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Fukushima is not Chernobyl? Don't be so sure.

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Fukushima City, view from the train station, Nov. 2012.

The March 11, 2011 Tohoku earthquake and tsunami caused the deaths of approximately 16,000 persons, left more than 6,000 injured and 2,713 missing, destroyed or partially damaged nearly one million buildings, and produced at least \$14.5 billion in damages. The earthquake also caused a triple meltdown at the Fukushima Daiichi nuclear power plant on Japan's eastern coast. After reading the first news reports about what the Japanese call "3.11," I immediately drew associations between the accident in Fukushima and the Chernobyl nuclear disaster of 1986 in what was then the Soviet Union. This was only natural, since studying the cultural fallout of Chernobyl has been part of my life's work as an anthropologist for the past 17 years. Knowing rather little about Japan at the time, I relied on some fuzzy stereotypes about Japanese technological expertise and penchant for tight organization and waited expectantly for rectification efforts to unfold as a model of best practices. I positioned the problem-riddled Chernobyl clean-up, evacuation, and reparation efforts as a foil, assuming that Japan would, in contrast, unroll a state-of-the-art nuclear disaster response for the modern age. After all, surely a country like Japan that relies so heavily on nuclear-generated power has developed thorough, well-rehearsed, and tested responses to any potential nuclear emergency? Thus, I expected the inevitable comparisons

between the world's two worst nuclear accidents to yield more contrasts than parallels.



Bullet train, symbol of Japanese modernity, entering Fukushima station.

But as reporting on the meltdown at the Fukushima Daiichi NPP unfolded, an unsettling story of stonewalling and sloppiness emerged that was eerily reminiscent of the Chernobyl catastrophe. TEPCO (Tokyo Electric Power Company), which operates the Fukushima Daiichi NPP, and the plant's head, Masao Yoshida, proved to be masters of understatement. Yoshida characterized radiation levels nearly 100 times higher than normal as "higher than the ordinary level," and he used the wholly inadequate phrase "acute danger" to describe two explosions and the meltdown of three of the reactor cores^[1] (how about "catastrophic meltdown necessitating immediate evacuation?"). One is reminded of the first official statement acknowledging the Chernobyl accident, which only appeared in a Kyiv newspaper three days after the disaster, and was hidden on the third page in the Weather section: "From the Cabinet of Ministers of the USSR. An accident has occurred at the Chernobyl atomic electrostation; one of the atomic reactors was damaged. Measures are being taken to liquidate the consequences of the accident. The victims are receiving assistance."^[2]

Recently-released video footage of the early days and weeks of the Japanese crisis reveals that some of the same mistakes made during the Soviet state's blighted response to Chernobyl were repeated at Fukushima Daiichi. Military helicopters made futile attempts to douse flames inside the damaged reactors with water, a strategy already proven

ineffective, dangerous, and potentially counterproductive during the Windscale fire in Great Britain in 1957, and later at Chernobyl. Local Fukushima firefighters were called to the accident scene but not informed of the extremely high levels of radiation—the TEPCO video reveals an official at headquarters to say, “There’s no use in us telling the fire department. That’s a conversation that needs to happen at higher levels.” Recall the six firemen who lost their lives battling the fires at Chernobyl’s Reactor No. 4; along with 25 other plant workers and first responders the firefighters for years were the only Chernobyl casualties officially recognized by the Soviet state. The accidents at Chernobyl and Fukushima alike have been traced back to lax safety controls and poor plant design or siting, and the emergency response after both disasters included a muddled chain of command, the intentional withholding of vital radiological data and health directives, and the privileging of economic concerns and saving face over the well-being of human beings and the environment. Did we learn nothing from Three Mile, Sellafield, Windscale, and Chernobyl? Will the Fukushima accident finally jar us out of complacency, or will the accident be successfully “socially contained,” enabling humankind to “stagger on toward our next disaster?”[\[3\]](#)

Thanks to colleagues at the Japan College of Social Work in Tokyo, during October and November 2012 I visited Japan to participate in interviews, informal meetings, and conference roundtables with Fukushima evacuees, social workers, medical professionals, and community activists. It was an enlightening though sobering experience: many of the Fukushima stories I heard echoed nearly word-for-word narratives I have read and collected among persons affected by the Chernobyl accident in the former Soviet Union. Just like people who survived Chernobyl and the Soviet Union’s “rectification efforts,” Fukushima-affected persons and their advocates complain of government secrecy and misinformation, top-down decision making, generalized disorganization, and the social ostracism of nuclear accident “victims.”

“No one knows what really happened here”

I traveled through northeast Japan with an esteemed group of scholars: Dr. Yukio Yamaguchi and Dr. Takashi Fujioka, professors at the Japan College of Social Work; Dr. Masumi Shinya, a professor of sociology at East China University of Science and Technology’s School of Social and Public Administration; Dr. Decha Sungkawan, Dean of the Faculty of Social Administration at Thammasat University in Bangkok; and Dr. Charles Figley, professor and Chair of the Tulane University Trauma Institute.



Lt to Rt: Charles Figley, Masumi Shinya, Sarah Phillips, Takashi Fujioka, Decha Sungkawan. At Nihonmatsu Station. Photo by Yukio Yamaguchi.

We traveled by trains and taxis, making research stops in cities like Nihonmatsu and Yamagata City, which received thousands of disaster evacuees, and Otsuchi (Iwate Prefecture), a coastal town devastated by the 3.11 tsunami. Before the disaster Otsuchi had a population of 15,262. At least 800 residents were killed in the tsunami that carried away most of the city's infrastructure; nearly 500 residents are still missing. Today there are 10,000 people living in Otsuchi, 5,400 of who still live in cramped temporary housing units.

Our guide in Otsuchi was Mr. Ryoichi Usuzawa, a community organizer. Mr. Usuzawa drove us around the city, much of which now consists only of partial concrete foundations where buildings once stood. The entire city administration of Otsuchi (more than 20 persons) drowned in the tsunami—they had been called by the mayor to the town hall at the time of the earthquake. Mr. Usuzawa drove us up a steep hill to an area overlooking the town, just above the now-destroyed Buddhist temple and the adjoining hillside cemetery, which is still intact. On 3.11, hundreds of residents watched from this vantage point as the massive wall of water rolled in and mowed down their town (including their own homes, some with people still inside), the buildings collapsing “like dominos.” The devastation resulted in huge amounts of debris that caused further damage in turn, as tanks of propane gas bobbed along, became entangled in debris, and ignited fires and explosions “bubbling on top with smoke.” Mr. Usuzawa says, “It was like a huge washing machine was spinning the whole town. Everything was moving clockwise.”[\[4\]](#)



Otsuchi, Iwate Prefecture, October 2012

One of these hilltop spectators captured the scene on video, and we watched the terrifying footage on Mr. Usuzawa's laptop as we looked down over the now-leveled city.^[5] He explained that hundreds of residents, many of them elderly, fled to the Buddhist temple for refuge from the water and drowned inside. As the tsunami was rolling over Otsuchi, some 200 kilometers away a wall of water invaded the coast of Fukushima Prefecture, destroying the Fukushima Daiichi nuclear power plant and the surrounding towns. Yet the impact on residents' health is harder to calculate, because it consists not only of physical destruction but radiation contamination.

As cultural geographer Shiloh Krupar notes, "Embodied knowledge...take[s] on a particular significance in the presence of large-scale technological -environmental disasters..., where the variability and duration of harmful waste and its biological effects are uncertain and never closed."^[6] Measuring radiation exposure and absorbed dose requires specific, often hard-to-access technologies, and laypersons are dependent on experts and their expert knowledge for interpretation of these measurements. Individuals' ability to know and assess their risks is severely curtailed when expert knowledge—produced by agents usually beholden to states and powerful industrial interests—is the only form of knowledge recognized as valid, even as states and industry intentionally withhold information on hazards and their biological effects. Meanwhile, embodied self-knowledge is discredited.

Fukushima evacuees and their advocates report egregious examples of

misinformation, negligence, and cover-up that have exacerbated their health risks. After the earthquake and tsunami the United States Department of Defense and the Department of Energy conducted environmental and radiological monitoring of air, water, and soil on DOD installations in the region.^[7] According to Professor Yukio Yamaguchi of the Japan College of Social Work, when this valuable data was shared with Japanese authorities they shelved it for two weeks instead of immediately informing the population about radiation risks. Further, the Japanese government failed to provide the Japanese public with data from the System for Prediction of Environmental Emergency Dose Information (SPEEDI)—data predicting the location and extent of radioactive contamination after the nuclear accident—until March 23, nearly two weeks after the disaster. Because the SPEEDI data was not available, some families evacuated themselves to locations that actually were more contaminated than where they were living.^[8] Perversely, the Japanese authorities provided the SPEEDI data to the U.S. military on March 14 but waited a full nine days before releasing it to the Japanese people.^[9]

As happened in the Soviet Union after the Chernobyl accident, after the Fukushima accident the government quickly raised the “acceptable” level of individual radiation exposure. In Japan, the pre-nuclear accident maximum “safe” exposure was one millisievert (mSv)/year.^[10] After the Fukushima disaster, suddenly exposure of 20 mSv/year was deemed safe. Some medical professionals went so far as to suggest that 100 mSv/year was a safe level of exposure.^[11] Such inconsistencies made it difficult for those living near the Fukushima Daiichi NPP to make informed choices and take actions to minimize their risk of exposure to damaging radionuclides. In this context of uncertainty, a common phrase among Fukushima accident-affected persons is that, “No one knows what really happened here.”

In an age where sophisticated radiological monitoring is possible and information technology facilitates the rapid evaluation and dissemination of radiological data, the Japanese government’s crude “mapping” of the radiation fallout baffles the innocent and informed alike. Environmental contamination after a nuclear explosion or accident is uneven and patchy. We have known this since the 1950s, when radioactive fallout from bombs detonated in Nevada was carried by rain clouds all the way to New York state. Similarly, radiation maps of the area around Chernobyl (not released until years after the disaster) show an irregular contamination pattern around the NPP with “anomalous” hotspots of contamination hundreds of miles away caused by rains —biochemist and journalist Mary Mycio describes it as a “hand” with a dark palm six miles around the plant and 20-30 mile-long “fingers” caused by radiation carried by the wind.^[12] Why, in the immediate wake of the Fukushima Daiichi accident, did the authorities not apply this knowledge? Why was the contamination not

mapped according to the *actual* radiological data? Instead, in a move strangely reminiscent of the initial Chernobyl “mapping” of a 30-kilometer “zone of alienation,” a 20-kilometer “planned evacuation zone”[\[13\]](#) of compulsory evacuation was drawn around the Fukushima Daiichi NPP. The Japanese Cabinet Public Relations Office announced that the cumulative radiation level in those areas could reach 20 mSv/year. People living outside this artificially-drawn zone have been provided no state support to evacuate from their homes, even if the levels of contamination are actually higher there than in some places inside the planned evacuation zone.

Consider for instance the town of Namie. Namie, which was affected by both the tsunami and the NPP accident, is located inside the exclusion zone, and its roughly 20,000 surviving residents were evacuated to the city of Nihonmatsu.[\[14\]](#) However, levels of contamination in Namie are *lower* than in some towns outside the zone,[\[15\]](#) whose residents have not had equitable access to evacuation assistance, medical care and social services. Evacuees from Namie face their own set of very difficult circumstances in Nihonmatsu: they are tired of living in hastily-built, cramped temporary housing quarters; unemployment, boredom, and feelings of lack of control over the future fuel anomie. Long-term reliance on social welfare is demoralizing, and evacuation is especially frustrating for elderly persons who just want to go home. According to a community leader at NPO Namie in Nihonmatsu, evacuees are experiencing serious psychological problems; now that they are not in “emergency mode,” he said, they increasingly dwell on their memories of the devastating tsunami. Many suffer from survivor guilt, asking themselves why they lived when others perished. Social workers report high levels of depression and anxiety, alcoholism, gambling, and marital discord among residents of temporary housing units.



Temporary housing site for Namie evacuees in Nihonmatsu. Located in a former athletic field, this site accommodates 240 families (550 persons), including 75 children under 15 years old, and 78 solitary elderly persons. Photo by Charles Figley.

Realizing that returning to Namie is only a distant prospect, and concerned about reports of Namie children being bullied in local schools, in fall 2012 a group of community activists founded Namie Elementary School in Nihonmatsu. The school has enrolled just 30 students so far, but organizers hope it will grow and serve to cohere the community of Namie evacuees in Nihonmatsu, who one community leader described as having been “scattered like sesame seeds.”[\[16\]](#) Indeed, loss of community is one of the consequences of 3.11 and the resulting evacuations and resettlements of paramount concern to social workers and NPO leaders. Social work specialists in Japan point out that loss of communities was a major problem after the Great Hanshin (Kobe) earthquake in 1995, but the lessons of that tragedy have not been applied after 3.11.



Commons area at Namie Elementary School, Nihonmatsu. Photo by Charles Figley.



A map at Namie Elementary School in Nihonmatsu shows where students and teachers used to live in the seaside town of Namie, whose 20,000 surviving residents were evacuated after 3.11.

“Living apart is too difficult”

The experiences of the Nakamura family illustrate the difficulties faced by many Fukushima accident-affected families. Before 3.11, Miki Nakamura, a nutritionist, lived with her husband and three young daughters in Koriyama in Fukushima Prefecture, 58 kilometers from the damaged NPP. The Nakamuras evacuated temporarily immediately after the accident. However, being understandably reluctant to uproot their young family, they returned to Fukushima as the new school year began in April. As in other locations close to the damaged nuclear power plant, the schools in Koriyama stayed open even though neither radiological monitoring nor decontamination efforts were underway.[\[17\]](#) During an informal interview in October 2012, Miki Nakamura recalled that she and other parents were told “very firmly” by their children’s schoolteachers that children should continue to attend school; children were advised to wear masks, windbreakers, and hats to protect them from radiation. Trusting in the judgment of the teachers—and in the reassurances issued by the then Prime Minister Naoto Kan and the Secretary General that “there will not be immediate health impacts”—the children in Koriyama continued going to school.

The young families who at the time of the Chernobyl accident were living in Pripyat—the workers’ city built 2 km from the NPP—would find this tragedy familiar. Although news of the accident began to circulate informally hours after the Chernobyl explosion, the authorities did not warn the 49,000 residents of Pripyat to take precautions until a full 36 hours after the accident. Children enjoyed playing outside on the warm April day, unaware that their young bodies, especially their young thyroid glands, were soaking up radioactive particles. The thyroid gland is the organ most sensitive to radiation exposure; this is particularly true for children and for those with iodine deficiencies. Local health workers were instructed not to distribute prophylactic potassium iodine pills, for fear of “causing panic.” (Subsequently, around 6,000 cases of thyroid cancers—and many more cases of thyroid anomalies—have been documented among children who at the time of the Chernobyl accident were living in contaminated areas in Ukraine, Belarus, and Russia.[\[18\]](#)) Incredibly, a similar scenario unfolded after the Fukushima Daiichi accident. Although health workers themselves took prophylactic potassium iodine, it was not given to children.[\[19\]](#)

On March 15, it snowed in Fukushima, and the snow contained radioactive materials. Radioactive particles landed on the surface of the soil. In April, the air dose rate exceeded 3.8 microsieverts (?Sv)/hour at “hot-spots” in Koriyama, and 8 microsieverts/hour at some points along the school route.[\[20\]](#) Meanwhile, during the days following the Fukushima Daiichi accident, the Nakamuras’ dosimeter registered radiation levels of 1.5 microsieverts /hour right outside their home. It was not long before the eldest Nakamura daughter (age nine at the time) started having uncontrollable nosebleeds that her mother says “persisted even after

going through a box of tissues.” The child’s nosebleeds were the first key factor in the family’s decision to leave Koriyama.

The second factor was the resignation of Professor Toshiso Kosako, an expert on radiation safety at the University of Tokyo and a nuclear advisor to the Japanese Prime Minister. In late April 2011 Kosako resigned in protest of the Japanese government’s decision after the Fukushima Daiichi accident to raise the official acceptable level of radiation exposure in schools from 1 to 20 mSv/year, a decision that allowed “children living near the crippled Fukushima Daiichi nuclear plant to receive doses of radiation equal to the international standard for nuclear power plant workers...a level [that is] is far higher than international standards set for the public.”[\[21\]](#) Professor Kosako said he could not endorse this policy change from the point of view of science, or from the point of view of human rights.

The Nakamura family made a difficult decision: Miki and the children would move to Yamagata City, about an hour’s drive across the mountains from Koriyama. Mr. Nakamura would remain behind for his job, and the family would get together on weekends. Thus, Miki Nakamura and her three girls joined approximately 4,200 evacuees from Fukushima prefecture who moved to Yamagata. Like the Nakamuras, around 2,500 of these evacuees are from Fukushima City and the surrounding Nakadori area that were not under mandatory evacuation.[\[22\]](#) As “voluntary” evacuees, these citizens are hardly entitled to the same state entitlements that mandatory evacuees receive. Some voluntary evacuees did receive two-part reparation payments from TEPCO, the first for the months up until December 2012, and the second for the months from January to August 2013.

The financial stress on voluntary evacuees—many of which find themselves running two households (one back home, one in Yamagata)—is enormous. Rent is free for evacuation housing, but families spend approximately 100,000 Yen (\$1,110) per month on moving costs, utilities for two residences, and children’s kindergarten and school fees outside their place of official residence. (The latter obstacle compels some voluntary evacuee families to transfer their official place of residence, a decision that produces its own set of complications.) Costs of transportation are also high for these split families, who travel frequently to spend time together; also, unlike mandatory evacuees, voluntary evacuees must cover the costs of their own medical check-ups. Reparations from TEPCO do not even begin to offset these expenditures: the Nakamura family received the first compensation payment of just 400,000 yen for one child, 80,000 yen for each parent “for their unnecessary radiation exposure that could have been avoided,” and another 200,000 yen “for minor and additional costs.” The second payment consisted of only 80,000 yen for a child, 40,000 yen

for an adult, and 40,000 yen for additional costs.

Miki Nakamura notes that, lacking appropriate entitlements and compensation, among voluntary evacuees “there are so many children and mothers across the country that live each day by digging into their savings set aside for children’s education and their own retirement.”[\[23\]](#) Over time, despite their continuing concerns about radioactive contamination, the financial and emotional burdens of voluntary evacuation have compelled a number of these families to return home against their better judgment. Miki Nakamura predicts that a number of families will return to Fukushima Prefecture from Yamagata in spring 2013, “not because Fukushima will be safe, but because living apart is too difficult.”

“I am not a doctor but I know my children are sick”

In Yamagata City, the Nakamura girls continue to have health problems such as sore throat, canker sores, swollen lymph nodes, and dark circles under their eyes, which their mother believes to be related to the nuclear accident. The 10-year-old’s nosebleeds continue, but doctors—state employees who likely do not have the freedom to admit a Fukushima accident-related diagnosis—continue to discount radiation effects. One doctor who examined the eldest Nakamura child suggested that the girl’s nosebleeds were “caused by the stress of the mother.”

This readiness to attribute bodily complaints of disaster-affected persons to psychological and emotional stress is all too reminiscent of the diagnoses of “radiophobia” doled out by medical professionals and experts in the Soviet Union after the Chernobyl disaster.[\[24\]](#) Not surprisingly, many people in Ukraine, Belarus and Russia who believed that Chernobyl fallout had compromised their health balked at the suggestion that their ailments were caused by “fear of radiation,” not radiation itself. They had good reason to be skeptical. Anthropologist Adriana Petryna’s ethnographic study of the Chernobyl medical assessment and compensation system has revealed it that system to be anything but objective.[\[25\]](#) Petryna documents how the invention and application of radiation-related diagnoses in Soviet medicine were as political and social as they were scientific. Further, only half-hearted attempts were made to systematically collect health data from Chernobyl-affected persons (plant workers, clean-up workers, evacuees), making any firm conclusions about biological effects of radiation exposure versus psychological effects of “radiophobia” impossible.

During 1997 I shadowed medical professionals working at the clinic in Kyiv

that houses the “Chernobyl registry.” Persons with a “Chernobyl tie” from across the country (those deemed partially or fully disabled due to Chernobyl’s effects on their health) were offered regular examinations at the clinic—some were required to undergo these checks to retain their benefits—and personnel were supposed to enter patients’ data into the clinic’s computer database. The doctors and nurses I shadowed were harried and underpaid, and saw the data entry task as a nuisance. Often data was never entered, or it was entered helter-skelter. It is well known that after Chernobyl some data concerning individual exposure to radiation (particularly among clean-up workers) was actively destroyed or changed.[\[26\]](#)

I also in 1997 assisted with a WHO-funded study of children’s thyroid health in Chernobyl-contaminated areas whose planned evacuation was scuttled due to lack of funds. The research team exerted a yeoman’s effort, but the desperate conditions of local infrastructure made our tasks extremely difficult. We worked in hospitals without running water or electricity, and thus our ability to do blood draws and perform ultrasounds on children’s thyroids was limited. Local medical personnel were skeptical of our team and the study’s motives and we suspected they actively discouraged sick villagers from participating. Qualitative questionnaires were not tailored to local ways of life. For instance, youngsters who spent hours each day working in the fields and walking long distances to school were never sure how to answer the ill-phrased question, “Do you exercise or do sports regularly?”

Observing these problematic data-collection procedures makes me question research conclusions that purport to definitively assess Chernobyl’s health impacts, and especially those that downplay the medical effects of radiation exposure (e.g. the 2003-2005 Report of the Chernobyl Forum).[\[27\]](#) The same critical eye should be applied to Fukushima accident health studies, since reports from Japan indicate that health monitoring of persons exposed to radiation after the Fukushima Daiichi NPP accident has been far from systematic or problem-free. The affected population is skeptical that doctors in the state system of medicine can offer objective diagnoses. This distrust means they may be compelled to pay out-of-pocket for private health care, in which case their medical data may not make it into official databases. In the future, these persons will not be eligible for public compensation for their Fukushima accident-related health problems.

Skepticism of official health pronouncements is reflected in people’s desire to have their personal levels of radiation exposure checked. Whole body counters (a device used to identify and measure the radioactive material in the body) are in deficit in Fukushima City, and the waiting list to be checked is some six months long.[\[28\]](#) Even though Yamagata hosts

the largest group of Fukushima evacuees in Japan, there is not a single whole body counter in the city.[\[29\]](#) And as with Chernobyl, the chaotic evacuation of residents after the Fukushima accident complicates exposure assessment and health monitoring. Additionally, in early February 2013 at a private meeting of the research and survey committee on residents' health, it was suggested that the Fukushima Prefectural Medical College, the institution entirely responsible for examining radiation and its health effects, has attempted to delay the thyroid check-up for evacuees outside the prefecture.[\[30\]](#)

Not surprisingly, "radiophobia" has made its way into the Fukushima accident lexicon.[\[31\]](#) It becomes convenient and somehow perversely comforting to focus on the psychological impacts of nuclear disasters, with their many "unknowns." The victim-blaming Miki Nakamura encounters ("the child's health complaints are caused by the stress of the mother") would be familiar to many Chernobyl-affected persons I have interviewed in Ukraine. Of course, this is not to discount the real psychosocial stresses associated with evacuation and the multiple forms of Fukushima's fallout (radioactive, economic, social, psychological), many of which are being tracked by the Fukushima Health Management Survey.[\[32\]](#)

Miki Nakamura has met with other forms of stonewalling in her efforts to monitor her children's health. Like all children living near the disaster site, the Nakamura girls are entitled to thyroid screenings. After her daughters' thyroid checks at the Fukushima Prefectural Medical College, Miki received a brief notice in the mail that lacked any details or explanation of the test results. When she phoned the Medical College to ask for an explanation of the test results, personnel told her, "We are so very busy..." and discouraged her from getting a second opinion, which in the words of the doctors, "just causes confusion." Despite the deficit of whole body counters, Miki managed to arrange whole body counts for her daughters. However, without regular follow-ups to track the dynamic—whether their counts are going up or down—the information is of limited utility.

Miki Nakamura sums up her frustrations: "I am not a doctor but I know that my children are sick. And I saw that other children from Fukushima and in the greater Kanto region had the same health problems as my daughters, though I do not hear about it anymore..." Recent health studies show that Miki's concern about her daughters' thyroid health is far from unfounded. According to the April 2012 *Sixth Report of Fukushima Prefecture Health Management Survey*, which included examinations of 38,114 children, 35.3% of those examined were found to have cysts or nodules of up to 5 mm (0.197 inches) on their thyroids. A further 0.5% had nodules larger than 5.1 mm (0.2 inches).[\[33\]](#) Contradicting earlier reports, the National Institute of Radiological Sciences admitted in July 2012 that children from Fukushima had likely received lifetime thyroid doses of radiation.[\[34\]](#) The

Health Risk Assessment from the Nuclear Accident after the 2011 Great East Japan Earthquake and Tsunami published by the World Health Organization (WHO) in February 2013 states that in the most affected regions of Fukushima Prefecture the preliminary estimated radiation effective doses[35] for the first year after the disaster ranged from 12 to 25 mSv. According to the report, in the most contaminated location the estimated increased risks over what would normally be expected are as follows:

- all solid cancers – around 4% in females exposed as infants;
- breast cancer – around 6% in females exposed as infants;
- leukemia – around 7% in males exposed as infants;
- thyroid cancer – up to 70% in females exposed as infants (the normally expected risk of thyroid cancer in females over lifetime is 0.75% and the additional lifetime risk assessed for females exposed as infants in the most affected location is 0.50%).[36]

“The future is what we are looking at right now”

Miki Nakamura spends time with other evacuee families every day as founder and director the Yamagata Association of Mothers in Evacuation (YAME). The association is a resource base and support system for families like the Nakamuras who are voluntary evacuees often split between two households. YAME has a liaison council to help mothers get necessary information, provides babysitting services and a “mothers’ morning out,” offers free legal consultations, and sponsors a regular “children’s plaza” where mothers can socialize and exchange advice while their children play. Miki Nakamura and her association worked with a local politician to draft the Fukushima Child Victims’ Law, which was passed by the Diet. But this is just a resolution without enforceability, and specific measures to protect victims’ rights (e.g. the right *not* to return to Fukushima) have not been determined.

As a nutritionist, in a context of radiological uncertainty Miki Nakamura draws on her knowledge of food properties and the complexities of the food supply to regulate her children’s diet. She shares and publishes recipes that contain “radioprotective” ingredients. Foods that contain beta carotene and vitamin C, for example, can help rid the body of radionuclides.[37] One food that people in the Fukushima-affected areas have not enjoyed since 3.11 is persimmons (a crop for which the region is famous), which actively absorb radionuclides and thus are highly contaminated. The Yamagata countryside is adorned with scores of persimmon trees laden with ripe, juicy, entirely inedible fruit. Just as apples have become the key symbol of the Chernobyl accident (the

forbidden fruit, original sin, humankind's folly in seeking to control nature through science)[\[38\]](#), perhaps the quintessential symbol of the Fukushima Daiichi accident will be the persimmon, which in Buddhist thought symbolizes the transformation of humans' ignorance (the acrid green persimmon) into wisdom (the sweet, ripened fruit).



Loaded persimmon tree in Yamagata City.

Miki Nakamura has lost all trust in the authorities. Before the disaster she always believed the government and she never thought twice about living near a nuclear power plant. Today she demands justice. She said: “The Fukushima disaster is not just an economic problem, but a problem of our children’s future. The future is what we are looking at right now. Our kids have the right to safety and to a good and long, peaceful life. These are not ‘poor kids.’ They have a future. The most important part of reconstruction after the accident is the restoration of people’s trust and sense of security.”

Was nuclear technological failure—the Chernobyl disaster—the “straw that

broke the camel's back" of the Soviet Union?[\[39\]](#) The botched handling of the accident and its aftermath—and especially the central government's overt failure and disinterest to protect the safety of citizens—confirmed what many citizens strongly believed: their government did not care for them and the system had become thoroughly corrupt and untrustworthy. While widespread protest against nuclear energy and its environmental and health risks was not possible in the authoritarian Soviet state, even in those conditions of a muzzled press and lack of freedom of speech a green movement emerged in response to Chernobyl. Chernobyl's political fallout was one factor contributing to Gorbachev's policy of glasnost (openness), and in a limited way anti-nuclear sentiment also fueled the Ukrainian independence movement.

Similarly, Japanese citizens have lost trust in the government and in engineers and physicians who previously commanded such respect and authority. Community leaders strongly feel that Japan lags behind other industrialized nations in democratic governance; they are particularly concerned about lack of press freedom. Indeed, in December 2012 the World Audit on corruption, democracy, and freedom of press gave Japan a democracy ranking of 29 (1 is most democratic, 150 least democratic). This puts Japan in the Audit's "Division 2" list, along with Ghana, Panama, and Israel. Of the 26 OECD countries, Japan ranks 19th in democratic governance.[\[40\]](#)

The sound defeat of the Democratic Party by the Liberal Democratic Party in the national parliamentary elections in December 2012 reflected dissatisfaction with the status quo. But the elections were a referendum on the DP, not nuclear power; the LDP is pro-nuclear and does not plan to scale back nuclear energy production. Indeed, traveling through Japan I was struck by the relative lack of anti-nuclear discourse, even in Fukushima Prefecture. Few politicians criticize nuclear power. A notable exception is Tetsunari Iida, director of the Institute for Sustainable Energy Policies who lost a bid for governor of Yamaguchi Prefecture in elections in July 2012. The anti-nuclear Tomorrow of Japan Party—formed less a month before the national parliamentary elections in December 2012—garnered scant voter support and disappeared. Reportedly the party's calls for nuclear power drawdown failed to gain traction "amid concerns that electrical shortages could hurt the already shrinking economy."[\[41\]](#)

Indeed, one gets the impression that response to the disaster has centered primarily on short-term economic, not human, concerns. Before the accident at the Fukushima NPP, Japan relied on nuclear power for 30% of its energy needs and was planning to increase that to over 50% within two decades. According to Japan's Agency for Natural Resources and Energy, scrapping nuclear power would result in losses of \$55.9 billion

for power companies, at least four of which would likely face insolvency.[42] With these economic stakes, it is not surprising that TEPCO and the Japanese government have been stingy with information about the disaster, the radioactive fallout, and the potential health consequences. My acquaintances who hoped Japan would abandon nuclear energy after the Fukushima disaster fear that the chance to “change the country’s direction” has already passed by.

Haruhiko Fukase, a resident of Yamagata City who worked as a shelter volunteer and coordinator during the evacuation effort, said that the nuclear accident-affected people have been forgotten not just by the international community, but by many of their fellow Japanese citizens. “For people in Tokyo and other big cities,” he said, “the evacuees don’t even register anymore. Their problems have been forgotten.” But for thousands of families, the Fukushima nuclear disaster will never end. Community leaders repeat this refrain: “The reactor is still hot; the situation is still unstable.” Miki Nakamura and like-minded community leaders are not giving up on the democratic process. They continue to speak justice to power. As Nakamura said during the December 2012 Japanese elections, “To give up on Japanese politics is, to me, to give up on Fukushima.”[43]

Fukushima *is* Chernobyl. Independent of the system (Japanese, Soviet), nuclear technology requires disregard for the public, misleading statements, and obfuscation in multiple domains (medicine, science and technology, governance). As anthropologist Hugh Gusterson notes, “The disaster at Fukushima has generated cracks in what we might call the ‘social containment vessels’ around nuclear energy—the heavily scientized discourses and assumptions that assure us nuclear reactors are safe neighbors.”[44] Comparing the nuclear accidents at Chernobyl and Fukushima shows that “peaceful” nuclear technology is anything but.

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[2] *Vechirnij Kyiv*, April 29, 1986, p. 3.

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[8] Fuminori Tamba (Disaster Recovery Research Institute, Fukushima University), “Recovery in Fukushima: Present Situation and Future Issues,” paper presented at the International seminar on Social Welfare and the Pacific Rim 2012, “Social Work in Fukushima—Social Recovery from Damages Caused by Radiation” (November 3, 2012).

[9] *The Japan Times Online*,
<http://www.japantimes.co.jp/text/nn20120118a1.html>

[10] The millisievert is the most commonly accepted unit for measuring the amount of radiation people receive (their “dose”). 1 mSv = 0.001 Sv. It is estimated that the average person in the U.S. receives an effective dose of about 3 mSv per year from naturally occurring radioactive materials and cosmic radiation from outer space. Around 2 mSv of this “background radiation” comes from radon gas in homes. Common radiological procedures carry the following approximate effective doses: Computed Tomography (CT)-Colonography: 10 mSv; Computed Tomography (CT)-Spine: 6 mSv; X-ray of extremity: 0.001 mSv; Intraoral (dental) X-ray: 0.005 mSv; Mamography: 0.4 mSv. Source: Radiological Society of North America, Inc.,
http://www.radiologyinfo.org/en/safety/index.cfm?pg=sfty_xray

[11] Miki Nakamura, 2012, personal communication.

[12] Mary Mycio, *Wormwood Forest: A Natural History of Chernobyl* (2005, Washington, D.C.: Joseph Henry Press), p. 18.

[13] Opening Statement by Chief Cabinet Secretary Edano, Cabinet Secretariat, Cabinet Public Relations Office, Friday, April 22, 2011.
http://www.kantei.go.jp/foreign/incident/110422_0944.html

[14] The tsunami destroyed 600 homes in Namie. 198 persons died, and 30 are still missing.

[15] Tamba (2012).

[16] Toyotaka Kanakura, director of NPO “ShinmachiNamie” in Nihonmatsu.

[17] Tamba (2012).

[18] <http://www.unscear.org/unscear/en/chernobyl.html#Health>

[19] This was related by Haruhiko Fukase, head of the “Yamagata Lifesaving Club” at the Yamagata City Sports Complex and a shelter management volunteer leader during the evacuation of disaster victims to Yamagata.

[20] $1 \mu\text{Sv} = 0.000001 \text{ Sv}$

[21] Martin Fackler, “Japan’s Prime Minister Defends Handling of Crisis,” New York Times, April 30, 2011,
http://www.nytimes.com/2011/05/01/world/asia/01japan.html?_r=0

[22] Information from official at support organization for evacuees located inside the Yamagata City Sports Complex.

[23] Miki Nakamura, post to Facebook wall, 12/16/12.

[24] Adriana Petryna, *Life Exposed: Biological Citizens after Chernobyl* (2002, Princeton: Princeton University Press).

[25] Petryna (2002).

[26] Sergii Mirnyi, *Worse than Radiation* (2001, Budapest: Bogar Kiado).

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[28] Information from Haruhiko Fukase, head of the “Yamagata Lifesaving Club” at the Yamagata City Sports Complex and a shelter management volunteer leader during the evacuation of disaster victims to Yamagata.

[29] Information from Haruhiko Fukase.

[30] “The East Japan’s Great Earthquake/Fukushima Daiichi Nuclear Accident: Thyroid examination ‘delayed for evacuees outside the prefecture’ Fukushima Prefecture, principle discussed in a private meeting.” [Higashi Nihon Daishinsai: Fukushima Daiichi genpatsu jiko. Kojosen kensa “Kengai hinansha, atomawashi” Fukushima-ken, himitsukai de hoshin.], *The Mainichi Newspaper* [Online], Feb. 9, 2013, <http://mainichi.jp/feature/20110311/news/20130209ddm041040143000c.html>

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[32] Brumfiel (2013).

[33] Julian Ryall, "Nearly 36pc of Fukushima children diagnosed with thyroid growths," *The Telegraph*, July 19, 2012, <http://www.telegraph.co.uk/news/worldnews/asia/japan/9410702/Nearly-36-pc-of-Fukushima-children-diagnosed-with-thyroid-growths.html>

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[35] Effective dose is a measure of the overall risk arising from the exposure. The WHO describes effective dose as "sum of the products of absorbed dose to each organ multiplied by a radiation-weighting factor and a tissue-weighting factor that takes into account the radiosensitivity of tissues and organs" (WHO, 2013, p. 110).

[36] From http://www.who.int/mediacentre/news/releases/2013/fukushima_report_20130228/en/index.html. The full report is available in multiple languages at http://www.who.int/ionizing_radiation/pub_meet/fukushima_report/en/index.html.

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