

**A STUDY OF THE CONNECTION BETWEEN TV
METEOROLOGISTS AND THEIR VIEWERS
DURING SEVERE WEATHER BROADCASTS**

A Thesis presented to the Faculty of the Graduate School
University of Missouri

In Partial Fulfillment
Of the Requirements for the Degree
Master of Science

By

DANIEL M. EBNER

Dr. Anthony Lupo, Thesis Advisor

December, 2013

The undersigned, appointed by the Dean of the Graduate School, have examined the thesis entitled:

A STUDY OF THE CONNECTION BETWEEN TV METEOROLOGISTS AND
THEIR VIEWERS DURING SEVERE WEATHER BROADCASTS

Presented by Daniel M. Ebner

A candidate for the degree of Master's of Science

And hereby certify that in their opinion, it is worthy of acceptance.

Dr. Anthony R. Lupo, Professor

Dr. Mark H. Palmer, Associate Professor

Dr. Patrick E. Guinan, Extension Associate Professor

Mr. Eric M. Aldrich, Instructor

ACKNOWLEDGMENTS

The first person that I would like to thank is my brother, Nick Ebner, for going through college and graduate school with me. Without him doing this with me, graduate school would have been a much more difficult task. For the last five and a half years of college, it has been great to have someone to study with and someone there to help with ideas in the whole thesis writing process. The next person that I want to thank is Mr. Eric Aldrich for being a mentor and a best friend since I arrived at Mizzou. I have to thank Eric for convincing me to stay at Mizzou and continue my education through graduate school. Eric's support and constant encouragement through the entire graduate school process has been more than I can ever thank him for. I would like to thank Dr. Tony Lupo for being my advisor and thesis committee chairman. His help on getting funding for me to go to graduate school and all his help getting my research off the ground has been much appreciated. I have to also thank him for letting me stop by his office almost daily and his answering my hundreds of questions for class and all of my research. I would also like to thank Dr. Mark Palmer and Dr. Pat Guinan for all their help and knowledge they gave me to help put together my survey for this research. Without their background in social science and working with the public, I think my research would never have gotten to the point where it is today. The last person I have to thank is my father, Jeff Ebner. He has supported me through college in so many ways, I couldn't even begin to list them. From sending me money to making sure I had food to eat while I was away from home, if it were not for him, I do not know how I would have made it through college the last five and a half years.

TABLE OF CONTENTS

ACKNOWLEDGMENTS.....	ii
TABLE OF CONTENTS.....	iii
LIST OF FIGURES.....	v
LIST OF TABLES.....	viii
ABSTRACT.....	ix
CHAPTER 1: INTRODUCTION.....	1
1.1 Severe Weather Statistics.....	1
CHAPTER 2: LITERATURE REVIEW.....	3
2.1 Relationship between the broadcasters and the viewer.....	4
2.2 The public’s response to severe weather.....	5
2.3 Social media.....	7
2.4 Other forms of receiving weather information.....	8
CHAPTER 3: DATA/METHODS.....	9
3.1 Survey.....	9
3.2 Data.....	11
CHAPTER 4: ANALYSIS.....	15
4.1 Receiving weather information.....	16
4.1.1 How viewers receive severe weather information.....	16
4.1.2 Why viewers trust sources of weather information.....	18
4.1.3 Viewers and smart phones.....	19
4.1.4 Viewers’ reactions to being sent weather information via text....	21
4.1.5 Viewers and weather radios.....	24
4.1.6 Reasoning for buying or not buying a weather radio.....	26
4.2 Tornado sirens and the public’s severe weather plans.....	26
4.2.1 Ability of viewers to hear tornado sirens at work/school.....	27
4.2.2 Ability of viewers to hear tornado sirens at home.....	29
4.2.3 The actions that viewers take when a tornado warning is issued.....	33
4.2.4 Actions that would persuade viewers to seek shelter.....	35
4.2.5 Does the public feel tornado sirens are an adequate way of being warned about severe weather?.....	38
4.2.6 Viewers’ thoughts when a tornado warning is issued.....	41
4.3 Viewers’ perception of the media.....	42
4.3.1 Why viewers trust the meteorologist they watch.....	42

4.3.2 Does the media do an adequate job informing viewers of severe weather?.....	44
4.3.2.1 Why viewers think the media does not do an adequate job.....	45
4.3.3 Viewers and their trust with the media.....	46
4.3.3.1 Why viewers do not trust the media.....	48
4.3.4 Viewers thoughts on whether the media over-dramatizes severe weather.....	49
4.3.4.1 Why viewers do not trust the media.....	50
4.4 Publics' of severe weather alerts.....	51
4.4.1 What is a tornado watch?.....	52
4.4.2 What is a tornado warning?.....	53
4.5 Type of information viewers want to hear/see during severe weather broadcasts.....	54
4.5.1 The type of information that viewers want to hear/see when severe weather is approaching them.....	57
4.5.2 The type of information viewers want to see during a severe weather broadcasts.....	59
4.6 Viewer comments.....	62
4.6.1 What meteorologists can do to better persuade viewers to take immediate cover during severe weather.....	62
4.6.2 Other viewer comments.....	66
4.7 Case study: Joplin, MO.....	67
CHAPTER 5: CONCLUSION/RECOMMENDATIONS.....	71
5.1 Conclusion and Recommendations.....	71
5.2 Future Work.....	72
REFERENCES.....	77
APPENDIX A.....	78

LIST OF FIGURES

Figures	Page
4.1 How viewers their receive weather information.....	17
4.2 Weather information received by those living in rural areas and in the city...18	
4.3 Percent of viewers who have cell phones.....	20
4.4 Viewers who owned smart phones based on age.....	21
4.5 Would viewers seek shelter if sent information via text message?.....	22
4.6 Percent of viewers who own weather radios.....	24
4.7 Can viewers hear tornado sirens at their work/school?.....	27
4.8 Percent of viewers who cannot hear a tornado siren from their work/school based on age.....	28
4.9 Percent of viewers who cannot hear a tornado siren at their work/school based on area of residence.....	29
4.10 Can viewers hear a tornado siren at their homes?.....	30
4.11 Percent of viewers who cannot hear a tornado siren at home based on age group.....	30
4.12 Percent of viewers who cannot hear a tornado siren from their home based annual household income.....	31
4.13 Percent of viewers who cannot hear tornado sirens from their home based on place of residence.....	32
4.14 Actions taken by viewers during a tornado warning.....	33
4.15 Actions that would prompt viewers to seek shelter during a tornado warning.....	36
4.16 Action that would make viewers seek shelter immediately based on gender.....	37
4.17 Viewers' feeling about whether or not tornado sirens are an adequate way of being warned about severe weather.....	39
4.18 Viewers' feelings about whether or not tornado sirens are an adequate way of being warned about severe weather based on educational level.....	40

4.19 Viewers' feelings about whether or not tornado sirens are an adequate way of being warned about severe weather based on annual household income.....	40
4.20 What viewers are thinking when a tornado warning is issued.....	41
4.21 The reasons that viewers trust the meteorologist that they watch.....	43
4.22 How viewers feel when asked if the media do an adequate job information them about severe weather.....	45
4.23 Viewers who responded that they trust the meteorologist they watch expressed in percent.....	47
4.24 Percentage of viewers would responded that they do not trust the meteorologist the meteorologist they watch based on age group.....	48
4.25 Do viewers feel that the media over-dramatizes severe weather?.....	49
4.26 Percent of viewers who feel severe weather coverage is over- dramatized based on gender.....	50
4.27 What viewers think a tornado watch is.....	52
4.28 What viewers think a tornado warning is.....	53
4.29 Percent of viewers who thought a tornado warning meant conditions were favorable for tornadoes to develop based on education level.	54
4.30 An example of how viewers were intended to answer this question.....	55
4.31 An example of how most viewers answered the question.....	56
4.32 The type of information that viewers want to hear/see when a storm is approaching them.....	58
4.33 The type of information that viewers want to hear or see during severe weather broadcasts, comparing the overall data to those living in a rural area and in the city.....	59
4.34 The type of information do viewers want to hear during a severe weather broadcast.....	60
4.35 The type of information viewers want to hear during a severe weather broadcast comparing the overall data to those living in rural areas and in the city.....	61
4.36 Actions that meteorologists can do to persuade viewers to seek shelter during severe weather broadcasts.....	63

4.37 Events that would make a viewer take shelter during a tornado warning,
comparing the overall data to Joplin TV viewers.....68

4.38 Can viewers hear tornado sirens at work/school comparing the overall data
to those who live in the Joplin TV market?.....69

LIST OF TABLES

Table	Page
Table 3.1 Analysis of the data based on gender.....	12
Table 3.2 Analysis of the data based on age.....	13
Table 3.3 Analysis of the data based on highest educational level.....	13
Table 3.4 Analysis of the data based on annual household income.....	14
Table 3.5 Analysis of data based on TV market viewers watch.....	14
Table 3.6 Analysis of the data based on type of area viewers live in.....	15

A STUDY OF THE CONNECTION BETWEEN TV METEOROLOGISTS AND THEIR VIEWERS DURING SEVERE WEATHER BROADCASTS

Daniel. M. Ebner

Dr. Anthony R. Lupo, Thesis Advisor

ABSTRACT

After the devastating tornadoes in Joplin, MO and in the Deep South in 2011, it seemed appropriate to look at the impact that broadcast meteorologists (and their TV coverage) have on their viewers during severe weather events. Broadcast meteorologists play a vital role in the severe weather warning process and in persuading the public to take the appropriate actions during severe weather. This research was done by developing a survey that addressed the following questions: 1) Is the media doing everything they can persuade viewers to take shelter and protect themselves and their property?; 2) What do you do when a tornado warning is issued?; 3) Is there anything broadcast meteorologists can do or say that will make you take immediate action during severe weather? The survey was disseminated through television markets in Missouri. The goal of this research was to find new, improved and different ways of “connecting” with viewing during severe weather coverage. After looking at the results, we want to see if there are specific words, images or anything else a broadcaster can do that will

trigger a response by viewers to take cover. It is my hope the results and analyses from this survey will provide broadcast meteorologists with new and improved techniques to connect with the public and to assist them in making an informed decision during severe weather events.

1 INTRODUCTION

The purpose of this research was to evaluate whether broadcast meteorologists can modify their delivery method to persuade viewers to seek shelter during severe weather. The findings from this research will hopefully be used during TV severe weather broadcasts with the ultimate goal of reducing casualties and property damage during severe weather.

1.1 Severe Weather Statistics

It is important to look at statistics regarding deaths directly related to severe weather. According to the National Climate Data Center (NCDC) and during a period from 1991-2010, the United States averages 1,253 tornadoes annually. In Missouri, there is an average of 45 tornadoes each year in the same time period¹.

The average number of fatalities related directly to tornadoes each year in the United States is 57. In Missouri, the average number of fatalities related to tornadoes is four each year, according to the National Weather Service (NWS)². The data are from the period of 1991-2010. The reason this period is important is because it does not take into account the 2011 severe weather season, which was a particularly deadly year due to tornadoes. A three day long tornado outbreak occurred in the southern and eastern portions of the United States between April 25-28, 2011. During this outbreak, there were 358 confirmed tornadoes in 21 states which was responsible for 316 fatalities (NWS

¹ <http://www1.ncdc.noaa.gov/pub/data/cmb/images/tornado/clim/ann-avg-torn1991-2010.gif>

² http://www.nws.noaa.gov/om/hazstats/resources/weather_fatalities.pdf

Deep South Assessment, 2011). The strongest tornadoes occurred during the last day of the outbreak in Alabama, Mississippi and Georgia where several EF-4 and EF-5 tornadoes occurred, including some that went through Tuscaloosa, Alabama and Birmingham, Alabama (NWS Deep South Assessment, 2011). On 22 May, 2011, Joplin, Missouri was hit by a devastating EF-5 tornado that killed 161 people (NWS Joplin Assessment, 2011).

If the statistics from the 2011 severe weather season were included in the overall tornado related fatalities rate, the average deaths each year climb notably. There were 553 deaths related to tornadoes in 2011 which increases the 1991-2011 annual average to 80 deaths (up from an average of 57 deaths) due to tornadoes (NWS). In Missouri, there were 161 deaths from tornadoes in 2011 which brings the annual average to 11 deaths in Missouri (up from an average of four deaths).

Tornadoes are not the only form of severe weather to cause injuries and fatalities. Although tornadoes cause the most destruction and are usually perceived by the public as the severe weather phenomena that kills the most people, that is not the case. Flooding results in the most deaths when all of severe weather statistics are tallied. Between 1991 and 2011 flooding accounted for 86 fatalities. Lightning related fatalities are 46 annually. Statistics regarding straight line wind related fatalities did not start until 1995. Between 1995 and 2011, an average of 55 people perished annually from these events in the United States³. The magnitude of wind was not included with the data, which means it is unknown if the winds was above or below severe criteria. The criteria for a

³ Data from Jim Kramper at the National Weather Service in St. Louis, Missouri (LSX)

thunderstorm to be considered severe is it has to have wind greater than 58 mph, hail greater than one inch in diameter and/or a tornado.

In Missouri, between 1991 and 2011, flooding and lightning accounted for five and two fatalities respectively. Between 1995 and 2011, an average of one person died annually from straight line winds in Missouri.

2 LITERATURE REVIEW

After the devastating and deadly tornadoes in Joplin, Missouri and Tuscaloosa, Alabama in 2011, there was an increased interest in how the media conveys severe weather information. With 161 fatalities in the Joplin, Missouri tornado and 358 in the deep south (NWS, 2011), there is a need to understand the connection between TV meteorologists and viewers during severe weather. What can TV meteorologists do to help prevent such a large death toll from ever happening again? A survey done after the 1 March 1997 tornado in Saline and Clark county Tennessee indicates the public received their warnings from television bulletins (Balluz et al. 2000). Another survey following the devastating 3 May 1999 tornado in Oklahoma City demonstrated that 89% of those surveyed received tornado warning information from television weather broadcasts (Hammer and Schmidlin 2002).

The results of these surveys propose an interesting question: What is the relationship between TV meteorologists and their viewers? This relationship is fundamental to the trust between viewers and TV meteorologists. It would appear that viewers, who have a great deal of trust with their favorite meteorologist, are more likely to heed their warnings and respond properly

during severe weather. Generally, this response would be to seek appropriate shelter.

2.1 Relationship Between the Broadcaster and the Viewer

Many studies have shown how vital TV meteorologists are in the severe weather warning process. Studies have shown that viewers form a perception of a face-to-face relationship with “performers” in the media. One of the earliest studies to show this relationship was by Horton and Wohl (1956). This relationship can be seen with any public figure, including celebrities, movie stars, athletes and even local news and weathercasters. This face-to-face relationship was termed a “para-social relationship.”

Viewers feel a certain intimacy with people they see on TV (Horton and Wohl, 1956). The para-social relationship a viewer builds with a “persona” (meteorologists, in this case) is similar to the relationship built between two friends and they feel as if they actually know this person. The more interaction between the television meteorologist and the viewer, the deeper this intimacy becomes (Altman and Taylor, 1973).

Another part of the relationship between TV meteorologists and their viewers is a sense of dependability. Horton and Wohl (1956) tell how people come to rely on these public figures to “appear on a regular basis;” they explain how they are a “dependable event, counted on and planned for”.

Another study expands on the findings of Horton and Wohl showing that viewers have a strong para-social interaction (PSI) with local weathercasters (Sherman-Morris, 2005). PSI is another term for the relationship that is formed

between these two groups of people (Horton and Wohl, 1956). Sherman-Morris (2005) found that the higher the degree of the PSI a viewer had with a weathercaster, the more the viewer would trust the weathercaster.

The background and connection between the viewer and meteorologist has been established, but the question of how viewers respond to meteorologists during severe weather needs to be examined.

2.2 The Public's Response

The public's response to severe weather and warnings is very complex and depends on the public's perception of risk (NWS, 2011). This risk perception is often molded by the trust between viewers and their favorite TV meteorologists. Likewise, another factor that shapes a viewer's decision to seek shelter is if they trust the meteorologist they are watching. A survey in the mid-2000s indicated the majority of respondents trusted the local TV meteorologist they watch. Because of this trust, they would likely seek shelter if the local meteorologist advised them to do so (Sherman-Morris 2005). Furthermore, PSI is related to "trust in the recommendations of weathercasters" during severe weather, which can help determine if the viewers will take the desired precautions and actions during severe weather (Sherman-Morris 2005).

The 3 May 1999 tornado in Oklahoma City, Oklahoma was one of the most destructive tornadoes documented. A few survey respondents said the language used and what KWTW-9 meteorologist, Gary England, convinced them to seek shelter. He told them they needed to be underground or needed to get out of the path of this storm. They said Gary persuaded them to seek shelter or leave the

area they were in (Hammer and Schmidlin 2002). Horton and Wohl (1956) found the more a performer “adjusts his performance to the supposed response of the audience” the better chance the audience is to “make an anticipated response.”

One factor that influences the public response to severe weather is the “cry wolf” effect. This occurs when the public is repeatedly told there is severe weather and advised to seek shelter, but the warning ends up not being a threat to their lives. Another factor that influences the public’s response to severe weather is the “numbing” effect which causes people to feel as if they are not in imminent danger (Schmidlin and King, 1997). This numbing effect can stem from a few reasons: a large area being under a watch or a warning for an extended period of time, as well as concentrated and long lasting television coverage of severe weather. One example of this was from the 2010 New Year’s Eve tornado in St. Louis, Missouri. On a television broadcast from KMOV-TV, a man said he had been watching severe weather coverage all morning and finally turned it off because it had been on for so long. He stated just after he did this, the tornado struck his home.

Other reasons this “numbing” feeling by the public can occur are because of the high false alarm rate (FAR) with severe weather and severe weather warnings, particularly tornado warnings (Barnes et al., 2007). The high false alarm rate during severe weather is also considered part of the “cry wolf effect”. The FAR for tornado warnings was 74% and the FAR for all severe weather was 46%. These statistics were from period of 1 October 2007 to 1 April 2011 (NWS, 2011).

There is also a psychological and culture dimension as to whether the viewer feels it is necessary to seek shelter during severe weather. A study in the 1970s looked at the difference in tornado deaths in the northern and southern regions of the United States. The majority of people surveyed in the south believe there are “external” forces that have “active” rolls in their lives; these were described as God, fate and luck (Sims and Baumann, 1972). The opposite was the case in the north. In the north the people surveyed were more prone to taking responsibility for their own lives, meaning they were more willing to seek shelter when advised to do so during severe weather. In the south, however, it was the opposite. They felt there was fate, luck and, most importantly to them, God in their lives and they were less likely to seek shelter when suggested to do so (Sims and Baumann, 1972). These people believed no matter what they did, their life was already planned out and there was nothing they could do to change it.

2.3 Social Media

In the days of social media, a TV meteorologist’s job does not end with their television broadcasts. In this era of tablet computers and smart phones, social media also plays an important role in warning the public of severe weather as TV broadcasts do. Many viewers, especially the younger ones, in the age group of 18-34, seek other ways to receive severe weather information. Social media plays a vital role and internet sites like Facebook and Twitter provide a constant stream of information. Young viewers are more dependent on new media and social networking in addition to traditional television media (Farmer 2012). Social media can be used by the viewers and meteorologists during times of severe

weather. Meteorologist can use social media to send out severe weather information to quickly to their followers. Viewers can also participate in severe weather coverage by sending pictures and weather updates about the weather they are seeing where they are. When the meteorologists receive this information from their viewers, they can pass it along to the rest of their followers on social media. Social media allows for real-time information to be passed allow during severe weather events.

2.4 Other Forms of Receiving Weather Information

Television broadcasts and social media updates are not the only sources public receives severe weather information. One study revealed that television broadcasts and warning sirens were the most common way of being warned about tornadoes (Balluz et al. 2000). Many studies have shown while TV broadcasts are the most popular way of receiving severe weather information, many people want additional ways to verify information they are seeing on television. In the 3 May 1999 tornado, many people used more than one indicator before making the decision to seek shelter. A few of the indicators, besides TV broadcasts, were outside weather conditions and phone calls from friends or family (Hammer and Schmidlin 2002). One finding from the NWS Joplin assessment found the majority of residents surveyed did not immediately go into a storm shelter. Most of the residents of Joplin wanted to more information than TV reports and tornado sirens before seeking shelter (NWS, 2011).

3 METHODOLOGY AND DATA

A survey was developed to evaluate what TV viewers want to see during severe weather broadcasts and what would persuade them to take immediate shelter. This survey was used to get insight into what viewers are thinking during severe weather. The survey was developed by the researchers at the University of Missouri.

3.1 The Survey

There were 32 questions asked (the full survey can be seen in Appendix A). This survey had several different types of questions: multiple choice, check all that apply, and open-ended questions requiring a written response from the viewer. The first seven questions were demographics to gain background information from viewers participating in the survey. The following demographic questions were asked:

- Gender
- Age
- Highest educational background
- Household income
- TV market watched
- County and state
- Type of area of residence (i.e. city, suburbs, rural)

The next six questions asked how viewers received weather information and why they used those sources:

- How do you get severe weather information (sources)?
- Why do you use/trust that source to gather information about severe weather?
- Do you have a smart phone?

- If you were sent information about severe weather and tornadoes in text message, would you be more likely to seek immediate shelter during severe weather?
- Do you have a NOAA weather radio?
- If yes to having a NOAA Weather Radio, what encouraged you to purchase one? If no, what is prohibiting you from purchasing one?

The next section of questions asked viewers about tornado sirens and their severe weather plans:

- If a tornado warning is issued, what actions do you take?
- What would make you seek shelter immediately during severe weather?
- Can you hear tornado sirens at your job/school?
- Can you hear tornado sirens at home?
- Do you feel tornado sirens are an adequate way of being warned about tornadoes?
- When a tornado warning is issued, what do you think?

The next two questions asked viewers what type of information they felt was most important during severe weather TV broadcasts:

- What type of information do you want to see when a storm is approaching you (i.e. ETA, exact time, radar/maps, visual images)?
- What type of information do you want to hear when a storm is approaching (i.e. county name, local landmark, school names, road/bridges, shopping centers, places of worship)?

Next, the public's perception of the media and the TV meteorologists they watch were examined:

- Why do you trust the meteorologist you watch?
- Do you feel the media does an adequate job informing viewers of severe weather?
- If you do not feel the media does an adequate job, explain why.
- Do you trust the media when they provide you with severe weather information?
- If you do not trust the media when they provide severe weather information, explain why.
- Do you feel severe weather coverage is over dramatized by the media?

- If yes, explain why you think the media over dramatizes severe weather coverage.

Viewers were asked about their knowledge of severe weather alerts and what they mean:

- What does a tornado watch mean?
- What does a tornado warning mean?

The final two questions were open ended questions requiring a response from viewers:

- What can a meteorologist do to better persuade you to take immediate action during severe weather?
- Any other comments you have in general about meteorologists and their severe weather coverage are more than welcomed.

The last two questions were extremely important in this survey. They were important because these questions allowed viewers to respond critically rather than selecting answers from a list of possible responses. These responses were invaluable because viewers were able to express their opinions about TV severe weather coverage.

Every TV station in every TV market in Missouri was asked if they would be willing to participate in this research. This survey was done online for viewer convenience. Broadcast meteorologists were asked if they could post a link to the online survey to their station Facebook pages, Twitter accounts, station websites, blogs or any other means of getting the survey to their viewers via the internet.

3.2 Data

A meteorologist was contacted at a total of 24 TV stations. As a side note, a few of the stations were not actually in Missouri, but were part of TV markets that

provide TV broadcasts to the state of Missouri. Out of 24 stations contacted, only 12 responded saying they would participate. The list of stations that participated is given below:

- KTVI/KPLR – St. Louis, Missouri
- KSDK – St. Louis, Missouri
- KFVS/KBSI – Cape Girardeau, Missouri
- WSIL – Harrisburg, Illinois
- KRCG – Jefferson City, Missouri
- KOMU – Columbia, Missouri
- KYTV – Springfield, Missouri
- KOAM/KFJX – Joplin, Missouri
- KODE/KSNF – Pittsburg, Kansas
- KSHB – Kansas City, Missouri
- KQTV – St. Joseph, Missouri
- KHQA – Quincy, Illinois

There were 652 viewers that participated in the survey. An analysis of the data based on demographics is listed below in Tables 3.1 through 3.6. The totals on each table are not all equal because some respondents chose leave some of the certain demographic questions blank.

Table 3.1: Data analysis based on gender.

Gender	Number of Participants
Female	475
Male	170
Total	645

Table 3.2: Data analysis based on age.

Age	Number of Participants
18-24	50
25-39	168
40-55	250
56-69	150
70+	26
Total	644

Table 3.3: Data analysis based on highest educational level achieved.

Highest Educational Level	Number of Participants
High School Diploma	128
Some College	226
College Degree	208
Master's/Ph.D.	73
Total	635

Table 3.4: Data analysis based on annual income.

Household Income	Number of Participants
\$0 - \$24,999	139
\$25,000 – \$39,999	122
\$40,000 – \$64,999	175
\$65,000 - \$99,999	119
\$100,000 +	71
Total	626

Table 3.5: Data analysis based on TV market viewers watch.

TV Market	Number of Participants
Cape Girardeau/ Harrisburg/Paducah	216
Columbia/Jefferson City	52
Hannibal/Quincy	41
Joplin/Pittsburg	161
Kansas City	7
Kirksville/Ottawa	2
Springfield	38
St. Joseph	1
St. Louis	40
Other	88
Total	646

Table 3.6 Data analysis based on type of area viewers live in.

Type of Area Lived In	Number of Participants
City	234
Rural	340
Suburbs	68
Total	642

The data were analyzed statistically. First, the data were transformed into percentages then analyzed using the chi squared analysis to test whether the data were statistically significant between different groups in the demographics. For example, when looking at gender, was there a difference between males and females. The data were analyzed at the 90% confidence level (Neter et al. 1986).

4 ANALYSIS

The analysis section will go through the entire survey, question by question, and evaluate the data received. These data were analyzed using the chi squared test. This allowed all questions to be analyzed by each demographic category to identify whether the distribution of the data was statistically significant between different groups in the demographics. Each question was analyzed using the same variable for each demographic category:

- Type of area living in: compared city to rural
- Age: compared 25-39 to 56-69
- Gender: compared male to female
- Highest educational level: compared college degree to high school degree
- Household income: compared \$0 - \$24,999 to \$65,000 - \$99,999

- TV market: compared Cape Girardeau/Harrisburg/Paducah to Joplin

Some of the questions in this survey required a written response from the respondents. In order to statistically evaluate these questions, the responses were broken into categories based on the responses received.

One of the demographics that would be useful broadcast meteorologists is the question, “What type of area do you live in?” Meteorologists may change their approach if viewers in rural areas respond better to certain things than viewers in urban locations. This demographic was a key focus of this research.

Throughout the analysis section, quotes will be embedded from comments of the viewers for questions that required a written response.

4.1 Receiving Weather Information

In this section, the public was asked how they receive and trusted those sources of information.

4.1.1 How viewers receive severe weather information

The first question asked on the survey was in what ways do viewers receive severe weather information. They were given a list of possible options: TV, radio, NOAA weather radio, smart phone/weather apps, text messages, social media or other.

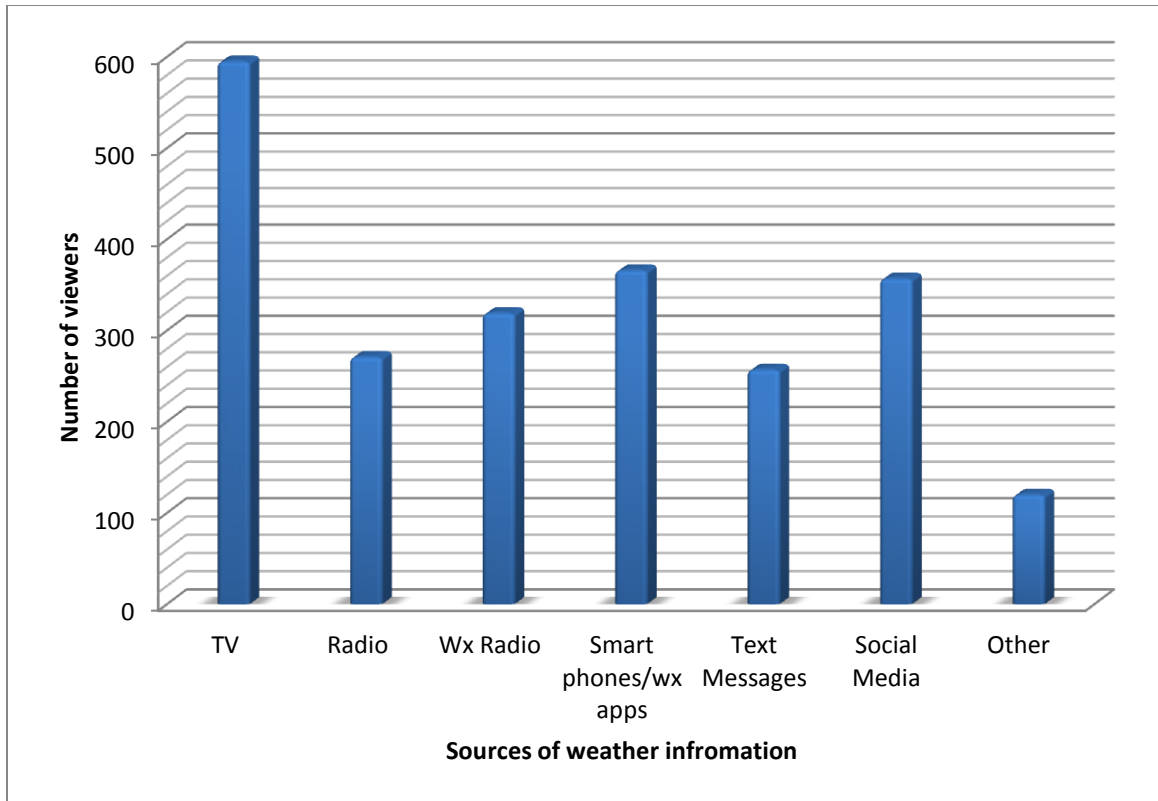


Figure 4.1 How viewers receive their weather information.

In Figure 4.1, 595 (91.3%) respondents responded they received severe weather information from TV weather reports. Smart phones and weather apps were also used 366 (56.1%) of the respondents. The third highest response was social media from 357 (54.7%) respondents. NOAA weather radios were used by 319 (48.9%) of those surveyed. One statistic that stands out is 90% of those surveyed responded they received weather information from TV. One reason this number could possibly be so high is because this survey was disseminated via TV stations.

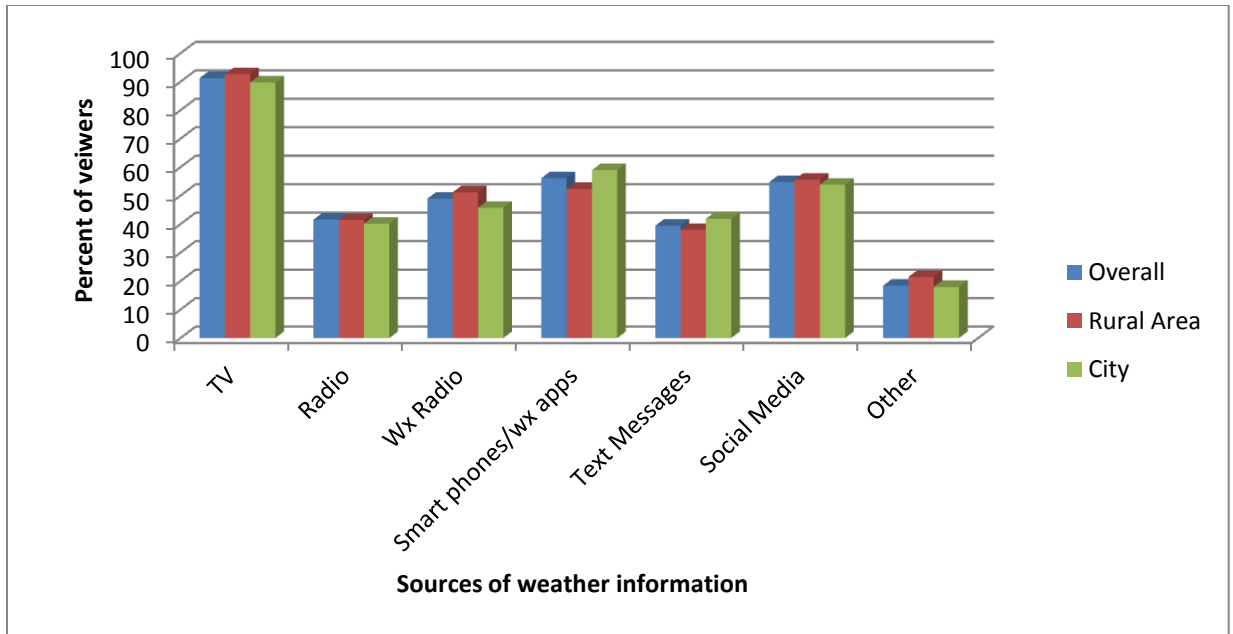


Figure 4.2 Weather information received by those living in rural areas and in the city.

Nothing significant was found when comparing rural verse city dwellers (Figure 4.2). However, those in the city were 6% more likely to use smart phones/weather apps to get weather information and 4% more likely to use text messages for weather information. Those living in more rural areas were 6% more likely to use a weather radio for weather information than those living in the city.

4.1.2 Why viewers trust sources of weather information

The previous question asked viewers to select all sources they use to receive weather information. The next question asked them why they trust that source (or sources) for their weather information. This question was difficult to analyze because viewers selected more than one source in the previous question; this means it is hard to know which source(s) they were referring in their written

answer. Overall, many of the answers said the reason they used the sources was because they had a proven history of being reliable, up-to-date and accurate.

Here are some quotes from the respondents:

*“Local people, reliable knowledge, information that is true in almost all cases.”
– Male, City*

“My local meteorologists provide enough information, visuals, etc that makes me feel at ease and well prepared if something does come my way.” – Male, City

One recurring theme was that viewers responded positively and had built a strong connection with the TV meteorologist when he/she would respond to their questions on Facebook or Twitter. The following quote reflects how viewer’s thought it was a great way for them to receive severe weather and general weather information.

“Very personal, in depth with details about my area, able to get individualized responses from the people who post [on facebook]” – Male, City

4.1.3 Viewers and smart phones

Smart phones and weather applications for smart phone platforms, like Apple and Android, offer multiple ways for viewers to receive severe weather information. When viewers were asked if they owned a smart phone, 62% said they did have a smart phone and 38% said they did not own a smart phone.

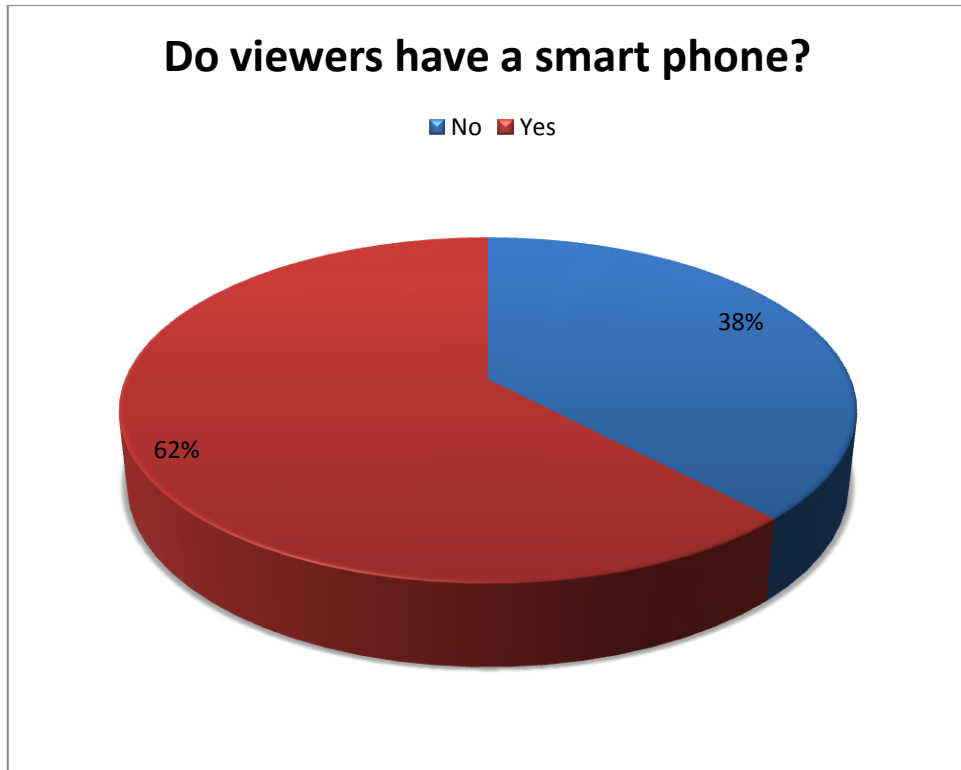


Figure 4.3 Percent of viewers who have cell phones.

Statistically when looking at who owned a smart phone, there was a highly significant difference between age groups. The younger viewers were more likely to have a smart phone. Three out of every four of the respondents in the 18-24 age group had a smart phone compared to 56-69 group, in which 42% said they had a smart phone as seen in Figure 4.4. There was also a statistical significance when looking at the educational level; the higher the educational level, the greater the chance they would have a smart phone. This was also the case with household income. The higher the income, the likelihood the viewer owned a smart phone increased. These results were expected by the researcher when looking at who owned a smart phone. Comparing rural viewers to city viewers, there was no difference between having a smart phone and not having one.

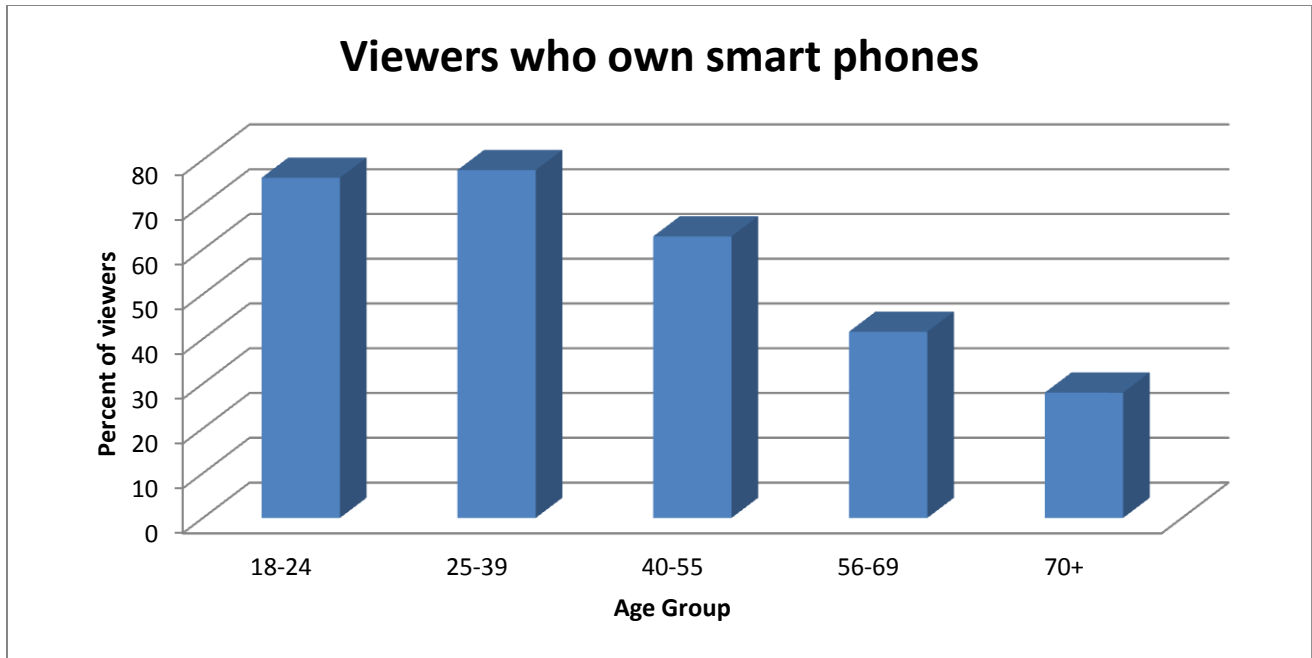


Figure 4.4 Viewers who owned smart phones based on age.

4.1.4 Viewers' reactions to being sent weather information via text message

The next question asked was would viewers seek shelter if sent weather information via text message. For this question written viewer feedback was required. The purpose of this research was to determine what could persuade viewers to seek shelter during severe weather. The viewers' written comments were put into four categories: Yes, No, Maybe and Don't Text are seen in Figure 4.5.

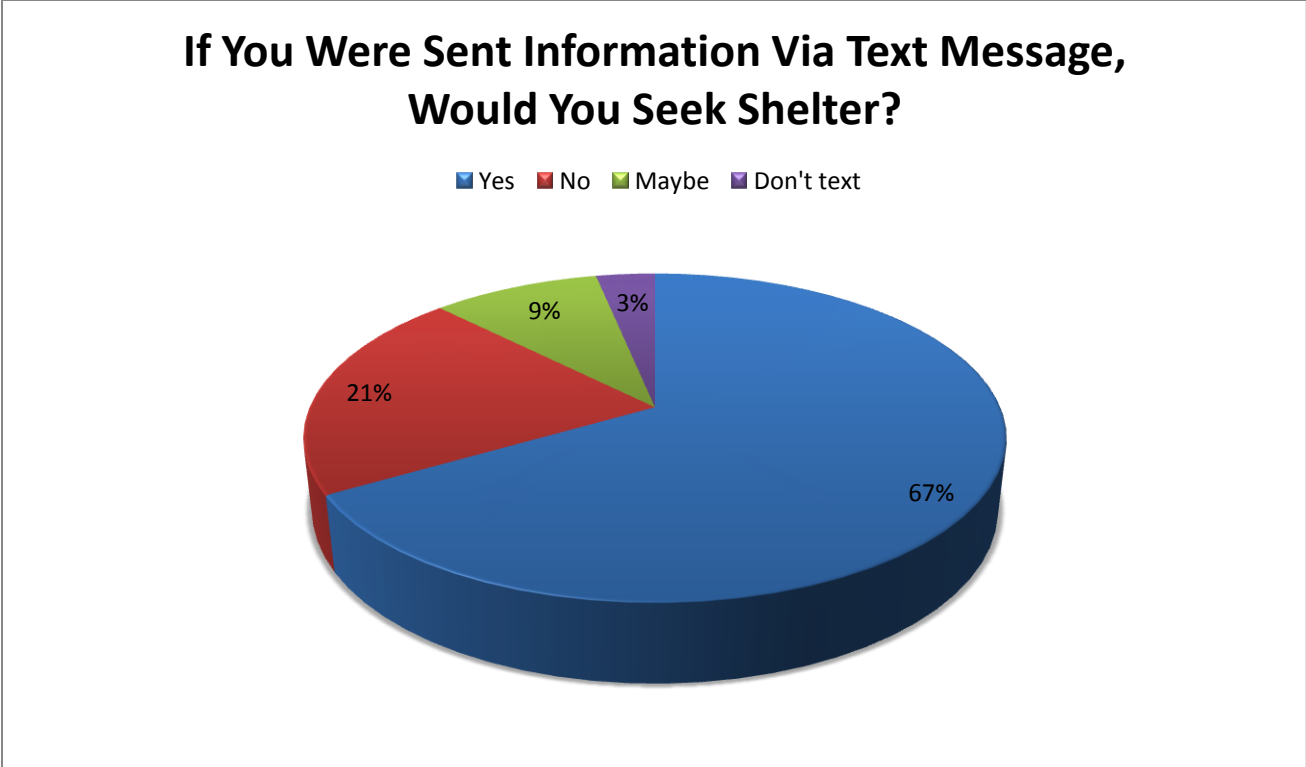


Figure 4.5 Would viewers seek shelter if sent information via text message?

The majority of the viewers, 67%, responded that they would be more likely to seek shelter if they were sent severe weather information via text message. About 20% said they would not be more likely to seek shelter and approximately 10% said they were unsure if it would persuade them to seek shelter immediately or not.

The age group of 18-24 was most likely to seek shelter if sent information via text message. The number of viewers who would seek shelter decreases as the age group increases. Seventy three percent of the 18-24 age group responded yes they would seek shelter if sent information via text; the 70+ age ground said yes only 41% of the time. The reason for this decrease in whether viewers would seek shelter is likely due to the older population no owning a smart phone or a cell

phone with texting capabilities. When evaluating the rural versus city dwellers, rural viewers were 4% more likely to seek shelter if sent information via text message; however, this was not statistically significant.

When analyzing the data, most answers were either a “yes” or a “no”, but a few interesting comments stood out that were not just a “yes” or “no”. Viewers said that if they were sent a text message with severe weather information, they wanted exact information in the text message to persuade them to take shelter during severe weather. Along with text messages, a few viewers stated they had tablet computers and would like to receive weather information on that device because they do not have a cell phone, as seen by the following quotes from the respondents:

“It depends on how precise it is. A text message about a tornado that is warned county-wide is not as precise as a text message that indicates exact cities or locations in the county. The more precise the forecast, the more likely I am to seek shelter.” - Female, City

“It would prompt me to verify the weather. Many times the information is about broad areas. I like to keep specific tabs on where I am.” – Female, Rural Area

Additional viewer quotes indicate they only wanted to receive a text message if it were a true emergency, and did not want this service to be abused by TV stations:

“Only if it wasn't sent unless it was a TRUE EMERGENCY!!!!” – Female, City

“yes if it was not ‘overused’” – Female, Suburbs

4.1.5 Viewers and weather radios

NOAA weather radios are a vital tool in providing severe weather information in a quick and timely manner. NOAA weather radios may be the only line of weather information in the event power goes out and the public is unable to receive important severe weather updates. Figure 4.6 shows that 56% of those surveyed owned a NOAA weather radio.

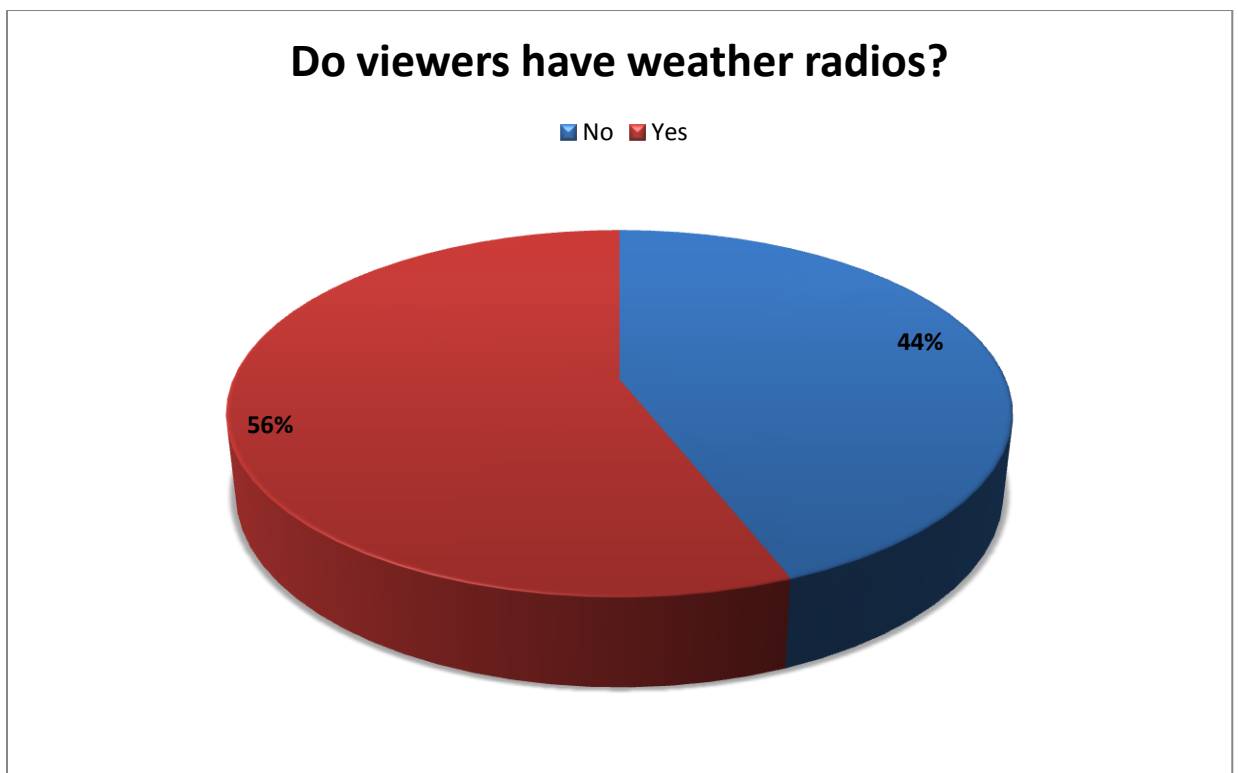


Figure 4.6 Percent of viewers who own weather radios.

After analyzing the data whether viewers had a weather radio or not, there was nothing significant between any of the demographics except the household income. The higher the household income, the more likely they were to own a weather radio. There was a difference of 17% between the \$0-\$24,999 and the

\$65,000-\$99,999 income range of who owned a weather radio, otherwise, the level of increase was very small, within a couple of percentages points. Those with a higher annual household likely have more discretionary spending money to buy things like weather radios, while those who make less would likely find it not a necessity in their lives. When comparing city and rural viewers, those in rural areas were 10% more likely to own a NOAA weather radio, however, this was not statistically significant.

4.1.6 Reasoning for buying or not buying a weather radio?

There were many reasons why viewers decided to purchase or not purchase a NOAA weather radio. Many people cite the 22 May tornado in Joplin and other tornadoes that hit the state of Missouri in 2011 as to why they bought weather radios indicated by quotes from respondents:

“Obtained one soon after Joplin's tornado.” – Female, City

*“The spring a tornado hit Lambert airport was the worst spring I can remember and it prompted me to buy the radio for use during sleeping hours.”
– Female, Suburbs*

Other quotes from viewers show that they bought them to be notified of severe weather in the middle of the night. Another reason why viewers purchased weather radios was because they lived in a more rural area, and that it is an effective way to receive weather information when other forms, such as a TV broadcast, are not available to them:

“All the severe weather we have at night. I like to know we can be alerted if something is going on.” – Female, Rural Area

*“We live outside of town and cannot hear the weather sirens”
– Female, Rural Area*

When looking at the comments from 44% of those respondents who did not have a weather radio, most of the reasoning behind why they did not have them was because they were too expensive and others said they have other ways of receiving adequate weather information. The following are quotes from respondents:

“not enough money to get one” – Female, did not indicate area living in

“My smart phone has warned me well enough so no need at the time to get a weather radio.” – Male, City

4.2 The public’s reaction to severe weather

This section examines the public’s reaction to severe weather and what they think and how they act if a severe weather warning is issued. This section will also look at how well the public can hear tornado sirens.

Viewers were asked if they could hear tornado sirens at home and at their work/school. Other research (Ebner, 2013) has shown many counties either do not have tornadoes sirens in their county or, if they do, they are in the more populated areas. On the survey, respondents were given three options if they could hear tornado sirens: yes, no or sometimes.

4.2.1 Ability of viewers to hear tornado sirens at work/school

When asked if they could hear tornado sirens at their work/school, 62% said they were able to hear them and 19% reported no or sometimes (Figure 4.7).

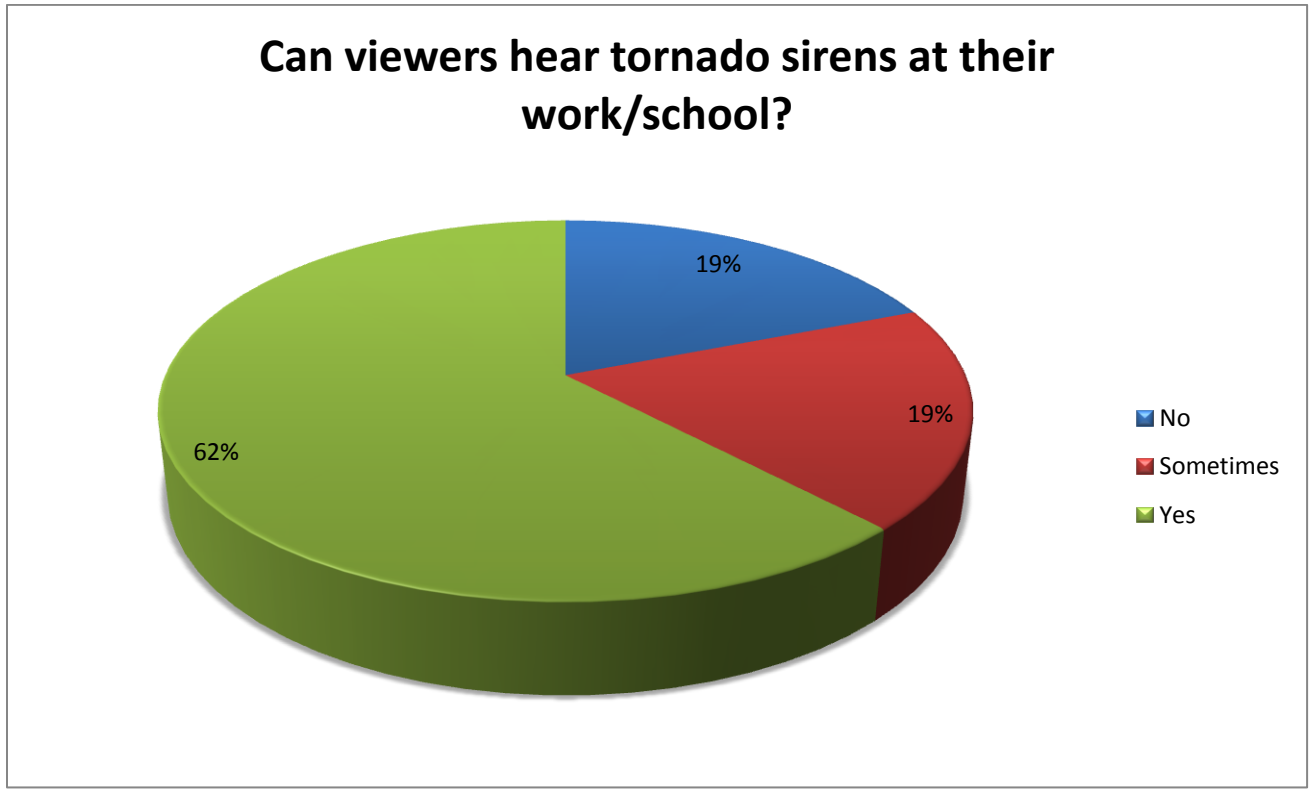


Figure 4.7 Can viewers hear tornado sirens at their work/school?

Demographically, there were a few groups who had some statistical significance. The 56-69 age group was 16% less likely to be able to hear tornado sirens at their work/school than the 25-39 age groups (Figure 4.8).

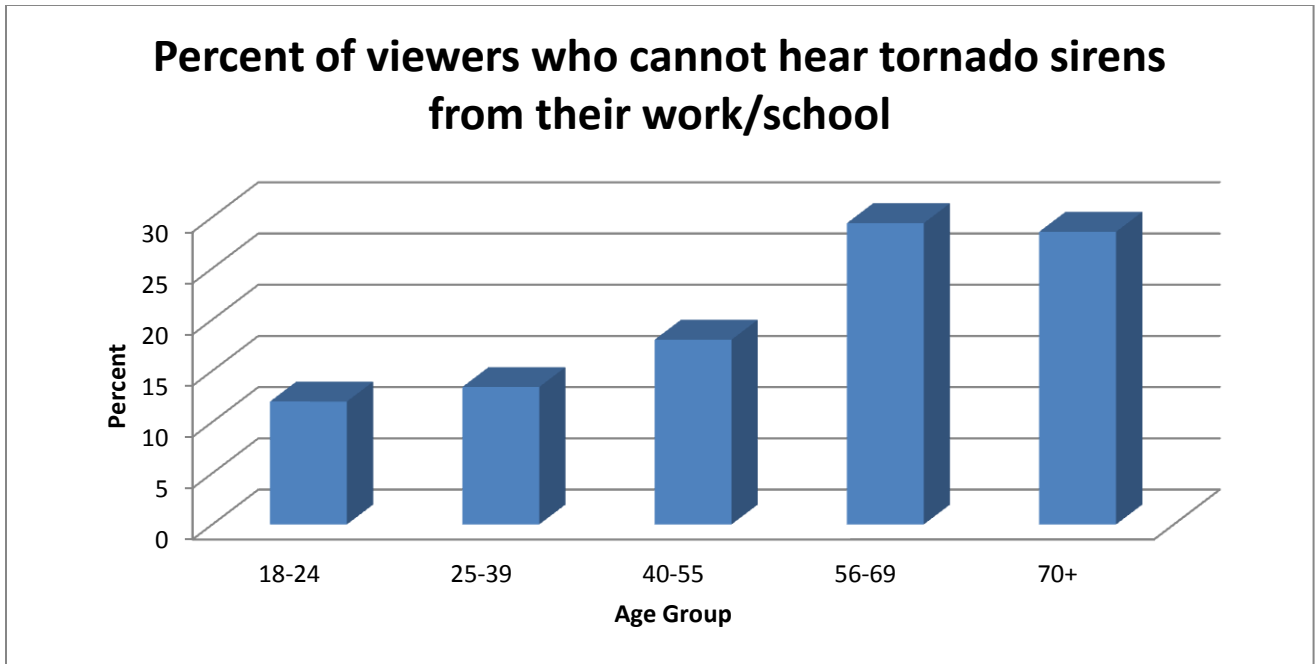


Figure 4.8 Percent of viewers who cannot hear a tornado siren from their work/school based on age.

When comparing rural to city, those working or going to school in a rural area were 12% less likely to hear the tornado sirens seen in Figure 4.09.

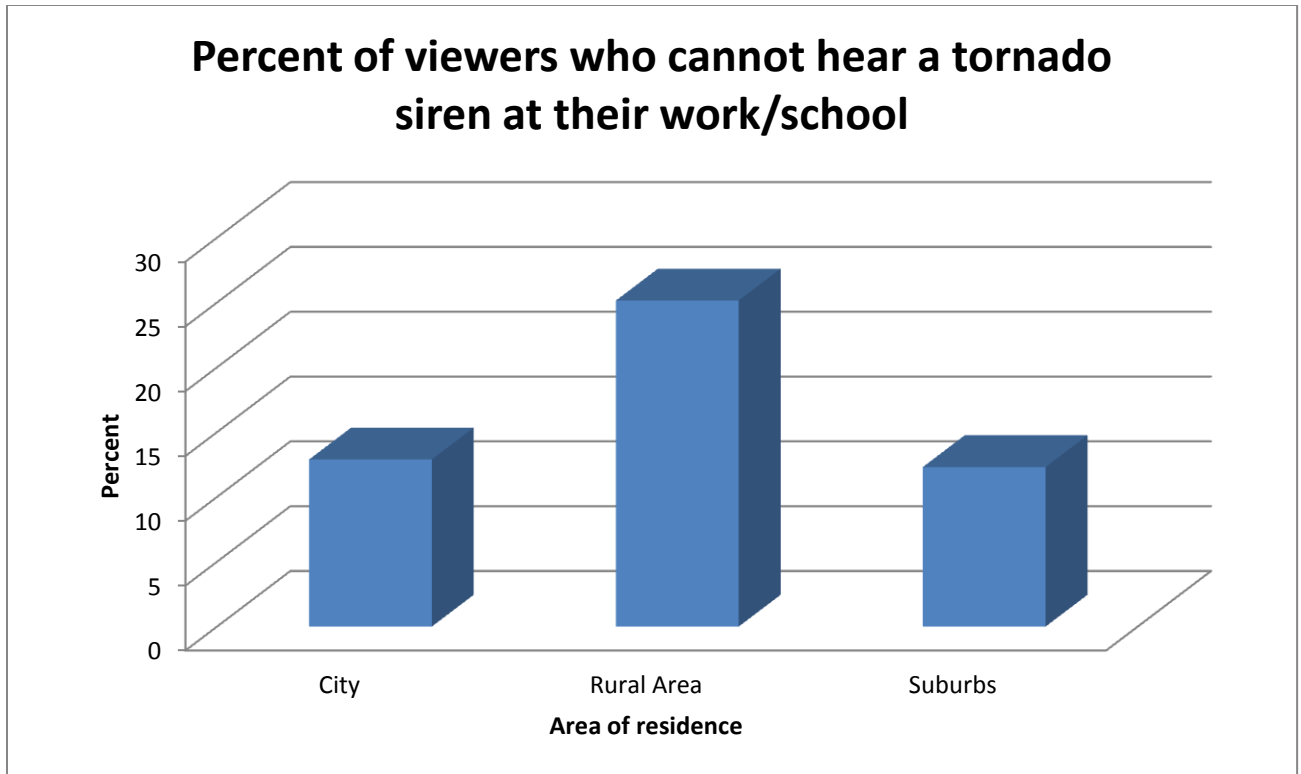


Figure 4.9 Percent of viewers who cannot hear a tornado siren at their work/school based on area of residence.

4.2.2 Ability of viewers to hear tornado sirens at home?

After asking if viewers could hear tornado sirens at home, Figure 4.10 shows 59% said they could and 23% said they could not.

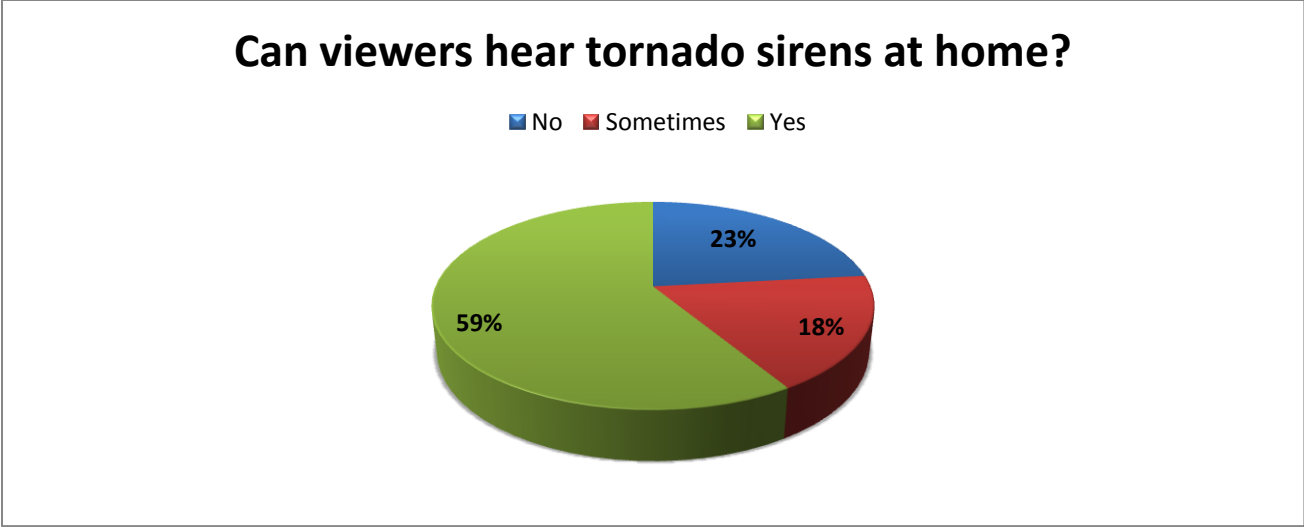


Figure 4.10 Can viewers hear a tornado siren at their homes?

Looking at the demographics, there is still a significant divide between the 25-36 age group and the 56-69 age groups as seen in section 4.2.1. The older age group was 16% less likely to hear the tornado sirens than the younger age group (Figure 4.11).

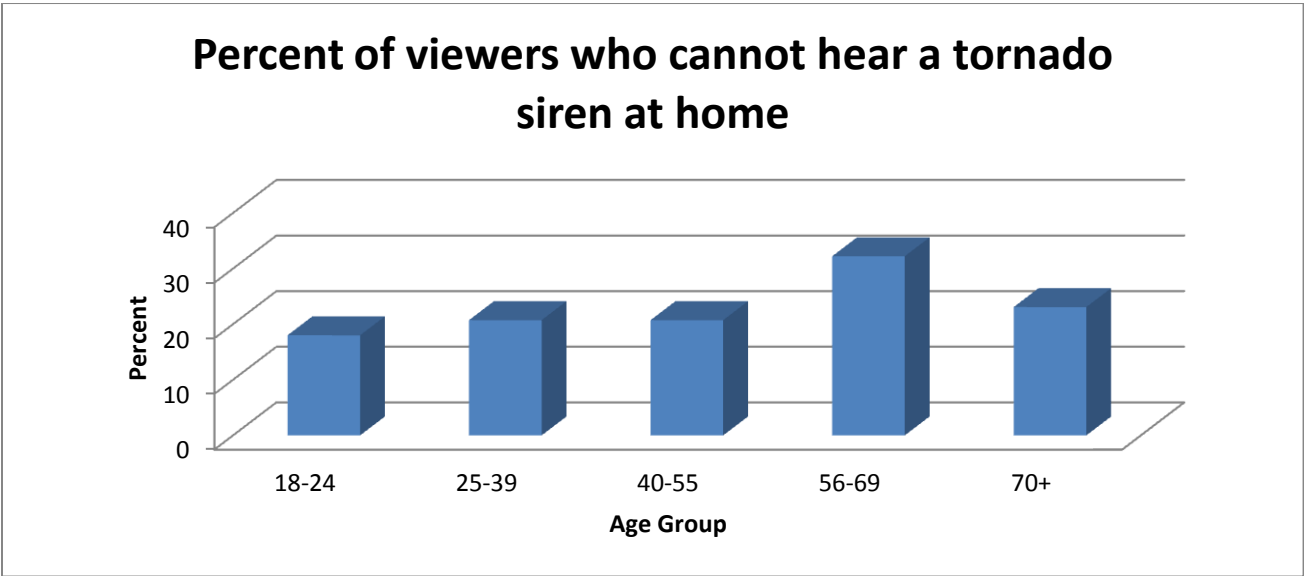


Figure 4.11 Percent of viewers who cannot hear a tornado siren at home based on age group.

The other demographic group that showed some significant difference was in household income. The \$65,000-\$99,999 income bracket was 12% less likely to be able to hear the tornado sirens at their homes. It's hard to speculate why these two demographics had such differences in whether they could hear the sirens or not while at home (Figure 4.12). One reason, however, those in the \$65,000-\$99,999 income bracket were less likely to hear tornado sirens in their homes could be because the homes they live in might be more expensive and use better building materials, which, in turn could make their homes more sound proof from noises on the outside.

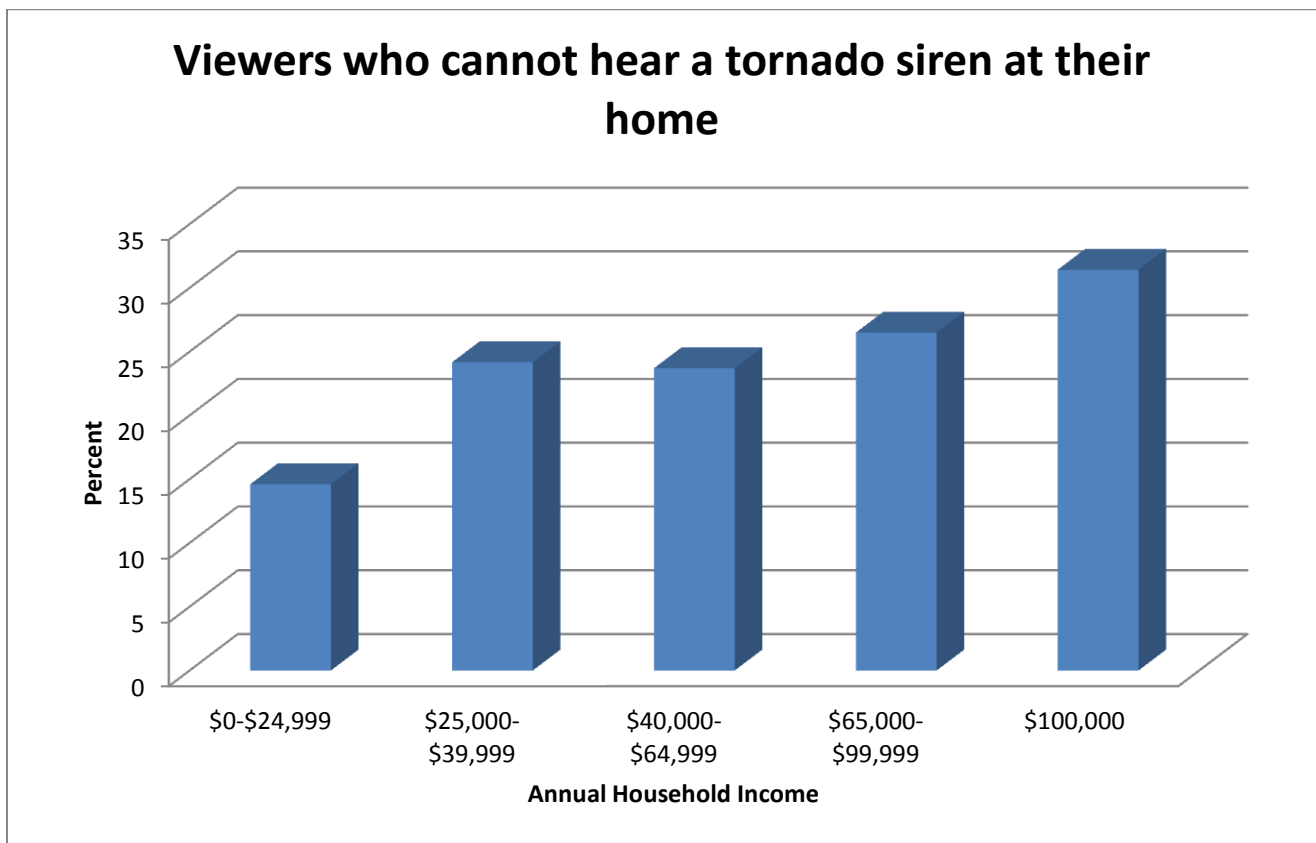


Figure 4.12 Percent of viewers who cannot hear a tornado siren from their home based annual household income.

When comparing rural versus city dwellers, those living in the city were 31% more likely to hear the sirens at home, while those living in rural areas were roughly 33% less likely to hear the sirens at home. When looking at just the rural area, there was a 13% higher chance that the public could not hear sirens at their homes compared to when they were at work seen in Figure 4.13.

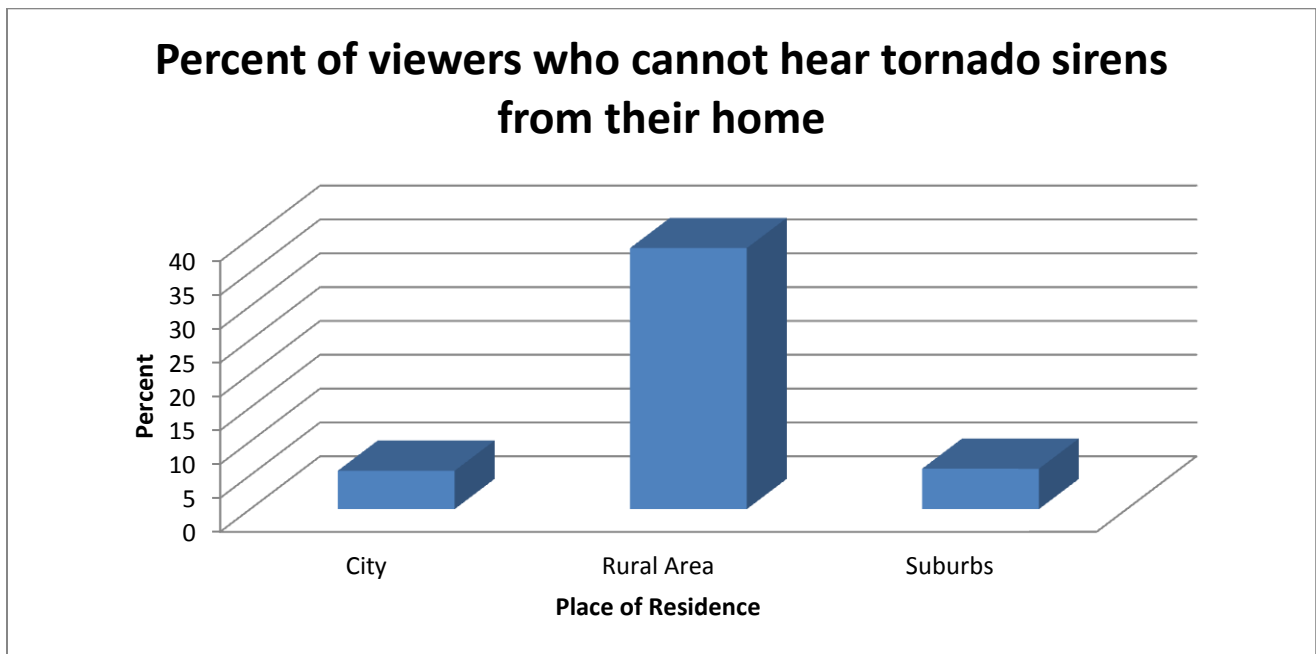


Figure 4.13 Percent of viewers who cannot hear tornado sirens from their home based on place of residence.

The reason a 13% difference is significant here is because many people drive to work or school from their home which is located in a rural area. This means many people might be able to hear the sirens at their work or school, while not being able to hear them when they return home. These results were expected by the researcher. Another reason why viewers may not be able to hear a tornado

siren at their home or work is because tornado sirens are meant to be an outdoor warning system only and are not meant to be heard indoors.

4.2.3 The actions that viewers take when a tornado warning is issued

Viewers were asked what their severe weather plan is if a tornado warning was issued. Their responses were put into categories based on their written answers. Those categories are as follows:

- Seek shelter
- Look for more information
- Do nothing
- Other

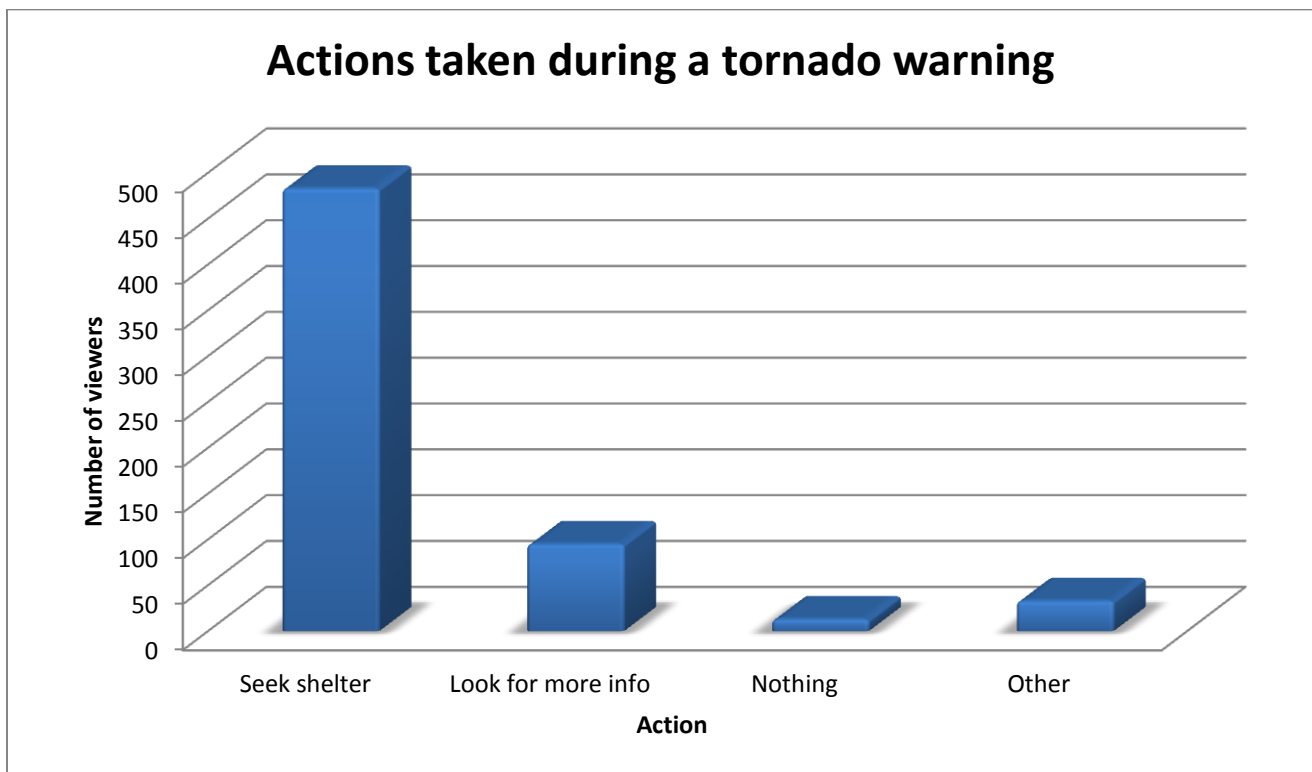


Figure 4.14 Actions taken by viewers during a tornado warning.

As expected by the researcher, most of the respondents seek shelter immediately when there is a tornado warning (Figure 4.14). However, 15% of those surveyed said they would search for more information before they would decide to seek shelter. To find more information, most viewers said they would either turn on their TV and watch local media or check the radar to see if they were in immediate danger; others said they would turn on their NOAA weather radio, a scanner or listen to their ham radio. When looking at the data by each demographic, there was no significance between the different demographics.

As seen in Figure 4.15, the majority of viewers seek shelter when a tornado warning is issued, however, a few viewers stated they do not seek shelter in their homes; they said they have to go to another location that has adequate protection from a tornado.

Though most seek immediate shelter, as seen above, some look for additional information before making a decision to seek shelter. Many quotes from respondents revealed they check radar, smart phones/ weather apps or turn to local weather reports before seeking shelter:

“[I] turn on the tv to see what's going on, if headed my way, then go to basement.” – Male, City

“Make sure to know the general track and then take shelter if it's anywhere near my area of the county.” –Male, City

*“Look at radar on my phone and then decide where/ what to do.”
–Female, Suburbs*

One thing viewers said they do when a tornado warning is issued was grab an “emergency kit” or “go” bag that has everything they would need in case a tornado would hit their location. This is a positive sign that many people have a plan and the appropriate items ready to go in case of severe weather. Quotes from respondents are shown below:

“Grab the kids and the go bag and head for the shelter.” -Female, Rural Area

*“Grab my purse and my emergency kit... and go into the basement.”
- Female, Rural Area*

4.2.4 Actions that would persuade viewers to seek shelter

To gain an understanding as to what would specifically persuade viewers to seek shelter immediately, they were asked ask “What would make you seek shelter immediately during severe weather?” Viewers were given four answers to chose from: A phone call from a friend or family member, seeing the tornado (on TV or in person), tornado siren or other.

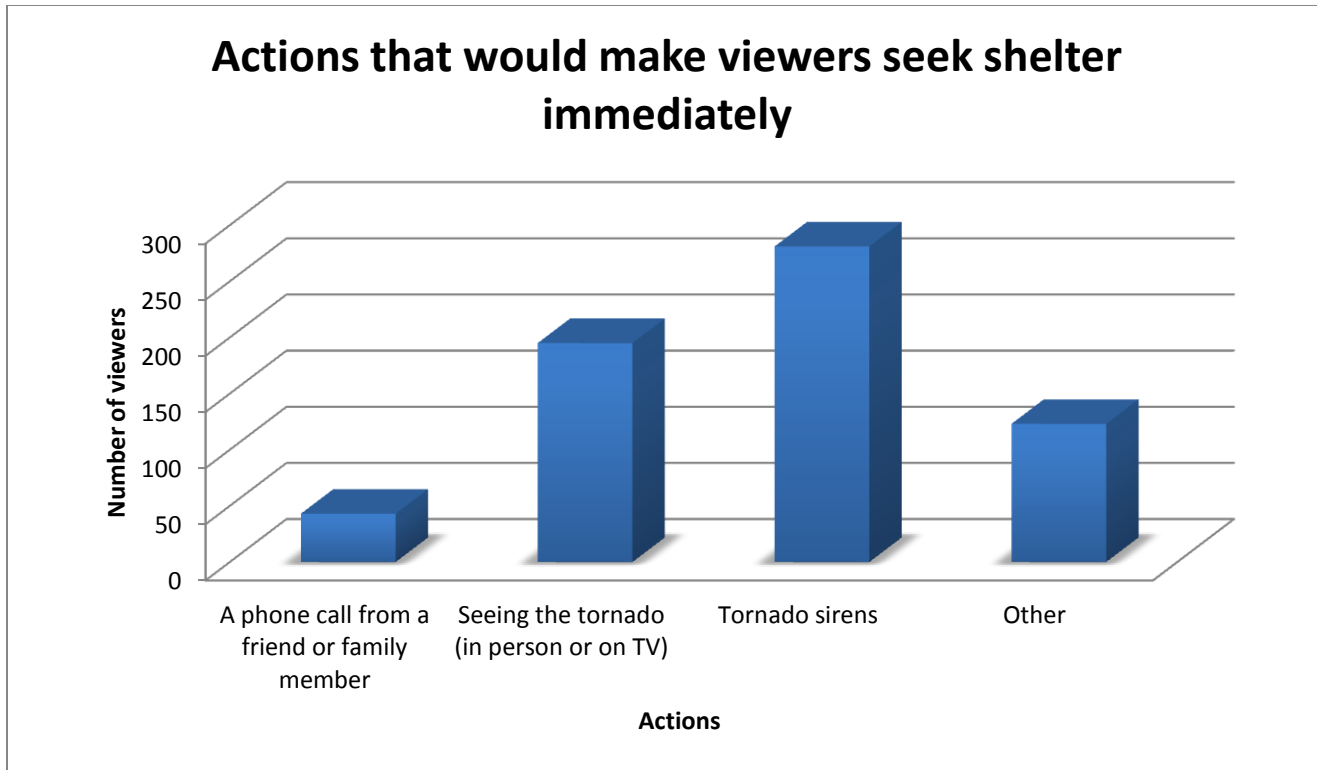


Figure 4.15 Actions that would prompt viewers to seek shelter during a tornado warning.

When looking at the data overall, Figure 4.15 shows 281 (44%) of the respondents felt that tornado sirens would be enough to persuade them to seek shelter. One hundred and ninety five viewers (30%) said seeing the tornado on TV or in person. Statistically speaking, there was some significance in the different demographic categories .

There was a significant divide between men and women. Men were 18% more likely to seek shelter if they see a tornado, whether was in person or on TV. However, women were 14% more likely to seek shelter just based on hearing the tornado sirens compared to men (Figure 4.16).

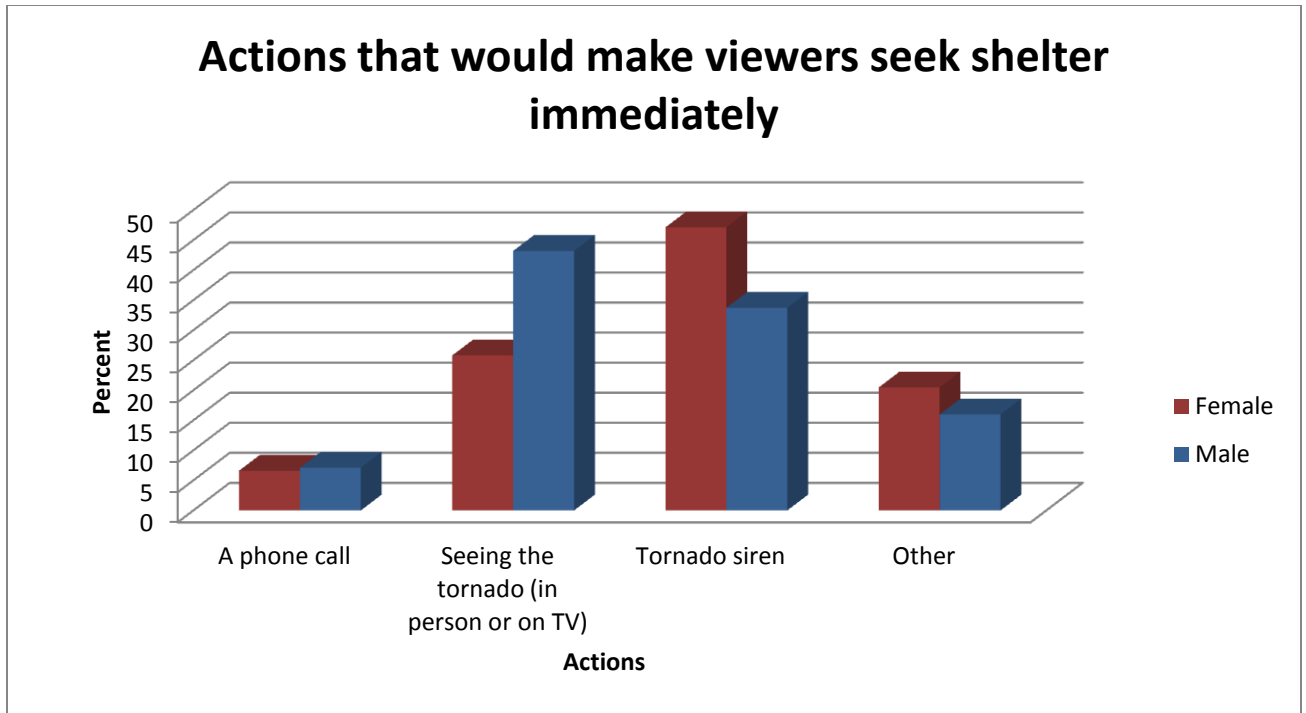


Figure 4.16 Action that would make viewers seek shelter immediately based on gender.

Based on educational level, viewers that only had a high school diploma were 10% more likely to seek shelter after receiving a phone call from a friend or family member and 5% more likely to seek shelter after hearing just the tornado sirens compared to those with a college degree. Those with a college degree were 15% more likely to seek shelter after finding out about a tornado from “other” sources compared to those with only a high school diploma. It is difficult to know what those other methods are because they were not asked to state what those alternate ways would be.

When analyzing rural versus city, there was a significant difference in what would persuade viewers to take shelter. In the city the public was 12% more likely to seek shelter by just hearing a tornado siren when compared to those in

rural areas. As seen in sections 4.2.1 and 4.2.2, those in rural areas are less likely to hear tornado sirens at their homes and work/school. This would lead to a conclusion that viewers in rural areas would rely less on tornado sirens as a way to warn them about severe weather, meaning that they would likely rely on one of the other actions (i.e. phone call, seeing the tornado on TV or in person, etc.) before taking shelter.

4.2.5 Does the public feel tornado sirens are an adequate way of being warned about severe weather?

Many people rely on tornado sirens, but do they feel the sirens do an adequate job? Viewers were asked this and given three possible answers to express their feeling about the siren system: yes, no and sometimes. Thirty seven percent of responded tornado sirens do a good job of warning about severe weather and 16% said the sirens are not an adequate way of being warned about severe weather. The majority, 47%, responded tornado sirens sometimes do an adequate job of warning about severe weather (Figure 4.17).

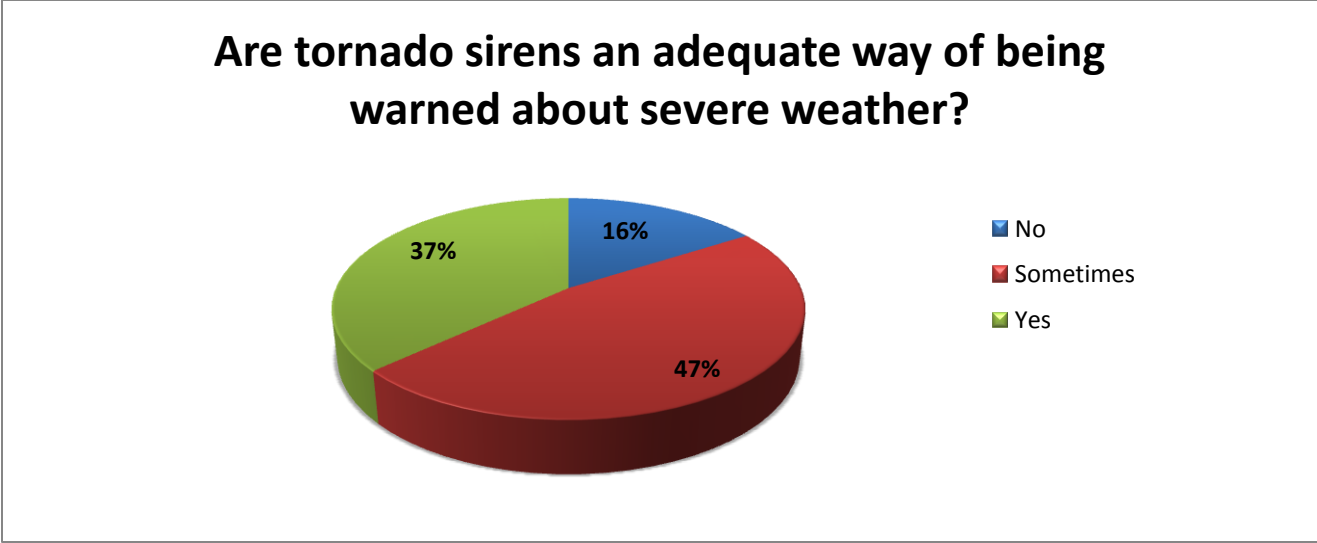


Figure 4.17 Viewers' feeling about whether or not tornado sirens are an adequate way of being warned about severe weather.

When comparing the educational demographic, those with a high school diploma were 19% more likely to think tornado sirens do an adequate job of warning them about severe weather compared to those respondents who have a college degree (Figure 4.18). Another small, but significant difference, was in the income brackets. Those making less than \$25,000 were 10% more likely to feel sirens do an adequate job alerting to severe weather compared, to those making between \$65,000 and \$100,000 (Figure 4.19). There was no statistically significant when comparing those rural areas to urban locations.

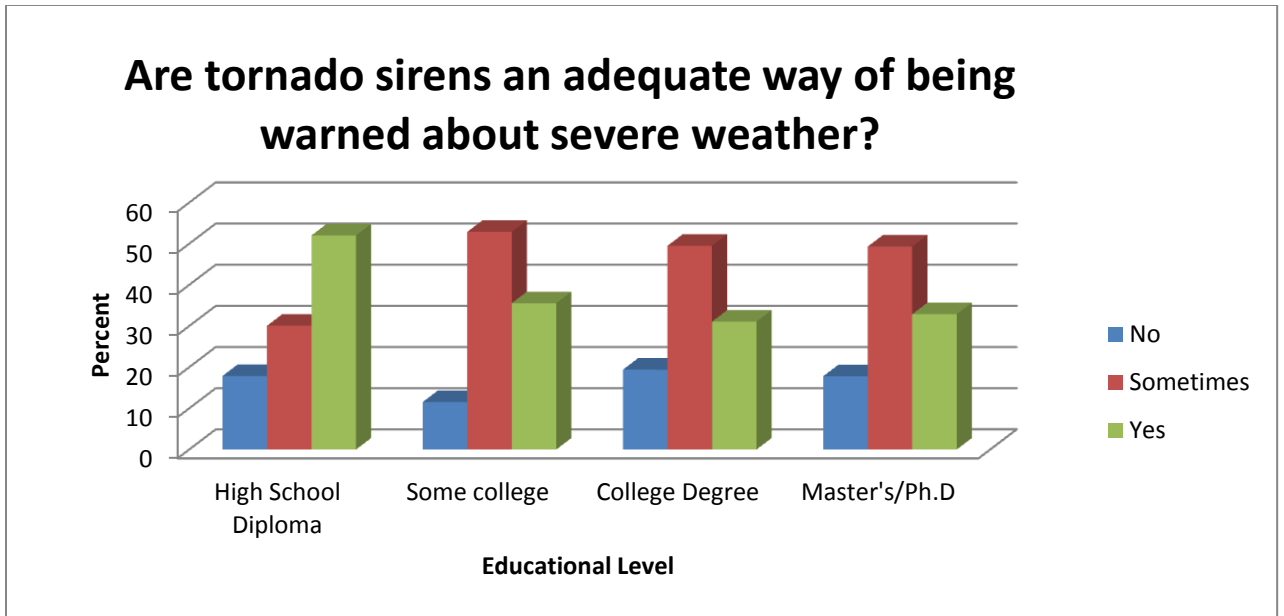


Figure 4.18 Viewers' feelings about whether or not tornado sirens are an adequate way of being warned about severe weather based on educational level.

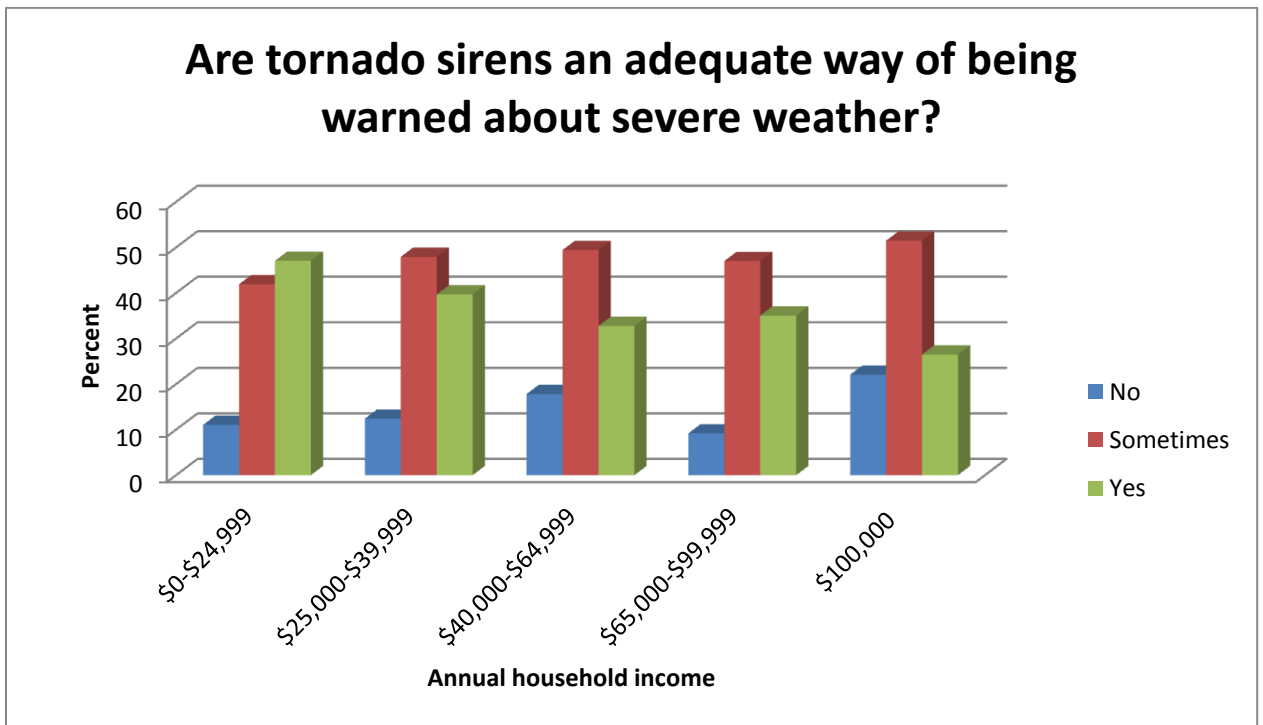


Figure 4.19 Viewers' feelings about whether or not tornado sirens are an adequate way of being warned about severe weather based on annual household income.

4.2.6 Viewers' thoughts when a tornado warning is issued

In order to understand what the public thinks during threatening weather, they were asked what they think when a tornado warning is issued. They were given four answers to choose from: Tornadoes never hit my house or happen here, I do not need to do anything different, I must seek shelter or I should look outside and see what is going on. These four answers were choices in the survey because these are the four most common responses when severe weather approaches. Overwhelmingly, Figure 4.20 shows that 461 (72%) viewers said that they need to seek shelter when a tornado warning is issued and 165 (26%) of viewers said that they would look outside and see what is going on.

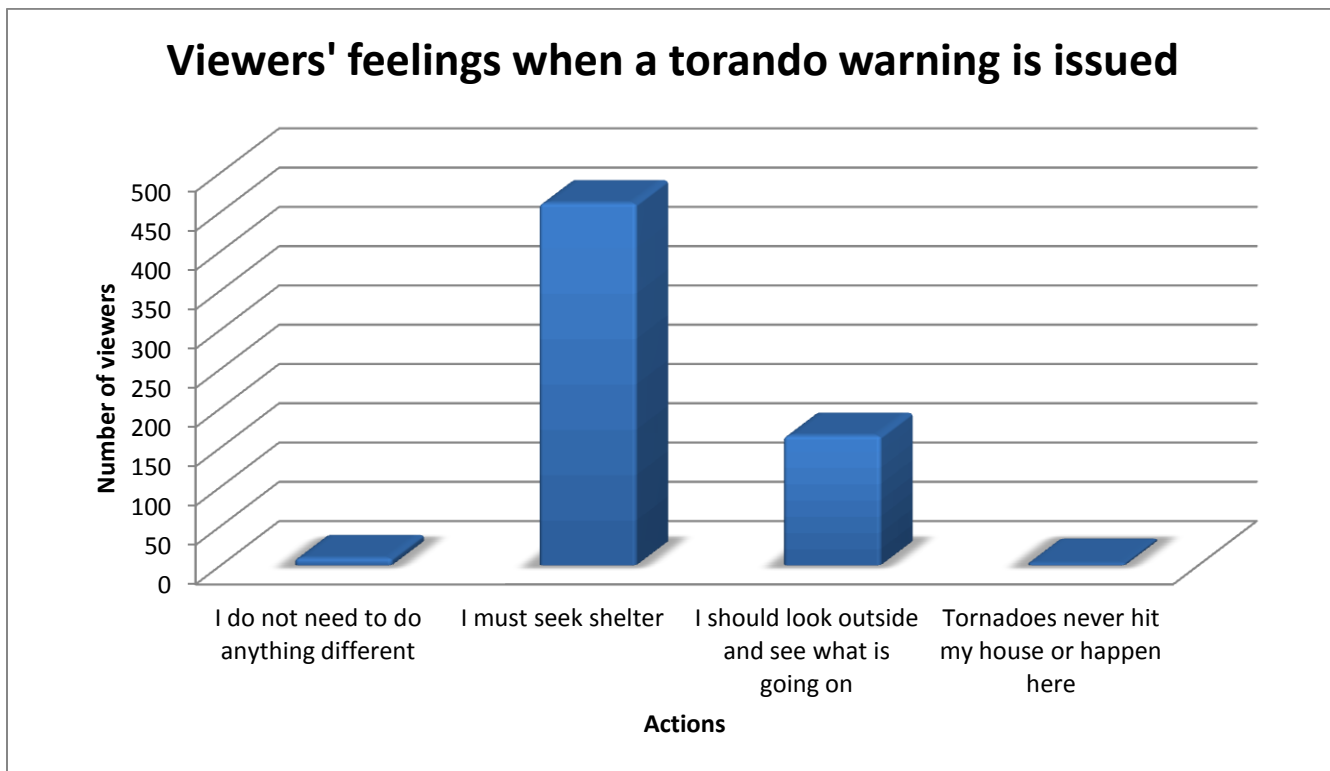


Figure 4.20 What viewers are thinking when a tornado warning is issued.

Breaking the data down by the different demographics, there were some significant differences between men's and women's responses. Women were 22% more likely to seek shelter immediately, while men were 19% more likely to decide to look outside and see what was going on.

Comparing rural areas to city areas, there was nothing significant statistically in the data. Again, overwhelmingly, 73% in both areas said they need to seek shelter, and 26% of both groups said they would look outside to see what is going on.

One positive point to mention is that the number of people that said tornadoes "never hit their house" was extremely low. Only three of those surveyed responded with that tornadoes "never hit their house".

4.3 The public's perception of the media and TV meteorologists

This section examines the viewer's perception and feelings toward the media and the TV meteorologist that they watch. Many of these questions were ones that required written feedback from viewers.

4.3.1 Why viewers trust the meteorologist that they watch

From previous research, it is known that viewers form a strong bond with the meteorologist that they watch on TV. For this question, viewers were asked to provide their own responses. Their written comments were taken and put into seven categories based off their written responses:

- Accurate
- Always watched them
- Don't trust the meteorologist

- They have experience/are knowledgeable about severe weather
- Always keep them updated on the weather
- Personable
- Other

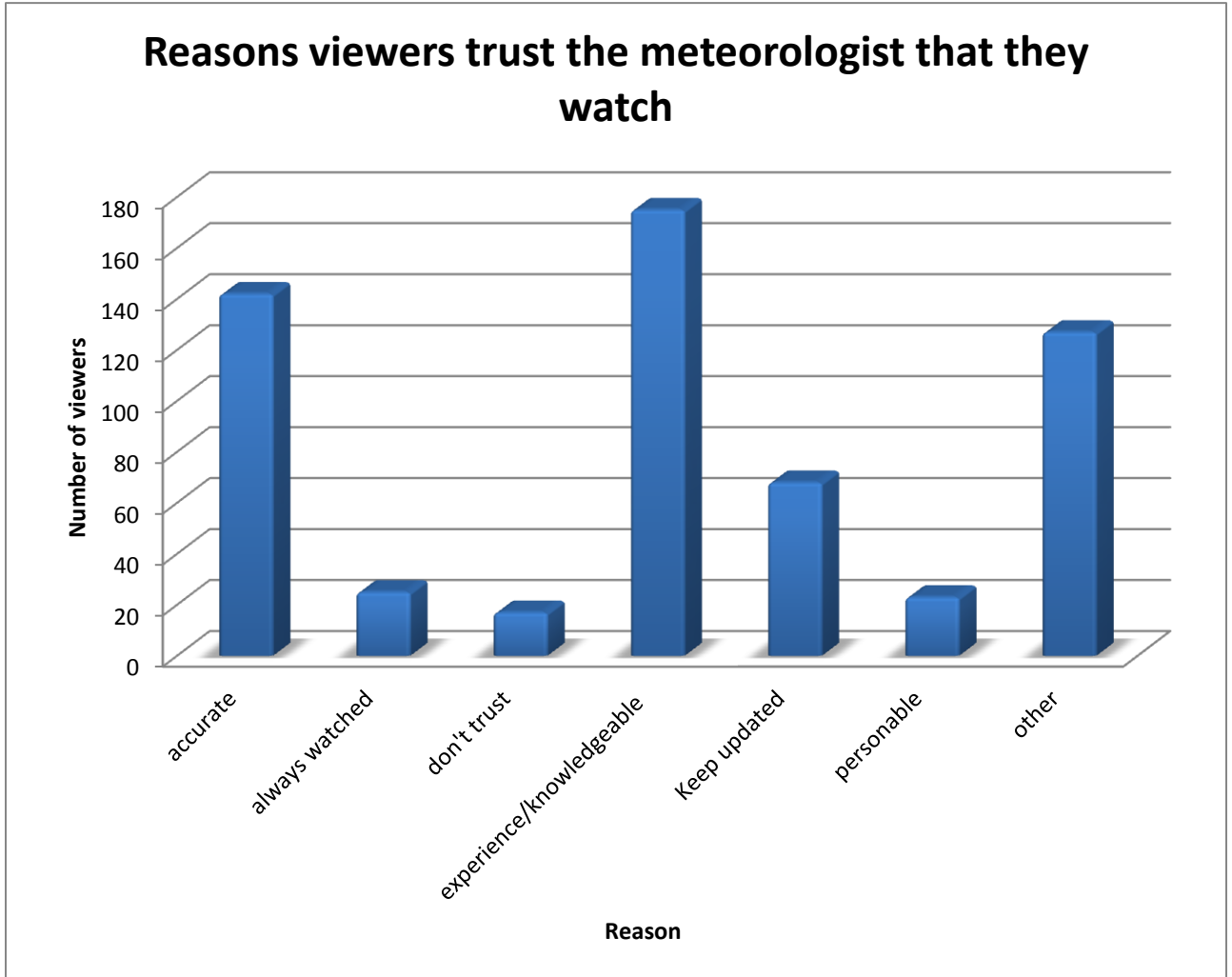


Figure 4.21 The reasons that viewers trust the meteorologist that they watch.

A meteorologist’s experience and perceived knowledge were the top reasons why viewers trusted the meteorologist that they watch, as seen in Figure 4.21. The second most popular response was that the meteorologist they watch was

accurate. Quotes from viewers on why they trust the meteorologist they watch are shown below:

*“Knowledge of weather, caring demeanor, past experience”
–Female, Rural Area*

“Accuracy, honesty, knowledge, experience” –Female, City

The next highest response from viewers as to why they trust the meteorologist they watch was the viewers felt that they were always kept up to date on severe weather. Whether that was on air or by social media this was important to many viewers. Quotes from respondents are listed below:

“They are very accurate and keep us updated minute by minute during bad weather” –Female, Rural Area

*“He keeps people updated with information and current radar via TV, as well as posting information on the internet and through social media”
–Female, Rural Area*

4.3.2 Does the media do an adequate job of informing viewers of severe weather?

Viewers were asked if they thought the media does an adequate job informing them about severe weather. Figure 4.22 shows overwhelmingly that 95% the media does an adequate job. There was nothing statistically significant when the data was broken down and analyzed by each demographic.

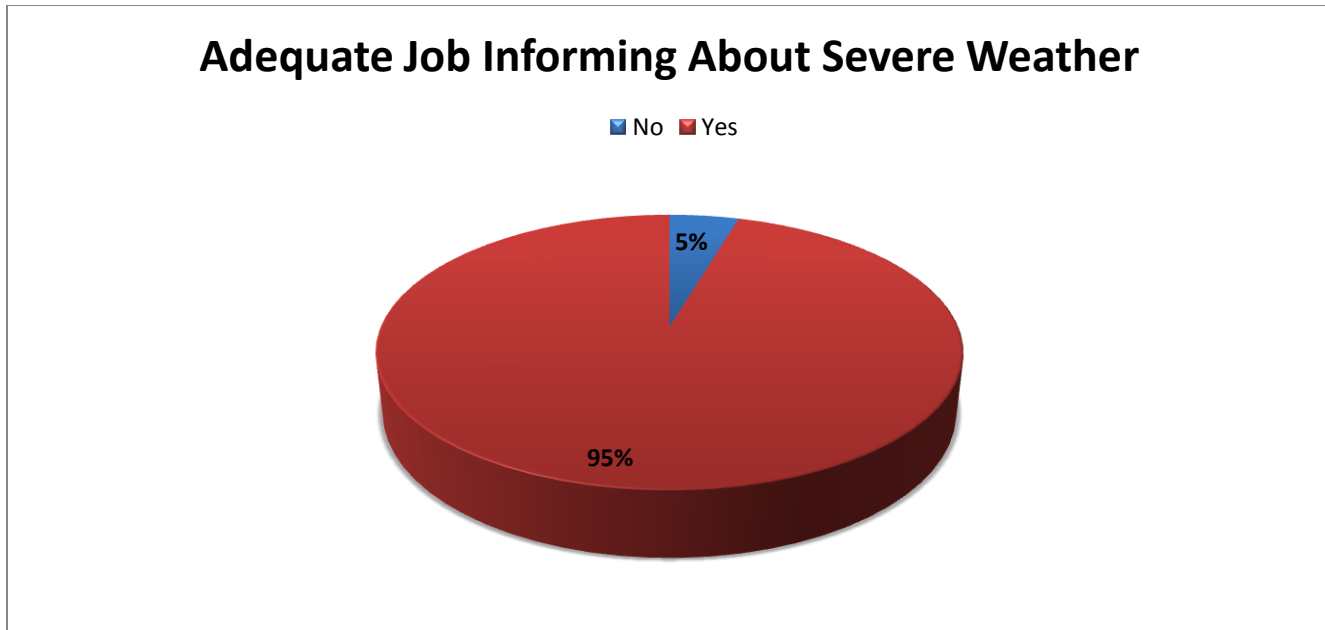


Figure 4.22 How viewers feel when asked if the media do an adequate job information them about severe weather.

4.3.2.1 Why viewers think meteorologists do not do an adequate job.

A secondary question was asked which prompted respondents to explain why they felt meteorologists do not do an adequate job informing them about severe weather. There were roughly 40 comments by viewers who said they did not feel meteorologists do an adequate job. A few comments from respondents showed that they did think meteorologists do an adequate job because they sensationalize severe weather for the purpose of ratings and viewership while others said the meteorologist(s) they watch were inaccurate when providing weather information. Quotes from respondents are listed below:

“With a few notable exceptions, it becomes just a job and a show/competition for ratings.” –Female, City

*“They are often wrong when predicting storms and severe winter weather”
–Female, Rural Area*

A few of the other reasons respondents were not as satisfied with coverage was because they said the TV station they watch ended TV coverage before severe weather got to their location or the TV station they watch was never on air when there was severe weather in their area. Quotes from those surveyed as seen below:

“Sometimes they end coverage about the time it gets to our area, but at least we know what's coming.” –Female, Rural Area

“I know i trust WPSD for alot of my weather, but alot of instances i am searching for tornado warning updates, they are the only ones 'NOT' airing breaking news, for some reason.” –Male, City

4.3.3 Viewers and their trust of the meteorologists

Because there is such a strong relationship between the viewers and the meteorologist they watch on TV, viewers were asked if they trusted the meteorologist when they provide the viewers with severe weather information. Overwhelming, they responded that yes they do trust the media at 97% which is seen in Figure 4.23.

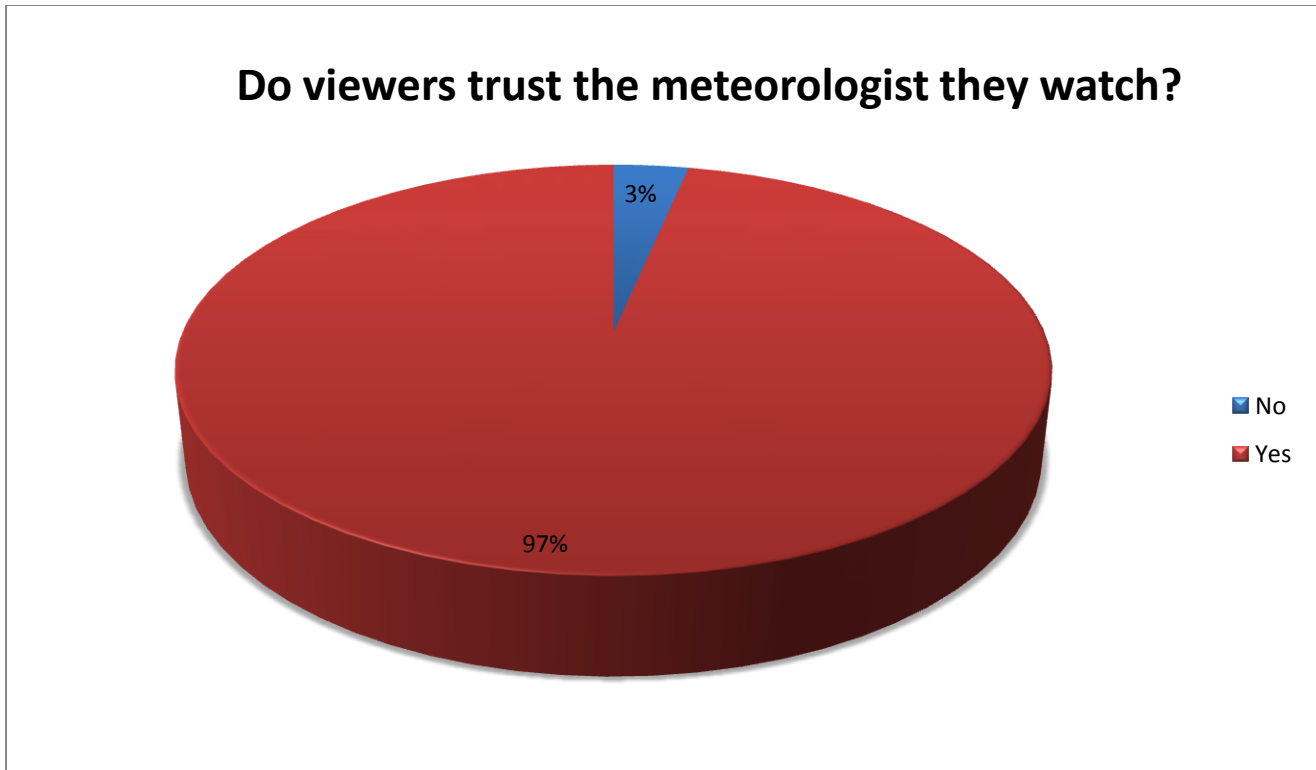


Figure 4.23 Viewers who responded that they trust the meteorologist they watch expressed in percent.

Statistically, looking at the age brackets, there is a difference in those who don't trust the media. As age increases viewers are less likely to trust the media when they provide severe weather coverage.

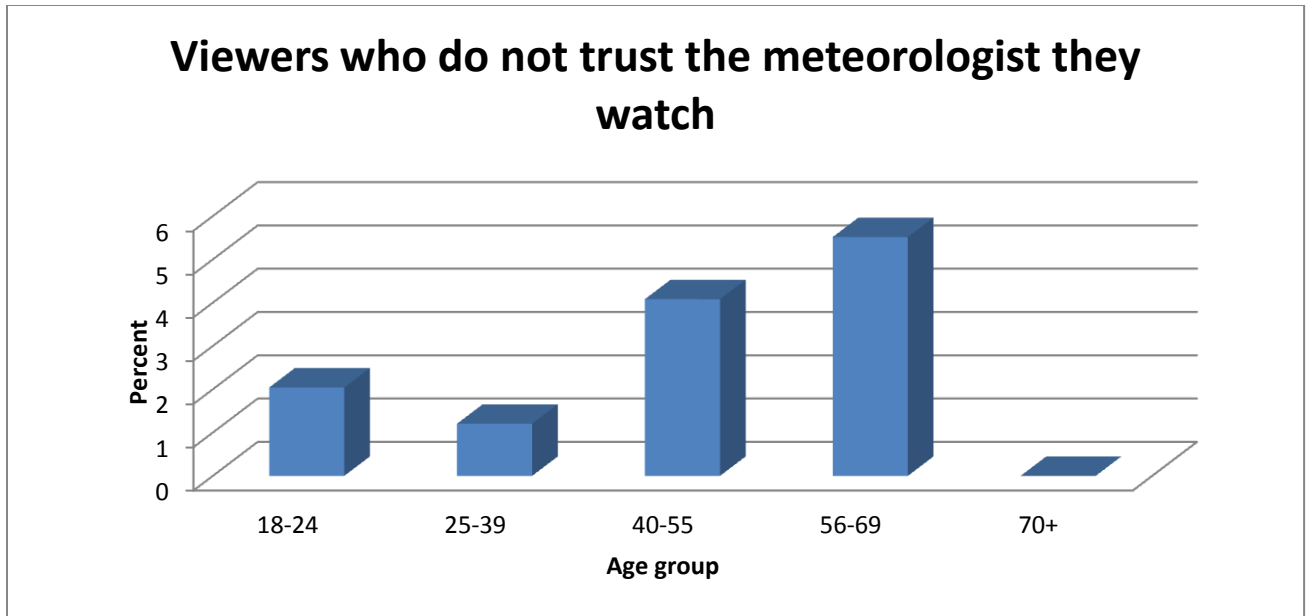


Figure 4.24 Percentage of viewers would responded that they do not trust the meteorologist the meteorologist they watch based on age group.

The 25-39 age group responded no 1% of the time, while the 56-69 age group responded no 5.5% of the time (Figure 4.24). While this seems like a small difference in percentage, when performing the chi squared test, it was proved that this was statistically significant. When looking at rural verse the city, the data falls in line with the overall data.

4.3.3.1 Why viewers do not trust the meteorologist they watch

Again, a secondary question was asked that prompted respondents to explain why they do not trust the meteorologist they watch when that meteorologist was providing viewers with severe weather information. There were 11 comments total. The only common response from this question as to why viewers did not trust a meteorologist was because they over-exaggerate severe weather information as seen by their quotes below:

“Too often over hyped, dilutes message” –Female, Suburbs

“They too often exaggerate.” – Female, Rural Area

4.3.4 Viewers thoughts on if the media over-dramatizes severe weather

Viewers were asked if they feel that the media over-dramatizes severe weather. The results were not conclusive. Figure 4.25 shows that 76% of the respondents responded by saying they did not think the media over dramatizes severe weather while 24% said that the media does.

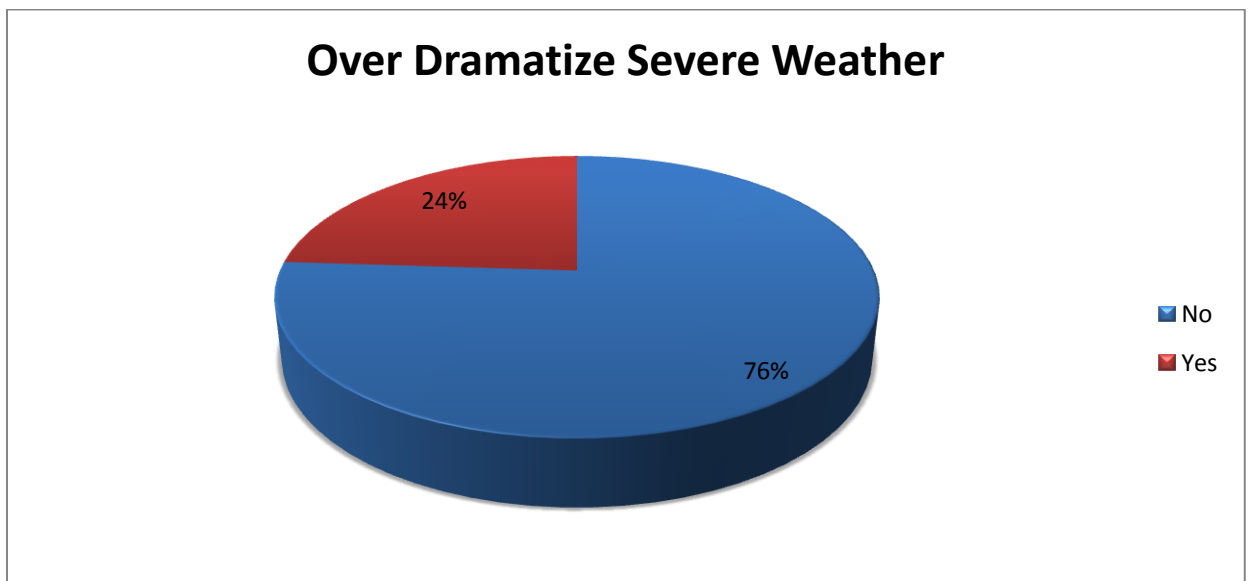


Figure 4.25 Do viewers feel that the media over-dramatizes severe weather?

Demographically, there were some significant divides in the data. When analyzing the gender group, men were 13% more likely to think that severe weather coverage was over dramatized (Figure 4.26).

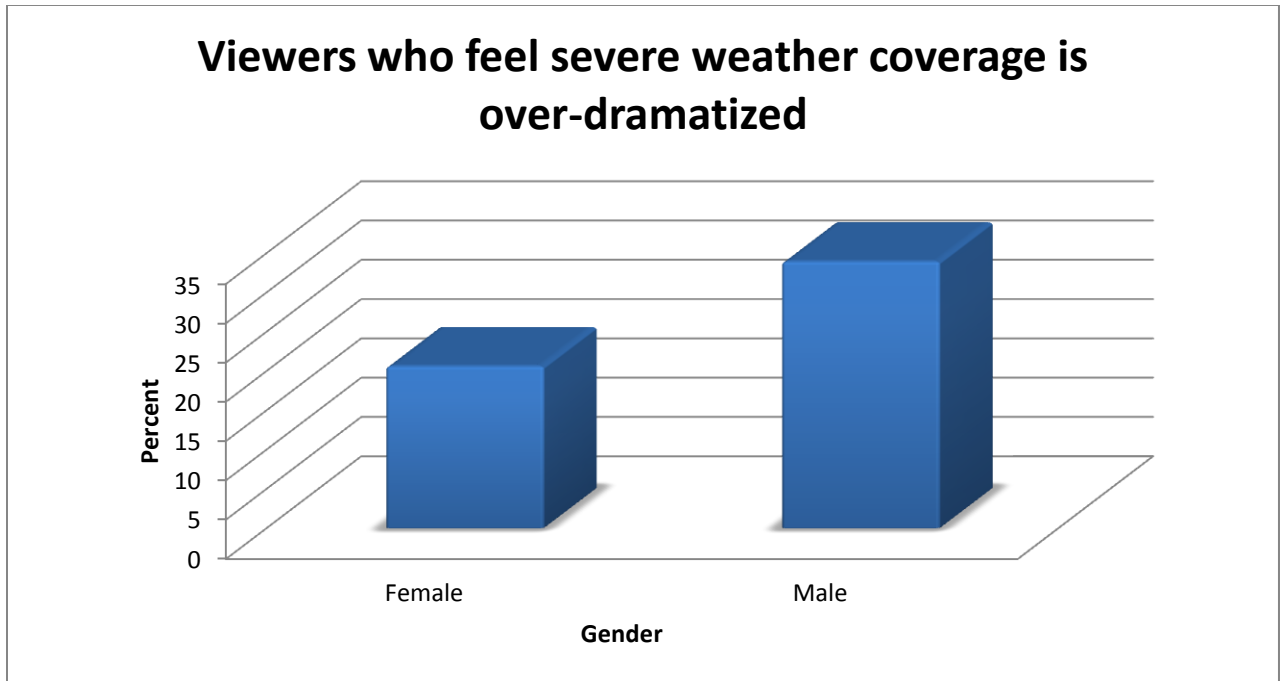


Figure 4.26 Percent of viewers who feel severe weather coverage is over-dramatized based on gender.

Looking at educational level, the higher the education level, the more likely they think that the media over dramatizes severe weather coverage. Viewers with only a high school diploma responded that yes, 15% of the time, the media over-dramatizes severe weather coverage while 29% of those with a college degree or higher, said the media over dramatizes coverage; this was a significant finding statistically. Rural versus city dwellers had a small difference, which was not significant.

4.3.4.1 Why viewers felt meteorologists over-dramatized severe weather

A secondary question was asked, which prompted respondents to explain why they felt coverage was over dramatized. There were many more comments on this question than the previous two. Again, many said they feel TV stations

sensationalize severe weather in order to gain ratings and viewers for their station however, others said that it depends on the station and the meteorologist. Many viewers stated that it was different from meteorologist to meteorologist. Quotes from respondents are seen below:

“one word ratings” –Male, Rural Area

*“This is also on a meteorologist by meteorologist basis. I know some do make things more dramatic then they need to be. Others just stick to the facts.”
–Male, Rural Area*

One set of comments that kept coming up was that sometimes it is alright to “over-dramatize” severe weather because that is the only way people will listen and take severe weather seriously. Some feel it is better to be a bit more dramatic than under dramatic. Comments from the viewers are seen in the quotes below:

“Sometimes it is way over dramatized but then again that is how the message gets across” –Female, Rural Area

*“If they do [over exaggerate], it's ok...better safe than sorry!”
–Female, Rural Area*

4.4 Knowledge of severe weather alerts

Part of being a TV meteorologist is making sure that viewers understand the different severe weather alerts. In this section, the knowledge of viewers’ understanding of severe weather alerts is examined. Viewers were asked if they knew the definitions of a tornado watch and a tornado warning. Viewers were

given the same choices to select from for each question. The answers they could select from are as follows:

- Conditions are favorable for tornadoes to develop
- A tornado has been spotted by a person or radar
- There will definitely be a tornado today

4.4.1 What is a tornado watch?

First, viewers were asked what constitutes a tornado watch. Ninety eight percent of respondents knew that a tornado watch meant conditions were favorable for tornadoes to develop (Figure 4.27). The only statistically significant variable was in the educational level. Viewers with a only a high school diploma were 4% more likely to think that a tornado watch meant there was an actual tornado compared to those with a college degree. There was no difference rural and city dwellers; however, those who lived in rural areas were 2% more likely to think a tornado watch meant a tornado had been spotted.

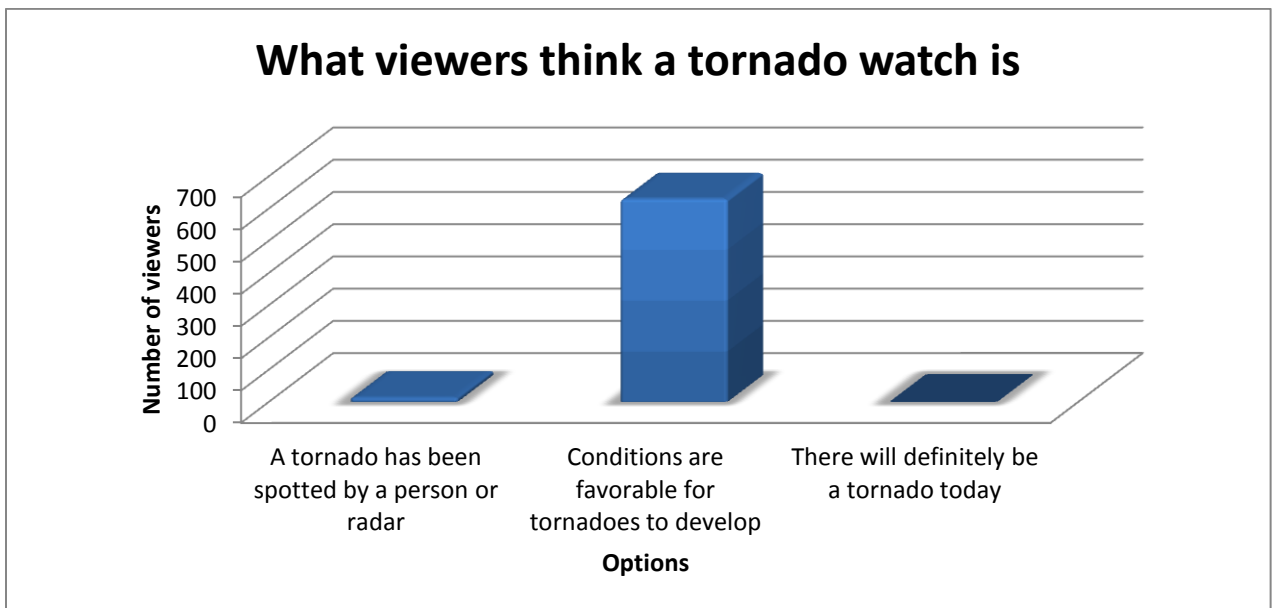


Figure 4.27 What viewers think a tornado watch is.

4.4.2 What is a tornado warning?

On the next question, viewers were asked “what is a tornado warning”. Figure 4.28 shows that the majority, 96%, knew that a tornado warning meant a tornado has been spotted in person or by weather radar (Figure 4.28). As in the previous question, the only demographic where there was a significant difference in the data was in educational level. The percentage of those with only a high school diploma who knew what a tornado warning was only 90% compared to those with a college degree at 97.5%. When looking at rural area verses city dwellers, there was nothing significant in the data.

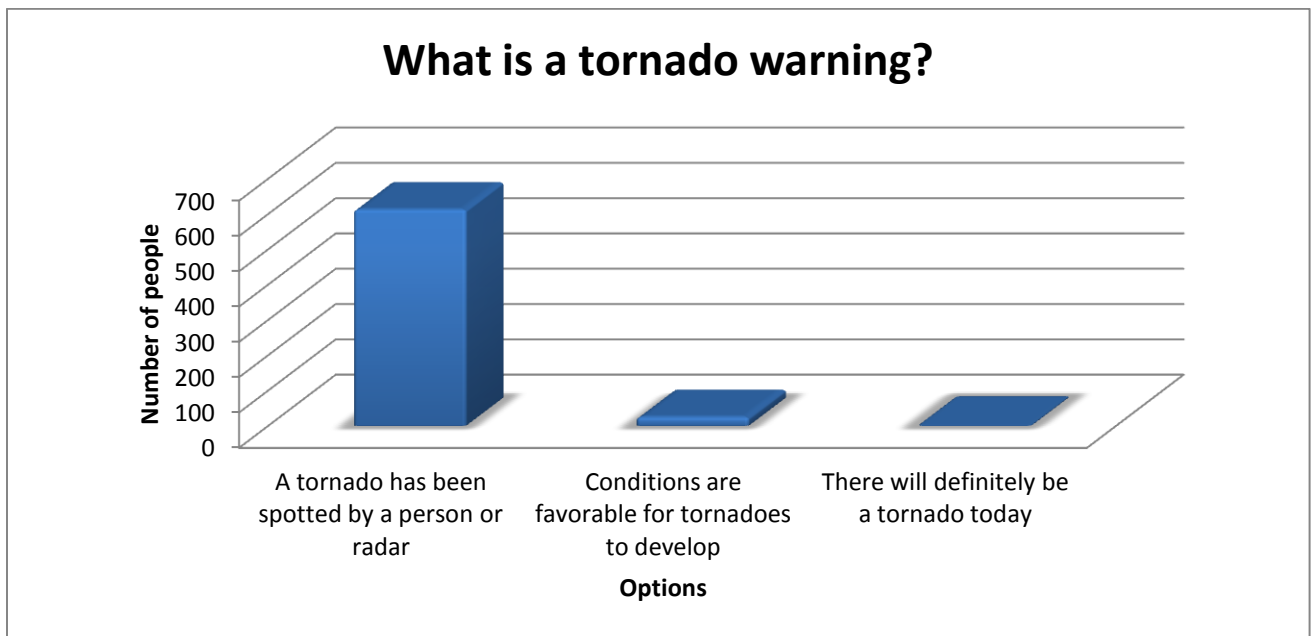


Figure 4.28 What viewers think a tornado warning is.

When comparing the two questions, the percentage of people who did not know what a tornado warning was compared to those who did not know what a tornado watch was showed had increase of two percent from two to four. Overall,

the higher an educational level achieved by a viewer, the higher the chance of knowing the difference between a tornado watch and a tornado warning. Those with only a high school diploma were 9% more likely to think that a tornado warning meant conditions are favorable for a tornado to develop while those that had a college degree responded with the same answer only 2% of the time (Figure 4.29); this difference was significant.

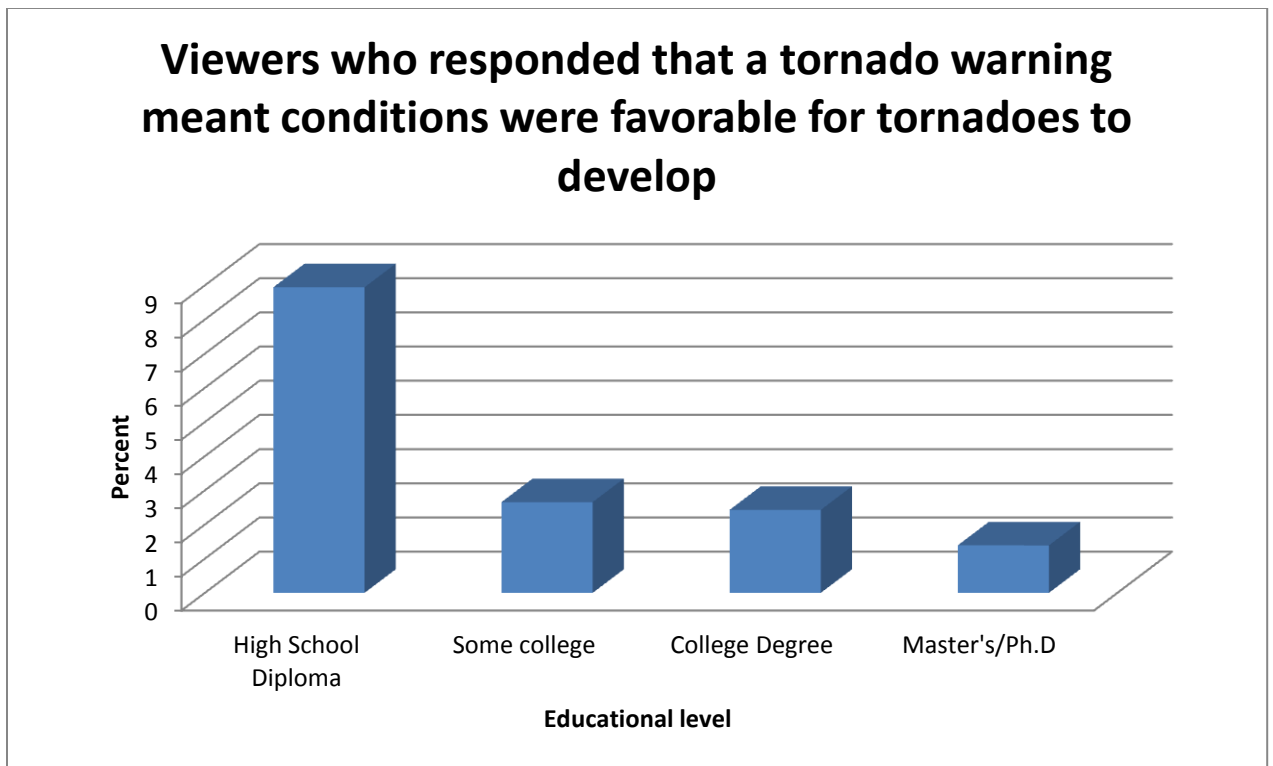


Figure 4.29 Percent of viewers who thought a tornado warning meant conditions were favorable for tornadoes to develop based on education level.

4.5 Information in severe weather broadcasts

The next two questions the viewers were asked were what type of severe weather information do they want to see and/or hear during severe weather broadcasts and were given two different sets of choices to select from. The

objectives for these two questions were to find out what were the most effective words or visual cues TV meteorologists can say or do on-air that would strengthen their connection with their viewers. For the first question, viewers were asked to rank a set of choices one through five and for the second question one through six based on which item was most important to them when watching a severe weather broadcast. Selecting one was the least important to them and selecting five (or six, depending on which question) was the most important to them.

After analyzing these two questions a problem arose. Viewers did not follow the instructions exactly. What was wanted from the viewers was to have them rank the answers one through five or six, with each numerical value only being chosen once. For example, as seen in Figure 4.30: County Name = 6, Local Landmark = 5, School Name = 4, Road/Bridges = 3, Shopping Centers = 2 and Places of Worship = 1

What would you like to hear during severe weather TV broadcasts?
 Rank them "1" being the least important - "6" being the most important to you

	1	2	3	4	5	6
County Name	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Local Landmarks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
School Names	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Roads/Bridges	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shopping Centers	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Places of Worship	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 4.30 An example of how viewers were intended to answer this question.

What most viewers actually did was rank them individually instead of as a group, as seen in Figure 4.31, giving some answers the same numerical values as others. For example: ETA = 5, exact time = 5, severe weather threats = 5, radar/maps = 5, visuals = 5.

What type of information do you want to hear/see when a storm is approaching you?
 Rank them "1" being the least important - "5" being the most important to you

	1	2	3	4	5
How long until it reaches your area (example: ETA 45 minutes)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Exact time it will reach your area (example: 5:15 pm)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
What severe weather threats to expect	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Radars/maps	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Visuals (pictures, sky cams, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Figure 4.31 An example of how most viewers answered the question.

This made the data too complicated to analyze because viewers did not follow the directions. Perhaps, the directions for these two questions were unclear to the viewers. We expected a ranking response which would have told us which choices from the list were selected by the majority of the viewers. The data was weighted and then averaged. For example, ETA was had been given a rank of a five (on a scale of five) 410 times; 410 was then multiplied by five (as its weight) to give us a

numerical value of 2050. ETA was given a rank of a four, on a scale of five, 109 times. 109 was then multiplied by four (as its weight) to give us a numeral value of 435. This same method was done for the ranks of three ,two and one. These five numbers were added up giving us 2751 as a total weighted number for each ranking (one through five). The total of 635 was multiplied by five (as its weight) and it gives us a numeral value of 3175. 2751 was divided by 3175 to give us 85.51%. This same method was done for exact time, severe weather threats, radar/maps and pictures/sky cams. Once a percentage was found, five was multiplied by that percentage to find an average out of five. In this case,85.51% was multiplied by five to give us a numerical value of 4.28. This average out of five was used to find which item viewers wanted to hear/see the most during severe weather broadcasts.

4.5.1 The type of information that viewers want to hear/see when severe weather is approaching?

This question was asked to find out what type of information is most important to viewers to help them make an informed decision to seek shelter during severe weather. The answers that viewers were asked to rank 1 through 5 were:

- How long until it reaches your area (example: ETA 45 minutes)
- Exact time until it will reach you area (example: 5:15 pm)
- What severe weather threats to expect
- Radars/maps
- Visuals (pictures, sky cams, etc).

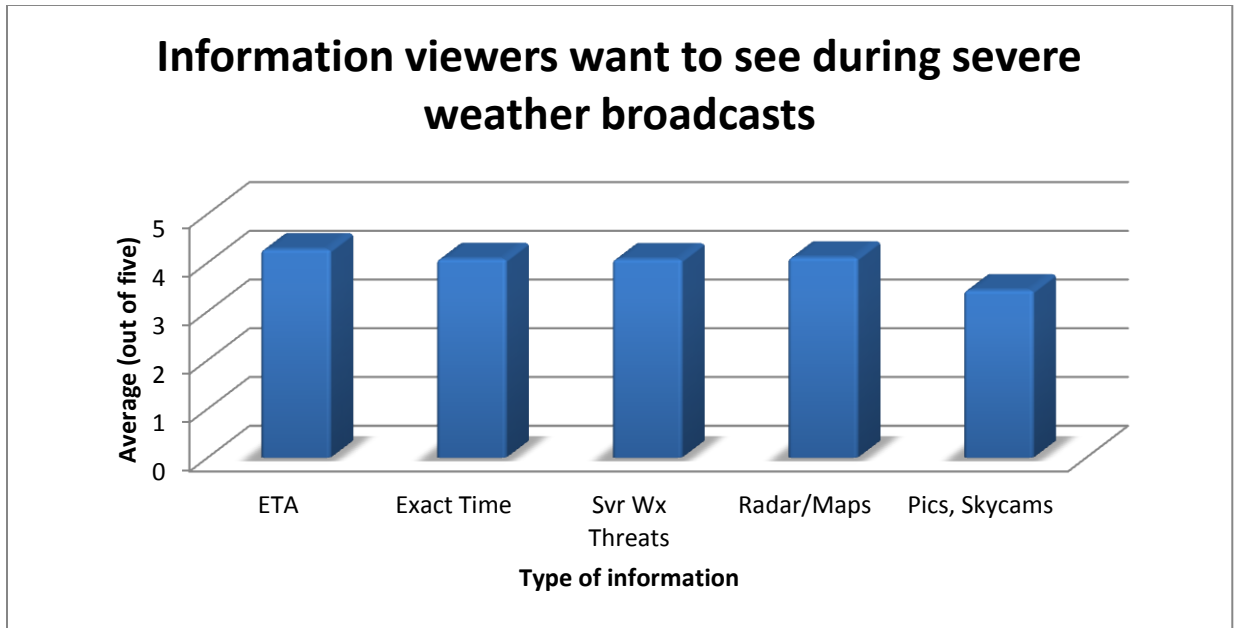


Figure 4.32 The type of information that viewers want to hear/see when a storm is approaching them.

Overall, Figure 4.32 shows that ETA had the highest average of 4.28/5, and the lowest average was picture/sky cams, which had an average of 3.44/5. The only demographic category that was used to analyze for this question was the type of area someone lives, as in seen in Figure 4.33 . When comparing rural viewers versus those who live in the city, the statistical analysis showed that there was no difference between the two groups.

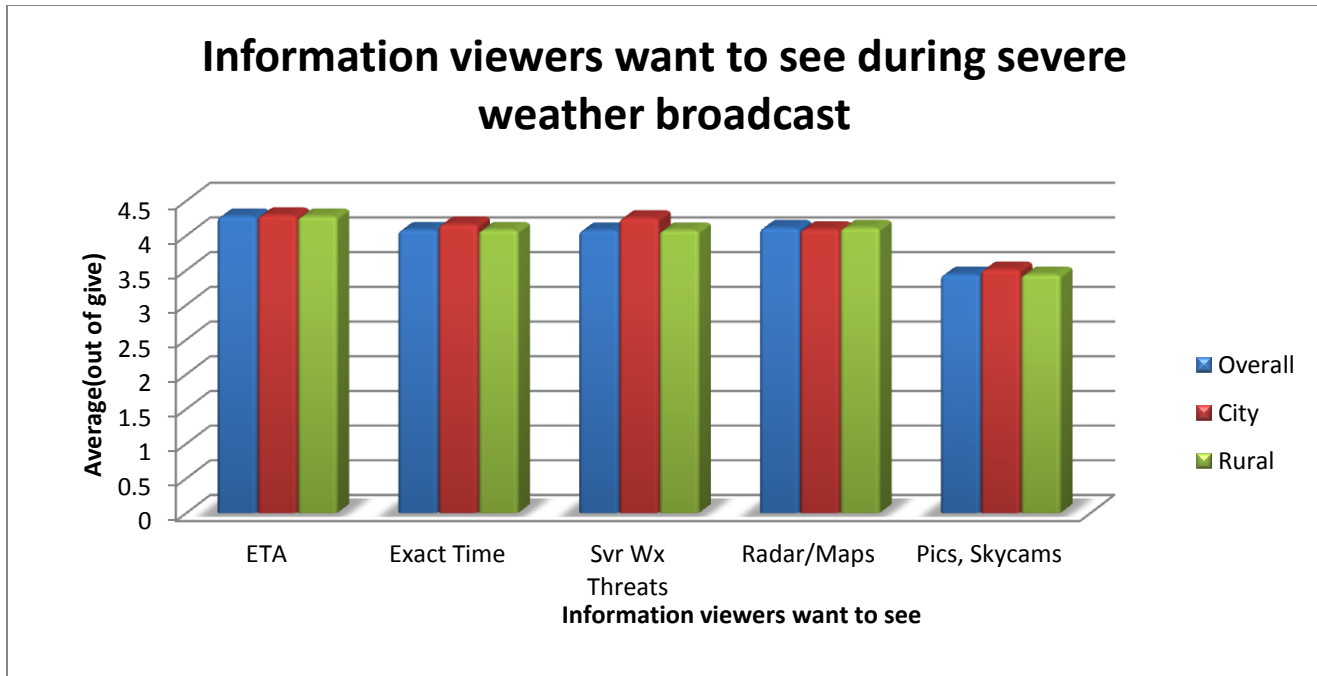


Figure 4.33 The type of information that viewers want to hear or see during severe weather broadcasts, comparing the overall data to those living in a rural area and in the city.

4.5.2 The type of information viewers want to see during a severe weather broadcast?

This question was asked to see how meteorologists can make a severe weather broadcast personal to viewers. It was the researcher's hypothesis that if TV meteorologists can make a personal connection with a place, name or landmark that is familiar with the viewer this would be one way to help persuade viewers to seek shelter immediately during severe weather.

The viewers were asked to rank the following choices 1 through 6 as to which one was most important and least important. As in the previous section,

most viewers did not follow the directions properly. The choices that they had to choose from were as follows:

- County name
- Local landmark
- School names
- Roads/bridges
- Shopping centers
- Places of worship

These choices were selected because this is a wide variety of landmarks familiar to different types of people. Those who live in more rural areas may identify with different landmarks than those do in more urban areas. The researcher's hypothesis was that those in more rural areas would identify more with shopping centers and places of worship.

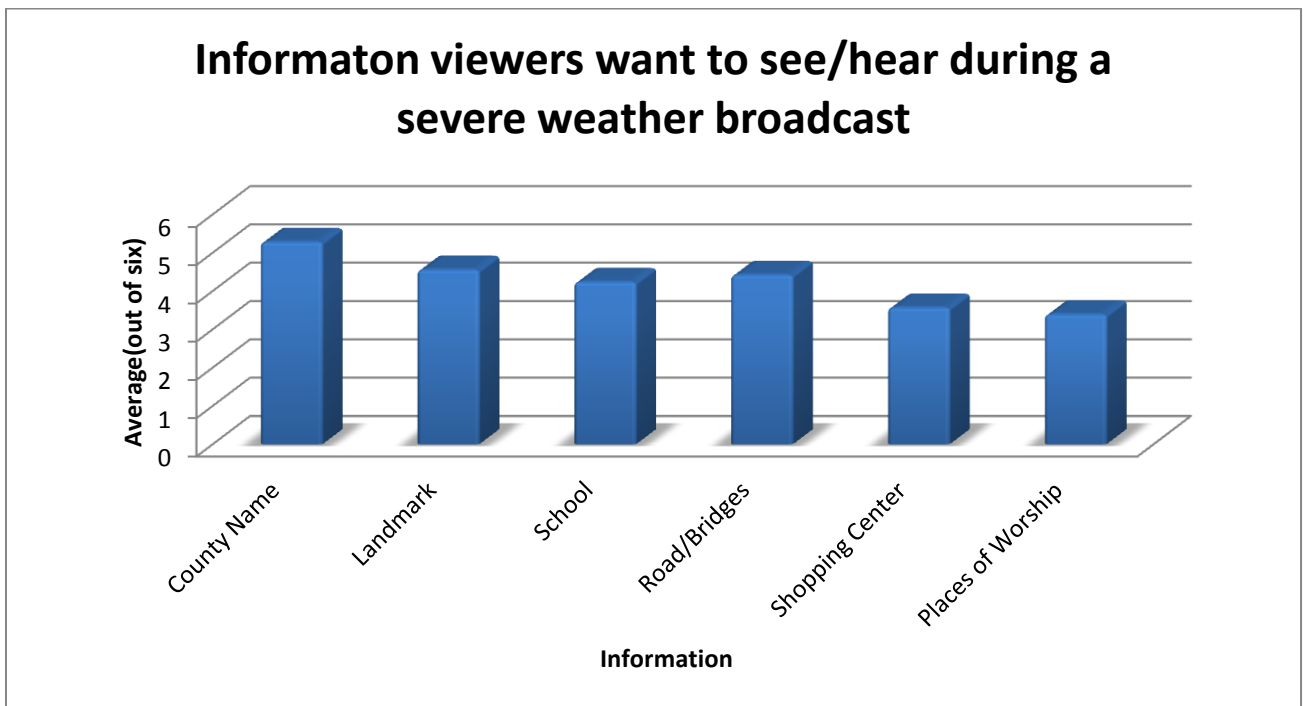


Figure 4.34 The type of information do viewers want to hear during a severe weather broadcast.

The choice that had the highest average at 5.28/6 was that viewers wanted to see the county name and the lowest was hearing about shopping centers (Figure 4.34). Again, when comparing rural viewers versus those who lived in the city (Figure 4.35) there was no differences. There was nothing that was statistically significant in the data. Although county name stands out as the number one thing viewers want to hear during a severe weather broadcast, what will be seen in the next section is that this really is not entirely true; viewers much prefer to see something else according to their comments.

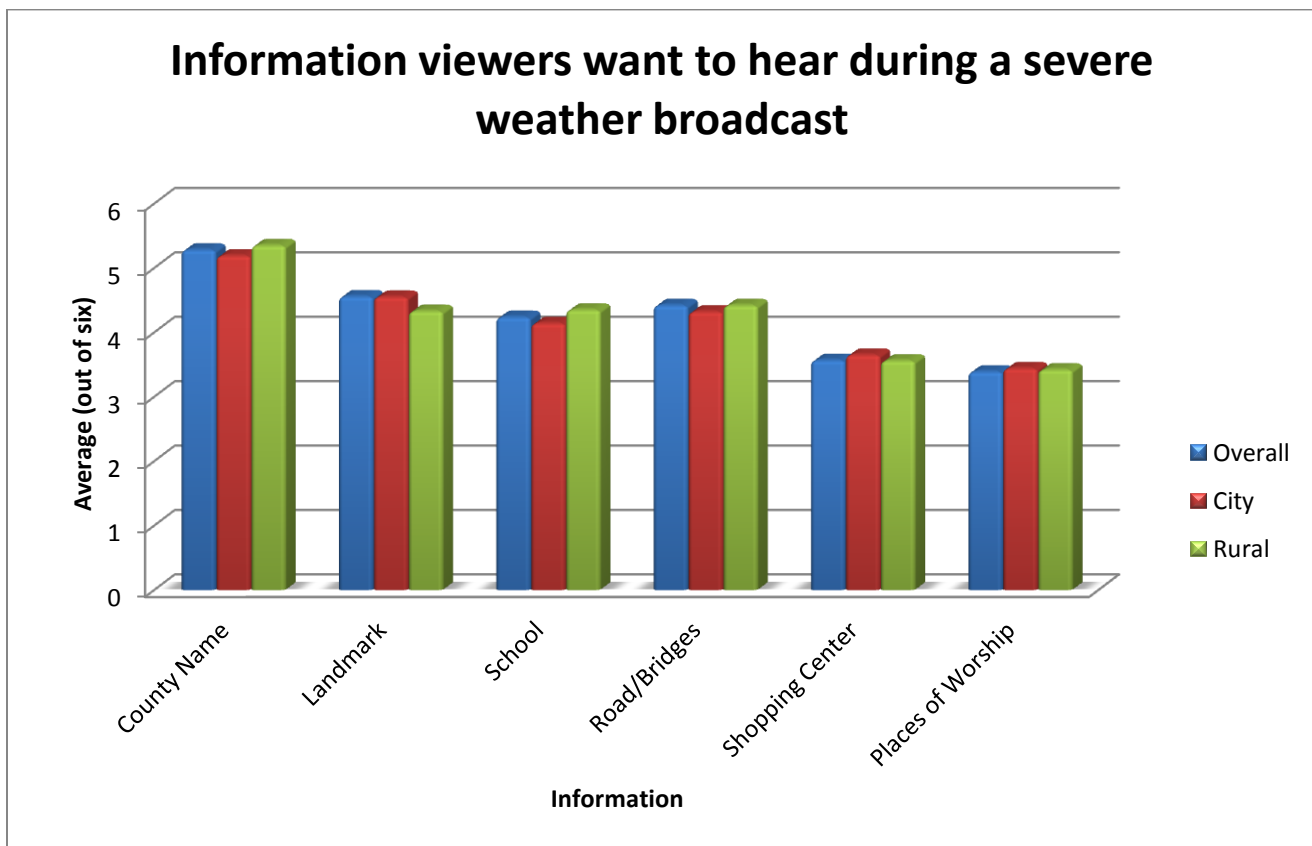


Figure 4.35 The type of information viewers want to hear during a severe weather broadcast comparing the overall data to those living in rural areas and in the city.

It is impossible to draw any conclusion from the last two sections of data. What can be seen here is that viewers want as much data as meteorologists can provide them so that they can make an accurate and informed decision about seeking shelter during severe weather.

4.6 Viewer Comments

The last two questions were questions that required written responses from viewers. These two questions were extremely important to this research because it allowed viewers to give their written opinions about TV meteorologists and their severe weather coverage rather than select from pre-chosen options. The two questions that were asked at the end of the survey were the following:

- What can a meteorologist do to better persuade you to seek shelter during severe weather?
- Any other comments that you have in general about meteorologists and their severe weather coverage are more than welcome.

Like the previous questions that required a written response from viewers, to analyze these, they were placed in categories by the responses that they wrote.

4.6.1 What meteorologists can do to better persuade viewers to take immediate shelter during severe weather

All the comments were put into the following categories (Figure 4.36):

- Change nothing/they do a great job already
- Be specific/exact with location and time
- Keep them constantly updated
- Look outside and see what's going on
- Spotted by person or radar
- Pictures/ videos
- Change in voice/action

- Cut down on hype/drama
- Other
- Blank

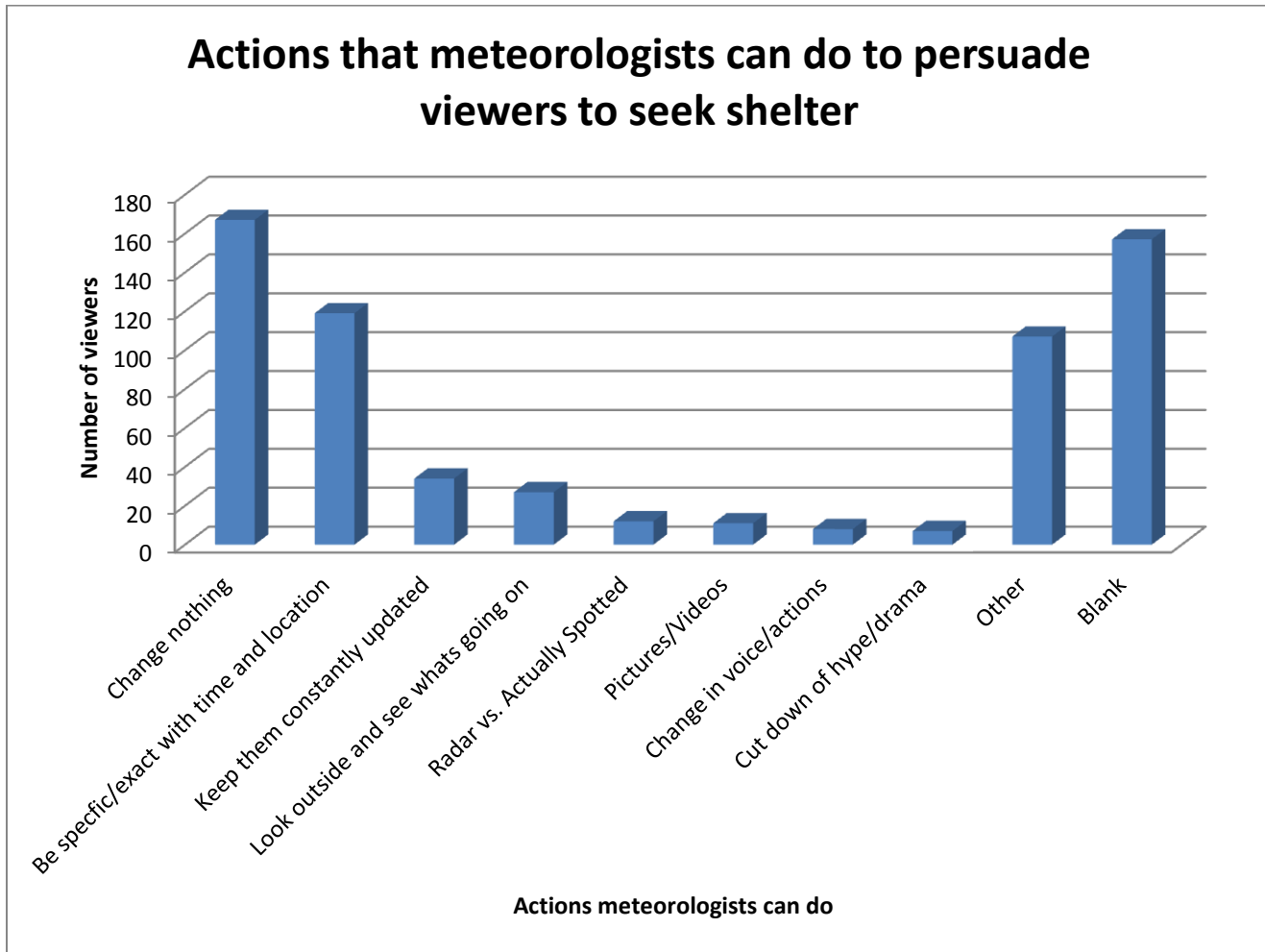


Figure 4.36 Actions that meteorologists can do to persuade viewers to seek shelter during severe weather broadcasts.

The first suggestion as to what meteorologists can do to better persuade viewers to seek shelter during severe weather is to be as specific and exact as possible with the location and timing of a storm. Respondents said that this is a critical factor when they are making the decision to seek shelter or not. Most said that they search for more information prior to making a decision to seek shelter.

Many said that they do not want to hear the county name as much as they want to hear the city name, because counties are too large of an area. Viewers also want a hyper-local view of storms. Viewers want to see the streets that a storm will cross. This is one of the ways to make severe weather “personal” to them. If meteorologists can make their TV broadcast personal for their viewers, they will be more likely to heed the warnings that meteorologists give and will seek shelter. There written responses are seen in the quotes below:

“Telling an area of the warned county that is under direct threat, i.e. Boone County north of I-70 and south of MO 124.”- Male, City

*“Tell more detail of path and location... not just "east side of county" Give me more specifics about where the tornado is located. Is it in my backyard or just in my county? I live in one of the largest counties in Missouri.”
– Female, Rural Area*

“Be more specific when issuing warnings. For example, saying "Tornado Warning is issued for Johnson County" doesn't narrow the gap. The county is very wide. Be more specific stating specific city names as well as stuff like "Northeast Johnson County" or "Southern Johnson County" but don't include the entire county.” – Male, Rural Area

*“When severe weather is in my area I tend to want to know how local.. Meaning is it in my neighborhood. Butler co. is a wide area and 30 miles north or south of me makes me think i have plenty of time to seek shelter.”
-Female, Rural Area*

Next, viewers said that they wanted to be constantly updated during severe weather. Some feel like they aren’t given enough information because they live in a rural area and that the bigger cities are the ones that get most of the severe weather coverage focus. Others stated that TV stations go off the air after the

threat for the major cities is over, leaving those in rural areas to find alternate ways of receiving the necessary information. Quotes from the viewers can be seen below:

“...keep the weather situation updated in a timely manner” – Male, Rural Area

“Since we live so far west of TV station, the bad weather is usually gone before we get the information.”- Female, Rural Area

Along with being updated on air, many people want to be updated on social media whether that is via Facebook or Twitter.

“Use social media sites like facebook and twitter to send weather updates, frequently.” –Female, Rural Area

*“Continuing coverage, up to date, responds to questions on social media.”
-Female, Rural Area*

“I would love to see more TV meteorologists use social media, especially because satellite coverage (which we have) is notoriously unreliable during storms. By the time a storm approaches, we usually cannot count on the TV signal, so I rely upon the information on my smartphone, especially real-time Twitter updates from the #tristatewx hashtag” – Female, Rural Area

Some viewers said that for them to make an informed decision they want to know if a tornado has actually been spotted or is only radar-indicated. They said that depending on if it was actually on the ground or just spotted on radar, this would influence their decision making process of whether to seek shelter or not.

“I think it is very helpful when the meteorologist says if a tornado has actually touched ground or not. That way we are completely sure we are under shelter and ready.” – Female, Rural Area

“Let me know if there is something actually on the ground or if it is just possible rotation. However, I have 2 small kids, so once there is a warning, we are in the basement.” – Female, Rural Area

*“To let them know that one has been spotted and the location where it was seen. Or if it is the radar seeing rotation and one hasn't been spotted yet.”
– Female, Rural Area*

Respondents also stated that if there was a tornado they would like to see live video of it, if possible. Viewers said that video would influence their decision making process when deciding if they needed to seek shelter or not.

*“Live coverage of the tornado through chaser tv, tower cam, or some other source. When it's just a map some viewers don't grasp the danger.”
– Male, Rural Area*

“Give live footage, even if remote non-human cameras”. –Male, Suburbs

Many viewers said that meteorologists do a good job with the severe weather coverage and there is nothing that needs to be changed.

“Keep doing what they are doing, which is a good job!” – Male, Rural Area

4.6.2 Other viewers comments

The final question that was asked was for any other comments that the viewers had about severe weather. Generally these comments were along the same lines as the previous questions and most comments were repeats of what has already been stated in above sections.

4.7 Case Study: Joplin, MO

Because this research was done using TV markets in Missouri, an opportunity arose to survey the viewers in the Joplin, Missouri market. Due to the devastating tornado that went through Joplin on 22 May 2011, these viewers have a totally different perspective on severe weather than most of the others that were surveyed. Due to this, Joplin made a very interesting case study in this research to determine if their responses differ significantly than the overall results because of their experiences with such a deadly tornado. Another important reason for this case study is to see if there is anything that the TV meteorologists did in Joplin that made a life-saving difference that can be shared with other TV meteorologists. All of the questions that have already been examined were re-examined to look for anything significant that would make Joplin stand out within the data.

After re-analyzing the data for just the viewers in the Joplin, Missouri market, only a few of the questions were significant, statistically, when compared to the overall results. The first question that was much different was “What would make you seek shelter immediately?” Twenty percent of respondents from Joplin said that seeing the tornado on TV or in person would make them seek shelter; this is compared to the overall survey response of 30% who would need to see the tornado in some form before they would seek shelter.

Those who responded to tornado sirens overall was 44%, while those in Joplin who said they would only seek shelter if they heard the sirens was significantly less at 26%. One reason that many in the Joplin area may not seek

shelter when hearing tornado sirens was because of the repetitive nature of the tornado sirens on 22 May 2011. The tornado sirens would sound, end and then proceeded to sound again a few minutes later. This could have led to some confusion of the public, leading them to not rely on the sirens. Forty nine percent of those in Joplin responded with the “other” category compared to 19% from the overall data. For this answer it is difficult to determine what “other” ways would persuade viewers to seek shelter during severe weather, because they were not prompted to provide any answer as to what that other way would be. In hindsight, viewers would have been asked what those “other” events that would make them seek shelter during severe weather (Figure 4.37).

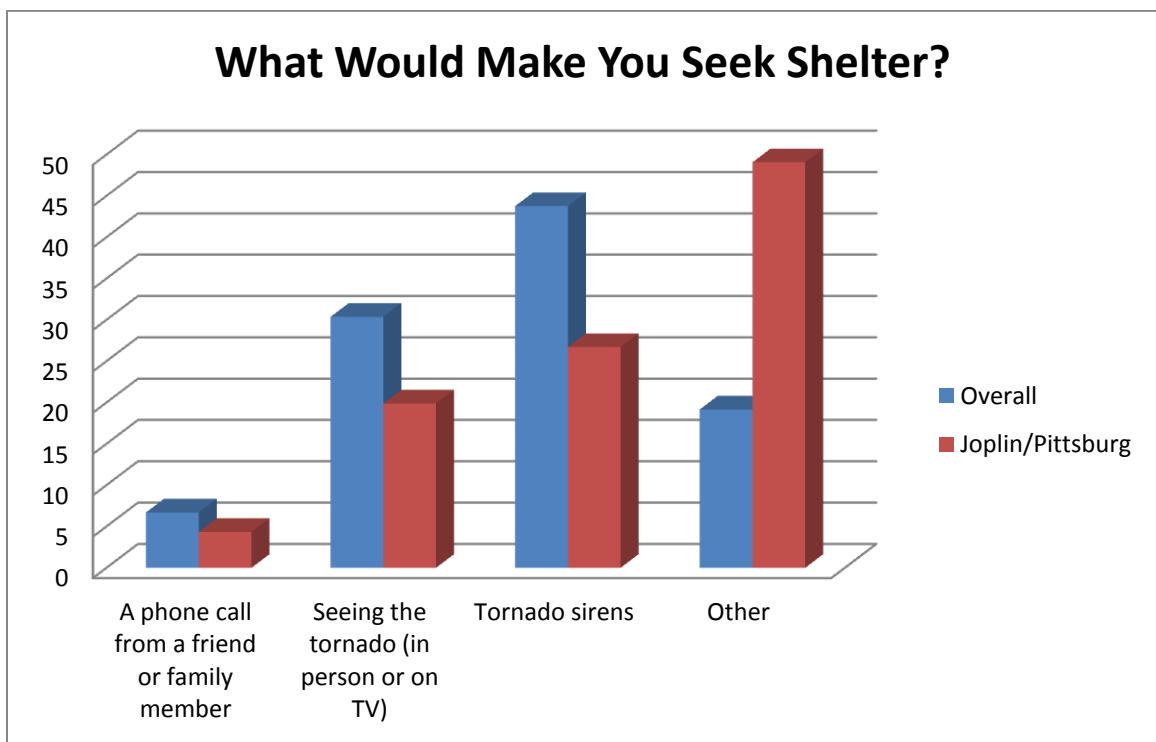


Figure 4.37 Events that would make a viewer take shelter during a tornado warning, comparing the overall data to Joplin TV viewers.

The next question that was significantly different was “can you hear tornado sirens at your work/school?” Overall, viewers said 19% of the time they can hear it “sometimes,” and those in the Joplin area said they could hear the sirens at work/school 34% of the time (Figure 4.38). Here it is hard to speculate why there is a large difference in the “sometimes” answer.

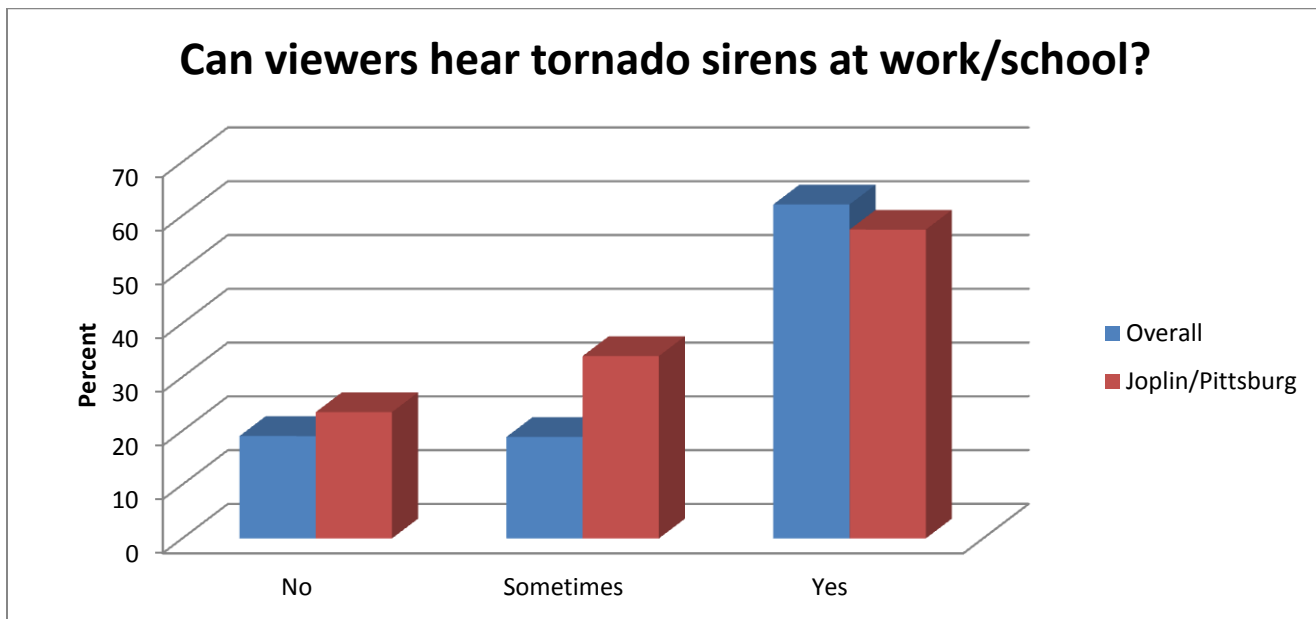


Figure 4.38 Can viewers hear tornado sirens at work/school comparing the overall data to those who live in the Joplin TV market?

When looking at NOAA weather radios, there was no difference between Joplin and the overall data. However, when asking viewers why they have a weather radio, many of them said the reason why they now have a weather radio was due to the Joplin tornado. Viewer’s quotes are seen below:

“The Joplin tornado was the deciding factor in finally purchasing a NOAA radio” – Female, Rural Area

Though Joplin’s data for the most part was not significantly different from the overall responses, the comments that came from those viewers give a lot of insight into what the meteorologist in Joplin did well on 22 May 2011. One comment from a viewer stated that the meteorologist she watched continuously repeated that viewers needed to seek shelter to stress how serious of a situation the tornado was and can be expressed in the following viewer quotes:

“tell us to [seek shelter] and keep reiterate it like Doug Heady did when the EF5 hit us in 2011” – Female, City

*“I just want to say the way Doug Heady handled his coverage of the tornado that hit Joplin was phenomenal. If it had not been for him I would not have seeked shelter as quickly as I had. It tore up my neighborhood. It is because of him and of course God that my daughter and I are alive and ok.”
-Female, City*

One thing that was hoped to be gained from this research was feedback from viewers, particularly in Joplin, about what the meteorologists did on 22 May 2011 that directly lead viewers to seek shelter prior to the tornado striking. Though many comments from viewers referred to that tornado, there were not many comments that stated what the meteorologists in Joplin did that helped save their life. If this survey were done again, the viewers in Joplin would have explicitly been asked what the meteorologists in that market did well on 22 May. This question would be asked to gain better insight in what meteorologists can do better during severe weather broadcasts.

Out of all of the information and written feedback that was given in this research, the following quote sums up the relationship and bond that is formed between viewers and the meteorologist that they watch every day:

“MY meteorologist is Doug Heady with KOAM Joplin/Pittsburg. I feel as if he is a close friend or part of my family even though I have never met him in person! I am a fan of his Facebook page and read his updates and blog regularly. I trust he will be on top of any weather situation that arises. If he says he is not concerned with a particular weather set-up, but he'll keep his eye on it, I'm comforted by that...knowing that if the circumstances should change, he will be live on television or updating his Facebook status with new information. He has established a great amount of trust with my family. When Doug speaks, we pay attention!” – Female, City

5 CONCLUSIONS/RECOMMENDATIONS

5.1 Conclusion and Recommendations

Broadcast meteorologists play a vital role in the severe weather warning process. The things they say and do during their severe weather broadcasts directly affect their viewers' decision making process about whether they will seek shelter. This research went directly to those viewers and asked them what is most important when TV meteorologists provide severe weather coverage. Six hundred and fifty-two viewers in multiple TV markets in Missouri were asked questions about severe weather and what is most important during severe weather. The goal of this research was to find ways that TV meteorologists can personally connect with viewers to help persuade them to seek shelter during severe weather situations. The implication of being personal with the viewers is the more personally connected the viewer feels with the meteorologist they watch, the more likely that viewer will trust him or her and will likely follow their instructions during severe weather situations.

The most important recommendation that can be made from this research, that will directly make a personal connection with TV viewers and influence them

to seek shelter, is to be as specific as possible with location of severe weather. Most viewers said that when they watch severe weather coverage, they do not care as much about what counties will be affected as much as they care about what cities will be affected. Many viewers stated counties are far too large of an area when discussing severe weather. They said many times when part of the county is under a severe weather warning, it is not part of the county that they live in. Most said that they relate much better to what is happening in cities around them. Viewers overwhelmingly said they wanted to see a more local view of approaching storms. This more local approach can be done through place based warnings (i.e. street names, school names, etc.). Many viewers suggested they wanted to hear street names that will be affected. Along with the exact location of the storm and exact location of where a storm is moving, viewers said that they wanted to know when a storm would arrive at their location. This is also a determining factor if people make a decision to seek shelter. The implication of a place based warning is that viewers will have a personal connection with different places, locations or streets and that personal connection with that place would likely influence their decision to seek shelter. For instance, parents with children that go to school will most likely make a personal connection with that school because it is near to their house. If viewers are aware that a severe storm is near a school their children attend (which is near their house), they will likely feel the need to seek shelter for their own safety.

The next most important thing to viewers is that TV meteorologists keep them constantly updated about severe weather both on and off the air. Some

viewers felt that rural areas did not get as much severe weather coverage and attention as the urban locations. Viewers stated they would like TV meteorologists to stay on-air until the threat is over, even for storms that are away from major population areas. Many viewers stated a way for them to remain constantly updated is from posts on social media. Over 50% of those surveyed said they use social media to receive weather information. Social media is one way for TV meteorologists to “personally connect” with their viewers. The stronger this personal connection, the more viewers will trust a meteorologist and the more likely they are to seek shelter. Many viewers responded by saying they enjoy it when they can dialog with TV meteorologists via Facebook, Twitter and other social media outlets.

Finally, the most important recommendation that can be made to TV meteorologists is that they express to their viewers when a tornado has been spotted by radar or in person (on the ground). Viewers expressed a need to know this to help influence their decision-making process as to whether to seek shelter or not. Most viewers said that if they knew there was a tornado spotted on the ground, they would immediately seek shelter in their safe place. If a tornado has been spotted or if it is just rotation in the atmosphere, viewers wanted to see video or pictures of the storms. Thirty percent of viewers said that if they saw live video of a storm that was moving toward their location or live video of a tornado, this would persuade them to take immediate shelter.

One main focus of this research was looking at rural versus urban areas. This is because it is the easiest demographic for TV meteorologists to relate to

while providing severe weather information. When analyzing most of the questions, there was not much that was statistically significant between these two locations. One thing that was significant was that those living in rural areas were 30% less likely to hear the tornado sirens at their residence and 9% less likely to hear them at their work. This means if the rural population is less likely to hear the tornado sirens from their location, they will rely on other means for severe weather information; most likely this indicated that they will turn on their TV in search of information. This means TV meteorologists should consider staying on-air even when severe weather is not affecting larger cities, because those in more rural areas have less reliable ways to receive weather information than those in larger cities. Many viewers rely on their smart phones for severe weather information. Those in rural areas said they would “maybe” seek shelter if sent information about severe weather via text message and 6% said they would not seek shelter. The reason for this is because those in rural areas are 4% less likely to have smart phones. Overall, for viewers to make an informed decision, they wanted to be given as many pieces of information as possible.

5.2 Future Work

There are many possible avenues for further research on this topic. One would be to expand this research to more TV markets in areas that experience high occurrences of severe weather. Other research could focus more on the social media and other technology away from the TV. Another route would be to survey those who have been affected by large severe weather events (mainly tornadoes) and ask them what TV meteorologists did well and not so well in their

opinion. Going straight to the viewers is the best way to find out what meteorologists can do better during severe weather.

Social media has become such an important part of many people's lives; looking at how TV meteorologists can warn viewers on Facebook, Twitter, etc. might be a future research project. As technology develops, the public looks for the next best electronic device, and with that, a new way for them to receive weather information on that device. Examining the interaction between the meteorologists and their viewers and how they use social media during severe weather broadcasts will continue to be an important topic to research as technology develops. One question that should be looked at in future is how can a meteorologist manage updating social media while they are providing severe weather updates over the air without sacrificing the current quality of their broadcast on TV.

Along with how meteorologists can manage social media and TV broadcast, looking at the positive and negative aspects of social media, smart phones and other digital technologies and how they impact the sharing of severe weather information with the TV meteorologist during severe weather. Are the viewer's reports accurate in time and space? If they are accurate, meteorologists can use the information from their viewers to pass along real-time storm information to others during severe weather situations. However, it has been seen in many cases of breaking news that information passed along via social media is often wrong. Finding ways to accurately and quickly verify severe

weather information that is given to a meteorologist by their viewers is something that could be looked at in the future.

Another way this research can be continued is by looking at each question that was asked in this survey and determine why certain demographic groups had such vast differences from the overall data. For instance, why was the \$65,000-\$99,999 income bracket 12% less likely to be able to hear the tornado sirens at their homes? Investigating these differences in demographics can help meteorologist better warn the public during severe weather situations.

REFERENCES

- Altman, I and Taylor, D., 1973. *Social penetration: The development of interpersonal relationships*. New York: Holt, Rinehart and Winston.
- Balluz, L., Schieve, L., Holmes, T., Kiezak, S., Malilay, J. 2000. Predictors for people's response to a tornado warning: Arkansas, 1 March 1997. *Disasters* **24** (1): 71-77.
- Barnes, L. R., Grunfest, E. C., Hayden, M. H., Schultz, D. M., Benight, C. 2007: False alarms and close calls: A conceptual model of warning accuracy. *Wea. Forecasting*, **22**, 1140-1147.
- Ebner, N, 2013. "A study of emergency management policy regarding the use of tornado sirens in the state of Missouri." A Thesis prepared for the faculty of the University of Missouri, 62 pages.
- Hammer, B., Schmidlin, T.W., 2002. Response to warnings during the May 1999 Oklahoma City Tornado: reasons and relative injury rates. *Weather and Forecasting* **17** (3), 577-581.
- Horton, D., Wohl, R.R., 1956. Mass communication and para-social interaction: observations on intimacy at a distance. *Psychiatry* **19**, 215-229.
- Neter J., W. Wasserman and G. A. Whitmore, 1988. *Applied Statistics*, 3rd Ed. Boston, MA. Allyn and Bacon, 1006 pp.
- NWS (2011). "NWS Central Region Service Assessment Joplin, Missouri Tornado – May 22, 2011." National Weather Service.
- NWS (2011). "The Historic Tornadoes of April 2011." National Weather Service.
- Shefner-Rogers, C. L., Rogers, E. M., & Singhal, A. (1998). Parasocial interaction with the television soap operas "*Simplemente Maria*" and *Oshin*." *Keio Communication Review*, **20**, 3-18.
- Schmidlin, T. W. and King, P. S., 1997: Risk factors for death in the 1 March 1997 Arkansas tornadoes. Quick Response #98. Natural Hazards Research Applications and Information Center: Boulder, CO.
- Sherman-Morris, K., 2005. Tornadoes, television and trust-A closer look at the influence of the local weathercaster during severe weather. *Environmental Hazards*, **6** (4), pp. 201-210.
- Sims, J. H. and D. D. Baumann, 1972. *Science*, New Series, Vol. 176, No. 4042, 1386-1392

APPENDIX A

This is the survey that was used for this research. It was developed after talking to all four of my thesis committee members. The survey was put together online through a survey company called Fluid Surveys. Below is exactly as it was seen online.

Connection Between TV Meteorologists and Their Viewers

My name is Dan Ebner and I am a Master's student at the University of Missouri. This survey will look at the connection between TV meteorologists and their viewers during severe weather broadcasts. The purpose of this survey is to see what TV meteorologists can do better or different during severe weather to help alert and persuade viewers to take cover during life threatening weather. To participate in this survey, you must be at least 18 years of age or older. Participation in this research is strictly voluntary. No personal or identifying information will be collected during this research. Thank you so much for your help! If you have any questions about this research, please feel free to contact me via email: dmef3f@mail.missouri.edu

What is your gender?

- Male
- Female

What is your age?

- 18-24
- 25-39
- 40-55
- 56-69
- 70+

What is your highest educational background?

- High School Diploma
- Some college
- College Degree
- Master's/Ph.D

What is your household income?

- \$0 - \$24,999
- \$25,000 - \$39,999
- \$40,000 - \$64,999
- \$65,000 - \$99,999
- \$100,000 +

From which city do you get your television news and weather?

- St. Louis
- Kansas City
- Springfield
- Cape Girardeau/Harrisburg/Paducah
- Hannibal/Quincy
- Columbia/Jefferson City
- Kirksville/Ottawa
- Joplin/Pittsburg
- St. Joseph
- Other

In what county and state do you live in?

i.e. St. Louis County, Missouri or Johnson County, Kansas

What type of area do you live in?

- City
- Rural Area
- Suburbs

How do you get severe weather information (check all that apply)?

- TV
- Radio
- NOAA Weather Radio
- Smart phones or weather apps
- Text messages
- Social media
- Other, please specify... _____

Why do you use/trust that source to gather information about severe weather?

Do you have a smart phone?

- Yes
- No

If you were sent information about severe weather and tornadoes via text message, would you be more likely to seek immediate shelter during severe weather?

Do you have a NOAA Weather Radio?

- Yes

- No

If yes to having a NOAA Weather Radio, what encouraged you to purchase one? If no, what is prohibiting you from purchasing one?

If a tornado warning is issued, what actions do you take?

What would make you seek shelter immediately during severe weather?

- Tornado sirens
- Seeing the tornado (in person or on TV)
- A phone call from a friend or family member
- Other, please specify... _____

Can you hear tornado sirens at your job/school?

- Yes
- No
- Sometimes

Can you hear tornado sirens at home?

- Yes
- No
- Sometimes

Do you feel tornado sirens are an adequate way of being warned about tornadoes?

- Yes

- No
- Sometimes

What type of information do you want to hear/see when a storm is approaching you?

Rank them "1" being the least important - "5" being the most important to you

	1	2	3	4	5
How long until it reaches your area (example: ETA 45 minutes)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exact time it will reach your area (example: 5:15 pm)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What severe weather threats to expect	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Radars/maps	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visuals (pictures, sky cams, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What would you like to hear during severe weather TV broadcasts?

Rank them "1" being the least important - "6" being the most important to you

	1	2	3	4	5	6
County Name	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local Landmarks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
School Names	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Roads/Bridges	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shopping Centers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Places of Worship	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Why do you trust the meteorologist that you watch?

Do you feel the media does an adequate job informing you of severe weather?

- Yes

- No

If you do not feel that the media does an adequate job, explain why.

Do you trust the media when they provide you with severe weather information?

- Yes
- No

If you do not trust the media when they provide severe weather coverage, explain why.

Do you feel that severe weather coverage is over dramatized by the media?

- Yes
- No

If yes, explain why you think the media over dramatizes severe weather

What does a tornado watch mean?

- Conditions are favorable for tornadoes to develop
- A tornado has been spotted by a person or radar
- There will definitely be a tornado today

What does a tornado warning mean?

- Conditions are favorable for tornadoes to develop
- A tornado has been spotted by a person or radar
- There will definitely be a tornado today

When a tornado warning is issued, what do you think?

- Tornadoes never hit my house or happen here
- I do not need to do anything different
- I must seek shelter
- I should look outside and see what is going on

What can a meteorologist do to better persuade you to take immediate cover during severe weather?

Any other comments that you have in general about meteorologists and their severe weather coverage are more than welcomed.