



## Towards long-term responses in Fukushima

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4 years have passed since the nuclear power plant accident at Fukushima, Japan, moving the problems there from an acute nuclear disaster to a chronic environmental disaster, with multiple social, psychological, economic, and political consequences. As described by Ohtsuru and colleagues,<sup>1</sup> many people continue to experience multiple losses, both tangible and intangible, at the individual, family, and community levels.

Putting Hiroshima and Nagasaki side by side with Fukushima, as done in this issue of *The Lancet*, seems inappropriate in major respects. Hiroshima and Nagasaki were intentional governmental acts of war, whereas Fukushima was accidental and negligent industrial behaviour in time of peace. They share exposure to radiation—but at vastly different levels and in different forms.<sup>2</sup> In Fukushima, no one has died from radiation exposure, and the UN Scientific Committee on the Effects of Atomic Radiation report<sup>3</sup> in 2013 stated that substantial changes in future cancer statistics attributed to radiation exposure are not expected to be observed, although the committee also noted “a theoretical increased risk of thyroid cancer among most exposed children” and recommended they be “closely followed”.<sup>4</sup>

However, putting these disasters together does reveal some shared characteristics. In Hiroshima and Nagasaki, people were “exposed to explosion” (*hibaku* in Japanese); while those in Fukushima are “exposed to radiation” (also *hibaku* in Japanese).<sup>5,6</sup> These words share the same pronunciation, but use different Japanese characters. Both groups are living with the social and psychological uncertainties and implications of possible radiation exposure. Both groups also became *higaisha* or victims. The apocalyptic disruptions of their lives did not arise from their own choices, but from social and political decisions taken by others. This reaction is common in radiation disasters worldwide.<sup>7</sup>

The survivors of a chronic environmental disaster typically seek redress around questions of care, compensation, and clean-up.<sup>8</sup> Although chronic environmental disasters have important medical dimensions, the human losses go far beyond the medical sphere. Below we briefly explore these three questions for Fukushima, examine the role of community engagement, and highlight changes needed to prevent another nuclear power plant disaster.

Long-term responses in Fukushima need to provide effective care for the complex problems that people confront, including physical and mental health risks as well as community health, as noted by Hasegawa and colleagues<sup>9</sup> and Ohtsuru and colleagues.<sup>1</sup> Different populations in Fukushima need different kinds of care—for example, to address parental concerns about cancer risks for children, young women’s concerns about their

marriage prospects, and evacuees’ profound challenges of social adjustment in relocated places.<sup>10</sup> Many of these problems are multidimensional (involving radiation risks, social stigma, family conflicts), in ways that physicians are not trained to address.

Questions of compensation frequently become sources of conflict in cases of environmental contamination, as affected people seek monetary redress for their economic, health (both physical and mental), material, and social losses. Conflicts often arise around who should be compensated, what should be compensated, how values should be determined, and how long compensation should continue.<sup>11</sup> These issues have led to a flood of lawsuits in Fukushima, against both the Tokyo Electric Power Company and Japan’s central Government. According to one review of the litigation for nuclear damages related to Fukushima, the financial magnitude was calculated at approximately ¥10 trillion (US\$110 billion) and involving more than 1·5 million claimants. This makes it “the largest civil liability case in the legal history of not only Japan, but probably the world”.<sup>12</sup> The lawsuits raise major legal, financial, and political implications.

The scale of clean-up needed in Fukushima Prefecture is enormous within the grounds of the destroyed Fukushima power plant<sup>13</sup> and in the surrounding areas. The total amount of contaminated soil and materials from Fukushima Prefecture alone is estimated to reach 22 million cubic metres, “equal to filling the Tokyo Dome [a baseball stadium] 18 times”.<sup>14</sup> The shortage of adequate storage sites contributes to delays in decontamination work and to indecision by some former residents who wonder whether to return home or relocate elsewhere permanently.<sup>12</sup> The decontamination effort is expected to last until at least 2017 and cost an estimated ¥1300 billion.<sup>15</sup> These ongoing clean-up activities, near areas where people are living, create profound social unease, in part because of the invisible nature of radiation. A coalition of technical experts in Japan and other countries examined the decontamination activities and raised crucial questions about whether the clean-up will “contribute to the restoration and rebuilding of the lives of those affected”.<sup>16</sup>

The International Commission on Radiological Protection (ICRP), in its report on people “living in long-term contaminated areas”,<sup>17</sup> concluded that those people need to be involved in the management of the “existing exposure situation”. Additionally, the ICRP stated, “[T]he responsibility of authorities at both national and local levels [is] to create the conditions and provide the means favouring the involvement and empowerment of the population.”<sup>17</sup> In short, living with long-term contamination needs community engagement—especially to address the related problems of care, compensation, and clean-up.

This process of popular engagement and empowerment has not been adequately developed in Fukushima initially. Too often, national and local authorities have decided to do things to local residents or to do things for local residents, rather than to do things with them. Some projects have been initiated by local citizen groups, showing an emergence of bottom-up citizen activism in Fukushima,<sup>18</sup> and illustrating local resilience in response to the accident. For example, Ethos in Fukushima has organised dialogue meetings focusing on culture and society and SafeCast has initiated radiation monitoring focusing on data and technology—both showing community empowerment through different approaches. The local government of Iitate village (an evacuee community) has started a local newsletter, using the process to foster collaboration among village officers, health professionals, and local residents.

In response to the Fukushima accident, Japan's national parliament established its first independent commission of inquiry—to examine what happened and recommend actions to prevent another catastrophe. The report of the Fukushima National Accident Independent Investigation Commission in 2012 is distinguished by its transparent process, thorough analysis, direct language, and strong recommendations.<sup>19</sup> This landmark report called Fukushima a “manmade disaster” that arose from systemic problems and from lax government and industry actions and attitudes. The report attributed the causes of the Fukushima power plant accident to structural problems in the “organizational, institutional, and legal framework” of the nuclear power industry in Japan, especially the ineffective regulatory structure and the capture of government regulatory agencies by industry, along with attitudinal problems of both public and private authorities. A separate investigation conducted by the civil society group Rebuild Japan Initiative Foundation also identified the profound dysfunction of the Japanese bureaucracy as the root cause of the nuclear accident.<sup>20</sup>

Very similar structural and attitudinal problems were found at the roots of the Three Mile Island nuclear power accident in the USA in 1979, according to the analysis of the US President's Commission.<sup>21</sup> These commonalities suggest shared causes for nuclear power accidents, and that Fukushima was not a uniquely Japanese phenomenon. The parliamentary commission's report argues that Japan needs a paradigm shift in its approach to nuclear power, not simply incremental changes at the margins, to prevent future accidents. The report called for seven recommendations to correct the systemic sources of the accident (see appendix for the list of proposals).<sup>19</sup> Unfortunately, the commission's chair recently wrote, “Four years after the accident, it seems that many fundamental problems, and also the prevalent Japanese mindset, have changed little.”<sup>22</sup>

Restoration of Fukushima needs a vision of long-term reconstruction of how to repair the social fabric and

social trust that have been destroyed in Japan. What people most want—to be returned to pre-disaster conditions for individual, family, and community—cannot be achieved. Here we identify three principles to provide a foundation for the long-term responses in Fukushima.

First, a system of continuous community involvement is needed to help to establish standards, decide on care and clean-up processes, and involve community representatives in understanding what long-term contamination means for Fukushima. Communities and individuals need to be empowered to understand their own situation and decide on protective actions that are appropriate for them. Concerted efforts among different stakeholders will lead to shared value, which is the key for rebuilding the destroyed fabric of social trust in Fukushima.<sup>23</sup>

Second, responses to the radiation health risks (and the perception of risks) in Fukushima need to be integrated into the existing health system, without medicalisation of social issues or treatment of worries about radiation risk as psychiatric problems. The health system needs to adjust and refocus—to provide effective counselling and social support, in a team approach and patient-centred care—along with the launching of a new prefectural medical science centre and the ongoing health management survey of all Fukushima residents.<sup>24</sup>

Finally, there should be an independent assessment of the implementation of the policy proposals from Japan's parliamentary commission, to establish whether the Japanese Government is making progress in strengthening its capacity to control the risks of nuclear power, respond to nuclear disasters, and heal the damage done in Fukushima.

In conclusion, more efforts are needed, both inside and outside Japan, to share the lessons learned from Fukushima around the world. This special issue of *The Lancet* is a first step in that direction.

#### Contributors

MRR prepared the original draft, and AG and MRR subsequently added to, revised, and edited the draft. Both authors have seen and approved the final version.

#### Declaration of interests

We declare no competing interests.

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