

Document

Trends and Issues in Research on Disaster Preparedness of Mothers Raising Infants

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Abstract

The purpose of this study was to identify trends and issues in research on disaster preparedness among mothers raising infants. The Central Journal of Medicine web edition and PubMed were searched on 6 January 2024. A total of 262 references were found, of which 13 were finally extracted. The literature increased dramatically in the 2020s. Based on a content analysis of the literature, the findings were grouped into four categories: [Preparedness of mothers with infants], [Preparedness for children with special needs], [Current state of support] and [Current state of education on preparedness]. The largest number of references related to [preparedness of mothers with infants] revealed the current state of preparedness, as well as interest and related factors. Future issues are providing information and disaster education for practicing preparedness behaviors.

Key words: infant, mothers raising infants, disaster, preparation

Introduction

In recent years, natural disasters have become more frequent and severe due to climate change, and the imminence of a Nankai Trough earthquake or an earthquake directly under the capital has been pointed out. When a large-scale disaster occurs in a wide area, self-help and mutual aid are required as public assistance is limited (Cabinet Office, 2022).

Infants and their mothers are considered “persons who require special care”, and it is difficult to evacuate or live in an evacuation area while carrying small children. Infants and mothers living in groups at designated evacuation centers are forced to leave the evacuation center and sleep in cars or tents due to the cries of their children and the difficulty of breastfeeding and changing their children. As a result, it is difficult to locate infants and their mothers during disasters (Ministry of Health, Labor and Welfare,

2021). Infants are extremely vulnerable and susceptible to environmental changes and require highly individualized care to prevent dehydration and infection. If the mother is pregnant or postpartum, additional consideration must be given to her own health. Living in an evacuation zone is characterized by the fact that infants and their mothers are more likely to suffer from health problems, making childcare and daily life difficult.

Based on these backgrounds, we hope to organize literature on the preparations of mothers raising infants, grasp the actual situation during preparations and disasters, clarify issues, and provide support to protect infants and mothers in the event of a disaster. Therefore, this study aimed to clarify trends and issues in research regarding disaster preparedness for mothers raising infants.

Method

The domestic literature search was limited to original articles using the keywords “disaster/earthquake”, “infant/newborn”, “mother”, and “preparation” using the central journal of medicine web edition. Foreign literature was searched using the database PubMed with the keywords “disaster” AND “infant OR mothers raising infants” AND “preparation”. The search period is from the year of recording to the survey date (January 6, 2024). The criteria for selecting literature was that it had a description of mothers’ preparation for raising infants, and that it was written in Japanese or English.

The extracted documents were organized mainly by author, year of publication, country of study, human research subject, and main results. We carefully read the texts and categorized them based on similarities, focusing on content related to disaster preparedness for mothers raising infants.

Result

1. Overview of literature

The database search identified 262 references (33 in the Journal of Central Medicine and 229 in PubMed). 249 references were excluded ac-

cording to the selection criteria, and 13 references (9 in the Journal of Central Medicine and 4 in PubMed) were selected as eligible references (Figure 1). A summary of the literature is shown in Tables 1-4. By year of publication, there were no references before 2009, six references from 2010 to 2019, and seven references after 2020. In order to understand the trends and content of research on maternal preparedness for raising infants, the literature was reviewed and categorized according to similarities. The results were classified into four categories: [preparedness of mothers with infants], [preparedness for children with special needs], [current status of support], and [current status of education on disaster preparedness]. The number of cases in each category and the percentage of each category in the literature covered were: [preparedness of mothers with infants] 4 (30.8%), [preparedness for children with special needs] 3 (23.1%), [current status of support] 3 (23.1%), and [current status of education on preparedness] 3 (23.1%).

2. Disaster preparedness of mothers raising infants

1) Preparedness of mothers with infants

The literature on preparedness of mothers with infants and toddlers revealed the current state of preparedness behaviors, interests, perceptions,

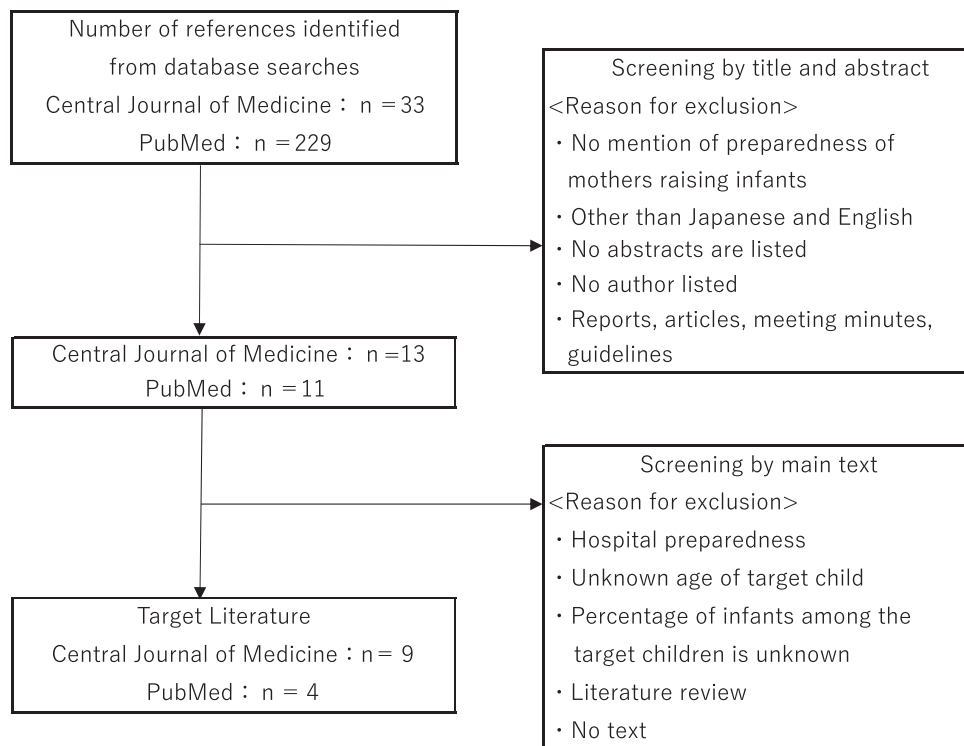


Figure 1 Literature extraction process and number of references

and related factors. (Table 1).

The percentage of respondents implementing disaster preparedness behaviors ranged from 2.4% to 46.3% in Japan (Fukuoka et al., 2023; Hosokawa et al., 2022). Overseas, disaster preparedness ranged from 60.1% to 82.8% (Fung et al., 2010), with the highest percentage of respondents stockpiling medicines.

Regarding the awareness of disaster preparedness, 71.2% (Fukuoka, 2023) are concerned about disasters, 90.4% (Hosokawa, 2022) a major earthquake will occur, 31.1% (Hosokawa, 2022) a landslide or windstorm will occur, and 97.8% (Hosokawa, 2022) disaster preparedness is necessary (Hosokawa, 2022) disaster preparedness is adequate (Fung et al., 2010) 9.1%. Regarding

knowledge of disasters, 45.6% (Hosokawa, 2022) were “aware of disasters” and 45.2% (Fukuoka, 2023) were “aware of postnatal and infant physiological changes after a disaster”.

Factors related to disaster preparedness were interest in disasters and knowledge of physiological changes in infants (Fukuoka, 2023), awareness of disasters occurring when they are with their infants, knowledge of disasters and preparedness, age, and infants and older children entering preschool or school (Hosokawa, 2022). In addition, mothers were prepared for disaster preparedness in the wake of the Great East Japan Earthquake (Matsunaga et al., 2019). Their needs for preparedness were appropriate information, learning opportunities, and acting with someone

Table 1 Overview of the literature covered (Preparedness of mothers with infants)

Author (Year of publication) Country	human research subject	Result
Fukuoka, et al. (2023) Japan	Pregnant women and women with infants (n=472)	<ul style="list-style-type: none"> · 74.2% were aware of the need for disaster preparedness and 71.2% were concerned about disasters, but 46.3% had implemented preparedness. · Being concerned about disasters was significantly associated with being prepared and being aware of the need for preparedness. · 45.2% of respondents understood that physiological changes occur in pregnant women, postpartum women and infants after the disaster. Preparedness implementation was significantly associated with understanding of physiological changes, while awareness of the need for preparedness and interest in disasters were not associated with understanding of physiological changes.
Hosokawa, et al. (2022) Japan	Parents of infants in two cities in A prefecture affected by the Great Hanshin-Awaji Earthquake (n=694)	<ul style="list-style-type: none"> · Regarding awareness of disasters, over 90% of respondents thought that major earthquakes would occur, but only half were aware of landslides and windstorms. · Less than 20% of households took disaster preparedness measures and around 30% took evacuation measures. · Factors related to disaster preparedness were: having thought about disasters in infancy, having knowledge about disasters and preparedness, age, and having an infant or older child attending nursery or school. · The needs for disaster preparedness were [appropriate information for infants and parents about disasters and preparedness], [accessible learning opportunities] and [preparing together]. · Many parents did not implement adequate disaster preparedness. Factors for preparedness were mainly related to awareness that disasters occur with infants and knowledge of disasters.
Matsunaga, et al. (2019) Japan	Mothers who experienced the Great East Japan Earthquake with infants aged 0-6 years. (n=24)	<ul style="list-style-type: none"> · Mothers were inspired by the disaster to implement disaster preparedness measures such as [equipping themselves with goods], [adjusting the environment], [training and education] and [making assumptions]. · Specifically, they were preparing for home evacuation, preparing luggage for temporary housing, securing means of transport, preparing for information gathering such as social networking and radio, adjusting childcare and school facilities, home furnishings, good relations with local residents, disaster education and outdoor living training for children, and assuming disaster and evacuation behaviour.
Fung, et al. (2010) Hong Kong	Heads of households with children under 15years of age (n=198)	<ul style="list-style-type: none"> · 94.4% of householders considered the 2003 SARS outbreak to have been a disaster. · ‘Essentials for young children’ (82.3%/73.3%) and ‘medicines’ (82.8%/60.1%) were stockpiled for three/seven days respectively. · A flashlight with adequate batteries (74.7%), spare blankets (69.2%) and a first aid kit (60.6%) were kept at home. · In the past, ‘panic buying’ occurred during typhoon attacks (68.2%) and infectious disease outbreaks (46.0%). · 9.1% of respondents considered themselves adequately prepared for disasters.

else. (Hosokawa, 2022).

2) Preparedness for children with special needs

The literature on preparedness for children with special needs was related to preparedness for home ventilator wearers, children discharged from the NICU, and children with allergic diseases (Table 2).

In a survey conducted by Higaki et al. (2020) in 2016, 11.5% of home nursing stations prepared individual plans for persons requiring evacuation support for those with tracheostomy-positive pressure ventilation (TPPV). In addition, only 20 to 30% of the respondents were equipped with charging devices and generators (Higaki et al., 2020). When discharged from the NICU with home care required, 4% of facilities provided guidance in case of disaster, and nearly 80% did not provide patients and families with contact information in case of disaster (Kono et al., 2019). Regarding the preparedness of patients with allergic diseases, it was reported that inhalers cannot be used during power outages and that it is difficult to obtain allergy milk and allergy foods (Yamaoka et al., 2011).

3) Current status of support

In the literature on the current state of support, the current state of maternal and child health care in the U. S., nutritional and dietary preparedness in municipalities nationwide, and the current state of information on disaster preparedness were identified (Table 3).

During the hurricanes that made landfall in the U. S. in 2017/2018, there were issues such as lack

of access to necessary medical care, inability to maintain breastfeeding, and inability to choose a place of refuge. Challenges included supporting breastfeeding, ensuring continuity of care for infants and families, shelters for infants to stay overnight, access when needed, and policies and communication regarding the use of shelter locations for children with special medical needs and their families (Scott et al.). The national municipal stockpile status (2018) for nutrition in the event of a major disaster was 30.8% for infant formula and 20.9% for allergy-compatible food (Kubo et al., 2020). Yamamoto et al. (2014) collected information on children affected by the Great East Japan Earthquake regarding disaster preparedness and evacuation immediately after the disaster, and prepared a booklet that can be used immediately by pregnant women, infants, and their guardians themselves.

4) Current status of education on preparedness

In the literature on education on preparedness, one domestic and two international disaster education were reported (Table 4). Hanai et al. (2021) showed the effectiveness of a risk communication program through a baby visitation project. Heagele et al. (2022) distributed disaster preparedness booklets to mothers with newborns in the NICU and found that the booklets, disaster kits, and speed/cost of intervention were drivers of preparedness. In addition, a study by Gillen et al. (2019) found that families of children who needed medical equipment were significantly better able to cope after discharge from the

Table 2 Overview of literature covered (Preparedness for children with special needs)

Author (Year of publication) Country	human research subject	Result
Higaki, et al. (2020) Japan	Visiting nurse station (n=394)	<ul style="list-style-type: none"> • The proportion of 0–9 year olds on home ventilators was 18.1% on TPPV (tracheostomy positive pressure ventilation) and 3.0% on NPPV (non-invasive positive pressure ventilation). • 33.0% of respondents ‘registered’ TPV wearers on the list of persons requiring evacuation assistance, 9.6% ‘did not register’ and 57.4% ‘do not know’. • 11.5% ‘have prepared’ an individual plan for persons requiring evacuation assistance for those wearing a TPPV, 20.4% ‘have not prepared’ one and 68.1% ‘do not know’ one. • The items prepared for disasters were suction equipment 87.0%, resuscitation bags 78.9%, generators 37.8% and charging equipment 25.9%.
Kawano, et al. (2019) Japan	Paediatricians and neonatologists who participated in educational seminars. (n=70)	<ul style="list-style-type: none"> • 70% of doctors were aware of disasters, but 4% of facilities provided disaster guidance to patients discharged from the NICU requiring home care. • 83% of home healthcare patients did not have a clear contact person in case of a disaster. • 6% of facilities had disaster simulations for home care patients.
Yamaoka, et al. (2011) Japan	Parents of children with allergic diseases who regularly visited an allergist in Miyagi Prefecture. (n=402)	<ul style="list-style-type: none"> • The most common problems encountered in the Great East Japan Earthquake were: for bronchial asthma, ‘could not use the electric inhaler due to power failure’; for atopic dermatitis, ‘could not take a bath and eczema got worse’; and for food allergies, ‘it was difficult to obtain allergy milk and allergy-friendly foods’.

Table 3 Overview of the literature covered (Current state of support)

Author (Year of publication) Country	human research subject	Result
Scott, et al. (2022) America	Parents in Florida affected by Hurricanes Irma, Maria and Michael (n=22) Expert (n=13)	<ul style="list-style-type: none"> · On the day of the hurricane, a child born with respiratory distress died because oxygen could not be supplied due to a power failure. · The number of mothers who fully breastfeed their babies is declining significantly. Factors contributing to this are the flood of formula and the stress of mothers. People gave their babies water after donations for hurricane relief dried up. · Families with children with special medical care needs were concerned about the availability of medical supplies, emergency services and shelter options during a disaster. There was also concern that the policy of only one carer being allowed to go with a child to a special needs shelter would divide families. · Challenges included enhanced communication and cooperation between families and health care providers, coordination between health care providers and social service providers, effective public messaging, materials and processes modified to meet demands, and the need for post-disaster mental health services and employment resources.
Kubo, et al. (2020) Japan	Disaster management departments in 1,741 cities, towns and villages nationwide (n=1,056)	<ul style="list-style-type: none"> · Stockpiling for people with special needs included porridge (28.2%), infant formula (30.8%) and allergy-friendly food (20.9%). · 35.9% of the respondents stated in their local disaster management plans and related plans about identifying people with special needs who are unable to eat a normal meal.
Yamamoto, et al. (2014) Japan	Disaster prevention and support information on pregnant women and parents with infants.	<ul style="list-style-type: none"> · Municipalities across the country provided 36 pieces of information on pregnant women and parents of infants, 18 of which related to infant food and nutrition. · The amount of disaster management information on children and parents provided by private organisations, academic societies and companies was vast, constantly updated, duplicated and convoluted. Of these, 179 titles were accessible on the internet, treated infants, children and parents themselves as protagonists and had credibility and validity as of 24 October 2013.

Table 4 Overview of literature covered (Current state of education on preparedness)

Author (Year of publication) Country	human research subject	Result
Hanai, et al. (2021) Japan	Mothers in City A (n=10)	<ul style="list-style-type: none"> · A preparedness promotion programme was implemented in the "Baby Visiting Project". The average implementation time was 32 minutes, and all mothers were receptive, with positive changes such as 'I have more knowledge about disaster preparedness'.
Heagele, et al. (2022) America	Parents with newborns (n=68) Maternal/child nurses (n=13)	<ul style="list-style-type: none"> · During the infant's hospitalisation, parents completed a booklet on disaster preparedness etc. in the home and received a disaster kit. Facilitators of this intervention included booklets, disaster kits, speed and cost of the intervention, while barriers included the weight of the disaster supplies, parental anxiety and the need for parental follow-up.
Gillen, et al. (2019) America	Children under 18 years and their parents who are admitted to the PICU and require medical equipment at home. (n=50)	<ul style="list-style-type: none"> · Preparedness for 72-hour home power cuts was significantly higher at post-discharge, post-discharge counselling, two weeks and six months after discharge than at admission. · Many households in New York City do not have access to alternative sources of power, such as generators, so they need to register with their local utility company and understand how to use backup batteries.

hospital after being provided with information and educational materials on long-term power outages during their PICU stay.

Discussion

The literature was published after 2010, with seven references in about four years from 2020,

compared to six references in the 2010s. The Great East Japan Earthquake (2011) drew attention to the preparedness of mothers raising infants, and we believe that problems and issues have been identified every time a large-scale disaster has occurred since then. The increase is considered to be due to the growing interest in disaster preparedness, given the imminence of the

Nankai Trough mega earthquakes and earthquakes directly under the Tokyo metropolitan area after 2020.

Literature on preparedness of mothers with infants and toddlers accounted for more than 30% of the total eligible literature and was the largest among the four categories.

All of the domestic literature is post-2019, which infers that the need for research has increased in recent years. However, the current status of preparedness behavior indicates that although interest in disaster preparedness and the need for preparedness are high, it has not yet reached the point of taking preparedness action. Regarding the factors related to preparedness, Hosokawa et al. (2022) indicated awareness of the possibility of disasters occurring when they are with their infants, knowledge of disasters and preparedness, etc. The issues are how to understand the necessity of preparedness and knowledge and how to put them into action. Hosokawa (2022) indicated that the needs for preparedness are “appropriate information,” “opportunities to learn,” and “to act with someone else.” It is important that mothers receive information and education and still be able to act for preparedness.

In the literature on preparation for children with special needs, the target population is considered to be infants and children, and there is a wide range of ages of children, so the current situation limited to infants is not clear. For children with medical care, the inoperability of medical equipment during a power outage is directly related to a life-threatening situation. When evacuating children with medical care needs, it is difficult to determine whether they should go to designated shelters or hospitals (Scott et al., 2022). In addition to disaster preparedness for patients and families, there is an urgent need to plan for collaboration and support systems with medical professionals. In Japan, the number of children in medical care and infants with food allergies is increasing (MHLW, 2020; Matsubara, 2018), and disaster preparedness needs to be strengthened. A survey by Kono et al. (2019) revealed that 4% of facilities provide guidance to children and families requiring home care upon discharge from the NICU, and nearly 80% of facilities do not provide patients and families with contact information in case of disaster. Preparations must be made to ensure that necessary medical care is available even in the event of a disaster.

As for the current status of support, there was only one reference on food stockpiling by local

governments, and we could not find any literature on evacuation life and support for mothers with infants. In the Kumamoto earthquake (2016), it was reported that there were many people staying in cars, space for changing clothes and breastfeeding, hygienic environment, lack of concern for people around for crying at night, place for children to spend (play), and lack of relief supplies of diapers and baby food (Cabinet Office, 2018), and mothers, children and their families need a place to spend evacuation life safely and securely. Scott et al. (2022) reported a decrease in exclusive breastfeeding. Lack of knowledge and resources, over-reliance on formula are issues, and privacy, professional breastfeeding support, and existing breastfeeding practices are said to promote breastfeeding (Supipi et al., 2022). Mothers themselves also need correct knowledge and support from experts. In addition, since 2013, the content and volume of information on preparedness and disaster prevention for mothers with infants provided by the government and private organizations have not been clarified. In recent years, tools such as disaster prevention apps have become more accessible. It is necessary to ascertain how mothers collect and use information on preparedness and disaster prevention.

Regarding the current status of education on preparedness, there was one baby visit in Japan (Hanai et al., 2021) and one each during NICU and PICU admission in the United States (Heagele et al., 2022; Gillen et al., 2019). Note that only one (7.6%) of the three (23.1%) references to [Current Status of Education on Preparedness] mentioned domestic matters. In Japan, the actual status of disaster prevention education for mothers with infants and young children is hardly clarified, and research on disaster prevention education has become an issue.

Infants and their mothers are people to be considered, and more consideration is needed when the mother is a pregnant woman. We believe that further research is needed to clarify the actual conditions of evacuation life and support for mothers raising infants, and to secure a place where mothers, children, and their families can live in peace during disasters. Mothers themselves and those around them need to increase their awareness and knowledge of those with special needs. It is also necessary to promote local disaster prevention planning and education so that infants and mothers can receive necessary medical care and professional support even in the event of a disaster, and can take

preparedness actions even in the case of a disaster.

Conclusion

The literature on disaster preparedness among mothers raising infants increased sharply after 2020. After analyzing the submissions, four themes were identified: [disaster preparedness for mothers with infants and toddlers], [disaster preparedness for children with special needs], [current status of support], and [current status of education on disaster preparedness]. The largest number of references related to [preparedness of mothers with infants] revealed the current state of preparedness, as well as interest and related factors. Future issues are providing information and disaster education for practicing preparedness behaviors.

Study Limitation

The results are only those that meet the literature selection criteria in this study.

Disclosure of Conflict of Interest

No conflicts of interest to disclose.

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