

Paper:

# Support That Disaster Victims of the 2011 Great East Japan Earthquake Felt and Considerations on How to Formulate Measures for Disaster Management in the Future – Based on a Comparison with the 1995 Great Hanshin Awaji (Kobe) Earthquake, the 2004 Mid-Niigata Earthquake and the 2007 Chuetsu-Oki Earthquake

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[Received April 2, 2021; accepted April 27, 2021]

In this study, the results of a large-scale random sampled questionnaire survey of the disaster victims of the 2011 Great East Japan Earthquake are summarized. This survey was conducted during the period between March and June 2016, five years after the earthquake disaster, and included all men and women of age 20 and older who resided in the three disaster-stricken prefectures that suffered significant damage. In this study, the situation at the time of the disaster and the effective measures for disaster management in the future are examined through two questions: “Who does the disaster victims rely on for life recovery?” and “Based on this experience, who should responsibly implement the measures for disaster management in the future?” The results of these large-scale random sampled questionnaire surveys for the disasters in the past are referenced to compare the 1995 Great Hanshin Awaji (Kobe) Earthquake, the 2004 Mid-Niigata Earthquake, and the 2007 Chuetsu-Oki Earthquake. Analysis of the question, “Which persons and organizations (supporters) were relied upon in life recovery?” shows that three persons and organizations, including, a partner, children, and the town or city administration, are relied upon in all the aspects of personal or emotional, material or financial, and vital information. From all generations and kinds of supporters, people sixty and over constitute the demographic from which the least support is expected. For this generation, the family of a partner, children, mutual assistance from community associations and governmental assistance from the town/city administration are considered as the common support in all aspects. Then, comparing this with other earthquake disasters showed that a quick and careful response to all the earthquake victims by the administrative organizations is limited in large cities where relations between organizations and locals cannot be evaluated and expected. In the analysis of the question, “Who should

implement the measures for disaster management in a responsible way?” it is made clear that the division of roles among self-help, mutual assistance, and governmental assistance can be summarized in the following four patterns: Mainly by governmental assistance, mainly by self-help, in cooperation with mutual assistance and governmental assistance, and in cooperation with self-help, mutual assistance, and governmental assistance, altogether. Comparisons between all the earthquake disasters, lead to the understanding that the disaster victims who experienced a large-scale disaster consider that the measures for disaster management should be implemented by through self-help, mutual assistance, and governmental assistance, altogether, regardless of the disaster and local characteristics. In Japanese society it seems that the division of roles among self-help, mutual assistance, and governmental assistance could generally be proposed.

**Keywords:** large-scale random sampled social survey, supporters at the time of disaster, division of roles

## 1. Background and Objective of This Study

### 1.1. Life Recovery from the Damage of the Great East Japan Earthquake in the Long Term

The large-scale environmental changes caused by a large-scale disaster exert the influences on the disaster victims and disaster-stricken areas in a long term not only on tangible factors like structure, lifeline, and information system but also on intangible ones like social organization and the physical and psychological conditions of disaster victims. The Great East Japan Earthquake that occurred on March 11, 2011, was an unprecedented huge earthquake and tsunami disaster in modern Japanese so-



ciety that led to the death of 19,418 people, and the disappearance of 2,592 people. It led to the complete destruction of 121,809 houses and seriously damaged another 278,496 [1]. The questionnaire survey was conducted between March and June 2016, five years after the occurrence of the earthquake. The number of evacuees decreased from about 470,000, immediately after the disaster, to about 170,000 in 2016. The number of temporary houses decreased from a maximum of about 124,000 one year after the occurrence of the earthquake to about 66,000 [2]. This shows the conditions on living that constitutes the life foundation are still unstable. To prepare for such a disaster, that may have a long term influence on our lives, it is important to understand the actual situations of past disaster victims and to examine the characteristics and generality thereof scientifically. This can be done by comparing the past disasters and by promoting effective disaster management measures for potential future disasters.

## 1.2. Objective of This Study

This study analyzes the results of the large-scale random sampled questionnaire survey conducted to use the experience of the disaster victims practically for developing measures to protect against disasters and measures for reconstruction in the future. Concretely, it makes clear the responses after the Great East Japan Earthquake, a super wide area disaster that extended over several prefectures and how the life recovery advanced over five years.

In particular, this study describes, in detail, the results of the examination in terms of the questions, “Who (what supporter) did the disaster victims rely on for life recovery?” and “Who should responsibly implement the measures for disaster management in the future, based on this experience?” (the division of roles among self-help, mutual assistance, and governmental assistance). Furthermore, this study considers how the actual situation of life recovery should be described through scientific methodology and how the measures for disaster management should be implemented effectively by comparing the results of the large-scale random sampled questionnaire surveys of the disasters in the past, the 1995 Great Hanshin Awaji (Kobe) Earthquake, the 2004 Mid-Niigata Earthquake and the 2007 Chuetsu-Oki Earthquake.

## 2. Method

### 2.1. Circumstances of Survey

The data of this study are acquired from “the Survey on Life Recovery from the Great East Japan Earthquake for 5 Years since its Occurrence,” which was conducted by the survey team for life recovery from the Great East Japan Earthquake during the period from March to June 2016. The survey team consists of the author and researchers from universities and institutes. And the survey, including sampling, is conducted in cooperation with the

Reconstruction Agency, Iwate, Miyagi, and Fukushima Prefectures.

The objective of this survey is to describe scientifically how the life recovery has proceeded for five years since the Great East Japan Earthquake, a super wide area disaster that extended over several prefectures, by comparing the three disaster-stricken prefectures that suffered significant damage, the Iwate, Miyagi, and Fukushima Prefectures, with the earthquake disasters in the past, the Great Hanshin Awaji (Kobe) Earthquake, the Mid-Niigata Earthquake and the Chuetsu-Oki Earthquake.

### 2.2. Survey Area, Survey Respondents, and Survey Period

To describe the experience of the disaster victims who lived their lives in the areas which suffered largely from the damage by the Great East Japan Earthquake 36 municipalities in Iwate, Miyagi, and Fukushima Prefectures with significant human and housing damage are selected as the survey areas. As the method for selecting the municipalities, the first 35 municipalities that meet at least one of the following conditions in their comparison to human and housing damage are selected, 1) the rate of the dead and missing is 1% or more, 2) the rate of completely destroyed houses is 10% or more, 3) the number of the dead and missing is 100 people or more, and 4) the number of completely destroyed houses is 100 or more. These municipalities are then classified into coastal and inland areas (no municipality in the Iwate Prefecture is classified into any one of these areas). Accordingly, Ichinoseki City, Iwate Prefecture is added to the municipalities to be surveyed because this city has the greatest number of seriously damaged and destroyed houses in the inland area of the Iwate Prefecture. The total number of the municipalities to be surveyed is 36.

The survey respondents are all adult men and women of age 20 and above. As an extraction method the two-stage stratified sampling is adopted by extracting at random 100 points from the municipalities to be surveyed according to the population rate and then 20 votes from the electoral roll or the Basic Resident Register using the systematic sampling. At the time of the survey Japanese citizens legally came of age at 20 and the electoral roll covered adult men and women at the time of the extraction. As a survey method the questionnaire is sent by mail, is completed, and returned by mail.

### 2.3. Survey Items

The survey frame is shown in **Fig. 1**. From the results of past surveys, such as the survey on the 1995 Great Hanshin Awaji (Kobe) Earthquake the following is confirmed, 1) the situation of disaster victims and the disaster area after the occurrence of a disaster changes in various ways as time passes and 2) the way people experience life recovery can be measured by their degree of satisfaction through seven elements of the life rebuilding problem, “Living,” “Connection with people,” “Town,” “Physical

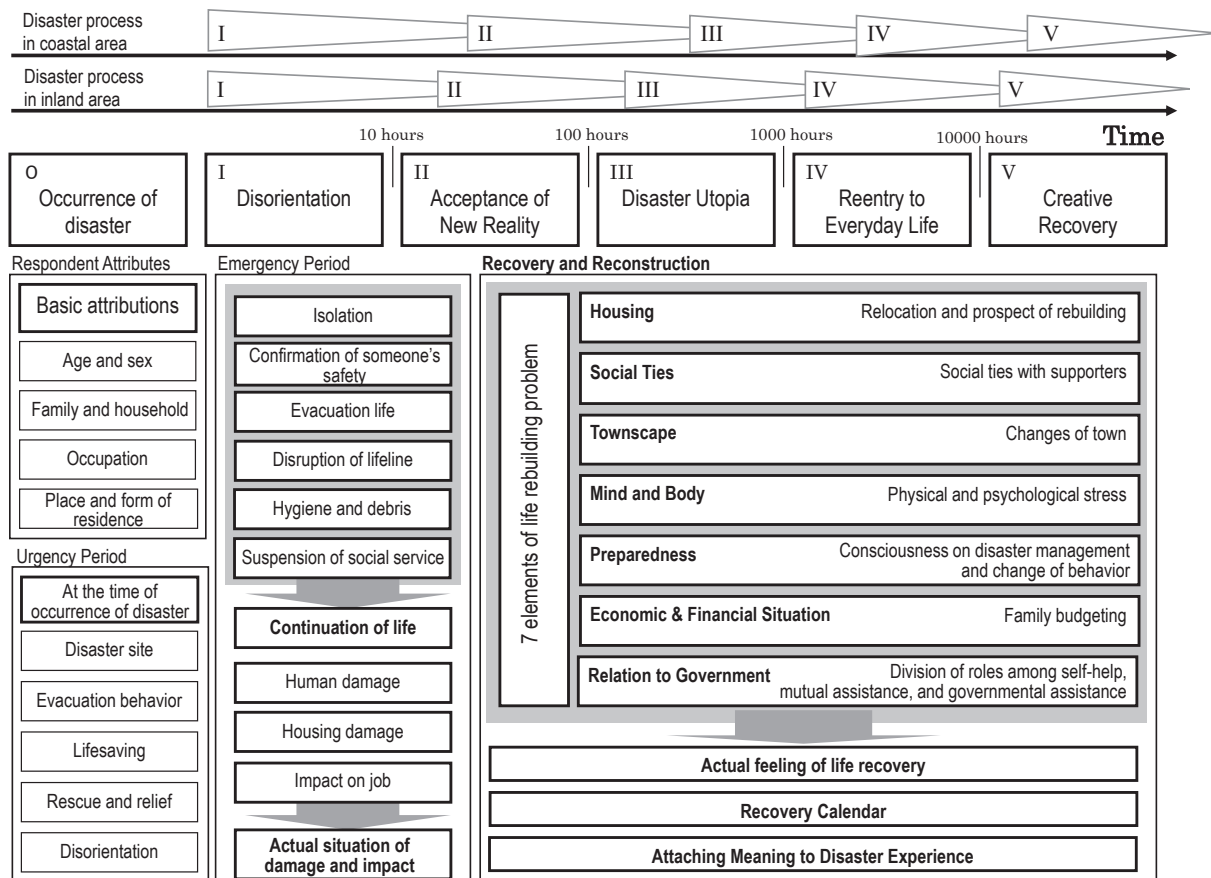


Fig. 1. Survey frame.

and psychological health,” “Preparedness for the next disaster,” “Life circumstances,” and “Commitment with administrative bodies” (for example, [3–6]). In this survey the question items are made based on the survey frame constructed by this concept.

As for the survey items, 60 questions are asked in terms of the following six points, (1) damage situation by earthquake, tsunami and accident, (2) evacuation and confirmation of someone’s safety after an earthquake, (3) living conditions and work after an earthquake, (4) progress of restoration and reconstruction in the surroundings, (5) current physical and psychological condition and change of relationship, (6) what a respondent thinks five years after an earthquake disaster. As for the order of questions, it is considered that a respondent can answer the questions by recalling the events as time pass.

### 3. Results and Considerations

#### 3.1. Collection Situation and Characteristics of Respondents

6,000 sheets were sent, 2,000 sheets in each prefecture. The total number of responses include 2,342 sheets with a response rate of 39.1%. From the total number of response blank paper, sheet not fully filled out, sheets filled out with many mistakes and sheets without enter-

ing age, sex and address are excluded. And the respondents to be surveyed are limited to those who lived in the three prefectures concerned with the earthquake disaster and those who did not live there at that time are also excluded. As a result, the final valid number of responses is 2,111 sheets with a response rate of 35.2%. The valid number of responses and the valid response rate by prefecture are 781 sheets with 39.1% in Iwate Prefecture, 727 sheets with 36.4% in Miyagi Prefecture and 603 sheets with 30.2% in Fukushima Prefecture.

The average age of the respondents is 57.6 years old. This points to average ages of 58.4 years in the Iwate Prefecture, 56.6 years in Miyagi Prefecture and 57.9 in the Fukushima Prefecture. By generation, people in their twenties and thirties account for 13.1%, forties and fifties 32.9%, and sixties or older 54.0%. Sixties or older account for about a half. Statistically significant differences in rates are not recognized in different prefectures through different generations generation ( $\chi^2(6) = 18.94, n.s.$ ).

The survey reflected that 3.9% of its respondents lost a family member, while 3% of them has a family member who needed to be hospitalized due to an injury or illness, 4.7% has a family member who suffered from an injury or illness but who was not hospitalized, and 88.4% of respondent’s family members suffered no damage. Considering the trends by prefecture, there are many respondents who lost their family members in the

Iwate and Miyagi prefectures and many respondents in the Fukushima prefecture had family members who were hospitalized ( $\chi^2(6) = 18.94, p < .01$ ). Respondents also reflected on housing damage and it was determined that the houses that 11.7% of the houses in the affected area were completely destroyed or washed away, 15.7% of the houses were seriously damaged or nearly destroyed, 25.2% were partially destroyed, 47.5% were not damaged at all. The trends in different prefectures show that many houses were completely destroyed or washed away and many suffered no damage in the Iwate prefecture. Many houses were completely destroyed or washed away and many houses partially destroyed in the Miyagi prefecture, while many houses were seriously damaged and partially destroyed in the Fukushima prefecture ( $\chi^2(6) = 239.0, p < .01$ ).

The value of  $\chi^2(n)$  used in this section is the test result of the chi-square test, a method of inferential statistics. This is the value used to test whether the ratios at the different events are different or not, expressing stochastically that “the ratios at the different events are different” if null hypothesis is rejected. In this section, the chi-square test is conducted in terms of “whether the degrees of generational, human, and housing damage are the same among the prefectures.” Since the null hypothesis for human damage and housing damage is rejected at the 1% level, it is concluded that “the degrees of human damage and housing damage are different between prefectures and in accordance with them.”

### 3.2. Who Did the Disaster Victims Rely on for Life Recovery?

For successful life recovery amid the damage and influence caused by a disaster it, disaster victims should pursue life recovery not only by themselves but with the support from various people and organizations. Accordingly, future support for disaster victims is considered by clarifying the actual situation on the issue through the question “Which persons and organizations (supporters) were relied on for life recovery?”

In particular, this survey brings clarity about the actual situation of the disaster victims by devising the following three methods based on the surveys which the authors conducted for the 1995 Great Hanshin Awaji (Kobe) Earthquake and the 2004 Mid-Niigata Earthquake, etc. [4, 7]. The first method is to classify the support for the disaster victims into three aspects, “Personal/Emotional support,” “Material/Financial support,” and “Vital Information support.” This support type classification explains from whom the disaster victims acquired which support.

The second method asks the respondents to not to evaluate the supporter directly. For example, if the respondents were asked directly “Please circle the supporter who was most useful at the time of the Great East Japan Earthquake,” some would refuse to answer and others would circle almost all the supporters, because they may think “I am thankful for all the supports regardless of the scale of support” and, therefore, be reluctant to evaluate and se-

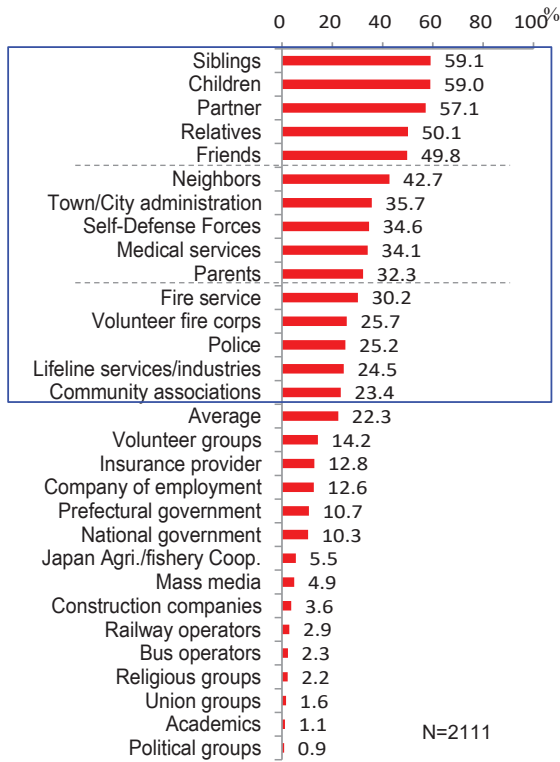
lect a single useful supporter. For this reason, by devising the question as follows, “If a disaster occurs in the future, who do you think is the most reliable supporter among those mentioned below in the aspect of Material/Financial support?” The evaluation and expectations of the disaster victims with regards to the supporters could indicate an answer such as “at the time of this earthquake disaster I relied upon so-and-so person or organization, so I would preferably rely on them should another disaster occur in the future” and can, therefore can be clearly recognized.

The third method is to ask the respondents about support in each aspect using a two-step question method. After asking them, “Please circle the supporters whom you would like to rely on in the aspect of Material/Financial support if another disaster occurs,” they are asked “Please select the most reliable person or organization among the supporters you circled.” Through this method the circles drawn in the multiple answers can be analyzed and the expectations and true feelings of the disaster victims can indicate all the people and systems that can be relied on at the time of an earthquake. This analysis can be done based on actual experiences of past earthquakes and from the single respective answers the expectations and the true feelings of respondents can be, respectively, to indicate the person whom the respondent would rely on, should a disaster actually occur. The disaster victims evaluate 29 supporters and supporting organizations. These 29 supporters and supporting organizations are listed as follows: 1. Town/City administration, 2. Prefectural government, 3. National government, 4. Insurance provider, 5. Construction companies, 6. Company of employment, 7. Japan Agricultural/Fishery Cooperatives, 8. Union groups from the same industry, 9. Academics, 10. Mass media, 11. Medical services, 12. Self-Defense Forces, 13. Police, 14. Fire service, 15. Volunteer fire corps, 16. Community associations, 17. Religious groups, 18. Political groups, 19. Lifeline services/industries such as electricity, gas, water, and telephone service, 20. Railway operators, 21. Bus operators, 22. Parents, 23. Children, 24. Siblings, 25. Relatives, 26. Partner, 27. Friends, 28. Neighbors, 29. Volunteer groups. By using the results of the author’s interview surveys that were conducted on the disaster victims, these supporters and supporting organizations are extracted from local ties, blood relatives, business relations, the disaster response staff, and the public organizations which actually provided support to the disaster victims.

#### 3.2.1. Supporter Whom Disaster Victims Would Like to Rely upon for a Disaster in the Future

Figure 2 shows the supporters in the Personal/Emotional support field, Fig. 3 those in the Material/Financial support field and Fig. 4 those in the Vital Information support field, respectively. In each figure, the right column indicates multiple answers (supporters whom disaster victims can rely on during future disasters) and the left column displays a single answer (the most reliable supporter). In these figures, the

Multiple answers (Supporters who disaster victims can rely upon at the time of disaster)



Single answer (The most reliable supporter)

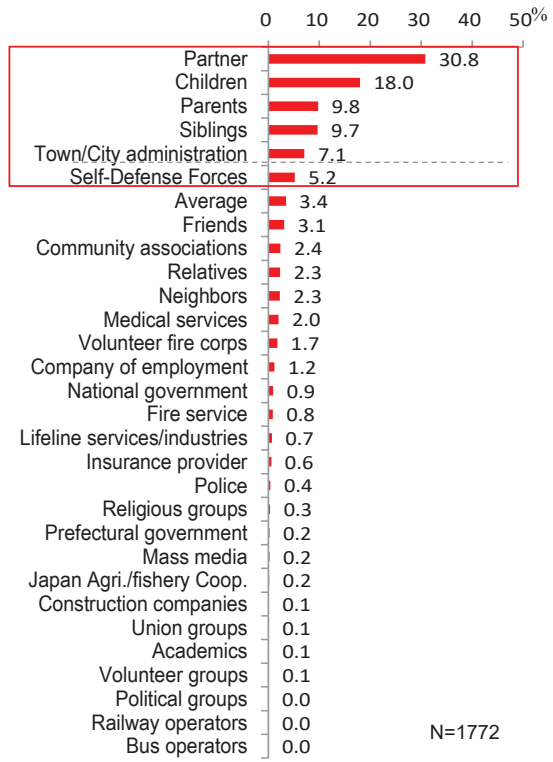
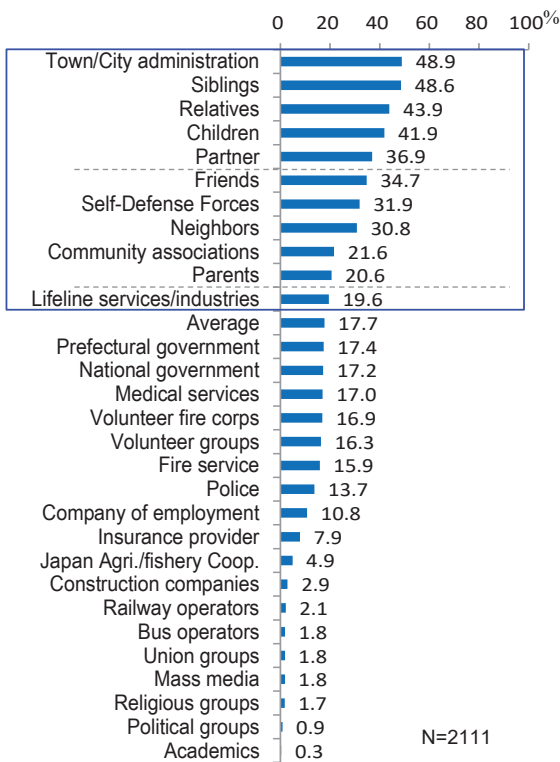


Fig. 2. Supporter in Personal/Emotional (total).

Multiple answers (Supporters who disaster victims can rely upon at the time of disaster)



Single answer (The most reliable supporter)

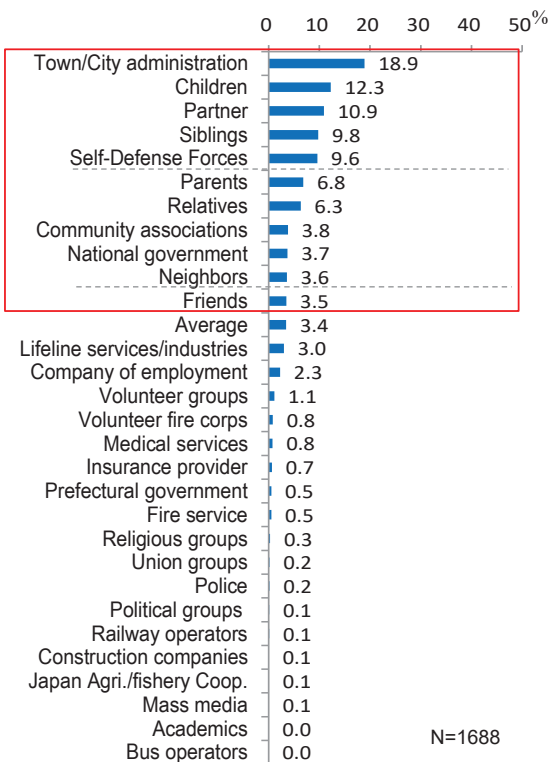


Fig. 3. Supporter in Material/Financial (total).

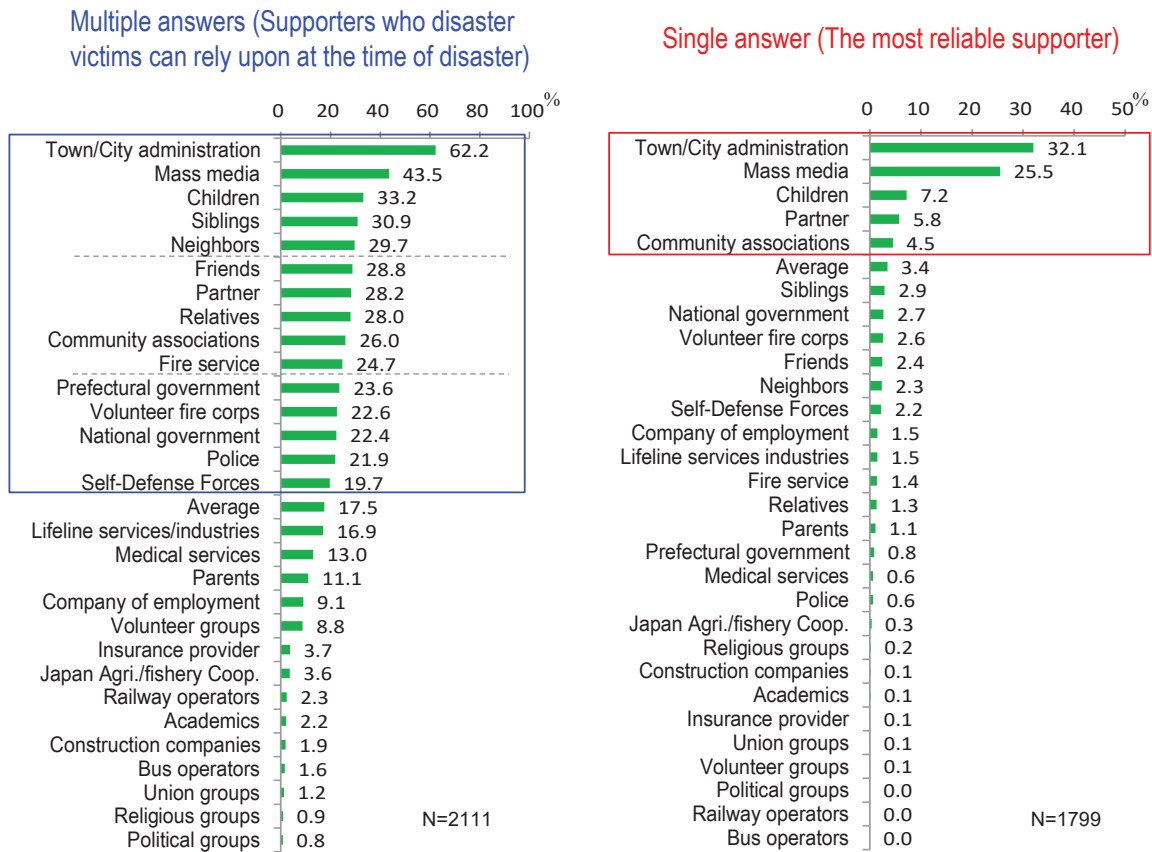


Fig. 4. Supporter in Vital Information (total).

supporters are listed according to the approval rating and the supporters exceeding the average approval rating are framed.

In reference to those who are considered Personal/Emotional supporters, as shown in Fig. 2, the approval ratings of the following 15 supporters exceed the average approval rating of all in multiple answers (supporters whom disaster victims can rely on during a disaster), Siblings, Children, Partner, Relatives, Friends, Neighbors, Town/City administration, Self-Defense Forces, Medical services, Parents, Fire service, Volunteer fire corps, Police, Lifeline services/industries, and Community associations. Blood relatives, local ties, and local organizations etc. are listed evenly among them. The approval ratings of the following six supporters exceed the average approval rating in a single answer (the most reliable supporter): Partner, Children, Parents, Siblings, Town/City administration, and Self-Defense Forces. These are second-degree blood relatives, local administrative organization, and the Self-Defense Forces.

With regards to supporters in the Material/Financial support field, as shown in Fig. 3, the approval ratings of the following 11 supporters exceed the average approval rating in the multiple answers section (supporters whom disaster victims can rely on during a disaster), Town/City administration, Siblings, Relatives, Children, Partner, Friends, Self-Defense Forces, Neighbors, Community

associations, Parents, and Lifeline services/industries. Blood relatives, local ties, and local organizations, etc., are listed evenly among them. The approval ratings of the following 11 supporters exceed the average approval rating in the single answer category (the most reliable supporter), Town/City administration, Children, Partner, Siblings, Self-Defense Forces, Parents, Relatives, Community associations, National government, Neighbors, and Friends. In contrast to Personal/Emotional support systems, it is found that various people, blood relatives, organizations, local ties, and local organizations, etc., are relied upon, depending on the personal circumstances, in Material/Financial support systems.

Considering the Vital Information field of support, as shown in Fig. 4, the approval ratings of the following 15 supporters exceed the average approval rating in multiple answers (supporters whom disaster victims can rely on during a disaster), Town/City administration, Mass media, Children, Siblings, Neighbors, Friends, Partner, Relatives, Community associations, Fire service, Prefectural government, Volunteer fire corps, National government, Police, and Self-Defense Forces. Blood relatives, local ties, and local organizations, etc., are listed evenly among them. On the other hand, the approval ratings of the following five supporters exceed the average approval rating in the single answer category (the most reliable supporter), Town/City administration, Mass media, Children, Partner, and Community associations. They are the public

organizations, the first-degree blood relative, and the local autonomous organization.

### 3.2.2. Supporter Whom Disaster Victims Would Like to Rely on During a Future Disaster (Overlapping of Single Answers)

Figure 5 shows the complete image of support for disaster victims. In this figure, the supporters displayed in the circles of the Personal/Emotional, Material/Financial, and Vital Information systems, indicate the supporters whose approval ratings exceed the average approval ratings in the single answer category (the most reliable supporter). From this figure the true circumstances with regards to holistic support for the disaster victims (those whom they evaluate and expect as the supporter in which aspect of support) can be established. This can be seen in Fig. 5, which displays three persons and organizations including Partner, Children, and Town/City administration, which are relied upon in all the support systems namely, Personal/Emotional, Material/Financial, and Vital Information support. Siblings, Parents, and Self-Defense Forces are relied upon in both Personal/Emotional and Material/Financial support, while Community associations are relied on in both Material/Financial and Vital Information support systems, respectively. It is also understood that Relatives, Friends, Neighbors, and National government are approved and relied upon, especially in the Material/Financial support field, and Mass media in the Vital Information support system, respectively. In terms of the persons and organizations that the disaster victims would like to rely on during future disasters, the difference among the supporters, according to their life stages, such as their generation, e.g., twenties and thirties, forties and fifties, and sixties or older, is analyzed (Fig. 6).

The supporters whom the disaster victims would like to rely on in the same aspect of support regardless of their generation are only seen in four fields namely, Town/City administration in Personal/Emotional, Material/Financial, and Vital Information support, Self-Defense Forces in Personal/Emotional and Material/Financial support, Mass media in Vital Information systems, and Relatives, blood relatives, other than direct family, in Material/Financial support. As for supporters that fall outside of these four fields, the differences are recognized depending on generation. Accordingly, it is found that there are differences in the reliable persons and organizations among the generations.

It is characteristic that victims aged 60 and older rely on ten different kinds of supporters, the least among all generations. The family of the partner and their children, the mutual assistance of Community associations and the governmental assistance of the Town/City administration are the common supporters in all the aspects of support for this age demographic. It is understood that if the partner, children, and relatives suffered from a disaster at the same time and their local autonomous functions were also lost, this generation could rely on almost nothing, except for the public organizations for this generation. A clear contrast is shown between this generation and people within

their forties and fifties, who have abundant human and organizational resources. In reference to the perspectives of all the workers in disaster response, it is thought that support from public organizations for the disaster victims in their sixties and older has a significant impact on the success of their life recovery.

### 3.2.3. Comparison of the Great Hanshin Awaji (Kobe) Earthquake, the Mid-Niigata Earthquake, and the Chuetsu-Oki Earthquake

In the disaster-stricken areas of the 1995 Great Hanshin Awaji (Kobe) Earthquake, the 2004 Mid-Niigata Earthquake, and the 2007 Chuetsu-Oki Earthquake, large-scale random sampled questionnaire surveys are conducted and similar questions are asked [4, 8]. The results of each survey are summarized in Fig. 7. After comparing the results, it can be seen that there is a high number of kinds of supporters exceeding the average approval rating in the Great East Japan Earthquake. There are eight kinds of supporters in the Great Hanshin Awaji (Kobe) Earthquake disaster and 11 in each of the Mid-Niigata Earthquake and the Chuetsu-Oki Earthquake disasters, while there are 12 in the Great East Japan Earthquake.

In the Great Hanshin Awaji (Kobe) Earthquake, an inland epicentral earthquake in a large city there is only "Lifeline services/industries" at the center of all the circles. Contrarily, in the Mid-Niigata Earthquake in the low uplands, the Chuetsu-Oki Earthquake in provincial city and the Great East Japan Earthquake in both the low uplands and provincial city the organizations related to the local ties such as "Community associations" and "Neighbors" are evaluated and expected to be the supporters at the center of all the circles. It is thought that for the disaster victims living in a large city where the local ties are not relied on much, the restoration of the lifelines to stop gas leaks, turning on the power and flushing toilets does not only lead to the restoration of flow of social life but is also expected to function as holistic support, including all the aspects of Personal/Emotional, Material/Financial, and Vital Information support systems for the disaster victims.

This indicates that in a large city with a larger population the administrative organizations have limited ability to respond quickly and carefully to all the earthquake victims. It seems the effective response to meet the actual requirements for the single generation who cannot use local ties due to, for example, their relatives living far away, that the measures of governmental assistance would be enhanced. On the other hand, in the low uplands and provincial city it is regarded as an effective support for the disaster victims to strengthen the support system focusing on the local ties and the disaster response system led by the local administrative organizations with the support of the Central Government and the prefectures before the occurrence of a disaster.





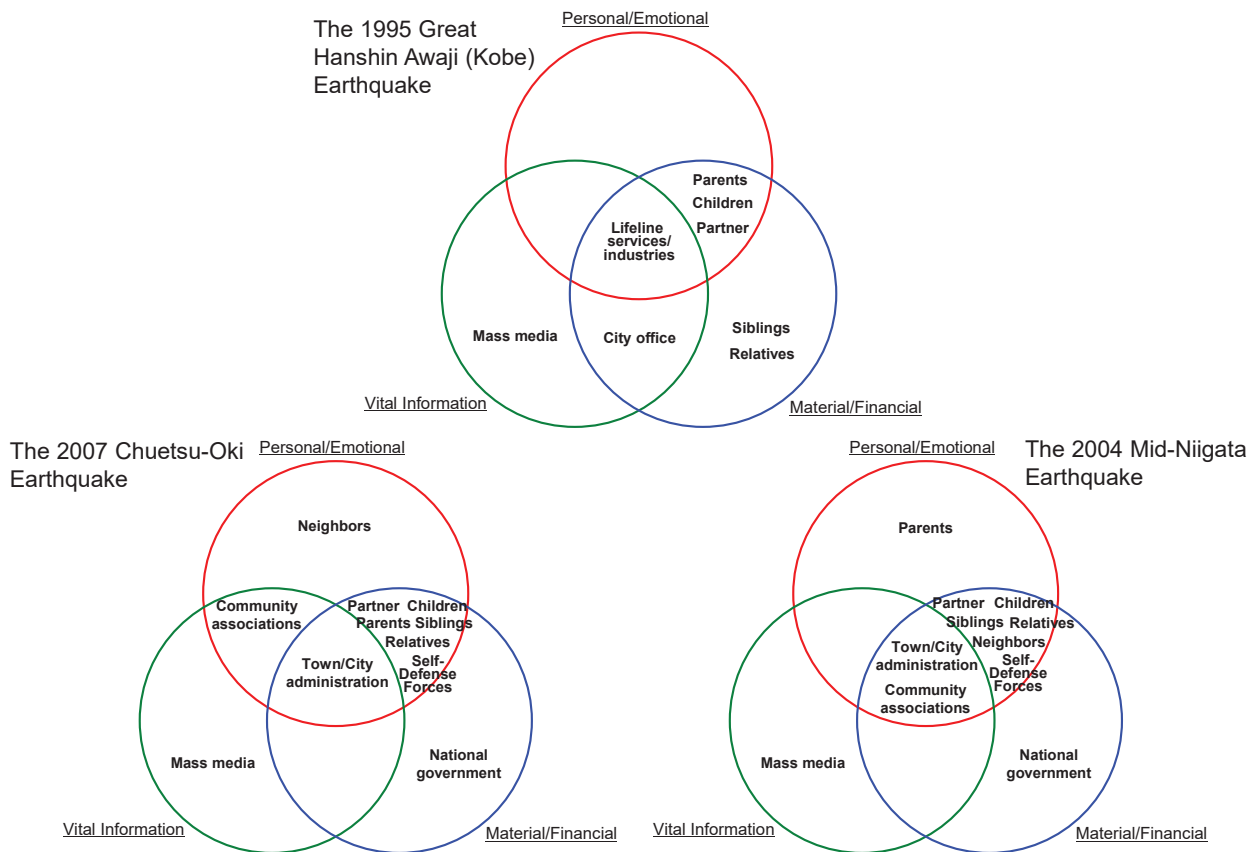


Fig. 7. Persons and organizations who disaster victims rely upon in next disaster (overlapping of single answers) (comparison of earthquake disasters).

### 3.3. Who Should Implement the Measures for Disaster Management in a Responsible Way?

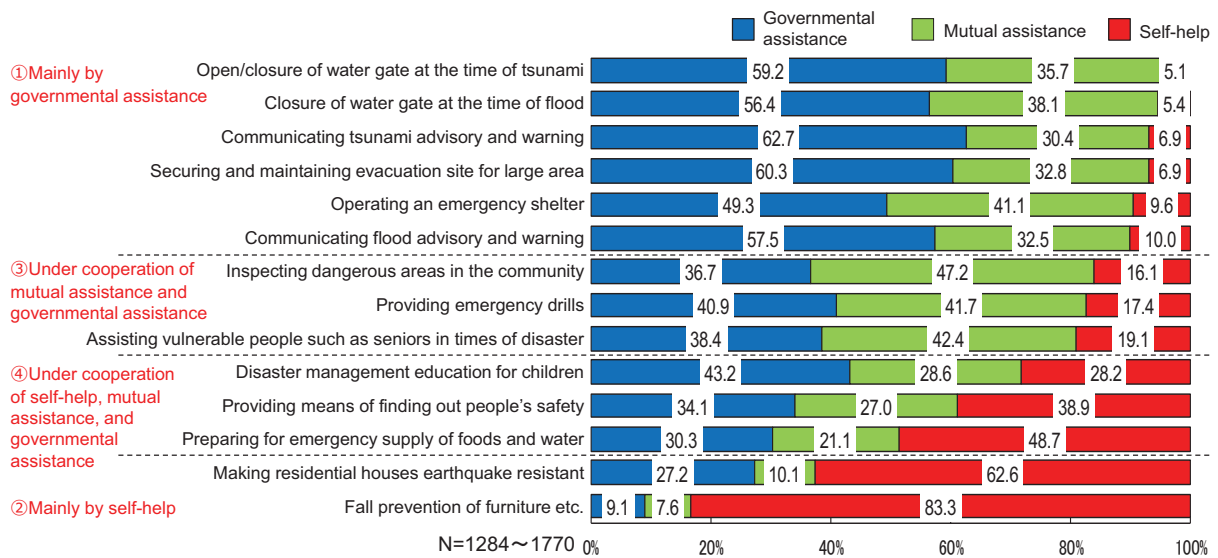
To overcome a large-scale disaster, it is necessary that each one of the three actors namely, residents, local communities, and public organizations, such as administrative ones, should consider their own roles when disaster occur. This should be determined in advance and preparation for these measures should be done in advance for them to act swiftly and appropriately at the time of disaster. In Japan, the actors who promote disaster management are classified into self-help, mutual assistance, and governmental assistance. Self-help represents residents themselves, family and relatives, mutual assistance in the local community and organizations, and governmental assistance from the disaster response workers of public institutions and utilities such as central and local government and lifeline service providers. In the event of the disaster exceeding the response capacity of governmental assistance it is particularly essential to take measures in advance and respond to the disaster by assigning roles while taking the advantage of self-help, mutual assistance, and governmental assistance.

Accordingly, in this survey a question is asked to clarify the division of roles among self-help, mutual assistance, and governmental assistance in the various measures for disaster management. Concretely, the question states, "It

is said that disaster management for an earthquake disaster includes three kinds of efforts, namely self-help, which refer to the efforts by individuals and family, mutual assistance, which include help from community associations and in local society, and governmental assistance, which refers to help from administrative organizations." Participants are also asked how they think roles should be divided between self-help, mutual assistance, and governmental assistance, should these activities be carried out. Another question asks participants to refer to an example and to rate self-help, mutual assistance, and governmental assistance so that the three ratings add up to 100%. In addition, they asked to assign percentages of self-help, mutual assistance, and governmental assistance so that the three add up to 100% over 14 items, such as "Prevention of falling furniture," "Providing emergency drills," and "Assisting vulnerable people, such as seniors, in times of disaster," etc. These items are determined based on the results of the surveys conducted by the author and others for the 1995 Great Hanshin Awaji (Kobe) Earthquake and the 2004 Mid-Niigata Earthquake, etc. [9, 10].

#### 3.3.1. Division of Roles Among Self-Help, Mutual Assistance, and Governmental Assistance

Listing the results of the answers in ascending order the percentages of self-help shown in Fig. 8, it has been established that there are four patterns in the division of roles



The trends of the Great East Japan Earthquake are similar to those of the 1995 Great Hanshin Awaji (Kobe) Earthquake, the 2004 Mid-Niigata Earthquake and the 2007 Chuetsu-Oki Earthquake

**Fig. 8.** Division of roles among self-help, mutual assistance, and governmental assistance (in March 2016 (5 years after the earthquake disaster)).

among self-help, mutual assistance, and governmental assistance.

The first pattern is the category wherein measures “should be implemented mainly by governmental assistance” (1). “Open/closure of water gate at the time of tsunami,” “Closure of water gate at the time of flood,” “Communicating tsunami advisory and warning,” “Securing and maintaining evacuation site for large area,” “Operating an emergency shelter,” and “Communicating flood advisory and warning” fall under this category. On the other hand, there is another category wherein measures “should be implemented mainly by self-help” (2). “Fall prevention of furniture” and “Making residential houses earthquake resistant” fall under this category. These categories 1 and 2 are the groups in which the percentage of governmental assistance or self-help rounded to the nearest whole number exceeds 50% and at least one of the remaining two actors accounts for less than 10%. In these categories the actor that accounts for the majority should take the initiative in actively promoting the general measures. This could lead to the effective promotion of the measures.

The next pattern is the category wherein “mutual assistance and governmental assistance should cooperate” (3). “Inspecting dangerous areas in the community,” “Providing emergency drills,” and “Assisting vulnerable people in times of disaster such as seniors” fall under this category. This category is the group in which the percentage of mutual assistance and governmental assistance added, exceeds 80%. To implement the measures effectively in this category, the measures should not be entrusted entirely to either mutual assistance or governmental assistance. Instead, governmental assistance should support the activities institutionally and economically and mutual

assistance should carry out the activities actively for the mutual cooperation.

The last pattern is the category in which the three actors of self-help, mutual assistance, and governmental assistance should cooperate (4). “Disaster management education for children,” “Providing means of finding out people’s safety,” and “Preparing for the emergency supply of foods and water” fall under this category. This category constitutes the group in which self-help, mutual assistance, and governmental assistance accounts for 20% or more each. In this category it is effective for self-help, mutual assistance, and governmental assistance to play their roles for cooperation and promotion. As an example, in “Providing means of finding out people’s safety” it was believed that the measures would not be promoted if the Central and local governments did not prepare for the system for confirmation of someone’s safety, the local community did not create, keep, and update the list for confirmation of safety of, for example, vulnerable people in times of disaster, such as seniors and this method for confirmation was not checked under the cooperation of the local community and the individual families.

The results above establish the actual feeling of the victims who experienced the disasters. They feel the degree of the contribution of the self-help, mutual assistance, and governmental assistance categories differs depending on the measure of disaster management. They also feel it is necessary to implement the measures by building the cooperation among three actors for each measure.

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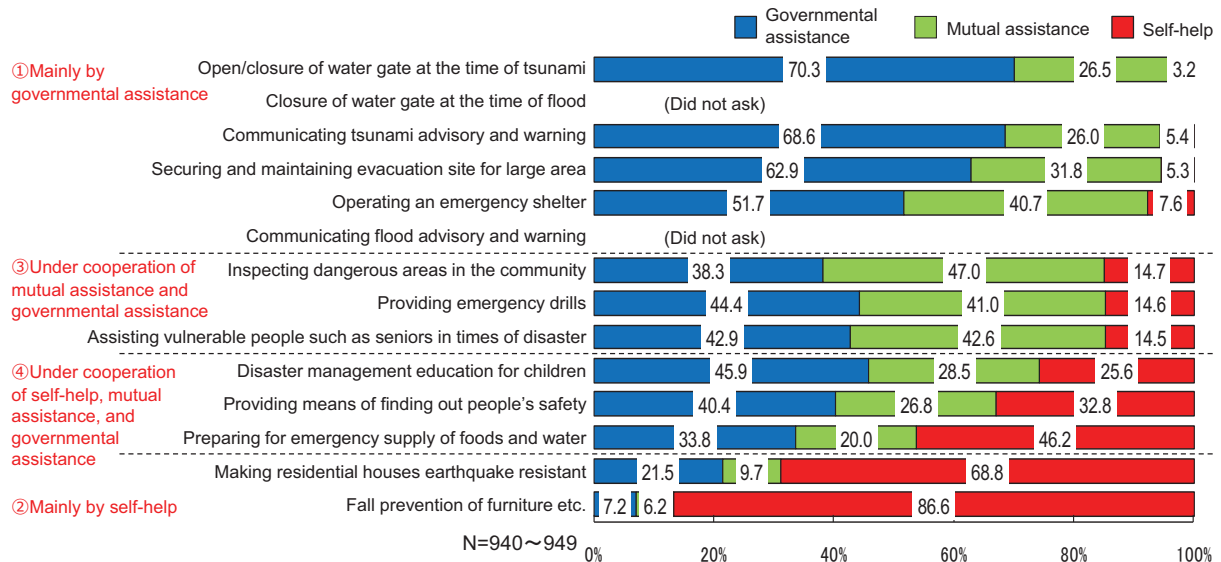


Fig. 9. Division of roles among self-help, mutual assistance, and governmental assistance (the Great Hanshin Awaji (Kobe) Earthquake) (in March 2005 (10 years after the earthquake disaster), created based on the Hyogo Prefecture Life Recovery Survey Report, 2005).

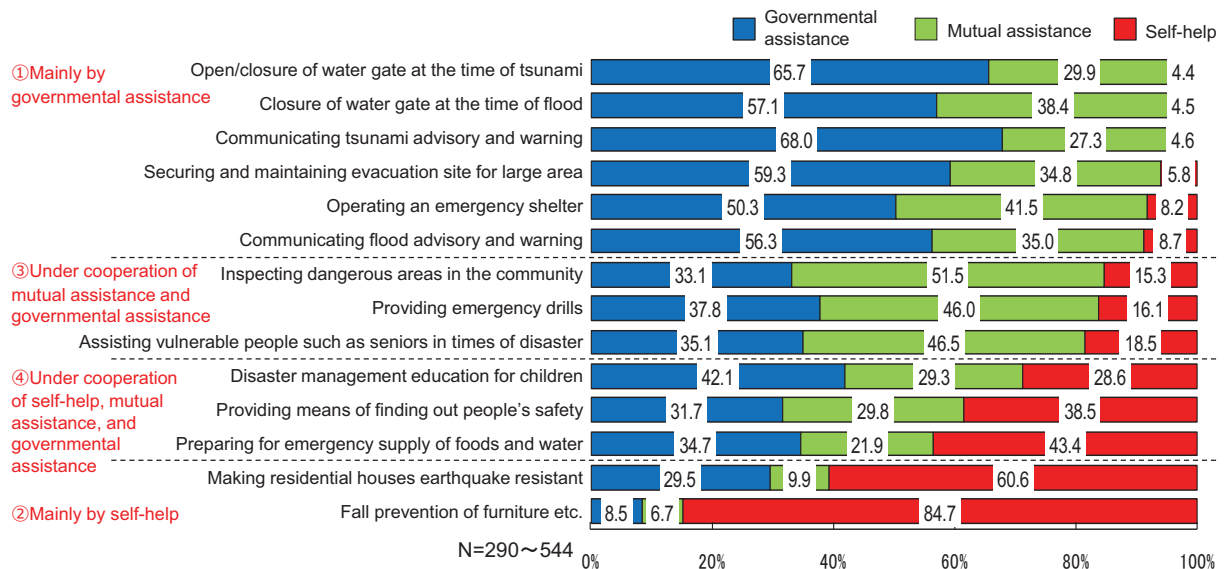


Fig. 10. Division of roles among self-help, mutual assistance, and governmental assistance (the Mid-Niigata Earthquake) (in March 2009 (4 years and half after the earthquake disaster), created based on the Report on Survey Results for Comprehensive Reconstruction Support from Earthquake Disaster in Niigata Prefecture, 2010).

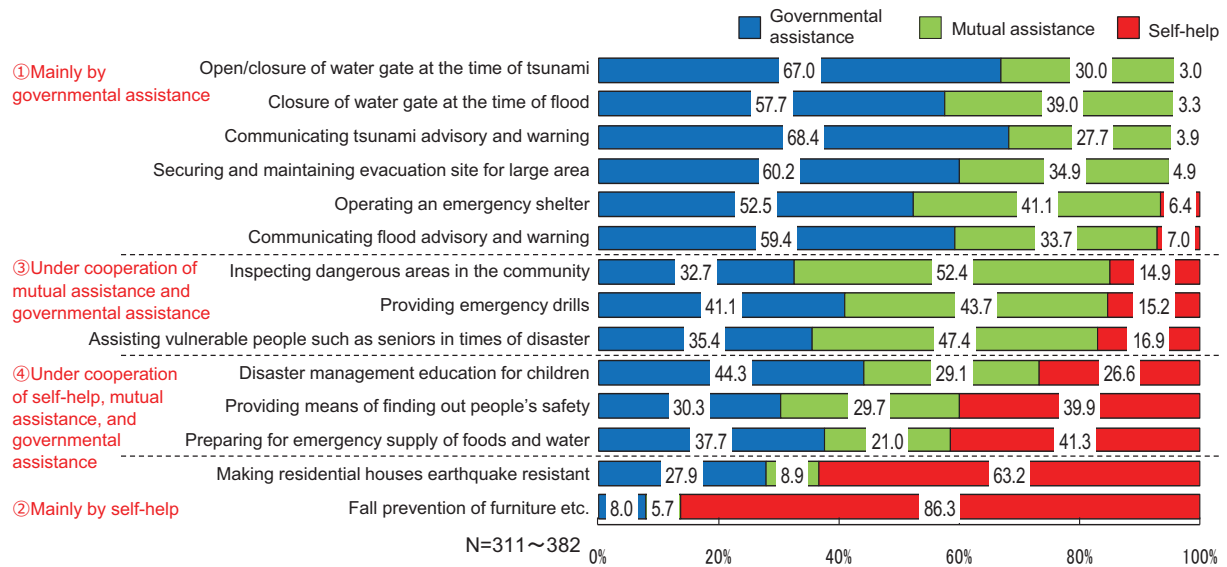
### 3.3.2. Comparison of the Great Hanshin Awaji (Kobe) Earthquake, the Mid-Niigata Earthquake and the Chuetsu-Oki Earthquake

The same question is asked in the large-scale random sampled social surveys for the disaster victims of the 1995 Great Hanshin Awaji (Kobe) Earthquake, the 2004 Mid-Niigata Earthquake and the 2007 Chuetsu-Oki Earthquake [9, 10]. The results are shown in Figs. 9–11.

In the earthquake disasters with different disaster and local characteristics, the Great East Japan Earthquake, a subduction-zone earthquake, the Great Hanshin Awaji (Kobe) Earthquake, an inland earthquake in a large city,

the Chuetsu-Oki Earthquake, an inland earthquake in a provincial city, and the Mid-Niigata Earthquake, an inland earthquake in the low uplands, it is verified how the differences would be confirmed among the results. Concretely, a statistical equivalence test is conducted in terms of the ratings among the self-help, mutual assistance, and governmental assistance fields in each item, based on the analytical method carried out by Kimura et al. [8]. As a result, a statistically significant difference cannot be confirmed in all the items.

From the results it is understood that the disaster victims who experienced a large disaster consider that



**Fig. 11.** Division of roles among self-help, mutual assistance, and governmental assistance (the Chuetsu-Oki Earthquake) (in March 2009 (2 years after the earthquake disaster), created based on the Report on Survey Results for Comprehensive Reconstruction Support from Earthquake Disaster in Niigata Prefecture, 2010).

self-help, mutual assistance, and governmental assistance should promote the measures for disaster management by taking their own roles, respectively and regardless of the disaster characteristics and local characteristics. Furthermore, in Japanese society a certain generality can be assumed in terms of the division of roles among self-help, mutual assistance, and governmental assistance. First it is to be explained to the residents that there are measures to be taken, mainly by governmental assistance. Those to be taken mainly by self-help and those to be advanced by mutual assistance under the cooperation with governmental assistance and self-help and each actor should promote the measures for disaster management. As for the items of “Making residential houses earthquake resistant” and “Fall prevention of furniture, etc.,” the actor of self-help takes measures in advance, as much as possible, and the administrative organizations, etc., grasp the situation of advancement. As for the items of “Providing emergency drills,” “Inspecting dangerous areas in the community,” and “Assisting vulnerable people in times of disaster, such as seniors,” the actor of mutual assistance is urged to advance the measures under the active cooperation of administrative organizations. Concerning “Preparing for the emergency supply of foods and water” and “Providing means of finding out people’s safety,” self-help, mutual assistance, and governmental assistance promote the measures as own problem, respectively. The measures for “Disaster management education for children” in preparation for a future disaster is implemented comprehensively at the various scenes, such as the classroom, local drill, and at home. According to the experiences of the disaster victims, in aid of life recovery, the above-mentioned measures seem to be important to overcome a future disaster.

#### 4. Conclusions

In this study, the results of a large-scale random sampled questionnaire survey of the disaster victims of the 2011 Great East Japan Earthquake are summarized. This survey was conducted in 2016 between March and June, five years after the earthquake disaster. The survey included male and female participants aged 20 and above, who reside in the three disaster-stricken prefectures that suffered significant damage. In this study, the results of a large-scale random sampled questionnaire survey of the disaster victims of the 2011 Great East Japan Earthquake are summarized. This survey was conducted during the period between March and June 2016, five years after the earthquake disaster, and included all men and women of age 20 and older who resided in the three disaster-stricken prefectures that suffered significant damage. In this study, the situation at the time of the disaster and the effective measures for disaster management in the future are examined through two questions: “Who does the disaster victims rely on for life recovery?” and “Based on this experience, who should responsibly implement the measures for disaster management in the future?” The results of these large-scale random sampled questionnaire surveys for the disasters in the past are referenced to compare the 1995 Great Hanshin Awaji (Kobe) Earthquake, the 2004 Mid-Niigata Earthquake and the 2007 Chuetsu-Oki Earthquake.

Analysis of the question, “Which persons and organizations (supporters) were relied upon in life recovery?” shows that three persons and organizations, including Partner, Children, and Town/City administration, are relied upon in all the aspects of Personal/Emotional, Material/Financial, and Vital Information. From all generations and kinds of supporters, people sixty and over

constitute the demographic from which the least support is expected. For this generation, the family of Partner and Children, mutual assistance from Community associations and governmental assistance from Town/City administration are considered as the common support in all aspects. Then, comparing this with other earthquake disasters showed that a quick and careful response to all the earthquake victims by the administrative organizations is limited in large cities where relations between organizations and locals cannot be evaluated and expected.

In the analysis of the question, “Who should implement the measures for disaster management in a responsible way?” it is made clear that the division of roles among self-help, mutual assistance, and governmental assistance can be summarized in the following four patterns: Mainly by governmental assistance, mainly by self-help, in cooperation with mutual assistance and governmental assistance, and in cooperation with of self-help, mutual assistance, and governmental assistance, altogether. Comparisons between all the earthquake disasters, lead to the understanding that the disaster victims who experienced a large-scale disaster consider that the measures for disaster management should be implemented by through self-help, mutual assistance, and governmental assistance, altogether, regardless of the disaster and local characteristics. In Japanese society it seems that the division of roles among self-help, mutual assistance, and governmental assistance could generally be proposed.

To improve self-help, mutual assistance, and governmental assistance and build an appropriate support system for future disasters, it is important to review the disasters in the past and to understand what kind of natural phenomenon occurred and what kind of damage and influence affected the people and society. By doing this the disaster victims could enhance their own awareness of how disasters affect everyone and the supporters could consider how communication and coordination among themselves should be conducted. For disaster victims, in particular, it is believed that their awareness of how disasters affect everyone, would lead them to consider measures to prevent its damage and influence (mitigation) and to minimize the damage and influence which already occurred (preparedness) and, thereby, carry out the solution actively.

Such measures can be implemented daily for “health management against illness” and “crime prevention” with a high frequency of occurrence but seldom for the disaster management against a large disaster with relatively low frequency of occurrence. However, in spite of the low frequency of occurrence of a large disaster, there is a risk for life to be overturned that could lead to the need to live in a profound manner once a disaster occurs. There is also a high possibility that a disaster can be experienced several times during the human life in the 21st century. Accordingly, it is necessary to consider the experience of others as if they were oneself (indirect experience of disaster) to promote disaster management. It is thought that the Great East Japan Earthquake would exert the influences on life and society that are not limited to five years but

could extend 10 and 20 years into the future. It is important to continue conducting the awareness survey and reconstruction survey for the residents scientifically to clarify the reconstruction situation and the problems for the disaster-stricken areas and its victims and the needs of the victims and to formulate measures for reconstruction and disaster management based on them.

### Acknowledgements

This study constitutes a part of the results of the SECOM Science and Technology Foundation, General Research Grant, “Construction of ‘Educational Hub for Disaster Management and Disaster Mitigation’ to Improve Disaster Management Literacy for Wide-ranging Stakeholders” (represented by Reo KIMURA, University of Hyogo) and JSPS KAKENHI Grant-in Aid for Scientific Research (A), “Construction of ‘Study for Life Recovery Process’ to Visualize Silent Majority (Voice without Voice)” (JP26242031) (represented by Reo KIMURA, University of Hyogo).

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