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The Fukushima Daiichi Nuclear Power Plant accident and school bullying of affected children and adolescents: the need for continuous radiation education

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ABSTRACT

The health threats of radiation-release incidents are diverse and long term. In addition to direct radiation effects, it is imperative to manage the indirect effects of radiation such as stigma, prejudice and broader mental health impacts. Six years after the Fukushima Daiichi Nuclear Power Plant accident of March 2011, bullying caused by stigma and prejudice toward evacuees, including children, has become a social problem in Japan. This phenomenon may be associated with the fact that knowledge about radiation has still not reached the general public, and to a potential lack of motivation among Japanese citizens to learn about radiation and bullying. Continuous and sustained education regarding radiation is warranted in order to enhance the general knowledge level about the effects of radiation in Japan after the Fukushima Daiichi Nuclear Power Plant accident, and this education will become an important reference for education after future nuclear disasters.

Keywords: stigma; school bullying; psychological burden; Fukushima Daiichi Nuclear Power Plant accident

INTRODUCTION

The health threats of radiation-release incidents are diverse and long-term. Many people suffered from various effects of radiation-release incidents for an extended period after the atomic bombs in Hiroshima and Nagasaki, as well as after the Chernobyl Nuclear Power Plant accident [1]. In addition to direct radiation effects such as acute radiation syndrome, and increased cancer incidence, including thyroid cancer, it is also important to manage the indirect influence of radiation, such as the potential impacts in terms of mental health, stigma, and changes in living environments, in the wake of nuclear disasters [1].

After the Fukushima Daiichi Nuclear Power Plant (FDNPP) accident that occurred following the Great East-Japan Earthquake and tsunamis of March 2011, it has been found that the direct health effects of radiation exposure have been marginal [2]; however, the indirect health effects continue, and the mental health impacts are particularly profound [3]. The accident led to mass evacuation of residents, including children, out of Fukushima Prefecture. As of 11 March 2017, ~37 000 evacuees, including 8000 elementary and junior high school students, continue to remain outside of Fukushima Prefecture. Discussions about children's health after the FDNPP accident have predominantly focused on the long-term effects of low-dose radiation exposure and the risk of thyroid cancer [2]. On the other hand, while it is probable that a psychological burden is part of the long-term

health effects among children affected by the FDNPP accident [3, 4], few reports have discussed the mental health of children.

A PSYCHOLOGICAL BURDEN FOR CHILDREN: SCHOOL BULLYING OF EVACUEES AFTER THE FDNPP ACCIDENT

According to the Ministry of Education, Culture, Sports, Science and Technology of Japan, 199 cases of bullying have been confirmed in children who evacuated outside Fukushima Prefecture after the nuclear accident, and 13 of these cases were directly related to evacuation [5]. For example, it was reported that a male elementary school student who evacuated to Yokohama city, Kanagawa prefecture, located ~250 km southwest of Fukushima Daiichi NPP (Fig. 1), was hit and kicked by his classmates and called a 'germ' from August 2011 to May 2014, and the boy was forced to pay his bullies 1.5 million yen (approximately $13 200) to avoid physical abuse after being ordered to do so [6]. Similar bullying has also been confirmed in evacuees residing in several other areas of Japan, such as Niigata, Chiba and Kanagawa prefecture [5] (Fig. 1). These incidents have ignited new discussions about bullying in Japan, and exemplify one way that nuclear accidents may impact children.

Although the Japanese government and international authorities such as the International Atomic Energy Agency (IAEA) and United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) predict that there will be no detectable direct health effects of radiation to the general public after the FDNPP accident [7, 8], many evacuees lost their homes and communities. To a child in these circumstances, the addition of stigma and discrimination could amount to a further psychological burden.

CURRENT LEVELS OF UNDERSTANDING OF RADIATION AND RADIATION-RELATED STIGMA

Stigma around radiation exposure, the experience of which can be viewed as one origin of psychosocial distress, still remains 6 years after the FDNPP accident [9]. For example, in Minamisoma city, located 13–38 km north of Fukushima Daiichi NPP, >75% of residents reported fearing radiation exposure, leading to the avoidance of consuming tap water, local products and participation in outdoor activities in 2012, immediately after the accident [10]. As a result, local products are still not used in school food services, due to opposition from parents in the city, as of 11 March 2017, although the Japanese government permits the use of products from Fukushima (which first undergo extensive screenings), following guidance from the International Commission on Radiological Protection (ICRP) [11]. The proportion of residents avoiding tap water and local foods has gradually decreased [10]; however, a considerable proportion of citizens still are evasive about using them. Long-term stigma around radiation and radiation-induced illnesses also occurred after World War II, directed at survivors of the atomic bombs in Hiroshima and Nagasaki [12]. Many were discriminated against because of their exposure to radiation, and the resultant stigma affected their marriage prospects, childbearing decisions (i.e. pregnancy terminations) and employment opportunities [13]. Similarly, mental health became an important issue in Ukraine and Belarus after the Chernobyl nuclear accident [14]. In the case of

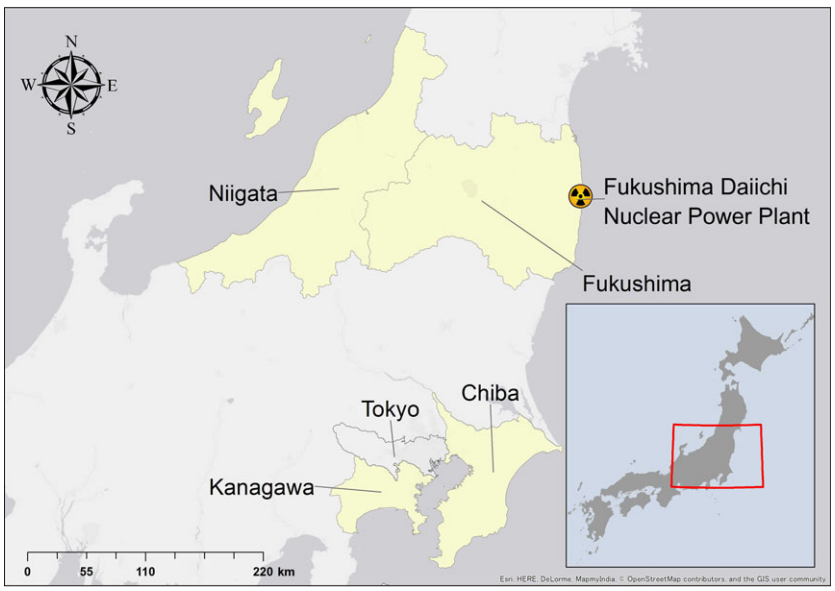

Fig. 1. Kanagawa prefecture, where a symbolic case of bullying has been confirmed in a child who evacuated outside Fukushima Prefecture after the Fukushima Daiichi Nuclear Power Plant accident, located ~250 km southwest of the Fukushima Daiichi Nuclear Power Plant. In several other areas such as Niigata, and Chiba prefecture, where many evacuees are residing, similar bullying has also been confirmed.

Fukushima, stigma and prejudice around radiation is also likely to become a long-term social problem [15].

KNOWLEDGE ABOUT RADIATION

One reason for stigma and prejudice may be that knowledge regarding radiation still has not reached the general public. It is commonly known that high doses of radiation exposure can have harmful effects on the human body, and fear and avoidance of radiation exposure itself may be seen as a reasonable behavior in this regard [16]. However, insufficient knowledge may lead to exaggerated attempts to protect oneself from radiation, misunderstandings about radiation, and anxiety. Immediately after the accident, hundreds of residents showed interest in participating in community meetings about radiation hosted by the local government. An internal radiation screening service has been offered at no cost to the residents of Minamisoma city every year since the nuclear accident. Appointments for internal radiation screenings were fully booked a year in advance in Minamisoma city; however, the attendance rates at both the community meetings and the screenings have decreased year by year. Although the main purpose of the radiation screening itself is not radiation education, counseling about radiation exposure is also given to residents during the screenings, providing an opportunity to enhance knowledge about radiation. While 5975 people underwent internal radiation screening in 2011, a this number gradually decreased to 3498 in 2013; a trend which may be due to decreased interest and/or the largely undetectable level of radiocesium burden seen in the first wave of the screening [17]. Both the limited opportunities to learn about radiation, and a decreased motivation to participate may result in difficulty in obtaining accurate information, which could possibly lead to misunderstandings about radiation risks.

RADIATION EDUCATION FOR THE GENERAL PUBLIC IN JAPAN

In Japan, radiation was removed as a topic from compulsory education in 1977, but in 2008 radiation education was revised and now is allocated ~2 h in total within the compulsory education curriculum. Because of the recent timing of the radiation education revival, an entire generation of young and middle-aged adults have had little or no education on radiation safety. We suggest that a two-pronged approach for radiation education may be necessary for residents in Fukushima prefecture and the broader population in Japan. For people in Fukushima, there is a need for radiation education focused on practical safety information about Fukushima. After the FDNPP accident, the Fukushima local government started a new prefecture-wide radiation education program in 2013, organized with the aim of helping children to build knowledge about radiation and to become able to communicate about the situation in Fukushima to others. Under this new program, all 450 primary schools and 221 secondary schools in Fukushima prefecture now give lessons about radiation; however, the ways lessons are taught, and their contents, are still controversial. In addition to determining how to teach such a topic, teachers are also faced with the difficulty of producing high-quality lessons: they must deal with radiation in addition to the normal curriculum, despite the fact that radiation is outside the field of study for almost all teachers [18]. The Japanese government has initiated plans to raise knowledge about radiation through designating model schools for radiation education in Fukushima prefecture; however, there has been a very limited number of schools selected to become model schools. In addition, education to raise the level of knowledge around radiation is needed for the broader general population in Japan. In the current circumstances, there are limited opportunities for the general public, including pupils, students and their parents outside Fukushima prefecture, to learn about radiation, and residents inside Fukushima generally know more about radiation effects than residents outside Fukushima. Education for residents outside Fukushima prefecture may be important for comprehensively tackling the issue of stigma and the prejudice around radiation, which may be related to issues such as school bullying.

LESSONS TO BE LEARNED FROM THE SCHOOL BULLYING OF EVACUEES FROM FUKUSHIMA

Comprehensive education may be beneficial to enhance the level of radiation knowledge, and may serve as a potential way to alleviate bullying due to stigma and prejudice through correcting misguided knowledge about radiation. It may be difficult to completely resolve radiation-related stigma and prejudice through education alone; however, similar to the effects of education in alleviating stigma in other health-care fields such as acquired immune deficiency syndromes (AIDS) [19], we suggest that education may play an important role in reducing stigma and prejudice about radiation, and related bullying, after the FDNPP accident. Certainly, this problem presents a challenge for public health (e.g. in the design of radiation education). For example, ways of discussing the radiological impact on local residents due to the nuclear accident may differ greatly between a physicist and a psychologist. In debates around radiation education and responses to the nuclear disaster, such as whether costly internal radiation screenings should be continued [20, 21], careful consideration should be given not only to supporting affected residents, but also to answering the question of how we can cope with these problems as a country. Furthermore, it is of importance to educate not only the residents most affected by radiation related incidents, but also the broader general population in order to alleviate stigma and prejudice. Responding to the FDNPP accident will be an important reference for education programs after any future nuclear disasters. Continuous and sustainable education regarding radiation, which can create opportunities to learn, or at least give individuals a chance to come in contact with the topic, is warranted in order to enhance the general knowledge level in Japan after the Fukushima disaster [22].

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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