

Evaluation of Disaster Preparedness: Evacuation Shelter Plans for Pregnant Women, Mothers and Their Children in Tokyo 23 Special Wards

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東京 23 区における妊産婦・母子専用の福祉避難所の整備状況に関する実態調査

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In Japan, welfare shelters have primarily served the elderly and disabled, while pregnant women, mothers and children have found it difficult to acquire enough support. In May 2021, the Basic Law on Disaster Countermeasures was revised, calling for the strengthening of support for people in need during disasters and stating that welfare shelters should be accessible directly to those who need assistance in Japan without reservation. Therefore, we examined whether the local governments in Tokyo have responded to the law changes and we developed an online platform to publicize the current disaster preparedness system in local governments during the prenatal and childhood years.

A cross-sectional study was conducted using an online survey questionnaire. Interviews were also conducted with five wards that already have equipped shelters regarding the concept, operation methods, supplies, and facilities of welfare shelters.

Only 6 wards have specialized facilities for mothers and children, 7 have welfare shelters available to them, and all 23 wards have general evacuation shelters with special needs areas. The 11 wards that resided in established mother-child shelters show a slightly lower birth rate. Also, this study is the first to detail the common supply for pregnant women and children in welfare shelters in Tokyo. A website platform has been created to extensively disseminate the visualization of shelters and a calculator to estimate the number of pregnant women and infants in addition to the number of deliveries in the event of a disaster was also developed and made available to the public.

It is critical to establish standard shelters, basic guides and means for informing those in need in all communities. A digital platform is also important to share information about all the maternal and child welfare shelters in Japan.

Key Words : disaster preparedness, maternal and child welfare, shelters,
Tokyo 23 wards, digital platform

I . Introduction

Japan is vulnerable to a wide range of natural calamities. It is known as an "earth-

quake-prone country” because it accounted for more than 17% of total damage caused by natural catastrophes globally between 1984 and 2013 (Cabinet Office 2022a). With a 70–80% chance of a massive earthquake of magnitude 8–9 occurring over the next 30 years (Cabinet Office 2020), the country must prepare for and take precautionary measures against natural disasters.

When disaster strikes, people rush to evacuation centers to safeguard themselves. However, some evacuees have difficulty evacuating and living in shelters. In Japan, the percentage of people with special needs in the overall population was published (Ministry of Health, Labor, and Welfare 2020, Statistics Bureau, Ministry of Internal Affairs and Communications 2021a, 2021b). The specifics were as follows: 28.3% of the elderly, 6.0% of the mentally and physically challenged, 4.2% of babies, 2.1% of immigrants, 0.6% of expecting and nursing mothers, and 58.8% of people in normal health. The overall number of people requiring special consideration was 41.2%, constituting a sizable proportion of the total population. The proportion of pregnant and nursing women (1.5%) and babies (10.2%) among those requiring special treatment was the smallest. Administrative support may not reach these individuals when a disaster strikes.

In May 2021, the Basic Law on Disaster Countermeasures was revised, calling for the strengthening of support for people in need during disasters (Cabinet Office 2022b) and stating that welfare shelters should be accessible directly to those who need assistance in Japan without reservation.

However, welfare shelters have mainly been used for the elderly and the disabled. Pregnant women, mothers, and their children are unable to receive sufficient support even when they need it (Yoshida 2021).

In Japan, where people were asked to refrain from leaving their homes during a new type of coronavirus infection, the method of collecting information on the Internet became common as a result of information and communication technology (ICT) of maternal and child health information in local governments. This has made it possible for residents to submit information online, whereas previously they had to go to the municipal office to pick up the documents or submit them by mail. In addition, collective disaster prevention projects such as evacuation drills that had been regularly held until then have been canceled, forcing residents to search for evacuation centers online and prepare their own methods of evacuation and evacuation.

Under such circumstances, we report on our efforts to build a new website platform for

mother-child evacuation centers during disasters so that families with pregnant women and newborns can identify in advance which shelters are available to accept them.

It is important to establish places for pregnant women, mothers, and children during disasters, because they are often the most vulnerable populations in emergencies (Dickinson et al. 2016). They have special demands, such as prenatal and neonatal care (Suzuki et al. 2022). Access to medical treatment may be limited during a crisis; consequently, shelters equipped with medical personnel and supplies ensure that vulnerable populations receive the care they require (Harville et al. 2010). Lactation consultants and other breastfeeding resources can be provided in designated shelters to ensure that nursing mothers and their infants receive the support they need to continue breastfeeding during and after a disaster (Mudiyanselage et al. 2022). They require specialized supplies including diapers, formula, and baby food. They must have access to the resources they require to keep healthy and safe amid disasters. Pregnant women and new mothers may experience anxiety, stress, and depression during and after a disaster (Sahoo et al. 2021). Designing shelters with mental health professionals and support groups can help people cope with the emotional and psychological effects of disasters (Ren et al. 2014). Furthermore, pregnant women and mothers with young children may have limited mobility and require assistance in evacuating to safe areas. Without adequate shelter and supplies, individuals may be more vulnerable to injury, illness, and even death during disasters.

Overall, building and developing places for pregnant women, mothers, and children during disasters is crucial to ensure their safety, health, and well-being.

However, lessons learned from previous disasters raised the challenges faced by pregnant women and mothers with young children during disasters, such as a lack of privacy, inadequate supplies, and difficulty in accessing medical care, and emphasized the need for disaster planning that specifically addresses the needs of this vulnerable population (Veenema et al. 2023).

In the aftermath of Hurricane Katrina in 2005, the Louisiana Department of Health and Hospitals established a mother's Room in the Superdome emergency shelter, which provided a private space for breastfeeding and infant care (Deitz 2015). In response to the 2010 earthquake in Haiti, the United Nations Population Fund (UNFPA) established mobile clinics to provide medical care and support to pregnant women and mothers with young children in emergency shelters (United Nations Population Fund 2010). Following the 2011 earthquake and tsunami in Japan, the Japanese Red Cross established a network of

Child-Friendly Spaces in emergency shelters to provide a safe and supportive environment for children to play and learn (Asia-Pacific Human Rights Information Center 2012).

Currently, several common manuals and guidelines exist for emergency shelters for maternal and child health during disasters. The most popular guidelines are the Sphere Handbook (The Sphere Project 2018). The Sphere Project is a global initiative that strives to improve humanitarian response quality by establishing basic catastrophe response criteria. The Sphere Handbook offers recommendations for providing mother and child health services in emergency contexts, such as emergency obstetric and newborn care, family planning, and infant and young child feeding.

In addition, an interagency field manual on reproductive health in humanitarian situations is available (Foster et al. 2017). This manual, developed by the Inter-Agency Working Group on Reproductive Health in Crisis, provides guidance on the provision of reproductive health services in humanitarian emergencies, including guidelines for maternal and newborn healthcare, family planning, and the prevention and management of sexually transmitted infections. The minimum initial service package for reproductive health in crisis scenarios is a set of priority actions that should be provided within the first few days and weeks of a humanitarian emergency (UNFPA 2020). The package includes guidelines for providing maternal and newborn healthcare, family planning, and prevention and management of sexually transmitted infections. The Baby-Friendly Spaces Guidance developed by UNICEF (UNICEF 2018) provides guidelines for setting up safe spaces for pregnant and breastfeeding women, newborns, and young children during emergencies. The guidance includes information on the design and operation of baby-friendly spaces as well as guidelines for providing maternal and newborn health care, breastfeeding support, and age-appropriate play and learning activities.

Several tools have been disseminated by the World Health Organization to assess maternal and child health issues in humanitarian emergency settings (Pyone et al. 2015). These manuals and guidelines provide a comprehensive framework for emergency shelters to ensure maternal and child health during disasters.

Until now, most of municipalities in Japan are not fully prepared to establish maternal and child welfare shelters because they lack knowledge of the supplies and equipment required for pregnant and nursing mothers and their children (Yoshida 2021). The 23 wards of Tokyo, Japan's capital city with its largest population and birth rate, in particular, have not been investigated for disaster readiness for maternal and child life.

This study examines the current situation of disaster preparedness for welfare shelters for pregnant and nursing mothers and their children in 23 special wards of Tokyo, which has the highest birth rate (approximately 70,000 per year in 2022) in Japan. In addition, to disseminate information about shelters widely, we visualized information about evacuation centers in advance using websites.

II. Methods

The researchers have surveyed 23 special wards in Tokyo through the Internet, e-mail, and interviews. The 23 Wards are numbered in administrative order: (1) Chiyoda, (2) Chuo, (3) Minato, (4) Shinjuku, (5) Bunkyo, (6) Taito, (7) Sumida, (8) Koto, (9) Shinagawa, (10) Meguro, (11) Ota, (12) Setagaya, (13) Shibuya, (14) Nakano, (15) Suginami, (16) Toshima, (17) Kita, (18) Arakawa, (19) Itabashi, (20) Nerima, (21) Adachi, (22) Katsushika, and (23) Edogawa.

Variables related to maternal and child welfare shelter (MCHWS) including specialized facilities for mothers and children (six wards: Chiyoda, Bunkyo, Shinjuku, Ota, Setagaya, and Arakawa), welfare shelters accessible to mothers and children (seven wards: Meguro, Ota, Nakano, Suginami, Toshima, Arakawa, and Adachi), and the fertility rates of the wards were determined. The relationship between existence and the total fertility rate (TFR) was assessed using the t-test and rank-sum test. All statistical analyses were performed using Stata/MP 16.1 (StataCorp, College Station, TX, USA). The TFR is the average number of children a woman would assume that current age-specific birth rates remain constant throughout her childbearing years (usually considered to be ages 15–49 years).

The contents of the inquiries by e-mail were as follows: facilities for pregnant women and infants, their names, and addresses, the manual for operating welfare shelters for mothers and children, the number of acceptable people, equipment, supplies, and the number of staff and doctors at each shelter.

Interviews were conducted in five wards (Chiyoda, Shinjuku, Bunkyo, Setagaya, and Arakawa) that have welfare shelters specifically for mothers and children. The inquiries were as follows: the current situation of shelters for mothers and children, number of welfare shelters, capability, dispatch of midwives, delivery handling, manuals for mothers and children, and public information to the residents. Researchers interviewed the person in charge between 2021/10/11 and 12/15 at their office.

The locations and facilities of welfare shelters in Tokyo were mapped onto a website using

WordPress. The products were designed by web experts who used the WordPress engine and registered on the wordpress.com site, the fastest indexed by the Google search engine.

III. Results

1 Situation of welfare shelters in 23 special wards in Tokyo

Shelters that accept pregnant and nursing mothers, infants, and their children and their addresses were collected. Shinjuku, Bunkyo, and Setagaya Wards publish a list of welfare shelters on the Internet. Because there was no information on welfare shelters on the Internet, we contacted 20 wards in Tokyo by e-mail and received responses from all.

Table 1 presents the classification of welfare shelters for mothers and children in Tokyo's

Table 1 Classification of shelters for mothers and children in 23 special wards in Tokyo

No.	Ward	Number of specialized facilities for mothers and children	Number of welfare shelters accessible by mothers and children	Space for people with special needs in general evacuation center	TFR**	number of births
1	Chiyoda	1 (pregnant only)		+	1.23	601
2	Chuo			+	1.37	1,969
3	Minato			+	1.27	2,461
4	Shinjuku	16		+*	0.97	2,304
5	Bunkyo	4		+	1.12	1,855
6	Taito			+*	1.10	1,520
7	Sumida			+	1.08	2,230
8	Koto			+	1.20	3,957
9	Shinagawa			+	1.15	3,536
10	Meguro		22	+	0.96	2,096
11	Ota	2	18 (children only)	+	1.09	5,152
12	Setagaya	7		+	1.03	6,713
13	Shibuya			+	1.05	1,909
14	Nakano		22 (children only)	+	0.96	2,387
15	Suginami		7	+	0.96	4,078
16	Toshima		21 (children only)	+*	0.93	1,855
17	Kita			+	1.13	2,548
18	Arakawa	1	21	+	1.17	1,548
19	Itabashi			+*	0.99	3,675
20	Nerima			+	1.06	5,236
21	Adachi		69	+	1.10	4,144
22	Katsushika			+*	1.14	2,888
23	Edogawa			+*	1.20	4,683

* Nursing room available, ** total fertility rate, TFR

Source: Vital Statistics, 2022 (Tokyo Metropolitan Government 2021a, 2021b)

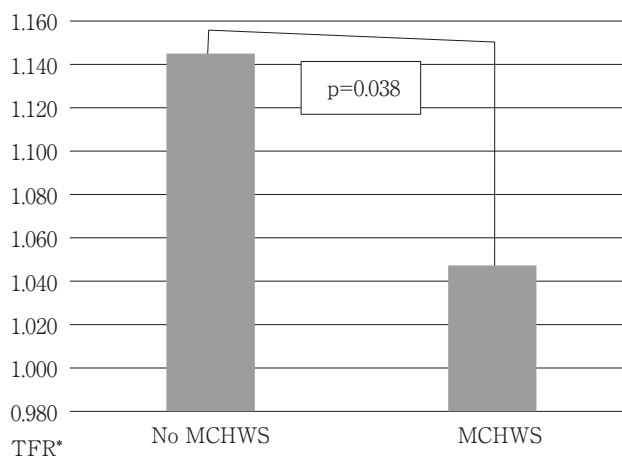
23 wards. The number of specialized facilities for mothers and children was assessed through mail surveys. All 23 wards had general evacuation centers with spaces for people with special needs, including the elderly, persons with disabilities, foreigners, infants, and expectant mothers. The nursing room is located in six wards. In addition, six wards (Chiyoda, Shinjuku, Bunkyo, Ota, Setagaya, and Arakawa) had specialized facilities for mothers and children, and seven wards (Meguro, Ota, Nakano, Suginami, Toshima, Arakawa, and Adachi) had welfare shelters accessible to mothers and children. Most wards developed these facilities after the Great East Japan Earthquake (Chiyoda: 2014; Shinjuku: 2001; Bunkyo: 2013; Ota: 2015; Setagaya: 2014; Arakawa: 2011).

The researchers surveyed the annual number of births and the total fertility rate (TFR) in each ward according to the Vital Statistics (Tokyo Metropolitan Government 2021a, 2021b). Setagaya Ward, the largest ward in terms of annual births, had a total fertility rate of 1.03.

2 Relationship between the existence of specialized facilities for mothers and children and TFR in 23 special wards in Tokyo

Figure 1 shows that the wards which have specialized facilities for mothers and children (6 wards: Chiyoda, Shinjuku, Bunkyo, Ota, Setagaya, and Arakawa) or welfare shelters accessible by mothers and children (7 wards: Meguro, Ota, Nakano, Suginami, Toshima, Arakawa,

Figure 1 Statistical significance of total fertility rate (TFR) with or without maternal and child welfare shelter (MCHWS)



*TFR = total fertility rate, **MCHWS: Maternal and child welfare shelter

***p was calculated by chi2-squared test

and Adachi) has statistically significant lower TFR ($p=0.033$, $SE=0.03$) than those who don't have both type of the welfare shelters for mothers and children (1.145, 1.047, respectively) and for those who has the maternal and child welfare shelter (MCHWS) had a lower TFR (OR, .0000252; 95% CI:0.06–0.93).

3 Situation of welfare shelters in 5 wards which have shelters specialized for mothers and children

Of the six wards that had specialized facilities for mothers and children (Table 1), interviews were conducted in five wards (Chiyoda, Shinjuku, Bunkyo, Setagaya, and Arakawa) with welfare shelters exclusively for mothers and children.

Only Bunkyo Ward has established an evacuation center for mothers and children, which may provide evacuees with specialized services with standard manuals and checklists. Individual evacuee sheets (Figure 2) included a column for pregnant women to enter their conditions, such as the presence or absence of morning sickness or abdominal pain. The “Guidelines for the Establishment and Operation of Expectant Mothers and Infants Rescue Shelters” (Bunkyo Ward 2020) were available for inspection in Bunkyo Ward.

As a current status, total number of facilities, number of people accommodated in shelters for mothers and children, dispatch of midwives, delivery handlings, manuals for mothers and children, and public information in 5 wards are shown in Table 2.

Table 2 Capacity and services available in the shelter

	Chiyoda Ward	Shinjuku Ward	Bunkyo Ward	Setagaya Ward	Arakawa Ward
Number of the welfare shelter	1	16	4	8	1
Total number of people	10	50	240	80	500
Dispatch of midwives			+	+	+
Delivery handling			+	+ (equipment available)	
Manuals for mothers and children			+	+	
Public information			+		+

+ Services available in shelters

Figure 2 Evacuee information sheet in the shelter for pregnant and nursing mothers and children

Date and time		/	/
Shelter	<input type="checkbox"/> A University <input type="checkbox"/> B University <input type="checkbox"/> C College <input type="checkbox"/> D College		
Information of mothers			
Name		Blood type	
Date of birth	/ /	Age	y.o.
Address			
Telephone number			
E-mail address			
Expecting date			
Information of infants (with a mother described above)			
Name		Blood type	
Date of birth		Age	
Emergency contact			
Name		Relationship	
Address			
Telephone number			
E-mail address			
Medical check			
Allergy	<input type="checkbox"/> Yes <input type="checkbox"/> No Food () Medicine () Others ()		
Taking medicine	<input type="checkbox"/> Yes <input type="checkbox"/> No () <input type="checkbox"/> brought <input type="checkbox"/> not brought () <input type="checkbox"/> brought <input type="checkbox"/> not brought		
Medical history	<input type="checkbox"/> Yes <input type="checkbox"/> No () <input type="checkbox"/> under treatment <input type="checkbox"/> end of treatment () <input type="checkbox"/> under treatment <input type="checkbox"/> end of treatment		
Disclosure of information	To inform name, address, evacuation <input type="checkbox"/> Consent <input type="checkbox"/> No consent		
Current problems on physical conditions of mother			
Do you have any anxiety of physical condition?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Do you have any injury which needs treatment?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Do you have fever, cough, diarrhea, or vomiting?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Do you have abdominal ache, bleeding or water breaking?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Remarks by shelter staff			
Number of accept		Name of shelter	
Moving out		Name of relocation	

Arakawa and Bunkyo wards conducted publicity activities to inform people that there are shelters exclusively for mothers and children. Specifically, Arakawa and Bunkyo wards put up signs at facilities designated as evacuation centers. Bunkyo Ward posts flyers on its website and includes flyers in the “Mother and Child Health Bag” distributed to all pregnant women. Shinjuku, Chiyoda, and Setagaya Wards do not actively engage in public activities.

4 Stockpiled supplies and facilities at shelters for mothers and children in the 4 wards

At the time of the interview, the researchers received a list of stockpiled supplies in the mother-child refuge shelters and compared the supplies common to all shelters with those unique to each shelter (Table 3). Supplies in Chiyoda Ward was excluded from comparison because they are currently under investigation and are not answered this time.

All four shelters had the following supplies: a portable cooking stove, a kettle, drinking

Table 3 Supplies and facilities at shelters for mothers and children in the 4 wards

	Shinjuku Ward	Bunkyo Ward	Setagaya Ward	Arakawa Ward
Portable cooking stove & kettle	+	+	+	+
Drinking water	+	+	+	+
Powdered milk with allergic consideration	+	+	+	+
Powdered milk without allergic consideration	+	+	+	+
Feeding bottle	+	+	+	+
Diaper with various size	+	+	+	+
Keeping Privacy	+	+	+	+
Wet tissue	+	+	+	+
Wet tissue for babies	+	+	+	
Sanitary napkin with various size	+	+	+	
Sanitary napkin of one size	+		+	
Mobile toilet	+		+	+
Liquid milk		+		+
List of evacuees at home		+		+
Medical equipment		+	+	
Baby food with allergic consideration			+	
Baby food without allergic consideration	+			+
Underwear with various size				
Underwear of one size		+		

+ Supplies available in shelters

water, powdered milk with/without allergic consideration, a feeding bottle, diapers of various sizes, wet tissue, and privacy. Furthermore, some shelters had sanitary napkins, mobile toilets, and knickers for mothers, but not all. The Bunkyo and Arakawa wards have a list of evacuees at home, which is crucial.

5 Map of shelters for mothers and children

The map provides basic information on the shelters that accept mothers and children from Tokyo's 23 wards (Figure 3 and 4). The main items were as follows: Address, Google Maps, telephone number, fax number, e-mail address, website URL, photographs, and number of people to be accepted (Yoshida 2020) .

The researchers proposed making a “map of shelters for mothers and children” on the “giftfor” website and making a “map of shelters for mothers and children” using Google Maps’ “My Maps” option. As information became available, researchers expanded mother-child shelters outside of Tokyo’s 23 wards.

Figure 3 Map of shelters for mothers and children in times of disaster (in Japanese)



Figure 4 Details of shelters for mothers and children in Arakawa Ward (in Japanese)



6 Development of a tool for estimating the number of mothers and children evacuated from the affected area

In conducting this study, the number of evacuees is the basis for local governments to plan and formulate disaster relief measures for pregnant and nursing mothers and infants. Since pregnant and nursing mothers fall out of the category of pregnant and nursing mothers after about 10 months, it is impossible for local governments to begin policy planning unless they know how many mothers and children they need to support during a disaster.

Therefore, from an obstetric and gynecological perspective, the following figures were used to estimate the number of eligible persons.

- Basic numbers: Number of births per day at the time of the disaster
- Number of births per year \div 365 = number of births per day, @ *Rounded to the nearest whole number
- Number of pregnant women
- Number of @ \times 280 days (gestational age) = Pregnant women from early pregnancy to full term
- Number of full-term pregnant women and newborns
- Number of @ \times 28 days = Number of pregnant women from 37 to 40 weeks, number of newborns at 4 weeks of age
- Number of postpartum mothers
- Number of @ \times 42 days = Number of mothers within 6 weeks of postpartum

For generalization and verification of probability, we compared the estimated figures with the actual situation in several municipalities, and confirmed that the errors were small (MIAC 2022). However, this calculation tool does not consider home deliveries or relocation, so the figures may be an overestimate.

Figure 5 shows the Maternal and Child Population Calculation Tool, which can be utilized

Figure 5 Introduction of the maternal and child population calculation tool



Figure 6 Maternal and child evacuee population calculation tool



the calculation tool to calculate the number of mothers and children evacuated from this area. By entering the annual number of births in your area, the numbers in Figure 6 below can be automatically and instantly derived.

The above automatic calculation tool is now available on the website (Figure 5) so that anyone can easily calculate the number of mothers and children covered. An automatic calculation tool for estimating the number of target population in the maternal and child health field, which can be calculated from the annual number of births per basic municipality (Figure 6), was developed and made accessible online to all.

IV. Discussion

This is the first study to examine the current state of evacuation shelters for pregnant and nursing mothers, as well as children, in Tokyo, Japan, a disaster-prone country.

During a crisis, pregnant and nursing women and their children are less likely to be aware that they “need to be taken care of” and are more likely to receive inadequate help, despite being explicitly identified as “persons requiring special consideration.” It is critical to build and widely publicize welfare shelters designed specifically for pregnant and nursing mothers and their children, where they can go with peace of mind and readily obtain care, and where those who provide support can quickly find assistance.

The situation of shelters in all 23 wards of Tokyo was surveyed. While all municipalities set up general evacuation centers, six wards had facilities specialized for mothers and children, and seven wards had welfare shelters accessible to mothers and children. However, there were considerable variations among shelter municipalities. Even among municipalities that have prepared welfare shelters specifically for mothers and children, some do not actively recommend evacuating to shelters but rather recommend staying at home (Tokyo Metropolitan Government 2018). However, pregnant mothers and families with infants should be provided suitable places to stay when needed.

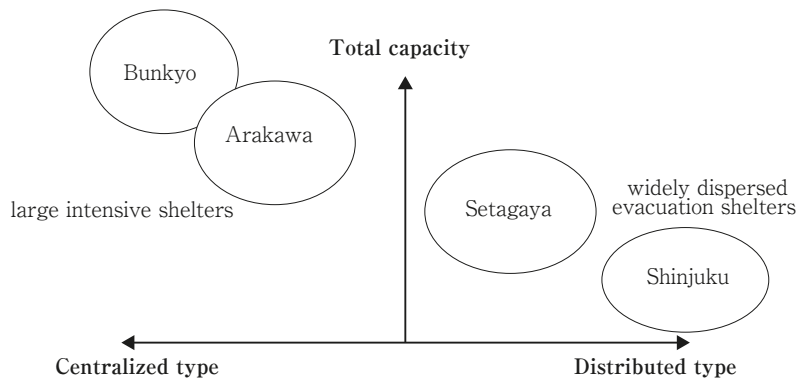
Wards with specialized facilities for women and children had significantly lower TFR than those without any sort of welfare shelter for mothers or children. The fact that the 11 wards that built mother-child shelters have a marginally, but statistically substantially lower TFR may imply that the sense of crisis over the dropping birthrate has contributed to the development of mother-child shelters. As a result, wards in metropolitan areas with the highest birth rates in the country demonstrate a dedication to protecting pregnant women and infants during catastrophes as a countermeasure to the declining birthrate. We believe that the other 1,700 cities, wards, towns, and villages in Japan should also reconsider the idea of mother-child evacuation centers as part of their measures against the declining birthrate.

Although the situation of evacuation centers should be considered in accordance with the characteristics of each municipality, it is highly important to establish unified standards and basic manuals and methods useful in all municipalities to inform those who are in need.

Interviews conducted in the five wards also revealed differences in the concept and positioning of shelters for pregnant and nursing mothers and children in each municipality, making it difficult to compare shelter positions on a single axis. Four shelters for pregnant women and infants have already been created in Bunkyo Ward to accommodate evacuees. In the “welfare shelters” that accept people who have difficulty moving and living alone, Shinjuku, Setagaya, and Chiyoda wards set up shelters for mothers and children. Arakawa Ward identifies the shelters for mothers and children as “secondary shelters,” which accept persons without reservation who are unable to stay at primary evacuation centers; evacuees can receive help that is tailored to each person with specific needs.

In the five wards, the evacuation centers can be divided into two types: large intensive shelters (centralized type) and small, widely dispersed evacuation shelters (distributed type). Two wards each set up the centralized type and distributed type is set up by 2 Ward (shown in Figure 7).

Figure 7 Typing of shelters for mothers and children



To verify the effectiveness and efficacy of these shelter types, further studies are required.

The equipment for mothers and children in the shelter was first listed in this study. The basic equipment in the four shelters was as follows: portable cooking stoves and kettles, drinking water, powdered milk with allergic considerations, powdered milk without allergic considerations, feeding bottles, diapers of various sizes, wet tissue, and partitions to maintain privacy. This will help establish a standard manual for developing shelters.

During the peacetime, a map of shelters is required to convey information with Japanese moms and foreigners. Foreigners with children living in Japan will find it more difficult to prepare for a disaster because of linguistic limitations. Many foreigners might benefit from the website's English edition.

A limitation of this survey is that information was collected and shared only in the 23 Wards of Tokyo. However, the researchers surveyed the most densely populated areas and those most at risk from disasters, with 70,000 births per 1.4 million population. It is necessary to expand the collection and sharing of shelter information to the greater Tokyo area as well as to the entire country by collaborating with colleagues. If information on evacuation shelters can be disseminated through the website developed in this study, it will be useful to better understand disaster preparedness and approaches that lead to behavioral changes in pregnant and nursing mothers. To verify its effectiveness, additional surveys are required to determine how well a website is recognized, and whether it is useful.

There are some ways to promote and spread information on evacuation shelters for maternal and child health. First, researchers could work with the local government: collaboration with local governments and disaster management agencies can be beneficial. It can guaran-

tee that information is incorporated in disaster preparedness plans and shared through official channels, such as emergency warning systems, by partnering with local governments. Second, collaborating with local organizations such as women's groups, childcare organizations, and health clinics can be an efficient approach to promote and disseminate information about maternal and child health evacuation shelters. These organizations may already have networks and channels in place for communicating with their members and communities. Third, researchers should make greater use of social media: social media may be a tremendous instrument for distributing information about maternal and child health evacuation shelters. Shelters and their facilities can be shared through social media platforms like as X (formerly Twitter), Facebook, and Instagram. Social media can also be used to communicate with the community, answer inquiries, and address issues (Han et al. 2020, Khan et al. 2019). Fourth, distributing leaflets and brochures could be an efficient strategy to promote and disseminate information about mother and child health evacuation shelters. Local organizations, health clinics, schools, and community centers can disseminate these resources. They can also be found in public places like train stations and shopping malls. Finally, training and awareness programs for residents and volunteers can help promote and spread information about evacuation shelters for maternal and child health. These programs include information on the location and facilities of the shelter as well as training on maternal and child health-care, breastfeeding support, and infant and young child feeding (Semaan et al. 2020).

Using a combination of these methods, we can effectively promote and spread information about evacuation shelters for maternal and child health to the local community.

To verify the effectiveness of a website promoting evacuation shelters for maternal and child health during disasters, several approaches can be taken. First, collecting feedback from users who have used the website can provide valuable insights into its effectiveness. This can be achieved through surveys, user tests, or focus groups. Second, analyzing website traffic data can provide insights into how users interact with websites. Metrics such as page views, bounce rate, and time spent on the website can help determine whether users find the information they need and engage with the website. Third, monitoring social media platforms for website mentions can provide insight into how they are perceived and used by the public. Fourth, case studies of communities that have used the website and successfully implemented maternal and child health services in evacuation shelters can provide concrete evidence of its effectiveness. This study recognizes the importance of sharing shelter information in different languages, including English, to help foreigners residing in Japan pre-

pare for disasters.

Furthermore, to conduct additional research and behavior change in the future, we could identify research questions with expectant mothers, government staff, NGO staff, and experts that need to be answered to improve the website and its effectiveness in promoting maternal and child health in evacuation shelters during disasters. Researchers may use the research findings to make improvements to the website and its approach to promoting maternal and child health in evacuation shelters. We will continue to monitor and assess the success of the adjustments implemented, and will make additional improvements as warranted. It may be necessary to repeat the study process in order to uncover more areas for improvement.

This study revealed that the common supplies and equipment of shelters for maternal and child health among municipalities will lead to standardized guidelines for establishing mother-child evacuation centers. Although it would be difficult to establish a unified standard shelter for all municipalities, the researchers offer a basic supply list and guidelines. The researchers hope to use this web platform to share information about all maternal and child health welfare shelters in Japan.

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