

Brief Report

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Establishing and Operating Welfare Shelters in the Aftermath of the 2024 Noto Peninsula Earthquake: A Case Study of Adaptive Management for Vulnerable Populations

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Abstract

Objectives: Disasters disproportionately affect vulnerable populations, necessitating specialized support through welfare shelters, which offer tailored care for those with special needs. Despite their importance, comprehensive reporting on welfare shelter operations during disasters remains limited. This study aimed to analyze the establishment and operation of a welfare shelter in Wajima City, Japan, following the 2024 Noto Peninsula Earthquake, providing insights into operational processes.

Methods: The research presents a first-hand narrative account of a welfare shelter's operation over a 3-month period. The authors, directly involved in key roles, structured the narrative around 3 phases: Initial (January 1–7, 2024), Operational (January 8–March 31, 2024), and Withdrawal (March–April 2024).

Results: Key findings include challenges in personnel management and resource procurement during the initial phase, implementation of continuous care systems and health management in the operational phase, and difficulties in securing relocation sites for evacuees during the withdrawal phase. Challenges in maintaining nutritional balance and managing infectious diseases were observed throughout the shelter's operation. Implementing flexible staffing strategies may serve as a practical means to support sustained welfare shelter management.

Conclusions: This case study highlights the importance of pre-disaster planning, broad regional collaboration, and adaptability and continuity in welfare shelter management. The study offers valuable lessons for improving welfare shelter operations and emphasizes the need for comprehensive disaster preparedness strategies including long-term care and relocation planning for vulnerable populations.

Disasters have far-reaching effects on communities, with vulnerable populations such as the elderly and persons with disabilities facing heightened risks from both immediate impacts and secondary health effects due to evacuation and social isolation. In response to these challenges, welfare shelters play a crucial role in providing specialized support beyond that of general shelters, particularly for those requiring medical care or assistance with daily activities.¹

In Japan, welfare shelters are established under the Basic Act on Disaster Management, catering to “persons requiring special consideration during disasters.” These include the elderly, individuals with disabilities, infants, and others with specific needs.² The concept, first implemented after the 2004 Niigata Chuetsu Earthquake and further developed during the 2011 Great East Japan Earthquake, aims to prevent disaster-related deaths among vulnerable populations. While a report showed the difficulties of managing welfare shelter,³ there remains limited comprehensive reporting on the operation of welfare shelters during disasters.

On January 1, 2024, a magnitude 7.6 earthquake and subsequent tsunami struck the Noto Peninsula in Ishikawa Prefecture, Japan. By August 21, the disaster had resulted in 1678 casualties, including 341 fatalities, and damaged 126 678 homes.⁴ Wajima City, with its aging population exceeding 45%,⁵ was significantly impacted. Extensive infrastructure damage forced mass evacuations, with welfare shelters becoming critical hubs for those requiring special care.

This report documents the establishment and operation of one welfare shelter in Wajima City following the Noto Peninsula Earthquake. It provides insights into operational processes from the immediate aftermath through to medium- and long-term phases, highlighting challenges encountered and proposing preparedness strategies for non-crisis periods. By analyzing these experiences, this report aims to contribute to the effective management of welfare shelters in future disasters, ultimately enhancing support for vulnerable individuals during evacuation periods.

Methods

Study Design

This research employs a single-case study design, focusing on the establishment and operation of a welfare shelter in Wajima City following the 2024 Noto Peninsula Earthquake. The case study approach was selected for its capacity to provide a comprehensive, contextually grounded analysis of complex phenomena within real-world settings, facilitating a deeper and more nuanced understanding of the subject.

Setting

The study was conducted at Umyu-dosora, a regional living support center in Wajima City, Japan. It functioned as a group home for people with disabilities but served as a welfare shelter from January 1-March 31, 2024 in response to the 2024 Noto Peninsula Earthquake.

Data Collection

Following Yin's framework for case study research, we utilized multiple sources of evidence to ensure a comprehensive and balanced perspective.⁶ This framework was chosen to facilitate an exploratory and descriptive examination of the challenges faced by welfare shelters under conditions where systematic data analysis was challenging. The sources of information utilized in this study were as follows:

1. Documentation: We analyzed daily logs, operational reports, and official communications related to the shelter's management.
2. Archival Records: We examined pre-existing facility records, disaster response plans, and local government data on population demographics and health care resources.
3. Participant-Observations: As authors directly involved in the shelter's operation, we conducted systematic observations throughout the 3-month period, documenting daily activities, challenges, and decision-making processes.
4. Direct Observations: We supplemented our participant-observations with structured observations of shelter operations, evacuee interactions, and staff activities.
5. Physical Artifacts: We documented and analyzed physical changes to the facility, including modifications for accessibility and infection control measures.

Data collection spanned the entire operational period of the shelter, from January 1-March 31, 2024, with follow-up data collection during the withdrawal phase in April 2024.

Data Analysis

We employed a chronological approach to data analysis, organizing our findings into 3 distinct phases:

1. Initial Phase (January 1-7, 2024)

2. Operational Phase as a Designated Welfare Shelter (January 8-March 31, 2024)
3. Withdrawal and Transition Phase (March-April 2024)

For each phase, we identified key challenges, strategies, and outcomes, using the collected data. We triangulated data from multiple sources to enhance the validity of our findings and reduce potential biases.⁶

Ethical Considerations

Due to the emergency nature of the situation, formal ethical approval was not obtained. However, we adhered to ethical principles in disaster research, ensuring the privacy and dignity of evacuees and staff. All data were anonymized, and no personally identifiable information was included in our analysis or reporting.

Results

Case Presentation

Initial phase as voluntary shelter (January 1-7, 2024)

On January 1, 2024, immediately following the Noto Peninsula Earthquake, the regional living support center "Umyu-dosora," which functioned as a group home, initiated emergency operations as a voluntary evacuation shelter. Figure 1 shows the challenges and actual responses in each period.

Personnel management. Original group home staff stayed and engaged in managing voluntary shelter and group home. A disaster support team was formed on January 2, comprising CANNUS (an organization of volunteer home visiting nurses, collaborating to provide life support during disasters), Gurundtvig, Inc. (a care service provider operating home visiting nursing and small-scale, multifunctional Home Nursing Care), and Orange Medical and Social Services (a care service provider operating home care). Professionals from various fields were continuously dispatched to support operations, ensuring a diverse range of expertise on-site.

Evacuee reception and management. On January 1, residents of a nearby facility and local residents were accepted without discrimination. By 9:00 p.m. that day, approximately 60 people had sought refuge. From January 2, the shelter implemented assessment sheets to better organize evacuee information. Media coverage of the shelter led to additional arrivals, including individuals citing health concerns such as fever.

Resource procurement. On January 1, local residents provided stored water and rice, which staff used to prepare and distribute rice balls to evacuees. The following day, external collaborators attempted to deliver supplies but were thwarted by poor road conditions. As a result, the shelter had to rely heavily on nutritional supplements due to supply shortages.

Health management. On January 1, a 101-year-old resident experienced a choking incident, which was successfully managed using available suction equipment. The next day, staff conducted safety confirmations of all home nursing patients via telephone, and home nursing services were provided within walking distance where possible.

Operational phase as designated welfare shelter (January 8-March 31, 2024)

On January 7, the decision was made to convert the facility to a welfare shelter, with official designation by Wajima City following on January 8.

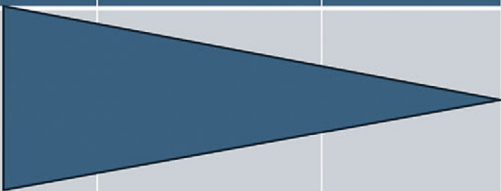
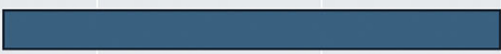
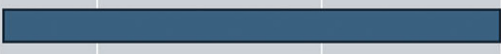

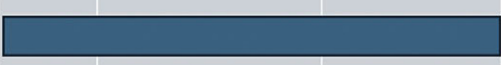
Challenges	Detail of the challenge and actual response	Initial Phase	Operational Phase as Designated Shelter	Welfare	Withdrawal and Transition Phase
Specialized Personnel Management	Professionals from various fields were continuously dispatched to support operations of the welfare shelter from a few days after the disaster. One of the collaborators ensured the continuity of support on-site by having external supporters take turns providing medical services at the main home care clinic. This allowed Orange staff to remain on-site for an extended period.				
Evacuee Management and Care	Immediately after the disaster, facility users and local residents were accepted without discrimination. A week later, the shelter then began accepting individuals with specific needs in response to the request from the municipality, while original residents evacuated to distant locations.				
Resource Procurement	Immediately after the disaster, the facility distributed meals using stored supplies and items provided by nearby residents. Later, they called for nationwide support to secure additional supplies.				
Evacuee Relocation Challenges	Relocations to secondary evacuation sites were difficult due to the closure of numerous elderly care facilities in the city. Collaborating organizations independently set up welfare shelters in Takaoka City and Katsuyama City and facilitated the relocation to those shelters.				
Health Management	The shelter implemented oral care, dementia care, and regular health checks by physicians. Disaster prescription enabled management of chronic disease of elderly or disabled evacuees. We managed nutritional imbalance due to long-term disproportion of aid supplies by using nutritional supplement.				

Figure 1. Challenges and actual responses in the welfare shelter after 2024 Noto peninsula earthquake.

Specialized personnel management. The shelter implemented a rotating system for medical professionals, ensuring weekly shifts and continuous care. Regular dental inspections were conducted to maintain oral health. In mid-February, Famsco, which had been dispatching caregivers, withdrew from operations. This period also saw the commencement of Nutrition Patrol Net services, enhancing the shelter's nutritional management capabilities.

Evacuee reception. The admission of evacuees was coordinated with Wajima City's Medical and Welfare Coordination Headquarters. Original Umyu-dosora residents were relocated to a facility for people with disabilities in Aichi Prefecture. The shelter began accepting individuals with specialized needs. This included persons with dementia who are at risk of wandering, individuals requiring medical care, people with disabilities depending on their families' support, and those who had previously caused disturbances in general shelter settings.

Resource and nutrition management. Supply chains gradually stabilized, allowing for more nutritionally balanced meals. However, concerns about excessive carbohydrate and low protein intake persisted. These were addressed by providing nutritional supplements, canned mackerel, fish sausages, cheese sticks, bananas, and mandarins to ensure adequate vitamin and potassium intake.

Health and safety measures. The shelter implemented oral care, dementia care, and regular health checks by physicians. Evacuees were able to continue taking regular medications thanks to the disaster prescription by the physician. In mid-late January, outbreaks of influenza and COVID-19 necessitated the establishment of isolation zones. Effective toilet cleaning practices resulted in minimal cases of gastroenteritis. Despite these efforts, 2 fatalities occurred within the shelter in January.

Withdrawal and transition phase (March–April 2024)

In early March, Wajima City decided to close the welfare shelter. New admissions ceased in late March, with the official closure

occurring on March 31. By April, Umyu-dosora resumed its original functions as a group home.

Evacuee relocation challenges. Relocations to secondary evacuation sites began in late January, but securing appropriate sites proved difficult due to the closure of numerous elderly care facilities in Wajima city in Ishikawa Prefecture. In collaboration with partner organizations, secondary welfare shelters were established in Katsuyama City in Fukui Prefecture (about 150km away from Wajima City) and Takaoka City in Toyama Prefecture (about 70km away from Wajima City). The location of the cities is shown in Figure 2. Some evacuees remained at the shelter due to an inability to secure alternative accommodations.

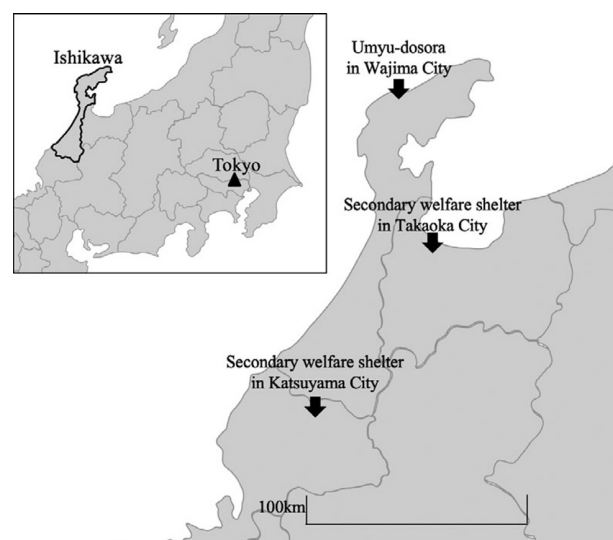


Figure 2. The location of Umyu-dosora in Wajima City, and the secondary welfare shelters in Katsuyama City and Takaoka City.

Ongoing health concerns. According to the shelter manager, who previously served on the hospital's Nutrition Support Team, the extended evacuation period potentially resulted in significant nutritional imbalances among evacuees, specifically characterized by insufficient protein intake coupled with excessive carbohydrate consumption. It should be noted, however, that this assessment was based on professional clinical judgment rather than systematic empirical data collection.

Final arrangements. The original group home residents returned to the Umyu-dosora facility. Additionally, 2 families of the residents whose homes had been damaged in the earthquake were accommodated, reflecting the shelter's continued role in supporting the community even as it transitioned back to its original function.

Discussion

This study provides a comprehensive account of establishing and operating a welfare shelter during the Noto Earthquake. While the welfare shelter generally worked well, unique challenges across 3 distinct phases: initial, operational, and withdrawal were revealed.

In the initial phase, securing adequate personnel emerged as a significant challenge, consistent with existing literature.⁷ Our success in overcoming this challenge was largely due to the involvement of organizations with nationwide networks, enabling the rotation of personnel from across the country. This underscores the importance of pre-existing broad regional collaborations in effective disaster response. Previous research on the Great East Japan Earthquake has shown that assigning personnel in charge of health matters is important for health management of evacuees.⁸

The operational phase presented complex challenges in health management and care provision. Consistent with previous research,⁹ we observed that post-disaster disruptions to medical consultations interfered with medication regimens for chronic conditions. Our approach of having on-site physicians and issuing disaster prescriptions proved effective in ensuring medication continuity after the initial weeks. A previous study on medical services for evacuees during hurricanes also highlighted the significant role of prescription issuance and referrals to pharmacies, which is consistent with the findings of this study.¹⁰ Nutritional management also proved challenging, mirroring difficulties reported in general shelters during the Great East Japan Earthquake.¹¹ Although our assertion as for low protein is based on direct experience, another study has objectively demonstrated the protein deficiency in meals provided at shelters following the 2024 Noto Peninsula earthquake.^{12,13} However, our implementation of regular dental checkups successfully prevented aspiration pneumonia, aligning with research emphasizing the importance of post-disaster dental interventions.¹⁴ This highlights the need for comprehensive health care strategies in welfare shelters that go beyond immediate medical needs.

The pre-withdrawal phase introduced unprecedented challenges in securing appropriate relocation sites for evacuees. Unlike previous disasters such as the Great East Japan Earthquake,¹⁵ our situation necessitated large-scale evacuations to secondary welfare shelters. The establishment of these secondary shelters in nearby cities, facilitated by cooperating organizations, represents a novel approach to managing long-term displacement of vulnerable populations. Notably, the shared house model implemented in Kat-suyama City proved effective in mitigating social isolation among elderly evacuees, a finding that builds upon discussions following the Great East Japan Earthquake about the potential of such models.¹⁶

This case also highlighted the critical importance of adaptive management in welfare shelter operations. The ability to quickly

adjust strategies in response to emerging challenges – such as implementing isolation zones during disease outbreaks and modifying nutritional plans – was crucial to the shelter's successful operation. This adaptability, while touched upon in disaster management literature, has not been extensively documented in the context of long-term welfare shelter management.

Lessons Learned

The operation of the welfare shelter during the Noto Peninsula Earthquake offers several important implications for disaster management. Firstly, the case underscores the critical importance of pre-disaster planning and broad regional collaboration. The ability to quickly establish a support network and rotate personnel from across the country proved vital in maintaining the shelter's operations. This highlights the need for disaster preparedness strategies that extend beyond local resources. The cooperation in this response was not pre-planned; however, for example, the Orange Medical and Social Services devised a strategy to ensure that their staff could stay on-site for an extended period and focus on managing the welfare shelter. They achieved this by having some of the supporters from across the country temporarily take over their regular clinical duties in Fukui Prefecture. This approach could be valuable for future disaster response efforts. Secondly, the study emphasizes the significance of continuous medical and dental care in welfare shelters to prevent secondary health issues. Regular health checks and specialized care should be integrated into shelter management plans to mitigate risks such as aspiration pneumonia and exacerbation of chronic conditions. As a general lesson applicable to future disasters, it is important to establish a system that ensures continuous support, considering the possibility that shelters may need to operate for an extended period. Additionally, allocating personnel and resources based on real-time situation assessments and facilitating smooth collaboration among multiple professional organizations are crucial for effective shelter management.

Nutritional management emerged as a key challenge, with a tendency towards imbalances, particularly excessive carbohydrates and low protein intake. This underscores the need for nutritionists' involvement from the early stages of shelter operation to ensure balanced meal planning. Additionally, the establishment of secondary shelters and the use of shared housing models for evacuees demonstrated potential effective strategies for managing long-term displacement, particularly for vulnerable populations. The implementation of infectious disease control measures, including isolation zones and thorough sanitation practices, further highlights essential components of welfare shelter management that should be prioritized in future disaster responses.

Limitations

This study has several limitations that should be considered. As it is based on a single case of a welfare shelter in one specific disaster event, the findings may not be generalizable to all disaster situations or cultural contexts. Although the operation of the welfare shelter involved many stakeholders, this study primarily reflects the perspective of those responsible for its management. As a result, there may be challenges that were overlooked from other viewpoints. Furthermore, the long-term impacts of the shelter operation on evacuees' health and well-being were not assessed due to the immediate nature of the report. The absence of a comparative analysis with other shelters or disaster responses limits the breadth of insights that could be drawn. Lastly, the specific challenges faced

in securing next destinations for evacuees may be unique to the local context and the scale of this particular disaster.

Conclusion

In conclusion, the establishment and operation of the welfare shelter during the Noto Peninsula Earthquake provided valuable insights into the challenges and strategies for supporting vulnerable populations in disaster situations. The case highlighted the importance of pre-disaster planning, broad regional collaboration, and adaptability in shelter management. Key areas of focus included securing and rotating skilled personnel, ensuring continuity in health and support services, and planning for long-term displacement solutions in anticipation of prolonged shelter operations. The experience underscored the critical role of welfare shelters in preventing secondary health issues among vulnerable populations during disasters. It also revealed the need for comprehensive disaster preparedness that includes strategies for wide-area evacuation and the establishment of secondary shelters. These insights gained from this experience can inform policy makers, disaster management professionals, and health care providers in developing more effective and comprehensive approaches to supporting vulnerable individuals in times of crisis.

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 personal fees from Taiho Pharmaceutical. It is outside the submitted work. The remaining authors declared no interest.

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