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Investigation of the sustainability of breastfeeding and infant nutrition in the earthquake region based on mothers' experiences: a qualitative study

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Abstract

Background To explore the breastfeeding status of mothers with children aged 0–2 years after the major earthquake disaster in Kahramanmaraş, to reveal the obstacles to the sustainability of breastfeeding, and to reveal the problems and experiences they have in breastfeeding, preparing formula, and feeding their infants.

Methods This study used a qualitative, exploratory research design with a phenomenological approach. Data were collected between September and November 2023 by face-to-face interviews using a Personal Information Form and a semi-structured interview form. A total of 21 participants who breastfed their babies before the earthquake and experienced the earthquake were included in the study, which was conducted using purposive sampling technique. Data were methodologically analysed using inductive coding and thematic analysis procedures. Max Qualitative Data Analysis Analytics Pro2020 software was used to code data.

Results The results revealed four primary themes and twenty-two subcategories. The four main themes were; (i) Expectations from Health Personnel, (ii) Suggestions of Mothers, (iii) Difficulties Experienced and (iv) Experiences in Breastfeeding and Infant Feeding.

Conclusion The results obtained in this study showed that mothers had problems in terms of information, support, equipment, appropriate area, and food supply related to infant feeding especially in the early post-disaster period. Insights into mothers' perspectives can help healthcare professionals understand the challenges faced by mothers during disasters and emergencies. In this way, nurses can take the lead in implementing programs designed to support continued breastfeeding and appropriate nutrition for children during disasters.

Keywords Breast milk, Infant feeding, Earthquake disaster, Disaster management, Nursing care

Introduction

Nutritional characteristics of the infant, especially in the first two years of life, determine the health of the individual in childhood and adulthood [1]. Breast milk is the optimal nourishment for infants as it contains bio-active components that protect against infections, promotes growth and development, lowers rates of illness and death, is cost-effective, and offers numerous other benefits [2–4]. The World Health Organisation (WHO)

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advises are to initiate breastfeeding immediately after birth for 60 min and that infants should be exclusively breastfed for the first six months, with no other food or liquids, including water, introduced during this period [5]. From the sixth month onwards, additional nutrients can be introduced alongside breastfeeding, and breastfeeding should continue until the child reaches two years of age and beyond [6]. Reduction or discontinuation of breastfeeding is linked to an increased risk of infant sickness, such as acute infections, chronic disorders, and infant death. Whereas, breast milk consumption promotes healthy growth and development, including cognitive and neurological development, which increases social production [3, 6, 7].

Global evidence emphasises that the protective effect of breastfeeding on infant health in natural disaster situations is particularly important [8, 9]. Due to its ability to tailor its composition to fulfil the specific nutritional requirements of infants and offer enhanced protection against infection-related agents, breastfeeding is especially crucial during emergency situations [8, 10]. In this regard, national and international organisations recommend that care be taken to protect, encourage and promote breastfeeding of infants [11–14]. At the same time, they emphasise the necessity of providing counselling support to mothers in emergency and disaster situations due to the fact that breastfeeding is hygienic, healthy content, free of charge, constantly available and effective in reducing the psychological effects of such processes [7, 15, 16].

On February 6, 2023, a series of catastrophic earthquakes have struck southeastern Türkiye, with the epicentre located in Kahramanmaraş and affecting a total of 11 provinces. It is stated that newborn and infant mortality rates rise significantly during disasters and emergencies [17, 18]. Infants are a vulnerable population, especially in emergencies; therefore, it is vital to ensure compliance with recommended infant and young child feeding practices. When the literature is analysed, it is emphasised that as a result of the disaster, it may not be possible to prepare infant formula safely due to insufficient access to clean drinking water and lack of training and materials in this field, and this situation may pose significant risks for the health of infants [8, 19, 20].

Developing comprehensive management plans, policies, and procedures is crucial to effectively support infant feeding during emergency reaction scenarios, such as earthquakes. These measures are necessary to satisfy the specific needs of both mothers and infants, and to promote effective communication, awareness, and education across all levels and sectors [15, 21]. Therefore, the studies to be carried out on the subject have a strategic importance in terms of being prepared for the

current situation and raising awareness of policy and decision makers. Although the importance of maintaining breastfeeding and infant feeding in disaster situations is emphasised in guidelines and studies [11–15, 19, 21], there are a limited number of studies in the literature with mothers who experience this situation [7, 8, 10, 20]. In the literature, systematic review addressing country policies on the subject and analysis of newspapers and documentaries on this subject have been made. Unlike the studies in the literature, our study addressed the mothers' individual and cultural contexts and their experiences during the earthquake process using a qualitative research methodology. The experiences, needs and difficulties experienced by mothers during this process were addressed by creating themes in our article. Most of the themes and categories (sustainability of breastfeeding, obstacles to this, mothers' food preparation needs during this process, use of formula, food preparation material needs, supplementary feeding process and provision of nutrients, diarrhea and allergy seen in children) are different from the limited studies in the literature. Unlike other studies in the literature, the experiences of mothers of babies in the 0–24-month lactation period were taken. The aim of this study is to determine the experiences of mothers with children aged 0–2 who experienced the major earthquake disaster in Kahramanmaraş regarding breastfeeding and infant feeding, to create data for health professionals in providing early intervention in similar situations by making inferences from the infant feeding experiences and needs, to examine the sustainability of breastfeeding in case of disaster and to reveal the obstacles to the sustainability of breastfeeding, and contribute to the field of breastfeeding and infant feeding in the national disaster prevention and response action plan.

Methods

Design

The study used a phenomenological design to analyse the experiences of breastfeeding mothers before and after the earthquake through in-depth interviews. Phenomenology is a methodology that evaluates experiences and reveals meanings and perceptions of phenomena, presenting the phenomenon as an accessible and recognisable human experience [22].

Sample

The study data was collected from mothers with infants aged 0–2 years who experienced an earthquake in a container city in Kahramanmaraş between September and November 2023. Kahramanmaraş is a city located in the southeast of Turkey. The 2023 earthquake centered in Kahramanmaraş and is one of the cities most affected by the earthquake. The population of the

study group consisted of all mothers living in the relevant container city (N: 38), and the sample consisted of earthquake survivor mothers who experienced the moment and aftermath of the earthquake in accordance with the inclusion criteria (n: 21).

The purposive sampling method was used to gather the sampling that is “mothers who breastfed their babies in the pre-earthquake period or continued breastfeeding with complementary feeding”. Purposive sampling allows in-depth research to be carried out by selecting cases where more information can be obtained in parallel with the purpose of the study [23]. Criterion sampling is based on the study of situations meeting the criteria determined by the researcher [24].

Within the scope of this study, semi-structured, open-ended interviews were conducted with 21 mothers and data collection process was stopped after reaching data saturation. Inclusion criteria: Being 19 years of age or older, volunteering to participate in the study, being literate, having experienced the earthquake that took place in February 2023 in Kahramanmaraş, mother and baby living in the same environment, living in a tent/container, and having no physiological and psychological barriers to communication. Exclusion criteria; Mothers who had to live separately from their babies for a while after the earthquake, who had a condition that prevented them from continuing the care of the baby, who had special health problems, who had more than one infant (twins, triplets, etc.).

Qualitative data collection

Data were collected through face-to-face in-depth interviews using a semi-structured interview form in order to reveal the experiences, perceptions, opinions, feelings, and thoughts of the participants. The interviews lasted between 45–60 min on average.

In the study, a form consisting of two parts was used by the researchers. The first section included 21 questions about the sociodemographic characteristics of mothers and infants. A semi-structured interview form consisting of a total of 11 questions was utilised. The draft semi-structured interview form was prepared in line with the literature and the experiences of the researchers [12, 14, 19, 25]. The opinions of experts in the field (5 people who are experts in the field and qualitative data experts working in the Department of Paediatric Nursing, Midwifery, Child Health and Diseases Specialist, Nutrition and Dietetics Specialist) were taken and the final version was given after the necessary arrangements. Final version of the semi-structured interview form is provided in Table S1.

Audio and video recording

In qualitative research, qualitative data collection techniques such as observation, interview, document, and discourse analysis are generally used. In addition, this type of research is based on in-depth analyses of human perceptions and events in social reality and natural environment [26]. In qualitative research, data collection process can be in the form of writing the conversations during face-to-face interviews, or it can be transcribed later by creating audio-visual materials that strengthen data such as audio and video recordings, and the analysis process can be completed with videography (video analysis) [27]. The qualitative interviews were recorded in both audio and video formats to enhance the validity of the study and facilitate thematic analysis.

Measurements

Firstly, a pilot interview was conducted to determine the comprehensibility of the semi-structured questions. The pilot and all other interviews were conducted by two researchers (PhD, ST ve SYÇ) who are experts in the field of paediatric nursing. It was checked whether there were any obstacles that prevented the mother from understanding the questions in the form and giving clear answers, the answering time was measured and her opinion was obtained about the general comprehensibility and usefulness of the form. The pilot interview was conducted with two mothers and was not included in data analysis. The pilot study and subsequent interviews were conducted by sitting at the same level and guided by active listening through questionnaire forms. The interviews were conducted by ST while SYÇ observed the interviews and took audio and video recordings. NÇ, ST, and ÖKS transcribed the audio recordings after the interview and provided appropriate documentation for the analysis.

Ethical considerations

This research was approved by Sakarya University Non-Interventional Research Ethics Committee (Date: 28.07.2023 and Number: E-71522473–050.01.04–267880-234). The rationale of the study and the purpose for which the results would be used were explained to the mothers participating in the study. All participants were informed and verbal informed consent from the participants themselves were assured before data collection. No individual identifying information was collected to protect participants. This study was conducted according to the Declaration of Helsinki.

Data analysis

In this research report, the Consolidated Criteria for Reporting Qualitative Research guidelines were used for guidance [28]. The study data were evaluated with the support of IBM SPSS Statistics 23 and Max Qualitative Data Analysis (MAXQDA) Analytics Pro2020 programs. The participants' descriptive features were examined using frequency n (%) for categorical variables. The qualitative component of the study included thematic analysis to assess mothers' experiences about nursing and infant nutrition following the earthquake. Data analysis is an essential phase in qualitative research, involving the identification and classification of occurrences, along with the clarification of links between ideas [26]. Following the first speech recording, coding commenced and was reiterated with expert input, leading to a consensus, after which the thematic analysis process. Thematic analysis was conducted according to Braun and Clarke (2006) to identify, analyze and report themes in data [29]. Data was analyzed in four stages: (1) Coding data, (2) Finding the codes, categories and themes, (3) Organizing and defining data according to the codes and themes, (4) Interpreting the findings and creating recommendations for the breastfeeding and infant nutrition area of the national disaster prevention and intervention action plan to be prepared according to the analysis results of the views of the earthquake victim mothers. All recorded focus group interviews were transcribed verbatim after their completion by one researcher (ÖKS). The analysis was an iterative and non-linear process whereby the research team (NÇ, ÖKS, SYÇ, ST) moved back and forth between steps in analysis to refine data. During the coding process of the data, open and complete coding was done by two independent researchers. Data were inductively coded, line by line, independently by the research team. In order to increase the consistency between the codes, regular comparisons were made between the coders. During all phases of the analysis, codes and themes were discussed by the research team until consensus was reached. Consensus was reached on the codes. The researchers generated initial codes on relevance to the phenomenon of interest which were sorted into potential themes. The constant comparison method was used to verify the consistency of the themes with the data. In the coding and theme creation process, original quotes obtained from the participants were used and participant verification (member checking) was done to prevent meaning shifts. Thereafter, themes were reviewed by the research team, some themes were excluded, while others were combined or split into separate themes.

The MAXQDA software facilitates the comparison of extensive sample data, the aggregation of codes under certain themes, the rapid repetition of operations as needed, the continuous access to findings, and the organization and presentation of acquired data in models, graphs, or reports. First, the MAXQDA program was used to code data. By merging the codes that were categorized into subcategories and related categories, relationships between the underlying concepts were discovered and themes were created. Following the program's classification of the codes, the researchers identified, analyzed, and reported on pertinent themes. The survey numbers of the participants (P1, P2, P3, etc.) were used to code data.

Reflexivity

The researchers employed reflexivity throughout the study. In qualitative research, reflexivity is important for the researcher to manage their influence as a data collection tool [30]. Throughout the process, the researchers were transparent with the participants about their careers as nurses. The interviewers recorded their experiences and feelings in a journal to avoid insider bias and unintentional manipulation or influence of the study's results. This helped them approach subsequent interviews with greater reflexivity.

Trustworthiness

To ensure consistency and to avoid potential problems arising from differences in interviewer role, all interviews were conducted by the same researchers (ST and SYÇ). The researchers have a PhD degree in pediatric nursing and have conducted studies with qualitative research methodology. In addition, ST, one of the researchers, resides in Kahramanmaraş province, knows the internal dynamics of the region, experienced the earthquake and took part in the post-earthquake processes. For this study, the strategies suggested by Lincoln and Guba (2011) for trustworthiness were used [31]. These strategies are credibility, consistency, confirmability and transferability. To ensure research ethics, the researchers obtained verbal and informed consent from the participants before each interview. Participants were also informed about confidentiality, anonymity and the opportunity to withdraw from the study at any stage. To increase the reliability of data, participants were not addressed by name during the interviews.

Validity, reliability, and rigor: For the reliability of this study, the components of qualitative rigor, namely credibility, transferability, dependability, and confirmability were considered [32].

Credibility: The interview transcripts were transcribed separately. An online meeting was organized

for the interview recordings and similarities/differences were evaluated. To ensure the credibility of the study, data were translated from Turkish to English by a team of translators independent of the research. The Turkish and English texts were compared and the study was finalized.

Transferability: Demographic characteristics of families and children are given. This gives readers the opportunity to assess whether the study is applicable to their own studies or populations.

Dependability: Expert opinion was obtained about the interview questions and their content. A pre-application was conducted to ensure reliability. Due to the nature of qualitative research, the sample size is completed when data reaches saturation. To examine the saturation of data, attention was paid to code and meaning saturation [33]. Code development and iterative evaluation of codes continued separately for each interview until all 21 interviews were reviewed and code documents were completed.

Confirmability: At the end of each interview, a summary was given to each mother and her confirmation was awaited. The reader needs to be able to analyze data to confirm that the results or author interpretations accurately represent data. Written documentation, code files and data collection tools were all documented and recorded for this reason.

Results

Sociodemographic characteristics

Table 1 presents the sociodemographic data of mothers and infants in detail. Of the mothers; mean age was 30.28 ± 5.49 years, 66.7% are high school graduates, all are unemployed, 85.7% have a nuclear family type, 57.1% have two or more children, and 71.4% have had a cesarean section. The mean age of the infants was 13.42 ± 5.18 months and the mean birth weight was 3080.95 ± 256.64 g. 66.7% of the mothers were secondary school graduates, 100% were housewives, 38.1% had low income, 85.7% had nuclear family structure and 57.1% had 2 or more children. 71.4% of the infants were delivered by caesarean section, 66.7% had a gestational week of 39 and above and 52.4% of the mothers held their babies immediately after birth.

Themes and sub-themes

In the analysis of data, inductive coding was followed methodologically. As a result of coding, four themes and 22 codes related to the experiences of mothers in the sustainability of breastfeeding and infant feeding in the earthquake region are provided in Fig. 1.

Main theme 1. Expectations from health personnel

The theme of expectations from health personnel includes three categories: (1) information/guidance: Participants expressed that they wanted more support in the post-earthquake period, that guidance was lacking, and that information on infant care and nutrition should be provided; (2) psychological support: Mothers stated that they felt bad when they could not breastfeed their babies, that their milk decreased after this feeling, that they could not get enough support, and that they needed psychological support in their current situation; (3) health check of infants: The need for regular examination of infants with condition-related health problems was emphasized (Table 2).

Main theme 2. Mothers' suggestions

The theme of mothers' suggestions includes six categories. These categories include (1) having a distribution plan for infant nutrition products: Mothers emphasized the need to distribute infant care products in a way that is accessible to all infants and appropriate to their needs. In addition, health staff identified a list of infants in tents and made suggestions to facilitate distribution. They expressed the importance of distributing formula according to the age/month of the babies; (2) insisting on breastfeeding the infant: mothers should insist on breastfeeding their babies; (3) remaining cool and strong: mothers should not be caught up in negative emotions and should remain strong; (4) making infant food products available for earthquake risk: earthquake emergency kit should be prepared according to the needs of babies; (5) nutrition of nursing mothers: attention should be paid to the nutrition of breastfeeding mothers; (6) breastfeeding and supplementary foods: attention should be paid to the nutrition of babies and supplementary foods (Table 2).

Main theme 3. Difficulties experienced

The theme of Difficulties Experienced includes nine categories. These categories are (1) difficulties in accessing food/formula: not being able to access formula in container cities; (2) diarrhoea/allergy: experiencing health problems after the formula provided to the baby; (3) difficulties with safe food preparation: living conditions are not suitable for preparing hygienic and hot food for babies; (4) difficulties related to the family/mother's situation: financial means of the family and the health status of the mother are effective factors in feeding babies; (5) access to heater/hot water: not being able to prepare hot water and having difficulties in accessing hot water due to the lack of heaters and electricity; (6) not being able to feed the infant: difficulty in feeding the baby and the

Table 1 The mothers' and infants' demographic information (n = 21)

Variables	Mean± SD	Min-max
Mother's age	30.28 ± 5.49	22-43
Infant's age (month)	13.42 ± 5.18	5-24
Birth weight	3080.95 ± 256.64	2800-3800
Birth height	50.33 ± 1.23	48-54
Education level	N	%
	3	14.3
Primary School	14	66.7
Secondary School	4	19.0
High school	0	0
Yes	21	100
No	8	38.1
Low	13	61.9
Middle	18	85.7
Nuclear	3	14.3
Extended	9	42.9
1 child	12	57.1
2 and above	6	28.6
Vaginal delivery	15	71.4
Caesarean section	5	23.8
38	14	66.7
39	2	9.5
40-42	16	76.2
Immediately	3	14.3
One hour	2	9.5
After the first hour	11	52.4
Immediately	3	14.3
One hour	7	33.3
After the first hour	14	66.7
Yes	7	33.3
No	13	61.9
Breast milk and formula	2	9.5
Formula	4	19.0
Formula and supplementary nutrition	2	9.5
Supplementary nutrition		

^a self-reported

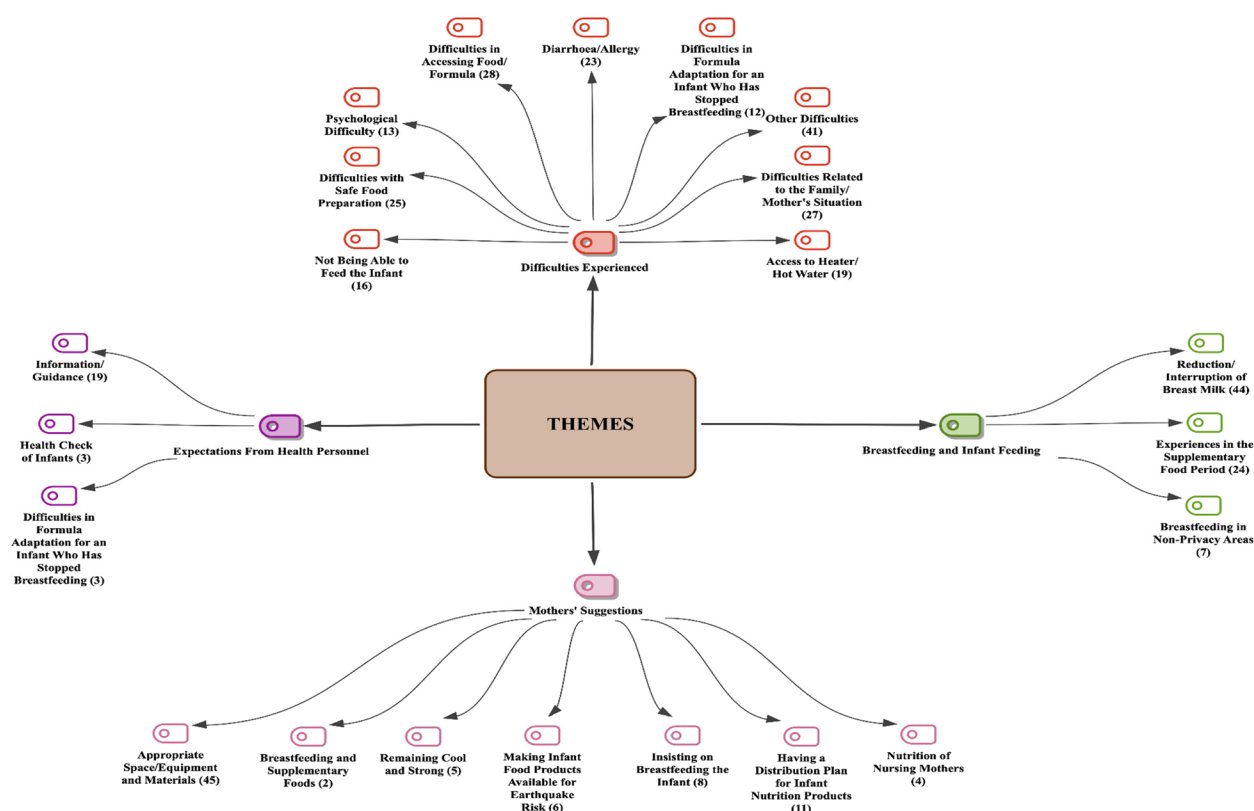


Fig. 1 Themes and codes representation

baby being hungry from time to time; (7) difficulties in formula adaptation in an infant who has stopped sucking; difficulties in accepting formula and showing selectivity in a midwife who breastfeeds; (8) psychological difficulty: psychological wear and tear and fighting; (9) other difficulties: tent city conditions are not suitable for infant care, lack of electricity and hygiene conditions (Table 2).

Main theme 4. Breastfeeding and infant feeding

The theme of needs related to experiences in breastfeeding and infant feeding includes three categories. These categories are (1) reduction/interruption of breastfeeding: reduction of breastfeeding due to stress and adverse conditions; (2) experiences in the supplementary food period: initiation of supplementary feeding under inappropriate conditions in tent cities; (3) breastfeeding in non-privacy areas: inability to provide breastfeeding privacy in crowded environments; (4) appropriate space/equipment and materials: Participants stated that there were no infant care products and infant area (Table 2).

The codes frequently mentioned by the participants are shown in Fig. 2. The map shows the relationships between the codes and which codes are frequently mentioned together. The lines are shown wider to reflect the relationship between codes that are mentioned

together and those that are mentioned more frequently. Accordingly, the participants who mentioned the code of decreased/interrupted breastfeeding also mentioned the codes of psychological difficulties, breastfeeding in areas where there is no privacy, not being able to feed the infant, difficulties due to the situation of the family/mother, difficulties in accessing formula/food, other difficulties and appropriate space/equipment and materials.

When the results of the study are examined, the experiences of disaster survivor mothers regarding breastfeeding and infant feeding were determined in accordance with our objectives, barriers related to the sustainability of breastfeeding were revealed, inferences were made, and contributions were made to health professionals and national disaster prevention and response action plans in the field of breastfeeding and infant feeding in similar situations.

Discussion

This study aimed to assess the long-term viability of breastfeeding and child feeding practices in the earthquake-affected area, drawing on the firsthand accounts of mothers who experienced the Kahramanmaraş earthquake in Türkiye in early 2023. As a result of the interviews conducted with the mothers, the themes of

Table 2 Themes, codes and mothers' statements

Themes	Codes	Mothers' statements in subcategories
Theme 1. Expectations from health personnel	Information/Guidance	<p>"I didn't get any support. I needed support. We have no experience for disaster situations about what we can do. We cannot see and learn some things without experiencing. But health personnel receive their training. A lot of patients pass through their hands and they see a lot of similar situations. They can guide us more accurately." (P1)</p> <p>"I didn't get any support. I needed support. We have no experience for disaster situations about what we can do. We cannot see and learn some things without experiencing. But health personnel receive their training. A lot of patients pass through their hands and they see a lot of similar situations. They can guide us more accurately." (P7)</p>
	Psychological Support	<p>"The only thing I feel bad about as a mother is not being able to breastfeed my infant. I couldn't do it. It was such a disaster that my milk decreased with my tears. I would have liked to have had someone to support us as a mother at that time." (P18)</p>
	Health Check of Infants	<p>"I want my infant to be screened for nutrition. That's why health personnel should give us great support. We need a great deal of support for maternal and infant nutrition after the earthquake. Because my infant did not get enough nutrients at that time. This led to prolonged diarrhoea and illness. At the same time, his/her face became very pale and we lost weight. For some reason, it seems to me that he/she still hasn't recovered. That's why we need this support. At the same time, extra support programmes can be made for children and infants in earthquake zones. It would be good if special nutritious, vitamin-rich, practical foods were distributed to these children. The children could not eat the dry food distributed for us. When we buy soup, it gets cold until we get to the tent." (P9)</p>
	Having a Distribution Plan for Infant Nutrition Products	<p>"I would have liked health personnel to act in a more organised way in terms of distribution. Because the staff from the Red Crescent and AFAD may have difficulties in identifying who is lacking what, especially in families with babies. But it would be better if the health personnel made a tent by tent list. We wouldn't be without food or bottles for a month." (P8)</p> <p>"Regarding the uncontrolled distribution of infant formula, perhaps if it were under their control, they would know better which mother needs how much formula and whether the formula distributed is suitable for the age of the infant. At that time, my infant had a urinary tract infection and I didn't know what to do. It was impossible to get to the hospital immediately. Maybe they would have calmed our fears." (P10)</p>
Theme 2. Mothers' suggestions		

Table 2 (continued)

Themes	Codes	Mothers' statements in subcategories
	Insisting on Breastfeeding the Infant	<p>"My suggestion to mothers is not to stop breastfeeding their babies, at least until they reach the time to consume additional food. Yes, maybe they will be weaned like me, but at least they should get treatment from a doctor. Because maybe if I was breastfeeding and had a little milk, I wouldn't have such a hard time." (P5)</p> <p>"I have been through so many difficult things that I have tried to be strong for my children. Let them be strong. Mothers are the only indestructible house that can protect their children. I endeavoured to get my milk back, because what is available is a blessing that does not make me dependent on anyone. But it didn't work out, maybe that's what happened to me. They should definitely not rely on formula and give their milk to their children." (P21)</p>
	Remaining Cool and Strong	<p>"Mothers should be cold-blooded. She should eat whatever she can find to make milk for the infant. If they have the means, they should stay outside the city until the situation improves." (P1)</p> <p>"I have been through so many difficult things that I have tried to be strong for my children. Let them be strong. Mothers are the only indestructible house that can protect their children. I endeavoured to get my milk back, because what is available is a blessing that does not make me dependent on anyone. But it didn't work out, maybe that's what happened to me. They should definitely not rely on formula and give their milk to their children." (P21)</p>
	Making Infant Food Products Available for Earthquake Risk	<p>"There must be an earthquake lunch box for earthquake. It should contain ready-to-eat food, jarred food, milk, baby biscuit, fruit puree, canned foods, things that will not spoil and will not be affected by the cold. Only God knows when the earthquake will happen." (P6)</p> <p>"Such situations can happen at any time. The mother should be prepared and have formula and nappies ready. Because mums are being weaned. Something happens, they become helpless. But it would be a great support to those mothers if they had at least one formula in their bags at that moment. Water is also very important in such a situation, children become breathless and dehydrated. We can't find food and we have trouble finding water. Therefore, mothers should keep a bag of clothes, food, and water for babies. You don't think about it when an earthquake strikes. The state can also prepare and distribute this for mothers. But before the state can distribute it, because it will take time to distribute it, who and where will you find at that moment, the mother must be ready. They must be prepared." (P12)</p>

Table 2 (continued)

Themes	Codes	Mothers' statements in subcategories
Theme 3. Difficulties experienced	Nutrition of Nursing Mother	"They should definitely continue breastfeeding, whether it is a little or a lot. Because mothers cannot access healthy food immediately. They should eat whatever they find, no matter how dirty it is, so that their milk will come. From time to time, they can store milk at home. It doesn't come to mind when you run away from home, but if we had it ready, it would have made us more comfortable for at least a few days." (P2) "People couldn't help to give us food in those early days. It was not right for us to expect such a thing while people were dying under the rubble. Could breastfeeding mothers perhaps be given drinks or medicines to increase their milk? I do not know if it's too much to say. But another life feeds on us. Actually, the food distributed is more expensive." (P16)
	Breastfeeding and Supplementary Foods	"Mothers should be careful what they feed their children. They should give formula, but I can't say anything if they can't reach them. They should not be late in switching to supplementary foods, I had the most difficulty in this. There is nothing else I can say, God forbid it gets worse, God forbid it happens again." (P7)
	Difficulties in Accessing Food/Formula	"I don't give supplementary food. After the earthquake, we stayed in a tent for 2 months. The tent was out of place. We did not have a supplementary food environment for the infant. Look, it's like that now, for example, it's been 2 months since we moved to the container and it will be 3 months. There is neither a market nearby to buy food nor a market that brings fresh produce. We have no easy access, as if they had gotten shet of us. We couldn't get it. This time it's not healthy, I give them little by little what we have, whether it's soup or yoghurt." (P2) "It took 3–4 days for proper food to arrive in the tents. After that, we always had food, but as I said, we had no hot water. Then we found a gas tube and I heated it in the tube. Wouldn't you know it, I used that tube for one of my children and my infant so that the gas wouldn't run out. Because you never know what's going to happen. We saved it for them." (K4) "As I said, I had difficulty in getting the formula. Even when we tried to buy it with money, the owner wouldn't give it to us. He didn't give it to me in case there was a looting when he opened the shop. For the first three days I gave the little food I had with me and we stayed in the car anyway, then we went to the collective tents and food was distributed, but this time there was no clean water." (P20)

Table 2 (continued)

Themes	Codes	Mothers' statements in subcategories
	Diarrhoea/Allergy	"Yes, it happened. As I said, I could not provide supplementary food, so I was giving his water. But it also disturbed my infant bittersweetly and I had to give it to him/her. And that's how he/she got a sore in his/her mouth. He/she had a lot of flatulence. He/she fever and diarrhoea and he/she went through a lot of trouble." (P4) "Yes, I did, and I had a lot of trouble. Once he/she had allergies, I think from the food we ate, and a couple of times he/she had severe diarrhoea. But at that time, many children in the tent area complained of thirst. I don't know, it may be due to water or it may be due to bulk food." (P14)
	Difficulties with Safe Food Preparation	"Preparing the food at night was also a problem. There was mud and dirt everywhere. There was no hygiene. It took a long time to get hot water and prepare the food. As you can see, we and the babies had the hardest time in this process." (P3) "I could not breastfeed our youngest one in the first days of the earthquake. I was supplementing with formula before the earthquake. I could not breastfeed immediately after birth, my milk decreased after 2–3 months. So, we switched back to formula. We were already using it before the earthquake. On the first day of the earthquake, with that fear and our escape, my milk never came. The child is hungry, there is no water if I give food. The water was cut off, I would say that I make the food with cold water, but I don't have that either. I had no milk. I experienced a great despair. Believe me, we did not have access to hot water, so we tried to heat the food between our trousers and coats. We had a hard time. I was already pregnant at that time." (P5)
	Difficulties related to the Family/Mother's Situation	"I mean, we didn't have an organisation like before the earthquake. In this process, they were underfed most of the time, especially in the first periods of the earthquake. They were malnourished. There are many mothers in this situation. Whenever I talk to a mother who has children like me both in tents and containers, it is always the same problem. That's why we say monilia disease in my infant's mouth. He/she has got a sore inside his mouth. Normally, it will go away after giving mulberry molasses jam or they need to see a doctor. But we didn't have such a possibility. If we could, we would have gone to another city. Or we'd get a nice house in a nice place. It is very difficult for us to even cover the travelling money to the supermarket. We are having a very hard time. And yes, we had to deal with a lot of health problems." (P2) "Since I was pregnant, I didn't know what to do. I'm in a terrible predicament." (P6) "We were hungry, we had nothing to do, so I had a lot of difficulty with nutrition and other issues. We entered the food tent and it took 4 days to arrive after we entered the tent, and we always had nutritional problems." (P8)

Table 2 (continued)

Themes	Codes	Mothers' statements in subcategories
	Access to Heater/Hot Water	<p>"I could not breastfeed our youngest one in the first days of the earthquake. I was supplementing with formula before the earthquake. I could not breastfeed immediately after birth, my milk decreased after 2–3 months. So, we switched back to formula. We were already using it before the earthquake. On the first day of the earthquake, with that fear and our escape, my milk never came. The child is hungry, there is no water if I give food. The water was cut off, I would say that I make the food with cold water, but I don't have that either. I had no milk. I experienced a great despair. Believe me, we did not have access to hot water, so we tried to heat the food between our trousers and coats. We had a hard time. I was already pregnant at that time." (P5)</p> <p>"After moving to the mass tent settlements, free milk was distributed to mothers with babies. I was feeling worse, I insisted on breastfeeding, but it didn't work, the infant was crying from hunger and I was completely dependent on formula. Especially at night he/she didn't want to suck at all. You know that breast milk is very good, but I wanted to give him formula even to make him sleep longer at night. I had no choice. But I had another crisis. My infant didn't want to eat the food I prepared for him. He/she wouldn't take it either. I know I cried for days; this helplessness is terrible. You're already psychologically unwell and incompetent towards your child. It was very, very difficult to be a mother under those conditions. I tried some other food and he/she started drinking it for a while. During the day, I would breastfeed first and if not, I would give formula supplements. It was very difficult to prepare the formula at night. You stay in a tent. You need hot water, heating the water and preparing the food is arduous. It was dark most of the time. It is really troublesome to get out of bed in those cold temperatures and prepare the formula and give it to the infant." (P16)</p>
	Not Being Able to Feed the Infant	<p>"No, not really. My child was just a little weak because he/she wasn't full. I attribute this to the fact that he/she didn't get enough food at that time. But I also found medicine for him/her, so he/she can get plenty of vitamins from my other tent neighbours. I took precautions in advance so he/she wouldn't get sick." (P8)</p> <p>"As I said, I had plenty of milk. But it decreased. I didn't know what to do, I panicked so much. We stayed in the car in the cold for about 4 days, then we went to our relative's house, and when 20 people stayed in the same house, we could not do it, so we came back. We settled in a tent city. Thank God we found a tent here. We suffered a lot. What can I tell you? The infant is crying, I have no milk. First, I mixed whatever they gave me from the neighbourhood with cicibebe biscuits and water. When I got milk, I gave it with milk. When the formula started to be distributed, I also started to feed with it." (P19)</p>

Table 2 (continued)

Themes	Codes	Mothers' statements in subcategories
	Difficulties in Formula Adaptation in an Infant who has Stopped Sucking	<p>"We were in a position to get it. But I didn't think formula was enough for my infant. I had a bit of a hard time here. I thought breast milk would be more adequate. Also, at that time, various types of food were distributed. My infant did not take every formula" (P7)</p> <p>"I needed formula the most. But the infant did not eat the formula. Maybe the infant rejected it because of the brand of the formula. I always gave food with foreign ingredients. He/she may not have liked their flavour. Maybe if there are things we know, if such things are distributed here now, I will know what they are and the child will eat them then." (P12)</p>
	Psychological Difficulty	<p>"I am a mother of 2 children, one 5 years old and one 8 months old, my infant was 30 days old at the time of the earthquake. I was breastfeeding. The earthquake was a separate problem. The fear of whether there would be another earthquake or whether we would die was another problem. There was also the fear of how the infant would be fed and what it would eat. I had incredible difficulties, I felt very helpless as a mother. To be frank, at that moment, it also feels like nothing will ever get better and nothing will ever be the same again." (P4)</p> <p>"My youngest infant is now 8 months old and was 1.5 months old during the earthquake. My middle daughter is 2 years old. My eldest daughter is 4 years old. I was scared, and when I was scared, I could not be useful to my infant in the first days. My husband works in Antalya. I was caught alone in the earthquake. I didn't know what to do in the earthquake. I couldn't reach my husband. When all three of them were kids, I was very scared about how to feed them and what to do, and I was left alone." (P12)</p>
	Other Difficulties	<p>"The biggest problem I had was the toilet problem. My infant has epilepsy and has frequent seizures. My other daughter had to go to the toilet. When I took her to the loo, I was on pins and needles. I had to leave my infant in the tent because it was cold. This also affected my milk. It affected other things. The food started to be distributed when I moved to the tent after the earthquake." (P1)</p> <p>"No light, no sockets, no electricity. There's no formula. We left the house without any food. I went to mosques, used electricity in mosques with electricity, and heated and used it here. The things that I had. I really had a hard time. In such a situation, you think of your child first. Perhaps our greatest convenience in terms of feeding, compared to mothers with younger children, was that the child ate additional food. We tried to feed whatever we had in front of us without saying bitter or sour, in a way that would not disturb him." (P9)</p>

Table 2 (continued)

Themes	Codes	Mothers' statements in subcategories
Theme 4. Breastfeeding and infant feeding	Reduction/Interruption of Breast Milk	<p>"God bless them. I'm a mother of 2 children. One's 5 years old, one's 8 months. My infant was 30 days old at the time of the earthquake. I was breast-feeding. The earthquake was a separate problem. The fear of whether there would be another earthquake or whether we would die was another problem. There was also the fear of how the infant would be fed and what it would eat.. I had incredible difficulties, I felt very helpless as a mother. To be frank, at that moment, it also feels like nothing will ever get better and nothing will ever be the same again. I really wanted to breastfeed, but my milk went dry a week after the earthquake. Sadness, fear and the difficulties caused by the loss of my relatives all overlapped and I had incredible difficulties." (P3)</p> <p>"I had just given birth; my infant was already 20 days old and I had milk. I was already eating everything before the earthquake to get my milk. I was very scared after the earthquake. I did not go out for forty. And I stayed indoors too long. I was in the car too long. They wouldn't give me petrol or anything. That stress, that distress came on top of that, my child was only 6 days old when he underwent surgery. He/she had an operation because one of his/her vertebrae was turned upside down in the womb. Then the stitches were opened, which caused an abscess. We had to take him/her to hospital. At that time, my milk stopped, and I actually did everything we could until that day. I breastfed my infant again, more, or less. In this case, we had to give my infant formula from time to time. Then we started to give it all the time." (P7)</p>
	Experiences in the Supplementary Food Period	<p>"I was not planning to switch to supplementary food before the 4th month, but I accelerated the process after the earthquake. I accustomed him/her to touching his pacifier little by little earlier. We just switched to formula. To be honest, I couldn't give him/her much. We had dry food, it was coming, but no additional food was provided for the child. The bottle came much later anyway. Whatever I ate, I gave him/her the pot liquor" (P4)</p> <p>"The only thing I remember is that I couldn't even find a dry bread and feed it to my infant. There was always chaos in the distribution of food and non-food in the collective tent centres. It was cold, snow, winter and people were panic-stricken, nervous, and tense. You get in the queue, the food cools down until it is your turn, and you give it to the infant as much as you can feed. And generally, the same things were given over and over again. I had just recently switched to supplementary foods and I had a lot of difficulty with it. I had to underfeed him/her for months. He/she was weak and frail, but what can you do?" (P14)</p>

Table 2 (continued)

Themes	Codes	Mothers' statements in subcategories
	Breastfeeding in Non-Privacy Areas	"I also had a lot of trouble with breastfeeding. Everyone was staying in one place. It was crowded. It was all foreigners and men. We had to go there because it was hot. But it was too crowded. You're a mother, you're a lady. I had a very difficult time in this respect." (P1) "Everything is destroyed, you have lost your loved ones, you are under stress, your daily life is suddenly disrupted, your infant has just left the hospital, what could be the result. We were placed in communal tents but it was very difficult to find cosy, private places, and time for breastfeeding. It's cold, it's winter outside, who's going to go out and breastfeed the infant? Even if it is your relative, you are ashamed, your privacy is shaken, come and try to breastfeed in this way. I'm low on milk from travelling around. Food and drink are a problem, you can't eat anything. When my infant started to have less milk, my milk gradually stopped." (P18)
	Appropriate Space/Equipment and Materials;	"It was very difficult to feed. When I moved to the tent, I had great difficulty due to the conditions of the tent. He/she had a fever of 104 degrees. Mud, cold, nothing to eat, nothing to drink. It was a disaster; I had a very hard time in those first times in the earthquake. I've had a terrible, miserable time. The supplies came to us after a very long time. It should be day 8 or 9. What are we gonna do till then? We were miserable. At that time, our neighbour had a market. God bless him a thousand times, he told me to go and take everything, but when we got there, most of the things were finished, there were not many things that appealed to the infant, but it was enough for 8 or 9 days. (P6)

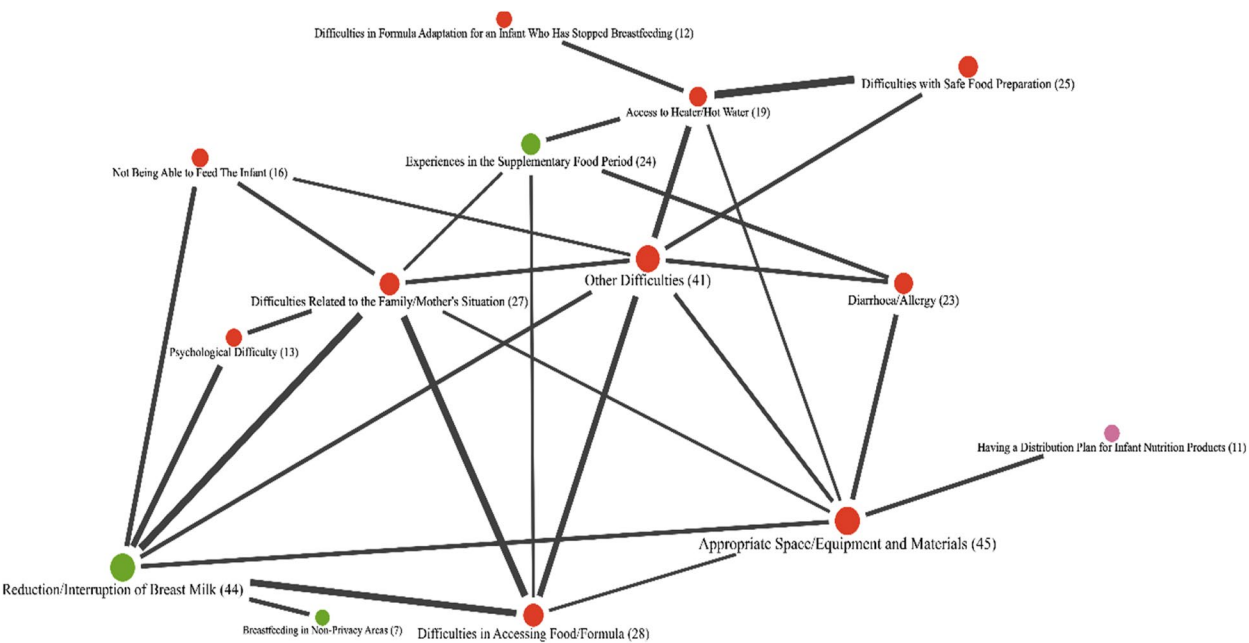


Fig. 2 Code map

expectations from health personnel, requirements related to infant feeding, experiences in breastfeeding and infant feeding, difficulties experienced and suggestions of mothers were determined. The themes and codes of this study suggest that it is important to develop management plans, policies, and procedures to support infant feeding to meet the needs of mothers and infants in emergency response situations such as earthquakes, and to ensure communication, sensitisation and education at all levels and sectors.

Main theme 1: Expectations from health personnel

Several participants in the study reported experiencing negative emotions when they were unable to breastfeed their infants. They also noted a decrease in their milk supply as a result of these emotions. Additionally, they expressed a lack of sufficient support and emphasised the need for psychological assistance in their particular circumstances. The literature suggests that disasters increase psychological burden and individuals often experience post-traumatic stress symptoms [34]. Losing a loved one, feeling hopeless about the future and losing memorable objects and places due to disasters can lead to psychological problems among women [35]. Oz et al. (2024) in their study with 173 mothers after the earthquake, they found that 49.7% of the mothers showed post-traumatic stress symptoms [36]. Assuming new roles and responsibilities in the recovery period after the disaster may positively affect women's psychological health. Health practitioners can assist by offering information on strategies to enhance the mental well-being of mothers and by providing advice on seeking support when needed. The participants in our study conveyed a desire for further information and guidance from health-care professionals throughout the post-earthquake period. In some studies, women reported that access to health services was prevented due to the destruction caused by the earthquake and that guidance was incomplete [35, 37]. Evidence in the literature demonstrates the importance of professional support for breastfeeding mothers. Professional support in the form of one-on-one counseling supports mothers by encouraging breastfeeding and infant feeding practices [20, 38].

Our study concluded that most mothers expect support for the regular examination of babies with health problems. During natural disasters, the health status of infants is particularly threatened [39]. In the study conducted by Akkaya et al. (2024), it was reported that forty-two (5.8%) children applied for health check-ups after the earthquake [40]. According to the study of Felix et al., (2020), when the health problems of children affected by the earthquake were analysed, it was stated that they had musculoskeletal system problems, they were at risk

in terms of developing respiratory problems, digestive system disorders and sleep problems [41]. Routine post-disaster health screenings are important in terms of prevention and early detection of physical and mental diseases.

Main theme 2: Theme of mothers' suggestions

Mothers are advised not to distribute infant food uncontrolled and to check whether it is suitable for the age of the infant. One of the most frequently identified challenges during disasters and emergencies is access to formula in the right form and characteristics in disaster-affected areas. In disasters, it may take time to find formula suitable for the infant. The use of inappropriate formula is harmful to the infant's health [40]. Giusti et al. (2023) found that there were inappropriate distributions and donations during the emergency response and that infant products, infant formula and commercially produced supplementary nutrition were actively and widely distributed to mothers after the earthquake without any prior needs assessment [25]. This lack of prevention or management of donations contradicts international recommendations [42, 43]. There are a number of guidelines for infant feeding after natural disasters [11–14, 42–46]. All guidelines prioritise the significance of safeguarding and advancing breastfeeding. They also outline safeguards that should be taken while distributing infant formula in the aftermath of a disaster. It is important to acknowledge that the unregulated distribution of infant feeding products during disasters can have a negative impact on the continuation of breastfeeding. Therefore, it is crucial to pre-determine how supplies will be transported to the affected region and to plan for alternative modes of transportation [47]. The impact of the distribution of large quantities of infant formula in aid areas on current and future breastfeeding rates is unknown. Therefore, there may be a need to monitor the nutritional impact on affected mothers and children to protect breastfeeding and ensure that these public health measures are successful.

Breastfeeding is the recommended and safest available way to feed babies after disasters [19]. In our study, mothers suggested that mothers should insist on breastfeeding their babies after the disaster. Due to the rich content of breast milk, all the nutrients needed for the infant are provided [48]. It is easily available and improves the infant's immune response [12]. Breastfeeding is an effective way to protect the infant from hypothermia. During and after a disaster, if the mother cannot reach sufficient food and water, breast milk is the best food for the infant until help arrives [48]. According to Article 24 of the United Nations Convention on the Rights of the Child, "To combat disease and malnutrition, including

within the framework of primary health care, though, *inter alia*, the application of readily available technology and through the provision of adequate nutritious foods and clean drinking-water, taking into consideration the dangers and risks of environmental pollution" is stated. These statements emphasise the importance of promoting health and nutrition for all children and state that this should be achieved, where possible, through continued breastfeeding [49].

In our study, mothers suggested that infant food products should be kept ready for the risk of earthquake. According to the Final Report of the Panel and Workshop on Emergency Nutrition Needs and Coordination after Disasters (2023), "Emergency Kits for Infants" should be prepared [48, 50]. Emergency Kits" are designed for the first 72 h. These kits contain ready-to-eat nutritional foods. Emergency feeding algorithm for infants can be a guideline in disaster situations.

In our study, mothers suggested that attention should be paid to the nutrition of breastfeeding mothers after the disaster. Although the basic needs of breastfeeding women are similar to those of the general population, there are some specificities that must be taken into account when responding to an emergency [25]. The daily energy requirement of nursing mothers is increased by 500 kcal. A minimum of 1800 kcal/25 g of additional protein/25 g of pulp should be provided [50, 51]. Adequate fluid intake in nursing mothers is very important in terms of increasing breast milk. According to the Final Report of Post-Disaster Emergency Nutrition Needs and Coordination Panel and Workshop (2023), nursing mothers should be recommended to consume two changes of milk and milk products in addition to daily nutrition [50]. Although mild to moderate malnutrition does not affect breastmilk supply, milk production is likely to decrease if the mother is severely malnourished [51]. In this case, the woman needs emergency feeding and extra food while continuing to breastfeed [52, 53].

In our study, the mothers suggested that mothers should not hesitate to continue breastfeeding and supplementary foods after the disaster. To enhance the mother's psychological well-being and foster a trusting environment for her infant, it is advisable to explicitly recommend and provide support for breastfeeding [54]. There are ready-to-use therapeutic foods that meet the nutritional needs of babies and children, which are defined as lifesaving in disasters, wars and epidemics [55, 56]. It is very important to obtain this therapeutic food from Turkey and store it in appropriate places.

Main theme 3: Difficulties experienced

Appropriate, evidence-based, and timely support of infant and young child feeding in emergencies saves lives

(IYCF-E), protects child health and benefits mothers [14, 56]. According to our study, moms reported encountering challenges in obtaining food and formula for their infants. Additionally, they expressed difficulty in transitioning their babies from breastfeeding to formula feeding, and occasionally struggled to provide consistent nourishment for their infants. Studies emphasise that in order to become stronger and more protected against natural disasters, it is necessary to expand the pre-disaster supply area and take proactive measures [50, 57, 58].

One of the most frequently identified challenges during disasters and emergencies is access to formula in the right form and characteristics in disaster-affected areas. According to our study, mothers reported encountering challenges in obtaining formula suitable for their kids' specific age. Giusti et al. emphasised the importance of preserving, to the extent possible, the type or brand of infant formula previously used to support the psychological continuity of pre-emergency life [25]. The risk of contamination is high due to limitations in the preparation, storage, and cleaning of formula milks. According to our study, women reported encountering challenges in the process of preparing food for their infants. Difficulties in accessing clean water and food sources, use of formula under inadequate hygienic conditions may increase the risk of disease due to contamination of infants [19]. In our study, mothers stated that their babies had diarrhoea/allergy problems caused by food. During natural disasters, the incidence of foodborne diseases increases as a result of early cessation of breastfeeding and the use of unsafe water in food or formula. WHO data indicates 600 million suffer from foodborne illnesses annually, with children under 5 bearing 30% of foodborne fatalities [59]. Following the 2004 tsunami in Southeast Asia, children who were fed formula had a diarrhoea rate that was three times greater than that of children who were nursed. Similarly, after the 2006 earthquake in Yogyakarta and Central Java, there was a significant correlation between the consumption of infant formula and the occurrence of infant diarrhoea [60]. The UNICEF survey found that 80 per cent of all households with infants aged 0–5 months received donated infant formula. The incidence of one-week diarrhoea was higher among people who received donated infant formula (25.4%) than among those who did not (11.5%) [60]. Uncontrolled distribution of infant formula is thought to increase the risk of diarrhoea among infants and young children in emergencies.

Main theme 4: Theme of experiences in breastfeeding and infant feeding

In our study, mothers stated that their milk decreased due to stress conditions and that they started to give supplementary food even though it was not suitable for the

month of their infants. Mothers in the earthquake zone may have reduced milk supply due to "stress, injury, preoccupation with property damage and loss of privacy". Regular breastfeeding should be maintained even if breast milk decreases due to this acute stress experienced by mothers after the disaster [61]. Mizrak Sahin et al. (2024) study, participants who breastfed their babies during the earthquake mentioned many sources of stress, such as the effect of the earthquake's severity, death of family members, hunger, and housing problems, which decreased or stopped their breastfeeding [52]. Nevertheless, breastfeeding practices may be interrupted during and after a disaster, access to donor breast milk may not be available, or hygienic preparation and storage of formula may be difficult [20]. The World Health Organisation's operating guide on child and adolescent health in humanitarian circumstances emphasises the importance of providing timely, safe, sufficient, and suitable supplementary nutrition during disasters and emergencies [44]. Clean and safe supplementary nutrition along with breast milk should be appropriately included in the infant's diet after the 6th month [62]. Following the disasters, it is crucial to organise nutritional aid for children to resume their regular diet. It is imperative to promptly provide the required formula or additional meals that are appropriate for the diet of the infants.

In our study, the participants stated that breastfeeding privacy could not be provided in crowded environments and they needed appropriate space/equipment and materials for infant feeding. Mudiyansele et al. draw attention to "privacy" (e.g. infant tents, curtains, shawls, and private areas) as a facilitator of breastfeeding during disasters [20]. Mizrak Sahin et al. (2024) studies, the lack of privacy was a major barrier to the continuation of breastfeeding [52]. Safe and private places should be created for the continuity of breastfeeding after the disaster [15]. International studies examining women's experiences of breastfeeding in the community have determined the factors that contribute to the role of privacy in breastfeeding, such as attracting attention, sexualizing the breasts, being aware of the discomfort of others, and making efforts not to be seen [63]. According to the results of a systematic review conducted on infant and young child feeding in natural disasters, it is emphasised that feeding materials, areas for cleaning these materials and instructions for the correct preparation of infant formula should be provided to the mothers of disaster victims [20]. In accordance with the systematically prepared disaster plan after the disaster, fast and safe care environments should be provided to ensure the care and feeding of newborns and infants requiring special care. In addition, appropriate materials and equipment for newborns and infants should be delivered to the disaster area as soon

as possible [15]. Women in disaster tents face challenges in nursing as they lack privacy, lack of baby feeding tools and are unable to establish an appropriate atmosphere for breastfeeding and infants feeding.

Lack of privacy prevents breastfeeding women from breastfeeding their children comfortably, causing them to experience stress and this may negatively affect the breastfeeding process [60, 64]. Our findings underline the need to prioritise Infant and young child feeding in emergencies on the emergency preparedness agenda. There is an urgent need for coordinated action targeting managers, health professionals and other relevant stakeholders. Training sessions on sustaining breastfeeding and feeding infants in emergencies should be actively offered to this population group.

Strengths and limitations

This study was conducted after the earthquake, when the event was still remembered and the mothers' memories were fresh. Therefore, the strength of this study in terms of recall of events and impairments in memory is that the mothers remembered their experiences very well and shared them with the researchers. Another strength is that although the mothers experienced severe trauma due to the earthquake itself and its consequences, the fact that their opinions were taken and the idea that they could help other mothers and babies motivated them to participate in the study and share their experiences. Even though emotional situations were experienced from time to time, the mothers' willingness and motivation to participate in the study during the interviews were significantly reflected in the results of this study. One limitation/difficulty of this study is that emotional moments were experienced during the interview due to the events, physical conditions, and material/moral losses experienced after the earthquake. In this study, which was conducted with the in-depth interview method, the intense emotionality experienced made the interview difficult to the detriment of the researcher. Another limitation is that the researchers experienced difficulties due to problems with transportation and accommodation to the place where the study was conducted in the post-earthquake region, and differences occurred in the planned hours and days. Another limitation is that in this study, the purposive sampling method was used. This technique allowed us to better explore the experiences of the mothers and to select participants who were suitable for the purpose of the study. However, the purposive sampling technique has some limitations in terms of generalizability. In qualitative studies, instead of statistical generalization, it is important to evaluate the findings in similar contexts. Therefore, the findings of our study are

valid only in the specific context and cultural framework where the participants are located.

Conclusion

Since this study was conducted very soon after the earthquake, it is a unique study whose results can be utilized in disaster management strategies to encourage the dissemination of experiences and conclusions about breastfeeding in communities living in earthquake geography. As a result of this study, it was seen that mothers who specifically mentioned the sub-theme related to the reduction/interruption of breastfeeding also drew attention to issues related to psychological difficulties, breastfeeding in areas where there is no privacy, inability to feed the baby, difficulties arising from the family/mother's situation, difficulties in accessing formula/food, and lack of appropriate space/equipment and materials. All these data underline the urgency of transitioning earthquake survivors from tents to permanent housing to improve the well-being of mothers and infants in the aftermath of the earthquake. Local and regional action plans should also be developed to protect the privacy of breastfeeding mothers in this process. As part of this policy, mothers who wish to continue breastfeeding while staying in their shelters should be provided with a special space (breastfeeding room/cabinet/ mobile food kitchens) with feeding equipment. In addition, baby-friendly areas should be structured for mothers who want to continue breastfeeding. These areas in disaster areas should also be visited by experts to provide breastfeeding support. In addition, written policies for breastfeeding mothers should be created before disasters, personnel should be trained for these situations and should be mobilized to the region immediately in an emergency.

Nurses working in the clinic and in the field during the disaster process can create a vision for the implementation of programmes to be designed to support the mother to maintain and initiate breastfeeding, to provide the necessary privacy for breastfeeding after the disaster, to distribute nutrients appropriately, to provide psychological support, to provide appropriate equipment and environment for feeding, and to provide the necessary nutrients for the infant and mother. Therefore, it is crucial to address the risk factors associated with breastfeeding and nutrition that may arise due to adverse circumstances experienced by children who are breastfed and/or receive additional food during disasters. It is also important to plan interventions that can be implemented beforehand. In addition, destructive disasters such as earthquakes can lead to

psychological problems such as post-traumatic stress disorder in mothers. In order to prevent this, breastfeeding can also help to maintain the continuity of mother-infant attachment, maintain the well-being of mothers, and reduce stress in mother and infant. It is important to address these factors in studies.

Abbreviations

IYCF-E	Young Child Feeding in Emergencies
MAXQDA	Max Qualitative Data Analysis
UNICEF	The United Nations Children's Fund
WHO	World Health Organization

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-025-22137-0>.

Supplementary Material 1.

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Authors' contributions

Özge Karakaya Suzan: Supervision, Writing – original draft, Software, Resources, Project administration, Methodology, Data curation, Conceptualization, Visualization, Writing – review & editing. Sümeyra Topal: Writing – review & editing, Supervision, Conceptualization, Data curation, Methodology, Project administration, Resources, Software. Sinem Yalınzoğlu Çaka: Writing – review & editing, Writing – original draft, Visualization, Supervision, Software, Resources, Methodology, Data curation, Conceptualization. Nursan Çınar: Supervision, Software, Resources, Project administration, Methodology, Data curation, Conceptualization, Visualization, Writing – review & editing.

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Data availability

The datasets used or analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This research was approved by Sakarya University Non-Interventional Research Ethics Committee (Date: 28.07.2023 and Number: E-71522473–050.01.04–267880-234). All research staff completed required steps in the ethical conduct of research with human participants. This study was conducted according to the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. Likhari A, Patil MS. Importance of maternal nutrition in the first 1,000 days of life and its effects on child development: a narrative review. *Cureus*. 2002;14(10):e30083. <https://doi.org/10.7759/cureus.30083>.
2. Thai JD, Gregory KE. Bioactive factors in human breast milk attenuate intestinal inflammation during early life. *Nutrients*. 2020;12(2):581. <https://doi.org/10.3390/nu12020581>.
3. Kaya Ö, Çınar N. The effects of freezing and thawing on mature human milk's contains: A systematic review. *Midwifery*. 2023;118:103519. <https://doi.org/10.1016/j.midw.2022.103519>.
4. Pérez-Escamilla R, Tomori C, Hernández-Cordero S, Baker P, Barros AJ, Bégin F, Richter L. Breastfeeding: crucially important, but increasingly challenged in a market-driven world. *The Lancet*. 2023;401(10375):472–85. [https://doi.org/10.1016/S0140-6736\(22\)01932-8](https://doi.org/10.1016/S0140-6736(22)01932-8).
5. World Health Organization (WHO) and UNICEF. Global strategy for infant and young child feeding. Geneva, Switzerland: 2009. Available from: http://apps.who.int/iris/bitstream/handle/10665/44117/9789241597494_eng.pdf;jsessionid=CCOE1F586DB2B99BB682D4EE9B2EF55B?sequence=1. Accessed 24 Jul 2024.
6. World Health Organization (WHO). Exclusive breastfeeding for optimal growth, development and health of infants. <https://www.who.int/tools/elena/interventions/exclusive-breastfeeding>. 2023. Accessed 2 Jun 2024.
7. Aros-Vera F, Melnikov S, Chertok IRA. Emergency and disaster response strategies to support mother-infant dyads during COVID-19. *International Journal of Disaster Risk Reduction*. 2021;65:102532. <https://doi.org/10.1016/j.ijdrr.2021.102532>.
8. Hwang CH, Iellamo A, Ververs M. Barriers and challenges of infant feeding in disasters in middle- and high-income countries. *Int Breastfeed J*. 2021;16:1–13. <https://doi.org/10.1186/s13006-021-00398-w>.
9. Tomori C. Global lessons for strengthening breastfeeding as a key pillar of food security. *Front Public Health*. 2023;11:1256390. <https://doi.org/10.3389/fpubh.2023.1256390>.
10. Vilar-Compte M, Navarro CP, Burrola-Méndez S, Sachse-Aguilera M, Veliz P. Barriers and enablers of breast-feeding protection and support after the 2017 earthquakes in Mexico. *Public Health Nutr*. 2021;24(8):2286–96. <https://doi.org/10.1017/s13688980020002359>.
11. United Nations International Children's Emergency Fund (UNICEF). Nutrition security and emergencies. http://www.unicef.org/nutrition/index_emergencies.html. 2018. Accessed 18 Jun 2024.
12. American Academy of Pediatrics. Infant feeding in disasters and emergencies: breastfeeding and other options. <https://downloads.aap.org/AAP/PDF/DisasterFactSheet6-2020.pdf>. 2020. Accessed 25 Jun 2024.
13. T. C. Sağlık Bakanlığı. Deprem Bilgilendirme Platformu. Afet Durumlarında Bebek Beslenmesi. <https://deprem.saglik.gov.tr/halk-sagligina-yonelik-bilgiler/anne-ve-cocuk-sagligi/afet-durumlarında-bebek-beslenmesi.html>. Accessed 2 Jul 2024.
14. Centers for Disease Control and Prevention (CDC). Infant and young child feeding in emergencies (IYCF-E) toolkit. <https://www.cdc.gov/infant-feeding-emergencies-toolkit/php/index.html>. 2022. Accessed 2 Jul 2024.
15. Akça K, Özdemir AA. Afetlerde bebek beslenmesi ve bakımı. *Yüksek İhtisas Üniversitesi Sağlık Bilimleri Dergisi*. 2023;4(2):57–62. <https://doi.org/10.51261/yiu.2023.1285379>.
16. Dall'Oglio I, Marchetti F, Mascolo R, Amadio P, Gawronski O, Clemente M, Giusti A. Breastfeeding protection, promotion, and support in humanitarian emergencies: a systematic review of literature. *J Human Lactation*. 2020;36(4):687–98. <https://doi.org/10.1177/0890334419900151>.
17. Marshall J, Wiltshire J, Delva J, Bello T, Masys AJ. Natural and Manmade Disasters: Vulnerable Populations. In: AJ. Masys, R. Izurieta, M. Reina Ortiz (Eds), *Global Health Security. Advanced Sciences and Technologies for Security Applications*. Springer, Cham. 2020:143–161. https://doi.org/10.1007/978-3-030-23491-1_7.
18. Canpolat N, Saygılı S, Sever L. Earthquake in Türkiye: Disasters and children. *Turk Arch Pediatr*. 2023;58(2):119–121. <https://doi.org/10.5152/TurkArchPediatr.2023.160222>.
19. Calderon-Rodriguez C, Noble L. Infant Feeding After a Disaster. In RA. Lawrence, RM. Lawrence, (Eds), *Breastfeeding: A Guide for the Medical Profession*. Elsevier Inc. 2022:695–703. <https://doi.org/10.1016/B978-0-323-68013-4.00023-7>.
20. Mudiyansele SR, Davis D, Kurz E, Atchan M. Infant and young child feeding during natural disasters: A systematic integrative literature review. *Women and Birth*. 2022;35(6):524–31. <https://doi.org/10.1016/j.wombi.2021.12.006>.
21. Gribble K, Peterson M, Brown D. Emergency preparedness for infant and young child feeding in emergencies (IYCF-E): An Australian audit of emergency plans and guidance. *BMC Public Health*. 2019;19:1–1. <https://doi.org/10.1186/s12889-019-7528-0>.
22. Korstjens I, Moser A. Series: Practical guidance to qualitative research. Part 2: Context, research questions and designs. *Eur J Gen Prac*. 2017;23(1):274–279. <https://doi.org/10.1080/13814788.2017.1375090>.
23. Korkmaz İ. Nicel araştırmalarda evren, örneklem, örnekleme teknikleri. In: Oral B, Çoban A, editors. *Kuramdan uygulamaya eğitimde bilimsel araştırma yöntemleri*. Ankara: Pegem Akademi Yayınları; 2020. p. 147–59.
24. Yıldırım A, Şimşek H. Sosyal bilimlerde nitel araştırma yöntemleri. Ankara: Seçkin Yayıncılık; 2018.
25. Giusti A, Marchetti F, Zambri F, Pro E, Brillo E, Colaceci S. Breastfeeding and humanitarian emergencies: the experiences of pregnant and lactating women during the earthquake in Abruzzo. *Italy International Breastfeeding Journal*. 2022;17(1):45. <https://doi.org/10.1186/s13006-022-00483-8>.
26. Merriam SB, Grenier RS. Qualitative research in practice: Examples for discussion and analysis. San Francisco, CA: Jossey-Bass Publishers; 2019.
27. Pinar Y. Nitel araştırmada videografi ve video analizine giriş. Ankara: Pegem Akademi; 2022.
28. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. 2007;19(6):49–57. <https://doi.org/10.1093/intqhc/mzm042>.
29. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3(2):77–101. <https://doi.org/10.1191/1478088706qp0630a>.
30. Dodgson JE. Reflexivity in qualitative research. *J Hum Lact*. 2019;35(2):220–2. <https://doi.org/10.1177/0890334419830990>.
31. Lincoln YS, Guba EG. *Naturalistic Inquiry*. Beverly Hills, CA: Sage Publications; 1985, pp.289–331. [https://doi.org/10.1016/0147-1767\(85\)90062-8](https://doi.org/10.1016/0147-1767(85)90062-8).
32. Kyngäs H, Kääriäinen M, Elo S. The Trustworthiness of Content Analysis. In: Kyngäs H, Mikkonen K, Kääriäinen M, (eds) *The Application of Content Analysis in Nursing Science Research*. Springer, Cham. 2020; pp.41–48. https://doi.org/10.1007/978-3-030-30199-6_5.
33. Hennink MM, Kaiser BN, Marconi VC. Code saturation versus meaning saturation: how many interviews are enough? *Qual Health Res*. 2017;27:591–608.
34. Fu M, Hall BJ, Xi J, Guo J. Gender differences in trajectories of mental health symptoms among Chinese earthquake survivors. *J Psychiatr Res*. 2021;142:117–24. <https://doi.org/10.1016/j.jpsychires.2021.07.034>.
35. Yoosefi Lebni J, Khorami F, Ebadi Fard Azar F, Khosravi B, Safari H, Ziapour A. Experiences of rural women with damages resulting from an earthquake in Iran: a qualitative study. *BMC public health*. 2020;20(1):625. <https://doi.org/10.1186/s12889-020-08752-z>.
36. Öz E, Küçükkepçe O, Kurt O, Kapıcı Y. The relationship between earthquake-induced post-traumatic stress disorder and breastfeeding attitude and behavior. *BMC psychiatry*. 2024;24(1):43.
37. Gul S, McGee TK. Women's participation in disaster recovery after the 2005 Kashmir. *Pakistan earthquake Disasters*. 2022;46(4):1007–26. <https://doi.org/10.1111/disa.12510>.
38. Hirani SAA, Richter S, Salami B, Vallianatos H. Sociocultural factors affecting breastfeeding practices of mothers during natural disasters: A critical ethnography in rural Pakistan. *Global Qualitative Nursing Research*. 2023;10:1–16. <https://doi.org/10.1177/23333936221148808>.
39. Kun P, Wang Z, Chen X, Le H, Gong X, Zhang L, Yao L. Public health status and influence factors after 2008 Wenchuan earthquake among survivors in Sichuan province, China: cross-sectional trial. *Public Health*. 2010;124:573–80. <https://psycnet.apa.org/doi/10.1016/j.puhe.2010.06.001>.
40. Akkaya B, Öztürk B, İnan C, Güneylüoğlu MM, Yaradılmış RM, Aydın O, Tuğgun N. Reflections of Children Victims of the Türkiye Earthquake on February 6, 2023 to a Pediatric Emergency Department Far Away. *Turkish J Pediatr Dis*. 2024;18:235–9. <https://doi.org/10.12956/tchd.1438227>.
41. Felix E, Rubens S, Hambrick E. The relationship between physical and mental health outcomes in children exposed to disasters. *Curr Psychiatry Rep*. 2020;22:1–7. <https://doi.org/10.1007/s11920-020-01157-0>.
42. Infant Feeding in Emergency Core Group. Infant and Young Child Feeding in Emergencies. Operational Guidance for Emergency Relief Staff and Programme Managers Developed by the IFE Core Group. 3rd ed. Oxford:

- Emergency Nutrition Network; 2017. <https://www.enonline.net/resources/operationalguidancev32017>.
43. World Health Organization. Seventy-first World Health Assembly. Infant and Young Child Feeding. https://apps.who.int/gb/ebwha/pdf_files/WHA71/A71_ACONF4Rev1-en.pdf. 2018. Accessed 8 Jul 2024.
 44. World Health Organization. Regional Office for the Eastern Mediterranean. Child and adolescent health in humanitarian settings: operational guide: a holistic approach for programme managers. World Health Organization. Regional Office for the Eastern Mediterranean. <https://iris.who.int/handle/10665/351255>. 2021. Accessed 24 Jul 2024.
 45. World Health Organization. International Code of Marketing of Breast-milk Substitutes. <https://apps.who.int/iris/handle/10665/40382>. 1981. Accessed 24 Jul 2024.
 46. Emergency Nutrition Network. <http://www.enonline.net/>. Accessed 03 Jul 2024.
 47. Binns CW, Lee MK, Tang L, Yu C, Hokama T, Lee A. Ethical issues in infant feeding after disasters. *Asia Pac J Public Health*. 2012;24(4):672–80. <https://doi.org/10.1177/1010539512453253>.
 48. Öney B, Akman K. Afet durumlarında beslenme hizmetleri. *Afet ve Risk Dergisi*. 2022;5(1):239–246. <https://doi.org/10.35341/afet.1058795World>
 49. World Health Organization. International Code of Marketing of Breastmilk Substitutes. <https://apps.who.int/iris/handle/10665/40382>. 1981. Accessed 24 Jul 2024.
 50. UNICEF. Convention on the Rights of the Child <http://www2.ohchr.org/english/law/pdf/crc.pdf>. Accessed 24 Jul 2024.
 51. Yalap R. Afet Sonrası Acil Beslenme İhtiyaçları ve Koordinasyon Panel ve Çalıştay: Sonuç Raporu. Nevşehir: Kapadokya Üniversitesi Yayınları; 2023.
 52. Albracht-Schulte KD, García-González Á, Wilson S, Robert-McComb JJ. Nutritional guidelines and energy needs during pregnancy and lactation for active women. In *The active female: health issues throughout the lifespan*, Cham: Springer International Publishing. 2023, pp. 363–378.
 53. Mizrak Sahin B, Kabakci EN. Breastfeeding experiences of mothers staying in temporary shelter areas in disaster-affected provinces in the 2023 Türkiye earthquake. *J Human Lactation*. 2024;40(4):613–22.
 54. Wubetie BY, Mekonen TK. Undernutrition and associated factors among lactating mothers in rural Yilmana Densa District, Northwest Ethiopia: A community-based cross-sectional study. *Food Sci Nutr*. 2023;11(3):1383–93. <https://doi.org/10.1002/fsn3.3176>.
 55. Ekström-Bergström A, Thorstensson S, Bäckström C. The concept, importance and values of support during childbearing and breastfeeding—A discourse paper. *Nurs Open*. 2022;9(1):156–67. <https://doi.org/10.1002/nop2.1108>.
 56. UNICEF. Saving lives with RUTF (ready-to-use therapeutic food). <https://www.unicef.org/supply/stories/saving-lives-rutf-ready-use-therapeutic-food>. 2022. Accessed 20 Jul 2024.
 57. Bilgin DD, Karabayır N. Infant and young child feeding in emergencies: A narrative review. *Turkish Archives of Pediatrics*. 2024;59(2):135–43. <https://doi.org/10.5152/turkarchpediatr.2024.23184>.
 58. Bullock JA, Haddow GD, Coppola DP. Mitigation, prevention, and preparedness. *Introduction to Homeland Security*. 2013;435. <https://doi.org/10.1016/B978-0-12-415802-3.00010-5>.
 59. Özcan FÖ, Duru ÖA. Doğal afetlerde gıda ihtiyaç durumunun değerlendirilmesi ve beslenme müdahaleleri: deprem örnekleri açısından incelenmesi. *Sağlık Akademisyenleri Dergisi*. 2021;8(4):337–41.
 60. World Health Organization. Climate change. <https://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health>. 2023. Accessed 12 Jul 2024.
 61. Hipgrave DB, Assefa F, Winoto A, Sukotjo S. Donated breast milk substitutes and incidence of diarrhoea among infants and young children after the May 2006 earthquake in Yogyakarta and Central Java. *Public Health Nutr*. 2012;15(2):307–15. <https://doi.org/10.1017/S1368980010003423>.
 62. Gözübüyük AA, Duras E, Dağ H, Arica V. Olağan üstü durumlarda çocuk sağlığı. *J Clin Exp Investig*. 2015;6(3):324330. <https://doi.org/10.5799/ahinjs.01.2015.03.0544>.
 63. Bülbül S, Kılınçkaya MF. 0–2 yaş grubu bebeklerin anne sütü ile beslenme durumları ve etkileyen faktörler. *Kırıkkale Üniversitesi Tıp Fakültesi Dergisi*. 2013;15(1):15–20.
 64. Hauck YL, Bradfield Z, Kuliukas L. Women's experiences with breastfeeding in public: An integrative review. *Women and Birth*. 2021;34(3):e217–27. <https://doi.org/10.1016/j.wombi.2020.04.008>.
 65. Talley LE, Boyd E. Challenges to the programmatic implementation of ready to use infant formula in the post-earthquake response, Haiti, 2010: a program review. *PLoS ONE*. 2013;8(12):e84043. <https://doi.org/10.1371/journal.pone.0084043>.

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