

JAPAN TRIP 2012

When the gigantic tsunami hit the Tohoku region on March 11, Kazuya Kikuchi was just getting out of his truck at Sendai port. As he saw the killer waves swallow up a bunch of brand-new Toyotas at the harbor waiting to be shipped, he was frozen by the surreal sound of metal against metal—a sound he said he will never forget.

After the cars' alarm systems set off a cacophony of honking. Kikuchi ran into a nearby building and dashed up five flights of stairs, getting away just in time. Kikuchi was spared, but the things he saw and the terror he felt that day have been haunting him ever since.

"I haven't been able to have a decent night's sleep in the past several weeks. My sleep has been cut short," the truck driver in his 40's said during an interview in Shiogama, Miyagi. "The scene and that sound keep coming back."

- Mizuho Aoki, "Reaching Out to Traumatized Victims", The Japan Times Special Report: 3.11 – A Chronicle of Events Following the Great East Japan Earthquake, p. 51

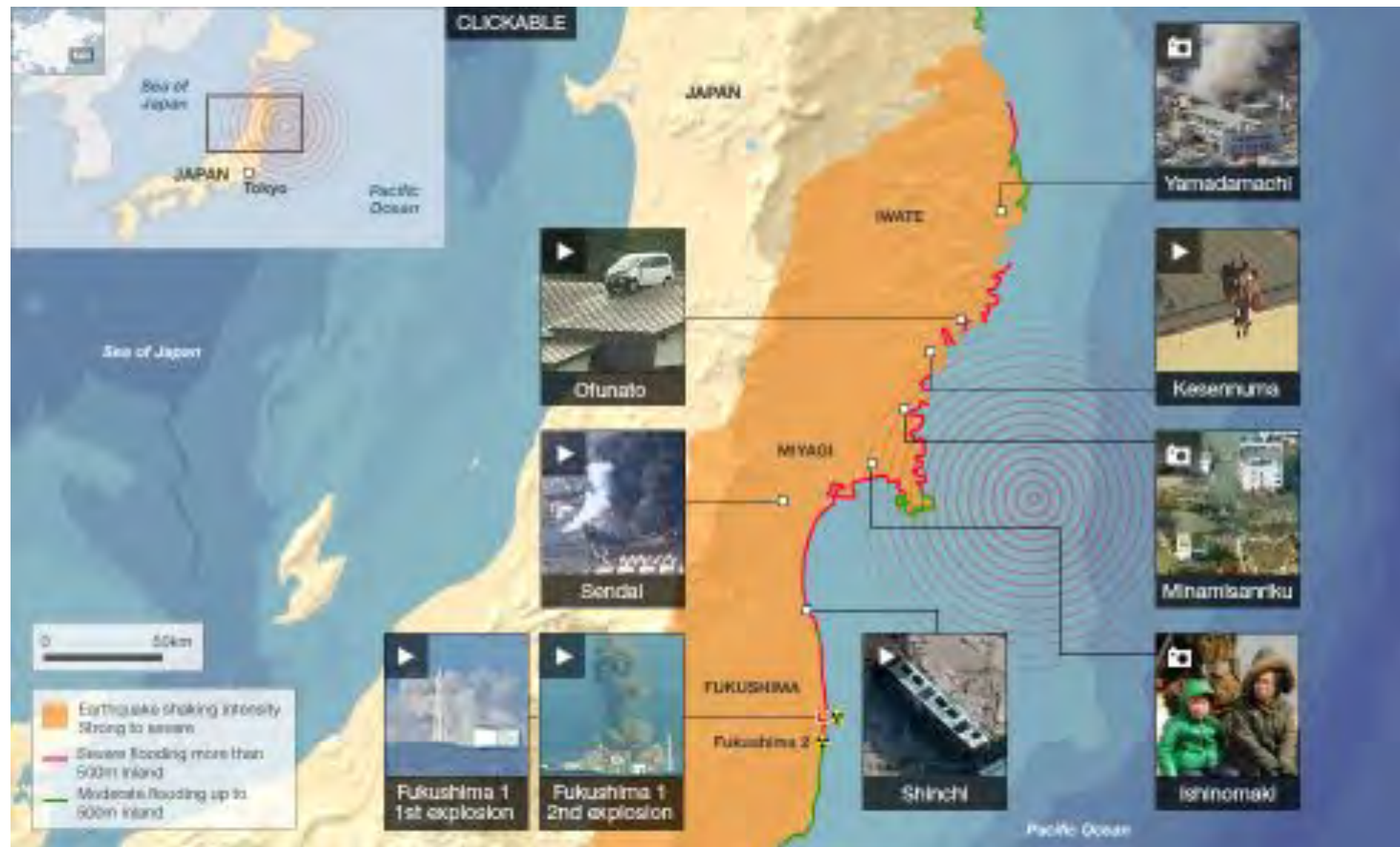
By all measures, the Great East Japan Earthquake, the official name of a massive earthquake that struck off the coast of Japan last year, was a catastrophic event. Occurring on March 11, 2011, this earthquake measured 9.0 on the Richter Scale, making it the 4th largest earthquake in recorded history. It shifted the earth's axis by 25 centimeters and shortened the day by 1.8 milliseconds (Chronicle p. 6). This earthquake triggered a massive tsunami and a nuclear power plant meltdown, resulting in a nuclear disaster not seen since Chernobyl in 1986. The grisly results are difficult to digest (all numbers are from 6 June 2012 unless otherwise indicated):

- 15,861 confirmed deaths
- 3,018 people still missing
- 6,107 people injured
- More than 400,000 people evacuated their homes
- 344,000 evacuees still living in temporary homes (as of 29 Feb 2012)
- 129,225 buildings totally destroyed
- 254,204 buildings "half-collapsed"
- 691,766 buildings partially damaged
- 500 square kilometers of land was flooded
- 22,000 fishing boats were destroyed

While these numbers are startling, they don't tell the entire story. The real story lies within the individuals who experienced and were affected by this earthquake, tsunami, and nuclear threat. It was our desire to hear these stories that brought Marlana Sheridan and me to Japan this summer. We sought to visit the areas and people most affected by this disaster, becoming a witness to their lives and experiences while letting them know the world still remembers them.

LOCATION

We stayed in Sendai, a city in Miyagi Prefecture. From Sendai, we travelled to areas in Miyagi, Iwate, and Fukushima Prefectures that were most affected by the tsunami. Of note, we spent considerable time in Sendai, Desenuma, Minamisanriku, Ishinomaki, and Minamisoma (near the Fukushima Nuclear Power Plant).



<http://www.bbc.co.uk/news/world-asia-pacific-12722187>

The human cost



Dead
15,853

Injured
6,023

Missing
3,282

Casualties by area



More than 330,000 living in temporary accommodation

Source: National Police Agency of Japan - 27 Feb.
2012

SENDAI

Effects of the Earthquake and Tsunami

Sendai is located in Myagi Prefecture. Here are the statistics for Myagi:

MYAGI PREFECTURE	
Dead	9,512 (as of 12 March 2012)
Missing	1,688 (as of 12 March 2012)
Evacuees	127,792 (as of 8 March 2012)

Source: Japan Times, [3.11 One Year On: A Chronicle of Japan's Road to Recovery](#), p. 8

Our Hosts: The Nakamuras:

In Sendai, we stayed with family friends Kayo and Tadahō Nakamura. After receiving his M.D. and specializing in anesthesiology four years ago, Tadahō married Kayo. Three years ago they moved to Sendai so Tadahō could complete a PhD in pharmacology at Tohoku University Medical School.



Clockwise: Marlana, Me, Tadahō, and Kayo

On March 11, 2011, both Tadaho and Kayo were at work in Sendai.

Tadaho was in his lab on the 6th floor of an academic building in the middle of Sendai. During the first 10 seconds, he quickly stood. However, as the earthquake continued, amplifying in strength with each passing moment, he dove under a desk. While under the desk, he could hear his laboratory equipment and books crash to the ground. The electricity flickered on and off, ultimately leaving everyone in the dark. His mind began to drift: “Is my research going to be okay?”.



Tadaho's office after the earthquake

All the while, he could hear a screeching crescendo around him. The concrete building that housed his lab was cracking and straining under the earthquake's force. As the chaos and reverberations around him increased, it soon dawned on him that this earthquake could be more severe than most earthquakes that strike this earthquake-prone nation. Instantly, his thoughts darted to more profound matters: “Is my wife okay?” and “Will I survive?”. After five more minutes, Tadaho and his coworkers began their escape from their building. After descending down the dark, damaged stairwell, they waited in the parking lot for 30-60 minutes.

It is important to keep in mind that a tsunami as large as 133 feet would soon follow this earthquake. Tsunamis do not always follow earthquakes and, if they do, they are rarely as large and devastating as the one that hit Japan that day. Thus, the Japanese people, responding to an earthquake as they usually do, would have been vulnerable to the effects of the large tsunami. As Tadaho reminded me, if his building was closer to the ocean and on lower ground, his coworkers and him would have been killed by the subsequent tsunami.

Kayo, meanwhile, was at her office, surrounded by the earthquake's destruction. The office was in disarray and, like Tadaho's office, without electricity.

Emerging from her office, it was apparent there was no way to drive home. She would have to walk through the ravaged city.

Kayo and Tadahō carried their worry and concern for one another over the next five hours as they walked home. After arriving home they were reunited, thankful for their survival and good fortune.



Tadahō and Kayo Nakamura

Day 1: Kampo Medicine

On our first day in Japan we met Dr. Shin Takayama and Dr. Seki. Our day was spent learning about Kampo Medicine, which is the Japanese adaptation of traditional Chinese medicine. It uses diagnoses that address one's chi (energy), blood, and humors. Treatment options include acupuncture, herbal medicines, and massage. Dr. Takayama summarized the relationship between Western and Kampo medicine in this way, "Western medicine treats an organ. Kampo medicine treats the whole person." These two medical philosophies work best together, he added. This philosophy and concept really resonates with me. It makes logical sense that all aspects of our lives influence one another and they all influence our health and well-being.

We made our own herbal medicine, mixing the ingredients together and brewing them like a tea. The medicine we created was meant to help with cold-like symptoms, warming up one's body, and infusing energy. It seemed to work, as I felt energized and a feeling of warmth spread over me. And it tasted pretty good...a quality unheard of in Western medicines. Quite cool!



Dr. Takayama displaying some medicinal herbs



Marlana mixing medicinal herbs w/ Dr. Seki



Me mixing medicinal herbs w/ Dr. Seki



Creating Kampo medications!

Next, we learned about acupuncture. Acupuncture is a Chinese practice that uses small, thin needles to unblock and balance the flow of chi (energy) through meridians (pathways). The practice is used in the US; however, it is mostly relegated to musculoskeletal problems, for which evidence-based research has proven it to be quite beneficial. Asia, on the other hand, uses acupuncture for a wide range of maladies, including musculoskeletal, psychological (Alzheimer's Disease and dementia), liver function, and glaucoma...anything really! Marlana and I practiced a little on one another. We put needles in one another's knee joint, causing a unique, difficult to describe sensation throughout my body.



A model displaying “meridians.” It is through the interconnection of these pathways that an acupuncture needle in the knee, for example, can help with liver disfunction.



My knee with an acupuncture needle in it.

We also spent time with Dr. Takayama's clinic. A quick note: Dr. Takayama is an M.D. and has been trained and practiced modern medicine. However, he did a fellowship in Kampo medicine and uses that in his practice. Traditional medicine is never a replacement for modern medicine, merely a compliment to it. Most patients he saw were individuals who had been seen by other physicians practicing modern medicine. Modern medicine was unable to diagnose or help these individuals. Through traditional medicine, many of these patients experienced improvements in their conditions. There was a language barrier for Marlana and I, so the mechanism and reason for these improvements weren't entirely clear, but it was clear from the patients' reactions to Dr. Takayama that his practices had helped them. Interestingly, all of his diagnoses focused on energy and its flow. Far different from the disease model practiced in the US.

Kampo during the Great East Japan Earthquake

Finally, Dr. Takayama shared his experiences during the Great East Japan Earthquake. The earthquake and resulting tsunami and radiation threat created large logistical and medical problems. First, power was lost during the disaster and for days, sometimes weeks afterwards. So, those patients with terminal or chronic illnesses were in dire straits. Some were helicoptered to other parts of Japan and other hospitals. Those who remained were given what western medicines remained. However, western medicines quickly ran out and no supplies were able to make it into the area. So, Kampo medicine was used to great effect.

For example, many people emerged from the devastation suffering from chronic pain and neck and shoulder stiffness. According to a paper published by Dr. Takayama, about 550 people in the disaster region were treated with massage and acupuncture, with 92.5% reporting satisfaction with the treatment and alleviation of physical and psychological distress (Takayama, S. et al. "Report on Disaster Medical Operations with Acupuncture/Massage Therapy After the Great East Japan

Earthquake.” *Integrative Medicine Insights*. 2012; 7: 1-5.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3342075/>).



Massage therapy given in evacuation center after the earthquake

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3342075/figure/f2-imi-7-2012-001/>

In this moment I was struck by the importance of knowing disaster medicine. Much of what we spend our time learning in medical school in the US is predicated on the latest technology, which is a wonderful extension of our senses. However, in disasters such as the Great East Japan Earthquake technology is not available. Additionally, the suffering and need for help are acute and at their highest. We, as physicians, need the skills to help those in need even when there are not medicines and technology is not available. I don't know how you learn those skills other than through experience, but I now know the importance and value of fostering those fundamental traits and skills when I am able throughout my medical education.

Day 1: Dr. Nakamura's experiences helping victims of the tsunami

In the evening, Tadahiko spoke to us about being a physician during the tsunami. As I mentioned earlier, on March 11, Tadahiko was in his laboratory. However, in the following weeks, he served the areas ravaged by the Great East Japan Earthquake as a physician. Given the level of destruction, it was tireless work for all care givers. In describing the people he met he said something that was initially surprising to me. There was a difference in some of the people who had been affected by the tsunami, he said. They are not "Japanese" any longer, meaning they no longer exhibit the warmth and hospitality for which the Japanese are known. They can be rude, short, and resentful; all of which are signs of post-traumatic stress disorder (PTSD). At times, they would reject Tadahiko as both a physician and an outsider. He did not suffer greatly during the tsunami, they would rationalize, so he would not understand their struggles.

Day 2: In the Operating Room

Today, we spent time with Tadaho in the operating room (OR). Even though he is currently getting his PhD, he works as an anesthesiologist one day every week.



Marlana and me scrubbed up in the OR!

The patient was a 77 year old female with lower colon cancer. The surgery was a colectomy to remove the malignant tumor.

The surgery took 6 hours. The first three, the surgeons poked five holes into the woman's stomach. The first hole was punch and they used it to put CO₂ into her abdomen, inflating her abdomen like a balloon. This allowed them to put a camera in her and make the other 4 holes. During the surgery, these holes were used for a camera, three claws, and a machine that emitted high frequency waves that broke up connective tissue. Pretty amazing! They spent a majority of the surgery navigating the bowels, trying to get to the rectum. Then they resected the rectum. The tumor was surprisingly very small. The surgeons were able to connect the descending colon to the remnants of the rectum, meaning the woman would not need to have a colostomy bag.

I was surprised how much work Tadaho had to do as an anesthesiologist. He had a lot of maintenance work to do. He has to have an expert understanding of physiology, pharmacology, and chemistry to ensure the patient's vital signs remain balanced.

He explained to us the principles of anesthesiology. Here are the steps of an operation:

1. Pre-operative/pre-anesthetic evaluation – ensure the patient is physically and emotionally ready for an operation.
2. Admission into the OR – ID the patient (i.e. – name, birthday, operation).

3. Vigilance and Ventilation – constantly ensure the patient’s vital signs are normal.
 - i. Induction
 - ii. Maintenance
 - iii. Recovery
4. Discharge from OR
5. Post-operative/post-anesthetic evaluation

Here are the four components of general anesthesia:

1. Sedation/loss of consciousness
2. Analgesia (pain management)
3. Immobility (muscular relaxant)
4. Elimination of adverse effects

The Japanese seem to have different surgery protocols. Sanitation was a high priority for those touching the patient, but otherwise there were many instances where gloves weren’t used and casual sanitation was used. Also, we were able to go in and out of the OR. I’m not sure that is allowed in the US, even though I greatly appreciated that today.



Marlana, me, and Tadaho



Marlana, me, nurses, and anesthesiologists

Day 3: Hiraizumi

Hiraizumi is in Iwate Prefecture. Beginning in 1100, for about 100 years it was the capital of Oshu, which encapsulated about a third of Japan. In fact, it rivaled the power and splendor of Kyoto, the capital of Japan at the time. Seeing Hiraizumi as a threat, forces from Kyoto invaded Hiraizumi and seized all of its land. Many of the original structures in Hiraizumi have since been destroyed by fires. However, what remains has been designated as a UNESCO World Heritage Site.

The first site was Motsuji Temple, which is a temple honoring Yakushi (“the healing Buddha”). All that remains of the original complex are foundations of temples and buildings. It is most famous for the surrounding gardens and lake.



Hondo (“main hall”) of Motsuji Temple



Garden and lake surrounding Motsuji Temple



Stream in Motsuji Temple

The next site was Chuson-ji Temple, which is a UNESCO World Heritage Site. It is famous for the Konjikido (“Golden Hall”), which honors Amida (“the Buddha of Infinite Light”).



The steep path leading to Chuson-ji



Chuson-ji Temple



Posing as samurai



Konjikido ("The Golden Hall")



Three Great Buddha's in the Chuson-ji museum



Day 4: Sendai and Mottanai

Today, we explored some sites around Sendai. Of note, there was a *torii*, or gate leading to a Shinto shrine, that was destroyed by the earthquake.



Shinto shrine in Sendai



Torii destroyed by earthquake

We also learned about a Japanese concept called “*mottanai*”. It was difficult for Tadahō and Kayō to explain the idea, but I found the concept fascinating. Here are some definitions:

- wasteful (How wasteful to let the water run like that.)

- Your praise is more than I deserve.
- Her fine cooking will be wasted on a man like that.
- It is a sacrilege to put a Buddhist image in such a place.

When I looked it up on [Wikipedia](#) the following was said: “*Mottainai* in Japanese refers to far more than just physical waste (resources) as in other cultures. It can refer to wasted and wasteful efforts and actions, activities, time, souls, talents, emotion, minds, dreams, and potential. It is even used to refer to thought patterns that give rise to wasteful action. Mottainai activities commonly lead to anger or protest when the person who is observing the utter waste is incapable of holding back their emotions. Those who do not dwell on the negative and are resigned to move on are more capable of sadly regretting.”

Day 5: BBQ

One of the major exports of America to Japan is the concept of BBQ. Tadaho has discovered the BBQ Pit Boys at [bbq.com](#). He cooked a great meal of chicken, chicken hearts, sausages, and fish. Quite delicious!



Tadaho barbequing



Day 5: Diabetes in Japan

During our meal, Tadaho's brother-in-law Dr. Keizo Kaneko, who is a physician specializing in metabolic diseases, gave Marlana and I a presentation on diabetes in Japan. Essentially, Japanese and American people are physiologically different. The Japanese produce less insulin than Americans. This fact means that even though very few Japanese are overweight (BMI >30), a high proportion of the population has Type 2 diabetes. Individuals afflicted with this disease were confronted with a problem during the Great East Japan Earthquake. Regions affected by the earthquake could not get adequate supplies of insulin. Thus, diabetic patients had to be helicoptered to other regions of Japan to get care. Furthermore, food and water were in low supply, especially in those regions affected by the nuclear disaster. The food that was brought in for the refugees, unfortunately, was highly processed and high in carbohydrates and fats. This diet made controlling diabetes extremely difficult.



THE REST OF OUR TRIP

For the rest of our trip, we traveled to towns and areas most affected by the tsunami.

MINAMISANRIKU

Effects of Earthquake on Minamisanriku

Minamisanriku is located in Miyagi Prefecture. During the first week following the Great East Japan Earthquake, about 10,000 people, more than half of the town's population, were missing (Japan Times, 3.11: A Chronicle of the Events Following the Great Japan Earthquake, p. 13).

MINAMISANRIKU (as of May 14, 2011)	
Dead	514
Missing	664
Evacuees	4,870

A powerful account of the events of March 11, 2011 is recorded in the following excerpt from a news article written by Alex Thomson. An English teacher named Shinji Saki recounts his memories to Mr. Thomson.

"The whole thing. First there was the quake, the shaking. Then, the sirens warning there would be a tsunami. I was already here, teaching, upon the hill. But in a few minutes you heard this huge roar and then it all began. We watched as our entire town was simply swept away. It just no longer exists."

I look at him, genuinely wondering how it must have felt for those gathered on the hill on Friday watching their friends, family, businesses, being washed away before their eyes.

"There were around 7,000 of us on the hill that day," Shinji says. "Perhaps, a few thousand at the school on the hill opposite. That was it really. Seven thousand people here, but there are 17,000 in the town. All the others have gone."

He shrugs, looks at me: "Who knows if there are eight or ten thousand people still missing here. I just can't comprehend it."

We are about to walk away when he looks at me, opening up about the horrors he has just witnessed.

"You see, there was this man. I saw him going past on this water, sitting on the roof of his house as it floated by. I saw him. I looked at him and there was nothing at all I could do."

All the schools were full the Friday afternoon the tsunami struck. The buildings are all on high ground, built on the mountain side, so there are many children who have lost their parents. (Thomson, Alex, "Minamisanriku: Japan's tsunami-hit ground zero,"

Channel 4 News. <http://www.channel4.com/news/minami-sanriku-japans-tsunami-hit-ground-zero>)



Minamisanriku – March 2011

http://www.channel4.com/news/photo-gallery-japan-earthquake-and-tsunami/display/image/japan_new4



Minamisanriku – March 2011

http://www.washingtonpost.com/blogs/blogpost/post/japan-tsunami-minamisanriku-a-fishing-port-that-vanished-/2011/03/13/ABulj1T_blog.html

Takeshi Kanno and Shizugawa Hospital

On March 11, 2011, Takeshi Kanno was a young physician at Shizugawa Hospital, a public hospital in Minamisanriku. That afternoon, when he heard the

tsunami alarm, he quickly began moving patients to the roof of the five story hospital. There was not much time between the earthquake and tsunami, but in that time Dr. Kanno was able to save dozens of patients by getting them to the roof. When the tsunami came, it flooded the entire hospital except for the roof. The next two days for Dr. Kanno were spent caring for patients on the roof of the hospital. It was not until the last patient was helicoptered to safety that he left. Three days after the earthquake he was reunited with his wife, moments before the birth of their second child. He was named one of the “100 Most Influential People of 2011” by TIME Magazine. (Mahr, Krista. “Takeshi Kanno.” The 2011 Time 100. http://www.time.com/time/specials/packages/article/0,28804,2066367_2066369_2066313,00.html)



Takeshi Kanno

Dominic Nahr/Magnum for TIME

http://www.time.com/time/specials/packages/article/0,28804,2066367_2066369_2066313,00.html

For most of those in Shizugawa Hospital, help did not come fast enough. While 200 people were rescued from the hospital’s roof, only 35 of the 107 patients survived. The rest drowned or died of hypothermia. Dr. Kanno describes his feelings that day, “I felt so helpless. [As a doctor] I was so frustrated and angry that I couldn’t save everybody. All I could do was sit [next to patients], and watch them take their last breath.” (Fujita, Akiko. “Hero Tsunami Doctor Still Coping with Japan’s Disaster One Year Later.” ABC News. http://abcnews.go.com/International/hero-doctor-tsunami-recovery/story?id=15856852#.T9t797_a9ax.)



Shizugawa Hospital - May 2012
Note the boat resting on the second floor

Crisis Management Building

One of the symbols of last year's tsunami is this hollowed out government building in Minamisanriku. Out of 130 government workers, only 30 made it onto the roof of the three storey building, including the town's mayor and Miki Endo. Miki Endo was an employee of the Crisis Management Department. Using a loudspeaker, she, along with the town's mayor, made several announcements and warnings concerning the impending tsunami to the town's citizens. Unfortunately, Mrs. Endo went missing when the tsunami hit this building. She was later confirmed dead. Of the 30 people who made it to the roof, only 10 survived. Those 10 survived by holding onto poles and rails as the torrent rushed over them.



Before and After: Crisis Management Building, Minamisanriku

<http://www.nippon-sekai.com/main/articles/great-east-japan-earthquake-of-2011/haunting-minami-sanriku-tsunami-images/>



Crisis Management Building immediately after the initial wave had passed
 Note Shizugawa Hospital in the background and the few survivors on the building's roof holding on to poles and railings.



Crisis Management Building – May 2012

Japanese citizens come by the busload to sites affected by the tsunami to honor and remember the victims. For survivors, this “tourism” of their destroyed lives is a double edged sword. On one hand, it brings in attention and money to rebuild their town. On the other, their destroyed lives are now tourist attractions for outsiders.



Tadahito praying for the victims of the tsunami

The town of Minamisanriku in 2012





Cars destroyed by the tsunami

Every town we visited had a football field sized area completely covered with destroyed cars stacked on one another. We were told the government wants to contact all vehicle owners and ask them what they would like done with their cars.





Trash and debris

Every town we visited had numerous piles of trash and debris stacked throughout the city.

Minamisanriku Festival

While we were in town there was a festival with food and entertainment to raise money for the reconstruction of Minamisanriku.





ON THE ROAD

As we drove from Minamisanriku to Kesennuma, the devastation of the earthquake and tsunami were evident all around us.



The remains of the Japan Railway



Rows of cranes that symbolize prayers and thoughts for tsunami victims

KESENNUMA

Effects of Earthquake on Kesennuma

KESENNUMA (as of 14 May 2011)	
Deaths	928
Missing	609
Evacuees	4,580

Kesennuma was a large fishing port, housing several large fishing boats. Also in this town was an oil tanker to refuel ships when they came into port. When the earthquake and tsunami hit this town, these fishing vessels crashed into one another and the oil tanker was destroyed, releasing the oil held in their hulls. When this oil was ignited, a raging fire burned the city. The fire burned for almost a week.



The Ship

Kesennuma houses another symbol of the Great East Japan Earthquake, a giant fishing vessel resting upright in the middle of the city.





As we saw in Minamisanriku, buses of individuals came to this town. Prayers were offered at the ship and throughout the city. However, the touristic element of these people's visit struck me. For survivors, I imagined the hurt victims must feel when outsiders travel to their destroyed home as a tourist. I began to understand Tadaho's observation that survivors rejected the help and attention of outsiders. Even immediately after the disaster, divisions were drawn between victims and everyone else.



Temporary Markets

As in most destroyed towns we visited, Kesennuma had temporary markets that were erected for the remaining citizens. This resilience is a trait historically seen in Japan's response to disaster. For example, after the atomic bomb was dropped on Hiroshima in 1945, temporary markets were erected to serve the citizens remaining in the city. An amazing sign of resiliency and strength in the face of devastation.



Business shack after atomic bombing in Hiroshima - 1945



Temporary market in Kesennuma - 2012

While in the temporary market in Kesennuma we visited with one of the storeowners. He moved to the town about 3 years prior to the tsunami. His house was brand new. When the tsunami crashed into the city he and his wife were able to find safety on a nearby hill, where they saw their city destroyed and literally watched their new home become uprooted and wash away.



The town

As we saw in Minamisanriku, this town was destroyed and there were piles of debris, trash, and cars everywhere. The only difference is that in Kesennuma the cars were rusted and burnt from the fire.







MINAMISOMA AND FUKUSHIMA

Effects of the Earthquake on Fukushima

Fukushima is a prefecture (i.e. a state) in Japan. One city within Fukushima is Minamisoma, which is about 23 km from the Fukushima #1 Nuclear Power Plant that melted down as a result of the earthquake and tsunami. In addition to the devastating effects of the earthquake and tsunami, this area dealt with one of the worst nuclear disasters in history.

FUKUSHIMA	
Dead	1,605 (as of 12 Mar 2012)
Missing	214 (as of 12 Mar 2012)
Evacuees	97,946 (as of 8 Mar 2012)

Nuclear Disaster

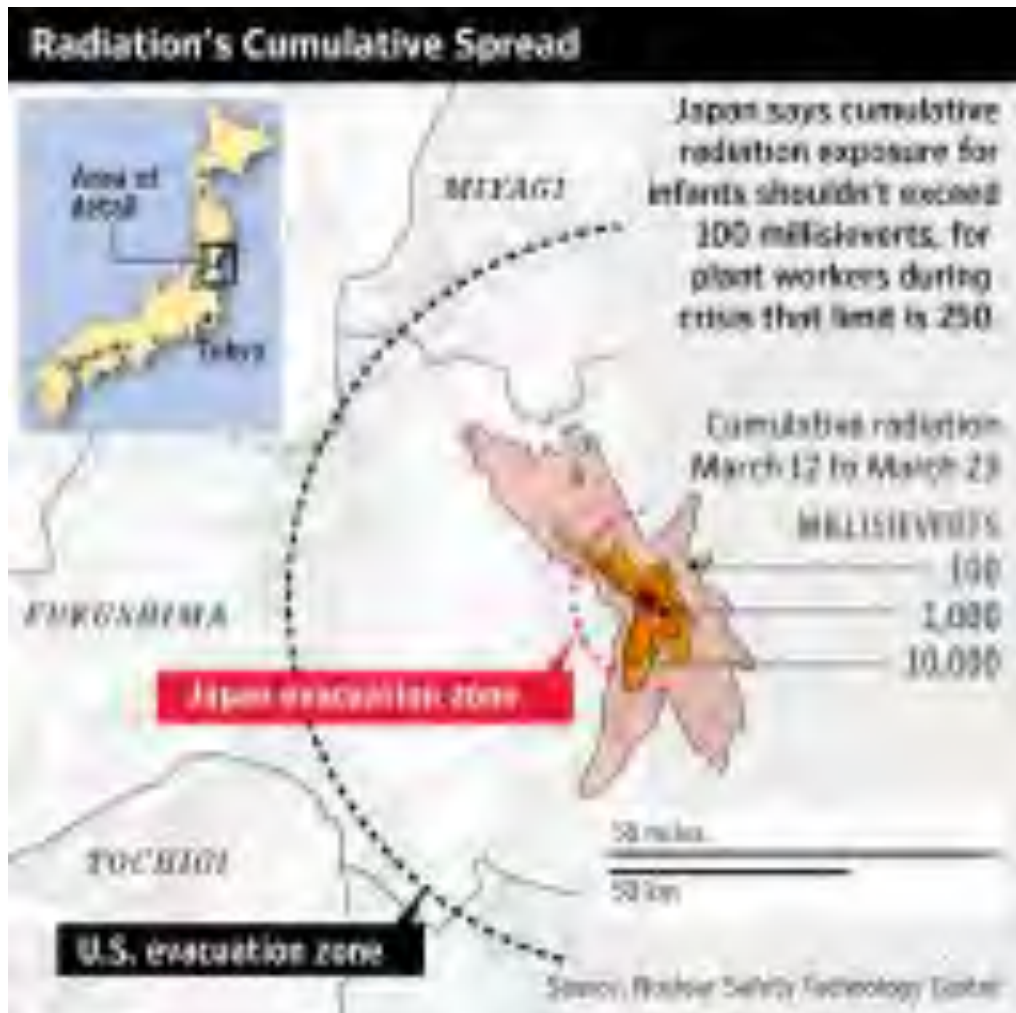
When the Great East Japan Earthquake began, several nuclear power plants, including Fukushima, shut down automatically. At Fukushima, diesel generators began supplying energy to the nuclear complex delivering the power necessary to maintain circulation of cool water required to cool the hot nuclear core. In about 30 minutes, a giant tsunami hit the complex, causing the diesel generators to stop functioning. A “State of Emergency” was issued, creating a cascade of ever increasing evacuation areas around the nuclear power plant. With the nuclear complex structurally damaged, ocean water flowing into the reactor areas, and the coolant no longer circulating, the nuclear core overheats causing the water in the reactor to boil. The temperature in the reactor steadily increased as steam accumulates, eventually causing a hydrogen explosion at the Unit 1 reactor on 12 Mar 2011. In response, the evacuation area around the power plant was increased to 20 km and the Tokyo Electric Power Company (TEPCO) began spraying seawater into the reactor to serve as a coolant.



Unit 1 Reactor

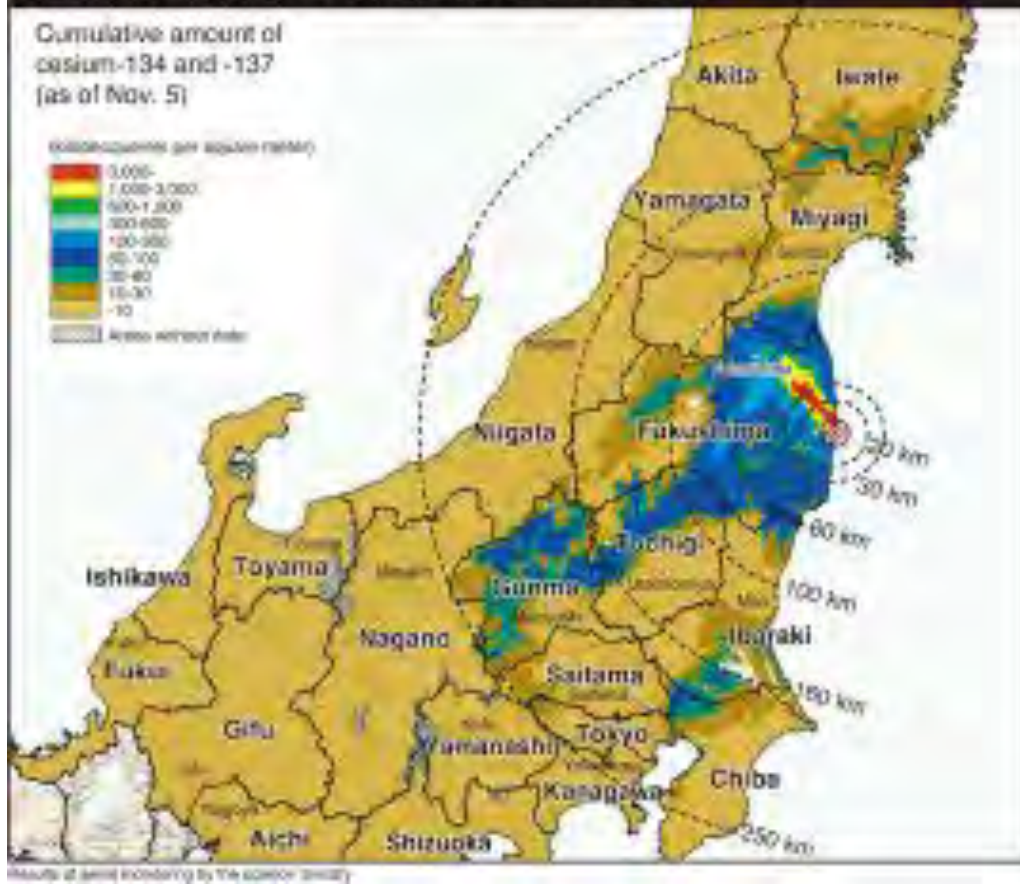
<http://www.scientificamerican.com/article.cfm?id=one-year-later-fukushima-nuclear-disaster>

Over the next few days, TEPCO continued to use seawater as a coolant for all of the reactor units to prevent another meltdown and explosion. Unfortunately, a series of explosions occurred in the coming days: hydrogen explosions occurred at the Unit 3 reactor (14 Mar 2011) and Unit 2 reactor (15 Mar 2011). In addition, a fire began at the Unit 4 reactor (15 Mar 2011). (<http://www.scientificamerican.com/article.cfm?id=one-year-later-fukushima-nuclear-disaster>). These events spread radioactive materials into the atmosphere, ocean, forests, and soil not only of Japan, but the world.

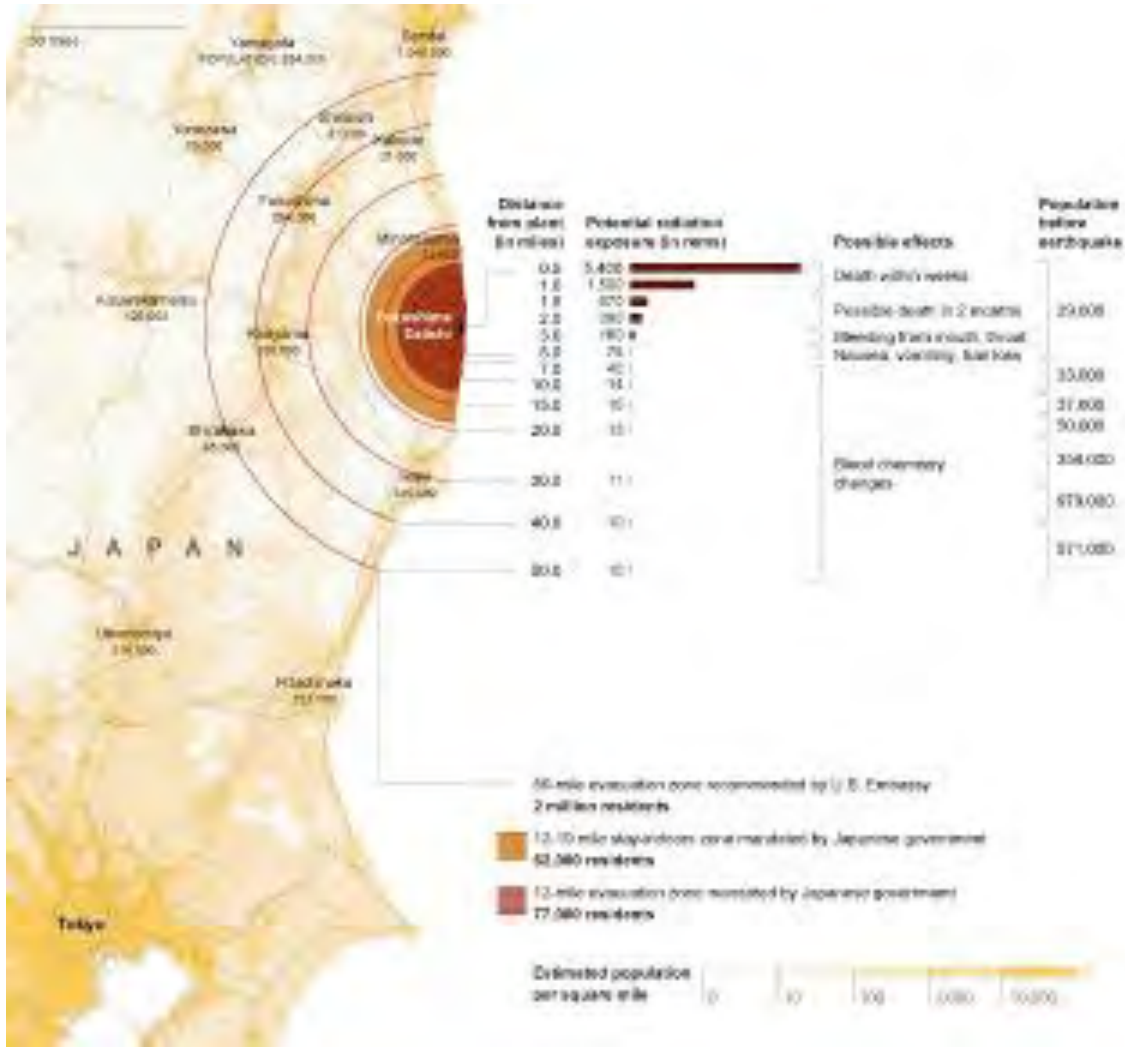


<http://online.wsj.com/article/SB10001424052748704517404576224563960070934.html>

Surface deposits of cesium-134 and -137



<http://www.japantimes.co.jp/text/nn20120308f1.html#.T1gAYJonvm8.twitter>



<http://www.pedalforjapan.com/p/disaster.html>



Edge of the evacuation zone, which is now 10 km from the nuclear power plant

According to the International Atomic Energy Association's (IAEA) International Nuclear Event Scale (INES), the meltdown of the Fukushima Dai Ichi Nuclear Power Plant is rated a 7, the highest rating on the INES. The only other disaster to be given a rating of 7 was the Chernobyl nuclear disaster in 1986. According to the INES, a level 7 is described as the "major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures." (Hayden, Erik. "What Does 'Fukushima Is Now As Bad As Chernobyl' Actually Mean." *The Atlantic Wire*. 12 Apr 2011. <http://www.theatlanticwire.com/global/2011/04/what-does-fukushima-bad-chernobyl-actually-mean/36575/>).

Fukushima vs. Chernobyl

	FUKUSHIMA DAIICHI	CHERNOBYL
DATE	11 Mar 2011	26 Apr 1986
CAUSE	9.0 earthquake caused cooling mechanisms to fail, leading to several gas explosions	Sudden power output surge during systems test caused reactor vessel to rupture, leading to series of explosions
REACTORS	Boiling water reactors	Graphite-moderated boiling water reactor <ul style="list-style-type: none"> • Graphite makes core highly combustible
RADIATION RELEASED	900,000 terabecquerels	5.2 million terabecquerels
AREA AFFECTED	60 km (36 miles)	500 km (300 miles)
HEALTH RAMIFICATIONS	None expected	Thyroid cancer in young

Effects of Radiation

To make some of these effects more practical, we met with Dr. Masaharu Tsubokura, a hematologist who has become a radiological oncologist. He studies the effects of radiation on the population of Fukushima Prefecture. According to his findings, internal radiation in Minamisoma averages 0.7 microsieverts/hour, which is less than the radiation an airplane (5 microsieverts/hr) and an x-ray (60 microsieverts/hr) releases. The radiation settles in the soil, not on asphalt. So, the radiation levels are low in Fukushima, meaning the health threat due to exposure is also low. However, in a prefecture that is predominantly agricultural, blue collar, and poor, there is still a radiation threat. If people who subsistence farm eat their own produce, their internal radiation will be elevated. If they did not evacuate their homes close to the power plant, their internal radiation will be elevated.



Full Body Scanner in Minamisoma

Used to measure the internal radiation of all citizens of Minamisoma and the surrounding areas once per year.

All of these numbers mean that people lost everything: their home, their jobs, and their peace of mind. In 2010, Fukushima was Japan's fourth-largest rice-growing prefecture. All of those farmers and workers lost their jobs due to the nuclear disaster. A citizen said, "Once abandoned, it will be really tough, both mentally and physically, to start all over again, especially when many farmers are aging." (Aoki, Mizuho. "Fukushima Farmers in Two-Front War." 3.11: One Year On. Japan Times. 7 Mar 2012. P. 19.). Even if the farmers can maintain their crops, many of their countrymen will refuse to eat their produce. Consumers fear the effects of radiation and don't want to expose themselves or their families to the possible risks. The worry about their livelihood and future has taken a toll on these farmers and the citizens of Fukushima. "Many local farmers said they are worried about the quality of the vegetables and rice grown in their own fields due to the disaster, and *some are losing the will to continue on,*" a vegetable farmer, Makoto Ebisawa observed (p. 20)



An abandoned business within what used to be the restriction zone



An abandoned farming field



Standing water on what used to be a farming field

This water is from the tsunami and most likely has high radiation levels

The Youth Exodus

The most striking effect of the radiation is the loss of the area's youth. After the nuclear disaster, young families quickly took their children and left the area. The population of Minamisoma, for example, plummeted from 70,000 people to 10,000 after the earthquake. The population has since rebounded to 40,000 people, but young people are not among those returning, fearing the effects of radiation on themselves and their families. Birthrates are a telling indicator of this exodus. From Jan-Mar 2011, there were 700 births in Minamisoma. For the rest of 2011 (Mar-Dec 2011), there were only 30 births. Of those currently in Minamisoma, 50% are over 50 years old and 33% are elderly, sharp increases from pre-earthquake figures.

This exodus leaves the remaining elderly population isolated. First, they have lost their homes and jobs. So, they are now living in refugee camps. Second, their support system and community has left. Previously, children and spouses would help feed, transport, and socialize with their elderly family members. Now, with no young people, the elderly population is alone, malnourished, and unable to get to medical appointments. Dementia and malnourishment are increased. Suicide is also a serious concern. Most importantly, many people have lost hope.

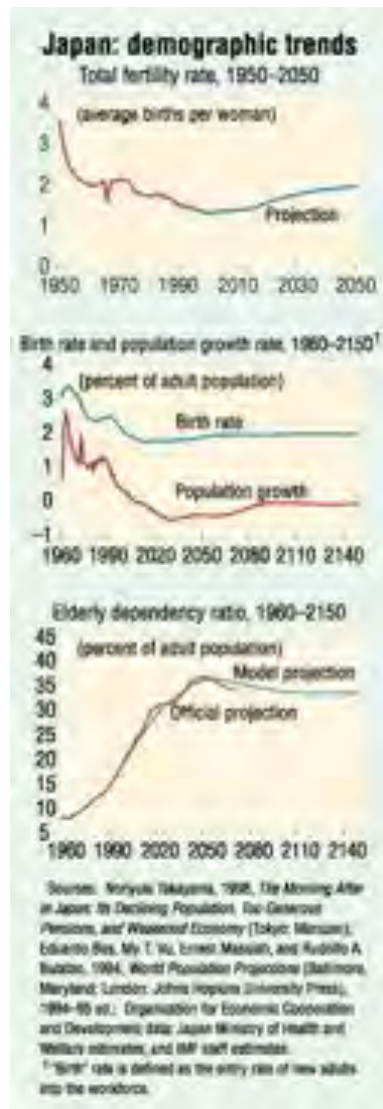


Children being released from school near a refugee camp in Minamisoma

Parents are torn: Their jobs, homes, and families are in the areas affected by radiation. However, the areas are affected by radiation. The Japanese government has assured its citizens that the areas around the nuclear power plant are safe for inhabitants, so mothers are cautiously trusting that guidance.

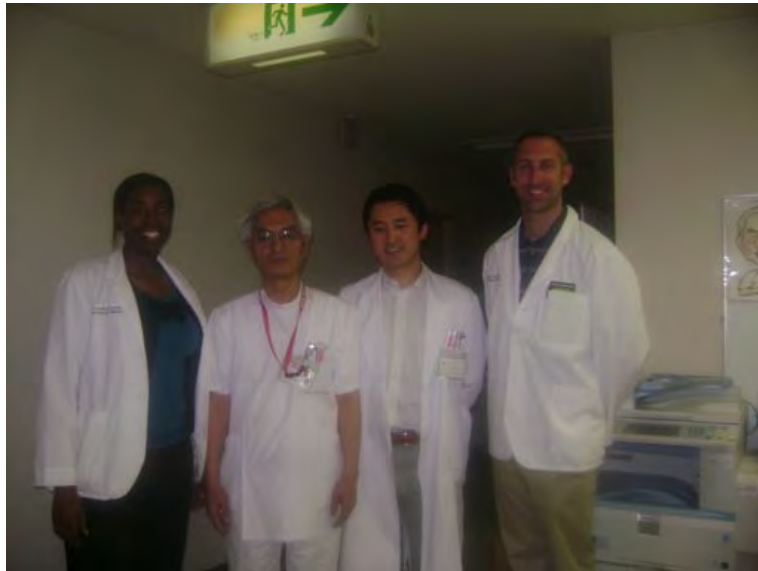
Doctors and Healthcare

Japan has universal healthcare. However, they have an aging population and a decreased fertility. These trends mean Japan's population is decreasing and there is an increasing number of elderly individuals for each working age citizen. These trends put a huge strain on the youth of Japan, particularly as the ever increasing elderly population needs more healthcare.



At the forefront of this trend lies Minamisoma and the other towns surrounding the Fukushima Daiichi Power Plant. Fearing the effects of radiation, young families and their children abandoned these towns. This left a disproportionately elderly population with a dwindling working age population. Furthermore, this area was left with a dearth of physicians and nurses to care for the population. Immediately after the nuclear disaster, there were four doctors for

about 10,000 people. Today, there are 14 doctors for about 40,000 people. To put those numbers in perspective, Kamogawa City has 40,000 people with 450 doctors.



The older gentleman is Dr. Kanazawa, one of four doctors who stayed in Minamisoma immediately after the earthquake, tsunami, and nuclear disaster.



Some of the amazing doctors and healthcare providers who are now living in Minamisoma to help the town and its citizens recover.

Going clockwise from the left: Yamamoto-Bumi (physical therapist), Dr. Odaka (neurologist), me, Marlana, Dr. Myatsuma (neurosurgeon), Dr. Harasawa (family medicine, former cardiac surgeon), Dr. Nimoto (family medicine, former cardiac surgeon, one of four doctors to stay in Minamisoma immediately after the earthquake)

Thus, these areas have become the frontlines of a new model of healthcare. The principles of this model use family practice, community development, home

visits for elderly, and creativity/experimentation. These same issues of finance, physician shortage, and a growing and aging population are affecting the US.

Home Visits

One of the physicians, Dr. Keitaro Harasawa, has started a program of home visits. Dr. Harasawa is an amazing person. After finishing his training, he became a cardiac surgeon. However, he felt the need to give more to people and care for them throughout their lives in a more profound way. He soon switched to Family Medicine, which is a new specialty in Japan. After the Great East Japan Earthquake, he recognized the need in Minamisoma and immediately moved there.

Remember that the population in Minamisoma is predominately elderly who have lost their communities, families, homes, and jobs. Thus, these individuals who are in dire need of medical care and human interaction are isolated and unable to get to the hospital. So, Dr. Harasawa went door to door through neighborhoods and the numerous refugee camps to see who needed care. He now has started a department for home visits to help these people.



Mrs. Omiyo Kato:

An 87 year old woman suffering from dementia and “disuse syndrome”. Her daughter-in-law (to the right) takes care of Mrs. Kato. The daughter-in-law was recently diagnosed with a kidney abscess that needs to be removed. Unfortunately, she will not go to the hospital for herself because she wants to care for her mother-in-law.

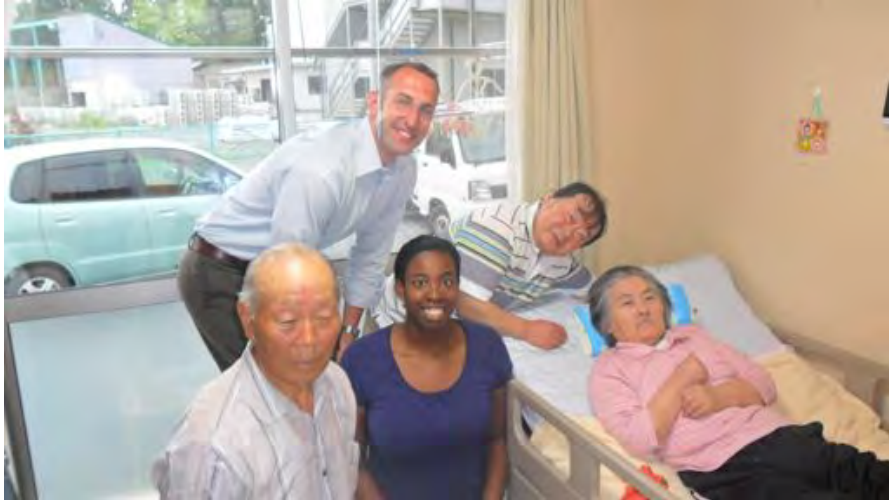


Mrs. Kinoi Kominato:

An 87 year old woman suffering from dementia, disuse syndrome, and a hemorrhage. She showed us her physical therapy exercises. The man to her left is her son. I asked her son how he maintains hope and his response startled me. He said, "There is no hope. I look for it, but there is no hope."



Mrs. Kinoi Kominato



The Watanabe Family:

Mrs. Watanabe is a 75 year old female suffering dementia, disuse syndrome, and a brain hemorrhage. She has not spoken in three months. The father and son both lost their jobs due to the disaster. Fortunately, the son is one of the few people to find work since, working as an electrician. This family is truly magnanimous! Very humbling!

Refugee Camps

After the Great East Japan Earthquake, hundreds of thousands of people were left homeless. The government immediately began to build temporary housing. It took six months for 53,000 homes to be built. Prior to getting into the temporary housing, people were living with friends, family, or in shelters.

As of February 29, 2012, approximately 344,000 people were still living in temporary housing in refugee camps throughout Japan. These people have three years to move out of these structures and find their own housing.

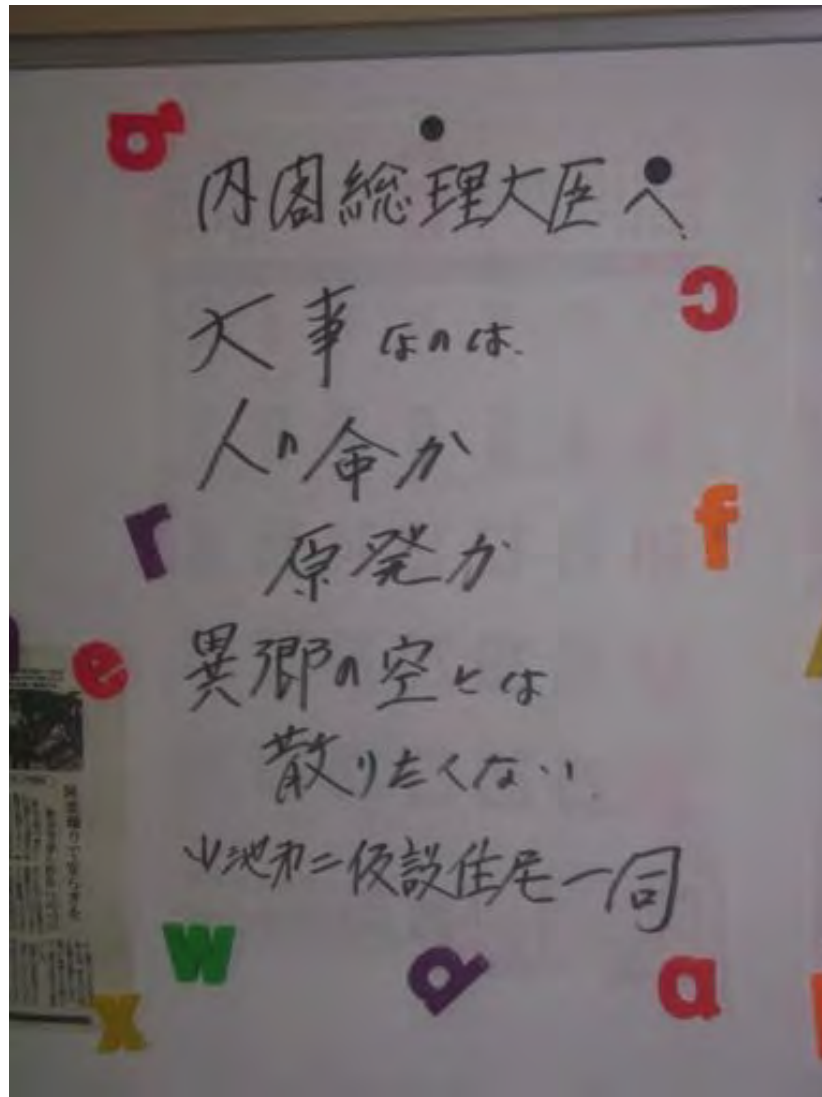




Refugee Camps: Each unit has three rooms, a kitchen, living room, and bedroom.

In each camp there is a common area that is used for meetings and events. Physical therapists come to teach the inhabitants exercises to maintain physical

fitness; physicians and EMT come to teach first-aid; physicians come to teach about chronic illnesses like diabetes; volunteers come to play games with the inhabitants.



A note posted in one of the common areas.

It says,

“Dear Mr. Prime Minister,

What is more important: human life or nuclear power? We don't want to die under a foreign sky.”

To those living in the temporary housing, anywhere other than their hometown is a “foreign sky”. They just want to go home.



Having coffee with some residents of the refugee camps.

The gentleman sitting in the white shirt was a former human resources executive. He mentioned that despite all of the horrible things that have happened in the last year, one good thing has emerged: they have made new friends and formed new communities.





Learning CPR. If you notice, it is predominantly female.





Playing golf





Making new friends.

These ladies were coming up behind me to compare their height to mine. They came up to the bottom of my shoulder blade.

Pachinko and Alcohol

As these towns begin to rebuild, the first buildings to be rebuilt are convenience stores (like 7-Elevens) and Pachinko buildings. Pachinko is a form of gambling similar to slot-machines. Victims of the tsunami have been put into temporary homes and also given a stipend from the government. The physicians with whom we worked observed that these stipends increasingly go to alcohol and gambling (Pachinko). A national controversy has emerged since North Korean business owners predominantly own Pachinko businesses.



Toshko Ine made these stories come to life for Marlana and me. We played golf with her at one of the refugee camps. She is a soft-spoken, possessing a refined “Tokyo accent”. When we walked in with Dr. Harasawa, she immediately

approached Dr. Harasawa, who she remembered from previous presentations he had made to the residents. She talked to Dr. Harasawa about her life. What I was able to gather was that her husband and her lost their home and their jobs. Afterwards, her husband began to drink and gamble. Their situation and relationship has gotten to the point where she is seeking a divorce from after 30 years of marriage. This interaction was a sobering sign that the social effects of this disaster and the pain it has caused continue to be felt.



Toshko Ine

Haramachi: Part of Minamisoma

Haramachi is a part of Minamisoma that is about 23km from the powerplant. The Minamisoma General Hospital, where we stayed is located here.



Minamisoma General Hospital

Odaka: Southern Part of Minamisoma

Odaka is a part of Minamisoma that is about 15km from the Fukushima Daiichi Powerplant. Until about one month prior to our visit (May 2012), it was within the restriction zone and completely abandoned. As such, when we visited this part of town it looked like the catastrophe had just happened. The destruction was overwhelming and really showed why people are losing hope.







Moma-San

He and his wife used to live in the house over my left shoulder. They ran a fish market from there. Due to the radiation, they were forced to leave their home and they lost their livelihood. They now live in the Haramachi part of Minamisoma (near the hospital). They plan to move back soon since their “life-line” (power, water, sewage) has been preserved.

Kashima: Northern Part of Minamisoma

Kashima is a part of Minamisoma that was comprised mostly of neighborhoods. Many generations of working class families lived in each house. Unfortunately, this area, which is on the ocean, was completely destroyed.



Debris piled up in what used to be a residential neighborhood.



Hollowed out, destroyed homes



The street





This land used to be a neighborhood



The tsunami wall that was unable to contain last year's tsunami.



A monument to children who lost their lives.



A shower



A home's entrance



These homes were 50 feet above sea level, but were still destroyed.

REBUILDING

One of the enduring frustrations for the citizens of Japan is the government's unwillingness and/or inability to help them. A lot of work has been done, as most debris has been piled up in most towns not affected by radiation, but much work remains and the prevailing sentiment is that not enough is being done. Over a year after the Great East Japan Earthquake, the central government is still "mulling the possibility of relocating municipalities to higher ground and has yet to map out any specific outlines for rebuilding projects." (Hongo, Jun. "One Year On, Tohoku Stuck in Limbo." 3.11 One Year On: A Chronicle of Japan's Road to Recovery. Japan Times, p. 8). The government has set a goal of 2015 for incinerating and disposing of all debris, however it appears they will fall short of this goal. Most local government throughout Japan are refusing to accept debris, citing radiation fears. Thus, less than 10% of the 22.53 million tons of debris has been burned and buried (8).

In response to the government's lack of support, individuals are rising to the challenge of rebuilding their towns and homes. Two individuals formed non-governmental organizations (NGOs) to help rebuild their hometown of Minamisoma.

Kosuke Ito grew up in Minamisoma. Prior to the earthquake, he was working in marketing in Tokyo. After last year's disaster, he quit his job and returned home to help. He formed an NGO he named Frontier. Frontier seeks to serve children ages 3-8 years of age that are still in the area most affected by radiation. It currently serves approximately 1,300 children (out of an overall population of 40,000). The government says it is safe for children to play outside, however many families are scared of exposing their children to the radiation. Thus, kids are staying inside and are becoming increasingly inactive. These children are also scared of the ocean and water. So, Frontier is hoping to make opportunities for these children to have more outdoor activities and support them in their recovery from their traumatic experiences. Kosuke believes that "one person can do small things, but many people can make a giant leap."

Fukkouhamadan is another NGO that was formed by someone who grew up in Minamisoma. He was an accountant before last year's earthquake and quickly returned home to help in the rebuilding process. This organization hopes to clean debris and help people get jobs and homes. In fact, the day he met with us, this gentleman was cleaning in Odaka when he uncovered a child's bones.



With heroes

From the left: the founder of Fukkouhamadan, me, Marlana, Dr. Harasawa, and Kosuke Ito

ISHINOMAKI

Effects of Earthquake on Ishinomaki

By most accounts Ishinomaki was the area most affected the Great East Japan Earthquake. Approximately 50% of the town was submerged by the tsunami and as of June 17, 2011, over 3,000 people were confirmed dead and approximately 3,000 people were still missing.

ISHINOMAKI	
DEATHS	3,181
MISSING	651
BUILDINGS DESTROYED	22,357
BUILDINGS DAMAGED	110,021
CARS DESTROYED	20,000

Refugee Housing

There are two forms of refugee housing in Ishinomaki. First, there are temporary homes. These homes look like typical refugee homes; thus, these areas get volunteers and visitors for its residents. On the other hand, there are Minchin, which are pre-existing, available apartments. The residents of these homes are isolated from the volunteers and community that wants to help them.

Karakoro Station

Karakoro Station is an organization of mental and social health professionals hoping to help the citizens of Ishinomaki and the surrounding areas. It was started by a physician whose practice was destroyed by the tsunami. Without his practice, he focused on starting this organization. Through this group over 350 psychiatrists and 500 coworkers have worked in the Ishinomaki area. They have a litany of services:

- Outreach assistance for residents of temporary housing
- Counseling hot-line
- In office counseling services
- Job placement services
- Infant health care
- Community education by physicians



Karakoro Station

Leo

Leo ___ grew up in Ishinomaki. In March 2011, he was studying at a university in Hawaii. When he saw his hometown destroyed on TV, he was deeply troubled. He immediately returned home and joined Karakoro Station, which his dad began. When I asked him how it felt to see the TV footage of the earthquake and tsunami he was very emotional, unable to answer. He told me later, "I know one thing for sure, I try not to focus on the past. I think about the future and what can be done."



Okawa Elementary School

Okawa Elementary School has become one of the enduring tragedies and symbols of last year's earthquake. This school is located near a river and in a valley, which accentuated the devastating effects of the tsunami. When the earthquake happened, the teachers gathered the children in the playground. When the tsunami warning sounded, there was confusion and disagreement between the teachers on what to do. To one side is the river valley; to the other side is a steep and, at the time, snow covered mountain. Furthermore, few believed it would reach 4km inland. A senior teacher wanted the children to run to higher ground close to a bridge. Another teacher believed they should run up the heavily wooded mountain. Sadly, their disagreement and hesitation cost many children and teachers their lives. Most children were washed away as they fled toward the bridge. Other children ran to the highest ground they could, wrapping their arms around trees. For some this proved a saving grace, for most it was not enough. Out of the 108 students, 74 died, while 11 of the 13 teachers died. Of the two surviving teachers, the teacher who suggested running up the mountain committed suicide a few days later.





Buddhist monks praying for the school's victims







Naomi Hiratsuka



Naomi Hiratsuka

<http://www.thestar.com/news/world/article/1133603--japan-tsunami-s-wake-leaves-grieving-mothers-still-searching-for-children-in-school-disaster-zone>

On the morning of March 11, 2011, Naomi Hiratsuka was the mother three young children, one of whom was Koharu Hiratsuka, a 12 year old girl attending Okawa Elementary School. After the earthquake and tsunami, Koharu was not found. Determined to find her daughter's body, Naomi went back to school and got her license to operate heavy machinery to look for her daughter and other children lost in the tsunami.

In August 2011, a decapitated body was found several miles away from Okawa Elementary School. A month later, DNA analysis found it to be the body of Koharu. Koharu's father, Shinichiro Hiratsuka, remarked, "We can hold a proper funeral and send her off to be with everyone else." ("Mother Determined To Keep Up

Search For Missing Children After Daughter Found Dead.” The Mainichi. 23 Sep 2011. <http://mainichi.jp/english/english/features/news/20110923p2a00m0na019000c.html>). Both relieved and saddened by the recovery of her daughter’s body, Naomi remains determined to find her daughter’s head. “I’ll never be at peace if I don’t find her head,” says Hiratsuka, her eyes brimming with tears. “She also won’t be (at peace) where she is.” (Aulkah, Raveena. “Japan Tsunami’s Wake Leaves Grieving Mothers Still Searching For Children In School Disaster Zone.” The Star.com. 17 Feb 2012. <http://www.thestar.com/news/world/article/1133603--japan-tsunami-s-wake-leaves-grieving-mothers-still-searching-for-children-in-school-disaster-zone>).

Naomi Hiratsuka still uses her heavy machinery license to look through rubble to find her daughter’s remains and the remains of other children lost in the tsunami.

Damage to Ishinomaki Region





Hospital

Out of 70 patients and health-care workers only six survived



Tsunami wall







Mountain of Debris



A wedding ring in the rubble



A middle school that was destroyed but everyone survived





A destroyed hospital to the left and destroyed cars to the right.

MENTAL HEALTH

Chief Complaints

Karakoro Station, a mental health organization in Ishinomaki, found the following concerns to be affecting the most people.

1. Anxiety, fear (31%)
2. Depression (21%)
3. Irritability (20%)
4. Alcohol abuse (9%)
5. Lack of motivation (8%)
6. Eating disorders (5%)
7. Difficulty concentrating (4%)
8. Hallucinations (2%)

One of their patients experienced such severe anxiety and fear about the ocean and water that they have been unable to shower or wash her hands. When she touches cold water it reminds her of the flooding and resulting trauma.

Men and Women

Men don't ask for help until their situation becomes very bad. Instead, they turn to alcohol and gambling.

Women, on the other hand, readily come for help, especially elderly women between 60-69 years of age. Their biggest concern is stress and anxiety.

Post-Traumatic Stress Disorder (PTSD)



Dr. Sato is a psychiatrist who now works with Karakoro Station. He spoke with Marlana and I about the presence of PTSD in Japan. There are four characteristics to PTSD:

1. Flashback
2. Avoidance
3. Excitement/Hyperarousal
4. Unemotional

Someone with full PTSD is shows all four characteristics. Someone with partial PTSD has two of the four characteristics. Approximately 10% of the population has full PTSD, while another 10% has partial PTSD. Overall, anxiety and depression is 1.5-2x higher since the tsunami.

There are some unique aspects of PTSD for those in Japan. Since Japan is an island nation surrounded by water and constantly under the threat of earthquakes and tsunamis, the trauma cannot be labeled "post-traumatic". Instead, it should be considered on-going trauma. Thus, these patients are never relieved from their symptoms unless they move away from their hometowns and either out of the country or further inland. However, most victims are elderly and are unable to move and dependent upon the towns in which they grew up. So, these elderly victims are unable and unwilling to leave that which causes their fear.

If these victims do leave there is a stigma against them. If they go elsewhere, they are a refugee and they are looked down upon. If they stay, their countrymen ridicule them for staying.

BEING A WITNESS

One of the biggest themes of this trip has been the importance of being a witness to others. For most people, no one is a true witness to their lives. To some degree we keep people at a distance, even our spouses, family, and friends. Physicians, based on their expertise and the access we give them to our physical, emotional, and mental health, can be a witness to other's true self.

When we asked anyone what we could do for them they simply asked us to share their story. They wanted someone to see them and their lives as they truly are, unfiltered. We also saw the physicians be a witness to their patients. These caregivers recognized the healing power of listening to their patients and their stories. This patience and openness proved invaluable to the victims of the Great East Japan Earthquake as they were feeling isolated and fearful.



Dr. Harasawa being a witness