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Commentary

Localized Tornado Frequency: Views

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Abstract

The historical frequency of tornadoes in the state varied greatly. The Middle Tennessee counties saw the most tornadoes (105) over the course of the 50-year study period, but West Tennessee counties were not far behind (99), and that state also had the county with the most tornadoes. There were just 30 tornadoes in all across the East Tennessee counties. In all three regions, especially in those with lower population concentrations, it is reasonable to suppose that tornadoes were missed. With little difference between the two, Middle and West Tennessee had the highest odds of being struck by a tornado, while East Tennessee had the lowest odds.

Keywords: Historical frequency • Tennessee • Tornadoes • Seasonality

Introduction

Overall, 58% of participants said that a tornado would most likely hit the western part of the country, followed by the middle (28%) eastern (12%) and southern (28% of participants) areas. In the western region, fewer people from Haywood County (61%), which had the fewest tornadoes among the four western counties, than from Shelby County (51% of participants) chose their region as having the greatest likelihood. When asked which area was least likely to be affected by a tornado, there was greater consensus, with 71% of all participants choosing East Tennessee. According to chi-square results, a participant's perception of the likelihood of a regional tornado was not independent of the region in which they resided (Most likely: 2=30.83, p 0.01; Least likely: 2=39.23, p 0.01), indicating that where they live influences where they believe tornadoes are more likely to occur. The descriptive data imply that participants' impressions of their own region varied are consistent with this. Greater numbers of East Tennessee participants chose their hometown as the area least likely to be hit, indicating that they were aware of the area's low tornado risk. Residents in each of the three regions gave West Tennessee the greatest proportion of "most likely to be hit" replies, showing that these participants may have underestimated the increased tornado hazard in Middle Tennessee. just 28.4% of Only 28.4% of participants from Middle Tennessee indicated that their area was the most likely to be affected. This might be problematic if it alters how people view danger and susceptibility in tornado situations, but decision-making may be unaffected by comparative likelihood. As Wirtz and Rohrbeck discovered was the case for terrorism events, it's possible that the perceived likelihood of tornadoes influences planning but not necessarily action.

This work's potential drawback is the influence of recent memory on perception. For instance, if a citizen is asked if they have recently experienced a tornado but they remember a friend or family member in a different part of the state experiencing one lately, they may be more likely to choose that area as having a higher chance of experiencing one. Similarly to this, people may believe that a location is more dangerous than it is if it frequently suffers lesser tornadoes but with greater intensity. The same is true for the remaining analyses; for instance, if a recent large tornado occurred at night in March, it might change how people perceive when tornadoes occur allowing them to choose the traits associated with an event that occurs nearby.

These three regions experience similar peaks and troughs in tornado activity throughout the year, according to previous research on the seasonality of tornadoes for each region. Despite being tied with May in the eastern region and June in the western region, April was the busiest month across all study regions. June remained inactive in Middle and East Tennessee at this time. In all regions, there was evidence of winter activity, but it was more pronounced in West and Middle Tennessee. In November, all regions saw a minor winter peak, and a greater peak in January and February. In East Tennessee, where there was a smaller sample size, this second winter peak was less noticeable, and February activity was more of a gradual buildup to the springtime peak.

We measured participants' impressions of tornado seasonality by asking them to name the months when tornadoes were most and least likely to occur in their region. Three respondents said they believe tornadoes can occur at any time, and a fourth said they are more frequent as the seasons' change. Some comments were descriptive. The majority of participants said they are unsure of the busiest months. Tornadoes occur throughout the year, according to two responses to the question about the least active months, and 52 respondents said they were unsure of the answer.

To compare the remaining responses to the regional climatological findings in visually, we combined the remaining responses by region. Participants had the option to pick several months. among those taking part in the average number of months they chose was two, which were the busiest months. 45% of respondents chose one month, and 9% chose four or more months. The average number of months chosen by participants who gave answers to the question about the least active months was also two. The majority of respondents (61%) chose one month, while 6% chose four or more.

Participants were unaware of the increased seasonal tornado activity in the late fall and winter. After January and December, November was ranked as the third-least likely month for tornadoes, with February coming in at number four. Only a small percentage of respondents said a winter month was more likely to experience a tornado. This is hardly shocking in East Tennessee, where there haven't been many winter tornadoes in recent memory. The next crucial question is whether this demonstrates Tennessee's lack of preparedness for winter tornadoes or in any other way affects participant behaviour during winter tornadoes. For each region, the historical data were used to compute the percentage of tornadoes that happened at night. If the time of initiation of a tornado happened between the nearest large city's sunset and sunrise, it was deemed to be nocturnal (Memphis, Nashville, or Knoxville). Nearly half of the tornadoes that occurred during the study period happened at night in each of the three regions; specifically, 45% of West Tennessee tornadoes, 50% of Middle Tennessee tornadoes, and 47% of East Tennessee tornadoes occurred at night, which is consistent with the results.

Participants were asked how many of the ten tornadoes that would occur would be at night. We choose 10 tornadoes since it is an even number that is plausible and can be readily converted into a most participants (27%–29% in each of the three locations) accurately predicted that 50% of tornadoes happen at night. The remaining answers were evenly distributed among the others. The majority of locals appear to be aware that nocturnal tornadoes frequently occur in their area, which is encouraging. However, it is also conceivable that "approximately half" was just a hunch and not a true reflection of the participants' beliefs.

Not all participants were aware of their potential nighttime tornado threat. In each region, 10% or more of participants answered that 0% or 10% of tornadoes happen at night. Similar numbers of individuals (about 10%) claimed that 90% or 100% of tornadoes happen at night. It would be significant to ascertain. Participants were divided into groups for the bivariate analysis based on how often they believed tornado activity would occur at night. Those who predicted 0–2 tornadoes of 10 tornadoes would occur at night were in the "low" nocturnal-activity group, 3–7 of 10 tornadoes were predicted to occur at night in the "moderate" nocturnal-activity group, and 8–10 tornadoes of 10 tornadoes were predicted to occur at night in the "high" nocturnal-activity group. The participants' belief that a significant number of tornadoes occur during the day or at night led to the selection of the groups, which highlighted those in either tail.

In order to see the general direction of travel in each of Tennessee's three areas, historical tornado trajectories were plotted on a polar grid. The path of each polar grid's center is the direction of the tornado. These directions were estimated using EasyCalculate 10, an Add-in for ArcGIS 10.0 and above, and the start and end locations from the SPC tornado database. No depiction is made of tornadoes that have no known termination point. The predominant direction of travel was from the southwest to the northeast in all three areas. Participants' judgments of how much land-surface characteristics, specifically hills, water, and buildings, shield areas from tornadoes, with the most common response being that hills (58%) and buildings (66%) offered "not at all" protection. Participants in East Tennessee were more likely to feel very or entirely protected by hills, whereas those in West Tennessee were more likely to feel the same way about water. No area distinguishes out as having a greater or lesser belief in building protection.We selected a representative sample of each of the three regions of Tennessee to gauge their awareness of regional tornado features. The participants' perceptions of their regional tornado features were connected to the diversity in tornado climatology across the state and other geographic distinctions between the areas. Participants from East Tennesse were more aware than residents of the other regions that the state's western two-thirds experience higher tornado activity. Participants from East Tennessee, on the other hand, may have had a smaller sample size of tornadoes upon which to build their knowledge, making them less aware of the tornado seasonality.

A participant's home region is also related to their perception of the security offered by local physical features, particularly their perception of the security offered by hills and water bodies. more people reside in Possibly due to the sampled counties' vicinity to the Smoky Mountains, more people in East Tennessee believe they are protected by hills, whereas more people in West Tennessee believe they are protected by water due to the sampled counties' closeness to the Mississippi River a person's geography and prior experiences have an impact on their awareness of tornado risk and vulnerability. Local meteorologists are accustomed to hearing proposals like this. Some audience members commented on how often they heard these "folk" views when these data were presented at the 2018 Spring Partners Workshop in Memphis. letting locals know that hills and rivers won't keep them safe It's crucial to let locals know that hills and rivers won't shield them from a tornado coming their way, demonstrated, as these perceptions can influence how someone behaves during a tornado occurrence.

While the majority of participants from all regions acknowledged that they occasionally see tornadoes at night, some locals still hold the opinion that a disproportionately high or small proportion of tornadoes occur at that time. Residents in the SEUS must be aware of the danger posed by nocturnal tornadoes, which account for almost half of all tornadoes in Tennessee, may require more preparation, and are more likely to cause fatalities than tornadoes during the day. It's critical for people to understand their danger at night and to pay attention to reliable sources. For people's safety at a time of day when information is scarce, environmental cues are negligible, and issued warnings are less likely to be heard, it is crucial that they understand their risk at night and pay attention to reliable sources.

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