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Demographic Change of the Kawauchi Special Nursing Home Occupants in a Former Evacuation Area After the Nuclear Power Plant Accident: A Retrospective Observational Study

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Abstract

Objective: This retrospective observational study aimed to look into the social demographic change of the occupants of a long-term care (LTC) facility that was constructed in 2015 as a restoration support after the Fukushima Daiichi nuclear power plant accident.

Methods: The social demographic information during 2015–2021 of occupants in the Kawauchi Special Nursing Home was analyzed.

Results: A total of 172 participants were included in the analysis. The number (proportion) of evacuees was 37 (69.8%) in 2015, then gradually decreased to 7 (31.8%) in 2018, yet increased to 21 (58.3%) in 2019. There were 121 occupants (70.4%) who were from Kawauchi Village and other municipalities of the former evacuation area.

Conclusion: The Kawauchi Special Nursing Home initially received people who hoped to return to the former evacuation zone; however, its role changed to receive people who became in need of LTC after returning to Kawauchi Village. The construction of LTC facilities in the former evacuation area may help enhance the local LTC service where returnees are rapidly aging.

Vulnerable people such as those who are older, require nursing care, or live in long-term care (LTC) facilities tend to be strongly affected by disasters. After the accident in the Fukushima Daiichi Nuclear Power Plant (FDNPP), residents in the affected area were forced to evacuate. This evacuation order was lifted in most areas and residents are returning, but there are various health problems reported among them.

The residents of Kawauchi Village in Fukushima Prefecture, located 12–30 km southwest of the FDNPP, were forced to evacuate after the accident (Figure 1), and the evacuation order was lifted in April 2012. The proportion of elderly people in Kawauchi Village, which was already high before, increased after the disaster. In 2015, 37.9% of the village population were older adults age 65 years and over (national average was 26.7%).¹ An LTC facility was constructed in the village in 2015 as a part of the restoration support.

The previous studies reported that institutional caregiving was effective and essential in former evacuated zones where the aging population was prominent and ongoing.^{2,3} Nevertheless, there were few reports about longitudinal information of the residents in an LTC facility in Fukushima Prefecture. In this context, to evaluate the impact of the construction of the LTC facility on the LTC needs in the former evacuation zone, the present study determined the transition of the addresses of the LTC facility residents and their social demographics over time—particularly their original addresses and evacuation statuses.

Methods

Setting

The Kawauchi Special Nursing Home (KSNH), opened in November 2015, had 80 beds with approximately 29–34 health care staff and several part-time medical doctors. There were hospitals and LTC facilities in Ken-chu District with which KSNH was associated (see Figure 1). A medical clinic in the village with a full-time doctor⁴ reopened in April 2012.

Participants and Data Sources

The participants were those who were admitted to KSNH between November 2015 and January 2021. Information on their age, sex, care level, number of family members, previous residence

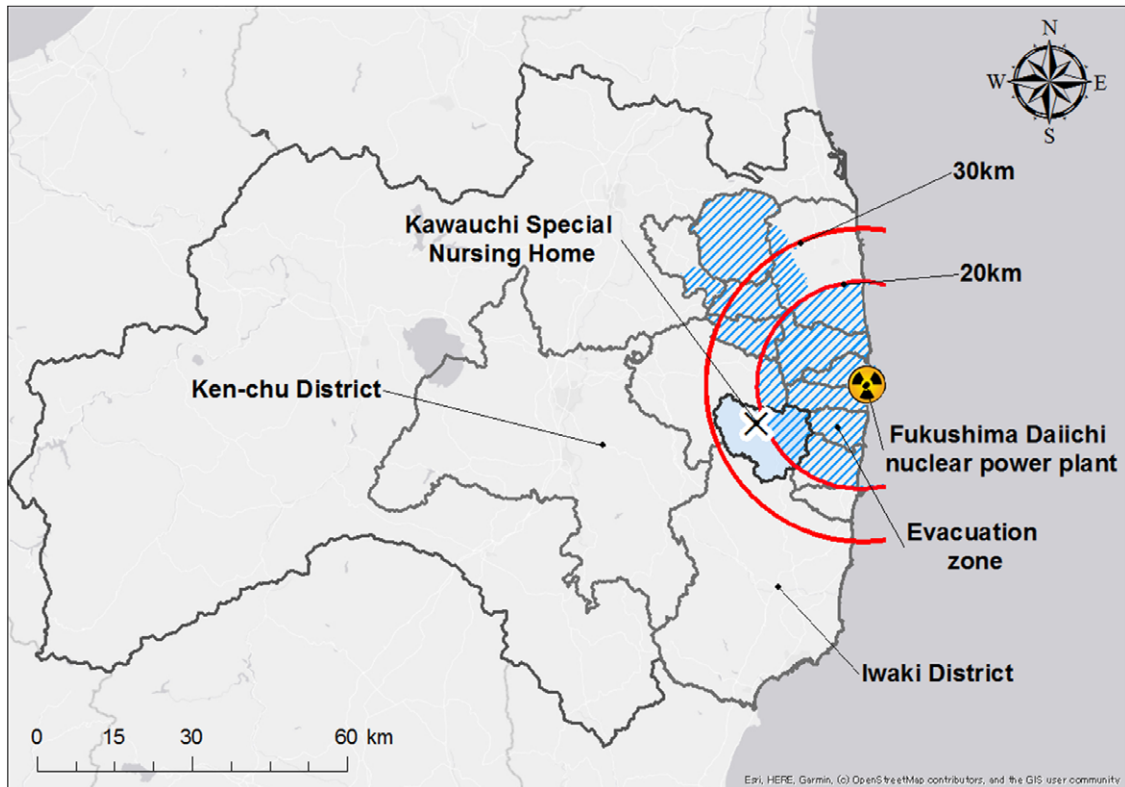


Figure 1. The map showing Kawauchi Special Nursing Home and the 12 evacuation municipalities, including Kawauchi Village.

*Evacuation zone = Evacuation order and planned evacuation zone on April 22, 2011.

A total of 1684 of 2746 residents officially registered in Kawauchi Village as Kawauchi villagers had returned in October 2015, leading to a population density of 10.20 people/km²—lower than the national average of 340.80 people/km².

address, and evacuation experience was obtained from the nursing home database. Area of previous residence was classified into 5 categories (see Figure 1). Participants with missing information in any category were excluded from the analysis. The primary outcomes were the area of previous residence and the social demographic change.

Statistical Methods

The social demographic characteristics of the participants, previous addresses, and evacuation statuses were determined for each year. The chi-square test for categorical values and a Jonckheere–Terpstra trend test for continuous values were used to set the significant *P* value at 0.05. The study was approved by the Ethics Committees of the Hirata Central Hospital (2017-0321-1) and the Fukushima Medical University (2019-064). The ethics committees approved the exemption of individual consent by guaranteeing the opportunity for opt-out to refuse the participation.

Results

Of the 327 participants, 178 (54.4%) were the occupants of KSNH, and 172 (96.6%) with the complete data were included in the analysis. The number of males was 75 (43.6%), the median age (interquartile range) was 89 years (85–93), and the median care level at the time of admission was 4 (3–4) (Figure 2).

The number of occupants was 53 (30.8%) in 2015, 36 (20.9%) in 2016, 25 (14.5%) in 2017, 22 (12.8%) in 2018, and 36 (20.9%) after 2019. There was no significant difference by year in the number of

males, median value of age, care level, and number of family members. The number of occupants who experienced evacuation was 37 (69.8%) in 2015, 7 (31.8%) in 2018, and 21 (58.3%) after 2019. There was a statistically significant difference by year in the proportion of occupants who experienced an evacuation (chi-square test, *P* = 0.016).

There were 121 (70.4%) occupants who were from Kawauchi Village and other evacuation municipalities. The number of occupants from Kawauchi village was 29 (54.7%) in 2015, 6 (27.3%) in 2018, and 16 (44.4%) after 2019. The number of occupants from Iwaki District was 1 (1.8%) in 2015 and 11 (30.6%) after 2019. There was a statistically significant difference by year in the proportion of the area of a previous address (chi-square test, *P* = 0.010).

Discussion

Previous studies have shown that evacuation causes deterioration of the quality of life for older adults.^{5–7} Without KSNH, not only the older adults themselves, but also their families who take care of them could not have returned. Hence, the special nursing home did help improve the health inequalities among residents caused by the evacuation.

The fact that there were significant changes in the addresses of the facility occupants means that the medical demand in the area changed frequently over a short period of time, which was also seen from the population dynamics in this area.³ After evacuation orders were lifted, various new medical facilities have been built as the reconstruction supports, and residents as well as the medical personnel have been returning. Since it is often difficult to see what

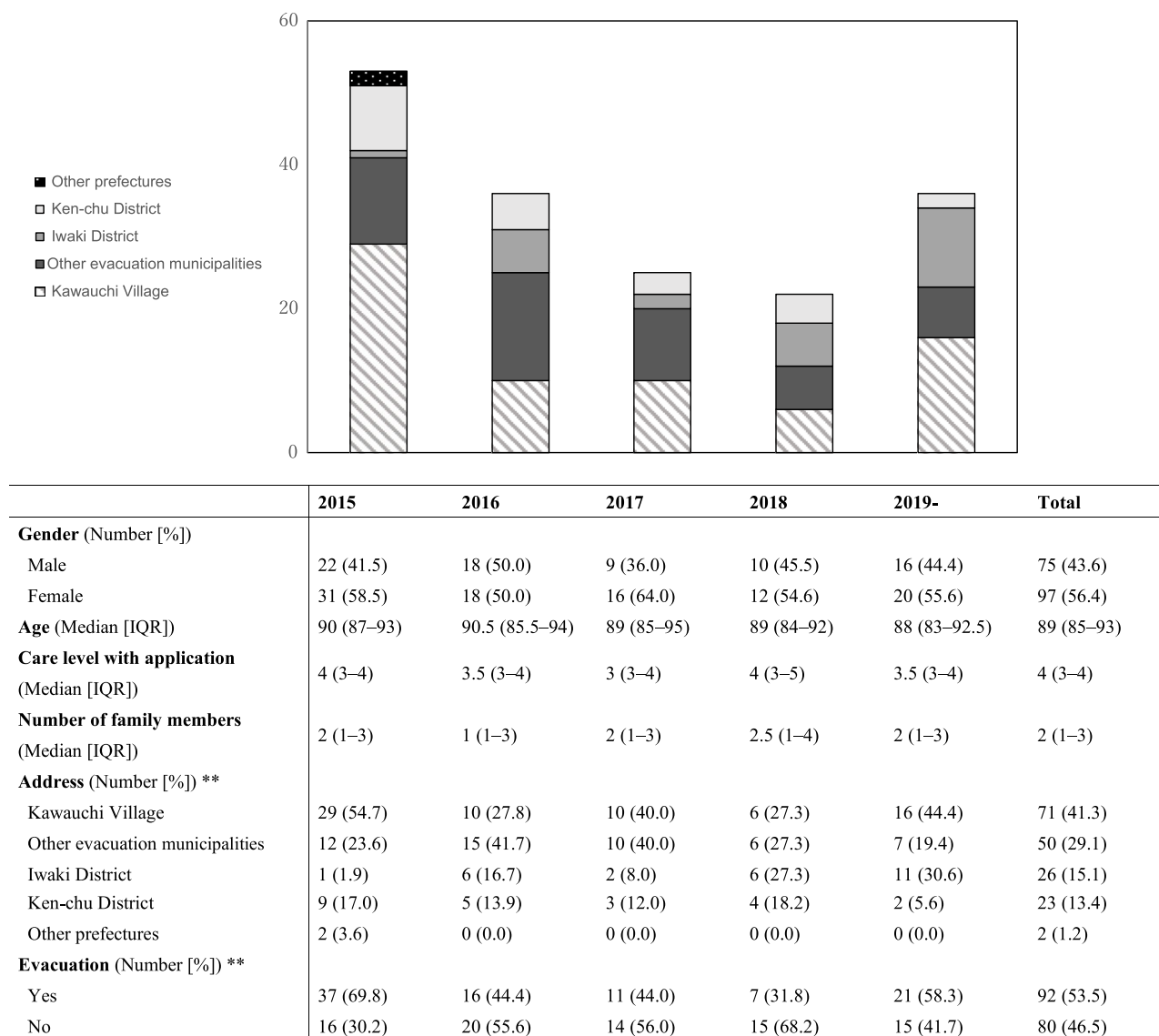


Figure 2. The social demographics of the residents of Kawauchi Special Nursing Home for each year.
 *Other evacuation municipalities = 11 evacuation municipalities, except Kawauchi Village; IQR, interquartile range.

is needed for the operation of medical facilities, for securing human resources, and for long-term investment in medical care, it is very important to accumulate data such those in this study.

Most of the people returning to the areas are older people, so it is expected that this older population will further increase within the next 10 years, and therefore the needs for medical and nursing care will increase. This region has been with few medical and nursing resources, and family members have been the main care resource. Also, medical and nursing care costs in this region have become free after the FDNPP accident, which made this region the highest nursing care insurance cost in Japan.⁸ In order to keep the medical and nursing care system in this region, it is very important to implement measures for the returning older population who need LTC.

There are limitations in this study. First, the number of participants was small. Second, Kawauchi Village is a region strongly affected by the FDNPP accident, which is different from other kinds of disasters, and caution is needed when generalizing the results of this study to other disasters.

Conclusion

In order to protect the lives of the residents in such areas, LTC facilities are necessary and their effects should be investigated. Further research is needed to determine whether such LTC facilities contribute to improving the problems of health inequalities among older adults in the former evacuation areas.

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Author contributions. The corresponding authors had full access to all the data in the study and had the final responsibility to submit the work for publication. YK and YN contributed to manuscript writing. MT contributed to the research design, management, and coordination between hospitals, universities, and other stakeholders. TM, FO, and NI designed the overall structure of the manuscript. All authors contributed to the review of the entire manuscript.

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Conflict(s) of interest. None declared.

Ethical standards. Individual informed consent for participation was not obtained because an opt-out method was approved by the Ethics Committee of Hirata Central Hospital and the Ethics Committee of Fukushima Medical University.

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