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A QUALITATIVE STUDY ON THE IMPACTS OF THE 2011 TRIPLE DISASTER EARTHQUAKE ON BREAST CANCER PATIENTS DIAGNOSED POST-DISASTER

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Abstract

Background: The 2011 earthquake, tsunami and nuclear accident in Japan disrupted healthcare. While prior research focused on patients diagnosed before the disaster, those diagnosed after remain understudied. This qualitative study examines how the disaster affected healthcare-seeking, treatment continuity, support needs and perceptions of cancer onset among post-disaster patients. ***Methods:*** Semi-structured interviews were conducted with 36 breast cancer patients diagnosed between 2011 and 2016 at two hospitals within 25 km of the Fukushima Daiichi Nuclear Power Plant. ***Results:*** Four main themes emerged: (1) Post-disaster healthcare-seeking (n=30), with 63% reporting no impact, while others faced issues in hospital selection (17%) and screening access (10%); (2) Impact on treatment (n=46), including psychological effects (15%) and limited medical facilities (13%); (3) Perceived cancer onset (n=16), with mixed beliefs about radiation (19%) and stress (19%) as causes; (4) Support needs (n=11), with 64% reporting no special support needed. Notably, some patients reported "no impact" despite significant delays, revealing a gap between perception and reality. ***Conclusion:*** This study shows disasters' complex effects on breast cancer care, with both resilience and vulnerability in access. The gap between perceived and actual delays suggests cognitive adaptation. Specialist presence, coordination, financial aid and psychosocial support are vital for care continuity during crises.

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Keywords
Breast neoplasms, disasters, Fukushima nuclear accident, qualitative research, delayed diagnosis, patient perception.

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1. Introduction

Breast cancer leads among women globally with 2.3 million new cases and 685,000 deaths in 2020 (WHO, 2024). Despite the importance of early intervention (Birnbaum *et al*., 2018; Plate *et al*., 2018), the median diagnosis delay can reach 7.5 months, with only 30% of patients diagnosed within three months of symptoms (Caplan, 2014). These delays impact survival - surgical delays exceeding 60 days increase mortality risk by 26% in invasive non-metastatic cases (Ho *et al*., 2020) and delays beyond eight weeks between diagnosis and surgery worsen outcomes (Wiener *et al*., 2023). Both patient factors (time to seek care) and system factors (appointment availability, testing schedules) contribute to these delays (Caplan, 2014), which may be further complicated by external events.

It is important to consider disasters as an extrinsic factor affecting breast cancer patients. Numerous reports have documented direct and long-term challenges following large-scale disasters, including Japan's 2011 triple disaster, Hurricane Katrina, the Gorkha earthquake and Typhoon Hagibis (Kaneda & Akashima, 2023; Kaneda *et al*., 2022; 2023). These events not only damage healthcare infrastructure but also cause broader societal disruptions through mass evacuations and community displacements, disrupting medical services, making regular treatment maintenance difficult and affecting overall patient health (David-West *et al*., 2015; Harmon & Boulmay, 2011; Imamura & Ueno, 2011; Kaneda *et al*., 2022; Man *et al*., 2018; Morita *et al*., 2017; Twombly, 2005). After Japan's triple disaster, patient isolation increased the risk of delayed medical consultations, resulting in later-stage diagnoses and significant changes in overall delay risk (Ozaki *et al*., 2017a; 2017b), with impacts persisting long-term for some patients (Hasegawa *et al*., 2016). Furthermore, breast cancer screening rates dramatically dropped from 20% before the disaster to 4.2%, requiring five years to recover (Ozaki *et al*., 2023). While chart-based studies can quantitatively demonstrate treatment delays but often miss underlying reasons and patient experiences, case reports also fail to comprehensively reveal the background factors causing these delays.

To date, we have qualitatively examined how the triple disaster affected patients diagnosed with breast cancer before the earthquake and their families, identifying key challenges in treatment continuity, social and psychological impacts and changes in healthcare access and support systems (Kaneda *et al*., 2024; Singh *et al*., 2024). However, despite the likelihood that patients diagnosed after the disaster faced different experiences than those diagnosed before, no interview-based research has yet explored the experiences of patients newly diagnosed with cancer in the affected areas. The purpose of this study was to leverage the characteristics of qualitative research to clarify the extensive impact on breast cancer patients after the disaster. Specifically, the study focuses on treatment delays, the factors contributing to these delays and the unique needs of patients, examining them in detail.

2. Methods

2.1. Study Design, Subjects and Participants

This study is a qualitative study, specifically utilizing thematic analysis. The investigation was conducted in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist to ensure transparency and reliability in qualitative research (Tong *et al*., 2007) (Supplementary Appendix 1).

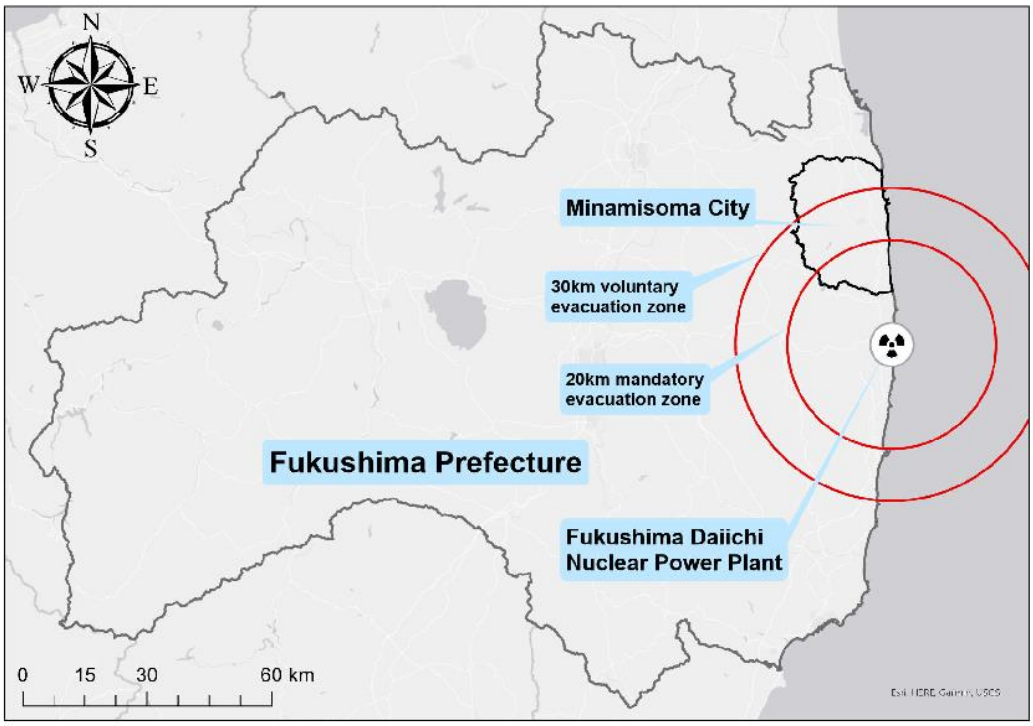

Figure 1. Location of the two study sites

The study sites are Minamisoma Municipal General Hospital and Watanabe Hospital. These hospitals are located 23 km and 25 km north of the Fukushima Daiichi nuclear power plant, respectively and were affected by hydrogen explosions during the 2011 triple disaster. Figure 1 was created using ArcGIS (Esri, Redlands, CA, USA) to illustrate their geographical location and proximity to the plant. The study participants consist of 132 breast cancer patients who were newly diagnosed after the disaster and received treatment at these medical institutions between 2011 and 2016, with these patients compiled in a database. The patient recruitment process has been described elsewhere (Ozaki *et al*., 2020). Briefly, potential participants received an informational document, followed by a phone call from a researcher explaining the study purpose. Those who returned signed consent forms were scheduled for semi-structured interviews. Of the contacted patients, 36 consented and participated in interviews lasting between 10 and 76 minutes.

2.2. Data Collection

First, sociodemographic data - including age, sex and occupation - as well as clinical data such as diagnosis, disease stage and treatment course were extracted from

the existing database to prepare for interviews. Subsequently, interviews were conducted and recordings were transcribed. The interview content included participants' names, dates of birth, occupations, situations during the disaster, evacuation experiences, conditions at the time of diagnosis and the impact of the disaster on diagnosis, treatment and support. The main interview questions were as follows:

1. Did the disaster create difficulties in your initial visit to a medical institution?
2. Did the disaster create difficulties in receiving breast cancer treatment?
3. Did evacuation affect your breast cancer treatment?
4. Do you have any advice or recommendations regarding breast cancer care after a disaster?
5. Do you think the disaster had an impact on the onset of breast cancer?

Participant anonymity was maintained through systematic anonymization where patient and physician names were removed from transcripts, while retaining location information. Participants were informed beforehand that complete anonymity could not be guaranteed and interviews proceeded only with those who provided informed consent under these conditions.

2.3. Data Analysis

This study employed thematic analysis as a qualitative research method to analyze the transcribed interview data using an inductive approach (Bond *et al*., 2021). The analytical framework followed the six-phase process proposed by Braun & Clarke (Itoh *et al*., 2019), which proceeded as follows: (1) familiarization with the data through repeated review by the research team; (2) generation of initial codes by extracting and categorizing meaningful units from transcripts; (3) theme identification by analyzing relationships among generated codes to identify recurring patterns; (4) theme review to evaluate validity and ensure consistency across the dataset; (5) theme refinement and naming to clarify characteristics and assign appropriate names and (6) results presentation by organizing and presenting the final themes as key findings of the study.

During the analysis, the research team meticulously reviewed the interview transcripts and iteratively refined the coding process. After extracting patterns, themes were integrated and refined, followed by multiple rounds of validation within the research team to ensure their accuracy. All analyses were conducted manually without the use of software tools. Data collection continued until theoretical saturation was reached - the point at which no new codes, themes or conceptual relationships emerged (Bastani *et al*., 2023; Lindeman *et al*., 2017). This saturation criterion determined the final number of interviews conducted.

2.4. Ensuring Trustworthiness

Trustworthiness was ensured through multiple strategies. Credibility was supported by team-based data triangulation and theme validation. Transferability was enhanced by detailed descriptions of context and experiences. Dependability was maintained through documentation of the analysis process. Confirmability was achieved via an audit trail, minimizing bias.

2.5. Ethical Approval

This study was approved by the Ethics Review Committee of Minamisoma Municipal General Hospital in October 2023 (Approval Number: 5-8). The ethical review

process adhered to the guidelines established by the Japanese Ministry of Health, Labour and Welfare (MHLW) and the Ministry of Education, Culture, Sports, Science and Technology (MEXT).

3. Results

Thirty-six patients who were diagnosed with breast cancer in the disaster-affected area after the 2011 triple disaster participated in this study. All participants provided consent for the interviews. Table 1 presents the characteristics of the participants, identified by unique patient identification numbers. Regarding age at the first visit, the majority were aged 50 years or older (31 patients, 86%). The diagnosis was triggered by screening in 14 patients (39%), while 22 patients (61%) were diagnosed due to self-recognized symptoms. The clinical stage at diagnosis was as follows: stage 0 in 2 cases (6%), stage 1 in 18 cases (50%), stage 2 in 12 cases (33%), stage 3 in 3 cases (8%) and stage 4 in 1 case (3%). Among invasive breast cancer cases, excluding non-invasive carcinoma, the most common breast cancer subtype was HR-positive/HER2-negative, accounting for 18 patients (53%). This was followed by HR-positive/HER2-positive in 13 patients (38%), HR-negative/HER2-positive in 2 patients (6%) and HR-negative/HER2-positive in 1 patient (3%). Delays in seeking medical consultation and starting treatment were categorized into three groups: within 30 days, 31-90 days and 91 days or more. For medical consultation, there were no missing data and all 36 participants were analyzed. Among them, 69% consulted within 30 days, 11% between 31-90 days and 19% after 91 days. For treatment delays (provider interval), data were missing for two participants, so 34 were analyzed. Of these, 26% started treatment within 30 days, 62% within 31-90 days and 12% after 91 days.

Table 1. Characteristics of breast cancer patients diagnosed after the earthquake

Variable	Subcategory	N	%
Age (years old)			
50 or above		31	86
Less than 50		5	14
Diagnosis	Detected in screening	14	39
	Self-detected	22	61
Stage	0	2	6
	1	18	50
	2	12	33
	3	3	8
	4	1	3
Subtype	HR+/HER2-	18	53
(invasive only)	HR+/HER2+	13	38
	HR-/HER2+	1	3
	HR-/HER2-	2	6
Patient interval	30 or less days	25	69
	31-90	4	11
	91 or more days	7	19
Provider interval	30 or less days	9	26
(Two have missing data)	31-90	21	62
	91 or more days	4	12

Findings of Thematic Analysis

The results of the thematic analysis are shown in Table 2. A total of 103 codes

were generated, which were summarized into 20 subthemes and 4 main themes. Question No.2 and No.3 were considered to overlap in themes. Therefore, we integrated them into Theme 2. Details of these themes are explained in the following sections. Participant statements are presented in italics throughout the text to distinguish direct quotes from the interview data.

Table 2. Themes and subthemes identified

Themes	N	Subthemes	N	%
Post-disaster Healthcare-Seeking Behavior	30	No impact	19	63
		Difficulty choosing hospital	5	17
		Difficulty with screening	3	10
		Importance of specialists	2	7
		Difficulty undergoing further examinations	1	3
Impacts of the Disaster on Breast Cancer Treatment	46	No impact	28	61
		Effects on mental status	7	15
		Limited options for medical care providers	6	13
		Erosion of personal bonds	3	7
		Critical role of financial support	1	2
		Changes in the treatment environment due to the disaster	1	2
Impacts of the Disaster on Breast Cancer Onset	16	No impact	6	38
		Affected by radiation exposure	3	19
		Affected by stress	3	19
		Uncertain	3	19
		Affected by the disaster	1	6
Support for Breast Cancer Care	11	No special support needed in breast cancer treatment	7	64
		Need for human connection	2	18
		Coordination among hospitals	1	9
		Need for cancer-related information	1	9

3.1. Theme 1: Post-Disaster Healthcare-Seeking Behavior (n=30, 29%)

For this theme, subthemes such as no impact and difficulty in choosing a hospital were identified. While many patients were able to maintain their usual healthcare-seeking behavior after the disaster, some faced various challenges, including difficulties in selecting a medical institution, undergoing screenings, delays in further examinations, time constraints and psychological impacts.

3.1.1. No Impact (n=19, 63%)

The majority of participants reported no impact on their healthcare-seeking behavior after the disaster.

"Well, I don't think there was much of an impact. I'm not the type to overthink

things".

However, there were also patients who responded that the disaster had no impact on their behavior, despite the fact that they had actually delayed seeking medical care. For example, one patient who said, "No, not really. I just thought that was how things were", had taken more than 365 days from symptom recognition to consultation.

3.1.2. Difficulty in Choosing a Hospital (n=5, 17%)

In contrast, some participants experienced difficulties in selecting a hospital.

"Well, there weren't many hospitals open at the time. And when I was actually told that I had breast cancer, I didn't even know where I should go for treatment".

3.1.3. Difficulty with Screening (n=3, 10%)

Similarly, some participants faced difficulties in receiving breast cancer screening.

"In 2011, it was my scheduled screening year, but because of the disaster, they said something about the machines not working properly, so I couldn't get my screening that year".

3.1.4. Importance of specialists (n=2, 7%)

Nonetheless, some participants mentioned that having a specialist helped them seek medical care.

"Yes, I knew I could rely on Dr. Ohira, so that was reassuring".

Since Dr. Ohira is one of the authors of this study, references to him are based on patients' personal experiences with him as a healthcare provider, rather than in his role as a researcher.

3.1.5. Difficulty Undergoing Further Examination (n=1, 3%)

One participant mentioned that a delay in medical consultation led to a cancer diagnosis.

"Because it was a bit late, the cancer had grown larger. I regret that".

Breast cancer patients faced diverse challenges in seeking healthcare after the disaster. While many continued their usual visits, some struggled with hospital selection, screenings, time constraints and psychological stress, all impacting treatment continuity. The presence of a specialist was crucial in guiding certain patients' treatment decisions.

3.2. Theme 2: Impact of the Disaster on Breast Cancer Treatment (n=46, 45%)

For this theme, subthemes such as no impact and experiencing difficulties were identified.

While many patients stated that they were able to continue their treatment despite the post-disaster turmoil, some faced individual challenges, including restrictions in choosing medical institutions, psychological impacts and changes in personal relationships. Additionally, while the exemption of medical expenses helped alleviate financial burdens, the unstable atmosphere within hospitals in the aftermath of the disaster contributed to increased psychological distress for some patients.

3.2.1. No Impact (n=28, 61%)

Most participants reported no impact on their breast cancer treatment due to the disaster.

"Even though I was diagnosed with cancer, it wasn't like I couldn't undergo surgery or treatment because of the disaster".

3.2.2. Effects on mental status (n=7, 15%)

However, participants reported an impact on their mental state.

"Well... my husband's family – almost all of them – were lost in the tsunami. So, when you ask about my mental state, it's a bit... how should I put it? I don't really know how to describe it, but maybe I've become a bit stronger. No matter what happens, I just try to keep going, I guess".

3.2.3. Limited options for medical care providers (n=6, 13%)

Similarly, some participants experienced difficulties in selecting a medical institution.

"The biggest problem at first was that there were no hospitals available".

3.2.4. Erosion of personal bonds (n=3, 7%)

Some participants stated that changes in personal relationships affected their treatment.

"If the disaster hadn't happened, I would have had more family and people around me to rely on. But with no one left, I had to handle everything on my own".

3.2.5. Critical role of financial support (n=1, 2%).

Nonetheless, one participant stated that financial aid helped reduce the burden of treatment.

"Regarding my treatment, actually, my hospitalization fees and such were waived because it was after the disaster. In a way, it really helped me - though it feels strange to say that. If that support hadn't been there, things would have been quite difficult".

3.2.6. Changes in the treatment environment due to the disaster (n=1, 2%)

Although their treatment was not affected, one participant felt that the hospital atmosphere had changed due to the disaster.

"It felt... unsettled, you know? The nurses and everyone seemed less at ease than usual. But they still took care of me very attentively".

The impact of the disaster on breast cancer treatment varied among patients. While many were able to continue their treatment, environmental and psychological factors had complex effects on the treatment process.

3.3. Theme 3: Impact of the Disaster on Breast Cancer Onset (n=16, 16%)

For this theme, subthemes such as no impact, radiation exposure, stress and the disaster itself as a potential trigger were identified. While many patients reported that they did not feel the disaster had an impact on their breast cancer onset, some believed that post-disaster living conditions and psychological stress were related to the development

of their cancer.

3.3.1. No Impact (n=6, 38%)

Approximately 40% of participants believed that the disaster had no impact on their breast cancer onset.

"I never thought about it at all".

3.3.2. Affected by radiation exposure (n=3, 19%)

Conversely, some participants believed that radiation exposure influenced their breast cancer onset.

"Isn't radiation exposure a factor for everyone?"

3.3.3. Affected by stress (n=3, 19%)

Some participants believed that stress played a role in their breast cancer onset.

"Rather than radiation, I felt that the extreme stress weakened my immune cells and I wondered if that might have led to cancer".

3.3.4. Uncertain (n=3, 19%)

One participant was unsure about the impact of the disaster on their breast cancer onset.

"I don't think radiation exposure is related, but I'm not really sure".

3.3.5. Affected by the disaster (n=1, 6%)

Similarly, one participant believed that the disaster itself had an impact on their breast cancer onset.

"It was after the disaster. As a nurse, work in Minamisoma was extremely busy, so… it was difficult to undergo surgery right away for both of us".

Opinions varied on whether the disaster influenced breast cancer onset. While some believed environmental and psychological factors contributed, many doubted a direct link.

3.4. Theme 4: Support for Breast Cancer Care (n=11, 11%)

For this theme, subthemes such as no need for special support, human connections, coordination between hospitals and lack of medical information were identified.

While many patients stated that they did not feel the need for additional support after the disaster, some cases highlighted the necessity for greater consideration and information provision in breast cancer treatment.

3.4.1. No special support needed in breast cancer treatment (n=7, 64%)

More than half of the participants stated that they did not need additional support for breast cancer care.

"Uh, not really. I can't think of anything".

3.4.2. Need for Human Connections (n=2, 18%)

By contrast, some participants felt the need for human connections.

"The emotional and human support… there was hardly any of that, wasn't there?"

3.4.3. Coordination among hospitals (n=1, 9%)

One participant felt that better coordination between hospitals was needed. To ensure anonymity, the names of medical institutions mentioned in the interviews have been anonymized

"Well, when [anonymized] Medical University sent my referral letter here, I got the feeling that this hospital - probably because they were overwhelmed with patients - wasn't very welcoming in how they received me".

3.4.4. Need for cancer-related information (n=1, 9%)

Similar to this, one participant felt that more information about cancer was needed.

"I think the problem was the lack of information at that time".

In post-disaster breast cancer care, most patients felt no special support was needed. However, some wanted emotional support, better hospital coordination and accurate information. These needs highlight the importance of adapting to changes in both the healthcare system and living environment.

Discrepancy between Perception and Reality of Treatment Delays

Regarding medical consultation behavior, while there were 3 cases with delays of 91 days or more among patients who responded "no impact", only 1 patient who reported "some impact" actually experienced a delay of 91 days or more and this patient complained about difficulties in hospital selection. Similarly for treatment delays, there were 2 patients with delays of 91 days or more among those who reported "no impact", whereas only 2 patients who reported "impact" actually experienced delays of 91 days or more, both of whom reported that their options for medical institutions were limited.

4. Discussion

From the analysis of interviews with breast cancer patients diagnosed after the 2011 triple disaster, four themes were identified: post-disaster healthcare-seeking behavior, impact on breast cancer treatment, perceived impact on breast cancer onset and support for breast cancer care. These findings provide valuable insights into the varied experiences of patients navigating cancer care in a post-disaster context.

Healthcare-Seeking Behavior and Treatment Impacts

Our analysis revealed that while the majority of patients (63%) reported no impact on their healthcare-seeking behavior, a notable proportion experienced challenges related to hospital selection (17%), screening access (10%) and examination delays (3%). Similarly, for breast cancer treatment, although 61% of patients reported no impact, others faced restricted institutional choices (13%), psychological effects (15%) and changes in personal relationships (7%) that indirectly affected their care.

Interestingly, we observed a discrepancy between patients' perceptions and their actual experiences of delays. Some patients who reported "no impact" had actually experienced significant delays in medical consultation (over 91 days in some cases), while others who reported difficulties did not show quantifiable delays in their care timeline.

The impact on consultations and treatments is not necessarily reflected in quantitative indicators such as the number of days delayed, but varies greatly depending on patients' subjective perceptions and their circumstances. The findings also revealed that even when patients were actually affected, this may not always be clearly expressed in their awareness or narratives. This phenomenon highlights how patients may try to normalize or minimize disruptions through subjectively perceiving the impact of the disaster in the context of broader societal challenges. Previous research has documented increased consultation delays following disasters, with a tendency toward diagnosis at more advanced disease stages (relative risk: 1.66, 95% confidence interval: 1.02-2.70, $p < 0.05$) (Ozaki *et al*., 2017b; 2020). In addition to the subjective nature of perceptions of medical consultation and treatment delays, the decreased consistency of memory among trauma survivors and recall bias due to the extended time elapsed since the disaster represent important considerations in interpreting these findings (Itoh *et al*., 2019; Lindeman *et al*., 2017).

The presence of specialists emerged as a critical factor in facilitating timely care, mentioned specifically by 7% of participants. This underscores the importance of maintaining specialist availability in disaster-affected regions. Financial assistance programs, though mentioned by a small percentage (2%), provided crucial support that alleviated treatment burdens during the economically challenging post-disaster period.

Comparison with Pre-Disaster Patients

Previous research examining patients diagnosed with breast cancer before the disaster indicated that they often prioritized family care and rebuilding efforts over their own treatment (Kaneda *et al*., 2024). In contrast, our study of post-disaster diagnosed patients reveals a different set of challenges, particularly related to navigating a changed healthcare landscape with fewer available institutions and resources. The shortage of medical staff that peaked one month after the disaster and persisted for at least 18 months (Ochi *et al*., 2016) created unique barriers for newly diagnosed patients that were distinct from those diagnosed pre-disaster.

Perceptions of Disaster Impact on Cancer Onset

Our findings regarding perceived impacts on cancer onset provide valuable insights into patients' illness beliefs. While 38% of patients believed the disaster had no impact on their cancer development, despite scientific consensus suggesting that the impact of radiation exposure from the nuclear accident on cancer development is minimal (United Nations, 2025), others attributed their disease to radiation exposure (19%), stress (19%) or were uncertain about the relationship (19%). These perceptions may influence treatment-seeking behavior and psychological adjustment to diagnosis. Previous research has demonstrated that the Great East Japan Earthquake significantly affected breast cancer patients' mental health, with disaster-related stress potentially influencing treatment behaviors (Kane *et al*., 2018; Neria *et al*., 2008; Zubizarreta *et al*., 2013). These findings highlight the necessity of psychosocial support during disasters and the importance of comprehensive care that extends beyond basic medical services.

Support Needs and System Recommendations

Although 64% of participants indicated no need for special support in breast cancer care, others emphasized the importance of human connection (18%), better hospital coordination (9%) and improved cancer information (9%). These identified

needs align with research on disaster response systems and suggest specific areas for improvement in healthcare delivery during crises.

Previous research has indicated an increase in consultation delays following disasters, with decreased family support being hypothesized as a primary reason. In our study, although participants did not explicitly mention family-related factors, findings suggest that knowledge about hospitals and healthcare professionals was associated with smooth medical consultations. This indicates that family members may have played a significant role as providers of such information, a phenomenon that has been noted in previous studies (Kaneda *et al*., 2024).

Implications for Practice

Based on these findings, we propose several practical implications for breast cancer care during disasters. First, ensuring the presence of breast cancer specialists in affected areas is crucial, as our results showed their importance in supporting patients' healthcare-seeking behavior. Second, strengthening collaboration between medical institutions within and outside affected areas can help sustain healthcare access. Third, economic support systems should be maintained and clearly communicated to alleviate financial burdens. Fourth, systems for rapid dissemination of accurate medical information about available services can address the information gaps identified by participants.

Finally, beyond medical care, a comprehensive approach that includes mental and social support is needed. The psychological impacts reported by patients highlight the importance of addressing the emotional dimensions of care during crises. Building resilient medical systems with backup resources and flexible service delivery models can help ensure continuity of care even during emergency situations.

Limitations

This study has several limitations. First, as interviews were conducted more than a decade after the disaster, memory recall bias and the natural fading of memories may have influenced participants' accounts. Second, the predominance of early-stage cancer patients among participants suggests a potential survivor bias that may have resulted in underrepresentation of those more severely affected. Third, the study's regional focus limits generalizability to other affected areas with different healthcare systems and disaster impacts. Finally, the relatively small sample size for some subthemes requires cautious interpretation of these findings.

5. Conclusion

This qualitative study of breast cancer patients diagnosed after the 2011 triple disaster in Japan revealed that while many maintained their usual healthcare routines, others faced significant challenges in accessing care, with notable discrepancies between patients' perceptions and their actual experiences of delays, highlighting the importance of specialist availability, financial support, institutional coordination, accurate information systems and psychosocial services in maintaining cancer care continuity during disasters.

Conflicts of interest

Dr. Akihiko Ozaki has received personal fees from MNES, Kyowa Kirin Inc., Becton, Dickinson and Company, Pfizer and Taiho Pharmaceutical Co., Ltd., for work unrelated to the submitted study. No other disclosures have been reported.

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