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Suggestions for Improving the Protection of the Health of Disaster-Vulnerable Groups[1)]

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Our scoping review suggests that the disaster-related damages that the victims come to suffer are due to their physical, psychological, social, economic, and environmental vulnerabilities. The health issues the victims have from disasters are mostly physical and mental damages sustained in a disaster situation or in the process of escaping it. Furthermore, some victims are found to experience changes in health behavior as a result of protracted disaster situations. In order to better protect people's health from disasters, it is essential to start from identifying in a precise way whom to protect. In the current legal framework, children, people with disabilities, and low-income groups are defined as vulnerable to safety risks. However, in order to prevent disaster-vulnerable groups from disaster-related damages and adequately support them in post-disaster recovery, the definition of 'the disaster-vulnerable' must be expanded beyond its current scope. Subsequently, systematic ways must be developed to protect people from disaster-induced health hazards. Of particular importance is enhancing accessibility to post-disaster medical and psychological recovery support.

The need for the protection of disaster-vulnerable groups

Since the 2000s, there have been a total of 48 'large-scale' accidents in Korea, each claiming 10 or more lives, averaging 2.2 cases per year. From the 1960s onward, a total of 293 large-scale accidents have occurred. The most common type was 'natural calamity', accounting for 164 cases, followed by 'land traffic accident', 'large-scale fire incident', 'collapse and explosion', and 'maritime accident'. An

1) This article is adapted from *Monitoring the Status of Health Inequality in Korea and Policy Development – Building Disaster Statistics to Improve Health Equity (2023; KIHASA)*, authored by Dongjin Kim et al.

earlier study by the same author, based on a survey conducted of experienced and perceived disaster-related inequalities, found that individuals of lower social class were more vulnerable to disasters and that government support was insufficient to offset their vulnerabilities. Consequently, the need has been pointed out for proactively identifying potential victims of disasters who have been excluded from support and finding ways to provide them with adequate support. It is essential to establish a disaster safety net to protect people from recurring disasters. Regular monitoring is crucial to ensure that the support aimed at disaster-vulnerable groups functions as intended. In light of the fact revealed from the covid-19 pandemic that the impact of a disaster tends to affect different social classes disproportionately, longer and more severely for socially vulnerable groups, efforts are needed to assess the impact of disasters on vulnerable groups, varying in nature and severity depending on sex, age, disability, education level, income level, and profession, and enhance support to meet their needs as identified.

[Table 1] Number of disasters occurred, by type, per decade

	Total	Natural calamity	Land traffic accident	Large-scale fire incident	Collapse/ explosion	Maritime accident	Aviation accident	Infectious disease
1960's[1)]	34	18	10	2	1	2	1	0
1970's	88	49	20	7	7	5	0	0
1980's	78	57	5	6	4	2	4	0
1990's	45	21	3	10	6	3	2	0
2000's	26	12	4	7	1	1	1	0
2010's	18	5	0	4	2	6	0	1
2020's[2)]	4	2	0	1	0	0	0	1
Total	293	164	42	37	21	19	8	2
Per year	5.05	2.83	0.72	0.64	0.36	0.33	0.14	0.03

Note: 1) refers to 1964~1969
2) refers to 2020~2021

Source: Lee, Byung-gi & Kho, Kyunghoon. (2018). A Study on the Disaster Safety Management of Local Government in Smart Society. Korea Research Institute for Local Administration; Kim, Dongjin et al. (2023). Monitoring the Status of Health Inequality in Korea and Policy Development – Building Disaster Statistics to Improve Health Equity. KIHASA.

Health impact of disasters

Our scoping review of previous studies on disaster-affected population groups and disaster-induced health impacts, direct and indirect, found that those hit hardest by natural disasters were older adults, pregnant women, infants, children, adolescents, patients, low-income people, women in caregiving professions, disabled people, and immigrant workers. The health impacts that disasters had on victims consisted of injuries and diseases sustained in a disaster situation or in the process of escaping from it, as well as mental issues such as post-traumatic stress disorder. It was also found that not only do disasters entail new health issues, but they also complicate existing conditions and interrupt health service use.

Other health impacts of disasters include such health behavior issues as declined sleep quality and increased alcohol consumption.

[Table 2] Negative health impacts of natural disasters

Disaster victims	Negative health impacts of natural disasters	Vulnerabilities to natural disasters
Older adults	- Increased prevalence of injuries, illnesses, and disabilities - Decline in physical health, functional levels (respiratory, cardiovascular, etc.) - Decreased mobility and physical activity - Increased post-traumatic stress disorder, anxiety, and depression - Decreased social relationships, support, and social capital	- Old age - Prevalence of chronic disease - Social isolation - Low income levels - Poor housing conditions - Low access to healthcare
Pregnant women, infants, and young children	- Increased risk of miscarriage and premature delivery - Increased risk of pregnancy complications such as gestational hypertension and gestational diabetes - Increased risk of congenital malformations in the fetus - Post-traumatic stress disorder, anxiety, and depression	- Old-age pregnancy - Ethnic minority - Low education level - Low income level - Low access to healthcare
Children and adolescents	- Lower levels of physical health (prevalence of respiratory disease, skin disease, obesity) - Increased risk of emotional and behavioral disorders (anger management disorders, attention deficit) - Increased post-traumatic stress disorder, anger, depression, anxiety, and suicidal thoughts - Decreased emotional resilience	- Social isolation, low trust levels - Poor mental health of caregivers - Caregiver's education level - Age of caregiver - Poor housing conditions - Low access to healthcare
Patients	- Increased stress - Increased unhealthy behavior (drinking) - Sleep disorder - Reduced use of health care services for health care needs - Increased risk of death	- Old age - Prevalence of multiple chronic conditions - Ethnic minority - Low income level - Uninsured - Low access to healthcare
Low-income people	- Poor sleep quality - Post-traumatic stress disorder, suicidal thoughts, increased stress, anxiety, and depression	- Aging - Experiencing childhood abuse - High stress levels - Poor housing conditions
Women in caregiving professions	- Increased mental stress - Sleep disorder - Increased unhealthy behavior (drinking)	- Old age - Low sleep quality - High stress levels
Disabled persons	- Increased stress - Reduced use of health care services for health and disability management - Decreased quality of life and life satisfaction	- Visual Impairment - Prevalence of chronic medical conditions
Immigrants	- Increased stress, anxiety	- Social isolation, low trust levels - Low income levels

Note: This is from a scoping review of 192 research articles on natural disasters and 28 research articles on both natural and social disasters. Natural disasters discussed include earthquake, hurricane, tsunami, and flood.

Source: Kim, Dongjin et al. (2023). Monitoring the Status of Health Inequality in Korea and Policy Development – Building Disaster Statistics to Improve Health Equity. KIHASA.

Research findings suggest that older adults, pregnant women, infants, children, adolescents, patients, low-income people, women in caregiving professions, disabled people, and immigrant workers are among the usual victims of both natural and social disasters. Essential workers, jobless and unemployed individuals, people with multicultural backgrounds, homeless people, and substance users are among the usual victims not of natural disasters but of social disasters. The adverse health impacts of social disasters are not so much bodily injury in type, as are the case with natural disasters, as they are a matter of psycho-emotional issues associated with long-term exposure to a disaster situation, like increased ill-health behaviors, stress levels, and depressive moods, which eventually lead to declines in life satisfaction, happiness, and quality of life. However, it should be noted that most of the existing articles inquiring into the health impact of social disasters are about infectious diseases like covid-19.

[Table 3] Negative health impacts of social disasters

Disaster victims	Negative health impacts of social disasters		Vulnerabilities to social disasters
Older adults	- Decreased physical activity - Increased stress, depression, anxiety, and loneliness - Increased unhealthy behaviors (drinking, smoking)	- Decreased social relationships - Decreased leisure activities - Decreased life satisfaction	- Older age, chronic medical conditions - Mobility issues - Social isolation - Low education/income level - Living in institutionalized settings
Pregnant women, infants, and young children	- Increased risk of pregnancy complications - Reduced healthcare utilization	- Increased post-traumatic stress disorder, anxiety, and depression	- Mobility issues - Low income level
Children and adolescents	- Decreased physical activity, increased sedentary time - Obesity, overweight gain - Less frequent breakfast, fruit consumption - Increased frequency of soda consumption - Increased risk of developing periodontal disease	- Increased drinking and smoking behavior - Increased time spent on smartphones - Increased stress, depression, anxiety, suicidal thoughts, and suicide attempts - Decreased sense of well-being	- Low Subjective Health Levels - Poor mental health - Experiencing domestic or school violence - Interpersonal anxiety - Low levels of social trust - Low household economic status - Living in a non-urban area
Patients	- Declined health status - Decreased physical activity - Failure to control and manage weight - Increased stress, depression, and anxiety	- Decreased life satisfaction - Decreased social interaction, social engagement - Decreased utilization of healthcare services	- Elderly or pediatric patients - Disability - Prevalence of chronic disease or mental illness - Lack of personal care services - Racial minority
Women in caregiving professions	- Decreased sense of self-esteem - Increased conflict and discord in the family	- Increased stress, depression - Increased experience of emotional burnout	- Experience of burnout - High stress - Low levels of social support - Low income levels - Employment instability

Disaster victims	Negative health impacts of social disasters		Vulnerabilities to social disasters
Disabled persons	- Decreased physical activity - Decreased leisure activities - Increased stress, trauma	- Decreased interpersonal and social engagement - Decreased quality of life - Decreased use of healthcare services	- Old age - Hearing, vision, and brain lesions - Social isolation - Low household income
Immigrants	- Increased stress, anxiety, and depression	- Increased incidence of mental health disorders	- Women - Social isolation - Low income levels
Essential workers	- Increased stress, anxiety, and depression - Decreased job satisfaction - Increased labor intensity and hours	- Increased unhealthy behaviors (smoking, drinking) - Decreased quality of life	- Women - High stress - Low self-esteem - Low subjective health - Low levels of social support - Low education and income levels
Jobless and unemployed individuals	- Increased post-traumatic stress disorder, anxiety, and depression - Increased unhealthy behaviors (drinking, smoking)	- Increased stress, anxiety - Smartphone overdependence	- High stress - Social isolation - Low levels of social support - Low household income
Families of multi-cultural backgrounds	- Less physical activity, more sedentary time		- Experience of social discrimination - Cultural adjustment
Homeless people	- Increased stress, depression - Increased substance use	- Increased unhealthy behaviors (drinking, smoking) - Increased risk of infection and death	- Substance addiction - Social isolation - Poverty
Substance users	- Substance overuse and death		- Social isolation - Low education levels - Poverty - Low access to healthcare

Note: This is from a scoping review of 231 research articles on social disasters and 28 research articles on both natural and social disasters. The disasters discussed in the articles include infectious diseases, the Sewol ferry disaster, CBRN accidents, and fine dust.

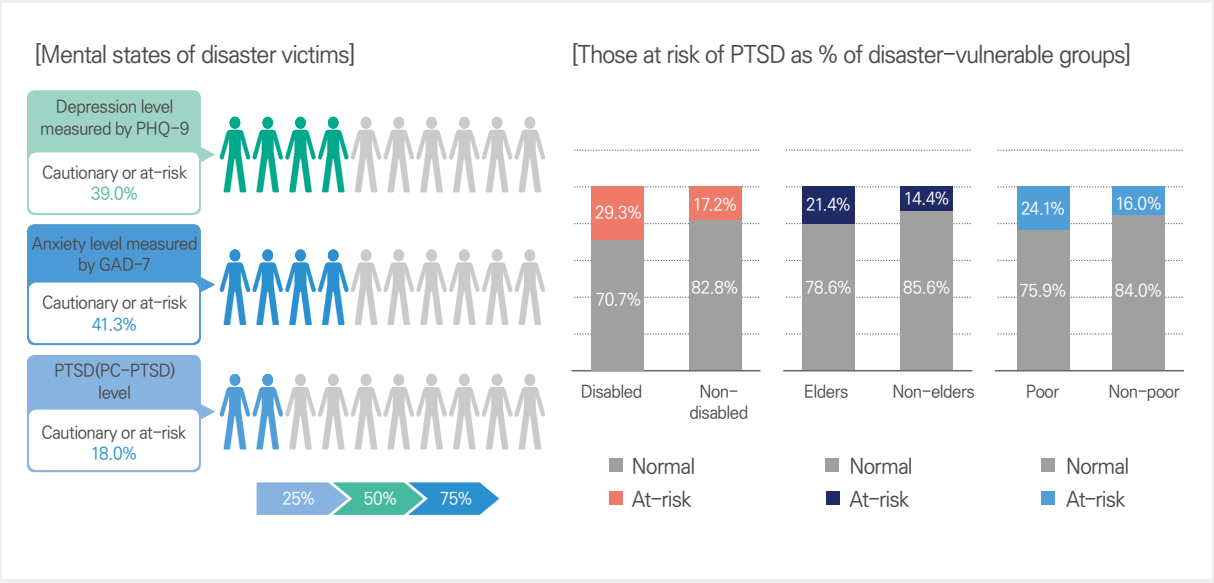
Source: Kim, Dongjin et al. (2023). Monitoring the Status of Health Inequality in Korea and Policy Development – Building Disaster Statistics to Improve Health Equity. KIHASA.

The damages sustained in those affected by natural and social disasters were due in many cases to the victims' physical, mental, social, economic, and environmental vulnerabilities. The health impacts of disasters that they experienced were mostly physical and mental health issues they sustained in a disaster situation or in the course of coming out from it. When it came to social disasters with prolonged impacts, changes were observed in health behavior as well.

Survey of recovery from disaster damages

A survey conducted by the National Disaster Management Research Institute found that of some 3,000 disaster-affected individuals on whom it was conducted, 18.0 percent were at risk of PTSD, 39.0 percent fell in the cautionary or at-risk category of depressive disorders (as measured by PHQ-9), and 41.3 percent were in the cautionary or at-risk range for developing an anxiety disorder (as measured by GAD-7). Mental health was in an especially poor state among disabled people, older adults, and low-income people, all of whom, as disaster-vulnerable groups, require focused support in post-disaster psychological recovery. However, only 6.1 percent of the respondents were aware of the availability of post-disaster psychological support services, and the proportion of those who actually had used available psychological support services was smaller still at 3.4 percent.[2)]

[Figure 1] Survey of the status of recovery from disaster-induced damages 2022: mental health



Note: Depression was assessed using the PHQ-9 scale, where a score of 4 or less is considered normal, 5-9 is considered cautionary, and 10 or more is considered at risk. Anxiety was assessed using the GAD-7 scale, where a score of 4 or less was considered normal, 5 to 14 was considered cautionary, and 15 or more was considered at risk. Post-traumatic stress disorder (PTSD) was assessed using the PC-PTSD scale, where a score of 2 or less was considered normal, and a score of 3 or more was considered at risk.

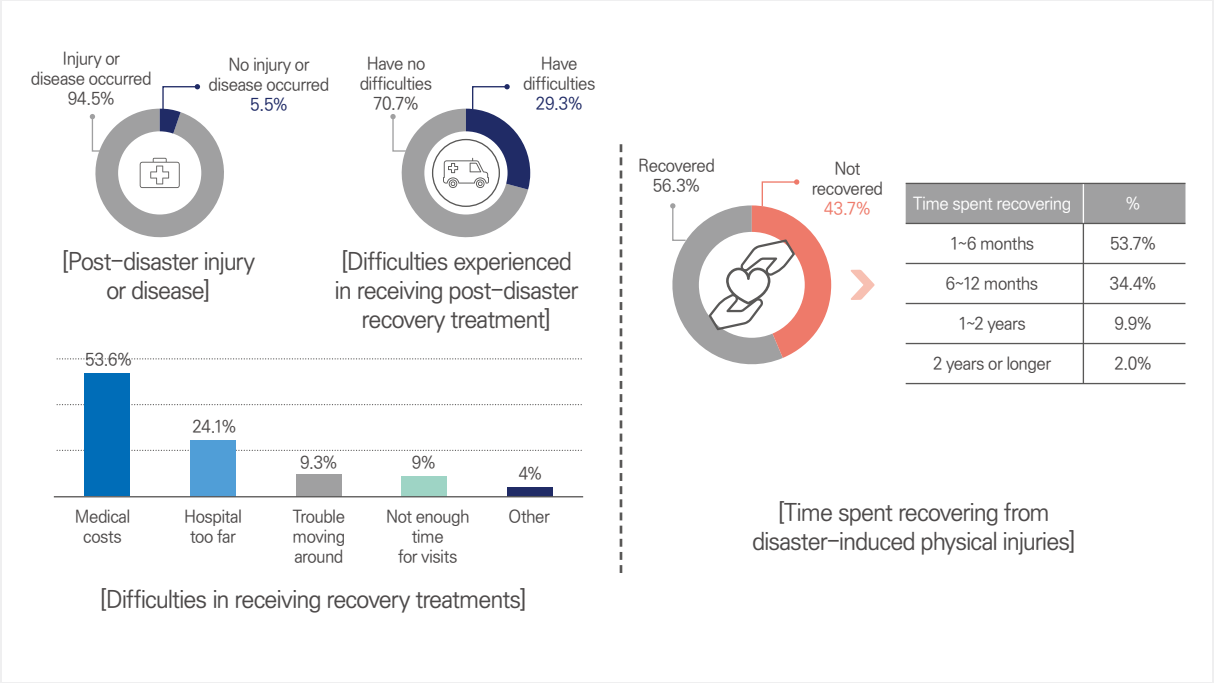
Source: Park, Sang-Hyun. (2023). Disaster Recovery Surveys and Their Use in Policymaking. Proceedings of the Policy Seminar on Preparing Measures to Reduce Health Inequalities in At-Risk Societies

2) Disaster Recovery Report 2022. National Disaster Management Research Institute.

Of the surveyed individuals, 5.5 percent experienced physical effects such as bodily injuries or physical illness. Among them, 46.3 percent required over 6 months to recover from their injuries, with 11.9 percentage points representing individuals who spent over a year recovering. This suggests a need for longer-term support for post-disaster health care.

Close to one in three (29.3 percent) of those surveyed who, physically affected by a disaster, have had medical treatment at a hospital or clinic, said they had experienced trouble receiving care. The difficulties cited include 'cost involved in medical treatment' (53.6 percent), 'hospital too far' (24.1 percent), and 'having trouble moving around' (9.3 percent). These findings point to the need for improving accessibility to health care.

[Figure 2] Survey of the status of recovery from disaster-induced damages 2022: bodily injury and disease



Time spent recovering	%
1~6 months	53.7%
6~12 months	34.4%
1~2 years	9.9%
2 years or longer	2.0%

Source: Park, Sang-Hyun. 2023. Disaster Recovery Surveys and Their Use in Policymaking. Proceedings of the Policy Seminar on Preparing Measures to Reduce Health Inequalities in At-Risk Societies

Improving the support for disaster-vulnerable groups

◆ *Expanding the scope of disaster-vulnerable groups*

The disaster-vulnerable could be defined as those who, due to their physical, mental, economic, or social vulnerabilities, cannot protect themselves or can recover on their own from a disaster. The Framework Act on the Management of Disasters and Safety defines children, older adults, disabled people, and low-income groups as vulnerable to safety risks. The Enforcement Decree of the Disaster Relief Act (Article 3) includes in its definition of 'vulnerable people' pregnant women, persons with severe disabilities, older adults, and those deemed to need a temporary shelter.

While in the past 'vulnerabilities' were conceptualized from an economic perspective, there have increasingly arisen in recent years, with socioeconomic conditions changing at an ever-accelerating pace, vulnerability issues that cannot be explained away in terms of economic conditions alone. With the elderly population growing, the spectrum of the disabled broadening, the emergence of the gig economy and the platform workforce, and the digital divide at play, the scope of those vulnerable is not as it was defined in the past. Consider, for example, how it was shown when the covid-19 pandemic was at its height that the risk of exposure and vulnerability to an infectious disease could be higher for socioeconomically vulnerable groups. Furthermore, as recognition grew of the inadequate social protection for such socioeconomic groups as call center workers, foreign workers, and homeless people, disaster-vulnerable groups came to be conceptualized more broadly, both in definition and range.

Disaster vulnerability has to do not only with social factors like education and income, conditions that stratify social classes, but also with the characteristics unique to each of the various population groups. Nor are social vulnerabilities unrelated with disaster vulnerabilities.

In the US, the Federal Emergency Management Agency defines disaster-vulnerable groups in an encompassing way, by considering socioeconomic status, age, sex, ethnicity, language proficiency, and medical conditions. International organizations, including the World Bank and the United National Office for Disaster Risk Reduction, have defined disaster vulnerable groups to include those least capable of using safely and with ease the resources made available with which they can prepare for and recover from the impacts of a disaster, among whom are persons with physical or mental disabilities, individuals who do not understand local languages, people who live in geographical and cultural isolation, the homeless, the physically and mentally frail, and children. In comparison, the definition Korea has of those 'vulnerable to safety risks,' including as it does only children, older adults, disabled persons, and low-income people, is way too narrowly circumscribed as a definition of the disaster-vulnerable. As disaster victims come in widely various types, as illustrated in Tables 2 and 3, and as disasters occur more often now than in the past, the definition of disaster-vulnerable groups must be expanded in an encompassing manner. Before expanding the definition of disaster-vulnerable groups, it is crucial to establish social consensus on the extent of expansion and prioritize support interventions. This process necessitates a thorough examination of post-disaster support implemented in Korea and elsewhere. In

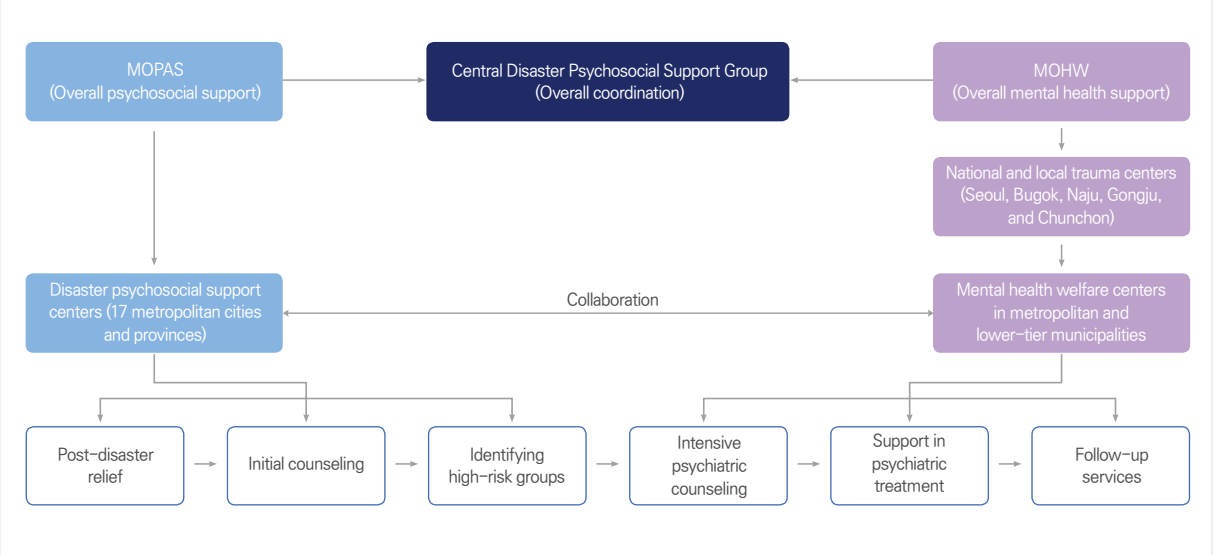
order to ensure that support is provided in an effective way to disaster-vulnerable groups, the details of such support should be stipulated in the relevant legal framework. The support provided to disaster-vulnerable groups should not be uniform across all groups solely to address common needs, but rather, it should be tailored to address the specific vulnerabilities of each group.

◆ *Enhancing support in post-disaster psychological recovery*

In recent years, Korea has witnessed one disaster after another—the Sewol Ferry disaster, the covid-19 pandemic, and the Itaewon crowd crush. As a result, it has been recognized as crucial that the government step in when it comes to psycho-emotional health issues that may arise during a disaster. Public interest has grown with regard to disaster-related mental health policies. Earlier studies have emphasized that the various psychological issues that individuals may experience upon exposure to a disaster, including intense fear, a feeling of anxiety, and a sense of loss, may, instead of dissipating soon afterward, lead to long-term listlessness, depression, anxiety, PTSD, substance addiction, and suicide.

Korea has in place a response mechanism by which the Ministry of Health and Welfare (MOHW) and the Ministry of Public Administration and Security (MOPAS) work to minimize the psycho-emotional toll that a disaster may take on people and support those affected in their recovery. Various mental health and psycho-emotional support programs are administered in response to national calamities like the covid-19 pandemic and other disasters. The roles that the two ministries play are different. MOHW's disaster mental health services are focused on psychiatric treatment, while MOPAS's post-disaster mental health recovery project is aimed at providing counseling as an emergency treatment in the event of a disaster and identifying high-risk groups. However, survey findings suggest that post-disaster psychological recovery support is used by only a minute fraction of those affected. This underscores the need to reassess collaboration between post-disaster mental health recovery support centers in metropolitan cities and provinces, as well as national and subnational trauma centers. Additionally, it underscores the importance of improving coordination between mental health welfare centers in metropolitan municipalities and those operating at lower-tier local levels. Of particular importance is to proactively identify those among the affected to whom to provide mental health support and to improve the delivery of mental health support so that services are provided in a well-structured way and without interruption. It is also important to make sure that post-disaster psychological recovery centers in metropolitan cities and provinces and mental health welfare centers in metropolitan and lower-tier municipalities are adequately equipped with resources—human and financial—to address the needs for mental health support that arise following a disaster. A case in point is that of psychological recovery support practitioners. In the event of a disaster, each of the metropolitan cities and provinces must, as a rule, have in place at least 50 practitioners supporting in the recovery of those affected from disaster-induced mental health issues. However, as it turned out that some of these metropolitan municipalities fell short of meeting the prescribed minimum number, there is a need for efforts to fill up the shortfalls.

[Figure 3] The support system for recovery from psycho-emotional impacts of large-scale disasters



Source: Post-disaster psychosocial recovery support manual. MOPAS. 2022.

◆ *Enhancing support for medical treatment*

Under current law, any disaster-affected locality may be declared a special disaster zone and residents thereof can apply for health support benefits. The Framework Act on the Management of Disasters and Safety stipulates that "the state or local governments may provide special administrative, fiscal, financial, and medical support necessary for the emergency response and the disaster relief and restoration to an area declared a special disaster zone." Pursuant to the Medical Benefit Act, residents of an area declared a special disaster zone are entitled to claim medical benefits for a maximum period of six months. As it was revealed by survey findings that almost half of disaster victims took more than six months to recover from the bodily injuries they had sustained in a disaster and that as most disaster victims cited the cost burden involved and the physical distance to the location of medical service as key difficulties they face in their post-disaster recovery process, much effort needs to be put into addressing these issues. The current situation merits considering, with a view to reducing the cost burden on those affected by a disaster, easing the eligibility requirements and extending the benefit-eligible period for those affected by a disaster, and expanding mobile medical services for victims living in areas with insufficient health care facilities and older adults and disabled persons who have trouble moving around.

◆ *Building evidence for policymaking through generating statistics on disaster-vulnerable groups*

Statistics on previous disasters are essential for accurately analyzing the impact of recurrent disasters and formulating policies for disaster-vulnerable populations. In Korea, however, the scarcity of relevant statistics makes it difficult to identify how much damage is inflicted by disasters occurring year in and year out on which specific populations and how far into recovery those affected are. Unlike some

advanced countries with well-knitted approaches to address the needs of disaster-vulnerable populations, encompassing emergency intervention, prevention, recovery treatment, and rehabilitation, Korea lacks even basic statistics about the prevalence of post-disaster health issues and the incidence of those health issues specific to different types of disaster. MOPAS's disaster yearbook and statistical yearbook of natural disasters, useful though they may be as key sources of data on disaster-related deaths, missing persons, and overall damage, offer little information about the damage dealt to each disaster-vulnerable group and the extent of recovery. It is crucial, therefore, to establish a system that enables to produce statistics on disaster vulnerabilities specific to sex, socioeconomic status, language proficiency, and disability and analyze the differential impacts on various population groups.

In Korea, disaster-related statistics are managed in a fragmented manner by various ministries and agencies concerned—the Ministry of Land, Infrastructure and Transport, the Ministry of Agriculture, Food and Rural Affairs, MOHW, the Ministry of Oceans and Fisheries, MOPAS, the Ministry of Environment, the Ministry of Food and Drug Safety, the Nuclear Safety and Security Commission, etc. Integrating these scattered pieces of information would lay a foundation for producing detailed statistics on disasters and formulating evidence-based policies on disasters. Additionally, there is a need for disaster statistics from different ministries and agencies to specifically capture the vulnerabilities of disaster-vulnerable groups. Such detailed disaster statistics can be useful for identifying the extent of the damage inflicted on various population groups and, subsequently, for identifying in advance groups that are in particular need of policy interventions. Although current laws in Korea do define disaster-vulnerable groups that require support in disaster prevention and recovery, there are no statistics produced that can be used to determine the extent of damages sustained and how far those affected are into recovery. The scope of population groups on whom disaster statistics are produced should be expanded, first to those outlined in relevant legal frameworks as particularly vulnerable to disasters, and then further over time.