



## THE HEALTH AND DAILY LIVES OF PREGNANT, PARTURIENT AND PUERPERAL WOMEN AND CHILDREN

### -During the Great East Japan Earthquake-

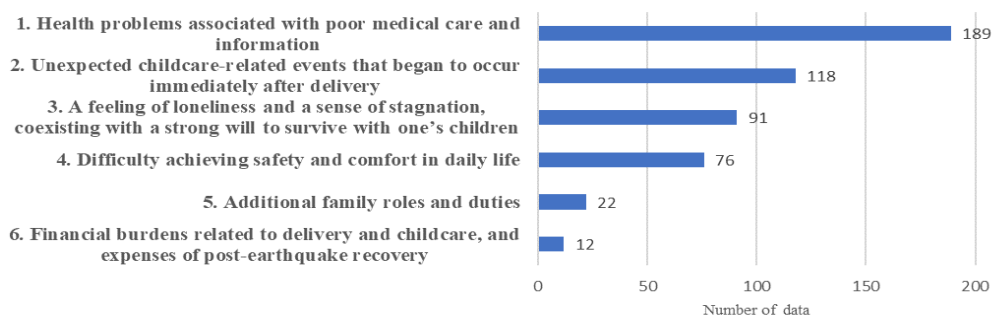
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### Abstract

Pregnant, parturient, and puerperal women and infants (hereinafter referred to as mothers and children) are particularly vulnerable to health problems. Therefore, we investigated the health and daily lives of these individuals during the Great East Japan Earthquake to identify necessary supports for them in future disasters. Specifically, we reviewed 37 studies on support conducted by healthcare professionals such as doctors, midwives, and public health nurses during the Great East Japan Earthquake, and extracted and analyzed specific descriptions of the health conditions, daily lives and difficulties of mothers and children during the disaster. We categorized the extracted descriptions into six groups as shown in the figure below.



“The health and daily lives of pregnant, parturient and puerperal women and children during the Great East Japan Earthquake”

The first category is “health problems associated with poor medical care and information.” Due to insufficient medical care and information required for evaluating and maintaining the health of mothers and children, it was impossible to ensure the appropriateness of diet, excretion, sleep, temperature, exercise, and hygiene. As such, the frequency of minor pregnancy problems increased, and abnormal conditions such as hypertension in pregnancy could not be treated. The second category is “unexpected childcare-related events that began to occur immediately after delivery.” Unexpected events during childcare occurred repeatedly due to the lack of sufficient childcare education and support, earlier discharge of mothers from hospitals, and damage to essential public utilities. The third category is “a feeling of loneliness and a sense of stagnation, coexisting with a strong will to survive with one’s children.” While mothers developed psychosomatic illnesses due to long-term unstable mental conditions, they derived strength from their maternal role. The fourth category is “difficulty achieving safety and comfort in daily life.” Mothers and children were not categorized as needing support. They moved from place to place seeking safe and comfortable living locations. The fifth category is “additional family roles and duties.” Mothers’ roles and duties in the family and in evacuation centers increased due to separation from or death of family members and insufficient maternal support. The sixth category is “financial burdens related to delivery and childcare, and expenses for post-earthquake recovery.”

Mothers and children required more than just medical support during the disaster because they had suffered both mental and physical harm, and mothers had difficulty continuing childcare. Disaster education and increased public awareness focusing on mothers and children are required in the future to develop their self-help capabilities. Based on the results of this study, we consider that such education should achieve the following: improve mothers’ self-care skills and their ability to maintain their own health and that of their children, encourage mothers to actively request support, teach mothers how disasters influence mental state, establish mutual support among residents and help mothers acquire childcare skills using familiar items.

**Keywords:**, the Great East Japan Earthquake, the health and daily lives, parturient, parturient, puerperal women and children,



## 1. Introduction

At the time of the Great East Japan Earthquake, pregnant, parturient, and puerperal women (hereinafter referred to as “mothers”) and children left evacuation centers sometime after the earthquake due to delays in the provision of welfare evacuation centers for such individuals. According to a survey that targeted four public health centers and 12 local governments in areas along the Iwate Prefecture coastline, there were many people with special needs, (including mothers, children, and elderly people) in evacuation centers for the first 24 hours after the earthquake, but most of women and children left within 72 hours after the earthquake<sup>[1]</sup>. Within 2 weeks after the earthquake, many pregnant women escaped to a less damaged area and gave birth there<sup>[2]</sup>. It is not known how many mothers and children stayed in their homes or escaped to their parents’ or relatives’ homes.

Medical facilities and local maternal and child health centers were not aware of mothers and children who needed support after the disaster. As a result, no healthcare support was given to these individuals, and their mental and physical health was compromised<sup>[3]</sup>. According to a survey on postpartum depression conducted in postpartum women who experienced the Great East Japan Earthquake, the percentage of mothers who were at a high risk of developing postpartum depression approximately 6 months after delivery was abnormally high, up to 21.5% <sup>[4]</sup>. Furthermore, a survey on the influence of the Great East Japan Earthquake on mothers reported that pregnant women who received a maternity checkup within a month after the disaster exhibited increased anxiety and worries about fetal growth, delivery, and childcare. Many of these women showed signs of threatened premature delivery, onset or worsening of minor pregnancy problems, and mental stress symptoms such as insomnia <sup>[5]</sup>.

During hospitalization, Japanese maternity hospitals usually instruct postpartum women in breastfeeding, childcare techniques such as bathing, nutrition and lifestyle required for recovery after delivery, prevention of health problems to which postpartum women are prone, and administrative procedures after delivery. However, after the Great East Japan Earthquake, many mothers were discharged without these instructions because the hospitals were closed, spent a great deal of time recovering their functions, or shortened patients’ hospitalization periods to cope with the aftermath of the disaster <sup>[6]</sup>. Therefore, it seemed that the disaster affected not only the mental and physical conditions of pregnant women but also the health, care, and daily lives of postpartum women and their children.

The mental and physical health of mothers and children and childcare conditions in disaster-affected areas remain poorly understood. Therefore, this study focused on mothers and children who were vulnerable to health problems during disaster, with the goal of revealing their mental and physical health, as well as childcare conditions after the Great East Japan Earthquake.

## 2. Purpose

The study aimed to reveal the mental and physical health of mothers and children, as well as the details of their daily lives, after the disaster. In addition, we considered possible support for these individuals during the disaster by collecting a broad range of relevant information from published papers, documents, reports by people who engaged in support activities during the disaster, and books that describe the experiences of mothers and children during disaster.

## 3. Method

### 3.1 Study design: Qualitative descriptive study

**3.2 Literature collection method:** To collect literature related to the health and daily lives of mothers and children who were affected by the Great East Japan Earthquake, we searched a database using the National Diet Library Search, the Scholarly and Academic Information Navigator, Ichushi-Web, Google Scholar, and reference lists of collected literature. From the literature collected in this search,



we selected reports and journals that specifically described their health and daily lives.

**3.3 Analysis method:** From the selected literature, we extracted descriptions of mental/physical health and daily lives of mothers and children who were affected by the disaster. The analysis of these descriptions was conducted in a qualitative descriptive approach. The experiences of women during the intrapartum period were excluded from the study because the intrapartum period is particularly unusual.

## 4. Results

**4.1 Collected literature:** The 37 collected papers are listed in Table 1.

Table 1: Literature list

Year	Literature	Authors / Editors	Type	Publication / Presentation	
1	2011	The importance of breast-feeding learned from experiences during disasters.	Kiyomi Omata	Report	Abstract Book of the Annual Meeting of the Japan Academy of Neonatal Nursing, 21, 59.
2	2011	Survey on nursing support for pregnant, parturient, and puerperal women in the aftermath of the Great East Japan Earthquake, based on interviews with midwives in Miyagi Prefecture	Etsuko Shiono	Journal	Current Information of Maternal & Child Health, (64), 75-77.
3	2012	Health and Labour Science Research Grant 2011. Study on the structure, equipment, and management system for healthcare and welfare services that can function during a massive disaster. Working Group Report: An ideal care system for pregnant, parturient, and puerperal women identified in the midwives' activities in the community during the aftermath of the Great East Japan Earthquake.	Fujiko Fukushima	Report	
4	2012	Problems during a massive disaster: Telephone counseling on breast-feeding	Takeshi Horiuchi	Journal	Perinatal Medicine, 42(3), 327-330.
5	2012	The influence of the Great East Japan Earthquake on the mental and physical condition of pregnant women	Hisae Horikawa	Meeting Minutes	Journal of Rural Medicine, 61(3), 482.
6	2012	Aftermath of the Great East Japan Earthquake. Report of the Miyagi Midwives Association Mother and Child Support Program	Mitsuko Nitta; Yukiko Tamura; Yumi Kato; Kazuko Yamagishi; Akiko Goto; Hatsue Ishikawa; Yoshiko Goto	Original paper	The Journal of Japanese Midwives' Association, 66(3), 30-31.
7	2012	Study on the establishment of welfare evacuation centers that can accept pregnant, parturient, and puerperal women based on the experiences of practicing midwives in the aftermath of the Great East Japan Earthquake.	Eri Osawa; Fujiko Fukushima	Meeting Minutes	The Journal of the Japan Society of Disaster Nursing, 14(1), 169
8	2012	The influence of the Great East Japan Earthquake on the mental health of mothers	Kineko Sato	Original paper	The Japanese Journal for Midwives, 66(10), 858-863.
9	2012	Circumstances surrounding mothers and children during a massive disaster	Emi Shibuya; Akemi Isoyama; Mihoko Komatsu; Kiyomi Ito; Ryoko Kajiyama; Tomoyo Akiyama	Report	Ibaraki Journal of Maternal Health, 56.
10	2012	Disaster handbook created by 812 disaster-affected mothers.	Tsunagaru.com	Book	Kadokawa Corporation
11	2012	Experience as a midwife dispatched to a disaster-affected hospital to support inpatient care.	Hiromi Ueno	Document	Shiga Journal of Maternal Health, 30.
12	2013	Activities for maternal and child health: Lessons learned from experiences after the Great East Japan Earthquake	Study group for "Research on issues related to healthcare activities for mothers and children in the community during the Great East Japan Earthquake, March 2013"	Report	Study group for "Research on issues related to healthcare activities for mothers and children in the community during the Great East Japan Earthquake, March 2013".
13	2013	Medical and healthcare support necessary for pregnant women during a massive disaster: Findings from a survey on the behavior of pregnant women who were affected by the Great East Japan Earthquake	Hidenori Iwama; Toshihiro Ogasawara; Masatoshi Murai; Naoko Izutsu; Hideo Kodama	Report	The Journal of Obstetrics and Gynaecology Research, 65(2), 787.
14	2013	Health and Labour Science Research Grant. Working Group Report: Roll allocation and information sharing in the obstetric field during a disaster	Junichi Sugawara; Kumiko Okubo; Keiko Kasai; Takahiko Kubo; Makiko Doai; Tomoyo Narita; Kanami Sai; Chika	Report	
15	2013	Maternal and child health during a disaster. Roles of midwives in protecting pregnant, parturient, and puerperal women, Part 2: Known and unknown situations of pregnant, parturient, and puerperal women in disaster-affected areas.	Honami Yoshida	Journal	The Japanese Journal for Midwives, 67 (2), 161.
16	2013	Maternal and child health during a disaster. Roles of midwives in protecting pregnant, parturient, and puerperal women, Part 3: Reasons why midwives were needed in disaster-affected areas.	Honami Yoshida	Journal	The Japanese Journal for Midwives, 67 (4), 325-327.
17	2013	Maternal and child health during a disaster. Roles of midwives in protecting pregnant, parturient, and puerperal women, Part 4: Medical checkups for pregnant, parturient, and puerperal women by a visiting doctor in evacuation centers and the assessment sheet used for their checkups (1)	Honami Yoshida	Journal	The Japanese Journal for Midwives, 67 (5), 398-401.
18	2013	Maternal and child health during a disaster. Roles of midwives in protecting pregnant, parturient, and puerperal women, Part 5: Medical checkups for pregnant, parturient, and puerperal women by a visiting doctor in evacuation centers and the assessment sheet for their checkups (2)	Honami Yoshida	Journal	The Japanese Journal for Midwives, 67 (6), 482-485.
19	2013	Maternal and child health during a disaster. Roles of midwives in protecting pregnant, parturient, and puerperal women, Part 6: Provision of locations for childcare where mothers and children can relax.	Honami Yoshida	Journal	The Japanese Journal for Midwives, 67 (7), 566-570.
20	2013	Maternal and child health during a disaster. Roles of midwives in protecting pregnant, parturient, and puerperal women, Part 7: Appropriate timing of ending disaster assistance. The importance of and difficulty in supporting independence.	Honami Yoshida	Journal	The Japanese Journal for Midwives, 67 (8), 658-660.



Year	Literature	Authors / Editors	Type	Publication / Presentation
21	2013 Maternal and child health during a disaster. Roles of midwives in protecting pregnant, parturient, and puerperal women, Part 9: Perinatal outcomes in the aftermath of the Great East Japan Earthquake.	Honami Yoshida	Journal	The Japanese Journal for Midwives, 67 (10), 878-879.
22	2013 Experience of participation in the disaster-relief volunteer activities of the Japanese Midwives Association: Visiting newborns in Higashi-Matsubara City, Miyagi Prefecture.	Yoshiko Tanaka	Journal	The Japanese Journal for Midwives, 65 (10), 917-918.
23	2013 Maternal and child health during a disaster. Roles of midwives in protecting pregnant, parturient, and puerperal women, Part 10: Findings of a survey on the needs of pregnant and puerperal women	Honami Yoshida	Journal	The Japanese Journal for Midwives, 67 (11), 984-989.
24	2013 Maternal and child health during a disaster. Roles of midwives in protecting pregnant, parturient, and puerperal women, Part 11: Support for postnatal care: visiting and vaccinating newborns	Honami Yoshida	Journal	The Japanese Journal for Midwives, 67 (12), 1084-1088.
25	2014 Experiences of visiting pregnant women, mothers and children after the disaster – Ideal postnatal support in the future	Tokiko Ishida; Kazuko Yasuda	Report	Fukushima Hoken Eisei Journal, 23, 17.
26	2014 Issues related to support for pregnant, parturient, and puerperal women at the time of a massive disaster	Yukie Masaka	Journal	Current Information on Maternal & Child Health, (2), 45-47.
27	2014 Advice that midwives should give when they visit pregnant, parturient, and puerperal women and newborns at the time of a complex disaster: Tips and tricks	Yukako Takizawa	Collection of papers	Reports of Nursing Research, Nursing Teacher's Course of Center for Professional Education, Kanagawa University of Human Services, 39, 241.
28	2015 Changes in blood pressure and heart rate of pregnant women after the Great East Japan Earthquake relative to before the disaster	Hirohito Metoki; Noriyuki Iwama; Zen Watanabe; Hidekazu Nishigori; Junichi Sugawara; Kiyoshi Ito; Kazuhiko Hoshi; Masakuni Suzuki; Nobuo Yaegashi		The Journal of Obstetrics and Gynaecology Research, 67 (2), 923.
29	2015 Transverse study on perinatal depression in the disaster-affected area in Miyagi Prefecture after the Great East Japan Earthquake	Hidekazu Nishigori; Junichi Sugawara; Takashi Sugiyama; Kunihiro Okamura; Nobuo Yaegashi		The Journal of Obstetrics and Gynaecology Research, 67 (2), 641.
30	2015 How to protect children from disaster from the viewpoint of crisis management. 3. The Great East Japan Earthquake 6) Experience of support for pregnant, parturient, and puerperal women and newborns	Kazuyo Yagihashi	Journal	Child Health, 18(9), 59-61. Shindan To Chiryō Sha, Inc.
31	2015 How to protect children from disaster from the viewpoint of crisis management. 3. The Great East Japan Earthquake 6) Support for pregnant, parturient, and puerperal women and babies and infants	Honami Yoshida	Journal	Child Health, 18(10), 770-773. Shindan To Chiryō Sha, Inc.
32	2015 Perinatal outcomes in the aftermath of the Great East Japan Earthquake and the Mother and Child Support Project	Honami Yoshida; Kentaro Hayashi; Hiroshi Ota; Yumie Ikeda; Keiko Otsuka; Nahoko Harada; Takanari Arai; Yosuke Fujioka; Megumi Haruna; Hiroyuki Nakao	Original paper	Journal of General and Family Medicine, (38), 136-141.
33	2016 Disaster response in perinatal medical care – Experiences in the Great East Japan Earthquake. Survey on disaster-affected pregnant, parturient, and puerperal women. Study on the behavior of perinatal women who experienced the Great East Japan Earthquake in Miyagi Prefecture and the support system for addressing their needs	Junichi Sugawara	Document	The Fourth Meeting on the Perinatal Medical Care System
34	2016 Activities to support mothers and children in disaster-affected areas. Considering ideal support for mothers and children in disaster-affected areas through the activities of Baby Smile Ishinomaki, a non-profit organization.	Hironi Araki	Journal	Bimonthly Journal: Child Care (Journal for continuous learning on newborn and pediatric nursing), 10(6), 69-72.
35	2017 Issues related to support for pregnant, parturient, and puerperal women at the time of a massive disaster.	Yukie Masaka	Journal	Current Information on Maternal & Child Health, (2), 44-47.
36	2018 Agreement between Sendai City and the Miyagi Midwives Association to dispatch of midwives to welfare shelters for perinatal women, and the relevant efforts of the Association.	Sachie Aoyama (Miyagi Midwives Association); Sumi Misawa; Yoshiko Goto	Journal	Clinical Midwifery: Skills Improvement, 10(6), 37-45.
37	2018 Support for people with special needs during disasters in general evacuation centers, focusing on elderly people, babies, and pregnant women.	Michiyo Yamanaka; Ryoko Hidaka; Sumie Kuroda	Report	Japanese Journal of Medical and Nursing Education, 28-33.

## 4.2 Health and living conditions of mothers

Collected data were categorized into six groups (Tables 2) and 26 subgroups as follows:

### Group 1: Health problems associated with poor medical care and information

Medical facilities and local maternal and child health centers lost functions due to the disaster. As a result, mothers and children were not able to receive regular medical checkups, home visit services by healthcare professionals, or medical care that is normally available.

Subgroups of Group 1 included the following:

- *The incidence of minor pregnancy problems and deviations from normal health conditions increased.* Deviations included gastrointestinal disorders, skin problems, urination disorders, poor blood circulation, and allergies resulting from worsened living environment and diet. In some cases, mothers and children could not receive any medical support in evacuation centers because no obstetricians, gynecologists, or pediatricians were included in the disaster medical care teams.
- *Mothers became mentally unstable due to increased anxiety and stress.* They experienced sleep disruption, a feeling of unwellness, weepiness, anorexia, irritation, fear, and depression.



- Mothers experienced difficulty in daily life due to lack of materials and environments required for appropriate diet, excretion, sleep, exercise, hygiene, and temperature.
- Mothers could not obtain medical support for health management and information about available medical facilities. For example, they could not obtain information about evacuation centers for people with special needs, available professional support, and consultation services.
- Mothers were unable to trace their own health conditions because they lost their maternal handbook in which they recorded their own and their children's health conditions. The hospitals' information systems were down, and the maternal information databases of the local governments were lost.

### **Group 2: Unexpected childcare-related events that began to occur immediately after delivery**

Unexpected events during childcare occurred repeatedly due to the lack of sufficient childcare education and support, earlier discharge of mothers from hospitals, and damage to essential public utilities.

Subgroups of Group 2 included the following:

- Mothers could not receive instructions required for childcare, including childcare skills and lactation guidance, during hospitalization because mothers and children were discharged earlier than usual. Hospitals had no choice but to discharge them because there were a limited number of maternity hospitals in operation during the disaster.
- Mothers were isolated, had anxiety about and difficulty in continuing breastfeeding, and had to decide whether to breastfeed or bottle-feed their babies by themselves.
- Materials for childcare (e.g., water, milk, disinfected milk bottles, clothes for babies, bathtubs) were not delivered to some mothers and children. Even though these materials were delivered to the evacuation centers, the mothers could not go to these centers to receive them. Furthermore, materials for children with special needs were not available.
- Mothers faced difficulty in receiving support because there were no sufficient supporters or means of supporters' transportation; there were only a small number of organizations dedicated to supporting mothers and children; information on support for mothers and children was not well communicated; and mothers had to request support by themselves.
- Mothers tried to find the best ways to care for their children, including using well water, river water, or firewood for bathing. They did what they could do at that time.
- Mothers could not obtain accurate information or determine what information was accurate; meanwhile, they were confused by inaccurate information provided by chain emails from their friends. It was difficult to obtain public information.

### **Group 3: A feeling of loneliness and a sense of stagnation, coexisting with a strong will to survive with one's children**

While mothers developed psychosomatic illnesses due to long-term unstable mental conditions, they derived strength from their maternal role.

Subgroups of Group 3 included the following:

- Mothers did not express their needs for support because they thought that there were people who were in more difficult situations than theirs, whereas they simultaneously felt that they were being abandoned by others and had a sense of isolation and stagnation. This situation resulted from the worsened living environment, separation from family members, unfamiliar childcare tasks, and the lack of people available to mothers.
- Mothers gained a sense of safety and recovered their confidence in childcare when healthcare professionals carefully listened to them during home visits or telephone counseling. These healthcare professionals included midwives and public health nurses.
- Mothers found themselves having a strong will to survive with their children.
- Mothers sometimes experienced unstable attachment to their children and had a feeling of self-hatred and guilt. Mothers' attachment to their children sometimes became unstable due to unexpected disaster.
- Mothers did not want to leave the disaster-affected area, based on concern about the lives of their



*family members including older children.*

- *Mothers wanted to talk with reliable people because they had no acquaintances or reliable people nearby.*
- *Mothers wanted to express their feelings caused by the disaster, or share them with others.*
- *Mothers hesitated to continue pregnancy or deliver children in the aftermath of the disaster.*

#### **Group 4: Difficulty achieving safety and comfort in daily life**

Mothers and children were not categorized as needing support. They moved from place to place seeking safe and comfortable living locations.

Subgroups of Group 4 included the followings:

- *Mothers moved from place to place seeking safe and comfortable living locations. Mothers and children could not achieve safety and comfort during daily living, which had been guaranteed before the disaster. Evacuation centers were not safe or comfortable places to take care of children.*
- *Mothers and children were not categorized as people vulnerable to disaster, and no support organization knew where they were.*
- *Due to limited accessibility, mothers had difficulty moving to destinations such as evacuation centers, hospitals, and homes, and often had to walk to their destinations because there was no other means of transportation. It was physically hard for mothers to move around. Due to this lack of mobility, it was not easy for them to travel to receive relief supplies, meet others, or go shopping.*

#### **Group 5: Additional family roles and duties**

Mothers' roles and duties in the family and in evacuation centers increased due to separation from or death of family members and insufficient maternal support.

Subgroups of Group 5 included the followings:

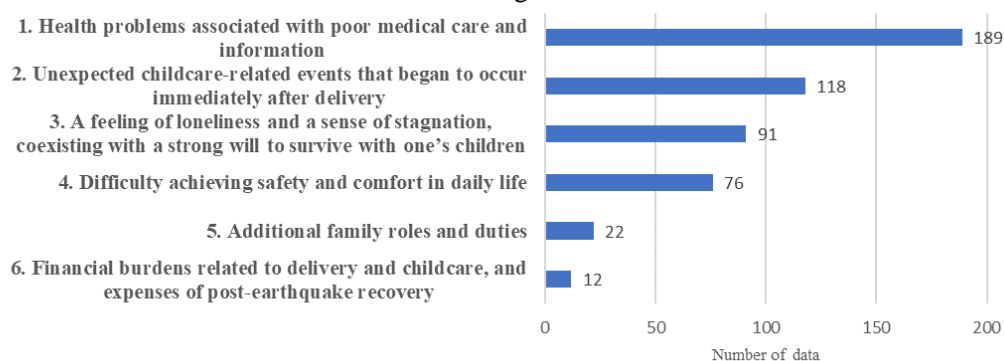
- *In addition to their roles as mothers and wives, mothers' roles and duties increased due to separation from or death of family members. Evacuation to distant relatives' homes or evacuation centers also increased their burdens.*
- *Mothers performed all activities of daily life, including childcare, household duties, and carrying of water and supplies by themselves.*

#### **Group 6: Financial burdens related to delivery and childcare, and expenses of post-earthquake recovery**

Subgroups of Group 6 included the followings:

- *Additional expenses were required for medical checkups and delivery because mothers had to go to other hospitals and medical checkup facilities due to closure of medical facilities and local governments' facilities.*
- *Financial burdens increased because income decreased due to loss of family members' jobs, continued living in shelters, and purchasing of furniture to rebuild their lives.*

Table 2: Health and living conditions of mothers





### 4.3 Health and living conditions of newborns and infants (hereinafter referred to as “babies”)

Collected data were categorized into four groups (Tables 3) and 13 subgroups as follows:

#### Group 1: Babies were at high risk of impairment in growth and development.

Risk factors included changes in living environment, high infection risk, lack of availability of allergy-friendly milk, and lack of medical services such as regular checkups and immunization.

Subgroups of Group 1 included the followings:

- *Babies could not be kept warm and were at risk of hypothermia.*
- *Even minimal medical care services required for the growth and development of babies, such as provision of vitamin K2 syrup and medical checkups, were unavailable.*
- *It was not possible to receive continuous medical support because medical facilities in disaster-affected areas were closed, and mothers had to go to distant pediatric clinics.*
- *Allergy-friendly milk was unavailable.*
- *Vaccination programs were unavailable.*

#### Group 2: Babies experienced health problems such as skin problems, cystitis, and allergic symptoms during the disaster although they are preventable in normal times.

Contributing factors included insufficient nursery items such as diapers and clothes, being unable to take a bath, and lack of appropriate environments for childcare.

Subgroups of Group 2 included the followings:

- *Babies repeatedly developed health problems, including diarrhea and cold symptoms.*
- *Babies developed skin problems, cystitis, and allergic symptom.*

#### Group 3: Caregivers of babies, and the environment surrounding babies, changed.

These changes resulted from separation from (or death of) family members, as well as moving to new locations.

Subgroups of Group 3 included the followings:

- *Caregivers of babies changed.*
- *Babies and toddlers had less chance of going outside because the number of safe playgrounds (e.g. Childcare Support Center) decreased after the disaster.*
- *Babies and toddlers had less chance to go outside with their mothers due to the worsened environment in their living areas after the disaster.*

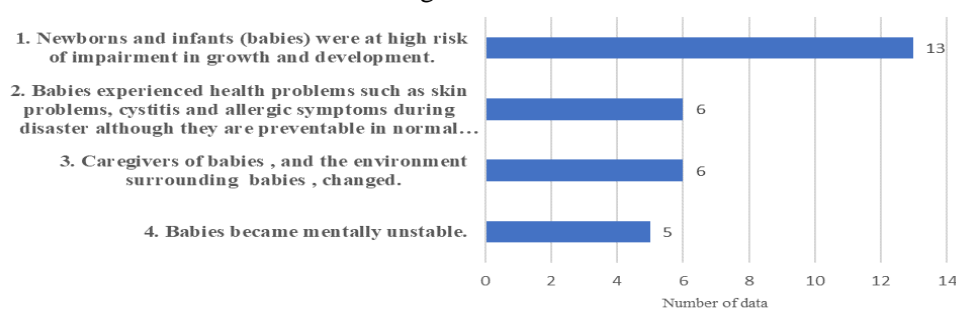
#### Group 4: Babies became mentally unstable.

They cried more frequently and did not stop clinging to their mothers because they did not understand why the environment had changed.

Subgroups of Group 4 included the followings:

- *Babies cried at night and cried for minor reasons.*
- *Babies wanted milk all the time.*
- *Babies did not stop clinging to their mothers.*

Table 3: Health and living conditions of newborns and infants





## 5. Discussion

### 5.1 Preparation for maintaining the health of mothers and children during disaster

Mothers and children experienced various kinds of mental and physical problems during disaster. Many mothers had to comfort their babies, who were crying because they did not understand the situation and suffering from health problems after the disaster, even as the mothers themselves suffered from health problems and anxiety. The health problems that have been revealed in this study are common in daily life and can be prevented. Common childcare knowledge, emergency goods, preparation for disaster, and disaster drills were effective during past disasters <sup>[7]</sup>. Therefore, it is important to acquire knowledge about preventive physical healthcare, such as infection control and nutrition during disasters, as well as about normal psychological responses to disaster. In addition, it is useful to learn a wide range of childcare knowledge, e.g., the accessible daily goods that can be substituted for standard childcare goods, as well as alternative childcare methods. Support for acquiring this knowledge is necessary to enhance self-care in mothers.

Changes in the living environment after a disaster compromised the childcare environment and imposed psychological burdens on mothers, e.g., anxiety and feelings of isolation and stagnation. In such a situation, however, mothers did their best to care for their children without sufficient essential public utilities. When mothers wished to express their feelings, healthcare professionals helped them gain a sense of safety and recover their confidence in childcare. Assistance for mothers and children increased their zest for life. A connection with other people helps people affected by disaster maintain their mental health and recover. Thus, the development of community relations as part of disaster preparations contributes to support for mental and physical health, daily life, and childcare during disasters.

### 5.2 Support system for mothers and children during disaster

In Japan, the regular prenatal checkup program specified by Article 13 of the Maternal and Child Health Act has contributed considerably to the decrease in perinatal mortality. In addition, local governments have recently started a medical screening program for postpartum women based on the guidelines of the Ministry of Health, Labour and Welfare. These programs have provided continuous support for women during pregnancy and the child-rearing period <sup>[8]</sup>. During the disaster, however, it was difficult for mothers to receive regular checkups and medical care, and to seek support. It is difficult for public agencies to be aware of the needs of pregnant women, particularly during early and middle pregnancy, unless they voluntarily ask for support. For future disasters, therefore, it is important to establish an outreach program that provides long-term, community-rooted, seamless support for mothers and children that can be initiated immediately after disaster.

This study revealed that information necessary for maintaining the health of mothers and children was unavailable during the disaster. Therefore, in order to support mothers and children, it is necessary to establish a two-way communication system to request support, establish consultation services, and ensure access to appropriate information sources.

## 6. Acknowledgement

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