# The voice of the most vulnerable: lessons from the nuclear crisis in Fukushima, Japan

A Sugimoto,[a] S Krull,[a] S Nomura,[a] T Morita[b] & M Tsubokura[b]

On 11 March 2011, the great earthquake in eastern Japan and its accompanying tsunami caused a meltdown at the Daiichi nuclear power plant in Fukushima. Large amounts of airborne radioactive materials were released into the atmosphere, causing widespread environmental contamination throughout eastern Japan with potentially damaging long-term health consequences.[1] The International Atomic Energy Association classified the nuclear disaster as a "level 7" event – the most dangerous possible in the era of modern atomic energy.[2] Confronted with this scenario, the Japanese government acted immediately to evacuate the population in designated evacuation zones within Fukushima prefecture. Initially a concentric circle was drawn around the power plant and a 20-km area was declared a "no-entry zone".[3] On 22 April, however, in the face of continued release and atypical expansion of radioactive material, this protective cordon was redrawn to include villages in a 20–30 km zone, now designated as an "evacuation zone in case of emergency", as well as several villages within a 30–50 km zone north of the plant, which was declared a "planned evacuation zone".[3]

Although this multi-faceted disaster is not the only large-scale calamity to strike Japan in recent years, it differs from previous events in several important respects. First, the situation at Fukushima, with its potential for future catastrophe, is a continuing one. Second, the effects of prolonged exposure to low-level radiation on human health have not yet been determined.[4] Finally, the convergence of three separate disasters – earthquake, tsunami and nuclear crisis – is not only unique in terms of its scale and complexity, but also as regards the complicated interaction of health problems to which it may have given rise. The great Hanshin-Awaji (Kobe) earthquake that killed over 6000 people in 1995[5] showed that in Japan disasters can affect different population groups with differing severity and that the elderly are especially vulnerable.[5] But when it comes to dealing with the health challenges resulting from the Fukushima disaster, with its unprecedented scale and complex characteristics, past experience may not be the best guide. In this article we highlight the importance of taking the social and cultural context into account during emergency planning and response. To support our views we present the results of a health check we conducted in one of the villages most affected by the nuclear disaster. Although the social context in which the Fukushima disaster occurred is quite specific to Japan, the implications for disaster planning apply to a wide range of settings, especially those with populations like Japan's that are ageing rapidly.

Annual health checks are an important part of Japan's system of universal health coverage and play a role in both health monitoring and intervention planning. Accordingly, in May 2011 volunteers from the University of Tokyo, in collaboration with local governments in Fukushima prefecture, conducted a free health check among villagers in the "planned evacuation zone". This was an essential measure, since widespread confusion and logistical difficulties had made it impossible to monitor the health of the local population after the disaster. For many villages, such as Iitate, it was the last opportunity to obtain information on the health of the population before the enactment of a compulsory group evacuation order on 25 May. Before 11 March, this particular village had a population of 6152, but within a few months this figure had dropped dramatically. With the elderly comprising 28.1% of its population, the village provides a good example of the ageing of Japanese society. The majority of its dwellers work in the primary industry sector. Of an expected 300 residents, which were the only ones that the local government could locate because of confusion after the evacuation order, 257 attended the health check. The majority of them were older than 60 years. The purpose of the health check was primarily to provide relief to those who had been affected physically and psychologically by the crisis, as well as to better understand the existing health situation and the feelings and opinions of residents of the area. Information about the health check was disseminated to all villagers in advance. Each person's health check lasted about one hour and was divided into two sections: (i) a health interview that included questions on pre-existing conditions, family history, self-reported symptoms, mental health and time spent outdoors since the disaster; (ii) a health examination that included urinalysis, blood tests, blood pressure measurement and a physical examination by a physician.

Although many people had comorbid chronic conditions, no direct radiation damage was detected in blood tests. Greater morbidity is naturally expected in an older population, but recent events in Fukushima could have led to an exacerbation of underlying chronic conditions. The life of villagers working in agriculture changed dramatically after the nuclear disaster. Whereas before they had spent most of their time outdoors, after the disaster they became more sedentary and avoided going outside the house. It soon became apparent from the health interviews that ambiguous official information disseminated through the media after the nuclear crisis had confused the inhabitants and resulted in self-imposed "grounding" and lack of physical activity. In its efforts to minimize the long-term risk of cancer, the government issued an evacuation order while advising residents to stay indoors. This indirectly encouraged

[a] Department of Global Health Policy, Graduate School of Medicine, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan.
[b] Institute of Medical Science, University of Tokyo, Tokyo, Japan.
Correspondence to A Sugimoto (e-mail: amigon0918@m.u-tokyo.ac.jp).
(*Submitted: 9 August 2011 – Revised version received: 20 March 2012 – Accepted: 10 April 2012 – Published online: 24 April 2012*)

the population to adopt a sedentary lifestyle that may have exacerbated existing chronic conditions in the elderly.

Psychological health is inseparable from physical health.[6] During the interviews, a woman in her late 80s made a lasting impression. Smiling at all times, she expressed no worry with respect to the radiation and had only one concern: "For generations, my family has lived in a close relationship with this land. I will feel accursed for losing the lands that my ancestors passed down to me." A man in his late 60s gave us similar food for thought, as he said with a laugh, "I do not know much about radiation, although I have heard it's dangerous. For the sake of my cattle, I have worked outside every day since the disaster. To me, watching my cattle die is like witnessing the killing of my own children". In two days' time he was confronted with the reality of having to abandon his cattle and move away from the land where he was born and raised and spent his entire life. Feelings such as these were expressed by many members of this population on the verge of displacement to an unfamiliar area. For elderly Japanese people reared in country villages, being torn from the land of their ancestors and moved to an unfamiliar environment can cause more stress and harm than direct exposure to radiation. Whereas their physical health is not likely to be affected in the short term by the radiation or the measures taken to protect them from it, evacuation from the land of central importance to the stability of their community and sense of belonging can greatly undermine their health.

The World Health Organization includes "a state of social well-being" in its definition of health. In Fukushima's post-disaster setting, attention to this dimension of health may be just as important as concerns about the immediate physical effects of radiation, especially among an active elderly population that judges its self-worth in terms of its ability to safeguard and convey basic social and cultural values and to contribute to society through farming or the custodianship of land long after retirement. What the elderly want is not necessarily a cancer-free life in 20 years' time, but rather, the ability to continue living their normal lives.

When an emergency occurs, governments have no choice but to prioritize people's health by taking some form of action. Beyond health considerations, under such circumstances evacuation becomes ethically mandatory. However, the current nuclear crisis in Japan is likely to be long-lasting, given the destruction of homes and businesses in the area by the tsunami. A year after the disaster, Fukushima is still suffering. Mitigating the effects of the disaster will require government leadership, accountability and transparency on multiple levels. Our interactions with the villagers suggest the need to not only monitor their health status and that of their communities, but also to establish a system for listening to their voices, particularly during the reconstruction phase, as a way to gain an understanding of sociocultural issues and how they affect people's physical and mental health. Health is a multi-faceted concept whose definition varies at different stages of the life cycle. If health interventions fail to take into account or to alleviate the fears and concerns of the people they target, they may ultimately prove more harmful than beneficial for some segments of the population, such as the elderly, in both the short and long term. ■

**Competing interests:** None declared.

## References

1. Bromet EJ. Lessons learned from radiation disasters. *World Psychiatry* 2011;10:83–4.
2. Prime Minister of Japan and his Cabinet [Internet]. [Selection of "planned evacuation zone" and "evacuation zone in case of emergency"]. Tokyo: Prime Minister of Japan [updated 22 April 2011]. Japanese. Available from: http://www.kantei.go.jp/saigai/pdf/201104220944siji.pdf [accessed 16 April 2012].
3. Kami M, Tsubokura S. [The effects of radiation on health]. In: *Soso Medical*. Tokyo: LOHAS medical; 2011. pp. 10-11. Japanese. Available from: http://lohasmedical.jp/ [accessed 16 April 2012].
4. Kunii O, Akagi M, Kita E. The medical and public health response to the Great Hanshin-Awaji Earthquake in Japan: a case study in disaster planning. *Med Glob Surviv* 1995;2:214–26.
5. Owen N, Bauman A, Brown W. Too much sitting: a novel and important predictor of chronic disease risk? *Br J Sports Med* 2009;43:81–3.
6. Bulletin of the Atomic Scientists [Internet]. Suzuki T. Daily update from Japan. Chicago: Bulletin of the Atomic Scientists [updated 29 April 2011]. Available from: http://www.thebulletin.org/web-edition/columnists/tatsujiro-suzuki/daily-update-japan [accessed 16 April 2012].