

Brief Report

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Assessing Demand for Welfare Evacuation Shelters After the 2024 Noto Peninsula Earthquake: A Case Study Based on Evacuee Flow

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Abstract

Objective: As disasters intensify alongside population aging, Japan has introduced welfare evacuation shelters for individuals requiring care. Following the 2024 Noto Peninsula Earthquake, Umyu-dosora was designated as one such shelter; however, data on its actual use remain limited. This study aimed to assess demand for welfare evacuation shelters by examining temporal trends in resident numbers after the disaster.

Methods: Data on evacuees' admission and discharge dates at Umyu-dosora were extracted from a cloud-based Kintone database, covering January–March 2024. Records with missing admission or discharge dates were excluded.

Results: Among the 83 evacuees with identifiable records, the most common age group for both sexes was 70–79 years. Age or sex data were unavailable for 22 individuals. The shelter began operating on January 8, 2024. Resident numbers peaked at over 40 in late January, stabilized at approximately 30 throughout February, and gradually declined by late March. The facility continued to accommodate some evacuees even after assuming its original function as a group home for individuals with mental illness.

Conclusions: The high demand for evacuation support for individuals requiring long-term care during the first month after the Noto Peninsula Earthquake underscores the need for the planned establishment of welfare shelters.

Introduction

With global population aging and the increasing severity of natural disasters, securing locations where individuals requiring long-term care can continue their daily lives during emergencies has become increasingly important.¹ This is because evacuation shelters often pose considerable health risks for older adults, and displacement may be prolonged. For example, following Hurricane Katrina, the median time to obtain stable housing was 1,086 days.

To address such needs, Japan—the world's most rapidly aging country—has established designated shelters for individuals with special needs, formally classified as “welfare evacuation shelters” within its disaster preparedness framework. These facilities are intended to accommodate individuals requiring care and their caregivers during disasters. However, their actual function during emergencies remains unclear.

The 2024 Noto Peninsula Earthquake, which occurred on January 1, severely affected regions with aging rates exceeding 50%,¹ and there were cases in which the continuity of medical care and support became difficult, including interruptions in outpatient services.² In response, the welfare evacuation shelter Umyu-dosora began operating on January 8 to receive individuals requiring care,³ with the aim of maintaining continuity of care and daily living for vulnerable individuals. Previous studies have identified practical challenges in the establishment and operation of the facility, including securing a sustainable workforce, managing nutritional care, and ensuring appropriate secondary evacuation sites.³ Cases requiring management of aspiration pneumonia⁴ and provision of end-of-life care were also reported. In addition, the essential role of interprofessional collaboration, including the involvement of

physical therapists, in supporting the health and mobility of evacuees in this shelter setting has been highlighted.⁵ Nevertheless, the actual scale of demand for such a facility has not been fully clarified.

This study aimed to assess the demand for welfare evacuation shelters following a disaster by analyzing the temporal trends in the number of residents at Umyu-dosora, which served as a welfare evacuation shelter after the Noto Peninsula Earthquake.

Methods

Setting and Participants

Wajima City, located on the northern tip of the Noto Peninsula in Ishikawa Prefecture, has a population of approximately 24,000 (Figure 1).

Following the 2024 Noto Peninsula Earthquake, the number of evacuation shelters in Wajima City reached a maximum of 154, and the number of evacuees peaked at approximately 12,900. Although 24 welfare evacuation centers had been designated in advance in Wajima City, only 4—including this facility—were able to begin operations on January 8.⁶ This study was conducted at Umyu-dosora, a regional living support center in Wajima City, Japan. The facility functioned as a group home for individuals with disabilities, but served as a welfare evacuation shelter from January 1 to March 31, 2024, in response to the 2024 Noto Peninsula Earthquake.

Data Collection

Data on evacuees' admission and discharge dates were extracted from a cloud-based Kintone database used to record shelter resident information. Data collection for the purpose of organizing records at the welfare evacuation shelter began on January 10, 2025. Only records with complete admission and discharge dates were included; cases with missing dates were excluded to ensure the reliability and consistency of the temporal data. This retrospective

study was conducted after the facility's closure and used information on evacuees' sex, age, and the dates of admission and discharge to identify patient flow patterns and residence durations within the shelter.

Data Analysis

Daily resident counts were analyzed as a time series using descriptive statistics and visual inspection to identify temporal trends. Periods of increase and decline were defined as consecutive days showing a consistent rise or fall in resident numbers, respectively, while stabilization was defined as minimal day-to-day variation within a narrow range.

Qualitative data were collected through contemporaneous field notes documented by researchers involved in shelter operations, focusing on practical challenges encountered during daily activities. These records were systematically reviewed to identify recurring themes related to care demand and operational issues. The qualitative findings were used to supplement and contextualize the quantitative trends.

Ethical Statement

This study was determined to be outside the scope of the Ethical Guidelines for Medical and Health Research Involving Human Subjects in Japan. Nevertheless, the study protocol was reviewed and approved by the Ethics Committee of Fukushima Medical University (Approval No. REC2025-199).

Results

Supplementary Material 1 shows the age and sex distribution of the evacuees ($N = 83$). Among men ($N = 24$), the most common age group was 70–79 years, comprising 8 individuals (33.3%). Similarly, among women ($N = 37$), the largest proportion was also aged 70–79



Figure 1. Geographic location of Wajima City in Ishikawa Prefecture, Japan.

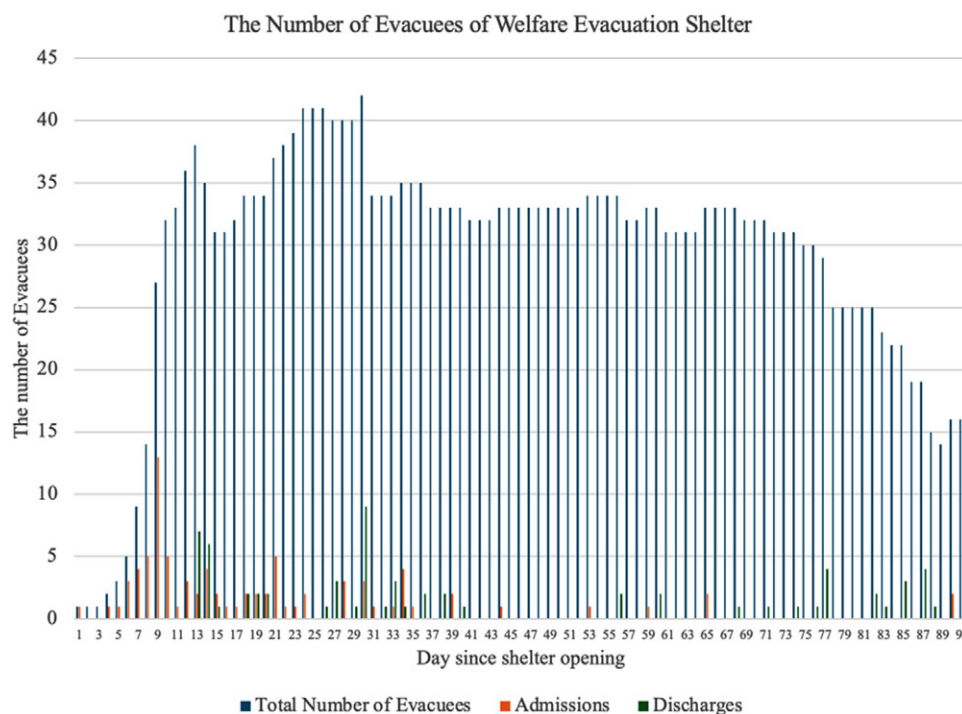


Figure 2. The number of evacuees at the welfare evacuation shelter.

years, comprising 13 individuals (35.1%). Information on either age or sex was unavailable for 22 individuals.

Figure 2 illustrates the change in the number of evacuees at the welfare evacuation shelter from early January to late March 2024. The number of evacuees increased sharply in early January, likely in response to a disaster event, and peaked at approximately 40 individuals by mid to late January. This peak was followed by a relatively stable period lasting several weeks, during which the number remained between 30 and 35. From mid-March 2024, the number of evacuees declined rapidly, suggesting returns to homes or transfers to alternative accommodations. By early April, occupancy had decreased to approximately 15, indicating the gradual closure of the shelter.

Discussion

This study showed that evacuees in their 70s constituted the largest proportion of the welfare evacuation shelter users across both men and women. National data in Japan indicate that the proportion of individuals certified as requiring long-term care is 5.5% among those in their early 70s and 12.4% among those in their late 70s, which is substantially lower than the 57% observed among individuals aged 85 and older. Despite typically living independently, individuals in their 70s might be more likely to require assistance during disasters.⁷ However, demographic information was unavailable for approximately one-third of evacuees (20 of 66), which may limit the generalizability of these findings.

Operation as a welfare evacuation center began on January 8, after which the number of evacuees increased rapidly, exceeding 40 residents by late January. With other welfare shelters remaining non-operational, the facility adopted a policy of accepting all referrals from the city hall and accommodated evacuees up to its maximum capacity. Despite the existence of pre-designated

shelters, the limited number of operational facilities resulted in demand exceeding supply during the first month. Consequently, some general evacuation centers accommodated evacuees requiring nursing care, effectively functioning as welfare evacuation shelters. These findings suggest that, for at least 1 month after the disaster, the supply of welfare evacuation services was insufficient to meet demand.

In February, the number of evacuees decreased to approximately 30 and remained relatively stable. From late January, secondary evacuations progressed, involving relocation to other regions, including Katsuyama City in Fukui Prefecture and Takaoka City in Toyama Prefecture.³ The social population decline (out-migration) of Wajima City was recorded as 200 individuals in January, 230 in February, and 400 in March,⁸ suggesting that secondary evacuations continued through February and March.

In early March, a decision was made to close the welfare evacuation center, and new admissions were substantially restricted. According to official records, 16 evacuees remained at the end of March. Even after the facility resumed its original function as a group home for individuals with mental illness, it continued to function in part as a welfare evacuation center.

The high demand for welfare evacuation shelters during the first month post-disaster underscores the critical need for facilities addressing health risks from unsanitary conditions, lack of food and medicine,⁹ and spread of infectious diseases. In the case of the 2024 earthquake, 421 disaster-related hospitalizations were recorded at the nearest university hospital within the first month following the disaster.¹⁰

Most evacuees were older adults previously living at home but exhibited care facility-level needs, including complex medical management. The shelter also accommodated patients with dementia, highlighting the challenges of managing mental health symptoms in evacuation settings. Therefore, welfare evacuation

shelters with enhanced care capacity are crucial for these vulnerable populations.

Limitations

This study utilized data from a single welfare evacuation shelter. Although up to 10 such shelters were established within Wajima City,⁶ the findings may not fully reflect the overall needs. In addition, among the 66 individuals included in the analysis, age and sex data were missing for 20 individuals, limiting the accuracy of the demographic distribution. This study was conducted in a small city with a population of approximately 24,000, where specific challenges such as disrupted roads and heavy snowfall were observed. Other regions may experience smoother secondary evacuations.

Conclusions

The high demand for evacuation support for individuals requiring long-term care in the first month after the Noto Peninsula Earthquake underscores the importance of the planned establishment of welfare shelters. Future studies should examine multiple welfare evacuation shelters to capture regional variation in demand and capacity. Future studies should examine multiple welfare evacuation shelters to capture regional variation in demand and capacity.

Supplementary material. To view supplementary material for this article, please visit <http://doi.org/10.1017/dmp.2026.10377>.

Data availability statement. The data that support the findings of this study are available from the corresponding author (M.K.) upon reasonable request. The data are not publicly available because they contain information that could compromise the privacy of research participants.

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Author contribution. MK and AO conceived and designed the study. MK collected the data. MK and AO drafted the manuscript. KI, EK, HB, CY, MY, RI, YN, TA, TZ, ME, TS, NM, and MT critically revised the manuscript for important intellectual content. All authors approved the final version of the manuscript.

Competing interests. Akihiko Ozaki declares personal fees from MNES Inc. It is outside the submitted work. Akihiko Ozaki declares personal fees from Kyowa Kirin Inc. It is outside the submitted work. Akihiko Ozaki declares

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References

1. Saito H, Takita M, Abe T, et al. Japan is facing a disaster striking the super-aged community. *Lancet*. 2024;**403**:1537. doi:10.1016/S0140-6736(24)00248-4
2. Kitamura Y, Nakai H, Naruse I, et al. Effect of the 2024 Noto Peninsula earthquake on outpatient chemotherapy among cancer survivors in Japan: a retrospective study. *BMC Cancer*. 2024;**24**:990. doi:10.1186/s12885-024-12760-2
3. Kosaka M, Yamamoto C, Ishikawa K, et al. Establishing and operating welfare shelters in the aftermath of the 2024 Noto Peninsula earthquake: a case study of adaptive management for vulnerable populations. *Disaster Med Public Health Prep*. 2025;**19**:e148. doi:10.1017/dmp.2025.10057
4. Endo M, Ozaki A, Ikeguchi R, et al. Challenges and implications of providing continuous care for the elderly in disaster situations: a case study from the Noto Peninsula earthquake. *Disaster Med Public Health Prep*. 2024;**18**:e307. doi:10.1017/dmp.2024.161
5. Abe T, Saito H, Yamamoto C, et al. Role of physical therapists in providing care to older adults in welfare shelters during the hyper-acute phase of a disaster: lessons learned in Wajima City, Japan, after the 2024 Noto Peninsula earthquake. *Front Disaster Emerg Med*. 2024;**2**. doi:10.3389/femer.2024.1425788
6. Cabinet Office, Japanese Government. *Status of Shelter Operations During the 2024 Noto Peninsula Earthquake*. Accessed June 19, 2025. https://www.bousai.go.jp/updates/r60101notojishin/pdf/kensho_team3_shiryo02.pdf
7. Ministry of Health, Labour and Welfare, Japanese Government. *Age-Specific Rates of Long-Term Care Certification*. 2022. Accessed June 23, 2025. <https://www.mhlw.go.jp/stf/wp/hakusyo/kousei/21/backdata/01-02-01-04.html>
8. Wajima City. *Population Statistics Table for Fiscal Year 2023*. 2024. Accessed June 18, 2025. https://www.city.wajima.ishikawa.jp/docs/2017050900011/file_contents/R641.pdf
9. Ochi S, Hodgson S, Landeg O, Mayner L, Murray V. Disaster-driven evacuation and medication loss: a systematic literature review. *PLOS Curr*. 2014;**6**:eurrents.dis.fa417630b566a0c7dfdbf945910edd96. doi:10.1371/currents.dis.fa417630b566a0c7dfdbf945910edd96
10. Uramoto H, Shimasaki T, Sasaki H, et al. Initial response to the 2024 Noto earthquake by the university hospital closest to the disaster area. *Sci Rep*. 2024;**14**:25013. doi:10.1038/s41598-024-75844-w