ORIGINAL RESEARCH

# Ongoing Mental Health Concerns in Post-3/11 Japan

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## ABSTRACT

**Background:** The triple disaster that struck the Tohoku region on March 11, 2011, has had massive psychiatric, social, and physical effects on the people of Japan. A staggering loss of life and property, as well as an ongoing nuclear disaster, has dramatically affected the ability of the country to recover.

**Objective:** In an effort to better understand the current social, health, and mental health needs of the region affected by the disaster and to share lessons from 9/11, a group of 9/11 survivors and doctors from the Icahn School of Medicine at Mount Sinai traveled to sites throughout the Fukushima, Miyagi, and Iwate prefectures.

**Methods:** A qualitative analysis was performed on transcripts of the cultural and medical exchanges, which occurred on this trip to identify relevant themes about the problems confronting the recovery effort almost 3 years after the disaster.

**Findings:** Significant themes that emerged included a crippling radiation anxiety, a considerable stigma toward addressing mental health care, and a shortage of mental health care throughout the region, as well as ongoing psychiatric symptoms such as insomnia, anxiety, and alcohol misuse.

**Conclusions:** These issues continue to complicate the recovery effort but suggest avenues for future interventions.


**Key Words:** Japan, 3/11, 9/11, psychiatric

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## INTRODUCTION

On March 11, 2011, Japan was struck with a triple disaster with massive consequences affecting the past, present, and future of the country. The Great East Japan Earthquake consisted of 4 earthquakes with a magnitude of 7 to 9 on the Richter scale and hitting within 40 minutes of each other close to the eastern coast of the Tohoku region (the northeastern portion of Japan's largest island, Honshu). This was followed almost an hour later by a massive tsunami, reaching 128 feet (38 m) in height at points, and reaching up to 10 km inland, unleashing further devastation. Additionally, the tsunami crippled the Fukushima Daiichi Nuclear Power Plant (NPP), triggering a nuclear meltdown, a hydrogen explosion, and a leak of radioactive materials (volatile fission products and radioactive noble gasses), prompting a 20-km evacuation zone surrounding the plant. This has been labeled a major accident, the highest level, on the International Nuclear Event Scale. As of September 2012, 15,883 deaths were confirmed, with 6146 injured and 2654 missing. As of August 2013, almost 150,000 people remain relocated in the region, and the clean-up of Fukushima Daichii NPP continues amid ongoing radiation concerns. The World Bank has reported this to be the costliest disaster in world history, with a sum upward of $235 billion.[1-5]

A disaster of this magnitude has far-reaching effects that are further complicated by the radiation threat in a country that has already dealt with significant nuclear tragedies in its history. Its toll has been not only physical but also mental. In the aftermath, a prevalence of acute stress disorder, panic disorder, delirium, psychotic excitement, anxiety, and sleep disorders has been observed.[5] Access to mental health workers and

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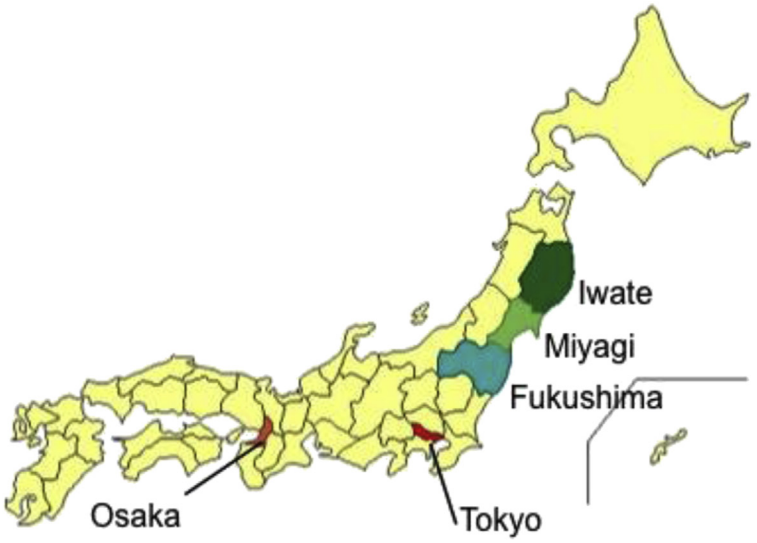


| | Osaka | Tokyo | Fukushima | Miyagi | Iwate |
|---|---|---|---|---|---|
| Area ($km^2$) * | 1,898 | 2,188 | 13,783 | 7,286 | 15,278 |
| Population* | 8,840,372 | 12,988,797 | 2,042,816 | 2,340,029 | 1,340,852 |
| Population density (persons/$km^2$) * | 4,657.7 | 5,937.3 | 148.2 | 321.2 | 87.8 |
| No. of psychiatrist** | 908 | 1,662 | 215 | 232 | 119 |
| No. of psychiatrist/100,000 people | 10.3 | 12.8 | 10.5 | 9.9 | 8.9 |

* Oct. 1, 2009 **Dec. 31, 2008 Ministry of Health, Labour and Welfare

**Figure 1.** Map of Japan with associated population and psychiatrist concentrations.

psychiatric medications were limited following the disaster and pervasive stigma against mental illness, not uncommon around the world, further complicated matters.[5] Mental health care response teams were dispatched soon after the disaster, and later, clinical sites such as the Nagomi Mental Health Care Center in Soma (a city in the north of the Fukushima prefecture) opened. Despite this, there remains concern for survivors' long-term mental health.[5] (See Fig. 1 for a map of Japan with population densities as well as associated psychiatrist concentrations in the prefectures before the disaster.)

The United States also has dealt with massive disasters such as 9/11, and studying the mental health outcomes of such events has proven invaluable for future care and prevention. In light of this, a team of doctors from the Icahn School of Medicine at Mount Sinai in New York City traveled to Japan with representatives of families affected by 9/11 to determine what social, health, and mental health care problems and concerns persisted in the Tohoku region almost 2.5 years after the event and to share lessons learned in the United States.

The 10-day trip consisted of personal exchanges with 3/11 survivors and professional exchanges with health and mental health professionals in Tohoku. Through this dialogue, a picture of the long-term psychosocial ramifications of 3/11 emerged that we have attempted to capture by conducting a qualitative study of transcripts of the exchanges. The findings from this study regarding relevance for post-3/11 mental health care and for disaster mental health response in general are presented and discussed here.

## METHODS

From August 31 to September 9, 2013, a group of 7 representatives of the September 11th Families' Association, 3 members of the Rotary International Foundation, 3 physicians from the Mount Sinai Medical Center, and 3 translators visited a convenience sample of mental

**Table 1.** Common Themes Identified in Southern Tohoku

| | Southern Tohoku |
|---|---|
| Community members | • Fear of radiation pertaining to safety and health of family<br>• Loss of property and housing concerns<br>• Stigma of being an evacuee<br>• Stigma of accessing mental health care and difficulty opening up to others<br>• Psychiatric sequelae: insomnia, anxiety, alcohol misuse in men, and feelings of distress in women |
| Health care professionals | • Fear of radiation<br>• Reduction of mental health services<br>• Importance of community<br>• Loss of property<br>• Stigma of being an evacuee<br>• Stigma of accessing mental health services and difficulty opening up to others<br>• Psychiatric sequelae: insomnia, anxiety, alcohol misuse in men and feelings of distress in women |

health centers, temporary housing, medical universities, and community centers in Japan's Tohoku region.

We targeted members of the community affected by the triple disaster, physicians from the region's medical universities (Fukushima and Tohoku), and social workers involved with the recovery process, as well as community leaders involved in organizing the recovery relief (primarily the Rotary International Foundation).

We conducted a multitude of exchanges consisting of open-ended questions assessing the primary concerns of survivors and responders of the 3/11 disaster that persist 2.5 years after the incident. Representatives of the September 11th Families' Association helped to facilitate discussion by sharing their own experiences of survival. All encounters were recorded with an audio device and later transcribed by one of the authors (J.R.) for further analysis.

We analyzed the material according to methodology previously described in (Winer et al, 2012).[6] Three members of the research team then separately coded the transcripts for salient themes, after which they met and arrived at consensus themes.

## FINDINGS

The mental health themes that emerged in the northern prefectures of Iwate and Miyagi were different from those observed in the more southern prefecture of Fukushima. Additionally, there were some differences in concerns identified by members of the community compared with health care professionals. Finally, 9/11 and 3/11 families shared many similar psychosocial concerns.

### Southern Tohoku: Fukushima Prefecture

Table 1 provides a comprehensive list of themes found in this region. It should be noted that Fukushima was in the evacuation zone for the NPP disaster at Fukushima Daiichi, and thus radiation concerns played a much higher role in this region. Both members of the community and health care professionals found that the "biggest problem for Fukushima residents is environmental contamination." Both doctors and residents described how significant concerns about radiation interfere with daily life, and said this has been demonstrated with what they call "radiation anxiety." For example, families playing at an indoor playground, Pep Kids, were questioned about their ongoing concerns; overwhelmingly they noted fear for the safety and health of their families as a result of radiation.

Both health care providers and community members discussed the loss of housing and property as a significant problem. During a visit to temporary housing, community families complained about remaining displaced from their homes and having lost property or sources of income such as boats and farms. Clinicians at Fukushima Medical University talked about further problems facing the 150,000 people who remain displaced, including conditions in temporary housing. The housing was described as cramped, poor quality, and having little privacy, leading to increased risk for friction between neighbors. They also related an ongoing problem of stigmatization for the evacuees placed in government-subsidized apartments. In Iwaki City, graffiti had appeared on the cars of evacuees with statements such as "Evacuees go home!" As such, they reported "evacuees of the NPP may not want to identify themselves as evacuees." Conversely, they noted the importance of a sense of community to the recovery from 3/11.

Community residents and health care professionals also noticed a persistent stigma against mental health issues and a difficulty for survivors to open up and communicate their problems. The director of the newly established Nagomi Mental Health Care clinic in Soma, which

**Table 2.** Common Themes Identified in Northern Tohoku

| | Northern Tohoku |
|---|---|
| Community members | • Importance of community<br>• Loss of property and housing concerns<br>• Stigma of accessing mental health services and difficulty opening up to others<br>• Psychiatric sequelae: insomnia, anxiety, alcohol misuse in men and feelings of distress in women |
| Health care professionals | • Importance of community<br>• Drain of adequate professionals<br>• Loss of property and housing concerns<br>• Stigma of accessing mental health services and difficulty opening up to others<br>• Reduction of mental health services<br>• Psychiatric sequelae: insomnia, anxiety, alcohol misuse in men and feelings of distress in women |

services much of the Fukushima evacuee community, noted that clinic staff had "trouble gaining trust from residents in temporary housing" and that residents were "reluctant to speak about their problems." The evacuees temporarily housed in Fukushima echoed this sentiment and were not used to discussing their feelings.

Additionally, the community of evacuees and the health care providers identified many pervasive psychiatric symptoms among the 3/11 survivors. These included insomnia and anxiety (both generalized and radiation-related), as well as increased alcohol misuse in men and a sense of "distress" in women. ("Men tend to drink more alcohol and women … seem more stressed"). A radiation medicine specialist at Fukushima Medical University noted, "A person who has been obsessed with radiation fear usually has more anxiety. In such people, they have economical anxieties [and] interpersonal anxieties."

Finally, professionals discussed the current shortage of mental health services in the surrounding community. The director of the Nagomi Mental Health Clinic observed, "The mental health system was severely damaged …; all psychiatric facilities and most welfare offices are located in places labeled as restricted areas." Physicians at Fukushima Medical University also focused on an "inadequate infrastructure" to handle the ongoing needs.

## Central and Northern Tohoku: Miyagi and Iwate Prefectures

Table 2 provides a comprehensive list of themes that emerged in the exchanges in this region. The loss of property and housing issues remained significant in Northern Tohuku. Cities such as Otsuchi were almost completely destroyed, with an official involved in reconstruction noting 2000 of the 15,000 inhabitants of the town were killed or remain missing with much of the remaining population in temporary housing. Figures 2, 3, and 4 show the extent of the devastation in Otsuchi. Jobs in major industries such as foresting, farming, and fishing became scarce, and the railroad to the city functioned only irregularly, thereby limiting commuting options for work outside of the area.

As in Central Tohoku, many residents and health care providers in the northern region echoed the stigma associated with seeking mental health care combined with a difficulty communicating one's feelings. The director of the mental health clinic, Kara-Koro Station, in Ishinomaki stated, "People were relatively new to mental health care …; if we said we were there for mental health care, people would refuse us. So instead we said we were coming to bring food, water and then we would try talking to them about mental health care." Many residents shared their difficulties opening up. One man said, "I lost my house completely …; my wife was in the area and saw, which was very shocking to her. But we've never spoke about our home, never once, after the earthquake. After a year, one of her friends sent her a letter asking about the conditions of her house, and all of a sudden she started crying.… She never expressed herself freely as a victim." Another man noted, "At the time of the great earthquake, I lost 2 of my workers and since then I've tried to forget what has happened all the time." In Otsuchi, foster parents of orphaned children

**Figure 2.** Destruction in Otsuchi.

**Figure 3.** Destruction in Otsuchi.

noted, "We are not their own parents, so trying to understand them is very difficult for us today …, and the children are very hesitant in saying something to their foster parents." A woman who survived the tsunami noted feeling "misunderstood."

Residents and health care providers spoke often of the importance of community in the ongoing recovery. A city welfare office guide noted that the government intended to relocate the town to prevent future disasters and that it had become problematic as "the people are stuck to the land, from not wanting to give up and from wanting to stay." A model of the town before destruction is on display in the reconstruction office of Otsuchi. Residents can place their family names where their homes used to be on a scale model of the town. Social workers at one of the town's temporary housing projects noted that other community efforts are under way and highlighted the example of a "camping group" that had formed for survivor children.

Similar psychiatric sequelae, including alcohol misuse in men, distress in women, insomnia, and anxiety, have been observed in the north. One local psychiatrist observed, "Many people have reported experiencing difficulties sleeping, anxieties, distress and problems with dependency on alcohol. In fact one-third of the cases here are about alcohol abuse." It should be noted, however, that the anxiety was generalized and not about radiation concerns, as the NPP accident took place to the south in Fukushima.

**Figure 4.** The state of many buildings left standing in Otsuchi.

Health care professionals talked about a shortage of mental health services in the surrounding community. A local psychiatrist noted how Kara-Koro in Ishinomaki city is the only such clinic in the prefecture of 2.3 million people offering mental health services for survivors.

Also highlighted was a discernible loss of local professionals in general after the disaster. Although many lost their lives, many others were migrating out of the region in search of a better life. A social worker in the temporary housing noted, "We need more teachers for the schools, people who have … knowledge of teaching and dealing with children … and those with other skills, such as knowing how to deal with trauma."

## 9/11 and 3/11 Commonalities

As reflected in Table 3, both 9/11 and 3/11 families found environmental contaminants to be a major persisting obstacle in recovery, with one 9/11 survivor stating, "There are similarities to 9/11, because after 9/11 we had the toxic dust.… Now we're 12 years out and we're experiencing the second wave, which is many, many illnesses and types of cancer."

Both groups also conveyed a difficulty with trusting their respective government's communication on environmental hazards in the recovery process. A 9/11 survivor stated, "There was a lot of mixed information about the safety of the dust" and that it would have been immensely helpful to have "concrete truths … as to what are the concerns and dangers." 3/11 survivors frequently echoed this feeling about radiation exposure. Survivors felt the government provided conflicting reports on the dangers of the NPP radiation leak. Eventually, radiation meters were installed throughout the cities, from parks to restaurants, to allay the public's concerns.

9/11 family members repeatedly emphasized the benefit they derived from being part of a community of survivors and sharing their stories and experiences with others (all were also docents at the World Trade Center Tribute Center in lower Manhattan). One 9/11 representative offered, "It's been an extraordinary experience

**Table 3.** Common Themes Identified Between 9/11 and 3/11 Families

- Environmental contaminants have lasting effects on recovery
- Recovery process complicated by difficulty trusting the government and the lack of concrete truths
- 9/11 families have found enormous benefit in being part of a survivor network and 3/11 families are now seeing the merit of that

to be a part of that community and meet people who suffered also during the 9/11 disaster but whose experiences were different from mine. To meet survivors, downtown residents, family members of firefighters—those experiences become very rich for me." The 9/11 survivors frequently encouraged 3/11 survivors to "seek a sense of community," a message that consistently resonated with the 3/11 survivors as well, with one responding, "After I heard about your experiences, I realized that I should not forget, and that we should keep talking about the people [we lost] and help each other."

## DISCUSSION

Although many ongoing themes were noted over the 2 years after the disaster, possibly the most prominent was the atmosphere of radiation anxieties among the people in Fukushima, who must deal with the uncertainty, isolation, and fear associated with radiation.[7] This fear reflects the main difference between concerns expressed in Northern and Southern Tohoku and may account for an observed improved spirit and sense of hope noticed in the northern cities.

Radiation fears likely complicate the recovery process significantly, especially as it is an invisible fear prompting anxieties that cannot easily be quelled. The current effects of radiation anxiety in Fukushima prefecture are quite similar to that of the Chernobyl nuclear disaster, wherein survivors suffered from anxiety and somatic complaints in a culture where psychiatric illnesses were also stigmatized and evacuees also suffered harassment.[1] The government of Japan has tried to address this issue, and despite reports that the health significance of these exposures is low, it has proven impossible to fully allay these ongoing anxieties.[4] Rumors and conflicting media reports may have strengthened these fears, whereas official seminars have been more helpful in lowering anxieties.[8] Given the overall cultural difficulties with sharing their emotions and a stigma toward accessing mental health care, radiation anxieties may be masking psychiatric syndromes such as generalized anxiety and clinical depression.

Another prominent difference between Northern and Southern Tohoku lies in the disparate sense of community that was conveyed across our exchanges about the recovery from 3/11. Residents of northern cities such as Otsuchi communicated a deep connection to their land and community. No doubt this may be in part attributed to their having remained in their town of origin, even if in temporary housing. Fukushima residents, meanwhile, were displaced as much as 20 km from their pre-3/11 towns. A sense of belonging and community is a vital element of mental well-being and this, in combination with a lack of radiation anxiety, likely has contributed greatly to a more palpable spirit de corps and overall well-being in survivors in northern prefectures compared to their central region peers. It has previously been found that "community-level characteristics and processes may help minimize [a mass traumatic event's] initial damaging effects on individual members and promote recovery in the longer term."[10]

As noted earlier, a widespread stigma toward mental illness has complicated the recovery process as well. It has previously been suggested that this stigma may stem from the national value placed on conformity, a culture of institutionalism of mental illness and a lack of national education campaigns.[9] There exists a great deal of distrust and misunderstanding toward mental health care, likely preventing clinically distressed people suffering from seeking help. This reality has prompted clinics, such as the ones in Soma and Ishinomaki, to focus on a "mind—body" approach. The psychiatrist in Ishinomaki noted that the acute disaster recovery, the distribution of food, water, and other necessities, was essential to successfully broaching the topic of mental health with survivors. This fear of being perceived to be different and suffering from a mental illness likely prevents a more candid and open discussion of survivors' experiences and symptoms with peers and health care workers. The following statement made by a retired firefighter and first responder in the group of 9/11 families of course suggests that by contrast in the United States, this fear exists and yet much progress has been made in addressing it: "There's always a stigma with admitting that you have some kind of mental or emotional problem. I think the [Fire Department of New York] has gone very far in terms of dealing with that. A lot more people are seeking help."

The reporting of subclinical psychiatric symptoms such as insomnia, anxiety, and increased alcohol consumption likely also reflects the social stigma toward mental health. On the one hand, these symptoms are largely nonspecific, and on the other hand poor coping mechanisms such as alcohol use are largely socially sanctioned.

A major similarity noted between survivors in the recovery of 9/11 and 3/11 were concerns about the longstanding effects of environmental contaminants and the government's response to the clean up. Both the toxic dust of 9/11 and the radiation of 3/11 prevented a return to normalcy for some time, and survivors were further frustrated by conflicting safety reports and the lingering effects of uncertainty and fear brought on by possible health hazards. The health hazards of working near the World Trade Center clean up have begun to emerge with higher rates of prostate and thyroid cancers and myeloma, as well as restrictive airway disease.[11,12] Additionally, there is possibly a moderate correlation between mental illness such as post-traumatic stress disorder and respiratory disease,[13] indicating the possibility of longstanding psychiatric repercussions from environmental exposures.

Although the health consequences of radiation from Fukushima have been estimated to be relatively low,[1] this

has not prevented a culture of fear and radiation anxiety seen in Japan. Many people have yet to return to regions deemed safe for habitation, and 76% of the Japanese populace deems food from Fukushima prefecture to be unsafe.[7] The longstanding physical effects of the radiation may not be known for quite some time, but the mental toll of radiation anxiety continues to be immense nationwide[7] and is likely fueling evacuee stigmatization and an inability to return to normal life. A pervasive sense of distrust toward official reports on the radiation, as well as many conflicting media discussions, also have likely worsened the anxiety. Survivors of both 9/11 and 3/11 felt they would have a greater sense of peace if consolidated and trustworthy information on the health hazards of both radiation and toxic dust had been made available.

Finally, a resounding sentiment echoed by the 9/11 survivors was the benefit a survivor community has had on them. They felt the sense of community and ability to share their experiences with peers who could understand has contributed greatly to their recovery. Many Japanese survivors took this message to heart and echoed their understanding for a better survivor community. As mentioned, a sense of community holds enormous benefits in recovery from traumatic events, and the formation of such an organization would greatly help survivors of 3/11 in sharing their experiences, understanding their psychiatric symptomatology and reducing the stigma of mental illness.

This study had a number of limitations, which should be mentioned. First, the language barrier required the majority of communication to take place through translators, complicating the exchange. Given this, misunderstandings and errors in transcription are possible. Second, it is unclear to what extent the 3/11 survivors benefited from the exchange with 9/11 survivors. Although 9/11 survivors uniformly described deriving a great benefit from sharing their stories, many observations noted that 3/11 survivors may not have been as well equipped to relate to these accounts and may see their experiences as entirely different. Although the sadness involved with a loss of life in both tragedies was similar, further comparisons given the nature of the events (a terrorist attack and a natural disaster combined with a manmade disaster) may not be realistic. Additionally, a larger sample size of interviewees would provide for more generalizable findings. This would include sampling residents across temporary housing sites in all 3 affected prefectures and engaging them in more formal and structured interviews.

## CONCLUSIONS

Massive disasters tend to expose weaknesses in any system, and the mental health system of Japan has been no exception. Before the disaster there were only 10.5 psychiatrists per 100,000 people in Fukushima prefecture, 9.9 in Miyagi, and 8.9 in Iwate, compared with 16.5 in the United States.[5] Following the disaster, many mental health clinics and hospitals closed in the Fukushima evacuation zone or were affected by the tsunami. Additionally, the Japanese government continues to reject coverage for psychotherapy under the health care insurance system.[5] Pre-existent psychiatric conditions were worsened following the catastrophe, including case reports of worsened manic states in people suffering from bipolar disorder.[2] This may have been caused by the stress of the catastrophe or a lack of access to medications and care.[2,5] Japanese people are forced to continue coping with potentially crippling radiation anxiety while suffering from significant loss of property and employment in a culture where discussing and addressing these concerns is highly stigmatized. A nationwide effort to reduce this stigma and increase mental health care in the affected zones is crucial to bring a sense of normalcy back to the lives of those who suffered from the triple disaster of 3/11.

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## References

1. Bromet E. Mental health consequences of the Chernobyl disaster. J Radiol Prot 2012;32:N71–5.
2. Kunii Y, Wada A, Matsumoto J, Yabe H, Niwa S. Worsening of manic state in patients with bipolar I disorder following the Fukushima disaster. Psychiatry Clin Neurosci 2012;66:622–3.
3. Matsuoka Y, Nishi D, Nakaya N, et al. Concern over radiation exposure and psychological distress among rescue workers following the Great East Japan Earthquake. BMC Public Health 2012;12:249.
4. Hardie SM, McKinley IG. Fukushima remediation: status and overview of future plans [e-pub ahead of print]. J Environ Radioact. http://dx.doi.org/10.1016/j.jenvrad.2013.08.002, accessed September 13, 2013.
5. Yamashita J, Shigemura J. The Great East Japan Earthquake, Tsunami, and Fukushima Daiichi Nuclear Power Plant accident: a triple disaster affecting the mental health of the country. Psycitr Clin N Am 2013;36:351–70.
6. Winer RA, Morris-Patterson A, Smart Y, et al. Knowledge of and attitudes toward mental illness among primary care providers in Saint Vincent and the Grenadines. Psychiatric Q 2013;84:395–406.
7. Brumfiel G. Fallout of fear. Nature 2013;493:290–3.
8. Sugimoto A, Nomura S, Tsubokura M, et al. The relationship between media consumption and health-related anxieties after the Fukushima Daiichi Nuclear Disaster. PLoS One 2013;8:e65331.
9. Ando S, Yamaguchi S, Aoki Y, Thornicroft G. Review of mental-health related stigma in Japan. Psychiatry Clin Neurosci 2013;67:471–82.
10. Le F, Tracy M, Norris FH, Galea S. Displacement, county social cohesion, and depression after a large-scale traumatic event. Soc Psychiatry Psychiatr Epidemiol 2013;48:1729–41.
11. Li J, Cone JE, Kahn AR, et al. Association between World Trade Center exposure and excess cancer risk. JAMA 2012;308:2479–88.
12. Berger KI, Reibman J, Oppenheimer BW, et al. Lessons from the World Trade Center disaster: airway disease presenting as restrictive dysfunction. Chest 2013;144:249–57.
13. Luft BJ, Schechter C, Kotov R, et al. Exposure, probable PTSD and lower respiratory illness among World Trade Center rescue, recovery and clean-up workers. Psychol Med 2012;42:1069–79.