the following positive comments as examples.

“The sheriff was amazing!”

“OPPD had a fantastic response, very fast. OPPD was essential with power restoration. Phenomenal.”

“It really amazes me of how many people have reached out and helping.”

“I was very impressed because of where we work, I had communication from both police [departments]. The response was amazing; they handled things very [sic] quickly. Response from OPPD and [Washington] County handled things quickly.”

Others highlighted the importance of the community members, family, and faith-based organizations.

“Faith was important and church has been a blessing.”

“Family support…over 200 people showed up to help.”

“I have been overwhelmed by the generosity of volunteers…”

“Community outreach was amazing here!”

“[First] Lutheran helped a lot.”

Other comments were focused on concerns about receiving early warnings and the lack of sirens, and limited communications for recovery and response. Example comments regarding these concerns included the following, with several inquiring about repurposing the Ft. Calhoun nuclear sirens.

“Faulty texting warning system. The text system is a good tool, but it is hit or miss. I don't have confidence in it.”

“No cell phone service when the power was out made it impossible to check on family while out of town.”

“Didn’t have a siren, and [the tornado] crushed neighbors. But we live in the country. Can we start to use the old Ft. Calhoun nuclear sirens?”

“Can we start to use the old Ft. Calhoun nuclear sirens?”

Another area of concern was the timeline for tree and debris removal assistance and continuing need for clean-up supports.

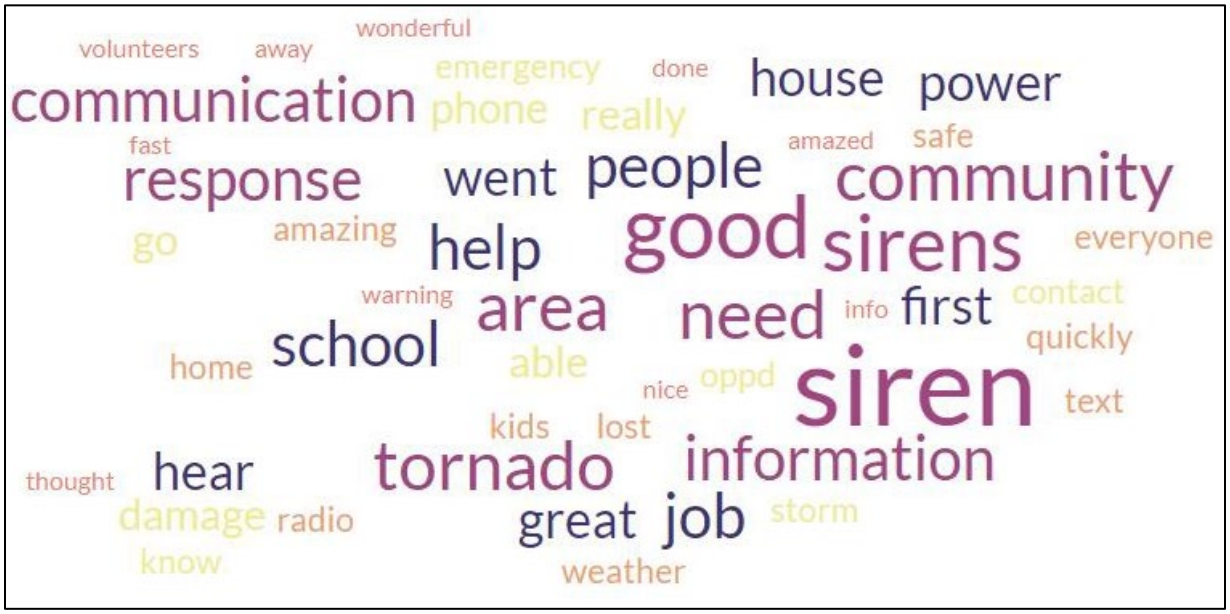
"It's a tragedy that all the debris hasn't been picked up; can't see going onto County Road 34 by Mrs. [X]'s house because her house was pretty torn up and there are huge piles of wood and limbs on the side of the road. There is a lot of burning - this is particularly problematic. It makes a mess and creates air pollution."

"All [the debris] is still there in a pile."

"I don't understand why FEMA passed fliers around that they would help with storm debris and we are now a month out and no one has been through to pick anything up. The intersection leaving our neighborhood is dangerous as tree debris limits sightline."

The common themes pulled from the free-text comments are shown in **Figure 2**.

Figure 2. Word Cloud of Common Terms in Open-Ended Response Question



Conclusions

Preparedness

Household-level emergency plans for Washington County residents are well developed regarding where to safely shelter in place, how to receive warnings and alerts, and how to access copies of important documents. However, emergency preparedness and planning related to evacuation routes, family emergency communication planning, and emergency supply kits were identified as areas for improvement. The tornado impacted the area around 4:00pm in the afternoon, and while many residents were at home, a significant proportion of household members were at work, school, or in their vehicle. Therefore, family emergency communication plans are important for reunification and communicating risks and needs. Further, just over 80% reported losing power or access to information during the tornado event, demonstrating a clear need for access to emergency supply kits that have light and power sources available.

Health and Well-Being

Some households reported having members with complex medical needs, which often makes evacuation difficult or impossible and can impact the person's resiliency or ability to recover after the disaster. In this community, 4% of households reported someone with a reliance on oxygen or ventilation, 9% reported use of mobility assistance technology, and 13% reported the use of insulin for diabetes. Among these respondents, 11% reported having difficulties addressing or accessing these needs after the tornado.

Health and well-being impacts on the household were, fortunately, minimal overall. About 1% or about 10 households reported injuries due to the tornado impact, and 3% or about 30 households reported being injured during clean-up activities. The most common existing health conditions that were reported as worsening since the tornado were asthma/COPD and allergies, which may be due to the changing season and weather patterns in general for this time of year, or the greater exposure to the outdoors because of the clean-up activities. Households reported that some members experienced new conditions since the tornado, such as agitated behavior, trouble sleeping and nightmares, and difficulty concentrating. Among those households with children between the ages of 2 and 17 years, most reported that their children were in excellent or good health and had seen no change in their health status since the tornado. Though some adults reported that their children had felt nervous or afraid or had problems sleeping since the tornado. At the individual-level, the most common well-being impacts were unable to stop or control worrying and feeling nervous, anxious, or on edge several to all days in the previous two-week period.

Communications

Communications, both before and after a disaster, are vital to saving lives and ensuring quick response and recovery. In rural communities, tornado sirens are often not available or maintained, and other routes of communication are needed. For this tornado event, TV and automated text or phone notifications like the wireless emergency alerts (WEAs) were the most common source of the tornado warning on April 26. However, only 65% of people received these warnings through their TV, and only 62% received the WEAs. Another 27% reported getting the warning through word-of-mouth (friends, family, neighbors, etc.), and only 27% reported hearing a siren or other alarm. Only 15% reported getting the alerts from their weather radio. As it was, over 5% or approximately 44 households in the impacted area did not receive or did not recall receiving the tornado warning from any source, and almost 17% or 144 households did not receive or did not recall receiving the early tornado watch information from any source. Respondents reported their preferred source of receiving emergency communications were, by far, TV (81%) and text message/cell phone (70%). Alternative options that were relatively similar in level of preference were internet or online news (37%), social media (26%), and friends, family, or word-of-mouth (24%).

Households also reported barriers to effective communication, including impaired hearing (12%) and vision (4%). Such barriers make receipt of warnings and alerts more challenging or can impact a person's ability to comprehend their risks.

These results highlight the need for multiple communication routes during emergencies, as well as the need for promoting the distribution and use of weather radios and supporting communities in installing and maintaining tornado sirens.

Post-event communication sources were even more varied, with about 50% of households reporting receiving information on available recovery resources from social media, TV, and friends and family (word-of-mouth). Newspaper, internet, and churches were secondary sources of information for about one-fourth to one-third of respondents.

Recommendations

- Install and maintain outdoor community tornado sirens
- Promote and distribute NOAA weather radios
- Provide community emergency preparedness education that focuses on:
    - Access to and use of multiple sources of emergency information
    - Family emergency planning and communication
    - Emergency supply kits that includes alternative light and power sources
- Ensure that households with individuals with barriers to effective communication (e.g., vision, hearing impairments) have appropriate methods of communication to address these limitations

- Ensure that community emergency response plans include planning and accommodation for individuals with complex emergency needs
- Re-evaluate emergency communication strategies and methods based on reported communication preferences
- Consider expanding access to community behavioral and mental health services post-event to serve those who reported impacts on their well-being

Summary

The tornado warnings and alerts issued for this event undoubtedly protected lives and prevented significant injuries. However, it is important to note that this tornado occurred during daylight hours when many individuals were commuting from school or their workplaces, heightening their situational awareness. Had this severe weather event transpired during the overnight hours when most people are asleep, the outcomes could have been markedly different. Without widespread access to multiple communication channels, such as outdoor warning sirens and weather radios, the potential for morbidity and mortality may have been substantially higher.

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Appendices

Appendix 1: Survey Information and Consent

Washington County Post-Tornado Needs Assessment

Your household has been randomly selected to participate in a survey about the recent tornadoes affecting Washington County. This work is being conducted by the Three Rivers Public Health Department and the University of Nebraska Medical Center with the Nebraska Department of Health and Human Services.

We are talking to residents about emergency preparedness; physical and mental health and wellbeing; communications; and experiences during the tornadoes. All surveys are completely voluntary and anonymous.

If you are interested in participating in this survey, you can do so:

- Over the phone, by calling (402) 979-6704.
- In person, by contacting kkintziger@unmc.edu or scanning the QR code below to arrange a time and location.

We hope you will participate in this survey to help us get a better idea of how we can better serve your community!

(402) 979-6704

kkintziger@unmc.edu

THREE RIVERS PUBLIC HEALTH DEPARTMENT
Dodge, Saunders & Washington Counties

NEBRASKA
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Appendix 2: Resource Card

Resources and Contact Information

Federal Resources

- Federal Emergency Management Agency: (800) 621-FEMA (3362) or www.DisasterAssistance.gov
- Red Cross Financial Assistance: (800) RED-CROSS (733-2767)

State and Regional Resources

- Nebraska Family Helpline: 888-866-8660
- Legal Aid of Nebraska, free legal assistance: (844) 268-5627
- Nebraska Department of Labor, Disaster Unemployment Assistance: https://neworks.nebraska.gov/
- Region 6 Behavioral Healthcare 24/7 Services, text or call 988
- 988 Suicide and Crisis Lifeline: Call or text 988
- Nebraska Emergency Management Agency: (402) 471-7421, Option 3 or nema.publicassistance@nebraska.gov

Three Rivers Public Health Department – Dodge, Saunders, and Washington Counties

- Three Rivers Public Health Department, Email: info@3rphd.org
    - Main Line: (402) 727-5396 or (866) 727-5396
    - After Hours Line: (402) 727-5396 or (866) 727-5396, Option 4

Washington County

- Washington County Damage Survey: https://nalhd.sjc1.qualtrics.com/jfe/form/SV_01Jq3q7VD4BbXnM
- Emergency Staging Area: Skinny Bones, 3935 State Hwy 133
- FEMA Disaster Recovery Center, First Lutheran Church, 2146 Wright Street, Blair, NE

University of Nebraska Medical Center

- Kristina Kintziger or Sarah Elizabeth Scales: wchp@unmc.edu or (402) 979-6704

Appendix 3: Washington County Tornado Response Survey

Cluster # _____ Interview # _____ HH = Household DK = Don't Know Ref = Refused NA= Not Applicable SATA = Select all that apply

We will get started with some basic questions about your HH characteristics.

Q1. Including yourself, how many people live in your HH? _____

Q2. Including yourself, how many people live in your HH?
<2 yrs _____ 2-17 yrs _____ 18-64 yrs _____ 65+ yrs _____

Q3. What is the main language spoken in your HH? (select one)
☐ English ☐ Spanish ☐ Other, specify _____
☐ DK ☐ Ref ___

Q4. [INTERVIEWER TO COMPLETE] Which of the following best describes this residence?
☐ Stand-alone (detached) permanent structure, like a house
☐ Condo, townhouse, or duplex that is attached to another structure
☐ Apartment of dorm room that is part of larger residential complex
☐ Mobile home (whether placed on permanent foundation or not)
☐ Other, specify: _____
☐ DK

The first set of questions will ask about how your HH prepares for emergencies, like the recent tornadoes.

Q5. Does your HH have any of the following emergency plans? (SATA)
☐a) How to contact family members if you are not together when a disaster happens
☐b) Routes to exit your community if there is an evacuation
☐c) Where to shelter safely if it is safer to shelter in place
☐d) How to receive information such as emergency alerts and warnings
☐e) How to get copies of important documents such as insurance records

Q6. Where does your HH typically shelter for a tornado?
_____

Q7. If one or more members of the HH were at home, where did your HH shelter during the tornadoes? ☐ Basement ☐ Designated tornado shelter (private) ☐ Designated tornado shelter (community/public) ☐ Small interior room w/o windows, such as a closet, bathroom/tub, laundry room, stairwell ☐ Other, please specify
_____

Q8. Did you feel that sheltering would protect you and members of your HH from physical injury? ☐ Yes ☐ No ☐ DK ☐ Ref

Q9. An emergency supply kit or go-kit has items stored together in containers that can easily be accessed in an emergency. Did your HH have an emergency supply kit prior to the tornado?
☐ Yes ☐ No [skip Q10-12] ☐ DK ☐ Ref

Q10. Did your household use emergency supplies from the emergency supply kit?
☐ Yes ☐ No [skip Q11] ☐ DK ☐ Ref

Q11. Did your HH use any of the following? (SATA) ☐11a) Food ☐11b) Water ☐11c) Batteries ☐11d) Medical supplies ☐11e) Other, please specify: _____

Q12. Did your HH need emergency supplies that were not included in your emergency supply kit?
☐ Yes ☐ No ☐ DK ☐ Ref

Q13. (For all respondents) What supplies were needed that your HH did not have? Please specify:

This block of questions is adapted from the National Oceanic and Atmospheric Administration's post-tornado survey.

Q14. Where were you and members of your HH when the tornado touched down?
☐ At home (go to Q15) ☐ At work (go to Q16)
☐ At school (go to Q15) ☐ At a business (go to Q17) ☐ DK ☐ In a vehicle (go to Q18) ☐ Other, please specify:_____

Q15. (If at home or school) How safe did you and members of your HH feel in this structure when the incident occurred?
☐ Not at all safe ☐ Only slightly safe ☐ Somewhat safe ☐ Moderately safe ☐ Very safe

Q16. (If at work) Which of the following categories best describes the work? (SATA)
☐a) Single-story building ☐b) Multi-story building ☐ c) Big box store (Lowes; Menard's) ☐ d) Shopping mall
☐ e) Other, please specify: _____

Q16_2. How safe did you and members of your HH feel in this structure when the incident occurred? ☐ Not at all ☐ Only slightly ☐ Somewhat ☐ Moderately ☐ Very safe

Q17. (If at business) Which of the following categories best describes the work? (SATA) ☐a) Single-story building ☐b) Multi-story building ☐ c) Big box store (Lowes; Menard's) ☐ d) Shopping mall
☐ e) Industrial/construction site ☐ f) Other, specify: _____

Q17_2. How safe did you and members of your HH feel in this structure when the incident occurred? ☐ Not at all safe ☐Only slightly safe ☐Somewhat safe ☐Moderately safe ☐Very safe

Q18. If your HH was in various locations, did this factor into how members of your HH did/did not take protective action?
☐Yes ☐No ☐Do not recall

Q19. Did anyone in your household see and/or hear the tornado?
☐Yes ☐No ☐Do not recall

Q20. Were individuals in your HH aware of the difference between a tornado watch and warning before the incident? ☐Yes ☐No ☐DNR

Q21. A tornado warning is issued by the National Weather Service when a tornado is imminent. Did you or any member of your HH receive a tornado warning for your area?
☐Yes ☐No ☐DNR

Q22. How did you and members of your HH learn about the tornado warning? (SATA)
☐ a) Broadcast radio ☐ b) Weather radio (National Weather Service radio)
☐ c) TV ☐ d) Siren or other alarm ☐ e) Internet
☐ f) Social media (Twitter/X, Facebook)
☐ g) Word of mouth (including phone or text, email, etc.) from family, friends, neighbors, employers, co-workers, etc.
☐ h) Automated text or phone notification specify: _____
☐ i) Other, specify: _____
☐ j) DNR
☐ k) No warning received

Q23. When your HH received the tornado warning, how confident were you and the members of your HH that you could take action to protect yourselves? ☐ Not at all ☐ Only slightly ☐ Somewhat ☐ Moderately ☐ Very ☐ DNR ☐ No warning received

Q24. When your HH received the tornado warning, did you or the members of your HH need to seek additional information on actions you could take to stay safe? ☐ Yes ☐ No ☐ Unsure

Q25. What did your HH do when you got the tornado warning? (SATA)
☐ a) Nothing; continued my daily activities ☐ b) Monitored the situation, but did not move to shelter ☐ c) Moved to the most sheltered part of the building, but did not leave the building ☐ d) Moved family or friends to the most sheltered part of the building, but did not leave the building ☐ e) Moved to a specially constructed storm shelter in the building ☐ f) Moved to nearby location/building that provided safer shelter ☐ g) Left the building & drove away from the tornado warning area
☐ h) Other, specify: _____
☐ i) DNR

Q26. A tornado watch is issued by the National Weather Service when tornadoes are possible in and near the watch area. Did you or any member of your HH receive a tornado watch for your area? ☐ Yes ☐ No ☐ DNR

Q27. How did your household learn about the tornado watch? (SATA) ☐ a) Broadcast radio ☐ b) Weather radio (National Weather Service radio) (SATA) ☐ a) Broadcast radio ☐ b) Weather radio (National Weather Service radio) ☐ c) TV ☐d) Siren/other alarm ☐ e) Internet ☐ f) Social media (Twitter/X, Facebook) ☐ g) Word of mouth (including phone or text, email, etc.) from family, friends, neighbors, employers, co-workers, etc. ☐ h) Automated text or phone notification specify
☐ i) Other specify: _____
☐ j) DNR ☐ k) Got no warning

Q28. What did your household do when you got the tornado watch? (SATA) ☐ a) Checked emergency supplies ☐ b) Bought emergency supplies ☐ c) Made sure NOAA/NWS radio was on & charged/plugged in ☐ d) Had local TV news/weather on ☐ e) Had local radio news/weather on ☐ f) Checked weather app on phone frequently (NOAA weather radar, etc.) ☐ g) Called friends and family nearby to warn them ☐ h) Sought information on tornado safety ☐ i) Other, specify: _____ ☐ j) Nothing ☐ k) DNR ☐ l) Got no watch

Q29. Did your HH lose access to power and/or information sources during the incident?
☐ Yes ☐ No ☐ DK ☐ Ref

Q30. Did your location and available resources make it easier or harder to protect yourself and members of your HH? ☐ Yes ☐ No ☐ DK ☐ Ref

The next set of questions covers the health and wellbeing of your household.

Q31. How would you describe the damage to your home?
☐ None/minimal ☐ Damaged but repairable ☐ Significant damage but habitable
☐ Destroyed/ uninhabitable ☐ DK ☐ Ref

Q32. Does your HH feel that your home is structurally safe to live in presently?
☐ Yes ☐ No ☐ DK ☐ Ref

Q33. Was your HH displaced from your primary residence?
☐ Yes (go to Q34) ☐ No ☐ DK ☐ Ref

Q34. (If yes to Q33) Where is your HH currently sheltering? [don't read list]
☐ Community shelter, such as churches, Red Cross, etc.
☐ With family or friends ☐ Hotel or temporary accommodation
☐ Secondary residence ☐ Currently unsheltered
☐ Other, specify: _____ ☐DK ☐Ref

Q35. Does everyone in your HH currently have health insurance?
☐ Yes – all ☐ Yes – some ☐ No ☐ DK ☐ Ref

Q36. Does anyone in your HH have complex medical needs? (SATA) [NOTE to interviewer – let the participant self-identify complex medical needs]
☐ a) Reliance on oxygen or ventilation ☐ b) Dialysis ☐ c) Use of assistive tech for mobility, including wheelchairs, power chairs, walkers ☐ d) Insulin/diabetes ☐ e) DK ☐ f) Ref

Q37. (If any selected in Q36) Have you or anyone in your HH experienced interruptions or increased difficulty in accessing or maintaining these needs? ☐ Yes ☐ No ☐ DK ☐ Ref

Q38. Were you or anyone in your HH injured as a result of the tornado?
☐ Yes ☐ No ☐ DK ☐ Ref

Q39. Were you or anyone in your HH injured as a result of cleanup activities so far?
☐ Yes ☐ No ☐ DK ☐ Ref

Q40. Have all adults in your HH had a tetanus shot (e.g., DTAp/Tdap/Td) in the past 10 years?
☐ Yes ☐ No ☐ DK ☐ Ref

Q41. Since the tornado, have you or any members of your HH experienced worsening of any of the following conditions? (SATA)
☐ a) Asthma/COPD ☐ b) Allergies ☐ c) Diabetes ☐ d) Hypertension
☐ e) Previous mental health condition ☐ f) Other, specify: _____ ☐ e) DK ☐ f) Ref

Q42. Since the tornado, has anyone in your HH had any of the following? (SATA)
☐a) Difficulty concentrating ☐b) Trouble sleeping/ nightmares ☐ c) Loss of appetite
☐ d) Agitated behavior ☐ e) Witnessed firsthand violent behavior/threats
☐ f) Increased alcohol consumption ☐ g) Increased drug use
☐ h) Other, please specify: _____ ☐ e) DK ☐ f) Ref

Q43. In general, how would you describe the health of children in the HH?
☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor
☐ Other, specify: _____ ☐ DK ☐ Ref

Q44. Compared with before the tornado, would you say the health of children in the HH is better, worse, or about the same? ☐ Better
☐Worse ☐About the same ☐ Other:_____ ☐ DK ☐ Ref

This section covers the wellbeing of children in the HH after the tornado. [only if children aged 2-17 in household]

Q45. Since the tornado, have children in the HH experienced any of the following? (SATA)
☐ a)Been very sad or depressed ☐ b) Felt nervous/afraid ☐ c) Had problems sleeping
☐ d) Had problems getting along with other children ☐ e) Experienced concerns for physical safety/wellbeing ☐ f) Been unable to attend school or extracurricular activities
☐ g) Other behavioral/emotional problems:_____
☐ h) DK ☐ i) Ref

Q46. Is there a healthcare professional you could turn to if any children in your HH had physical or mental health problems that may be related to the tornado?
☐ Yes ☐ No ☐ DK ☐ Ref

In this section, we are now going to ask about communications and communication preferences in emergency situations.

Q47. Does your HH know about resources to aid in recovery in your area?
☐ Yes ☐ No ☐ DK ☐ Ref

Q48. How has you HH received info on resources available to aid in recovery in your area? (SATA) ☐a) Newspaper ☐ b) Internet/online news ☐ c) social media ☐d) TV ☐ e) Radio ☐ f) Friends, family, word of mouth ☐ Church/place of worship
☐ h) Other:_____ ☐ i) None ☐ j) DK ☐ k) Ref

Q49. Is your HH aware of the following resources that were made available in Washington Co. to assist in recovery efforts? (SATA)
☐ a) Washington County Damage Survey online form ☐ b) Red Cross & other shelters ☐ c) Tetanus vaccine clinics ☐ d) Tree limb & debris drop-off locations
☐ e) Landfill fee waivers ☐ f) Building permit fee waivers
☐ g) Other, specify: _____ ☐ h) DK ☐ i) Ref

Q50. What was your HH's main source of info about the tornado during the event?
☐ a) TV ☐ b) Radio ☐ c) Internet/online news
☐ d) Social media ☐ e) Friends/family/word of mouth ☐ f) Text message/cell phone alert ☐ g) Church/ place of worship
☐ h) Other, specify: _____ ☐ i) DK ☐ j) Ref

Q51. What are your HH's three (3) preferred sources of information for receiving emergency communications? (SATA) ☐ a) TV ☐ b) Radio ☐ c) Internet/online news ☐ d) Social media ☐ e) Friends/ family /word of mouth ☐ f) Text message/cell phone alert ☐ g) Church/ place of worship ☐ h) Other, specify: _____ ☐ i) DK ☐ j) Ref

Q52. Does anyone in your HH have any of the following conditions that could be barriers to effective communication during an emergency? (SATA) ☐ a) Impaired hearing
☐b) Impaired vision ☐c) Developmental/cognitive disability ☐ d) Difficulty understanding English ☐ e) Difficulty understanding written material ☐ f) Other: _____
☐ g) None ☐ h) DK ☐ i) Ref

Q53. Did your HH encounter any local disaster response teams?
☐ Yes (go to Q54) ☐ No ☐ DK ☐ Ref

Q54. (If yes to Q53) ☐ How many days after the tornado did your HH encounter the local disaster response team? ☐ 0 day ☐ 1-2 days ☐ 3-4 days ☐ 5-7 days ☐ 8+ days
☐ Other, specify_____ ☐ DK ☐ Ref

Q55. Did you or anyone in your HH volunteer to assist in recovery efforts?
☐ Yes ☐ No ☐ DK ☐ Ref

In this section, we are going to ask about your individual health and wellbeing.

Q56. Over the last two (2) weeks, how often have you had little interest or pleasure in doing things? ☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day ☐ DK ☐ Ref

Q57. Over the last two (2) weeks, how often have you felt down, depressed, or hopeless? ☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day ☐ DK ☐ Ref

Q58. Over the last two (2) weeks, how often have you felt nervous, anxious, or on edge? ☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day ☐ DK ☐ Ref

Q59. Over the last two (2) weeks, how often have you been unable to stop or control worrying?
☐ Not at all ☐ Several days ☐ More than half the days ☐ Nearly every day ☐ DK ☐ Ref

We will finish up with one last question –

Q60. What other information would your HH like us to know about this event/ This can be anything you want to share about your experience with this tornado. [VERBATIM]