Chapter 2. Changes in the Environment Surrounding Japan and Future Challenges

This chapter looks back on the past 100 years and provides an overview of the various changes in the environment surrounding Japan that have occurred during this period, thereby clarifying challenges in promoting disaster management in the future.

Section 1. Increasing Severity and Frequency of Natural Disasters

Climate change and other factors are increasing the risk of natural disasters. This section discusses how temperatures and the frequency of heavy rains have changed over the past 100 years since the Great Kanto Earthquake, using meteorological data and taking into account long-term trends. This section also discusses the increasing imminence of large-scale earthquakes, such as a Tokyo inland earthquake that occurs directly under the Tokyo metropolitan area or a Nankai Trough earthquake, with reference to the evaluation results of the government's Earthquake Research Committee.

Climate Change and Its Impacts in Japan

In Japan, damage caused by meteorological disasters such as the Ise Bay (Isewan) Typhoon discussed in Chapter 1, Section 5 as well as windstorms, heavy rains, floods, sediment disasters, and storm surges have been occurring almost every year.

In recent years, Typhoon Habigis in 2019 and the torrential rains in July 2020 caused serious damage. Also in fiscal year 2022, heavy rains in August, Typhoon Nanmadol and Tropical Storm Talas, and other disasters caused damage in rapid succession. Climate change and its impacts, such as the recent rise in average temperature and the increase in the frequency of heavy rains, are manifesting across the country, and are becoming important issues for Japan.

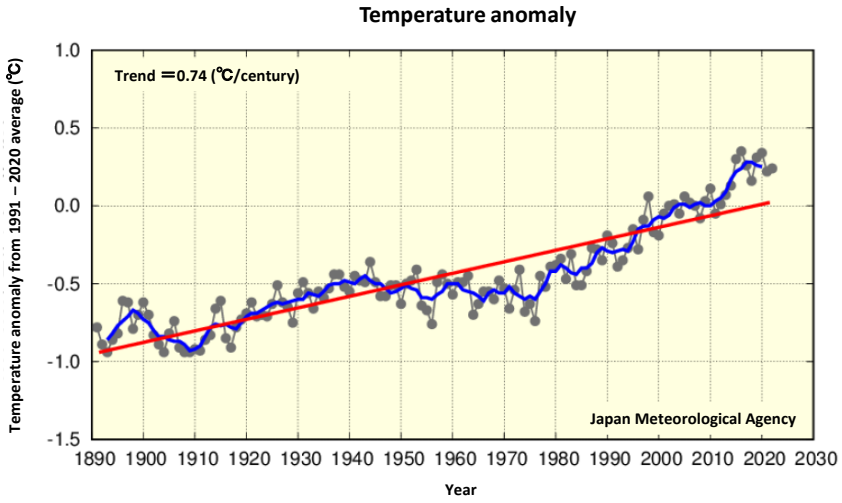
A look at long-term global temperature changes and Japan reveals that the global annual average temperature has been rising with various fluctuations, by 0.74°C per 100 years (Fig. 2-1).

On the other hand, the annual average temperature in Japan has been rising even faster, by 1.30°C per 100 years. Over the past century, global warming has been steadily progressing, due to increased greenhouse gases like carbon dioxide and the effects of natural fluctuations that are repeated every several years to several decades. The 5-year moving average trend shows an accelerating rate of increase in average temperature since the latter half of the 1980s (Fig. 2-2).

As if correlating with this rise in average temperature, the frequency of heavy rains and hourly extreme precipitations (downpours) is also increasing nationwide. The number of days with daily precipitation of 100 mm or more or 200 mm or more has been increasing over the past 100 years (Fig. 2-3). Data from AMeDAS, which started observations at many points in the late 1970s, reveal that the annual frequency of hourly extreme precipitation of 50 mm or more or 80 mm or more per hour has increased over roughly 50 years (Fig. 2-4).

Furthermore, the annual average sea surface temperature in the waters around Japan has increased by 1.24°C over the past 100 years, which is almost the same as the average temperature increase in Japan (Fig. 2-5). A rise in the sea surface temperature is generally considered to increase the forces of typhoons and may lead to them becoming even more damaging.

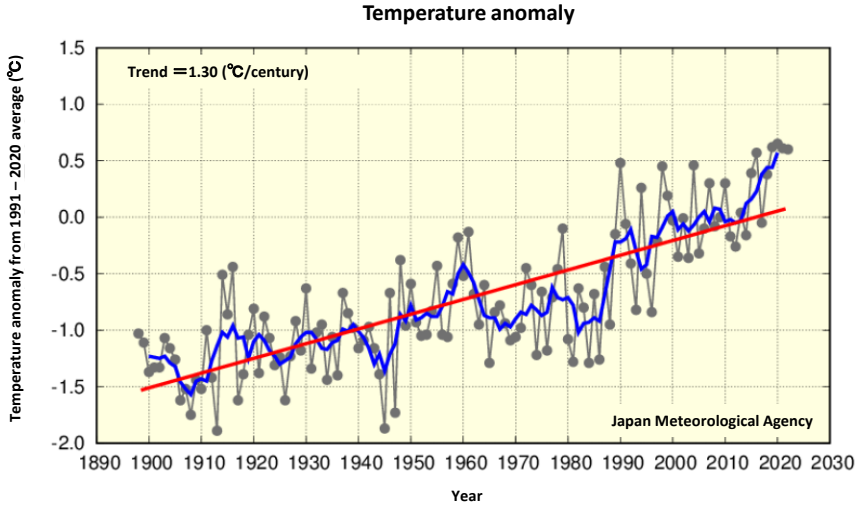
Fig. 2-1 Trends in Annual Global Average Temperature Anomalies (1891-2022)



Anomalies are deviation from baseline (1991-2020 average). The black line indicates surface temperature anomaly of each year (deviation from baseline). The blue line indicates their five-year running mean while the red line indicates the long-term linear trend of this period. The long-term linear trend is statistically significant at confidence level of 99%.

Source: Compiled by the Cabinet Office based on Japan Meteorological Agency "Climate Change Monitoring Report 2022"

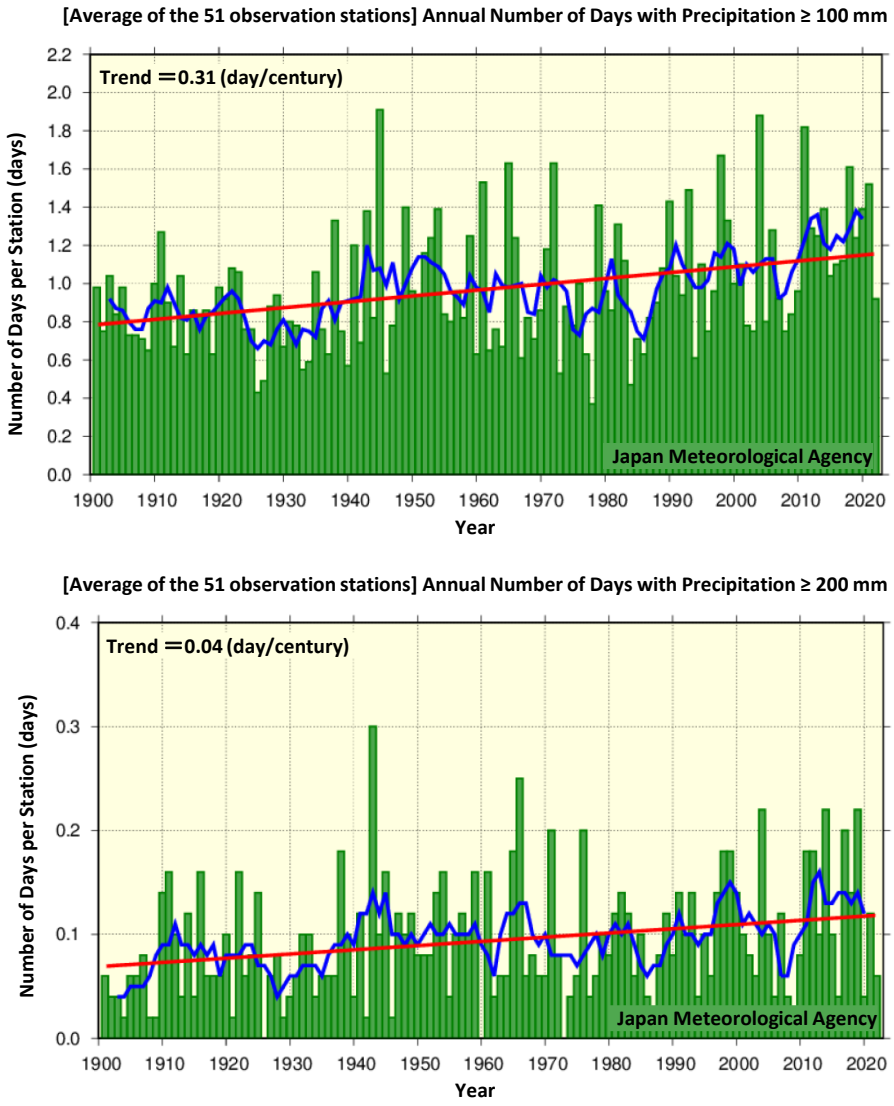
Fig. 2-2 Trends in Annual Average Temperature Anomalies in Japan (1898-2022)



Anomalies are deviation from baseline (1991-2020 average). The black line indicates values of each year averaged in 15 national observation stations (deviations from the baseline). The blue line indicates their five-year running mean while the red line indicates the long-term linear trend of this period. The long-term linear trend is statistically significant at confidence level of 99%.

Source: Compiled by the Cabinet Office based on Japan Meteorological Agency "Climate Change Monitoring Report 2022"

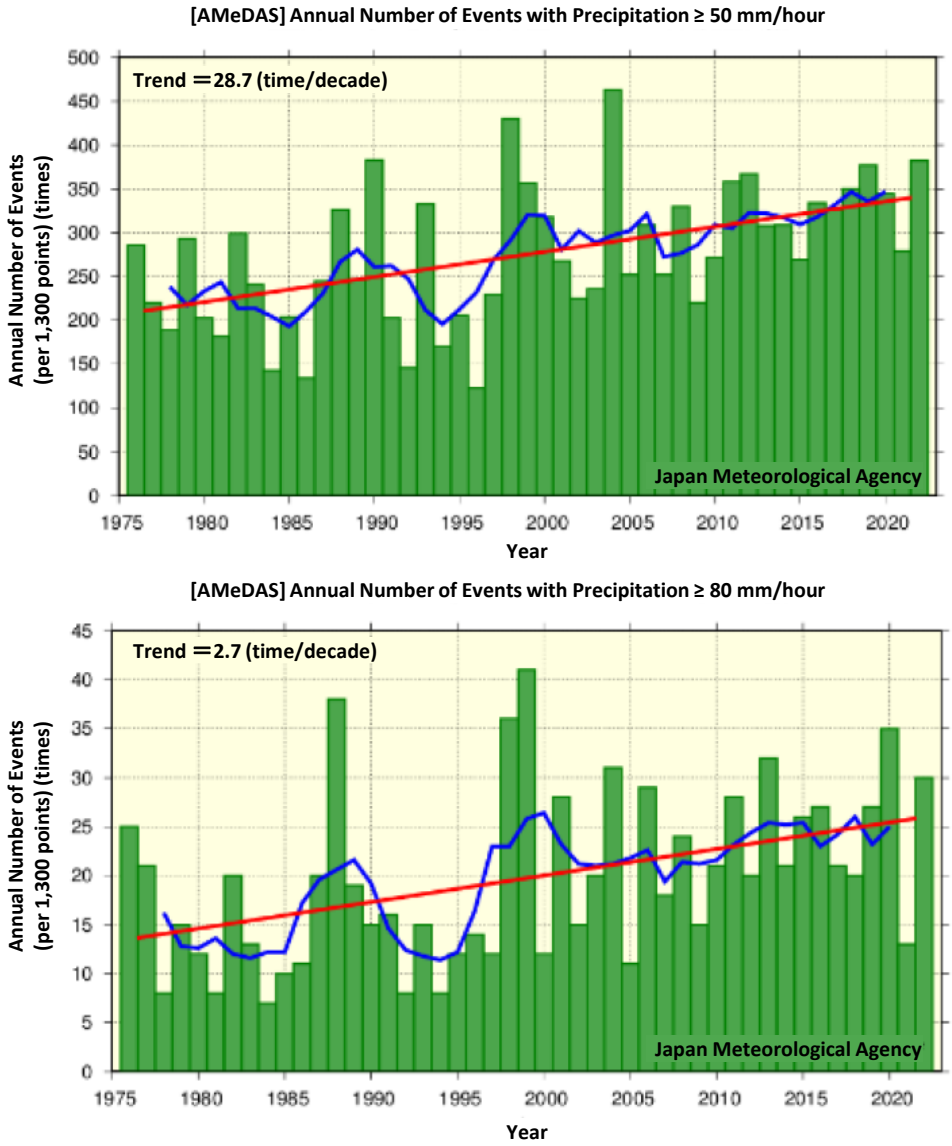
Fig. 2-3 Trends in Annual Number of Days with Precipitation ≥ 100 mm and ≥ 200 mm (1901-2022)



The green bars indicate annual occurrences of days with precipitation divided by the total number of monthly observation data sets available of the year (i.e., the average occurrence per station). The blue line indicates the five-year running mean, and the straight red line indicates the long-term liner trend of this period. The increase in the annual number is statistically significant at confidence level of 99%.

Source: Compiled by the Cabinet Office based on Japan Meteorological Agency “Climate Change Monitoring Report 2022”

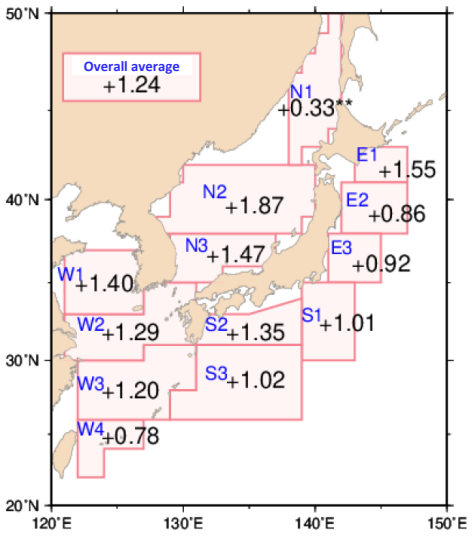
Fig. 2-4 Trends in Annual Number of Days with Precipitation ≥ 50 mm/hour and ≥ 80 mm/hour (1976-2022)



The green bars indicate the annual number of the event (days) at AMeDAS stations nationwide for each year (converted to a per-1,300-station basis). The blue line indicates the five-year running mean, and the straight red line indicates the long-term liner trend of this period. The increase in the annual number is statistically significant at confidence level of 99%.

Source: Compiled by the Cabinet Office based on Japan Meteorological Agency "Climate Change Monitoring Report 2022"

Fig. 2-5 Trends in Area-averaged Annual Mean SSTs around Japan (°C per century)



Area number	Area name	Area number	Area name
E1	Sea off Kushiro	N1	Northeastern part of the Sea of Japan
E2	Sea off Sanriku	N2	Central part of the Sea of Japan
E3	Eastern part of the sea off Kanto	N3	Southwestern part of the Sea of Japan
S1	Southern part of the sea off Kanto	W1	Yellow Sea
S2	Sea off Shikoku and Tokai	W2	Northern part of the East China Sea
S3	East of Okinawa	W3	Southern part of the East China Sea
		W4	Sea around the Sakishima Islands

Fig. 2-5 shows increase rates from 1900 to 2022. Areas with no symbol and those marked with [**] have statistical significant trend at confidence levels of 99% and 90 % respectively.

Source: Compiled by the Cabinet Office based on Japan Meteorological Agency “Climate Change Monitoring Report 2022”

Increasing Imminence of Large-Scale Earthquakes

The government's Earthquake Research Committee is assessing the intervals of the activities of major active faults and trench-type earthquakes as well as the probability of earthquakes and publishing the results. For example, the Committee announced the possibility of a Nankai Trough earthquake (magnitude 8-9 class) occurring within 30 years as 60 to 70% 10 years ago in 2013, as compared to 70 to 80% in 2023, which shows the imminence of the earthquake is increasing over time. In addition, the probability of an earthquake with magnitude 7 or so occurring within 30 years directly below the southern Kanto region, caused by plate subduction along the Sagami Trough, has not changed from around 70% at the time of the 2014 announcement because such an earthquake cannot be treated as one that occurs repeatedly in the same location. In the Kanto area, however, earthquakes of a magnitude 7 class have occurred frequently as far as the Committee has grasped. While seismic activities have been relatively calm over the 100 years since the Great Kanto Earthquake, a relatively active period is expected in future and continued vigilance is required.

Natural Disaster Risk Anticipated to Increase Further

Meteorological disasters have intensified and become more frequent over the past 100 years in visible ways and this trend is expected to continue as global warming progresses. In addition, we cannot neglect preparations for large-scale earthquakes, such as a Tokyo inland earthquake and a Nankai Trough earthquake and volcanic eruptions that are expected to occur in future.

We must squarely face the ever-increasing risk of natural disasters and make all efforts to avoid or mitigate the predicted damage.

Section 2. Improving Disaster Response Capabilities through the Development of Disaster Management and Mitigation Infrastructure

Compared with the Taisho Era, during which the Great Kanto Earthquake occurred, the current infrastructure for disaster management and mitigation (hereinafter referred to as “disaster management and mitigation infrastructure”) has been highly developed. This section presents examples of how damage has been mitigated by developing rivers and ports and reviews Japan's earthquake preparedness efforts and progress, with a focus on the seismic reinforcement of buildings. As well as the development of disaster management and mitigation infrastructure, this section discusses the need for efforts to raise disaster management awareness.

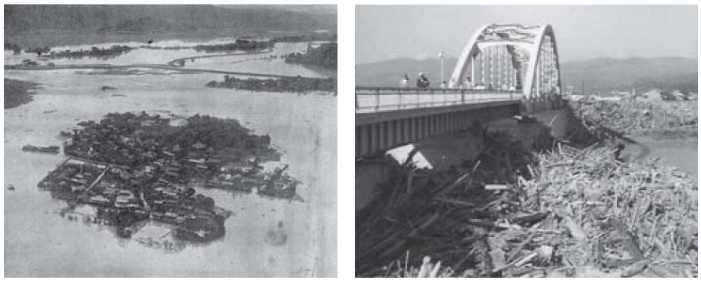
Damage Mitigation through Flood Control and Storm Surge Countermeasures

To protect the lives and property of residents from natural disasters, Japan has been promoting the development of disaster management and mitigation infrastructure, such as river development and dam construction, nationwide.

First, this section takes up the Kano River (Kanogawa), which flows through the Izu Peninsula in Shizuoka Prefecture, as an example of how damage can be mitigated by developing disaster management and mitigation infrastructure in flood control measures. The Kano River, which has its water source in the Amagi Mountain Range on the Izu Peninsula and flows from south to north, which is a rare flow direction on the Pacific Ocean side, has been at the center of people's lives for more than a thousand years. On the other hand, due to its geographically narrow downstream section and the high rainfall zone in the basin, it has caused many floods since ancient times. The Kanogawa Typhoon (Typhoon Ida) in particular brought about unprecedented flood damages to the basin in September 1958 (photo 7). In response, to lower the water level of the Kano River main stream, which traverses the downstream urban area, the Kano River Discharge Channel was constructed to divert the river flow at its midstream directly into the sea. Subsequently, Typhoon Hagibis in 2019, which brought heavy rain in this area, recorded a total rainfall of 778 mm, exceeding the total rainfall of the Kanogawa Typhoon (739 mm). However, the diversion of the flood via the Kano River Discharge Channel prevented the river from overflowing, significantly reducing human and property damage (photo 8).

Next, this section examines the effect of developing disaster management and mitigation infrastructure in storm surge measures, citing Osaka City as an example. Osaka City experienced large-scale flood damage due to the storm surge associated with the 2nd Muroto Typhoon (Typhoon Nancy) in September 1961, which prompted the city to implement storm surge countermeasures, including the water gates, storm surge barriers and seawall iron gates. In September 2018, more than half a century after the 2nd Muroto Typhoon, Typhoon Jebi (T1821) recorded TP + 3.29 m in Osaka Bay, far exceeding the highest tide level ever recorded in the bay (TP + 2.93 m in the 2nd Muroto Typhoon), but the proper operation of the water gates and seawall iron gates installed as part of measures against storm surge in Osaka Bay helped avoid flooding damage in the Osaka urban area (Photo 9).

Photo 7. Damage Caused by Kanogawa Typhoon in September 1958



Source : Numazu Office of River and National Highway, Chubu Regional Development Bureau, MLIT

Photo 8. Kano River Discharge Channel

Source : Numazu Office of River and National Highway, Chubu Regional Development Bureau, MLIT

Photo 9. Kizugawa Water Gate in Osaka Bay protecting the urban area from high waves caused by Typhoon Jebi in 2018

Source : Ministry of Land, Infrastructure, Transport and Tourism

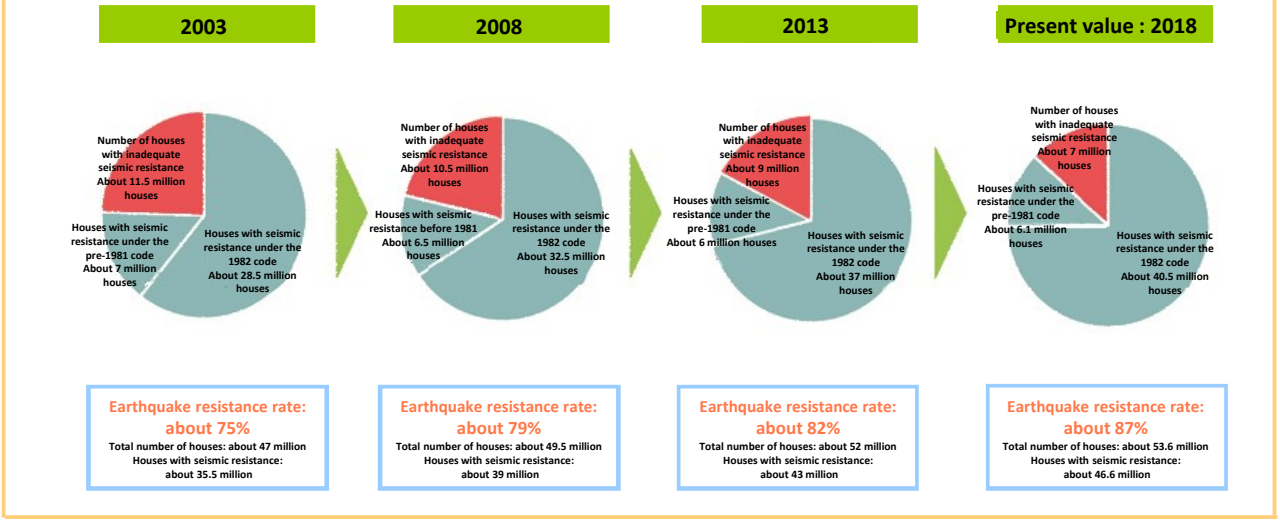
Progress in the Seismic Reinforcement of Buildings

Next, this section focuses on the seismic reinforcement of buildings as part of discussing Japan's efforts for earthquake countermeasures. As explained in Chapter 1, Section 1, the Great Kanto Earthquake caused more than 105,000 casualties due to the collapse of buildings and the resulting fires. As discussed in Chapter 1, Section 4, many buildings that had not been seismically reinforced collapsed. In response, seismic force-related provisions were enacted by law. During the later Great Hanshin-Awaji Earthquake, damage was particularly concentrated in buildings that did not satisfy the quake-resistance standards, so the seismic reinforcement of such buildings was promoted.

With these efforts, the seismic reinforcement of buildings in Japan has been making steady progress. For example, the earthquake resistance rate of residential houses[7] has been steadily increasing: approximately 75% in 2003, approximately 79% in 2008, approximately 82% in 2013 and approximately 87% in 2018. The effectiveness of seismic reinforcement has been confirmed, as evidenced by the lack of damage to many earthquake-resistant buildings in the Great East Japan Earthquake (Fig. 2-6). In preparation for future large-scale earthquakes such as a Tokyo inland earthquake, a goal of mostly eliminating the houses with inadequate seismic resistance by 2030 has been set and efforts toward it have been made with various public supports.

7 Percentage of housing stock with seismic resistance required by the 1981 quake-resistance standards

Fig. 2-6 Trends in Earthquake-resistant Housing in Japan (2018)



Source: Ministry of Land, Infrastructure, Transport and Tourism

Promotion of Disaster Management Measures Combining Hardware and Software

To cope with increasingly severe and frequent natural disasters, Japan has steadily developed and maintained disaster management and mitigation infrastructure over the past 100 years. Therefore, as was shown in the aforementioned damage mitigation examples, developing disaster management and mitigation infrastructure has often prevented or mitigated the occurrence of disasters in many areas, even in the cases of heavy rains or earthquakes that would have caused large-scale disasters if they had happened long ago. In addition, as these areas have been made safer, new housing has been developed in urban areas and land development for factories has been promoted in peripheral areas, all of which has helped upgrade land use and boost productivity nationwide. This, in turn, has contributed to Japan's economic development.

However, as hardware development progresses, new challenges emerge, such as aging facilities and an increasing number of vacant houses, if proper management is not carried out. In addition, as most people have less direct experience with natural disasters, their perception of natural disasters has diminished. Undeniably, more and more people fail to perceive natural disasters as a personal concern or are unaware of the need to take appropriate disaster management actions until a disaster actually occurs, believing that they will be fine or that no disaster will occur in their area.

There are thus obvious needs for steadily refining the development of disaster management and mitigation infrastructure, as well as implementing appropriate maintenance and aging-management measures in future. As discussed in Chapter 1, Section 5, it is also necessary to thoroughly implement a concept of “disaster mitigation” that minimizes damage by combining various hardware and software measures and further reinforce software measures such as disaster management education and drills.

Section 3. Concentration of Population in Metropolitan Areas and Aging Population

The previous chapter has reviewed the history of large-scale disasters from the time of Great Kanto Earthquake to the present day and how Japan responded to them. Japan’s economy and society have changed significantly

over the last 100 years. Since the population census in Japan started in 1920, three years before the Great Kanto Earthquake, it has been possible to take a chronological overview of the differences between the socioeconomic situations at the time the disaster occurred and today. Therefore, this section mainly uses population census data[8] to clarify the characteristics of the population structure at the time of the megaquake, analyze subsequent changes in the population structure and future trends and discuss demographic risks which are the subject of growing concern.

3-1 Distribution of Population by Region

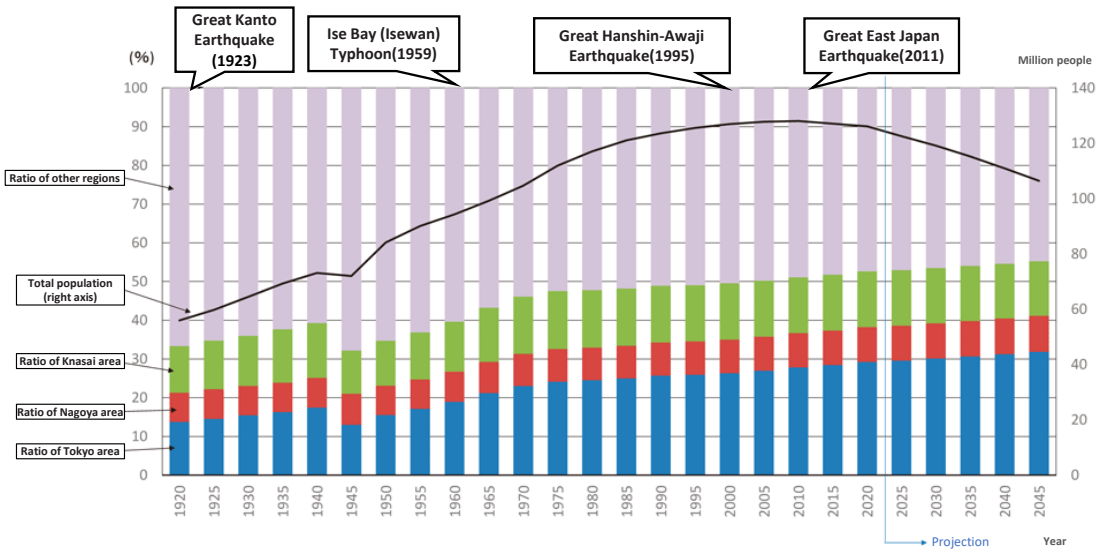
The Population of the Tokyo Area at the Time of the Great Earthquake Was Less than a Quarter of the Current Population.

The total population of Japan in 2020 was approximately 126.15 million. In 1920, three years before the Great Kanto Earthquake, Japan's total population was approximately 55.96 million (44.4% of the population in 2020), which was less than half the current population.

In terms of population distribution by area[9], the Tokyo Area in 2020 had approximately 36.91 million residents, accounting for about 29.3% of the total population, while the population of the same area in 1920 was approximately 7.68 million (about 13.7% of the total population), which was less than one-fourth its current population and only about half the current total population of Japan (Fig. 2-7).

Based on the above, it can be said that the impact of the Great Kanto Earthquake on the population and economic and social activities was relatively small compared with the impact of similar earthquakes in the present day.

Fig. 2-7 Trends in the Total Population and Population Composition Ratio by Regions



Source: "Population Census," Ministry of Internal Affairs and Communications; "Regional Population Projections for Japan: 2015-2045 (2018)" National Institute of Population and Social Security Research

8 Ministry of Internal Affairs and Communications, "Population Census"

9 Area divisions are as follows:
Tokyo Area: Saitama Pref., Chiba Pref., Tokyo, and Kanagawa Pref.
Nagoya Area: Gifu, Aichi and Mie Prefectures
Kansai Area: Kyoto, Osaka, Hyogo and Nara Prefectures
Local areas: prefectures other than the above

The Ise Bay [Isewan] Typhoon Occurring during the Rapid Population Growth in Metropolitan Areas

A study of the population structure at the times of major disasters after the Great Kanto Earthquake and the subsequent Second World War reveals that the regional population distribution differed from period to period.

The occurrence of the Ise Bay Typhoon in 1959 coincided with the full-scale concentration of population in the three major metropolitan areas. While the population of local areas decreased for the first time since the Second World War between 1960 and 1965, the populations of the three major metropolitan areas, including the Nagoya Area, which was hit by the Ise Bay Typhoon, surged during the same period.

The Great Hanshin-Awaji Earthquake, which Occurred at a Time When the Trend of Unipolar Population Concentration in Tokyo Intensified

The occurrence of the Great Hanshin-Awaji Earthquake in 1995 coincided with the period after the bursting of the economic bubble when the trend toward unipolar population concentration in the Tokyo Area intensified. The population change rate of the Kansai Area (over 5 years) remained almost flat at 0.8% from 1990 to 1995, and has been negative since 2015.

The Great East Japan Earthquake occurred in 2011, immediately after the total population of Japan peaked at approximately 128.08 million in 2008. The trend toward unipolar population concentration in Tokyo further intensified, and while the population ratio of the Tokyo Area accounted for 27.8% in 2010, the population ratio of the local areas including the Tohoku Area fell below half to 48.9%.

Expected Trend of Further Unipolar Population Concentration in Tokyo

According to the National Institute of Population and Social Security Research's future population projection by region[10], the unipolar population concentration in the Tokyo Area will further progress and the population share of the Tokyo Area is estimated to reach 31.9% by 2045. With the probability of an M7-class earthquake occurring within 30 years in the southern Kanto region estimated at around 70%, further countermeasures are required to prepare for a mega-disaster such as a Tokyo inland earthquake (an earthquake occurring directly under the Tokyo metropolitan area) than were required 100 years ago when the Great Kanto Earthquake occurred.

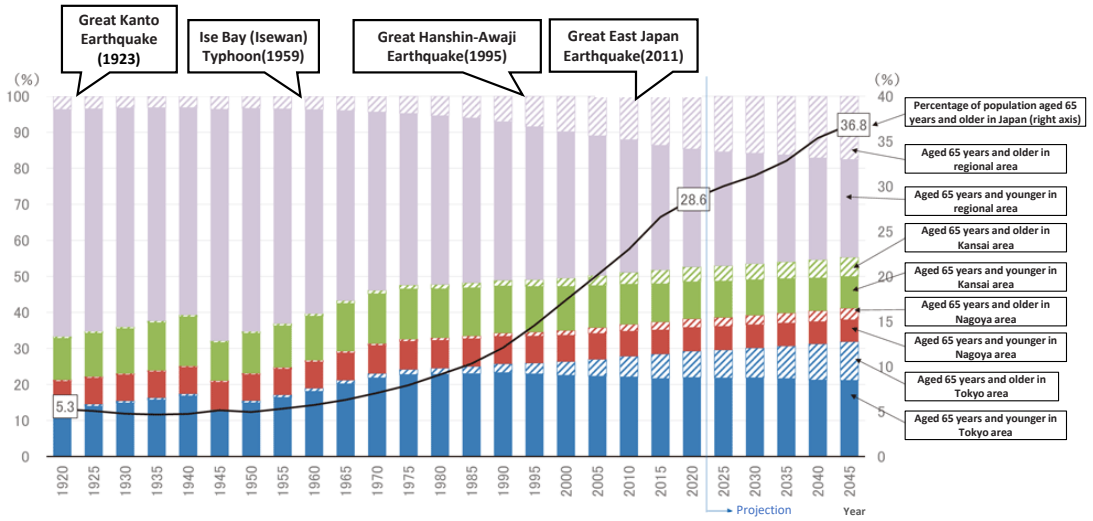
3-2 Aging of the Population

The Aging Rate at the Time of the Great Kanto Earthquake Was Less than One-Fifth of the Current Rate

Japan's population is aging, and the national aging rate (the ratio of the population aged 65 and over to the total population) in 2020 was 28.6%, meaning that more than one in four people were elderly. On the other hand, Japan's postwar population structure maintained a "pyramid-shaped" population structure, with the largest number of people at age 0 and population decreasing as the age increased, and the proportion of elderly people was much smaller than today. In 1920, the proportion of elderly people was 5.3%, or about 1 in 20 people, which was less than one-fifth of the current ratio (Fig. 2-8).

10 National Institute of Population and Social Security Research, "Population Projection by Region in Japan" (2018 estimate)

Fig. 2-8 **Trends in the Percentage of Population Aged 65 Years and Older in Japan and Population Composition Ratio by Regions and Age Groups**



Source: "Population Census," Ministry of Internal Affairs and Communications (For 2015 and 2020, unspecified values were complemented. Population aging rates in and before 2020 were calculated by proportionally distributing individuals with unspecified ages.), "Regional Population Projections for Japan: 2015-2045 (2018)" National Institute of Population and Social Security Research

Issue of Disaster-related Deaths among the Elderly That Attracted Attention in the Great Hanshin-Awaji Earthquake

Following the post-war baby boom, as the period of rapid economic growth started, Japan entered the period of a society with low fertility and death rates, but aging rate remained low for a while. During the late Showa Era, when the economic growth rate slowed, the birth rate began to decline and the aging rate began to increase progressively.

In 1995, the year of the Great Hanshin-Awaji Earthquake, the aging rate was 14.6%, an increase of 2.5 percentage points from five years earlier. The earthquake highlighted so-called "disaster-related deaths" due to prolonged evacuation and other factors, but behind this was the rapid increase in the number of elderly people.

The aging rate continued to rise especially in rural areas. By the time of the Great East Japan Earthquake (2011), the aging rate in rural areas reached 24.7% (2010).

The Aging of Population Expected to Progress Also in the Tokyo Area

The aging of the population is expected to progress further in the future, with the national average of aging rate estimated to increase from 28.6% in 2020 to 36.8% in 2045. The aging rate is particularly high in rural areas, where 31.0% in 2020 is estimated to increase to 39.3% in 2045.

Conversely, the aging rate in the Tokyo Area was 25.1% in 2020, which was lower than the national and local area averages, but is predicted to reach about 33.7% in 2045 because aging will continue to increase as in the local areas.

Thus, based on demographic projections for the next 20 years or so, more than one-third of the population of the Tokyo Area will be elderly and the population is expected to continue aging, with an increase in the number of elderly people aged 75 or older. Given the fact that most disaster-related deaths have occurred among the elderly, improving the evacuation environment in the event of a mega-disaster, such as a Tokyo inland earthquake, will be even more challenging with the mental and physical care of the elderly and their prolonged evacuation in mind.

Section 4. Changes in People's Disaster Management Awareness, and Progress in Self-Help and Mutual Support Initiatives

One of the lessons learned from the Great Kanto Earthquake is that each citizen's disaster management awareness and self-help and mutual support initiatives based on that awareness are key elements of enhancing a regional disaster resilience.

Despite the lack of any survey to determine people's disaster management awareness and the status of disaster management efforts on an ongoing basis since the Great Kanto Earthquake, this section analyzes trends since the late Showa Era and discusses future tasks based primarily on public opinion surveys by the Cabinet Office and surveys by the Fire and Disaster Management Agency.

4-1 People's Disaster Management Awareness, and Progress in Self-Help Initiatives

Low Public Awareness of Disaster Management Prior to the Great Hanshin-Awaji Earthquake

A "public opinion survey on disaster management" conducted in September 1984, asked for the first time: "Have you taken any measures in your home to prepare for a major earthquake or not?" (in a multiple-choice format), to which 41.6% of the respondents answered, "not taking any specific measures" (Fig. 2-9).

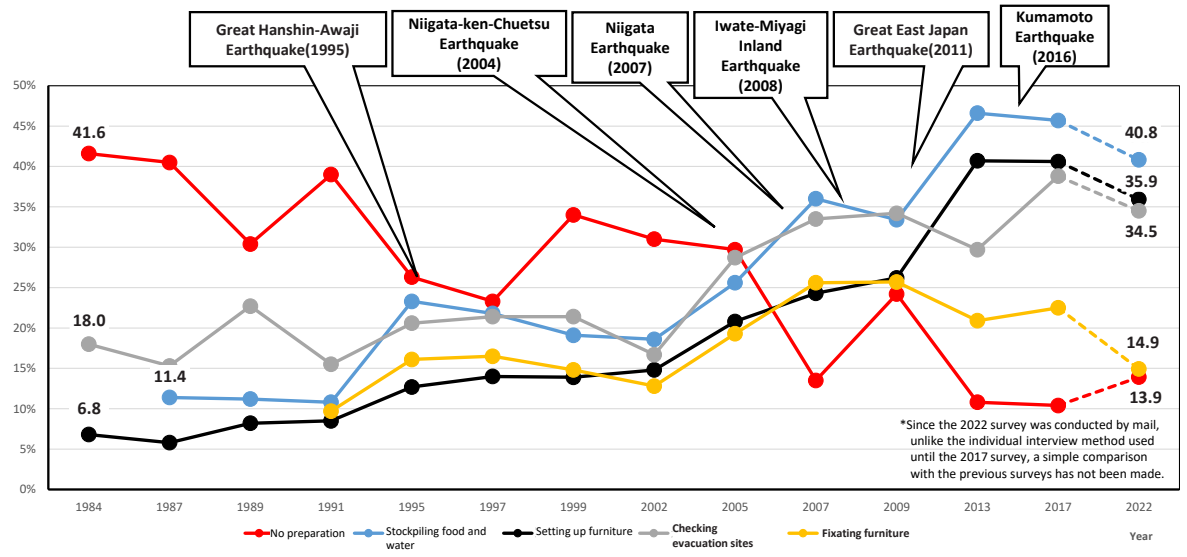
Also, the three subsequent surveys did not show any increase in public awareness of disaster management. As a result, the 1992 edition of the White Paper on Disaster Management, published about 30 years ago, made the observation below, touching on the relationship between disaster experience and disaster management awareness among the public.

"People who were 20 years old when the Great Kanto Earthquake occurred are now approaching 90 years old, and those who were 20 years old when the Ise Bay Typhoon struck are already in their 50s. As a result, the experience of the past large disasters will fade further."[11]

In addition to this observation, the white paper argued for the necessity of accumulating simulated disaster experiences through the active use of disaster video films and earthquake simulation vehicles.
What triggered a major shift in the public awareness of disaster management was the Great Hanshin-Awaji Earthquake of 1995. In a public opinion survey conducted in September 1995, shortly after the earthquake, the percentage of respondents who said they were not taking any specific measures dropped sharply to 26.3%. Regarding the percentages of implementing specific "self-help" efforts, "fixation of furniture and other home furnishings" increased from 6.8% to 12.7% (comparison between 1984 and 1995), and "stockpiling of food and water" increased from 11.4% to 23.3% (comparison between 1987 and 1995), both having increased significantly. This is due to the fact that people learned that most of the deaths in the Great Hanshin-Awaji Earthquake were caused by crushing under overturning furniture, and that food and other supplies were overwhelmingly in short supply at shelters immediately after the disaster.[12]

11 National Land Agency, "1992 White Paper on Disaster Management," pp. 198 to 199
12 Cabinet Office, "Collection of Lessons Learned from the Great Hanshin-Awaji Earthquake"

Fig. 2-9 Trends in Self-help Efforts in Preparation for a Major Earthquake (Public Opinion Survey of Disaster Management)



Source: "Public Opinion Survey of Disaster Management," prepared by the Cabinet Office

Improved Public awareness of Disaster Management Due to Successive Earthquake Disasters in the Mid-Heisei Era

Even after the Great Hanshin-Awaji Earthquake, earthquake disasters occurred successively in various regions in the mid-Heisei Era, including the Mid Niigata Prefecture Earthquake in 2004, Earthquake Off the Coast of Chuetsu in Niigata Prefecture in 2007, and the Iwate-Miyagi Inland Earthquake in 2008.

A total of six public opinion surveys were conducted from the 1995 opinion survey until the Great East Japan Earthquake (2011). During this period, the percentages of the respondents who "fixated furniture and other home furnishings" increased from 12.7% to 26.2% (comparison between 1995 and 2009), who "stockpiled food and water" increased from 23.3% to 33.4% (comparison during the same), who "checked evacuation sites" increased from 20.6% to 34.2% (same), and who "checked the method of contact among family members" increased from 16.1% to 25.7% (same), all of which generally maintained an upward trend. The background of this trend was that the public's disaster management awareness has increased as a result of those successive earthquake disasters.

Stagnating Self-Help Efforts after the Great East Japan Earthquake

Needless to say, the Great East Japan Earthquake (2011) significantly raised the public's awareness of disaster management. According to the 2013 opinion survey, the percentage of respondents who answered that they were not taking any specific countermeasures dropped to 10.8%. Specific "self-help" initiatives saw significant increases from the previous survey, with 40.7% of respondents "fixating furniture and other home furnishings" and 46.6% "stockpiling food and water," both marking an increase of over 10 percentage points.

However, despite the Kumamoto Earthquake that occurred in 2016 after the Great East Japan Earthquake and caused significant damage, the implementation rate of self-help efforts has shown signs of leveling off in the subsequent survey conducted in 2017; for example, only 40.6% of respondents answered that they "fixated furniture and other home furnishings. In addition, the most recent survey in 2022, which was conducted by mail, unlike the previous surveys conducted through individual interviews, suggests that the overall implementation rate

of self-help efforts has not increased, even though a simple comparison with the previous survey results is not possible.

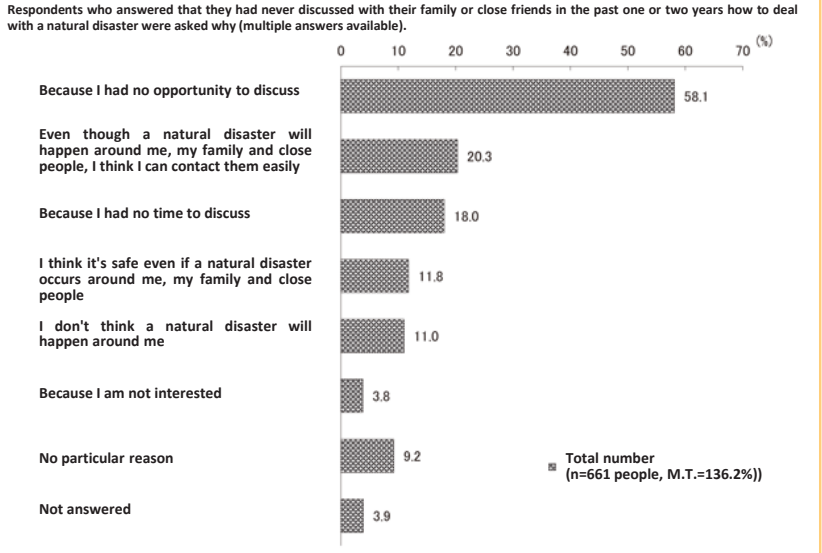
Need to Create Opportunities for the Public to Start Initiatives

In recent years, in addition to earthquake disasters, there have been a series of storm and flood disasters such as typhoons, torrential rains and landslides. However, the rate of implementation of “self-help” measures by the public has been stagnating. One reason is that many citizens only see and hear about disasters in the media and do not feel that they themselves may become victims someday, which seems to hinder efforts to boost disaster management awareness among the public, despite successive disasters.

On the other hand, in the 2022 survey, 36.9% of the respondents answered that “they had never discussed how to deal with natural disasters with their families or close people.” When they were asked why (in a multiple-choice format), the rate of those who chose the answer “I think it's safe even if a natural disaster occurs around me” or “I don't think a natural disaster will happen around me” was low, while the rate of those who chose the answer “Because I had no opportunity to discuss” was overwhelmingly high (58.1%). This suggests that although most people are aware of the risks of natural disasters, there are a certain number of people who are unable to take the first step to prepare for them (Fig. 2-10).

In the 2022 survey, 13.9% of the respondents answered that “they had not taken any particular measures” in preparation for a major earthquake. The answers were analyzed according to the attributes of the respondents: By region, 6.4% of residents in the wards of Tokyo answered the same way and by age group, 17.2% of those aged 18 to 29, 17.6% of those aged 30 to 39 and 11.4% of those aged 70 or over gave the same answer. This suggests a higher rate of those taking countermeasures among residents in the wards of Tokyo and among the elderly than in other groups. Accordingly, it is necessary to consolidate efforts to reach out to those who are yet to take the first step, bearing the differences in target regions and age groups in mind (Fig. 2-11).

Fig. 2-10 Reasons why respondents answered “they had never discussed how to deal with natural disasters with their families or close people”



Source: “Public Opinion Survey of Disaster Management,” prepared by the Cabinet Office (Survey in September 2022)

Fig. 2-11 Ration of respondent who answered “they had not taken any particular measures” in preparation for a major earthquake”

	Valid responses	Not taken any particular measures
		%
Total	1,791	13.9
[City scale]		
Large cities	500	11.6
Wards of Tokyo	110	6.4
Ordinance-designated cities	390	13.1
Middle cities	722	16.9
Small cities	403	11.9
Towns and villages	166	12.7
[Gender]		
Male	821	16.0
Female	970	12.2
[Age]		
18-29 years	145	17.2
30-39 years	182	17.6
40-49 years	286	15.0
50-59 years	333	13.2
60-69 years	354	13.8
70 years old and over	491	11.4

Source: “Public Opinion Survey of Disaster Management,” prepared by the Cabinet Office (Survey in September 2022)

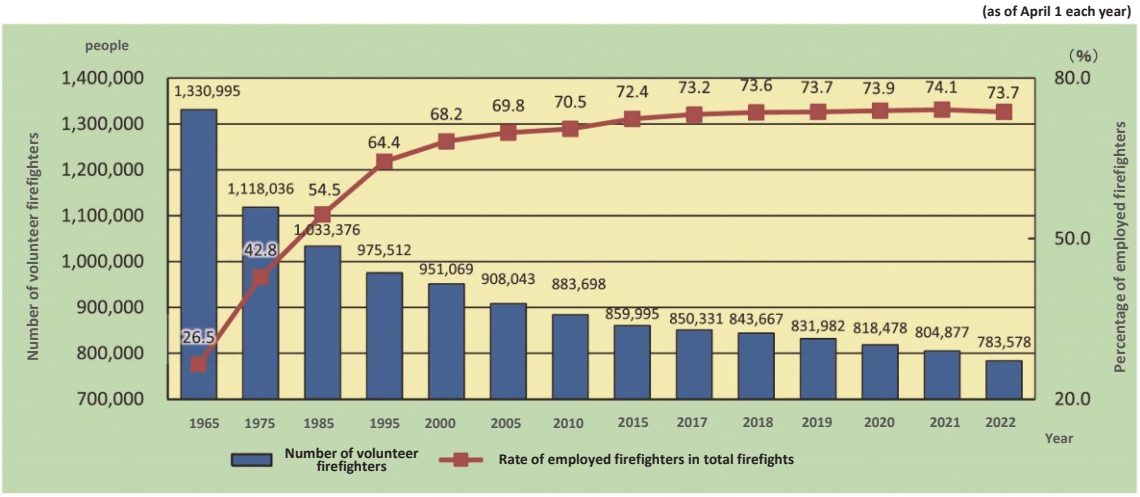
4-2 Progress in “Mutual Support” Initiative

Progress of “Mutual Support” Initiative in Communities

To improve regional disaster resilience, in addition to the promotion of “self-help” initiative by individual residents, “mutual support-based” disaster risk management activities with the awareness that “we protect our own community by ourselves” is important. To this end, the development of voluntary disaster management organizations that support voluntary disaster management activities in communities is being promoted, and the number of such organizations and their activity coverage rates are increasing year by year.

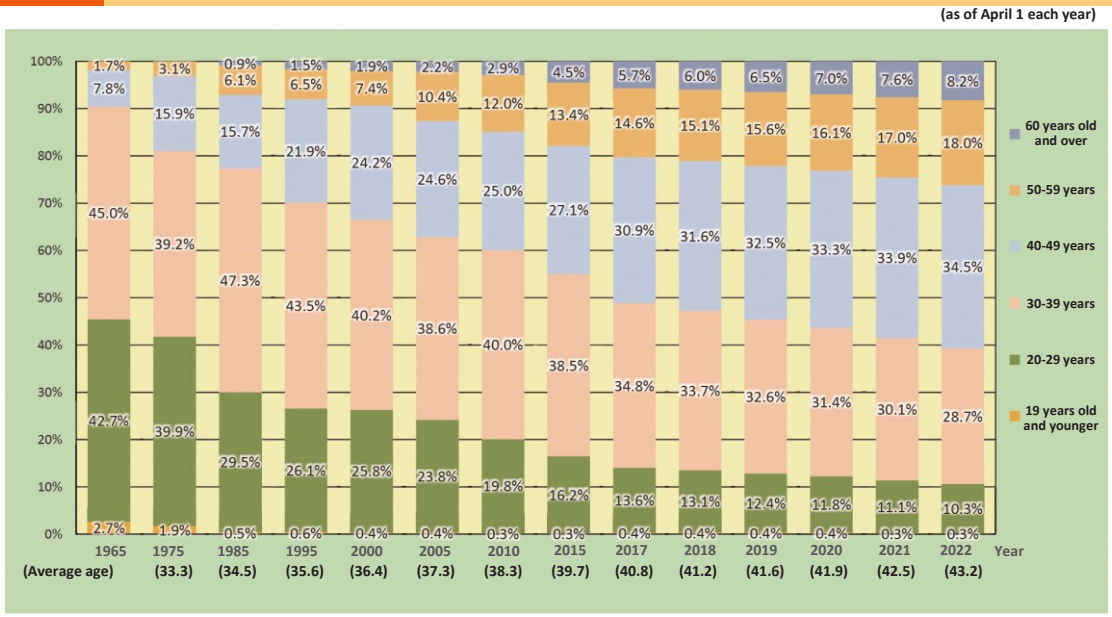
On the other hand, the number of fire corps volunteers, who play a central role in regional disaster resilience, declined from approximately 1.33 million in 1965 to approximately 780,000 in 2022, falling below 800,000 for the first time (Fig. 2-12). In addition, the members are aging: In 1965, 90.4% of the members were in their 10s to 30s, but by 2022, the percentage decreased to 39.3% (Fig. 2-13). Efforts are being made to encourage a wide range of residents, including women and young people, to join the fire corps volunteers, and to improve and strengthen their equipment, education and training.

Fig. 2-12 Trends in the Number of Volunteer Firefighters and Employed Firefighters



Source: “2022 White Paper on Fire Service” Ministry of Internal Affairs and Communications

Fig. 2-13 Trends in Number of Volunteer Firefighters by Age Groups



Source: "2022 White Paper on Fire Service" Ministry of Internal Affairs and Communications

Progress of Volunteer Activities

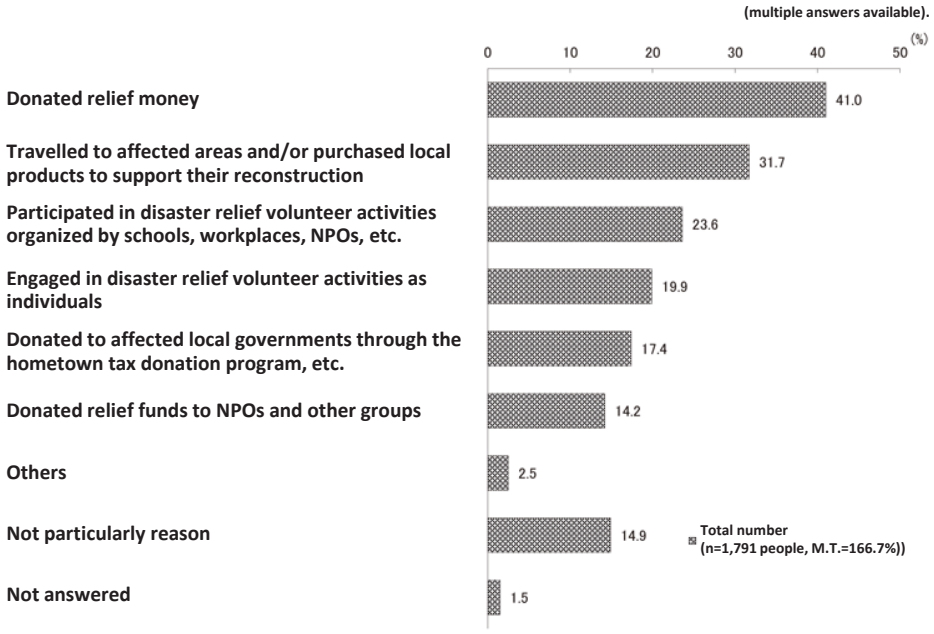
Since the Great Hanshin-Awaji Earthquake in 1995, often referred to as the "First Year of Volunteerism," in which a total of 1.38 million volunteers were engaged, support activities by disaster relief volunteers have become indispensable for disaster-stricken areas and people. As a result of the Mid Niigata Prefecture Earthquake (2004) and other disasters, it became common for the Japan National Council of Social Welfare to operate disaster volunteer centers, creating an environment favorable for the activities of individual volunteers. Furthermore, the Great East Japan Earthquake (2011) and other disasters have activated volunteer activities by organizations such as NPOs and companies. The establishment of the Japan Volunteer Organizations Active in Disaster (JVOAD), which supports such organizations' activities and the establishment of prefecture-level disaster relief intermediary support organizations are progressing in various regions.

Necessity of Widely Promoting a "Mutual Support" Initiative

The 2022 public opinion survey (using a multiple-choice format) investigated the awareness of people, including volunteers, towards support activities for disaster-affected people and areas. According to this survey, 41% of the respondents "donated relief money," 23.6% "participated in disaster relief volunteer activities organized by schools, workplaces, NPOs, etc.,"and 19.9% "engaged in disaster relief volunteer activities as individuals." Additionally, many respondents answered that they "travelled to affected areas and purchased local products to support their reconstruction" (31.7%), "donations to affected local governments through the hometown tax donation program, etc."(17.4%) and "donated relief funds to NPOs and other groups" (14.2%) (Fig. 2-14).

Such support activities can be regarded as a "mutual support" initiative in a broad sense. Amid concerns about the weakening of people's ties in each local community, there is a need to foster an environment that encourages a wide range of "mutual support" efforts, including those mentioned above.

Fig. 2-14 **Support Activities for Disaster-affected People and Areas in the Event of a Natural Disaster (Public Opinion Survey of Disaster Management)**



Source: "Public Opinion Survey of Disaster Management," prepared by the Cabinet Office (Survey in September 2022)

Section 5. Foreign Nationals Increasing Due to Globalization

Over the past 100 years, the number of foreigners living in or visiting Japan has increased significantly. This means that the number of foreign residents and foreigners who visit Japan and who may be affected and need assistance in the event of a disaster is increasing. From this perspective, this section compares the current situation of foreigners with their situation a century ago.

Significantly Increased Foreigners Living in Japan

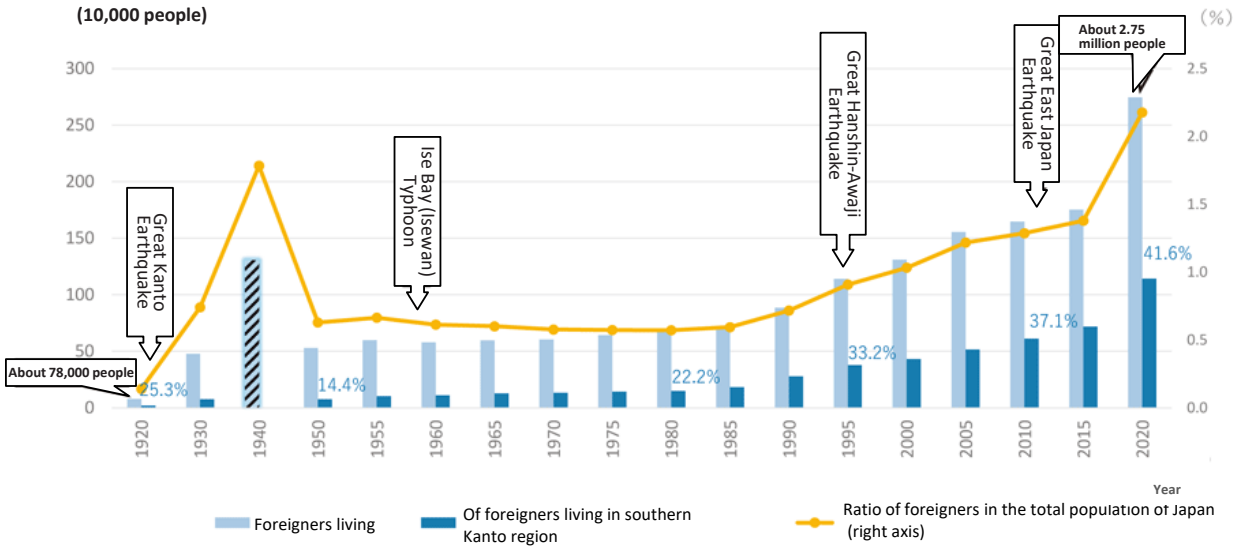
In 1920, three years before the Great Kanto Earthquake, there were only 78,000 foreigners living in Japan, but 100 years later, in 2020, the number increased 35-fold to 2.747 million. While the Japanese population has been declining since the 2010 population census, the foreign population has continued to increase, and the percentage of foreigners in the total population increased significantly from 0.1% in 1920 to 2.2% in 2020.

More Than 40% of Foreigners Living in the Tokyo Area

The following is a comparison of the regional numbers of foreigners in Japan a hundred years ago and the present. In 1920, the numbers of foreigners were high in the order of Hyogo Pref. (about 12,000), Kanagawa Pref. (about 11,000), Fukuoka Pref., and Tokyo (then Tokyo Pref.) (approximately 9,000 for both Fukuoka Pref. and Tokyo). At that time, the proportion of foreigners living in the Tokyo Area accounted for 25.3% of the total foreign population in Japan. On the other hand, in 2020, the order changed to Tokyo (about 564,000), Aichi Pref. (about 259,000), Osaka Pref. (about 242,000), and Kanagawa Pref. (about 231,000), and the proportion of foreigners living in the Tokyo Area increased to 41.6% (Fig. 2-15). The prefecture with the highest percentage of foreign residents

was Tokyo at 4 %.

Fig. 2-15 Trends in Number of Foreigners Living in Japan



Source: "Population Census," Ministry of Internal Affairs and Communications (For 2020, unspecified values were complemented.)

* Data on the number of foreigners living in Japan by prefectures in 1940 is not available.

Foreign Visitors to Japan Can Also Become Victims of Disasters.

As well as foreigners residing in Japan, the number of those staying temporarily for travel or other reasons is also increasing. In 2019, the year before the COVID-19 pandemic, the number of foreign visitors to Japan reached approximately 31.88 million annually. In Tokyo, where the largest number of foreign visitors to Japan stay, the total number of foreigners who stayed temporarily in 2019 was about 29.35 million and the total number of foreigners who stayed temporarily in the Tokyo Area in the same year was about 37.62 million, which averages out to about 100,000 foreigners staying in the area per day.

Given the far greater number of foreigners staying in Japan compared with 100 years ago, many could become disaster victims in the event of a major disaster such as the Great Kanto Earthquake. Therefore, to provide the information they need in a way they can understand, more efforts are required, such as providing information in multiple languages.

Section 6. Changes in Means of Information Transmission, Such as Digitization

Advances in information and communication technology have drastically changed means of information transmission over the past 100 years. This section discusses the changes in the means of information transmission since the Great Kanto Earthquake and how the means of obtaining information has changed in the modern era.

The Lack of Means of Information Transmission Delayed the Grasping of Damage from the Great Kanto Earthquake.

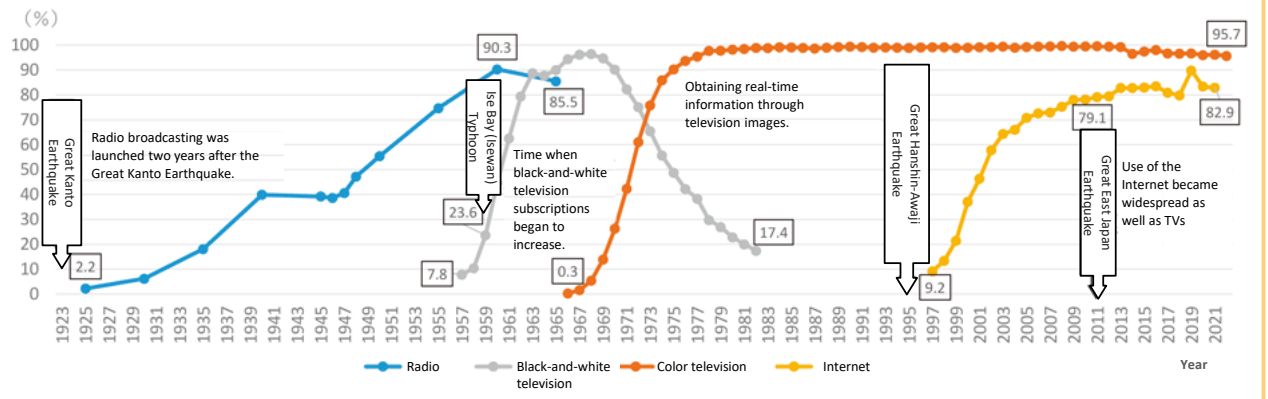
In Japan, radio broadcasting, the primary means of communicating real-time information to an unspecified

number of people, was launched in 1925, after the Great Kanto Earthquake. In other words, this medium did not yet exist when the Great Kanto Earthquake occurred, which made it difficult to accurately determine the extent of the damage and disseminate relevant information to the affected people. In addition, newspapers, which already existed as a medium for mass communication albeit not in real time, were also unable to immediately disseminate information because they were severely damaged by the earthquake.

Subsequently, the Means of Information Transmission Changed Significantly.

Once radio broadcasting started in 1925, the penetration rate of radios grew significantly for more than 30 years until the early post-war period. Subsequently, in 1953, televisions emerged as an alternative medium to radios and TV broadcasting started. In 1959, the year of the Ise Bay (Isewan) Typhoon, the radio penetration rate reached 90% and the number of black-and-white television subscriptions began to increase. Later, color TVs became the mainstream and after the Great Hanshin-Awaji Earthquake in 1995, many people learned of its damage through television images. Subsequently, the use of the Internet became widespread. In the aftermath of the Great East Japan Earthquake of 2011, information was disseminated via the Internet and social networking services (social media), making it easier to disseminate and obtain information (Fig. 2-16).

Fig. 2-16 Trends in Information Communication Medium Penetration



Source: Radio penetration rates: “Historical statistics of Japan,” Black-and-white/color television penetration rates: “Consumer Confidence Survey,” Cabinet Office, Use of Internet penetration rates: “Communications Usage Trend Survey” Ministry of Internal Affairs and Communications

Significant Differences in the Means of Obtaining Information by Generation

Public opinion surveys asked people regarding the means of obtaining information they wanted to use in a disaster. In recent years, the most common answer has been TV. Also in the 2017 opinion survey, the percentages of respondents who selected the answer “TV” were the highest in all age groups. On the other hand, in the 2022 survey, the percentage of respondents who selected the answer “TV” remained the highest at 81.7%, although a simple comparison with the past results is not possible because the survey method was different from the previous ones. The next common answer was “radio” at 48.3%, followed by “information on SNS including Twitter, LINE and Facebook” at 36.9%. By age group, respondents aged 18 to 29 selected the answer “SNS information” (76.6%) more often than “TV” (73.8%), whereas the percentage of those aged 30 to 39 who selected the answer “SNS information” (70.9%) was almost the same as those who selected the answer “TV (71.4%), suggesting that the

younger generation is likely to make use of SNS information. On the other hand, the percentage of respondents who selected the answer "TV" increased as age increased. For example, it was high at 91.9% for those aged 70 or higher. These show that the means of obtaining information differ markedly depending on the generation (Fig. 2-17).

Fig. 2-17 Means of Obtaining Information People Wanted to Use in a Disaster (top five responses / multiple answers available)

(Top five responses / multiple answers available)

		1	2	3	4	5
Total		Television (81.7%)	Radio (48.3%)	Information on SNS * (36.9%)	Disaster management app.** (34.1%)	Websites *** (32.4%)
By generation	18-29 years	Information on SNS (76.6%)	Television (73.8%)	Disaster management app. (36.6%)	Websites (26.2%)	Radio (24.1%)
	30-39 years	Television (71.4%)	Information on SNS (70.9%)	Radio (40.1%)	Disaster management app. (35.7%)	Websites (26.4%)
	40-49 years	Television (73.1%)	Information on SNS (52.4%)	Disaster management app. (38.8%)	Radio (38.1%)	Websites (35.7%)
	50-59 years	Television (79.0%)	Radio (47.4%)	Websites (44.1%)	Disaster management app. (39.3%)	Information on SNS (38.4%)
	60-69 years	Television (85.6%)	Radio (58.2%)	Disaster management app. (42.1%)	Websites (37.3%)	Newspaper (34.7%)
	60 years old and over	Television (91.9%)	Radio (57.8%)	Newspaper (46.6%)	Leaflets **** (31.0%)	Websites (23.2%)

Source: "Public Opinion Survey of Disaster Management," prepared by the Cabinet Office (September 2022)

Remarks * : SNSs including Twitter, LINE and Facebook
** : Disaster management app., etc.
*** : Websites on disaster management
**** : Leaflets of national and local governments

As shown above, social media, which is a convenient tool that allows anyone to easily share or obtain information, is being widely used as the primary means of obtaining information by the younger generation. In the event of a disaster, given the crucial need to determine the extent of damage swiftly and accurately, it is expected that social media features will continue to be utilized in future. Conversely, disseminating false or unverified information via social media, either intentionally or unintentionally, is also problematic. In the event of a disaster, it is necessary to prevent social confusion due to such disinformation or misinformation and every individual should use it with caution.