Short Report

# Healthcare Delivery to a Repopulated Village after the Fukushima Nuclear Disaster: A Case of Kawauchi Village, Fukushima, Japan

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Sustaining access to healthcare in a resource-poor setting is a key challenge in achieving global health.[1] While there exist huge differences in healthcare systems between developing and developed countries, shortages of doctors and other health professionals in rural and remote areas are universal issues.[2] In rural areas, both patient-specific and extrinsic factors affect access to healthcare.[3] Among these factors affecting access to healthcare, disasters represent one of the most complex conditions that aggravate healthcare access over the long term. While disasters cause tremendous damages every year around the world, little information is available on which approach is effective in sustaining long-term healthcare access in disaster-stricken remote areas.

Here, we describe the healthcare delivery in Kawauchi Village, Fukushima, which is located in a mountainous area 12 to 30 km southwest of the Fukushima Daiichi nuclear power plant (**Fig. 1**). While the Japanese government issued an evacuation order to nine municipalities including Kawauchi Village immediately after the Fukushima nuclear disaster, the local government declared that it is safe to start returning to the village in January 2012 considering the relatively low radiation level in the area,[4] and all areas of Kawauchi Village were ready for repopulation in June 2016. Among the total 2746 residents, 1820 people have returned to the village (as of July 1, 2016). However, the areas that regional foundation hospitals exist are still under the evacuation order; therefore, access to healthcare services continues to be difficult. The examination of healthcare delivery in Kawauchi Village will hopefully contribute to understanding the essential needs and responses to sustain healthcare access in disaster-stricken remote areas.

There is a national insurance clinic in Kawa uchi Village, which is the only medical institution in the village. One full-time physician provided by the Fukushima prefectural government works in the clinic. The number of patients and their reasons for visiting the clinic are shown in **Figure 2**. Hypertension, dyslipidemia, diabetes, chronic gastritis, gastroesophageal reflux disease, back pain, shoulder pain, arthritis, and sleep disorder are the major causes of visits. Needs to establish outpatient services for metabolic diseases, gastrointestinal diseases, orthopedics, ophthalmology, and psychosomatic medicine are present.

In response to these demands, specialized doctors in these fields are provided by private sectors (Hirata Central Hospital, Asaka Hospital, and Maeda Ophthalmic Clinic) that are in collaboration with local governments, thereby contributing to the delivery of healthcare services in Kawauchi Village. This system is significantly different from the one that was in place before the disaster, in which one physician handled all the patients who visited the clinic and

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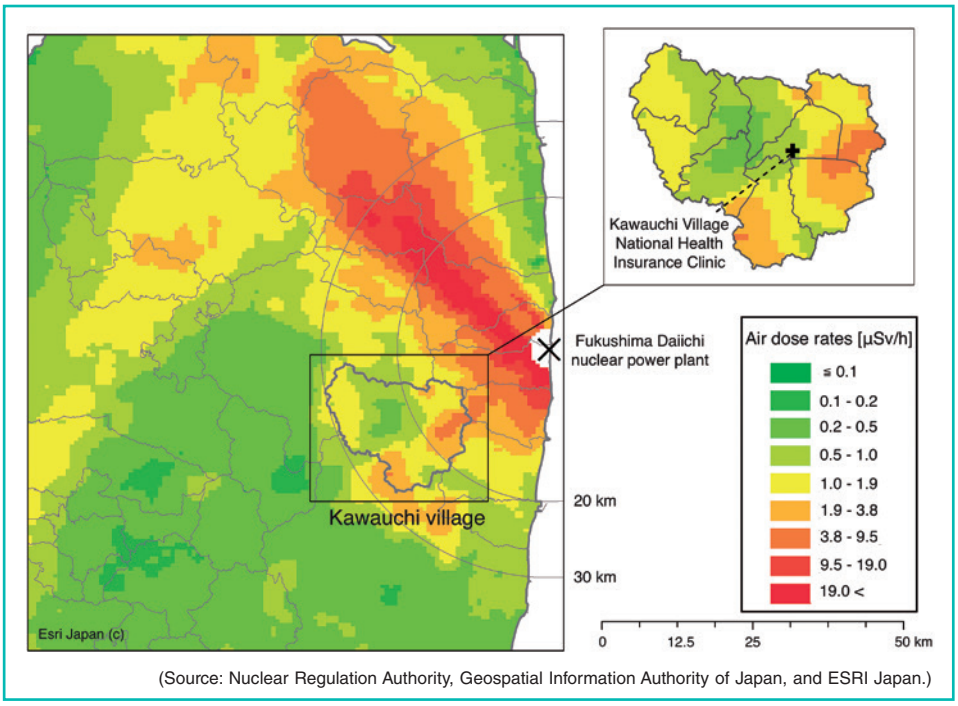


**Fig. 1 The geographical location of Kawauchi village, Fukushima**
The map is colored according to air dose rates at a height of 1 m above the ground on December 16, 2011.

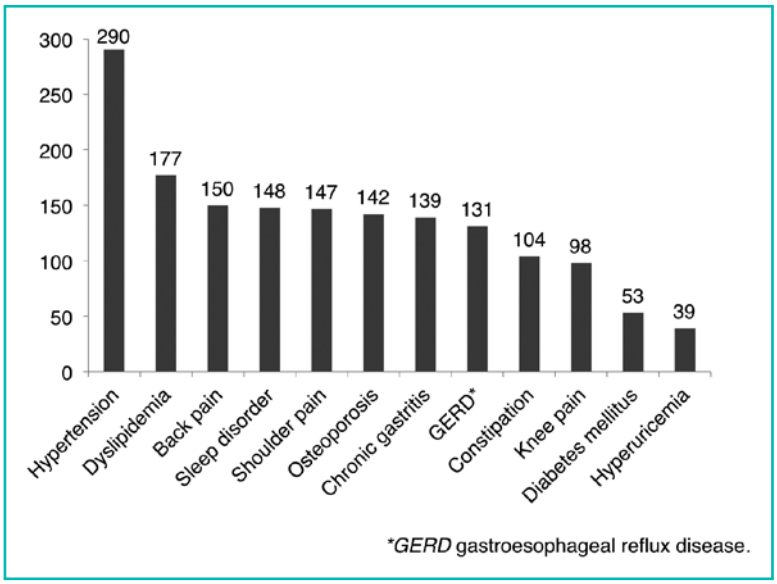


**Fig. 2 Number of patients for each purpose of visits**
The number of patients who periodically visited the Kawauchi Village National Health Insurance Clinic after the repopulation (from July 2015 to June 2016).

had to transfer difficult cases to other medical institutions when necessary. Although patient care by a single physician is usually expected in remote areas, the presence of specialists enrich

the quality of chronic care. Multilevel cooperation has been achieved to maintain residents' health.

However, several issues remain unresolved, such as home visit, other specialized outpatient services, rapid response to urgent cases, and long-term care. The first one, home visit, is difficult because the clinic physician commutes to Kawauchi from outside the village and cannot cover all the areas of the village (197.4 $km^2$), although up to six patients received home visits before the disaster. The second one, access to specialized care, is difficult since the foundation hospitals nearby are closed because their areas are still under the evacuation order. Although several specialists work in this clinic, patients with urologic, gynecologic, or dermatologic diseases occasionally need to visit other medical facilities in municipalities outside the evacuation area. The third one, rapid response to urgent cases, is also difficult because emergency hospitals nearby are in the evacuation area and are all closed, and currently accessible emergency hospitals are too distant. It should be noted that more than 50% of emergency patients in Kawa uchi Village were transferred to the hospitals in the evacuation area before the disaster. Finally, the need for long-term care is growing as the returned population is ageing. The number of people certified for long-term care or support in September 2010 and September 2016 are 182 and 249, respectively. Further modulation is needed to address these issues.

In summary, although there are some issues to be resolved, the examination of the healthcare delivery in Kawauchi Village suggests that multilevel cooperation among local and prefectural governments involved and private sectors have successfully contributed to the sound delivery of community healthcare even in a repopulated village after the Fukushima disaster.

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