

Investigation of Indicators at Each Stage of the Disaster Process from a Gender Perspective

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1. Introduction

When evaluating the damage and reconstruction process in the areas affected by the Great East Japan Earthquake and Tsunami, it is necessary to not only examine infrastructure development and housing security, but also consider the condition of daily living areas prior to the disaster and the conditions that support human livelihoods in relation to urban areas, such as work, care services, and attachment to, pride in, and comfort with the community, which transcend municipalities and similar cultural spheres. A closer look at the trends of people’s movements and lifestyles based on such regional conditions is needed, for which a gender perspective is essential.

Looking at demographic trends for instance, the survival strategies of individuals and families, such as the choice of family lifestyle, including family relations and economic problems, have a strong effect on how they live. Therefore, it is essential to look at household status and access to the workplace (multiple families work to establish a family budget in many cases), level of childcare and nursing care services, and the trends of domestic violence and abuse. Furthermore, it is necessary to look at the degree of participation of women in the reconstruction planning process in order to see how citizens’ perspectives are reflected in reconstruction projects.

Therefore, this paper summarizes the significance of gender perspectives in setting indicators related to the damage situation and the progress of reconstruction in the areas affected by the Great East Japan Earthquake, and examines the possibility of establishing specific indicator criteria. The data items listed this time were limited to quantitative data and comparable data between municipalities, but the possibility of establishing indicators based on qualitative data will be a topic for future study.

2. Examination of Indicators

2-1. Examination Framework and Review of Previous Research

Prior to the study, a comprehensive search was conducted of domestic literature, which referred to gender-related issues in the disaster process, including those even before the Great East Japan Earthquake and Tsunami. Among these, 114 articles were selected for their high research value and divided into 18 items (Table 1). We actively searched for literature other than academic articles for Group A in Table 1. Academic articles and books were the primary focus in Groups B-E, with a search done on a wide range of themes.

Table 1: Categories of Literature on Disasters and Gender in Japan

Group A: Understanding the entire domain
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(1) Overview

(2) Policy

(3) Support Activities (including grassroots groups)
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(4) History and Records
Group B: Preparedness
(5) Disaster Prevention Awareness and Human Resource Development
(6) Disaster Prevention Activities in Community
Group C: Emergency Response
(7) Casualties and Evacuation Behaviour
(8) Evacuation Life (including wide-area evacuation)
(9) Medical Care, Public Health and Welfare
Group D: Recovery and Reconstruction
(10) Family Life (e.g. marital and family relationships, child-rearing, caregiving, etc.)
(11) Economy (employment and labor)
(12) Housing
(13) Reconstruction and Community Development
Group E: Other Important Themes
(14) Gender-Based Violence (sexual assault, domestic violence, abuse)
(15) Adolescent and young adult women
(16) People with disability
(17) Sexual Minorities
(18) Ethnic Minorities

As a result, the importance of a gender-oriented analysis of various livelihood issues at each stage of the disaster process was once again clarified. However, academic papers based on quantitative surveys are limited, and public statistical data have not been fully utilized. Therefore, it can be said that it is meaningful to try to use diverse statistical data to analyze the disaster process of the Great East Japan Earthquake and Tsunami from a gender perspective.

Many of the studies concerning the Fukushima Daiichi nuclear disaster have gender perspectives such as family relations, but only a few studies on tsunami-affected areas included a gender perspective.

It can be said that the incorporation of gender perspectives was inevitable with respect to the nuclear disaster because the problems of family separation immediately following evacuation, long-term living at distant evacuation destinations, conflicts between families over return, and wide-area evacuation for mothers and children in particular became apparent. However, the selection of evacuation destinations and housing reconstruction even in tsunami-affected areas should, to a certain extent, be related to family relationships, and there should be many cases where households were separated or reorganized (Maeda, Tsukuda, Onoda et al., 2020).

For example, Karatani et al. conducted a detailed analysis of 14 households that successfully relocated and rebuilt their homes in Rikuzentakata City, Iwate Prefecture (Karatani and Kondo, 2016). This study showed that decision-making and relationships (human resources) that were useful for reconstruction were based on multiple factors, such as perception of risks of disasters; relationships with children, the elderly, and the community; age (particularly dealings with mortgage issues); land ownership status; and progress of reconstruction projects. The subjects were thought to be households with relatively favorable conditions, but these results suggest that many

factors need to be considered even in such cases.

Based on these previous studies, we examined statistical data items that were considered necessary as indicators for assessing the impact of damage and the state of reconstruction in the affected area. These are summarized in Table 2. In the next section, we explain the purpose of setting indicators for the stages of the disaster process while also providing an outline of related previous research.

We unfortunately abandoned the task of setting up indicator items for wide-area evacuations due to the effect of the Fukushima Daiichi nuclear disaster since it was considered difficult to statistically indicate the actual conditions of evacuation life and changes in households.

2-2. Investigation of Indicators at Each Stage of the Disaster Process

The assumption based on discussions at our group is that the indicators should be examined at each stage of the Great East Japan Earthquake and Tsunami: ①The Direct Damage Phase (based on the circumstances before the disaster) ②The Emergency Evacuation Phase ③The Refugee Phase ④The Provisional Living Phase ⑤The Recovery and Reconstruction Phase. Among these indicators, in particular ⑤The Recovery and Reconstruction Phase needed to be compared with the pre-earthquake situation, so a “All Stages of Disaster” indicator category was established as shown in Table 2. Using this “All Stages of Disaster” indicator category, we decided to compare ① and ⑤. In the following, we will examine each phase.

1) All Stages of Disaster

The first element to observe with respect to the changes in the disaster process in affected areas is demographic and household structure changes. It is particularly important to see whether or not the population structure would be sustainable in the future in areas where depopulation is progressing. Therefore, it is necessary to examine the dynamics of young women as well as the working-age population over time. It will also be necessary to use gender-based statistics to conduct a detailed analysis of the movement of the place of residence based on school or employment, employment and labor situation, trends of people returning to or migrating from local areas, and the actual conditions of childcare and nursing care.

Table2: Recovery Indicators from Gender Perspective

< All Stages of Disaster >

* Trend of declining birthrate and population aging

- Population composition
- Birth rate
- Social Mobility (including day and night population)
- Sex ratio of young population
- Social Mobility of Young Population by sex
- Changes in mutual aid relationships within households
- Household size and structure (three-generation, nuclear family, single-parent household)
- Social mobility (especially for women and young households)
- Population and Employment in place of work/schooling

<ul style="list-style-type: none"> * Situation of Employment <ul style="list-style-type: none"> • Employment rate • Sex-ratio of Workers by Sector • Number of unemployed people * Career Path after high school graduation <ul style="list-style-type: none"> • Job placement and college advancement rates * Care service <ul style="list-style-type: none"> • Distance to nursery school and day-care centers • Nursery capacity and number of children on waiting lists • Number of people requiring assistance and care (by care level) *Percentage of households on public assistance *Suicide rate *Community <ul style="list-style-type: none"> • Percentage of female community leaders * Women's Consultation Service <ul style="list-style-type: none"> • Number of consultations * Politics <ul style="list-style-type: none"> • Percentage of female politicians
<p>< The Emergency Evacuation Phase ></p> <ul style="list-style-type: none"> * Evacuation Behavior <ul style="list-style-type: none"> • day and night population • Casualties • Existence and Number of Members of Women's Groups for Disaster Prevention in Community
<p>< The Refugee Phase ></p> <ul style="list-style-type: none"> *Shelter Management and Support for evacuees at home <ul style="list-style-type: none"> • Percentage of female community leaders • disaster-related death
<p>< The Provisional Living Phase ></p> <ul style="list-style-type: none"> * Housing <ul style="list-style-type: none"> • Number of people living in temporary housing * Care <ul style="list-style-type: none"> • Number and ratio of life support staff * Trends in Life Reconstruction <ul style="list-style-type: none"> • Academic surveys and surveys by local governments
<p>< The Recovery and Reconstruction Phase ></p> <ul style="list-style-type: none"> * Build Back Better <ul style="list-style-type: none"> • Percentage of female members of the Recovery Planning Committee • Improving municipal disaster management policies from a gender perspective: Staffing, number of committee members, manuals, storage of goods, etc.

Regarding the outflow of young people from rural areas to large cities, it became clear that there were no attractive employment opportunities in rural areas and that among young people who have left rural areas, women in particular had a strong tendency not to return to their hometowns. This led to measures by the central government to revitalize rural areas (“Long-term Vision for Overcoming the Population Decline and Vitalizing Local Economy”).

Therefore, the degree of retention of women who bear and raise children is closely related to trends in depopulation, and creating a community in which these women can live is one of the most important issues to halt the progress of depopulation.

For example, Asakawa analyzed the effects of the earthquake on the population structure in Otsuchi Town, Iwate Prefecture, which was affected by the tsunami following the Great East Japan Earthquake. Specifically, the cohort change rate was calculated by investigating the number of people in five-year increments of age using the pre-disaster year 2010 as a reference, and comparing the figures with the values five years prior to the reference year. Future population estimates were made for every five years up to 2040. The impact of the earthquake on the population can be gauged by comparing this estimate with the actual population after the earthquake (Asakawa, 2017). In the reference year, the number of children under four years of age was extremely small compared to the number of women in the age group that is more likely to have children, both men and women had a strong tendency to leave Otsuchi Town when advancing to high school, university, etc., and the number of women returning to their hometowns was relatively low among the few people that actually did return.

Despite the fact that many of these young women have been affected by the life course, such as being burdened with increasing home care work after the earthquake, being forced to change jobs or their career paths, and being forced to move (Oxfam Japan, 2015), the actual circumstances have not been sufficiently clarified, and these situations have rarely been the target of assistance.

Next, let us examine the relationship between households and employment/labor. Dual-income households have been increasing nationwide in recent years due to worsening economic conditions and changes in the industrial structure. According to Nonaka, there have been a tendency in the Tohoku region, where the earthquake struck, many farmers' households had more than one person working to maintain the household budget, which has resulted in the full-time income of men being kept low in terms of subsidizing household finances (Nonaka, 2009). In fact, wage levels in the Tohoku region are low compared to the rest of the nation (Bank of Japan Sendai Branch, 2019).

Tabata, who has been supporting women in Iwate Prefecture for many years, uses statistical data to provide an overview of the labor problems of women in affected areas of Iwate Prefecture. According to the 2007 Employment Status Survey, the employment rate by age group shows that women exceed the national average at all ages except for those aged 75 years and older. The rate among women aged 30 to 59 years in particular is 10 points higher than the national average. According to the 2009 Basic Survey on Wage Structure, if male wages in the prefecture are set to 100, those for women become 69.1. The study also stated, “the high age-specific female employment rate among women in Iwate Prefecture is desirable, but it is thought that the reason for this is that household incomes are low and living is difficult when only one member of the household is working.” Also, “the average monthly salary per worker is low when counting establishments with less than five workers (not shown in statistics), and it is not difficult to imagine that the actual disparity between men and women would be much larger,” and “the current situation is such that multiple members of the household need to work to maintain a

living” (Tabata, 2012).

Based on the above, it appears that there were many cases where multiple members of the family supported the household budget prior to the earthquake in not only households engaged in agriculture and fisheries, but also others. This trend is expected to be further strengthened due to the increase in spending as a result of the disaster. Therefore, it is necessary to look at changes in the wage levels of men and women due to economic trends prior to the disaster, changes in industrial structure due to damage and reconstruction efforts, and employment needs and matching conditions.

For reference, a detailed comparative analysis by Ogaki et al. of the changes in fishery management bodies and workers in the areas affected by the Great East Japan Earthquake showed that the percentage of enterprises with annual sales of less than 3 million yen in 91 fishery districts was 47.3% in 2008 and 65.7% in 2013. These results showed that the proportion of small enterprises was originally high, and that the proportion of small enterprises increased as the number of entities decreased after the earthquake. It was also pointed out that there was insufficient human labor for land work supported by women and seniors particularly in areas where residential communities became remote, and fishermen began to go back to the sea for longer periods of time, with fishing activities continuing with reduced sales revenue (Ogaki and Saio, 2016).

In addition, Kanbayashi assumed that the disaster problem in Sendai City is unlike that of other areas in the Tohoku region and is closely related to the problems of urban poverty or the peripheral labor market, and analyzed the disaster vulnerability of the younger generation based on survey results of Sendai citizens aged 25-39 years. Results showed that there was a relationship between earthquake disaster damage and social structure, particularly among young women (Kanbayashi, 2014).

With regard to child rearing, Katsuki, Inoue, Nakajima, and others have clarified issues related to child rearing in the areas affected by the Great East Japan Earthquake and Tsunami through interviews with the concerned groups and supporters (Inoue, 2012; Katsuki, 2015; Nakajima, 2019). The widespread damage caused to nursery schools shortly after the disaster not only greatly decreased the amount of nursery services on a temporary basis, but also resulted in the lack of spaces for children to play or for parents and their children to spend time together. Child abuse, divorce, poverty, and teenage pregnancies became common during the reconstruction phase. There were also individual cases where the death of an elderly parent in the disaster left mothers unable to care for their children while they were working, and mothers with disabled children could no longer rely on their parents.

With regard to nursing, there is a study by Kano et al., which investigated the actual conditions of home-care households in affected areas in Iwate Prefecture. A questionnaire survey conducted between December 2013 and January 2014 with the cooperation of in-home support establishments revealed the following: second- or third-generation household structures accounted for nearly 80% of structures despite the small size of households; the percentage of long-term care-givers who say that nursing care is shared or help is available when needed was relatively lower among men than women; the unemployment percentage was higher than the prefecture average (particularly for men); those who have “slightly difficult” or “difficult” family circumstances comprised over 40% of respondents, and this trend was worsening; and “medical care (outpatient)” was listed as a difficult factor for nursing care by 50% of respondents (Kano, Tanaka, Iwabuchi et al., 2017). The research group led by Kano also selected 32 households from among the survey subjects and carried out seven follow-up surveys on the detailed situation of each household up to the reconstruction phase (Kano, Tanaka, Iwabuchi et al., 2017).

It is also necessary to keep in mind that the conditions for access to medical services when medical care is required can have a major impact on the household budget and livelihoods of family members providing care. A detailed case analysis by Niinuma showed that the livelihoods of families of patients in rural areas were seriously impacted as a result of the rapid restructuring medical care system promoted under national policies (Niinuma, 2012). It is necessary to consider how the effects of promoting medical reorganization regardless of the earthquake disaster and the impact of damage to medical institutions due to the disaster influenced evacuation life and daily life reconstruction of families during the reconstruction process.

Problems of violence against women and children have occurred from immediately after the event to the reconstruction phase (Women's Network for East Japan Disaster (Survey Team), 2013), so we decided that the occurrence of problems of violence such as domestic violence and abuse should be considered at all phases, and the number of women's counseling cases were added as indicator items.

2) The Emergency Evacuation Phase

We examined data that can be used as indicators of evacuation behavior and evacuation life in the first phase of the Great East Japan Earthquake and Tsunami and the Fukushima Daiichi nuclear disaster. We used day/night population, number of people requiring long-term care, human damage, and the presence of female disaster prevention organizations in the area as indicator items in order to examine the relationship between the situations of people in the region at the time of the event and the disaster response capability.

Looking at the overall trend of tsunami victims, we found that of the deaths in the three prefectures of Iwate, Miyagi, and Fukushima, which were badly affected by the tsunami, those who underwent an autopsy (as of March 11, 2012) included 8,363 females, 7,360 males, and 63 whose gender was unknown. There were approximately 1,000 more women than men, which was largely due to the difference in the number of deaths in those aged 70 years or older. The percentage of people aged 60 years or older in the population was 35.0% and 28.9% for women and men, respectively, while the mortality rates among those aged 60 years or older were 67.6% and 63.7% for women and men, respectively, which shows that there were many elderly individuals killed regardless of gender (Gender Equality Bureau Cabinet Office, 2012).

Nevertheless, some studies suggest that gender differences have occurred. For example, research by Mikami on tsunami victims in Yamada Town, Iwate Prefecture, and Ishinomaki City, Miyagi Prefecture, showed that the proportion of women was particularly high among victims who evacuated on foot (Mikami, 2014). Women constituted a high percentage of those in charge of family care, so the percentage of women who became victims alongside families who struggled to evacuate was high as well.

Meanwhile, a survey by the Gender Equality Bureau Cabinet Office of the victims revealed that a high percentage of men evacuated alone (female 13.1%, male 29.2%), a high percentage of women evacuated in groups (female 82.1%, male 64.0%), and a higher percentage of women than men responded that they obtained information via tsunami and evacuation warnings and chose to evacuate upon hearing the warnings or being advised by family members or neighbors to do so. In other words, women's behavior in the event of a disaster was strongly influenced by their relationships with local people compared with men. It is also clear that many women disaster prevention leaders rooted in the community took part in evacuation guidance and provided support for evacuation life (Asano, 2013).

Looking at the general trend of day/night populations, it was found that the percentage of women was high during the daytime on weekdays, with many providing the usual care for infants, the elderly, disabled, etc. The percentage of victims in each age group under the age of 70 years during the Great East Japan Earthquake and Tsunami either changed only slightly or had slightly fewer women. Therefore, it is necessary to investigate in detail the role played by women in evacuation actions at home and in the community.

Male victims are thought to have been influenced by the concentrated workplaces in coastal areas depending on some regions, those who were offshore to protect their ships, and those engaged in evacuation guidance as members of the fire brigade or community associations right until the arrival of the tsunami.

3) The Refugee Phase

For the Refugee Phase as an early stage of evacuation life, it is important to maintain a standard of care in evacuation centers and home evacuation, which is closely related to gender issues. Regardless of the fact that women are in charge of much of family care, the difficulties and burdens borne by them during a disaster increase drastically. Furthermore, there are hardly any women involved in decision-making areas, such as the operation of disaster management headquarters and evacuation centers in local governments, and the quality of support in areas such as hygiene, nutrition, childcare, and nursing care is often not sufficiently secured. Therefore, the percentage of women in leadership roles of community associations, presence of women's disaster prevention organizations and female membership, and the number of disaster-related deaths were added as indicator items.

In reality, the operation of evacuation centers in the initial phase of the Great East Japan Earthquake and Tsunami involved neighborhood association members in leading roles and mutual assistance activities by local women, but still had various problems (Equal-net Sendai, 2009; Gender Equality Bureau Cabinet Office, 2012; Women's Network for East Japan Disaster (Survey Team), 2012, 2013), and even existing local female leaders tended to face difficulties being involved in decision-making areas (Asano, 2013).

4) The Provisional Living Phase

The Provisional Living Phase involves moving into temporary housing in local communities or neighboring municipalities, or undergoing evacuation life in distant locations while considering ways to rebuild life. During this phase, individuals may feel isolated or have difficulties with respect to shopping and childcare/medical care services depending on the region. It is also a phase when there is an increasing possibility of conflicts among families over economic problems (including business reconstruction and securing employment destinations) and housing problems (including selection of destinations for relocation).

Therefore, the economic conditions of temporary housing and intention on housing reconstruction were selected as indicator items for trends in daily life reconstruction. Results of surveys of temporary housing inhabitants conducted by municipalities or researchers or intention surveys for investigating reconstructed community development can be used as data. The number of lifestyle support staff was also included in the indicator items related to quality of life.

For example, Takamatsu et al. analyzed the situation of affected people in temporary housing in Otsuchi Town, Iwate Prefecture, from a gender perspective and clarified the actual living conditions in terms of income and social participation (Takamatsu et al., 2016). This was based on a provisional living survey conducted in the summer of

2014, and although the respondents were skewed toward the population of Otsuchi Town in their 60s and 70s, this serves as a useful reference for seeing the relationship between the social situations from the recovery to reconstruction period and the lifestyle of the affected people.

The percentage of people who responded that their pre-disaster lifestyle was difficult was approximately 40% among those under the age of 60 years and 20% among those over the age of 60 years, but approximately 60% in both groups responded that their post-disaster lifestyle was difficult, indicating that age-related differences had disappeared. Furthermore, approximately 50.0% of women under the age of 60 years had a monthly income of 50,000-150,000 yen, and 14.0% had an income of 150,000-250,000 yen, indicating that they contribute a certain amount to the household budget. Meanwhile, approximately 44.7% and 64.2% of men and women, respectively, who were over the age of 60 years and living alone had a monthly income of less than 100,000 yen, thereby highlighting the economic difficulties. Looking at social participation, 41.8% of males and 53.0% of females participated in some kind of activity, 16.9% of males and 27.5% of females had friends, and 16.6% of males and 28.5% of females participated in events held at temporary housing lots of neighborhood associations, with the results showing that more women in general tended to participate.

The inconvenience of shopping for temporary housing inhabitants in areas spared by tsunami damage has also become a major problem and is considered a serious focus area (Matsuda and Matsuyuki, 2016).

There are several studies that provide a detailed analysis of family conflicts during this phase for the nuclear disaster (Yamane, 2013; Nishimori and Nakazato, 2014; Noguchi, 2015; Yamaguchi, Ohashi, Sato et al., 2017). However, no similar research on the tsunami-affected areas was identified in this study.

5) The Recovery and Reconstruction Phase

For the Recovery and Reconstruction Phase, we decided to measure the primary level of reconstruction completion by determining the regional situation before and after the earthquake disaster based on the indicator items mentioned in “All Stages of Disaster”. The ratio of female members in municipal reconstruction planning committees, status of gender-perspective-based reviews of municipal disaster prevention plans (e.g., personnel placement, number of members, manuals, stockpiling), and the presence of measures for the retention of young women in comprehensive plans and “Comprehensive Strategies for Towns, People, and Work” were also included as indicator items from the perspective of “reconstruction toward a better society.”

As previously mentioned, the ease of raising children/nursing care and the ability to develop a community where women can live fulfilling lives are important elements in the reconstruction and sustainability of a local society. However, the average percentage of women who participate in municipal reconstruction planning committees in the three prefectures of the Tohoku region was extremely low at 14.9% (Iwate Prefecture: 10.8%; Miyagi Prefecture: 13.8%; Fukushima Prefecture: 17.5%) (Gender Equality Bureau Cabinet Office, 2013). There is some variation in the level of female participation at the municipal level, so it is also meaningful to compare the reconstruction conditions alongside other indicators.

Surveys on reconstruction conducted by women's organizations and citizen groups, as well as the presence and number of symposia hosted on disasters and reconstruction may serve as indicators, but these will be considered as topics for future study.

3. Conclusion

The importance of examining the relationship between individual attributes and family conditions and the necessity of gender perspectives in analysis have been investigated when determining the impact of damage and the actual situation of daily life reconstruction, ranging from evacuation behavior immediately following the event to evacuation life and daily life reconstruction (including the securing of housing) during the recovery/reconstruction phase. Results showed that there was limited research that included perspectives on issues related to gender roles at home, conflicts between families, and economic disparities due to gender.

Previous studies revealed that research has been undertaken on the issues of sharing family work during the evacuation life phase and issues of household separation during the Great Hanshin-Awaji Earthquake in 1995 (Nagato, Inoue, Mizushima et al., 1998; Kuroki, 1999). A collaborative large-scale survey conducted by Hyogo Prefecture in collaboration with researchers summarized the associations between feelings toward reconstruction and family relationships as well as household budget issues (Hyogo Prefecture, 1999; Tamura, Hayashi, Tatsuki et al., 2003), suggesting that further analysis of the Great East Japan Earthquake was required.

Meanwhile, the Great East Japan Earthquake and Tsunami was the first time when an academic survey on the issue of violence was conducted, female participation in reconstruction planning was indicated, and comparative data was also collected. Therefore, for the Great East Japan Earthquake and Tsunami, it seems to be of great significance to use statistical data to explore the phenomena and reconstruction situation in each stage of the disaster process and analyze the relevance of these gender issues.

However, as was clarified by Tamiya et al. regarding the harsh situation with respect to damage and daily life reconstruction in households with disabled individuals (Tamiya, Tsuchiya, and Iguchi 2013), extremely vulnerable households (e.g., single parents, disabled individuals, foreigners, LGBT, young women, elderly care households) and wide-area evacuee households require careful individualized considerations. Therefore, it is necessary to examine the situations in which such households are placed during the reconstruction process while conducting interview surveys of stakeholders and supporting staff in parallel.

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