

# Great East Japan Disaster: Tsunami Study (Survey Results)

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Weathernews Inc., Japan

# GREAT EAST JAPAN DISASTER SURVEY: TSUNAMI

Weathernews wishes to offer our deepest sympathy to all the victims of the Great Japan Earthquake. We also wish to extend our gratitude to those who participated in this survey.

## Survey Overview

### ◆ Goals

March 11<sup>th</sup> 2011 was a day of tragedy for the coastal communities of East Japan that were hit by the massive tsunami following minutes after the Great East Japan Earthquake. This survey attempts to understand the decisions by people that led to either their safe evacuation and shelter, or failure to find shelter from nature's terrible power. Assisting Weathernews with the analysis of the survey results are Professor Fumihiko Imamura of the Tohoku University Disaster Control Research Center and Professor Katusya Yamori of Kyoto University Research Center for Disaster Reductions Systems. We hope that our joint analysis will lead to the development of countermeasures against such disasters occurring in the future.

### ◆ Survey Period

May 18<sup>th</sup> to June 12<sup>th</sup>, 2011

### ◆ Survey Respondents

5,296 residents of Hokkaido, Aomori, Iwate, Miyagi, Fukushima, Ibaragi and Chiba prefectures.

### ◆ Survey Methodology

Results and accounts of fatalities were collected from Supporters and users of the Weathernew website, Weathernews mobile application and Weathernews Touch smartphone application.

## ◆ Survey Items & Analysis Results

### 1. Time from Initial Quake Until Evacuation

- Average time until evacuation for survivors was 19 minutes.
- Average time until evacuation for fatalities was 21 minutes.

### 2. Reason for Decision to Evacuate

- Just 28% of people who evacuated immediately after the quake survived.
- The majority of people evacuated because of the Tsunami Warning.

### 3. Evaluating Evacuee's Course of Action

- One in five fatalities was unable to evacuate.
- The reason for many failures to evacuate was, "I thought it was safe."

### 4. Intended Sheltering Area<sup>①</sup>

- Three in four survivors evacuated to a safe location.
- Three of four fatalities were unable to make it to a safe location.

### 5. Intended Sheltering Location<sup>②</sup>

- 40% of evacuees were unable to reach high elevation.
- More than half sheltered in non-designated areas.

### 6. Why Couldn't You Evacuate?

- 18% of fatalities met with obstacles during evacuation.

### 7. Elevation for Tsunami Evacuation

- Survivor's average target evacuation elevation was 2.9 stories high.
- The average target elevation of fatalities was 1.7 stories high.

### 8. Getting to and Leaving the Shelter

- 60% of fatalities were due to leaving shelter and reentering the danger zone.

### 9. Reasons for Leaving the Shelter

- Many left shelter to search for family members.

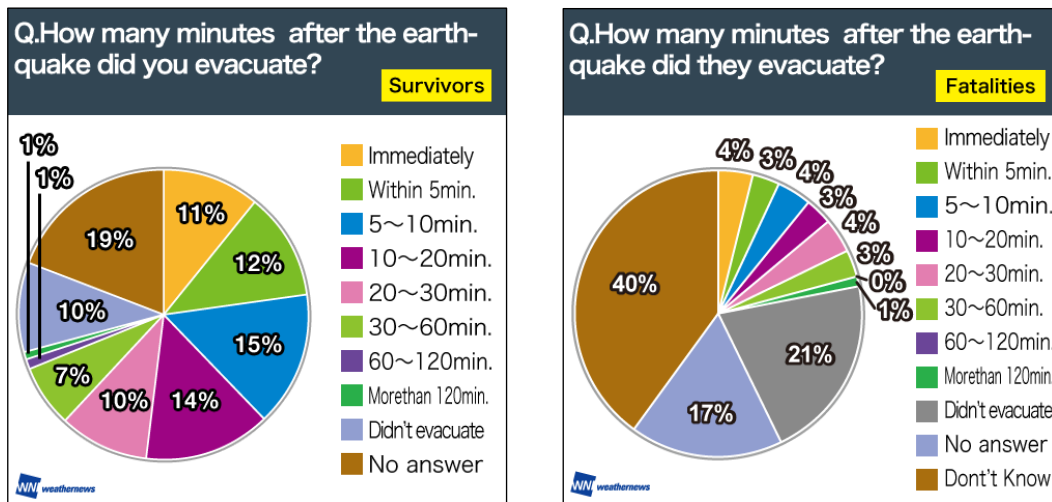
\*Detailed analysis of results on next page.

## Detailed Analysis of Results

### 1. Time from Initial Quake Until Evacuation

Average time until evacuation for survivors was 19 minutes.

Evacuating from a tsunami requires an immediate response. In areas inundated by the tsunami, we asked the amount of time between the earthquake and evacuation for people who survived, and their accounts of those who did not survive.



In response to our survey, we found that 10% (including survivors) chose not to evacuate, but the majority evacuated within 20 minutes after the quake struck. We tried to calculate the average time until people evacuated. The result clearly showed the average time for survivors as 19 minutes until starting to evacuate. However, the average time until evacuation for fatalities was 21 minutes after the quake. That is a difference of just two minutes. So for results this survey, we have determined the line between life and death as the 20 minute mark. Thus it became clear to use that evacuating from tsunami requires action within a matter of minutes, and every second counts.

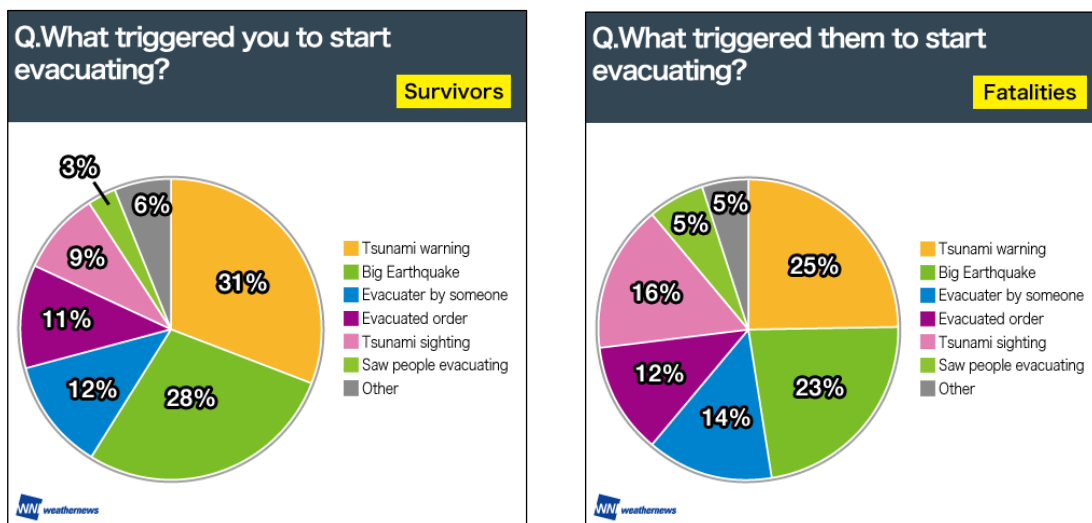
Also, looking at the results by age, people under 20 were the slowest to evacuate. Average time for fatalities in this age group was 32 minutes, and 22 minutes for survivors. At the other end of the spectrum, the people aged 60 and over were the earliest to evacuate, with an average time of 14 minutes until evacuation for survivors, and 18 minutes for fatalities. Taking into consideration the extra time it takes older people to move, it may be said that it was necessary for them to get moving earlier in order to escape.

*Data for survivors computed from 994 participants who were in areas submerged by the tsunami. Fatalities calculated from total responses of 1,998 participants.*

## 2. Reason for Decision to Evacuate

- Only 28% of people evacuating immediately survived.
- Most people evacuated following tsunami warnings.

In order to escape from a tsunami swiftly means that it was necessary to evacuate immediately after the initial earthquake hit, but what really triggered most people's escape? We asked survey participants the most common reason to evacuate.



For survivors and fatalities alike, the most common reason was a **Tsunami Warning/Alarm**. The next most common reason was because of the massive earthquake. Many of these people commented that they might not have made it on time if they had waited for a Tsunami Warning to be issued, and took initiative to evacuate. Of course, for these people a massive earthquake automatically means the risk of a tsunami, so they immediately evacuated after the initial quake struck on March 11<sup>th</sup>. 28% of respondents including many survivors were aware of this.

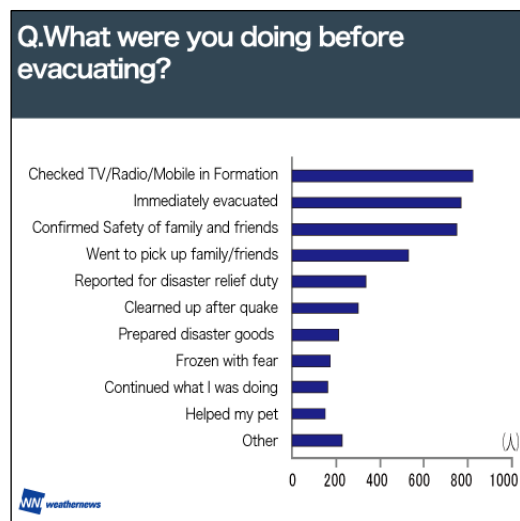
*Survivor data covers answers from 1,853 participants, excluding those who responded "Didn't evacuate," "Don't know" and "No answer." Data on fatalities inferred to have evacuated covers 692 of total 1,998 participants by excluding "Don't know" and "No answer" responses.*

Next, we asked participants in the survey what they did prior to evacuation.

Most answered that they were acquiring and confirming information. The next most common response was for people who just evacuated immediately. Many also responded that they tried to confirm the well being of family/friends.

*Covers 3,116 participants inferred to have evacuated.*

*(Multiple answers possible.)*



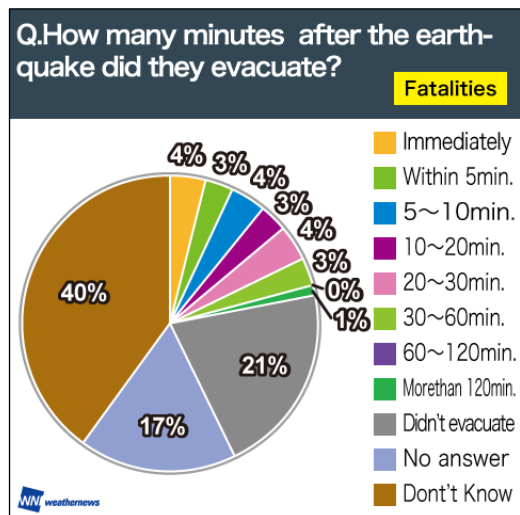
### 3. Evaluating Evacuee's Course of Action

- One out of five fatalities couldn't evacuate.
- The reason for many fatalities was, "I thought it was safe."

When we asked participants how many minutes it took before they began to evacuate, one thing that stood out was the number of fatalities who didn't even try to evacuate.

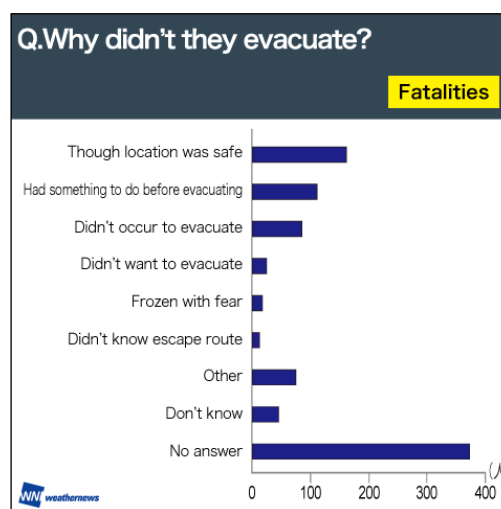
21% of fatalities did not attempt to evacuate. Including the results from those who answered that they didn't know how many minutes elapsed before evacuating, evacuation was not possible for one out of five participants.

*Total answers for fatalities collected from 1,998 participants.*



So why were they unable to evacuate? We tried to learn the reasons from participants.

We found that the most common response was that people thought they were in a safe location. There were a comparatively high number of responses for people who didn't evacuate in the over-60 group. It may be inferred that this includes a fair number of people with physical impediments. Among the responses we also found a number of people who commented that they thought they were not at risk because past tsunamis had only resulted in minor damage. There were also those who based their decision to evacuate on their memories of the Sanriku earthquake and tsunami of 1933, and the 1960 earthquake & tsunami in Valdivia, Chile.



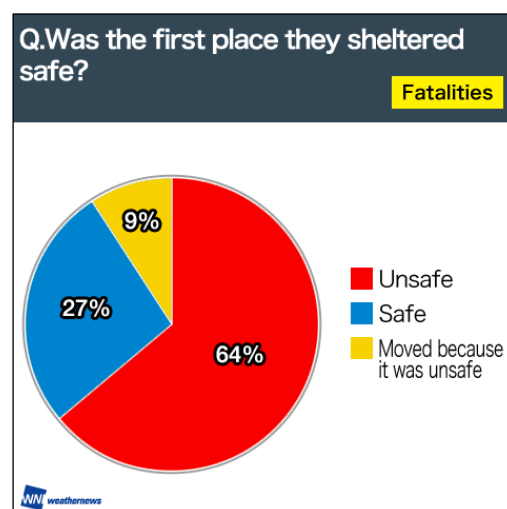
Data on fatalities collected from 420 participants. (Multiple answers possible.)

#### 4. Intended Sheltering Area①

- Three in four survivors evacuated to a safe location.
- Three in four fatalities were due to failure to reach a safe location.

We wanted to know if the sheltering areas evacuees were headed for were actually safe. So we asked participants, and found some differences between the initial sheltering locations chosen by survivors and fatalities.

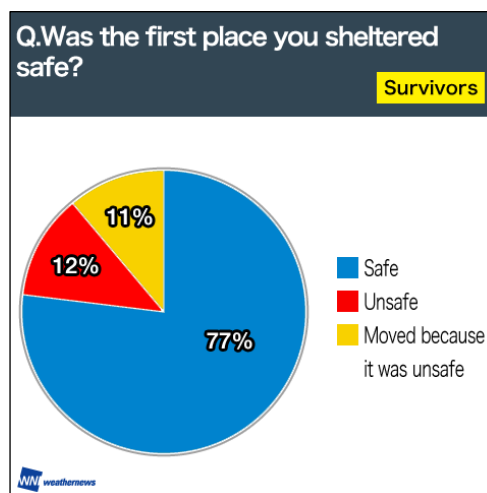
Among the accounts of 1,998 fatalities in this survey, 515 are assumed to have attempted to reach a primary shelter, and another 141 successfully reached their intended sheltering destination. This represents only 27% of responses from participants. The remaining 374 people (73%) were unable to reach shelter, and 37 of these also attempted to reach a secondary location to shelter. In other words, three of four people who tried to escape the tsunami were



ultimately unable to reach shelter.

However, of the 1,556 survey participants responded that they did reach shelter. 1,194 (77%) of those answered that their sheltering location was safe. The remaining 362 (23%) responded that their primary sheltering destination turned out to be unsafe. Here again, we saw a small portion of evacuees (167 people) attempt to reach a secondary sheltering destination.

*Survivor and fatality covers data collected from all participants, excluding the responses, "Don't know" and "No answer."*



## 5. Intended Sheltering Location②

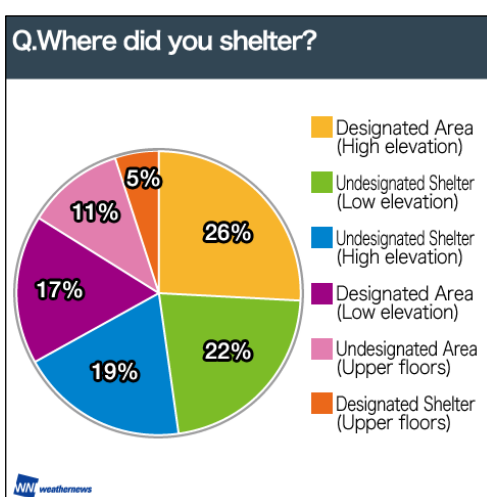
- 40% of evacuees were unable to reach a high elevation area.
- More than half of the evacuees sheltered in non-designated areas.

Reaching safety from the brunt onslaught of the tsunami meant escaping to high elevation. So did all the participants in this survey reach higher ground? We asked where they went to evacuate.

Most evacuees responded that they went to a designated sheltering location at high elevation. This accounted for 26% of responses. Overall, another 60% escaped to an undesignated location at high elevation such as the upper floors of a tall building. Conversely, 40% of participants could not reach an area of high elevation, and chose instead to get as far away from the sea as possible.

Also, 52% or just over half of survey participants responded that they evacuated to somewhere other than the designated sheltering location.

Based on our survey results, it seems that most people were not choosy about their destination, and chose to escape toward





whatever safe location they thought was most accessible at the time.

In either case, thinking about where to go in order to escape the tsunami would take up precious time once people became aware of the tsunami. Escaping from the tsunami meant a choice between heading to higher ground, or heading away from the sea. Depending on the particular area of the participating evacuees, the choice was often different for where they needed to fix a location to shelter. In other words, the time that people think about finding shelter is critical. There is a need to clearly fix a safe sheltering destination including the route there from one's home, workplace or other place of activity.

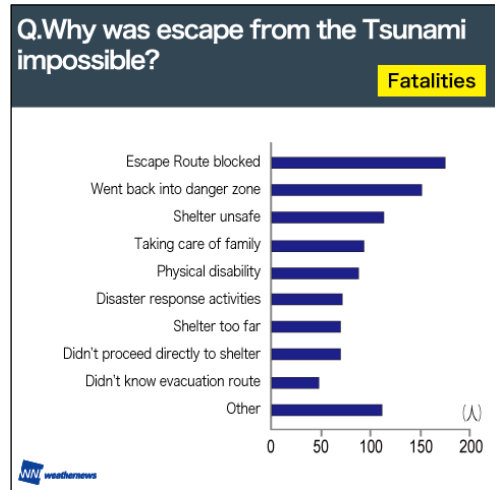
*Covers 2,222 of 3,116 participants after excluding the responses, "Don't Know" and "No answer."*

## 6. Why Was Evacuation Impossible?

- 18% of fatalities met obstacles while evacuating.

With respect to those who perished in the wake of the tsunami, we wondered why they were unable to successfully escape, and tried to learn the reasons why.

The most common reason we found was road congestion from traffic or landslides, which accounted for 18% of responses from participants involved with fatalities. Among open-ended responses to this question, we saw that several wrote in that people were trapped inside their car as it was washed away. Bearing in mind that even those who knew where they were headed to shelter encountered serious trouble on the way, knowing alternate routes to shelter became the difference between life and death.



In addition, at the time of evacuation, some participants responded that they escaped by walking or running, rather than by car. As it turns out, there were some merits (as well as demerits) to escaping on foot.

First, those escaping on foot were not hindered by the road congestion that affected many motorists. Pedestrian evacuees could also change routes easily when faced with damaged roads. Depending on their location, they were not limited to escaping by the roads either. On

the other hand, escaping by foot means limited speed, of course. Even running at full speed, some survey participants responded that people were not able to escape the tsunami coming from behind. Several participants escaping by car were able to use the car's speed to avoid the tsunami by driving away from the coast in areas where there was no high elevation to shelter. Of course, escaping by car meant that the number of routes available to high ground is limited, and these routes were often obstructed by traffic or debris that prevented drivers from going anywhere. When it was time to go, some thought about how to get from one's house or workplace to the sheltering area requires some additional visualizing of the actual conditions along the route.

*Data for 1,998 tsunami-related fatalities excluding, "Don't know" and "No answer" responses. Reasons for failing to escape tsunami inferred by survivors. (Multiple answers possible.)*

## 7. Elevation for Tsunami Evacuation

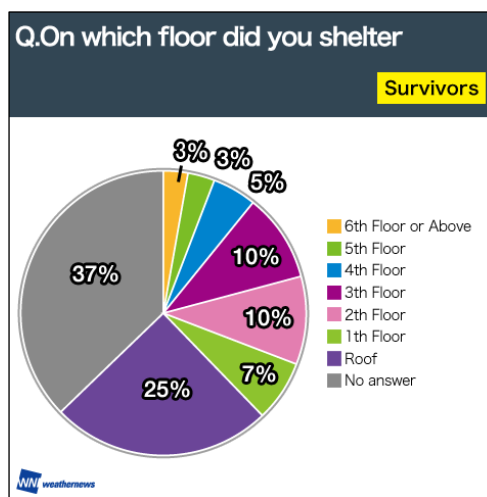
- Average target elevation for survivors was 2.9 stories.
- Average target elevation for fatalities was 1.7 stories.

We asked survey participants how many stories high they went to escape the tsunami.

Where did they take shelter? To what floor did they evacuate? The most common answers were the 2<sup>nd</sup> or 3<sup>rd</sup> floor of a building, which collectively accounted for 10% of the responses.

Based on the survey results, we tried to calculate the averages for survivors and fatalities. Survivors sheltered at an average of 2.9 stories high, whereas fatalities sheltered at an average of 1.7 stories.

Unfortunately, the tsunami reached heights that exceeded these building levels. In Iwate prefecture, the tsunami rose to 10 stories high (40.5 meters.) To escape this tsunami, evacuees would have the ideally escaped to higher levels of elevation.

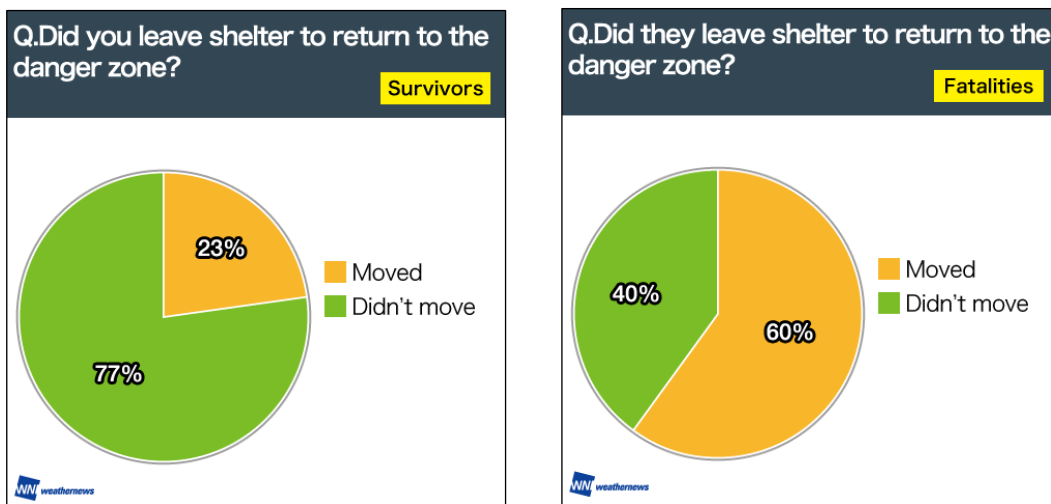


*Covers 1,881 participants, excluding those answering, "Didn't evacuate."*

## 8. Getting to and Leaving the Shelter

- 60% of fatalities occurred when leaving the sheltering area.

As mentioned previously in our analysis of the survey results, we asked why people did not fully commit to evacuating. The 2<sup>nd</sup> most common answer was that people left shelter to return to areas hit by the tsunami. We dug deeper by following up this question, and asked all participants whether or not they left their primary shelter to return to the danger zone.



Not surprisingly, 77% of responses to this question from survivors were negative. However, 60% of responses for fatalities were those who returned. Among open-ended answers to this question, many said that they thought it was safe when the wave receded initially. Of course, it is believed that even those who were already aware that the tsunami would roll back in risked leaving shelter. Nevertheless, even when there is a gap before the secondary waves of a tsunami, it is clear from these results that re-entering the danger zone is taking a potentially fatal risk.

*Survivor data covers 1783 out of 1881 participants, by excluding "No answer" responses. Data on fatalities inferred to have left shelter from 431 or 1235 participants, which excludes "Don't know" and "No answer" responses.*

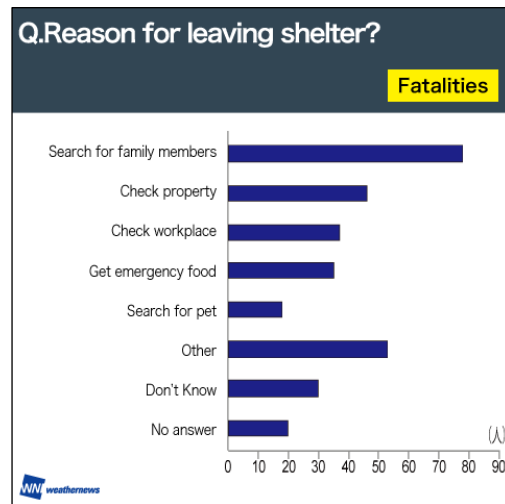
## 9. Reasons for Leaving the Evacuation Area

- Many left shelter to search for family members.

So why did people leave shelter to return to the danger zone? We ask the reason why there were so many fatalities among those who initially reached shelter.

The greatest number of responses people gave as the reason for leaving shelter was to go search for their family. Open-ended answers to this question revealed many responses that describe people who risked their own personal safety because they were worried about family and friends still being in danger. At the time of the earthquake and tsunami, it was common for families to be in different locations. Taking this into consideration, it can be assumed that many individual family members would have gone to

different sheltering locations. For example, students and small children would have been sent to one designated sheltering location, while their parents would have gone to another. Knowing the locations of various shelters for family members in this type of emergency beforehand may have saved lives.



*Covers 256 people inferred to have moved from primary shelter to other location. (Multiple answers.)*

## Summary Conclusions

At the onset of the great tsunami, we came to see that there were certain differences in decisions and courses of action between survivors and fatalities.

Based on this survey, the average time for survivors to start evacuating was 19 minutes after the initial earthquake struck. For fatalities, it was 21 minutes. One minute before or after the 20 minute mark meant the difference between life and death. A difference of only two minutes made a huge difference in the conditions people experienced, and brought the true destructive power of tsunami into clear view. Escaping means there can be no wasted time. Also, from the results we saw that one-in-five fatalities was unable to evacuate. The most common reason given by survey participants was, "I thought it was safe."

It is clear to us that the March tsunami exceeded all expectations based on the tsunami seen in the past. When we asked whether or not the locations people sheltered at were safe, results were three-in-four people that answered positive, versus three-in-four who reported fatalities because of failure to escape. In addition, 18% of fatalities met with traffic congestion while evacuating to shelter. This was a time when you would need to think about an even safer shelter, safety measure, or evacuation route than normal.

Even for those who made it to safe shelter, 60% of fatalities were people who left shelter to re-enter the danger zone. This behavior was attributable to the compelling desire to search for family members, among other reasons. However, because the tsunami occurred over a period of several hours, and when you consider that it rolled back in with successive waves, it is clear that there were many opportunities for people to leave shelter to take dangerous risks in the affected areas.

"What did people presume to do?" Kyoto University Professor Katsuya Yamori who assisted with the analysis of the survey results, suggested one topic that was brought to light by this survey is what people were trying to do when the tsunami hit, based on the high losses of public servants, emergency services, and volunteers trying to save families and even pets. That many met with danger while evacuating shows that the assumptions people made about designated shelters and evacuation routes were too relaxed, and that they did not take the tsunami threat seriously. In addition, Professor Yamori said that the survey also allows us to imagine that there were many survivors who were unprepared for a tsunami, as well as fatalities whom had made preparations which should have been adequate to mitigate the risks of a tsunami on this unprecedented scale.

Professor Fumihiko, Director of the Imamura of the Disaster Control Research Center at Tohoku University who also assisted in the survey analysis, said that in order to escape from and survive such a tsunami, there is one thing to consider above all: evacuation is not easy. No matter what time, place, situation or preparedness, the Great East Japan Earthquake challenged all to survive.

This survey in particular is the first to publish results about the differences in response to the emergency by those did and did not survive, and gives us all many things to deeply consider. It illustrates significant differences between the two group's perception of evacuation timing, actual tsunami risks, disaster preparedness, and safe sheltering elevation levels. We should take in these results seriously, and have an awareness of them to help prevent losses like this from happening again.

Based on the results of this survey, Weathernews is striving to create content for disaster mitigation to reduce losses of lives and property. In addition, we hope it will have the effect of information sharing between other organizations with the same goals, so we can move from self-help to "shared help" for disaster mitigation.

## 2011 Tsunami Survey: Personal Experiences

*The accounts collected here are from answers to open ended questions asked in Weathernews' Tsunami Survey. The first half are accounts of fatalities shared by survivors, and in some cases by people intimately acquainted with tsunami victims. The second half is examples of success stories shared by survivors. As much as possible, we have tried to preserve the original statements of survey participants. However some cultural and geographic details have been omitted or inferred in the translation process into English.*

### **Engaged in Disaster Relief Effort, Slow to Evacuate**

“I lost my brother, a firefighter. They were engaged in rescue efforts, trying to save the staff of a hotel that had been hit by the tsunami.”

*(Deceased: 30/M, Iwate Prefecture)*

“He was a local firefighter who went to close a floodgate. Until the tsunami, that floodgate never really had a purpose. He gave his life to close that gate.”

*(Deceased: 30/M, Iwate Prefecture)*

“The old man was going around the neighborhood telling people to evacuate, but was unable to get away himself.” *(Deceased: 60/M, Iwate Prefecture)*

“It was because she was trying to get children and elderly to evacuate. People who evacuated by car survived. So if I had been there, she would have survived, too.”

*(Deceased: 50/F, Miyagi Prefecture)*

“I lost a close relative. She was trying as hard as she could to get the other residents out. Everyone but herself.” *(Deceased: 70/F, Miyagi Prefecture)*

“I lost a close friend. She was working at a restaurant/bar, and was trying to get all the customers out, but didn't get out herself.” *(Deceased: 20/F, Miyagi Prefecture)*

“There was no power, and the batteries in my mobile phone died, so I asked around the neighborhood about what was happening but not one single person knew anything, so we figured we just wait for the fire department or something. A little less than an hour later, I went to pick up my kids at school – the same school that would be used as a shelter later, but there was nothing on the bulletin board, so we just went back home. I stopped in a convenience store on the way home to get some food. The wait was an hour long, which meant that now two hours had passed. While I was waiting on line, a young lady ran into the store, and I heard her say in a raised voice, “What!? There is a big typhoon coming? What the hell are you all doing here?” Only no one really felt there was any danger. We were 7~8 kilometers away from the shore, and while the affected areas were close, we didn’t really think of them as being all *that* close. If I think about it now, there were some people watching TV on their mobile phones, but no one was talking about the tsunami. The ones who made it took the highways and roads where the river didn’t overflow the embankments. The tsunami came as far as within a kilometer of an elementary school nearby. If that building wasn’t there, we’d have been finished, too. Some of the staff at the old-folks home where my mother was living were lost to the tsunami. They were shuttling residents out, but were swept away on their last trip back into the danger zone. It seems that one or two residents who were initially reluctant to evacuate took too much time to get out.” (*Deceased: 40/F, Miyagi Prefecture*)

“Rather than returning home, I thought about all the damage around me, and stayed in the disaster area. It was fortunate that I didn’t evacuate smoothly. If I had evacuated by car, I think that I would have been swept away. A doctor from the local clinic didn’t make it. Initially, he had evacuated but didn’t stay put. The reasons he went back were: 1.) He got a call for help. 2.) His dog was still chained up at home. 3.) To finish some work he was doing on an evacuation manual. 4.) People were getting swept away right in front of him, so he tried to help them.

The tsunami came from the ocean across from the bay. Roads were congested, and no one was going anywhere.” (*Deceased: 50/F, Miyagi Prefecture*)

“The storm shutters were closed, and she couldn’t evacuate. Wasn’t that because everyone thought tsunamis are always just 10~20cm high?”

(*Deceased: 60/F, Fukushima Prefecture*)



“A guy from the JSDF was driving through towns on the shore calling residents to evacuate with a loud-speaker. As a result, he was unable to evacuate himself.”

*(Deceased: 30/M, Miyagi Prefecture)*

“A firefighter had to close a floodgate, and couldn’t evacuate. “

*(Deceased: 30/M, Iwate Prefecture)*

### **People Who Went to Search for Family/Friends**

“He probably left work to go home and check if his family was safe, and got washed away just like that.” *(Deceased: 30/M, Fukushima Prefecture)*

“The kids would be coming home from school, and Grandma continued to wait for them. She did evacuate to the 2<sup>nd</sup> floor but went back down to close the windows and lock the front door. On her way back up, Grandma was washed away by water pouring in from the upstairs windows. I tried to save her from drowning.”

*(Deceased: 70/F, Miyagi Prefecture)*

“I was scared and crying. My superior got me to calm down, and ordered us to evacuate immediately. I think we made it thanks to him. A good friend of mine who works with the elderly didn’t make it, though. Her whole family was in the hospital, and I think she was probably so scared that she couldn’t do anything. I guess that’s why she couldn’t escape.” *(Deceased: 20/F, Miyagi Prefecture)*

“If my child’s homeroom teacher has stayed at the school, she would still be alive. Right after the earthquake, she headed home by car because she was worried about her family. I think she knew there was major tsunami alert, and that’s why she went home to check on them.” *(Deceased: 40/F, Miyagi Prefecture)*

“She was shopping in the area around the airport when the quake struck. After that, she headed for her parent’s house to evacuate them by car, and was washed away. The tsunami was behind them when she was getting her parents into the car. Just as the car turned around and started moving, it was swallowed up by the wave. Also in the car was her 13-year old daughter, who is still missing. The grandmother saw the wave coming from behind, and immediately started running. She was able to escape, and survived.”

*(Deceased: 30/F, Miyagi Prefecture)*

“Seems he bought it just as he left his workplace to go home and evacuate his family.”

*(Deceased: 50/M, Iwate Prefecture)*

“It is said that he was probably going to save our pets before escaping to high ground but probably decided to head in the direction of his family instead, and was swept away.” *(Deceased: 60/M, Iwate Prefecture)*

“My company promptly gave the order to evacuate. This was the right thing to do, and we got out in time. A close friend of mine was not so lucky. Her child was at home sick, so she was worried and went home right after the earthquake.”

*(Deceased: 30/F, Miyagi Prefecture)*

“I lost a friend. She went home to her parents’ house on the shore.”

*(Deceased: 20/F, Fukushima Prefecture)*

“My mother got caught in the first wave, and grabbed onto a tree. I went to save her but the second wave took her away.” *(Deceased: 60/F, Fukushima Prefecture)*

“I didn’t think the tsunami would come, but a policeman urged me to leave so I evacuated. He was washed away by the tsunami, and died. Another guy in the neighborhood safely evacuated, but went back into the danger zone to look for his family. He died, too.” *(Deceased: 60/M, Miyagi Prefecture)*

### **People Who Didn't Evacuate Because There Was No Information**

“They always put out an alarm even for minor tsunami but this time we didn't hear a thing. Was it that something stopped working because of the earthquake?”

*(Deceased: 60/M, Miyagi Prefecture)*

“The town's warning siren wasn't working after the earthquake, and we didn't get any information about the tsunami. Surely, I don't think anyone could have imagined that such a tsunami would come.” *(Deceased: 20/F, Miyagi Prefecture)*

“I guess there was no power or information at all.” *(Deceased: 20/F, Miyagi Prefecture)*

“It seems that there were no community announcements.”

*(Deceased: 70/F, Miyagi Prefecture)*

“She had just moved because of a large tsunami, and so I think she probably just didn't know what to do.” *(Deceased: 30/F, Iwate Prefecture)*

“It wasn't her hometown, so she didn't know where to go for shelter. She probably also had no idea from which direction the wave would come.”

*(Deceased: 20/F, Miyagi Prefecture)*

“There was nothing on the evacuation notice boards, so he probably guessed it was safe.” *(Deceased: 40/M, Miyagi Prefecture)*

“I think that she didn't understand the tsunami warning, and couldn't have imagined a major one would come, so she didn't evacuate. I don't think she thought the wave would come that far inland to where she was, and we can assume there was no reliable information to make her evacuate.” *(Deceased: 40/F, Miyagi Prefecture)*

### **People Slow to Evacuate Because They Were Searching for Things**

“He went back home to get his medication and health insurance card. The first wave didn't get him, but the second one did because he didn't see it coming. If he hadn't gone back home, he would still be alive.” *(Deceased: 70/M, Miyagi Prefecture)*

“My father was working close to the sea, and must have figured something was wrong when the tide suddenly receded. So it seems he was able to confirm what was happening, and quickly get away. However, my Grandmother went to the hair salon to prepare for a wedding scheduled for the following day. From there returned home to search for valuables, but was slow to escape, and drowned on the first floor.”

*(Deceased: 60/F, Miyagi Prefecture)*

“She evacuated to a safe location initially but went back home to get her valuables. She shouldn’t have gone back.” *(Deceased: 70/F, Miyagi Prefecture)*

### **People Who Got Caught in Traffic and Couldn’t Escape**

“He must have thought that if he could get the kids out of the day-care center, he could evacuate himself. There was a rumor that traffic stopped because a railroad crossing went down in error.” *(Deceased: 60/M, Miyagi Prefecture)*

“In this area, there are two routes via bridges for evacuating to shelter, and they were both impassable. Many were swallowed up by the tsunami.”

*(Deceased: 60/F, Miyagi Prefecture)*

“Not only was she slow to get out and evacuate but she got caught in traffic where the tsunami came up and got her from behind.” *(Deceased: 60/F, Miyagi Prefecture)*

“I lost a good friend. This area is surrounded by ports and beaches but it’s not like any are in the immediate vicinity so we didn’t feel we were really in any danger, and just waited to see what would happen. On top of being slow to evacuate, he evacuated by car which meant the depressed roads were obstructed here and there, so he couldn’t proceed.”

*(Deceased: 60/M, Miyagi Prefecture)*

“There was a married couple in car trying to evacuate, but their car got caught by the tsunami. The wife couldn’t release her seatbelt, so only her husband made it out.”

*(Deceased: 50/F, Miyagi Prefecture)*

“It seems his car got swept away by the tsunami when he got stuck in traffic trying to evacuate.” *(Deceased: 30/M, Miyagi Prefecture)*

“My course of action was to quickly take a route to high ground that avoided routes congested with traffic. However my close friend’s evacuation route was congested, and the distance to high ground was a bit too far so he didn’t make it in time.”

*(Deceased: 30/M, Miyagi Prefecture)*

“Everyone who didn’t take the tunnel avoided major delays, and made it home after getting caught in traffic for only a short time. A guy from my job didn’t make it though. They found him close to his house, so I think he was trying to get home. However, I wonder if he got caught in traffic that was moving too slowly.”

*(Deceased: 60/M, Miyagi Prefecture)*

### **Unprepared and Too Slow to Escape**

“Even though there was no order to evacuate, nor any information from TV or anything like that, I thought it would be good to evacuate. I lost a relative, though. She wasn’t the only one. Many people who have experienced tsunami in areas hit before also didn’t evacuate. Before, their houses just got a bit wet, they thought it would be the same this time. So many people didn’t evacuate. On top of that, there was no evacuation order from the police, and no information from the media because of the power outage, which I think was the main cause.” *(Deceased: 60/F, Miyagi Prefecture)*

“In this town, there have been many tsunami warnings but the tsunami was never more than a few centimeters high, so she thought it was safe and that the town wouldn’t be flooded.” *(Deceased: Girl from Miyagi Prefecture)*

“She lived near the coast but oncoming tsunami was not visible from the house, so they didn’t notice it coming. The tsunami got them coming out of the front door when they were going to escape.” *(Another girl from Miyagi Prefecture)*

“I think awareness of the reality of tsunami is actually pretty low. She wasn’t prepared.” *(Deceased: 70/F, Miyagi Prefecture)*

“It’s likely that because the wave receded, she thought it was OK to leave shelter.”

*(Deceased: 40/F, Miyagi Prefecture)*

“Everyone felt safe that it would not come here like the tsunami in Chile. Such a deep tsunami was totally unexpected.” *(Little boy from Miyagi Prefecture)*

“After all, a tsunami never came that far in the past. He tried to evacuate to the designated shelter but still got washed away.” *(Deceased: 60/M, Miyagi Prefecture)*

“The shelter she evacuated to was not on the coast, so no one thought the tsunami would reach it.” *(Deceased: 30/F, Iwate Prefecture)*

“He evacuated his two aging parents to their relatives’ place at the shore, and then went back home once. I heard his car was filled with produce that he bought from a fruit & vegetable stand. Maybe he didn’t think it was a big deal, and didn’t take the situation as serious until then. Then his wife was swept away, and he tried his best to help her.”

*(Deceased: 60/M, Chiba Prefecture)*

### **People Who Didn’t Evacuate in Time**

“After the quake struck, she kept getting calls from family to see if she was OK. She was responding to all those calls.” *(Deceased: 70/F, Miyagi Prefecture)*

“He understood that the tsunami was coming, but decided to stay behind alone in the house.” *(Deceased: 70/M, Miyagi)*

“It seems that his coworkers were working at the same location when the great wave came directly toward them, but they didn’t notice it and just kept working. Still, they say that when you’re working at the harbor, wearing life jackets while you work is an ironclad rule. However the guys that didn’t survive weren’t wearing life jackets because they said it made it hard to move. That made the difference between life and death.”

*(Deceased: 40/M, Miyagi Prefecture)*

### People Who Were Unable to Evacuate to Safe Shelter

“I lost my best friend. In a fishing village, we’re usually near the water. Even though the information on the radio was totally wrong, we believed it at first. However the older people of the fishing village who have lived there for years started saying that something was wrong, and I guess they evacuated. There was no point in evacuating to those shelters because the village was completely obliterated by the tsunami, and the fire that came after. There was no place to escape. Many of my classmates, relatives and friends died, and several of my friends are still missing.” (*Young boy from Iwate Pref.*)

“I lost a close friend who was working at a hospital. The elementary school they were evacuating to was at low elevation, so it seems that she and the other nurses were unsure of what to do, and were slow to evacuate.” (*Deceased: 20/F, Miyagi Prefecture*)

“To begin with, the town was destroyed. The destruction wasn’t limited to just people whose houses were in the mountain side...everyone was washed away.” (*Deceased: 40/F, Iwate Prefecture*)

### Survivor’s Experiences

“The first shelter I escaped to was 6-meters high. Then I got Tsunami mail from Weathernews, which said 7 meters was the minimum safe elevation, so I thought I’d better move to a higher shelter further away. After that, the tsunami broke through the coastal levee. I thought the place I was before would be washed away, so I escaped. Later, it was. The tsunami came quickly, so many couldn’t escape. People trying to lend a hand, people trying to save their family, and children who couldn’t run fast enough were all swept away. I wish they had been given more reliable instructions. Then more would have made it. There was no power, we couldn’t use mobile phones, and there was no information from the car’s GPS, local community announcements, or 1seg TV. I did get information from the Tsunami and Earthquake alarms sent by email from Weathernews. Without those, I probably would have drowned at the first shelter. My friend and I tried to escape by running. The tsunami passed us on the right. About 200 people were swept away at once. I was carried about 300 meters by the wave, and saved myself by grabbing onto a branch. My friend got separated, and her body was found later.” (*20/F, Iwate Prefecture*)

“At first I evacuated to a hotel parking lot at high elevation. However, the aftershocks felt like the building and parking lot would start to crumble, so I moved to a different location. I was quick to start evacuation so I survived. I followed the advice my parents gave me: Don’t wait for a Tsunami.” *(60/M, Iwate Prefecture)*

“I escaped by bicycle – not by car. I think that’s why I made it out in time.”  
*(30/M, Miyagi Prefecture)*

“My father was listening to the radio when he suddenly shouted that a tsunami was coming and that we had to evacuate, forcing us into the car. Thanks to him, we made it out in time. I heard there was a lady in the neighborhood thought the tsunami would not come, then went to have a look at the sea, and started telling people outside.”  
*(30/F, Fukushima Prefecture. Deceased: 60/F)*

“I thought my location was safe, and didn’t know where to evacuate anyway. However, in some places the expressway served like a breaker. That stopped the wave from coming, and saved me.” *(20/F, Miyagi Prefecture)*

“There was a long, unusually strong quake, and we were near the coasts and riverbanks, so I knew that a tsunami would follow. My mother, nephew and I collected our valuables and some towels, before evacuating to the elementary school my 6-year old son attends. The school was on flatland, so I knew for certain that was not a place you could call safe from tsunami. But I thought that to drive to another location from there by car would be more dangerous, so we stayed.” *(40/F, Miyagi Prefecture)*

“Right after the earthquake, I ran outside barefoot. I went back inside to grab my shoes and a warm coat, then got out of there. It was such a big quake that I was sure a tsunami would come, so I ran. From the time I was a kid, it was drummed into my head that after a big earthquake comes a tsunami. I grew up hearing this lesson all the time from people who had experienced it before, so I was able to evacuate quickly.”  
*(30/F, Iwate Prefecture)*

“Instead of evacuating to shelter, I went home thinking that the tsunami wouldn’t come all the way here. Surely it can’t happen here, I thought. As luck would have it, the tsunami came within about 200 meters of my house before stopping. I thought that if it



came back again, we'd get swallowed up. Since there was no information, and I didn't know the wave would have come within just a few hundred meters, I couldn't have imagined how destructive it would be. While I was talking to a man I know outside who was trying to evacuate his family, the wave got them."

*(20/F, Miyagi Prefecture. Deceased: 60/M)*

"The road to the shelter was flooded by the tsunami, so I wasn't going to that shelter. The tsunami just barely missed us, but from 5 meters in front of us there was massive damage from flooding. Looking inside the house, I started to panic but the kids were there so I told myself to calm down in front of them. I started cleaning up to find a map and find an escape route, then headed out to pick up my other child from school. There were impassable roads everywhere you looked, and I had to take the long way to get to the school where my youngest child was, walking through rubble and puddles to finally get there. By the time I got back home, it was pitch black so I fed the children in the dark. Then I dressed them in several layers of clothes, and wrapped them up in the futon. My husband was at work, and couldn't contact us. Eventually, I was able to text him to say we were OK, not to worry, and to keep working hard. It seems that among his coworkers, he was the only one who came home after 9pm. He told me the roads were closed, and the traffic was terrible. Even if we had quickly headed to the shelter, I think it was flooded. I have children so I couldn't really move freely, but actually I wonder if that was really a good thing. When some other people in the neighborhood pulled their cars out, I was surprised to hear their car's engine rev. It seems they had to make a sudden U-turn!" *(20/F, Ibaragi Prefecture)*

"I heard about the tsunami announcement from my next-door neighbor, and saw the wave coming so I evacuated. The wave was almost close enough to swallow me."

*(40/F, Miyagi Prefecture)*

"About 300 of us working at a new construction site next to Sendai Airport were ordered by the company to evacuate and return to the head office. There was that big earthquake, so we were sure a tsunami would follow. The building at the construction site had only just been completed in March. Since they were perpendicular to the sea, the tsunami passed through the 1<sup>st</sup> floor, but left the 2<sup>nd</sup> floor undamaged. Several part-timers who just started at the site that month died." *(50/M, Miyagi Prefecture)*

“At the time, I was at Sendai Airport. I didn’t think a tsunami would come, but it actually came very close. After evacuating, the tsunami didn’t come for a while, but I think I survived because I stayed in the shelter.” (40/M, Miyagi Prefecture)

“I got someone in the neighborhood to tell me what was going on, so I was able to make the decision evacuate.” (30/F, Miyagi Prefecture)

“While my family continued to clean-up, I watched the tsunami rise and fall on the embankment until it got dark. The reason was that I wasn’t sure if the embankment would hold or eventually collapse. That day after it got dark, water started to swell out of the sewers, and I saw it get as high as a car’s tires. A little after 7pm, I realized that it would be impossible to drive, and I wouldn’t be able to go home for a while. So I got futon and flashlight, and whatever else I could stuff into the car, then evacuated to shelter. I kept my eye on the rising water all night, and at about 1am it was high enough that we couldn’t leave the elementary school we were using as a shelter.”  
(30/M, Miyagi Prefecture)

“Near Sendai Airport, there was an industrial park flooded by the tsunami. Since it was such a large earthquake, when I felt it I knew a tsunami would follow. I evacuated and survived.” (30/M, Miyagi Prefecture)

“Worried about my family, I figured that I should try to head home. Because of traffic, cars stopped moving, and water from a nearby river started flowing onto the road and covering us. A police officer from a nearby police station shouted at us to shelter inside. Taking notice, I got out of the car and was saved.” (20/F, Fukushima Prefecture)

“When I went out to work, the earthquake hit. Last year there was an earthquake followed by a minor tsunami, so I knew one would be coming this time, too. I evacuated without bothering to go to my company near the fish market.” (30/M, Miyagi Prefecture)

“Because it was a big earthquake, I knew a tsunami would definitely follow, so I immediately evacuated and survived. I’ve done evacuation drills in the past, because I heard tsunami stories from my parents. There’s a strong awareness of disasters around this area.” (40/F, Iwate Prefecture)

“My workplace is near the sea, but there are large rocks behind it the building so it wasn’t washed away.” (*Girl from Fukushima*)

“I wasn’t thinking that a tsunami would come but I heard about a tsunami warning from some people, and then evacuated. The expressway saved us. If we had been just a bit closer to the sea, everything would have been lost.” (*40/F, Miyagi Prefecture*)

“I wasn’t thinking that a tsunami would come. When the big earthquake hit, I got out immediately, so I wasn’t worrying about a tsunami.” (*40/F, Iwate Prefecture*)

“Maybe I survived because I evacuated without going home first.”  
(*30/F, Ibaragi Prefecture*)

“I saw the tsunami from high elevation. At the time of evacuation, I wasn’t driving along the coastline, and I think that’s what saved me.” (*20/F, Miyagi Prefecture*)

“I was near the waterfront. Though I wasn’t thinking a tsunami would come when I evacuated, the area around me looked like it was going to be swallowed up by it. Anyway, I headed for the hills!” (*40/F, Miyagi Prefecture*)

“I got out because I saw the tsunami. The traffic made me abandon my car, and I think that’s why I survived.” (*40/F, Miyagi Prefecture*)

“My office was next to a river 200 meters away from the water front. It wasn’t my eyes and ears, but fear that told me to evacuate. There was a major tsunami warning. If it had come 20 minutes later, and I think I’d be dead now.” (*50/M, Miyagi Prefecture*)

“The place I was at was flooded. Somebody reached out their hand, and helped me.”  
(*30/F, Miyagi Prefecture*)

“I think I made it because I went on foot, without using the car.”  
(*30/F, Miyagi Prefecture*)

“I was in a flooded area. A major tsunami warning came, so I got out. I survived because I was quick to evacuate. If it weren’t for eastside highway, I think the tsunami would have reached my house.” (*50/M, Miyagi Prefecture*)

“Water flowing up out of the sewers was flooding the roads. I think the expressways and construction sites around Sendai ports acted as breakers. Without those, I think the tsunami would have come as far as my house without any loss of momentum.”

*(50/M, Miyagi Prefecture)*

“I was standing in the middle of a flooded floor but was still able to evacuate somehow. Was it because I knew about events like the earthquake and tsunami in Chile last year?” *(30/F, Miyagi Prefecture)*

“Had I made my move to evacuate a few minutes later, I think my car would have been washed away.” *(40/F, Iwate Prefecture)*

“As soon as saw the tsunami coming, I started climbing the hill behind my house. When looked down to see the first floor covered in rising water, I climbed as fast as I could. My daughter is pregnant and had three children with her, and I didn’t think they would make it.” *(40/F, Miyagi Prefecture)*

“The evacuation shelter is near my house. The gas mains closed but the propane tanks fell over, and the pipes were bent. I evacuated while worrying about gas escaping and starting a fire. As luck would have it, a classmate who works as a carpenter had come to fix and outer wall. After we went to the shelter together, we went back to check the gas. My late father would spend all day fishing, and from the time I was small I would go with him. He told me about his fear of the sea and tsunami back then, so I had some awareness of the danger. That and Weathernews’ Tsunami Category which I checked all the time is what I think saved me.” *(30/F, Fukushima Prefecture)*

“I was nursing my 3-week old baby daughter in bed. As soon as the earthquake hit, all our lifelines were cut off. Though it was hard to get through on mobile phones, we got a phone call from my husband who works at the JSDF air base. He told us that the base was flooding, and to get out of the house ASAP. Maybe if we hadn’t gotten that call, our car would have been washed away while trying to evacuate.” *(30/F, Miyagi Prefecture)*

“I survived because I was quick to evacuate. I wasn’t sure if it was best to be evacuating by car. The major roads going to the suburbs in the hills were already congested, and there were many people stuck in traffic who couldn’t get out of their cars and were washed away. I had already passed that point less than an hour before.”

*(40/F, Miyagi Prefecture)*

“I was away from home at work. Frozen with fear, I evacuated when prompted by someone. The next day, I went home and everything was totally ruined. Everything was gone.” *(50/F, Iwate Prefecture)*

“I went to pick up my daughter at the elementary school, which was the shelter so we just stayed there and waited to see what would happen but the tsunami swept the school. The elevation was higher was right behind the school, so we went up there where it was safe. If I had been shopping in town or something, I think the car probably would have been caught in traffic where I couldn’t get to high ground even if I tried to run. And with a small child with me, I think we would have been swallowed up by the tsunami.” *(30/F, Iwate Prefecture)*

“I was at work at Sendai Newport. What I did after the earthquake was wait for support from my superior, but it wasn’t really forthcoming. Ultimately, I was prompted by someone to evacuate. I wasn’t thinking a tsunami would come but I did see that the place we were in would be swallowed up by it. It wasn’t a decision I could make by myself so that helped me.” *(20/F, Miyagi Prefecture)*

“An ambulance was coming, and I was outside directing the cars of people evacuating in order to clear the way for it. I had heard that a tsunami was coming, but not that it was a major one. I thought it would be about 50 centimeters deep, as usual. When I was outside, I heard a sound that I had never heard before. A young person evacuating heard it, too, and we both decided to get out of there.” *(40/F, Miyagi Prefecture)*

“Furniture and stuff fell down with the shaking, trapping me inside. Before I could clear a path to the front door, the tsunami hit. The shoe closet in the entrance fell, which meant I wasn’t getting out soon. There was so much shaking that fixtures in the kitchen and bathroom came off the wall. Securing furniture to the walls proved to be useless. With furniture and things strewn about the house, I couldn’t get out. While searching for valuables and house/car keys in the mess, the tsunami hit before I got outside.”

*(40/F, Miyagi Prefecture)*

“While the designated shelter was a dangerous option, at the same time I considered that moving to a safer secondary location would take time, be a burden on the evacuees, and make them start to panic; and thus was an even more limited course of action. As night fell, I imagined stress taking its toll on evacuees with children. From the speed of the rising tide, I could visualize the scale of the tsunami, and that it would be safer to stay on the 2<sup>nd</sup> floor instead of sacrificing ourselves on the 1<sup>st</sup>.”

*(30/M, Miyagi Prefecture)*

“The port was expanded, but I didn’t know that the sea had gotten quite a bit closer. Looking at a hazard map, there was nothing but flatland with no tall buildings, so there was no where to run. On top of that, the town’s designated shelter was a two-story elementary school near the port. The gymnasium had no roof access, and there was no place with higher elevation that we could use as a shelter. I heard lots of people evacuated to a hotel 2 kilometers away, but they had to pay first. The local landscape changed because the government expanded the port without considering the local population, and so a huge volume of sea water rushed inland from those new parts of the port. It was their fault this happened. As in neighboring cities, there were terrible losses from the tsunami that was totally beyond our control.”

*(40/F, Miyagi Prefecture)*

“I work at a senior citizen’s home. We got the official tsunami warning following right after the quake, and started instructing the residents to evacuate and move to the shelter. The first group was people confined to wheel-chairs. It was about 3:10pm when we got them into the van, and got out. After that, we noticed something was not right. From the direction of the sea, a black tsunami came pouring in. It came too fast, and residents that were napping at the time didn’t make it to the shelter. Staff as well as residents were swallowed up by the tsunami.” *(20/M, Miyagi Prefecture)*

“Power outage and no information. The information we did eventually get was terrible. I learned nothing from the tsunami warning I heard, and didn’t trust it. There was a 1~2 meter tsunami, but the emergency broadcast just said, “This is an official tsunami warning.” If they had just said, “Hey, a tsunami is coming!”, then I would have gotten out of there.” (60/M, Miyagi Prefecture)

“The power went out right when the quake hit, so I didn’t know about the tsunami. Water spilled out of the irrigation channels and drains, and the field in front of my house was flooded, but I didn’t think the tsunami was going to be like that.” (30/F, Miyagi Prefecture)

“The power outage meant no television, and I couldn’t use my mobile phone because the local infrastructure was damaged. In addition, I didn’t have a radio so no information about the tsunami came my way. On top of that, there was no evacuation order from the fire department or police, so I just stayed where I was, thinking it was safe. I went out to buy food, water and a water tank. Also, because of the damage to the local network, I couldn’t use my mobile phone for several days, and had no idea if my family was OK, and no way of letting them know that I was alright.” (30/F, Miyagi Prefecture)

“The shaking was very intense and lasted a long time, so I thought this was no ordinary earthquake. I rounded up my pets, and got them out into an open area with no buildings around us. I wasn’t considering a tsunami. Even if one came, I thought it would just be the usual shallow tsunami.” (50/F, Iwate Prefecture)

“The hospital where I work is a 7-story building, but I was waiting on the 2<sup>nd</sup> floor for my coworkers to come upstairs. My coworkers were on the first floor gathering supplies and paperwork. I wanted to evacuate to a higher floor, but my superiors and coworkers said, ‘The tsunami coming shouldn’t be that high, so let’s wait here.’ I was quite worried. Myself, I felt the danger right away but couldn’t take action.” (50/F, Miyagi Prefecture)

“I was using the computer at home. Just as I got up to use the toilet, I got a Tsunami warning email from Weathernews. At that same moment, it started shaking intensely. I crouched down under the computer desk because there was nowhere else to hide. I had just moved into a new housing development 5 kilometers from the coast because I heard that it was safe from tsunami. So I was still new in town, and the sheltering area was not widely known. No sirens went off, and there weren’t even any public warning announcements. About an hour after the shaking, the tsunami was upon me, and I was alone. If the warning siren sounded sooner, I could have gotten out. It was very frustrating. This is area I want to see improved in town. I went around the neighborhood knocking on doors and calling out to people trapped inside to see if they were hurt. Then when I got out onto the road, I saw people carrying crying babies. I gave them all the hot/cold water I could. Just once I was able to use my mobile phone to send mail to my family, and make sure everyone was OK. When I was outside distributing water, I spotted a car, and called out for them to stop so I could listen for any news on the radio. When I heard that the tsunami had inundated Sendai Airport, I couldn’t believe my own ears. While I tried to figure out what was happening, the car disappeared. A few seconds later, a pitch-black wave carrying trucks, large trees, and people poured in right in front of my eyes. Because I was standing on a slight incline in front of my house, the water poured in as I ran upstairs to the second floor. If I had been standing out in the street with my back facing the tsunami, I would have been carried away, too. It was really terrifying.” *(40/F, Miyagi Prefecture)*

“Because I heard from the radio that the tsunami was 2~3 meters high, and school had just finished for the day, my brother walked home along the water’s edge just like we always do to see if there were any of our classmates on the road. Our house is a just little high up, so we were surrounded by the tsunami and isolated but safe from danger. If the tide was just a bit higher, me and my whole family would have died. Because my brother was exchanging information with people in the neighborhood, the tsunami came and rose up his legs. He is tall, and strong from practicing Judo, so he was able to survive by holding onto a fence.” *(Young girl from Iwate Prefecture)*