Refining the Baseline: Public Reception, Understanding, and Responses to Severe Weather Forecasts and Warnings in the Contiguous United States

Reference Report

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This report describes the results of an annual nationwide survey on severe weather in the United States. The Severe Weather and Society Survey (WX) was designed and administered by the Center for Risk and Crisis Management (CRCM) at the University of Oklahoma. It is the second survey in the annual series (see Silva et al., 2017 for information on WX17). WX18 was fielded July 6-11, 2018 using an online questionnaire that was completed by 3,000 U.S. adults (age 18+) that were recruited from an Internet panel that matches the characteristics of the U.S. population as estimated in the U.S. Census. Following WX17, which was designed to establish baseline measures of the extent to which U.S. adults receive, understand, and respond to severe weather forecasts and warnings, WX18 was designed to continue and, in some cases, refine the measurement of these concepts. Additionally, WX18 measured public trust in the National Weather Service (NWS), extreme weather and climate risk perceptions, risk literacy, interpretations of probabilistic language, and response efficacy. This report presents an overview of methodology of the survey data collection, data weighting, and a reproduction of the survey instrument with weighted means and frequencies for the questions that elicited numeric responses.

The University of Oklahoma provided funding for all data collection. NOAA's Office of Weather and Air Quality through the U.S. Weather Research Program provided funding for survey design and data analysis.

1. INTRODUCTION

1.1. Background

The mission of the National Weather Service (NWS) is to provide weather, water, and climate data, forecasts, and warnings for the protection of life and property and enhancement of the national economy. Currently, the NWS uses warning verification statistics (such as probability of detection, false alarm ratio, and warning lead time) to measure the extent to which they are achieving this mission. This measurement strategy assumes that increasing the accuracy and timeliness of forecasts and warnings will generate increases in the protection of life and property. While necessary, improvements to forecasts and warnings are not always sufficient to generate this outcome. Rather, there are many social conditions that must be met. For example, members of the public must receive, understand, and respond to the forecasts and warnings that the NWS issues. If one or more of these conditions are not met, improvements to forecast and warning technology will not necessarily advance the mission of the NWS. As such, we recommend that the NWS consider these and other social conditions when measuring performance before, during, and after policy changes. Accomplishing this task will require at least three things:

1. Valid and reliable indicators of social conditions (such as forecast and warning reception, understanding, and response);
2. Baseline measures of these indicators under the current forecast and warning system;
3. A protocol that will allow the NWS to track these indicators over time and space so that program managers can empirically detect changes that occur as, when, and where the NWS implements new policies.

The Severe Weather and Society Survey (WX Survey, for short), an annual nationwide survey on severe weather in the United States, was designed with these tasks in mind. WX17 was the first national survey in the WX series (see Silva et al., 2017 for more information). Pursuant to item two (above), WX17 was designed to establish baseline measures of the extent to which U.S. adults receive, understand, and respond to severe weather forecasts and warnings under the current watch, warning, and advisory (WWA) system. Pursuant to item three (above), WX18 was designed to continue and, in some cases, refine the measurement of severe weather forecast and warning reception, comprehension, and response over time and space. Additionally, WX18 measured public trust in the National Weather Service (NWS), extreme weather and climate risk perceptions, risk literacy, interpretations of probabilistic language, and response efficacy.

Select results from this research are highlighted in the following conference posters, presentations, and papers (available upon request):

- Krocak, M., and J. Ripberger, 2017: Establishing a Baseline: What We Know about Tornado Warning Reception, Comprehension and Response. [LINK]
- Ripberger, J., C. Silva, and H. Jenkins-Smith, 2017: Thinking Outside the Polygon: Using Signal Detection Theory to Study Tornado Warning Reception. [LINK]
- Allan, J., et al., 2017: The Oklahoma Warning Awareness Scale: A Psychometric Analysis of a Brief Self-Report Survey Instrument. [LINK]
- Allan, J., et al., 2017: Tornado Risk Literacy: Beliefs, Biases, and Vulnerability. [LINK]

- Krocak, M., et al., 2018: A Difference in the Details: Assessing the Impact of Region on Tornado Threat Awareness and Knowledge. [LINK]
- Ripberger, J., et al., 2018: Baseline Measures of Reception, Comprehension, and Response to Severe Weather Forecasts and Warnings. [LINK]
- Wehde, M., et al., 2019: How Can You Trust What You Don't Use?: Measuring Patterns of Individual's Weather Information Source Reliance and Trust. [LINK]
- Krocak, M., et al., 2019: The Waiting Game: The Impact of Lead Time on Protective Action in Response to Tornadoes. [LINK]
- Ripberger, J., et al., 2019: Tornado Warning Reception, Comprehension, and Response across County Warning Areas in United States. [LINK]
- Allan, J., et al., 2019: The Geographic Distribution of Extreme Weather and Climate Risk Perceptions in the United States. [LINK]
- Robinson, S., et al., 2019: Threat Intensity and the Public Use of Warning Information: A Quasi-Experimental Assessment of the New Ecology of Weather Information. [AVAILABLE UPON REQUEST]
- Wehde, M., et al., 2019: Is There Anybody Out There? Communication of Natural Hazard Warnings at Home and Away. [AVAILABLE UPON REQUEST]
- Ripberger, J., et al., 2019: Tornado Warning Reception, Comprehension, and Response in the United States. [AVAILABLE UPON REQUEST]

This report presents an overview of the WX18 sampling and weighting methodology and a reproduction of the survey instrument with weighted frequencies (or means) for the questions that elicited numeric responses. Before that, we provide a brief overview of survey research via the Internet. Silva et al. (2017) for information on WX17.

1.2. Survey Research via the Internet

Technological developments and telecommunication trends, such as the declining number of land-line phones, the increasing use of cellular phones, and the continuing expansion of high speed Internet services, have made probabilistic (often referred to as "random") sampling of the U.S. national population for the administration of lengthy surveys on complex issues infeasible for several reasons:

- The total universe of households without phone service of any kind is unknown;
- Wired phone lines are no longer maintained in a sufficient fraction of U.S. households to represent the national population, and members of households that do have land-line phone services differ systematically from households without wired phones;
- The number of households with wired phones that are exclusively used for purposes other than routine phone calls, such as home alarms or medical alert services, is unknown;
- The numbers of individuals and households having both a wired phone and a cell phone or those having more than one cell phone are unknown;
- The numbers of households and individuals having access to Internet services suitable for taking web-based surveys is unknown;
- The numbers of individuals who have access to Internet services from their workplace is unknown, and of those, the number of individuals who can take surveys while at work is unknown;

- Cell phones may be unsuitable for lengthy surveys, especially for respondents who are otherwise occupied, and surveys conducted using cell phones may incur costs to prospective respondents that might ultimately discourage survey participation or reduce the quality of data collected; and
- Face-to-face interviews or printed postal surveys of the U.S. public require long collection periods, often with low response rates, and are prohibitively expensive for many research projects.

Increasingly, academic quality surveys of the U.S. public on complex subjects, such as severe weather, are being conducted via the Internet. The factors listed above present special challenges for probabilistic sampling due to incomplete information about rapidly evolving telecommunication patterns, Internet accessibility, and the demographic composition of those who have suitable Internet access.

With increasing Internet access, the demographics of the online population are becoming more representative of the U.S. population, but samples recruited to participate in Internet surveys cannot be truly random samples of the U.S. public. All surveys, regardless of collection methods, include an element of self-selection bias because even if a perfectly random sample could be constructed, the final decision to participate must be made voluntarily by each respondent, and thus some degree of self-selection is unavoidable. This means that, even when derived from a theoretically perfect random sample, the demographic characteristics of survey respondents may not perfectly reflect U.S. population parameters. Non-probabilistic samples, such as those used to administer surveys of the public via the Internet, involve greater degrees of self-selection because participants first voluntarily agree to enter a pool or stream of U.S. residents willing to take surveys online, and then each member of that group must decide whether to participate in a survey opportunity. This requires the administration of Internet surveys that are as demographically representative as possible, and it warrants caution in presenting findings as statistically representative of views of the entire adult U.S. population.

2. SAMPLING, DEMOGRAPHICS, AND DATA COLLECTION

The sample of survey participants for WX18 was provided by Qualtrics a research and marketing company that maintains a diverse panel of Internet users in the U.S. who have agreed to participate in online surveys. Qualtrics recruits these panelists in multiple ways, including advertisements on web pages, social media, and contact with various online communities. They also utilize affiliate programs and partnerships to recruit participants.

For WX18, Qualtrics used a dynamic sampling process to identify eligible panelists (U.S. adults who live in the contiguous U.S.) and invite them to participate in the survey. To begin, invitations were sent to an anonymous group of panelists that match the demographic characteristics of the target population. As the first group of panelists completed the survey, Qualtrics sent additional invitations to panelists based on demographic targets. If a given group was underrepresented (relative to U.S. Census estimates), they sent more invitations to that group; if the group was overrepresented, they sent fewer invitations. This resulted in a diverse sample of survey participants that is generally representative of the U.S. adult population. Table 2.1 demonstrates

this representativeness by comparing key national and regional population estimates from the U.S. Census to the demographic characteristics of WX18 respondents.

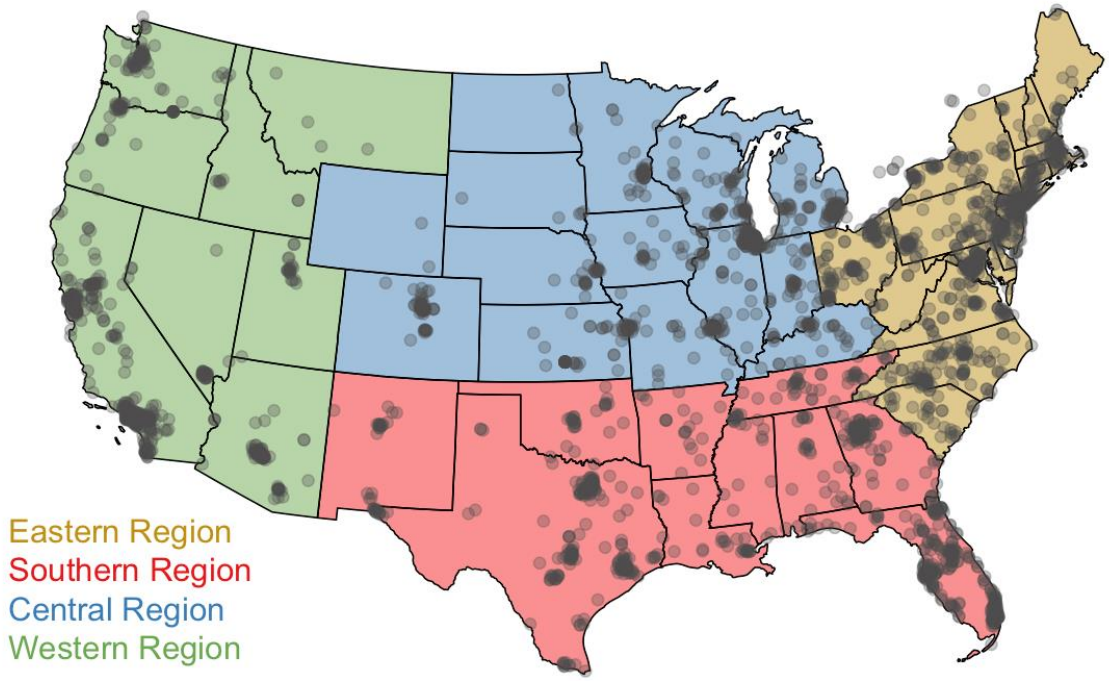
Table 2.1: Demographic Representativeness of WX18 Respondents

	U.S. Adult Population* (%)	Participants (%)
Gender		
Female	51.3	51.3
Male	48.7	48.7
Age		
18 to 24	12.1	12.2
25 to 34	18.0	18.2
35 to 44	16.2	16.4
45 to 54	16.8	16.6
55 to 64	16.7	16.6
65 and up	20.2	20.0
Ethnicity		
Hispanic	16.1	16.3
Non-Hispanic	83.9	83.7
Race		
White	78.2	76.4
Black or African American	12.8	13.6
Asian	5.8	6.4
Other Race	3.2	3.6
NWS Region		
Eastern	31.7	31.9
Southern	27.0	26.7
Central	20.7	21.2
Western	20.6	20.2

*****Population estimates were obtained from the U.S. Census Annual Estimates of the Resident Population by Sex, Age, Race, and Hispanic Origin for the United States and States: April 1, 2010 to July 1, 2017 (PEPASR6H).

Figure 2.1 shows the geographic distribution of WX18 respondents by zip code centroid. While the proportions of participants in each region generally match Census estimates, it is important to note the clusters of participants in urban areas. This pattern follows the geographic distribution of the U.S. population, but there are relatively few respondents in rural areas, which may complicate some inferences about that segment of the population. Such inferences would likely require oversampling that portion of the population in a subsequent study.

Figure 2.1: Geographic Distribution of WX18 Respondents



To ensure the protection of survey respondents, the WX18 survey questions and the survey protocol were approved by the Institutional Review Board of the University of Oklahoma. While Qualtrics was responsible for the recruitment of respondents, the University of Oklahoma (CRCM) implemented the survey and manages the data. The survey instrument was programmed to allow the survey to be self-administered at the preferred time and pace of each respondent within defined time constraints to maintain flexibility as well as data quality. To afford continuity of attention and to make the best use of information provided to each respondent during the survey, a maximum of 45 minutes was allowed for completion of any single web page of the survey (typically containing one to three survey questions) and respondents were given a maximum total elapsed time of two hours from start to finish to complete the entire survey. Average (median) completion time was 19 minutes. Each respondent who completed the survey received an incentive (survey points) from Qualtrics. Decisions to participate were entirely voluntary.

3. DATA WEIGHTING

To enhance the demographic representativeness of the sample and generalizability of the results, WX18 employed the data weighting methodology that is described in this section. Weighting survey data to selected demographic characteristics of the target population (also known as sample balancing or post-stratification) provides three key analytical benefits:

1. Generalizability of findings is strengthened to the degree that responses from survey participants are adjusted to mirror the demographic characteristics of the U.S. adult population at the time the survey is administered;
2. Comparability to other studies is strengthened because data weighting minimizes the demographic differences that may arise between this and other samples that match the demographic characteristics of the U.S. adult population;
3. Reliability of trends over time is strengthened because survey data are adjusted to represent continually evolving demographics of the U.S. population, such as the growth of ethnic and racial minority groups. This is especially important for understanding measures that may be influenced by shifts in national demographic characteristics.

To access these benefits, CRCM calculated a weight for each WX18 respondent that accounts for imbalances in gender, age, race, and Hispanic ethnicity within each of the four NWS regions that divide the contiguous U.S. (CONUS)—the Eastern, Southern, Central, and Western regions. The weighting process involved three steps:

1. Calculate the proportion of the U.S. population that shares the demographic characteristics of each respondent (the population proportion);
2. Calculate the proportion of the sample that shares the demographic characteristics of each respondent (the sample proportion);
3. Divide the population proportion by the sample proportion to calculate a weight for each respondent.

This process resulted in a weight factor that indicates how much each case will "count" in weighted analyses. A weight factor of one means that responses from a specified participant are used without adjustment. A weight factor greater than one means that a participant with a given set of demographic attributes is underrepresented in the survey sample (relative to the national population), and responses from that participant receive greater statistical emphasis than responses from survey participants who are represented in direct proportion to the adult population. Conversely, a weight factor smaller than one means that a respondent having a given set of demographic attributes is overrepresented in the survey sample (relative to the adult population), and responses from that participant receive less emphasis than fellow respondents who are represented in direct proportion to the adult population. Weight factors were calculated within NWS regions to facilitate generalization within and comparison across the regions.

4. SURVEY INSTRUMENT, WEIGHTED RESPONSE FREQUENCIES, AND CENTRAL TENDENCIES

This section provides a reproduction of the WX18 survey instrument with weighted frequencies or central tendencies for the questions that elicited numeric responses [shown in blue].

You are invited to participate in the Severe Weather and Society study. This study seeks to assess how U.S. residents receive, understand, and respond to weather forecasts and warnings. You were selected as a possible participant because you volunteered to participate in online surveys through Qualtrics or one of its partners. If you agree to participate, you will complete this online survey.

There are no risks or benefits.

If you participate, you will be compensated according to your agreement with your online survey provider. Your participation is voluntary and your responses will be de-identified before they are shared for research purposes or published.

Even if you choose to participate now, you may stop participating at any time and for any reason. Your data may be used in future research studies, unless you contact me to withdraw your data.

Data are collected via an online survey system that has its own privacy and security policies for keeping your information confidential. The University of Oklahoma cannot provide assurances as to how this online survey system is permitted to use the data you provide.

If you have questions about this research, please contact the Center for Risk and Crisis Management at the University of Oklahoma, at 405-325-1720 or at clsilva@ou.edu.

You can also contact the University of Oklahoma - Norman Campus Institutional Review Board at 405-325-8110 or irb@ou.edu with questions, concerns or complaints about your rights as a research participant, or if you don't want to talk to the researcher.

By answering the survey questions, I agree to participate in this research. Please print this page for your records. This research has been approved by the University of Oklahoma, Norman Campus IRB.

IRB Number: 9418
Approval date: 06/13/2018

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age: How old are you? [verbatim; require numeric; IF < 18 SKIP TO END OF SURVEY] [Median = 47]

gend: Are you male or female?
0 - Female [51.33%]
1 - Male [48.67%]

hisp: Do you consider yourself to be Hispanic, Latino, or Spanish or to have Hispanic, Latino, or Spanish origins?
0 - No [83.67%]
1 - Yes [16.33%]

race: Which of the following best describes your race?
1 - White [76.40%]
2 - Black or African American [13.63%]
3 - American Indian or Alaska Native [0.20%]
4 - Asian [6.43%]
5 - Native Hawaiian or Pacific Islander [0.13%]
6 - Two or more races [1.57%]
7 - Some other race (please specify) [1.63%]
race_spec: [VERBATIM]

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state: Please select the state or district where your primary residence is located.

zip: What is the five digit zip code at your residence? [VERATIM; REQUIRE 5-DIGIT NUMERIC]

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Approximately how long have you resided at your current address or any other address within the same zip code area?
long_years: **[**VERBATIM; REQUIRE NUMERIC] [Median = 10]
long_months: [VERBATIM, REQUIRE NUMERIC <12] [Median = 4]

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[SHOW IF **long_years** < 5]
last_state: Using the dropdown list, please select the state or district where your previous residence was located.

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now: Please indicate which of the following statements applies to you.
0 - I am completing this survey from my current primary residence. [86.21%]
1 - I am completing this survey from a location that is not my current primary residence. [13.79%]

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rural: Which of the following categories best describes the location of your current primary residence?
1 - Urban lot in a densely populated area [31.42%]
2 - Suburban lot in a neighborhood that is near a densely populated area [52.53%]
3 - Rural lot in a sparsely populated area [16.06%]

home: Which of the following categories best describes the nature of your current primary residence?
1 - Stand-alone (detached) permanent structure such as a house [65.59%]
2 - Condominium, town-house, or duplex that is attached to another structure [12.61%]
3 - Apartment or dormitory room that is part of a larger residential complex [17.56%]
4 - Mobile home (whether placed on a permanent foundation or not) [3.07%]
5 - Boat, boathouse, ship, dock, or other floating structure [0.03%]
6 - Other type (please specify) [1.14%]
home_spec: [VERBATIM]

rent: Which of the following categories best describes your living arrangements at your current primary residence?
1 - Live with family or friends and do not pay rent [17.97%]
2 - Pay to rent or lease your primary residence (includes college or other dormitory rooms) [25.46%]
3 - Own your primary residence (includes making mortgage payments or outright ownership with no mortgage payments) [56.57%]

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adults: ***Including yourself,*** how many ADULTS AGE 18 AND OLDER live in your current primary residence? [VERBATIM; REQUIRE NON-ZERO NUMERIC RESPONSE] adults [Median = 2]

children: How many CHILDREN AGE 17 AND YOUNGER live in your current primary residence? **[**VERBATIM; REQUIRE NUMERIC RESPONSE] children [Median = 0]

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We have some basic questions about the weather. How much do you agree or disagree with the following statements? [RANDOM ORDER]

follow: I follow the weather very closely.
1 - Strongly disagree [2.78%]
2 - Disagree [5.39%]
3 - Neither disagree nor agree [17.40%]
4 - Agree [49.63%]

5 - Strongly agree [24.80%]

plan_around: I plan my daily routine around the weather.
1 - Strongly disagree [4.67%]
2 - Disagree[15.46%]
3 - Neither disagree nor agree[28.18%]
4 - Agree [40.83%]
5 - Strongly agree[10.85%]

und_weather: I don't understand what causes extreme weather events like thunderstorms, tornadoes, and hurricanes.
1 - Strongly disagree [14.80%]
2 - Disagree [41.77%]
3 - Neither disagree nor agree [22.54%]
4 - Agree [15.63%]
5 - Strongly agree [5.26%]

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Thinking about all four seasons (winter, summer, spring, and fall), how do you rate the risk of the following extreme weather events to you and the people in your area? [RANDOM ORDER]

risk_wind: Extreme high winds
1 - No risk [3.27%]
2 - Low risk [17.07%]
3 - Moderate risk [41.98%]
4 - High risk [26.48%]
5 - Extreme risk [11.21%]

risk_rain: Extreme rain storms
1 - No risk [4.48%]
2 - Low risk [15.97%]
3 - Moderate risk [39.81%]
4 - High risk [28.48%]
5 - Extreme risk [11.26%]

risk_heat: Extreme heat waves
1 - No risk [2.06%]
2 - Low risk [12.41%]
3 - Moderate risk [34.04%]
4 - High risk [30.97%]
5 - Extreme risk [20.51%]

risk_drought: Droughts
1 - No risk [9.29%]
2 - Low risk [28.62%]
3 - Moderate risk [31.13%]
4 - High risk [17.33%]
5 - Extreme risk [13.63%]

risk_cold: Extreme cold temperatures
1 - No risk [15.60%]
2 - Low risk [24.16%]
3 - Moderate risk [26.22%]
4 - High risk [23.57%]
5 - Extreme risk [10.45%]

risk_snow: Extreme snow (or ice) storms
1 - No risk [23.64%]
2 - Low risk [17.95%]
3 - Moderate risk [24.52%]
4 - High risk [21.46%]
5 - Extreme risk [12.43%]

risk_tor: Tornadoes
1 - No risk [16.77%]
2 - Low risk [31.08%]
3 - Moderate risk [26.66%]
4 - High risk [14.86%]
5 - Extreme risk [10.63%]

risk_flood: Floods
1 - No risk [10.50%]
2 - Low risk [30.37%]
3 - Moderate risk [34.02%]
4 - High risk [16.04%]
5 - Extreme risk [9.07%]

risk_hur: Hurricanes
1 - No risk [39.94%]
2 - Low risk [21.51%]
3 - Moderate risk [15.28%]
4 - High risk [11.06%]
5 - Extreme risk [12.21%]

risk_fire: Wildfires
1 - No risk [22.56%]
2 - Low risk [35.23%]
3 - Moderate risk [18.26%]
4 - High risk [12.55%]
5 - Extreme risk [11.40%]

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risk_tie: It looks like you gave these extreme weather events the same rating. Please indicate which type of event poses the biggest risk to you and the people in your area. [CHECK BOX OF TOP RISKS; RANDOM ORDER; 1 = SELECTED]

----------End Web pg----------

Now we have some questions about the National Weather Service (NWS), an agency of the United States government that issues weather forecasts and different kinds of alerts to the public about hazardous weather, including severe weather watches and warnings.

alert_und: In general, do you understand the difference between watches and warnings?
1 - Definitely no [1.32%]
2 - Probably no [4.00%]
3 - Not sure [10.19%]
4 - Probably yes [42.56%]
5 - Definitely yes [41.93%]

----------End Web pg----------

The next few questions focus on severe thunderstorms and tornadoes. They may be relatively rare in your area, but severe thunderstorms and tornadoes can happen in every state.

To the best of your knowledge, is the following alert considered a tornado watch or a warning? [RANDOM SPLIT; 50% get **torwatch**; 50% get **torwarn**]

torwatch: This alert is issued when severe thunderstorms and tornadoes are possible in and near the area. It does not mean that they will occur. It only means they are possible.
1 - Tornado WATCH [76.93%]
2 - Tornado WARNING [19.32%]
3 - Don't know [3.76%]

torwarn: This alert is used when a tornado is imminent. When this alert is issued, seek safe shelter immediately.
1 - Tornado WATCH [13.35%]
2 - Tornado WARNING [84.03%]
3 - Don't know [2.62%]

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warn_prob_area: If the National Weather Service issues a tornado WARNING for your area, what is the probability that a tornado will occur in the warning area? Please indicate the probability as a percent that ranges from 0 to 100, where 0 means there is no chance of a tornado and 100 means that a tornado is certain. [VERBATIM, REQUIRED NUMERIC <= 100] percent [Mean = 56.18]

warn_prob_house: If the National Weather Service issues a tornado WARNING for your area, what is the probability that a tornado will occur within [RANDOM SPLIT: **prob_dist:** 1 mile | 5 miles | 10 miles | 15 miles] of your location at the time of the storm? Please indicate the probability as a percent that ranges from 0 to 100, where 0 means there is no chance of a tornado and 100 means that a tornado is certain. [VERBATIM, REQUIRED NUMERIC 0 <= 100] percent

	prob_dist: 1 mile	**prob_dist**: 5 miles	**prob_dist**: 10 miles	**prob_dist**: 15 miles
Mean	[46.67]	[50.25]	[51.58]	[52.27]

warn_cons: If the National Weather Service issues a tornado WARNING for your area, what is the probability that someone in the warning area will be injured or killed? Please indicate the probability as a percent that ranges from 0 to 100, where 0 means there is no chance of an injury or fatality and 100 means that an injury or fatality is certain. [VERBATIM, REQUIRED NUMERIC 0 <= 100] percent [Mean = 36.41]

warn_time: If the National Weather Service issues a tornado WARNING for your area, how much time do you have before the tornado arrives?
1 - less than 1 hour [55.30%]
2 - 1 to 24 hours [36.62%]
3 - 1 to 3 days [5.83%]
4 - more than 3 days [2.25%]

warn_size: Approximately how large is the area included in an average tornado WARNING?
1 - around the size of a city [30.22%]
2 - around the size of a county [38.27%]
3 - around the size of multiple counties [28.02%]
4 - around the size of a state [2.20%]
5 - around the size of multiple states [1.29%]

----------End Web pg----------

[SHOW ONLY IF **warn_time** = 1]
warn_time_minutes: You indicated that there is *less than 1 hour* between when tornado WARNINGS are issued

and when tornadoes arrive. To the best of your knowledge, how many *minutes* are there between when tornado WARNINGS are issued and when tornadoes arrive? [VERBATIM, REQUIRED NUMERIC <= 60] minutes [Mean = 29.65]

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[SHOW ONLY IF **warn_time** = 2]
warn_time_hours: You indicated that there is *1 to 24 hours* between when tornado WARNINGS are issued and when tornadoes arrive. To the best of your knowledge, how many *hours* are there between when tornado WARNINGS are issued and when tornadoes arrive? [VERBATIM, REQUIRED NUMERIC <=24] hours [Mean = 6.61]

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watch_prob_area: If the National Weather Service issues a tornado WATCH for your area, what is the probability that a tornado will occur in the watch area? Please indicate the probability as a percent that ranges from 0 to 100, where 0 means there is no chance of a tornado and 100 means that a tornado is certain. [VERBATIM, REQUIRED NUMERIC 0 <= 100] percent [Mean = 36.12]

watch_prob_house: If the National Weather Service issues a tornado WATCH for your area, what is the probability that a tornado will occur within [**prob_dist**] of your location at the time of the storm? Please indicate the probability as a percent that ranges from 0 to 100, where 0 means there is no chance of a tornado and 100 means that a tornado is certain. [VERBATIM, REQUIRED NUMERIC 0 <=100] percent

	prob_dist: 1 mile	**prob_dist**: 5 miles	**prob_dist**: 10 miles	**prob_dist**: 15 miles
Mean	[31.31]	[32.54]	[33.87]	[34.84]

watch_cons: If the National Weather Service issues a tornado WATCH for your area, what is the probability that someone in the watch area will be injured or killed? Please indicate the probability as a percent that ranges from 0 to 100, where 0 means there is no chance of an injury or fatality and 100 means that an injury or fatality is certain. [VERBATIM, REQUIRED NUMERIC 0 <=100] percent [Mean = 24.00]

watch_time: If the National Weather Service issues a tornado WATCH for your area, how much time do you have before the tornado arrives?
1 - less than 1 hour [19.12%]
2 - 1 to 24 hours [63.70%]
3 - 1 to 3 days [13.08%]
4 - more than 3 days [4.10%]

watch_size: Approximately how large is the area included in an average tornado WATCH?
1 - around the size of a city [21.48%]
2 - around the size of a county [33.27%]
3 - around the size of multiple counties [39.18%]
4 - around the size of a state [4.18%]
5 - around the size of multiple states [1.89%]

----------End Web pg----------

[SHOW ONLY IF **watch_time** = 1]
watch_time_minutes: You indicated that there is *less than 1 hour* between when tornado WATCHES are issued and when tornadoes arrive. To the best of your knowledge, how many *minutes* are there between when tornado WATCHES are issued and when tornadoes arrive? [VERBATIM, REQUIRED NUMERIC <=60] minutes [Mean = 31.72]

----------End Web pg----------

[SHOW ONLY IF **watch_time** = 1]

watch_time_hours: You indicated that there is *1 to 24 hours* between when tornado WATCHES are issued and when tornadoes arrive. To the best of your knowledge, how many *hours* are there between when tornado WATCHES are issued and when tornadoes arrive? [VERBATIM, REQUIRED NUMERIC <=24] hours [Mean = 6.77]

----------End Web pg----------

tor_watchwarn_und: How would you rate your understanding of tornado watches and warnings?
1 - Poor [9.76%]
2 - Fair [27.50%]
3 - Good [31.89%]
4 - Very good [21.58%]
5 - Excellent [9.27%]

tor_map_und: Forecasters, websites, and phone applications often use maps to display tornado watches and warnings. How would you rate your understanding of maps?
1 - Poor [5.53%]
2 - Fair [17.67%]
3 - Good [33.98%]
4 - Very good [26.42%]
5 - Excellent [16.41%]

tor_radar_und: Forecasters, websites, and phone applications also use radar images to communicate tornado risk. How would you rate your understanding of radar images?
1 - Poor [8.18%]
2 - Fair [23.64%]
3 - Good [32.22%]
4 - Very good [24.34%]
5 - Excellent [11.62%]

----------End Web pg----------

In addition to tornadoes, the National Weather Service issues alerts for severe thunderstorms. To the best of your knowledge, which of the following hazards does the National Weather Service consider when issuing SEVERE THUNDERSTORM WARNINGS? Please indicate all that apply. [CHECK BOX: RANDOM ORDER; 1 = SELECTED]
svr_hail: Large hail [60.21%]
svr_wind: High winds [80.88%]
svr_lightning: Lightning [78.01%]
svr_flood: Flooding [65.24%]
svr_rain: Extreme rainfall [76.86%]

svr_watchwarn_und: How would you rate your understanding of severe thunderstorm watches and warnings?
1 - Poor [4.84%]
2 - Fair [23.66%]
3 - Good [35.48%]
4 - Very good [25.03%]
5 - Excellent [10.99%]

----------End Web pg ----------

Please tell us how strongly you agree with the following statements about tornado WARNINGS: [RANDOM ORDER]
rec_all: I receive *all* tornado warnings that are issued for my area.
1 - Strongly disagree [6.47%]
2 - Disagree [15.91%]

3 - Neither disagree nor agree [28.12%]
4 - Agree [32.40%]
5 - Strongly agree [17.11%]

rec_most: I receive *most* tornado warnings that are issued for my area.
1 - Strongly disagree [4.91%]
2 - Disagree [7.52%]
3 - Neither disagree nor agree [25.76%]
4 - Agree [42.87%]
5 - Strongly agree [18.95%]

rec_soon: I receive tornado warnings as soon as they are issued for my area.
1 - Strongly disagree [5.12%]
2 - Disagree [12.20%]
3 - Neither disagree nor agree [29.08%]
4 - Agree [36.89%]
5 - Strongly agree[16.72%]

rec_miss: Sometimes I miss tornado warnings that are issued for my area.
1 - Strongly disagree [17.00%]
2 - Disagree [25.32%]
3 - Neither disagree nor agree [25.82%]
4 - Agree [26.13%]
5 - Strongly agree [5.74%]

rec_area: Sometimes I am not sure if a tornado warning is for my area or a different area.
1 - Strongly disagree [17.58%]
2 - Disagree [33.56%]
3 - Neither disagree nor agree [26.43%]
4 - Agree [17.83%]
5 - Strongly agree [4.59%]

rec_time: Sometimes I am not sure what time tornado warnings begin and end for my area.
1 - Strongly disagree [12.70%]
2 - Disagree [25.76%]
3 - Neither disagree nor agree [28.51%]
4 - Agree [26.10%]
5 - Strongly agree [6.94%]

----------End Web pg ----------

Sometimes people ***miss*** tornado WARNINGS because they are doing something that makes it difficult to pay attention to the weather. For example, people often miss tornado warnings when they are sleeping. How confident are you that you would ***receive*** tornado warnings in the following situations? [RANDOM ORDER]

rec_sleep: If you are sleeping?
1 - Not at all confident [25.70%]
2 - Not very confident [32.67%]
3 - Somewhat confident [21.78%]
4 - Very confident [11.51%]
5 - Extremely confident [8.34%]

rec_driving: If you are in a car?
1 - Not at all confident [7.21%]
2 - Not very confident [16.37%]
3 - Somewhat confident [33.88%]

4 - Very confident [27.38%]
5 - Extremely confident [15.16%]

rec_work: If you are at work or school?
1 - Not at all confident [4.54%]
2 - Not very confident [10.75%]
3 - Somewhat confident [29.68%]
4 - Very confident [34.58%]
5 - Extremely confident [20.44%]

rec_store: If you are at a store?
1 - Not at all confident [7.69%]
2 - Not very confident [20.16%]
3 - Somewhat confident [33.50%]
4 - Very confident [25.51%]
5 - Extremely confident [13.14%]

rec_small_group: If you are with a *small* group of friends or family?
1 - Not at all confident [3.73%]
2 - Not very confident [12.15%]
3 - Somewhat confident [37.38%]
4 - Very confident [31.31%]
5 - Extremely confident [15.44%]

rec_large_group: If you are with a *large* group of friends or family?
1 - Not at all confident [4.22%]
2 - Not very confident [12.94%]
3 - Somewhat confident [32.70%]
4 - Very confident [32.79%]
5 - Extremely confident [17.35%]

rec_dif_sit: Can you think of a ***different*** situation that might cause you to *miss* a tornado warning? [VERATIM]

----------End Web pg ----------

warn_hist: Do you recall having ever received a tornado WARNING for your area?
0 - No [38.21%]
1 - Yes [61.79%]

----------End Web pg ----------

[SHOW IF **warn_hist** = 1]
Think about the *most recent* tornado WARNING that you remember receiving.

warn_when: When did you receive the tornado warning?
1 - less than 1 month ago [10.07%]
2 - between 1 and 3 months ago [17.58%]
3 - between 3 and 12 months ago [25.79%]
4 - between 1 and 3 years ago [22.19%]
5 - more than 3 years ago [12.87%]
6 - I don't recall [11.50%]

How did you learn about the tornado warning? Please select all that apply.
warn_how_br_rad: Broadcast radio [18.97%]
warn_how_wx_rad: Weather radio (National Weather Service radio) [17.90%]
warn_how_tv: Television [65.56%%]

warn_how_siren: Siren or other alarm [23.77%]
warn_how_int: Internet [17.81%]
warn_how_soc: Social media such as Twitter or Facebook [10.54%]
warn_how_word: Word-of-mouth (including telephone or text messages, email, etc.) from family, friends, neighbors, employers, co-workers, etc. [12.12%]
warn_how_phone: Automated text or phone notification [34.92%]
warn_how_oth: Other source (please specify) [2.77%]
warn_how_dk: I don't recall [2.44%]
warn_how_spec: [VERBATIM]

warn_timercv: What time was it when you received the tornado warning?
1 - Between 6am and noon [5.16%]
2 - Between noon and 6pm [35.06%]
3 - Between 6pm and midnight [33.83%]
4 - Between midnight and 6am [1.71%]
5 - I don't recall [24.23%]

warn_where: Where were you when you received the tornado warning?
1 - At home [77.97%]
2 - At work [9.84%]
3 - At school [1.63%]
4 - At a business (such as a store or restaurant) [0.82%]
5 - In a vehicle (such as a car, truck, or bus) [2.63%]
6 - Somewhere else (please specify) [1.26%]
7 - I don't recall [5.84%]
warn_where_specify: [VERBATIM]

warn_iss: Did you receive the tornado warning as soon as it was issued?
0 - No [5.58%]
1 - Yes [67.57%]
2 - I don't recall [26.85%]

warn_sure: Were you sure that the tornado warning was for your area and not a different area?
0 - No [5.89%]
1 - Yes [83.57%]
2 - I don't recall [10.54%]

warn_tor: Did a tornado touch down in the tornado warning area?
0 - No [50.51%]
1 - Yes [28.20%]
2 - I don't recall/don't know [21.29%]

----------End Web pg ----------

[SHOW IF **warn_where =** 1, 2, 3, or 4]
last_act: What did you do when you got the *most recent* tornado warning that you remember receiving?
0 - Nothing; continued my daily activities [14.30%]
1 - Monitored the situation, but did not move to shelter [52.88%]
2 - Moved to the most sheltered part of the building, but did not leave the building [21.50%]
3 - Moved to a specially constructed storm shelter in the building [2.91%]
4 - Moved to a nearby location or building that provided safer shelter [2.63%]
5 - Left the building and drove away from the tornado warning area [1.74%]
6 - Something else (please specify) [1.30%]
7 - I don't recall [2.76%]
last_act_spec: [VERBATIM]

last_act_satis: Looking back, how would you rate your satisfaction with the action you took?
1 - Very dissatisfied [1.81%]
2 - Dissatisfied [1.65%]
3 - Neither dissatisfied nor satisfied [19.09%]
4 - Satisfied [52.58%]
5 - Very satisfied [24.87%]

last_act_again: How likely is it that you would take the same action again if you were in the same situation in the future?
1 - Very unlikely [2.19%]
2 - Somewhat unlikely [4.22%]
3 - About as likely as not [25.70%]
4 - Somewhat likely [32.35%]
5 - Very likely [35.54%]

----------End Web pg ----------

Now we want you to think about the NEXT TIME you receive a tornado WARNING from the National Weather Service.

next_act_day: If you are *at home during daylight hours* and you receive a tornado warning for your area, what do you plan to do?
0 - Nothing; continue my daily activities [7.02%]
1 - Monitor the situation, but not move to shelter [39.44%]
2 - Move to the most sheltered part of my residence, but not leave the building [33.98%]
3 - Move to a specially constructed storm shelter in the building [5.07%]
4 - Move to a nearby location or building that provides safer shelter [6.14%]
5 - Leave the building and drive away from the tornado warning area [2.72%]
6 - Something else (please specify) [VERBATIM] [1.14%]
7 - Not sure [4.50%]
next_act_day_spec: [VERBATIM]

next_act_night: If you are *at home in the middle of the night* and you receive a tornado warning for your area, what do you plan to do?
0 - Nothing; continue my nightly activities [7.85%]
1 - Monitor the situation, but not move to shelter [33.18%]
2 - Move to the most sheltered part of my residence, but not leave the building [40.78%]
3 - Move to a specially constructed storm shelter in the building [6.20%]
4 - Move to a nearby location or building that provides safer shelter [4.47%]
5 - Leave the building and drive away from the tornado warning area [2.24%]
6 - Something else (please specify) [VERBATIM] [0.83%]
7 - Not sure [4.45%]
next_act_night_spec: [VERBATIM]

next_act_car: If you are *in a car* and you receive a tornado warning for your area, what do you plan to do? [VERBATIM]

----------End Web pg ----------

Please tell us how strongly you agree with the following statements about tornado WARNINGS. If you have never received a tornado WARNING, please tell us how you think you will respond if you receive a WARNING in the future: [RANDOM ORDER]
resp_ignore: Sometimes I ignore tornado warnings that are issued for my area.
1 - Strongly disagree [23.53%]
2 - Disagree [33.20%]
3 - Neither disagree nor agree [23.36%]

4 - Agree [15.31%]
5 - Strongly agree [4.59%]

resp_prot: I always take protective action when tornado warnings are issued for my area.
1 - Strongly disagree [3.81%]
2 - Disagree [13.98%]
3 - Neither disagree nor agree [34.23%]
4 - Agree [34.87%]
5 - Strongly agree [13.11%]

resp_busy: Sometimes I am too busy to take protective action when tornado warnings are issued for my area.
1 - Strongly disagree [22.25%]
2 - Disagree [34.66%]
3 - Neither disagree nor agree [25.76%]
4 - Agree [14.16%]
5 - Strongly agree [3.17%]

resp_unsure: I am not sure what to do when tornado warnings are issued for my area.
1 - Strongly disagree [17.11%]
2 - Disagree [38.72%]
3 - Neither disagree nor agree [22.82%]
4 - Agree [17.15%]
5 - Strongly agree [4.19%]

----------End Web pg ----------

Sometimes people *ignore* tornado WARNINGS because they are busy or doing something that makes it difficult to respond. For example, people often ignore tornado warnings when they are sleeping. How confident are you that you would *take protective action in response* to tornado warnings in the following situations? [RANDOM ORDER]

resp_sleep: If you are sleeping?
1 - Not at all confident [18.09%]
2 - Not very confident [29.93%]
3 - Somewhat confident [25.90%]
4 - Very confident [16.13%]
5 - Extremely confident [9.95%]

resp_driving: If you are in a car?
1 - Not at all confident [5.38%]
2 - Not very confident [17.16%]
3 - Somewhat confident [37.60%]
4 - Very confident [25.77%]
5 - Extremely confident [14.10%]

resp_work: If you are at work or school?
1 - Not at all confident [3.32%]
2 - Not very confident [8.76%]
3 - Somewhat confident [31.99%]
4 - Very confident [35.73%]
5 - Extremely confident [20.20%]

resp_store: If you are at a store?
1 - Not at all confident [4.13%]
2 - Not very confident [15.52%]
3 - Somewhat confident [38.66%]
4 - Very confident [27.45%]

5 - Extremely confident [14.23%]

resp_small_group: If you are with a *small* group friends or family?
1 - Not at all confident [2.89%]
2 - Not very confident [10.93%]
3 - Somewhat confident [36.80%]
4 - Very confident [33.32%]
5 - Extremely confident [16.06%]

resp_large_group: If you are with a *large* group friends or family?
1 - Not at all confident [3.39%]
2 - Not very confident [12.22%]
3 - Somewhat confident [34.90%]
4 - Very confident [33.18%]
5 - Extremely confident [16.32%]

resp_dif_sit: Can you think of a ***different*** situation that might cause you to *not take protective action* in response to a tornado warning? [VERBATIM]

----------End Web pg ----------

For some people the time of day influences tornado warning reception, understanding, and/or responsiveness.

If a tornado WARNING were issued for your area tomorrow at [**rand_morn:** 1:00 AM | 2:00 AM | 3:00 AM | 4:00 AM | 5:00 AM | 6:00 AM | 7:00 AM | 8:00 AM | 9:00 AM], how confident are you that you would…

rec_morn: Receive the warning?

	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM
1 - Not at all confident	15.58%	14.75%	22.58%	15.80%	12.78%	7.54%	7.34%	4.97%	3.66%
2 - Not very confident	25.31%	26.32%	20.60%	24.37%	19.09%	13.23%	9.81%	9.05%	6.05%
3 - Somewhat confident	26.19%	27.44%	26.50%	28.18%	23.47%	29.31%	31.54%	31.51%	32.31%
4 - Very confident	21.09%	15.25%	19.44%	20.78%	32.30%	33.75%	31.44%	34.91%	40.07%
5 - Extremely confident	11.84%	16.24%	10.88%	10.87%	12.36%	16.17%	19.88%	19.56%	17.90%

und_morn: Understand the warning?

	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM
1 - Not at all confident	5.14%	4.86%	9.44%	3.62%	4.65%	1.93%	3.32%	3.40%	0.48%
2 - Not very confident	13.73%	14.10%	14.10%	12.59%	10.03%	5.45%	9.55%	5.39%	4.50%
3 - Somewhat confident	25.42%	28.77%	30.37%	33.71%	22.82%	30.08%	24.96%	27.33%	35.67%
4 - Very confident	40.00%	30.51%	31.30%	36.60%	47.80%	47.05%	34.87%	40.87%	36.17%
5 - Extremely confident	15.71%	21.77%	14.79%	13.48%	14.70%	15.48%	27.30%	23.00%	23.18%

resp_morn: Take protective action in response to the warning?

	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM
1 - Not at all confident	8.80%	6.84%	12.37%	5.69%	5.41%	5.06%	4.53%	4.57%	2.06%
2 - Not very confident	18.04%	17.39%	17.61%	17.31%	13.85%	7.71%	13.55%	7.18%	8.48%
3 - Somewhat confident	34.72%	36.28%	30.63%	37.70%	38.62%	35.84%	29.87%	35.29%	42.73%
4 - Very confident	26.83%	24.67%	20.62%	26.03%	30.41%	35.56%	32.92%	32.07%	33.66%
5 - Extremely confident	11.61%	14.83%	18.77%	13.27%	11.71%	15.83%	19.14%	20.89%	13.06%

----------End Web pg ----------

If a tornado WARNING were issued for your area tomorrow at [**rand_aft:** 10:00 AM | 11:00 AM | 12:00 PM (noon) | 1:00 PM | 2:00 PM | 3:00 PM | 4:00 PM | 5:00 PM], how confident are you that you would…

rec_aft: Receive the warning?

	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM
1 - Not at all confident	2.11%	2.92%	2.12%	1.68%	3.07%	4.51%	2.18%	0.25%

2 - Not very confident	6.44%	4.11%	6.44%	3.54%	4.82%	5.84%	6.14%	3.98%
3 - Somewhat confident	27.20%	28.27%	29.80%	24.37%	29.14%	24.58%	24.64%	27.31%
4 - Very confident	39.48%	42.03%	34.82%	39.13%	40.29%	37.54%	35.68%	42.61%
5 - Extremely confident	24.77%	22.68%	26.82%	31.28%	22.67%	27.53%	31.35%	25.85%

und_aft: Understand the warning?

	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM
1 - Not at all confident	3.01%	3.31%	1.97%	1.51%	2.07%	3.19%	1.68%	1.58%
2 - Not very confident	4.83%	4.35%	5.90%	4.26%	6.05%	3.83%	4.37%	3.67%
3 - Somewhat confident	23.13%	26.31%	26.65%	22.54%	26.77%	24.96%	22.70%	29.82%
4 - Very confident	43.30%	42.94%	41.81%	43.30%	44.15%	39.79%	38.40%	40.57%
5 - Extremely confident	25.73%	23.10%	23.67%	28.40%	20.96%	28.24%	32.85%	24.37%

resp_aft: Take protective action in response to the warning?

	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM
1 - Not at all confident	2.89%	2.83%	2.02%	1.79%	3.64%	4.64%	2.81%	2.57%
2 - Not very confident	8.38%	5.52%	9.30%	7.33%	6.53%	7.92%	4.17%	6.07%
3 - Somewhat confident	30.51%	34.51%	30.22%	29.61%	35.22%	32.67%	34.94%	38.99%
4 - Very confident	37.58%	34.33%	35.75%	41.20%	35.61%	33.15%	35.88%	35.59%
5 - Extremely confident	20.65%	22.81%	22.71%	20.06%	19.00%	21.62%	22.20%	16.77%

----------End Web pg ----------

If a tornado WARNING were issued for your area tomorrow at [**rand_eve:** 6:00 PM | 7:00 PM | 8:00 PM | 9:00 PM | 10:00 PM | 11:00 PM | 12:00 AM (midnight)], how confident are you that you would…

rec_eve: Receive the warning?

	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	12:00 AM
1 - Not at all confident	2.72%	3.71%	1.30%	3.21%	5.26%	7.35%	14.93%
2 - Not very confident	2.44%	3.08%	5.02%	6.67%	11.11%	13.18%	20.75%
3 - Somewhat confident	28.32%	20.90%	23.86%	28.80%	26.56%	28.95%	28.59%
4 - Very confident	45.04%	42.87%	42.12%	43.01%	35.26%	27.59%	21.40%
5 - Extremely confident	21.48%	29.44%	27.70%	18.31%	21.81%	22.93%	14.33%

und_eve: Understand the warning?

	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	12:00 AM
1 - Not at all confident	1.96%	3.27%	1.64%	2.69%	1.54%	4.17%	8.44%
2 - Not very confident	4.41%	3.74%	5.03%	4.96%	7.45%	7.63%	11.06%
3 - Somewhat confident	22.63%	23.70%	23.06%	26.92%	28.80%	25.97%	30.43%
4 - Very confident	47.56%	41.06%	42.36%	45.17%	36.52%	37.49%	30.26%
5 - Extremely confident	23.44%	28.23%	27.90%	20.27%	25.70%	24.73%	19.81%

resp_eve: Take protective action in response to the warning?

	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	12:00 AM
1 - Not at all confident	2.62%	3.39%	2.79%	3.52%	3.11%	4.98%	12.78%
2 - Not very confident	6.59%	5.18%	7.59%	9.78%	10.35%	12.67%	17.65%
3 - Somewhat confident	30.55%	30.94%	32.84%	35.16%	38.20%	31.61%	32.39%
4 - Very confident	41.57%	34.63%	33.61%	33.28%	30.96%	31.46%	22.65%
5 - Extremely confident	18.67%	25.86%	23.17%	18.26%	17.38%	19.28%	14.55%

----------End Web pg ----------

Imagine that it is 5:00 PM tomorrow evening and you are extremely confident that a large tornado will hit your location in the next [RANDOMIZE **short_torhit_time:** 2 | 15 minutes].

short_torhit_resp: What would you do? Please be as specific as possible. [VERBATIM]

short_torhit_resp_confidence: How confident are you that you would take this action?

	2 minutes	15 minutes
1 - Not at all confident	1.80%	1.54%

2 - Not very confident	2.70%	2.30%
3 - Somewhat confident	14.78%	17.03%
4 - Very confident	41.29%	41.74%
5 - Extremely confident	39.43%	37.39%

short_torhit_resp_protect: How confident are you that taking this action would protect you from the tornado?

	2 minutes	15 minutes
1 - Not at all confident	2.54%	3.74%
2 - Not very confident	11.89%	10.35%
3 - Somewhat confident	43.17%	39.88%
4 - Very confident	28.55%	30.37%
5 - Extremely confident	13.85%	15.66%

----------End Web pg ----------

Imagine that it is 9:00 AM tomorrow morning and you are somewhat confident that a large tornado will hit your location in the next [RANDOMIZE **long_torhit_time:** 4 | 8 hours].

long_torhit_resp: What would you do? Please be as specific as possible. [VERBATIM]

long_torhit_resp_confidence: How confident are you that you would take this action?

	4 hours	8 hours
1 - Not at all confident	1.67%	0.86%
2 - Not very confident	2.56%	2.76%
3 - Somewhat confident	22.10%	20.25%
4 - Very confident	41.17%	42.92%
5 - Extremely confident	32.50%	33.22%

long_torhit_resp_protect: How confident are you that taking this action would protect you from the tornado?

	4 hours	8 hours
1 - Not at all confident	3.43%	2.66%
2 - Not very confident	6.48%	7.94%
3 - Somewhat confident	37.00%	34.68%
4 - Very confident	32.65%	33.82%
5 - Extremely confident	20.43%	20.90%

----------End Web pg ----------

Please tell us how strongly you agree or disagree with the following statements. [RANDOM ORDER]
tor_eff1: It is possible for most people in my area to prepare and to secure their property ahead of time for a tornado.
1 - Strongly disagree [5.28%]
2 - Disagree [16.13%]
3 - Neither disagree nor agree [32.69%]
4 - Agree [34.22%]
5 - Strongly agree [11.68%]

tor_eff2: It is possible for most people in my area to develop a safety plan for how to deal with a tornado.
1 - Strongly disagree [2.84%]
2 - Disagree [7.57%]
3 - Neither disagree nor agree [27.12%]
4 - Agree [45.69%]
5 - Strongly agree [16.79%]

tor_eff3: It is possible for most people in my area to protect themselves against a tornado.
1 - Strongly disagree [3.80%]
2 - Disagree [13.44%]

3 - Neither disagree nor agree [31.67%]
4 - Agree [39.46%]
5 - Strongly agree [11.62%]

tor_eff4: It is possible for most people in my area to evacuate when necessary ahead of a tornado.
1 - Strongly disagree [4.61%]
2 - Disagree [17.13%]
3 - Neither disagree nor agree [31.91%]
4 - Agree [34.71%]
5 - Strongly agree [11.64%]

tor_eff5: I feel that I can prepare and secure my property ahead of time for a tornado.
1 - Strongly disagree [5.88%]
2 - Disagree [17.37%]
3 - Neither disagree nor agree [30.54%]
4 - Agree [34.70%]
5 - Strongly agree [11.51%]

tor_eff6: I have a safety plan for how to deal with a tornado.
1 - Strongly disagree [9.47%]
2 - Disagree [17.37%]
3 - Neither disagree nor agree [25.29%]
4 - Agree [34.81%]
5 - Strongly agree [13.07%]

tor_eff7: I can protect myself against a tornado.
1 - Strongly disagree [4.17%]
2 - Disagree [10.88%]
3 - Neither disagree nor agree [34.03%]
4 - Agree [38.81%]
5 - Strongly agree [12.12%]

tor_eff8: I can evacuate when necessary ahead of a tornado.
1 - Strongly disagree [3.64%]
2 - Disagree [10.99%]
3 - Neither disagree nor agree [26.69%]
4 - Agree [43.94%]
5 - Strongly agree [14.75%]

----------End Web pg ----------

Extreme weather can be dangerous and technically complex, so getting information you can trust is important. Please indicate your level of trust in information about extreme weather from each of the following organizations and groups. [RANDOM ORDER]

nws_trust: The National Weather Service
1 - No trust [0.95%]
2 - Low trust [1.19%]
3 - Moderate trust [15.76%]
4 - High trust [45.97%]
5 - Complete trust [36.13%]

lotv_trust: Regional or local TV stations
1 - No trust [1.61%]
2 - Low trust [3.17%]
3 - Moderate trust [25.03%]

4 - High trust [45.26%]
5 - Complete trust [24.93%]

natv_trust: National TV stations (like the Weather Channel)
1 - No trust [1.33%]
2 - Low trust [2.75%]
3 - Moderate trust [23.59%]
4 - High trust [46.34%]
5 - Complete trust [25.99%]

em_trust: State or local emergency managers
1 - No trust [1.19%]
2 - Low trust [3.49%]
3 - Moderate trust [25.17%]
4 - High trust [44.40%]
5 - Complete trust [25.75%]

fam_trust: Family, friends, neighbors, employers, co-workers, etc.
1 - No trust [2.45%]
2 - Low trust [15.49%]
3 - Moderate trust [46.92%]
4 - High trust [24.59%]
5 - Complete trust [10.55%]

----------End Web pg ----------

Warnings and information about severe weather are available from multiple sources. How much do you, *personally*, rely on each of the following sources of information about extreme weather? [RANDOM ORDER]

wx_info1: Broadcast radio
1 - Not much [11.19%]
2 - Little [12.43%]
3 - Somewhat [27.47%]
4 - Much [30.56%]
5 - A great deal [18.35%]

wx_info2: Weather radio (National Weather Service radio)
1 - Not much [15.87%]
2 - Little [10.54%]
3 - Somewhat [22.08%]
4 - Much [28.22%]
5 - A great deal [23.39%]

wx_info3: Television
1 - Not much [5.28%]
2 - Little [6.08%]
3 - Somewhat [21.00%]
4 - Much [36.30%]
5 - A great deal [31.33%]

wx_info4: Internet web pages focused on weather forecasts, such as those provided by the National Weather Service
1 - Not much [9.74%]
2 - Little [11.25%]
3 - Somewhat [32.19%]
4 - Much [28.82%]
5 - A great deal [18.00%]

wx_info5: Social media, such as Twitter or Facebook
1 - Not much [33.30%]
2 - Little [19.11%]
3 - Somewhat [24.31%]
4 - Much [14.01%]
5 - A great deal [9.28%]

wx_info6: Word-of-mouth (including telephone calls or texts) from family, friends, neighbors, employers, co-workers, etc.
1 - Not much [12.34%]
2 - Little [20.16%]
3 - Somewhat [37.56%]
4 - Much [20.18%]
5 - A great deal [9.76%]

wx_info7: Automated text or phone notifications
1 - Not much [11.27%]
2 - Little [9.02%]
3 - Somewhat [26.05%]
4 - Much [28.19%]
5 - A great deal [25.46%]

wx_info8: Outdoor warning sirens
1 - Not much [15.40%]
2 - Little [10.96%]
3 - Somewhat [22.19%]
4 - Much [27.52%]
5 - A great deal [23.93%]

----------End Web pg ----------

wx_info_tie: It looks like you gave these sources the same rating. Please indicate which source you rely on the *most* for information about severe weather. [CHECK BOX OF TOP SOURCES; RANDOM ORDER; 1 = SELECTED]

----------End Web pg ----------

People use different phrases to explain the possibility that a [RANDOMIZE **prob_event:** severe thunderstorm | tornado] will happen. When you see the following phrases, what percent chance comes to mind? Please indicate the chance as a percent that ranges from 0 to 100, where 0 means no chance and 100 means that it is certain. [RANDOMIZE **prob_word:** chance | probability; RANDOM ASSIGNMENT OF 5 QUESTIONS TO EACH RESPONDENT; RANDOM ORDER]

	prob_event: Severe Thunderstorm		**prob_event**: Tornado	
	prob_word: Chance	**prob_word:** Probability	**prob_word:** Chance	**prob_word:** Probability
ext_low: Extremely low	12.21	11.23	10.99	11.52
vry_low: Very low	14.00	13.95	12.40	14.61
vry_small: Very small	12.91	14.80	14.08	14.35
prty_low: Pretty low	16.03	17.52	16.13	15.46
small: Small	17.79	22.32	16.90	17.30
low: Low	20.41	21.56	19.11	19.91
remote: Remote	17.98	22.99	19.44	22.62
slight: Slight	21.42	23.73	20.66	23.43
medium: Medium	39.18	35.87	35.78	35.42
moderate: Moderate	42.14	41.67	38.35	39.44
good: Good	47.89	50.82	46.66	46.91
high: High	63.99	64.12	58.09	58.32
large: Large	60.77	61.20	60.13	61.09

prty_high: Pretty high	66.55	67.38	60.85	64.44
vry_high: Very high	69.66	73.26	67.11	68.29
sig: Significant	72.98	71.84	70.94	68.98
ext_high: Extremely high	82.63	81.08	78.37	71.67

----------End Web pg ----------

Have you or members of your family, neighbors, friends, or associates ever experienced property damage, personal injury, or loss of life from a *tornado*? Please select all that apply.
tor_exp_no: No [74.17%]
tor_exp_per: Yes, for you personally [9.04%]
tor_exp_fam: Yes, for family [12.52%]
tor_exp_neighbors: Yes, for neighbors [8.17%]
tor_exp_friends: Yes, for close friends or associates [7.67%]

Have you or members of your family, neighbors, friends, or associates ever experienced property damage, personal injury, or loss of life from a *severe thunderstorm*? Please select all that apply.
svr_exp_no: No [54.25%]
svr_exp_per: Yes, for you personally [23.17%]
svr_exp_fam: Yes, for family [20.29%]
svr_exp_neighbors: Yes, for neighbors [17.29%]
svr_exp_friends: Yes, for close friends or associates [12.76%]

----------End Web pg ----------

Now we want you to think about all types of extreme weather, not just tornadoes or severe thunderstorms.

Do you currently have any of the following at your residence? Please select all that apply.
prep_plan: A disaster response plan for you and your family [23.96%]
prep_kit: An emergency preparedness kit containing such things as first-aid supplies, flashlights, batteries, etc. [41.49%]
prep_water: Supplies of water and food specially packaged or designated for use in emergencies [41.24%]
prep_gen: A generator (either mobile or fixed) to provide electricity in emergencies [19.94%]
prep_room: A designated place within your home that you consider to provide the most shelter from tornadoes [51.54%]
prep_shelt: A specially constructed room or other facility on your property designed to provide shelter from tornadoes (may be above or below ground) [7.11%]

----------End Web pg ----------

transp_delay: If you had to guess, about how many days in an *average* year do extreme weather events *of any kind* cause traffic delays in your local area?
1 - Less than 5 days a year [32.18%]
2 - 5 to 10 days a year [33.02%]
3 - 11 to 20 days a year [20.32%]
4 - More than 20 days a year [14.48%]

transp_closures: If you had to guess, about how many days in an *average* year do extreme weather events *of any kind* cause road closures in your local area?
1 - Less than 5 days a year [44.14%]
2 - 5 to 10 days a year [33.96%]
3 - 11 to 20 days a year [15.33%]
4 - More than 20 days a year [6.57%]

transp_accidents: If you had to guess, about how many days in an *average* year do extreme weather events *of any kind* cause traffic accidents in your local area?

1 - Less than 5 days a year [26.21%]
2 - 5 to 10 days a year [28.59%]
3 - 11 to 20 days a year [22.54%]
4 - More than 20 days a year [22.27%]

transp_qual: In your opinion, how vulnerable are the roads and bridges in your local area to extreme weather events *of any kind*?
1 - Not at all vulnerable [9.41%]
2 - Somewhat vulnerable [41.88%]
3 - Vulnerable [26.75%]
4 - Very vulnerable [14.12%]
5 - Extremely vulnerable [7.84%]

transp_spend: In your opinion, should the government in your local area spend more, less, or about the same amount of money to improve the resilience of roads and bridges to extreme weather events *of any kind*?
1 - A lot less [2.84%]
2 - A little less [4.31%]
3 - About the same [41.19%]
4 - A little more [31.41%]
5 - A lot more [20.26%]

----------End Web pg ----------

For some people, religious beliefs play an important role when making decisions during disasters. Can you tell us how strongly you agree with the following statements? [RANDOM ORDER]
rel_1: I don't need to take protective action during disasters because I believe that God will protect me.
1 - Strongly disagree [47.44%]
2 - Disagree [23.91%]
3 - Neither disagree nor agree [17.74%]
4 - Agree [6.26%]
5 - Strongly agree [4.65%]

rel_2: My actions during disasters don't matter because God has a plan for me.
1 - Strongly disagree [38.57%]
2 - Disagree [23.58%]
3 - Neither disagree nor agree [21.34%]
4 - Agree [10.10%]
5 - Strongly agree [6.40%]

rel_3: I can control small things, but ultimately God has control of what happens to me during disasters.
1 - Strongly disagree [22.83%]
2 - Disagree [10.97%]
3 - Neither disagree nor agree [23.20%]
4 - Agree [25.28%]
5 - Strongly agree [17.71%]

rel_4: I believe that God leaves it up to me make good decisions during disasters.
1 - Strongly disagree [18.73%]
2 - Disagree [7.16%]
3 - Neither disagree nor agree [23.66%]
4 - Agree [28.52%]
5 - Strongly agree [21.94%]

----------End Web pg----------

income: Was the estimated annual income for your household in 2017:

1 - Less than $50,000 [go to **inc50**] [35.91%]
2 - At least $50,000 but less than $100,000 [go to **inc100**] [35.09%]
3 - At least $100,000 but less than $150,000 [go to **inc150**] [18.05%]
4 - $150,000 or more [go to **inc200**] [10.95%]

----------End Web pg ----------

inc_50: Was the estimated annual income for your household in 2017:
1 - Less than $10,000 [7.01%]
2 - $10,000 to less than $20,000 [6.65%]
3 - $20,000 to less than $30,000 [7.96%]
4 - $30,000 to less than $40,000 [7.83%]
5 - $40,000 to less than $50,000 [6.47%]

----------End Web pg ----------

inc_100: Was the estimated annual income for your household in 2017:
6 - $50,000 to less than $60,000 [8.26%]
7 - $60,000 to less than $70,000 [9.00%]
8 - $70,000 to less than $80,000 [7.27%]
9 - $80,000 to less than $90,000 [4.93%]
10 - $90,000 to less than $100,000 [5.59%]

----------End Web pg ----------

inc_150: Was the estimated annual income for your household in 2017:
11 - $100,000 to less than $110,000 [4.28%]
12 - $110,000 to less than $120,000 [4.24%]
13 - $120,000 to less than $130,000 [4.00%]
14 - $130,000 to less than $140,000 [1.94%]
15 - $140,000 to less than $150,000 [3.58%]

----------End Web pg ----------

inc_200: Was the estimated annual income for your household in 2017:
16 - $150,000 to less than $160,000 [2.29%]
17 - $160,000 to less than $170,000 [0.86%]
18 - $170,000 to less than $180,000 [0.80%]
19 - $180,000 to less than $190,000 [0.55%]
20 - $190,000 to less than $200,000 [1.68%]
21 - $200,000 or more [4.83%]

----------End Web pg ----------

edu: What is the highest level of education you have COMPLETED?
1 - Less than high school [0.83%]
2 - High school / GED [13.54%]
3 - Vocational or Technical Training [2.70%]
4 - Some College; NO degree [17.33%]
5 - 2-year College / Associate's degree [9.83%]
6 - Bachelor's Degree [33.15%]
7 - Master's Degree [17.23%]
8 - PhD / JD (Law) / MD [5.40%]

----------End Web pg ----------

oft_twit: About how often do you use Twitter?
0 - Never [56.45%]
1- Less than once a month [8.35%]
2 - Several times a month [4.77%]
3 - About once a week [4.56%]
4 - Several times a week [8.39%]
5 - Once or twice most days [8.03%]
6 - Several times almost every day [9.45%]

oft_FB: About how often do you use Facebook?
0 - Never [18.99%]
1 - Less than once a month [6.21%]
2 - Several times a month [4.50%]
3 - About once a week [5.64%]
4 - Several times a week [11.93%]
5 - Once or twice most days [20.55%]
6 - Several times almost every day [32.18%]

----------End Web pg ----------

Research shows that information can influence the way that people answer survey questions. We would like to know if you generally read the information that comes before survey questions. To demonstrate that you have read this text, please ignore the question below and click on the blue dot.

ign_instruct: Which of the following devices do you typically use to answer surveys on the Internet?
1 - A computer [94.50%]
2 - A tablet (such as an iPad) [1.60%]
3 - A smart phone (such as an Android or iPhone) [3.89%]

is_bluedot: *Clicked on the blue dot* [14.70%]

----------End Web pg ----------

comments: Is there anything else that you would like us to know about how you receive, understand, or respond to information from the National Weather Service?